THE ANDRÉE DIARIES

S. A. Andrée.

THE ANDRÉE DIARIES

BEING THE DIARIES AND RECORDS OF S. A. ANDRÉE, NILS STRINDBERG AND KNUT FRAENKEL WRITTEN DURING THEIR BALLOON EXPEDITION TO THE NORTH POLE IN 1897 AND DISCOVERED ON WHITE ISLAND IN 1930, TOGETHER WITH A COMPLETE RECORD OF THE EXPEDITION AND DISCOVERY

AUTHORIZED TRANSLATION FROM THE OFFICIAL SWEDISH EDITION BY

EDWARD ADAMS-RAY

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FOREWORD

On the 5th and 6th August, 1930, a Norwegian Expedition, on board the "Bratvaag" of Aalesund, which was equipped both for scientific investigation and for sealing, when on its way to Franz Joseph Land went on shore on the south-western point of White Island, which forms the easternmost portion of the Svalbard (Spitzbergen) Archipelago. The scientific leader of the Expedition was Gunnar Horn, D.Phil., a geologist, representing the Norway Svalbard and Polar Sea Research Institution. On landing, on the 6th August, the sealers of the party discovered the remains of the Andrée Expedition, which had been lost thirty-three years before.

When the news of the discovery of the death-camp of the Andrée men on White Island was published on the 22nd August, it led to certain steps being taken, both by Swedish and Norwegian authorities. The first measure taken by the Swedish Government was to appoint a Scientific Commission which, co-operating with the experts nominated by Norway, had the task of receiving, investigating and preparing the finds made by the "Bratvaag" Expedition. The Swedish representatives in this composite Commission were: Professors G. Hedrén and N. Lithberg, assisted by E. W. Warfwinge, M.D., and S. Köhler, C.E. The Norwegian Commissioners were: A. Hoel, Lecturer at the University of Oslo and the Chief of the Svalbard Office in that city; B. Dybwad-Holmboe, Chief Physician in the Province of Toms, and G. Horn, D.Phil.

Simultaneously with the arrival of this Commission in Tromsö there came a troop of journalists from every part of the world. One of these, Knut Stubbendorff, who represented *Dagens Nyheter* and *Veckojournalen*, of

Stockholm, and the American Newspaper Syndicate associated with these two papers, hired the " Isbjörn " —a sealing vessel—and, on the 28th August, started for White Island, where the new expedition landed on the 5th September. The melting of the snow had now laid bare parts of the Andrée camp which had not been accessible when the " Bratvaag " visited the place. From the 5th to 8th September, the camping-place was thoroughly investigated under the direction of Stubbendorff, and the remainder of the relics of the Expedition were found and brought back to Tromsö.

Dr. Horn's account of the discovery was published by a number of newspapers, including *Svenska Dagbladet* of Stockholm and *Aftenposten* of Oslo, but, at the request of the Swedish Government, all the Andrée documents found by the " Bratvaag " Expedition were handed over to the Commission in Tromsö without their contents being published. While still at the island in the Polar Sea, Stubbendorff sent by radio reports of the documents found by the " Isbjörn " Expedition, and these communications were published by the papers which had financed the undertaking. But at Tromsö, all the material found by the " Isbjörn " was handed over to the Commissioners there, and thus enjoyed the same care and protection as the relics found by the " Bratvaag." Incomparably the most important document found on White Island was Andrée's great Diary, which forms part of the material brought from the island by the " Bratvaag." A brief summary of the book was made at the request of the Swedish Government, and this was published on the 20th September. Andrée's second Diary, in the state in which it was found, was illegible, but a chemico-photographical treatment, carried out by Professor The. Svedberg and H. Andersson, D.Phil., has made the four and a half pages of which the document consists partly legible, and a report was communicated to the Press on the 17th October.

On the 26th September the Swedish Anthropological and Geographical Society—which, by its memorial publication in 1906 respecting the Andrée Expedition, and by the striking of its Andreé plaque, had kept alive the memory of Andrée and his comrades—was commissioned by the Government to undertake, for the time being, the care of the finds made at White Island, and to take steps for the publication of a book giving an account of the Andrée Expedition. The members of the Committee nominated by the Society for this task were: Professor Nils Lithberg, President of the Society; Chief Intendant, Axel Lagrelius, its Treasurer, and Professors J. G. Andersson and Hans W:son Ahlmann, members of the Society's Committee. The Committee thus appointed met on the 30th of the same month, together with representatives of the three families, Andrée, Strindberg and Fraenkel. The relations of the Polar travellers then resolved to make over to the Swedish Anthropological and Geographical Society the future care of all the finds from the camp at White Island, at the same time entrusting to the Society the publication of a book on Andrée's Polar Expedition.

The publishing firm, Albert Bonnier—which had taken the initiative in the sending of the "Isbjörn" Expedition, and therefore had the superintendence of the observations made by the Expedition and of the material for illustrations it had brought back—was able, more successfully than any other firm, to organize co-operation with leading publishers in other countries, and an agreement was made between Albert Bonnier and Chief Intendant, Axel Lagrelius, the Treasurer of the Swedish Anthropological and Geographical Society, respecting the publication of the volume which is here laid before the public. On the initiative of Professor J. G. Andersson, the Committee of the Swedish Anthropological and Geographical Society proposed to the Government that any money obtained by the sale

of the book on the Andrée Expedition should be employed to form a fund for scientific investigation, keep alive the memory of Andrée's, Strindberg's and Fraenkel's achievement.

But before the Society's Committee had come to that determination, the same plan, in all its far-reaching scope, had been formulated by Andrée's nephew, Sven Spånberg, ironmaster, of Ankarsrum. In a letter written shortly after the "Bratvaag's" discovery, and which, later on, was placed at the disposal of the editorial commission, Mr. Spånberg says, *inter alia:* "The plan might also be adopted of making over the right of publication entirely to the Geographical Society, which should also be entrusted with the task of the economic utilization of the receipts for the purpose of creating a fund." He also gives expression to the thought, that the relations of the explorers should not profit by the publication. "The chief thing is, that the memory of Andrée be honoured."

These expressions have made Sven Spånberg the founder of the Andrée Fund which is now in course of formation. But the same generous readiness to make a sacrifice in this matter for the sake of the Andrée Memorial Fund has been displayed by the Strindberg and Fraenkel families as well.

As early as the 6th October the Oslo newspaper, *Aftenposten*, made a most liberal donation of £550 to the Andrée Fund.

"The chief thing is, that the memory of Andrée be honoured"—the Society has made this thought entirely its own when planning the Fund. The plans for its organization have not as yet been drawn up in detail, but it seems evident that when this is done, special thought will be given to those branches of geographical research which most interested Andrée and his companions.

In consideration of the fundamental contribution made by Norwegian sealers and scientific investigators

to the discovery of the Andrée camp, and with no less respect paid to the manner in which all these Norwegian men, the Norwegian Government, the Norwegian Press and the whole of the Norwegian people have treated every question connected with the Andrée find, the Swedish Anthropological and Geographical Society is desirous that the Andrée Fund shall be open, in equal degree, to Norwegian and to Swedish investigators.

The documental material, found at the death-camp on White Island, consists of the following papers:

S. A. Andrée's great Diary, during the period 11th July–2nd October, 1897, embracing in the original, 118 pages in small octavo.

S. A. Andrée's second Diary, embracing 4½ partly legible written pages in small octavo.

N. Strindberg's Memorandum-Almanac for 1897, embracing short, unconnected notes respecting the Andrée Expedition, from 11th July to 17th October; 2 pages of observations for the period 11–19th July, and 32 pages of short notes and observations made between 11–15th July.

The Observation Book, I, kept by N. Strindberg, from 15th July to 4th September, embracing 120 written sides in small octavo and containing mostly astronomical observations; towards the end, however, there are also some stocktaking lists, bills of fare, etc.

The Observation Book, II, kept by N. Strindberg during the period from about 5th September to the 2nd October, embracing 14 written pages in small octavo, and containing chiefly astronomical observations, some stocktaking figures, sketches, etc. At the end of the same book:

Letters in shorthand, written by N. Strindberg between 21–31st July, and embracing 9 pages in small octavo.

The Meteorological Journal kept by K. Fraenkel during the period 14th July–3rd October.

The three maps and map-sketches drawn by N. Strindberg.

Andrée's Diaries, in combination with Strindberg's memoranda, give such a complete picture of the fate of the Expedition that the Editorial Committee have considered it but just to give S. A. Andrée and Nils Strindberg as the authors of this volume.

The task of compiling the four chapters based on the above documents:—"*The Journey of the 'Eagle,' 11–14th July, 1897*"; "*The Journey across the Ice towards Franz Joseph Land*"; "*Towards the Seven Islands*," and "*Caught in the Ice*" has been carried out by Professor Hans W:son Ahlmann, a member of the Committee. In the performance of this work, valuable help has been given by Axel Edström, President of the Geographical Association in Stockholm and Treasurer of the University of Stockholm, who has also prepared and superintended the publication of the documents and the arrangement of the material for the illustrations. The object of the chapters just mentioned is to give—on the basis of all available documents from White Island—a connected and as nearly as possible chronologically true picture of the fate of the Expedition, from the beginning of the balloon-journey, on the 11th July, 1897, down to the catastrophe on the ice-floe near White Island, on the morning of the 2nd October, 1897. All the memoranda and other notes have been followed as closely as possible, and nothing has been added to the account but such words and phrases as were necessary to combine the, very often, brief, independent and chronologically irregular memoranda from the Diaries into one narrative, or to make these notes more easily understandable. Andrée's and Strindberg's own words have been used as much as possible, although quotation marks have been used for long extracts which have been taken from the documents. In some instances, a word here or there has been made plainer, or the order of the sentences changed, when such a step has been considered necessary. Most of

the statements in Andrée's Diary, respecting the thickness of the ice, have not been included, as it is uncertain to what they really refer. In the same way, a number of memoranda respecting the samples collected by Andrée, and one or two descriptions of birds and fishes have been excluded, in order not to make the story ponderous. Such matter will be treated of later on in the work dealing with the scientific results of the Andrée Expedition. In the present description of the journey there have also been introduced a few summarized commentaries respecting the course taken by the party, as a directive to enable the reader, should he wish, to make his own deductions.

As all the documents on which the above chapters are based are published here *in extenso*—with the exception of Fraenkel's meteorological journal, which will form part of the scientific publication on the Andrée Expedition—the reader will be able to form his own judgment respecting the fidelity with which the chapters in question have followed the originals.

It has fallen to the lot of Professor N. Lithberg, a member of the Committee, to reconstruct, in the chapter entitled "*On White Island*," the probable course of the epilogue of the Polar drama, and, in "*The Camp on White Island*, and its equipment": to make a critical survey of the whole of the material found. This summary has been based on the stories of their discoveries, written by Horn and Stubbendorff; the minutes of the maritime inquiry; the articles found, the extremely scanty notices in Andrée's second Diary, and in Strindberg's Almanac. He has also written the chapter on the three men's "*Journey Home*," which begins at the moment their remains were brought on shore at Tromsö and ends with an account of their final restoration to their native country.

Dr. Gunnar Horn describes the "'*Bratvaag*'

Expedition," and the discovery of the Andrée camp; Editor Knut Stubbendorff gives a corresponding account of the "'*Isbjörn*' *Expedition*."

The story of the lives of the three Polar travellers and the introductory chapter on the journey of the "Eagle" is, in all essential details, a summary of the memorial publication, issued by the Society in 1906: "S. A. Andrée, his Companions and his Polar journey, 1896–1897." The biography of Andrée given in that publication was written by Mrs. Gurli Linder, who has also made the summary given in this volume. The account of "*The Balloon and its Construction*" has been written by Lieutenant-Colonel G. E. V. Svedenborg, who, in a certain sense, is the sole survivor of the Andrée Expedition, since he accompanied the party to Danes Island in 1897 as reserve man in the case of any of the others being prevented from making the journey.

The geodetical work, on which has been based the map showing the route taken by the "Eagle," and that of the party across the ice, has been carried out by B. V. Aurell, Observer, who, in "*Remarks on the Map showing the Route taken by the Members of the Andrée Expedition*," explains the grounds on which he has based his calculations.

Docent G. Hertzberg has succeeded, after several weeks of severe work, in developing some of the photographs taken by the Andrée Expedition. The best of these pictures, which have lain buried in the ice of White Island for thirty-three years, form part of this volume. In his "*Treatment of the Expedition's Photographic Material*" Hertzberg gives an account of the methods employed for the purpose.

Supported by the meteorological observation-material given in the Diaries, Chief Director A. Wallén has written the chapter "*The Weather of the Balloon-Journey*." Major-General K. A. B. Amundson and Professor I. Malmér are the authors of

"*Balloon-technical Commentaries on the Journey of the 'Eagle,' 11–14th July*," in which they give an account of the factors which, at the end, ended the flight of the balloon.

Professor H. U. Sverdrup, the well-known Polar explorer, and Professor E. Lönnberg, have written—the former, the "*Drifting Pack-ice*," and the latter, "*Animal Life among the Pack-ice*," to elucidate the numerous remarks found in Andrée's Diaries respecting the pack-ice and its drifting, its mammals and birds.

The above-mentioned brief commentaries on the Expedition form popular summaries of the special papers which will be collected in "Geografiska Annaler"—the Journal issued by the Swedish Anthropological and Geographical Society as a publication dealing with the scientific results of the Andrée Expedition. In this there will also be given a description of the samples of clay, gravel, drift-wood, plant-remains, etc. collected by Andrée during the wandering of the three men across the ice.

THE EDITORIAL COMMITTEE

Stockholm, 24th October, 1930

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THE ANDRÉE DIARIES

I

THE THREE MEN

Andrée

Salomon August Andrée was born at Grenna beside Lake Vetter on the 18th October, 1854. His father, Clas Georg Andrée, an apothecary, was born at Nyarp manor in Grenna rural parish; his mother, Jacobina Gustafva Wilhelmina Heurlin, was of an old clerical family which had boasted many prominent members, among them Bishop C. I. Heurlin, a friend of the poet Tegnér. Both on the father's and the mother's side, August Andrée had inherited a keen intelligence, strong will, tenacious perseverance and a rich fund of humour, together with the most upright of characters. There is still in existence an account of him written by his mother when Andrée was a child. She says that "from the very first moment he opened his eyes to the light of day he had been an uncommonly big and strong child, and as regards the development of his understanding, too, he was rather before than behind his age. His questions were frequently very difficult to answer, for he was never satisfied with the shell, but always did his best to find his way to the kernel. He was specially delighted in such games as, to his childish idea, necessitated the solution and explantion of some experiment or problem. He was, perhaps, a stubborn and defiant child, but never really what one calls naughty, and he would never have been able to torture a poor, innocent animal. If he was treated unjustly by any companion I am afraid that he spared

no effort to pay him back, but I am just as sure that he was never prompted by a feeling of revenge to complain of anyone, for by nature and from principle he was magnanimous."

All kinds of coddling and indulgence were banished from the education found in the home of the Andrées, where five sons and two daughters grew up together. The children were hardened by means of sport and life in the open air, and August Andrée's constitution, naturally strong, developed along thoroughly sound lines.

He received his earliest instruction from his mother, and then at a two-years pedagogic course in Grenna, whence, in 1865, he was transferred to the State High, or Secondary, School in Jönköping. He did very well here, and gained many prizes. On one Prize Day, one of the fathers present said to a neighbour: "That lad will wear out a pair of soles going up to receive his prizes." The answer was: "He may, if he likes, for he is *my* son!"

When the lad came home for the Christmas holidays in 1868, he thumped his fist on the table and cried: "I will not study one day more at school, and if you do not take me away of your own accord, I'll run away!" His father, who saw that his son was "a chip of the old block," said very calmly: "Well, on the whole you are right, but you mustn't finish in the middle of the school year. If you do well during the next term, I'll let you finish in the spring!" Said and done! Andrée left school when he was in the fifth class. In the autumn of 1869 he went up to Stockholm and, after a preparatory course, gained admission to the State Technical University.

Andrée found himself quite at home at this institution. He used to say that, in one respect, he had been a perfectly happy person, *just because* he had been allowed to devote himself to the profession for which he undoubtedly had a turn and also a liking. His

ANDRÉE'S MOTHER, MRS. ALMA ANDRÉE

ANDRÉE'S FATHER, C. G. ANDRÉE, APOTHECARY AT GRÄNNA, ANDRÉE'S NATIVE TOWN

Nils Strindberg

favourite subject was physics, and his teacher in it, Professor Robert Dahlander, assisted him in later years, both in word and deed. But Andrée devoted himself to his other subjects too, in a most exemplary manner. He was distinguished among his companions by strength of character and energy, and they all thought he would be heard of in the future. His interest in social matters also came to the fore during this period of study. Sometimes, dressed like a labourer, he would take his meals at modest eating-houses, and enter into conversation with the other guests there.

In 1873, Andrée passed his final examination at the State Technical University, and, after spending two years as drawer and designer at Göransson's Mechanical Works in Stockholm, he went abroad, "bold, proud and the least bit confidently defiant," as people then characterized him. He went to America, and there, to the World's Exposition at Philadelphia, 1876. He applied to the Swedish Consul-General in order to obtain work, and was offered the task of keeping the Swedish section of the Exhibition neat and clean. He accepted the offer with gratitude, for it gave him the opportunity of studying the exhibits and also of gaining his livelihood. Later on in life, whenever he saw a street-sweeper, he would often stop and say: "I learned that art when I handled a birch-broom in Philadelphia." Even before his arrival in America, Andrée had been seized by a passion for aeronautics which never afterwards left him. When in Philadelphia he called on a Mr. Wise, an old, experienced balloonist, who had made some 400 ascents, and from this man Andrée learned the elements of his future art.[1]

We still have Andrée's memoranda respecting his expenses at that time, and it is touching to see the

[1] Respecting the circumstances which gave Andrée the first impulse to his interest in aeronautics, see the introduction to the following chapter.

smallness of the sums which come under the heading "food." Bad nourishment and his use of ice-water brought about a serious illness, and after some six months he found himself obliged to leave the United States. Having regained health at home, he afterwards did service as assistant-engineer, but finally purchased a mechanical works, which he carried on in partnership with a comrade. But the concern did not turn out a good investment and he had to wind up the business. "When I left the business," he tells us, "I received several good offers, for I had, in some degree, earned a name for honesty and assiduity. But I had acquired a certain distaste for business, partly because it went against me to be constantly depreciating rivals when I wished to sell, and constantly depreciating goods when I wished to buy, and also because I had come to the opinion that a constant striving for money tended to kill my interest in things which I valued highly, and which I wished to retain."

Professor Dahlander then procured him an assistantship at the State Technical University. The economic conditions were not very flattering, but the work interested him and he lived on sixpence a day.

Andrée's many private memoranda from the youthful years show that he was very well read, and that he had a fermenting interest in, we may say, every human question: religion, philosophy, history and, first and foremost, natural science—all in a confused mixture. For instance, immediately after "Was der Vernunft entgegen ist, ist gewiss dass es Gott vielmehr entgegen ist" (Luther) (That which reason is against, God, we may be sure, is still more against) follows: What gases are there in the seed-vessel of a plant? And: Should not one assign a neutral place—preferably an uninhabited island—to nations at war with each other? The memoranda display his conversion to a purely natural-scientific view of life and an absolutely certain hope that an ever-increasing know-

ledge of the laws of nature will abolish faith in all so-called supernatural things. He writes: "Mankind is, as yet, only half awake." "The time will come when the natural-scientific method will be applied to every science." "Of what use, one may ask, is it for workmen to gain some little idea of astronomy, mechanics, meteorology, etc.? Why, they learn to see that everything is subject to laws!"

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In 1882, steps were taken to organize an international scientific enterprise. The aim was a meteorological and physical investigation of the two Polar regions. The participators were: Germany, England, France, Austria, Holland, Russia, North America, Sweden, Norway, Denmark and Finland. Fourteen stations were erected, twelve in the northern and two within the southern Polar tracts. Sweden's station was fixed at Spitzbergen, and the leader of the Swedish Expedition was the Assistant (afterwards Professor) at the Meteorological Institute at Stockholm, Nils Ekholm. S. A. Andrée was appointed to carry out the aero-electrical observations and to procure the technical equipment.

The expedition arrived at Spitzbergen in July 1882 and took up its winter quarters at Cape Thordsen in Isfjorden.

Later on, in a memorial paper published by the Royal Aeronautical Society, Ekholm has declared that Andrée directed the aero-electrical observations with the greatest success. Of the fourteen expeditions, says he, the Swedish has obtained the best results in respect to just these observations. By his energy and inventive faculty, Andrée succeeded in maintaining water in a fluid condition in the collector at a temperature of 22° F. By this means, this series of aero-electrical observations is as good as without any lacuna, while the greater number of the other stations had taken no aero-electrical observations, and others could

not continue them as soon as the temperature had fallen a few degrees below freezing-point. The number of Swedish observations was about 15,000.

Andrée also endeavoured to find a relation between the simultaneous variations of aero-electricity and geo-magnetism. "This," says he in a letter to Professor Dahlander, "has been hard work, for it has been necessary to work out about 5,000 values of the total intensity of geo-magnetism." He also made an investigation respecting whirling snow, the result of which he published in a short paper.

In order to discover whether Polar darkness really affected the colour of the face, or if the yellowish-green tinge the face displayed when daylight came resulted from the eyes of the Polar investigators being dazzled by the light, Andrée voluntarily allowed himself to be shut up in a house for a whole month, where he remained within doors uninterruptedly the whole of the day. When, at the end of the month, Andrée once more went out into the light of day, it proved that the colour of his face really was yellowish-green, while the other men's faces, under the influence of light, had begun to resume their normal hue. On the other hand, it was proved that Polar darkness does not bring about colour-blindness.

Andrée himself by no means overrated the work he did during this expedition. He writes: "As usual, much work and little result, but I have not wasted my time, at least."

When he determined to submit to the above-mentioned voluntary arrest, he writes in his diary: "Dangerous? Perhaps. But what am I worth?"

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"What shall I do when I come home?" writes Andrée in his diary from Cape Thordsen. However, when the Patent Office was reorganized in 1885, he was appointed the head of its technical department, a title which was afterwards changed to Chief Engineer.

By this appointment to the Patent Office, Andrée may be said to have found his right place. His great ability to work, his solid technical knowledge and his living interest in the development of industry made him specially suitable for his post. His Chief, Count Hugo Hamilton, makes some humorous remarks in his memoirs respecting Andrée's stubbornness. When he was obliged to call Andrée's attention to the fact that laws and ordinances placed hindrances in the way of realizing his opinions, he received the reply: "Well, then the law is wrong and shall be altered." And by means of several publications he succeeded in bringing about various improvements in laws and regulations, to the advantage of inventors and applicants for patents. He took the initiative in the founding of the Society of Swedish Inventors, which has been, and still is, of great benefit to its members.

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Andrée, with his sober intellectualism, his bent to systematization, and with his unbounded belief in the powerful development of applied natural-science, was, in a high degree, a child of his time—the 'eighties of last century—with its practical ideas and its fierce zeal for reform. He possessed the most optimistic belief in the power of technics and industry to make the human race happier by creating, for the greater part of mankind, better conditions of existence and more free time, with its attendant opportunities for mental development and bodily culture. "There will come a time during which science will be far behind technics (think of electricity!). The technicist makes his way into every hiding-place, and must solve problems that the man of science has never thought of." He thought that, by these means, the working class would have the opportunity to obtain an intellectual and scientific training which, in its turn, would supply industry with more wide-awake and intelligent workmen.

It was the intention of Andrée to publish a series of papers dealing with the influence of technics on, it may be said, every branch of human activity:—on the general development of mankind, on liberty, hygiene, athletics, language, architecture, military science, the home, marriage, education, etc. Andrée had time to complete and publish only one of these pamphlets, that on the question of Industry and Woman. In it he shows that industrial occupations have released woman from a number of domestic duties, and that it has thereby tended to promote her equality with man in the community. He has left a number of remarks and preparatory sketches for the other papers, and some of these are on subjects of actual interest to-day, *e.g.*: Is specialization, carried to extremes, harmful to the workman?

At the age of twenty-six, Andrée took part in a competition in connection with a question: "What are the defects in the existing system of the education of girls?" and gained the first prize. He recommended a more practical training, which should have a natural-scientific basis. His interest in social matters found expression in various publications, and when, during the 'nineties of last century, he was for a period a member of the Municipal Council of Stockholm, he brought forward a motion for a ten-hours, instead of a twelve-hours, working day for the men in the service of the town, and for an eight-hours working day for the women. The mere proposal of such a motion was sufficient to exclude Mr. Andrée from standing, said someone at a public meeting. And, as a matter of fact, he lost his place in the Council or, rather, the Council of Stockholm lost him.

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Andrée had such little appreciation of literature and art that it must be considered a defect in his character, and he was, too, altogether unmusical. If, by chance, he had been enticed to visit an exhibition of art or to

attend the opera, his companions had every reason to repent their success, for he always managed to spoil their pleasure by his remarks and criticisms. When Selma Lagerlöf received a literary prize for her "Gösta Berling's Saga," Andrée was invited to the banquet given in her honour. The hostess asked him if he had read the book and received the reply: "No, but I have read Münchhausen, and I suppose that is about the same thing." As regards Nature, however, he displayed a highly developed sense of beauty, and during his many balloon journeys he greatly enjoyed the magnificent scenery he had the opportunity of viewing.

Once Andrée had made up his mind to obtain a thing, he devoted all his energies to its acquirement. But before he came to a determination, marked out his goal, no one could weigh, no one could endeavour to calculate every consequence more ruthlessly, more critically than he. He never acted spontaneously, and there was wanting in him the spirit of fresh, impulsive action, but this was balanced by the sense of security which is always conveyed by the steps taken by a collected, discriminating man. *He embodied, in every respect, the ancient phrase: "To speak once and stand by one's word is better than to speak a hundred times."*

The reason why Andrée, a healthy, strong man in good circumstances, never married and had a family, lay just in that fear of consequences which he could not foresee and control. "In wedded life one has to deal with a number of factors which do not allow themselves to be arranged in accordance with some certain plan. It is altogether too great a risk to bind oneself to a condition of things where another individual would be fully entitled—and what right should I have to repress this individuality?—*to demand the same place in my life that I myself occupied!*" But he has also said: "As soon as I feel any heart-leaves

begin to germinate, I am eager to uproot them, for I know that the feeling which I ever allowed to live would become so powerful that *I should not dare* to submit to it." At all events, when the Polar Expedition had been determined, it so occupied his every thought, sense and imagination that there was no place for any other feeling.

Andrée, who was only sixteen when he lost his father, was always most tenderly attached to his mother. It was his mother who always received the first intelligence of anything that concerned his success or defeat. When he undertook his balloon journeys, she uttered no words of apprehension, nor expressed any wish that he should stop making them. But when the first news came of the intended Polar Expedition, she felt all a mother's fears, and they broke through the hindrances hitherto set by her iron will. But no more than one letter from her son was needed to make her once more his faithful comrade, the self-controlled participator in everything concerning him. In her last letter to him, in 1896, which was to be opened when the "Virgo"—the vessel which conveyed Andrée to Spitzbergen on the occasion of his first endeavour to find a favourable opportunity of carrying out his plans—had started, she writes: "I am so dissatisfied with myself for having been such a poor, weak creature on that difficult day of leave-taking. But there is *one* thing I should wish you to bear in mind, and that is: if, when you return, I am no longer here, you must not depress yourself by thinking that your grand enterprise has had *the least* influence on my having gone the way of all flesh. . . . And now, my thanks for all you have been to me! . . ."

The last words Andrée writes before he goes on board on that occasion are to his mother: "Don't be uneasy, dear, your heart is watching over me."

Mrs. Mina Andrée died after a short illness, one

month before the Expedition sailed in 1897. She was spared the grief of a second parting.

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Recalling Andrée's personality, we are most struck by his firm, strong will. That was his central characteristic, but it was accompanied by uncommon energy and a lively imagination. The cold-blooded calmness and bent for realities which distinguished him were not based on a cold temperament, but on his incessant exercise of self-control. Andrée enjoyed friendly intercourse with many, but he chose very few friends; to these, however, he was attached by unalterable fidelity and warm affection. In a circle of friends where he found himself at home, he was frolicsome and roguish. *He was extremely fond of children*, and liked to take part in their pranks and games in the families he used to visit.

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Was not Andrée ambitious? This question has been asked many times. Yes, the young Andrée was ambitious, but all the personal vanity which may once have distinguished him was burned away in the presence of his knowledge of the serious nature of the journey that was to be made, and of the responsibility which lay on his shoulders for the lives of others. His ambition was transferred to the Expedition and his comrades.

"Be careful of health, but not of life!"

"In my opinion there is, in our days, only one way of retaining a belief in ideal efforts, and that is by endeavouring to make them oneself."

"The thing is so difficult that it is not worth while attempting it. The thing is so difficult that I cannot help attempting it."

And then, finally, the words with which he began his memoranda at Danes Island in 1896:

"If those who have the courage to do it were too good for the work, who then should do it?"

They give a picture of the attitude assumed by Andrée towards both life and deeds.

STRINDBERG

NILS STRINDBERG was born in Stockholm on the 4th September, 1872. He was the son of Johan Oscar Strindberg, a wholesale merchant, and his wife, Rosalie Strindberg, *née* Lundgren. Both father and mother belonged to old Stockholm families. Of the members of the Strindberg family many devoted themselves to business, while several of them had literary and musical interests. The most celebrated person who bore this family name was the celebrated author, August Strindberg, born in 1849, died in 1912.

When he was only six years old, Nils Strindberg began his studies at the Beskow School and, in 1882, he entered the South Real School, which then occupied the old Town Hall in the south of the city. He was very successful in his studies, always earning good marks, which were sometimes very high, especially in natural-scientific subjects. Physics and chemistry were his principal subjects, and at home, in his room, he arranged a laboratory, where he carried out many experiments. In addition, he took pains to keep himself in vigorous, buoyant health, and shared in all the outdoor sports of the time.

He was very musical, and learned at an early age to play the violin, an accomplishment which he pursued during the whole of his youth. At a later period he took part in the musical evenings given by the family.

On the 15th May, 1892, he passed his matriculation examination, gaining very good marks, and in the autumn of the same year he was enrolled among the pupils at the University of Stockholm. During 1892–93, he studied at Upsala, where he took the degree of B.A. In 1893 and 1894 he spent his summers as tutor in families, and the following

summer he took part in geodetic work in Norrland, in the north of Sweden. After this he was appointed Assistant in Physics at the University of Stockholm. He was no more than sixteen when he began to develop a liking for photography, and he gradually became a very clever photographer, and experimented with interest and success with various methods in the art. At an exhibition of amateur photographs, held at the Industrial Palace in Stockholm, 1895, his pictures gained the first prize.

When, in 1895, Andrée brought forward his plan of travelling to the North Pole by means of a balloon, his intention was that the Expedition should consist of three members. Nils Ekholm, D.Phil., had already been engaged as the second man, and a great number of persons applied for the third place. Among these was Strindberg, and he was chosen, Andrée considering him, as scientist and physicist, the best equipped of all the candidates.

In order to further qualify himself for the balloon journey, Strindberg spent the spring of 1896 in Paris, where he pursued aeronautical studies and made six balloon ascents. On his return from Paris, he gave a lecture before the Swedish Society for Anthropology and Geography, on the 24th April, in which he described his experiences as aeronaut, and gave an account of the method employed in making a balloon.

Strindberg's practical bent and all-round skill were much in demand during the course of preparatory work for the Polar Expedition. As photographic expert he was entrusted with the task of attending to the photographic equipment of the Expedition, to which he contributed a very valuable addition in the form of a camera constructed in accordance with his own designs. As the cartographic work of the intended Expedition was, to a great extent, to be based on photographs, the importance of this side of Strindberg's work can easily be perceived.

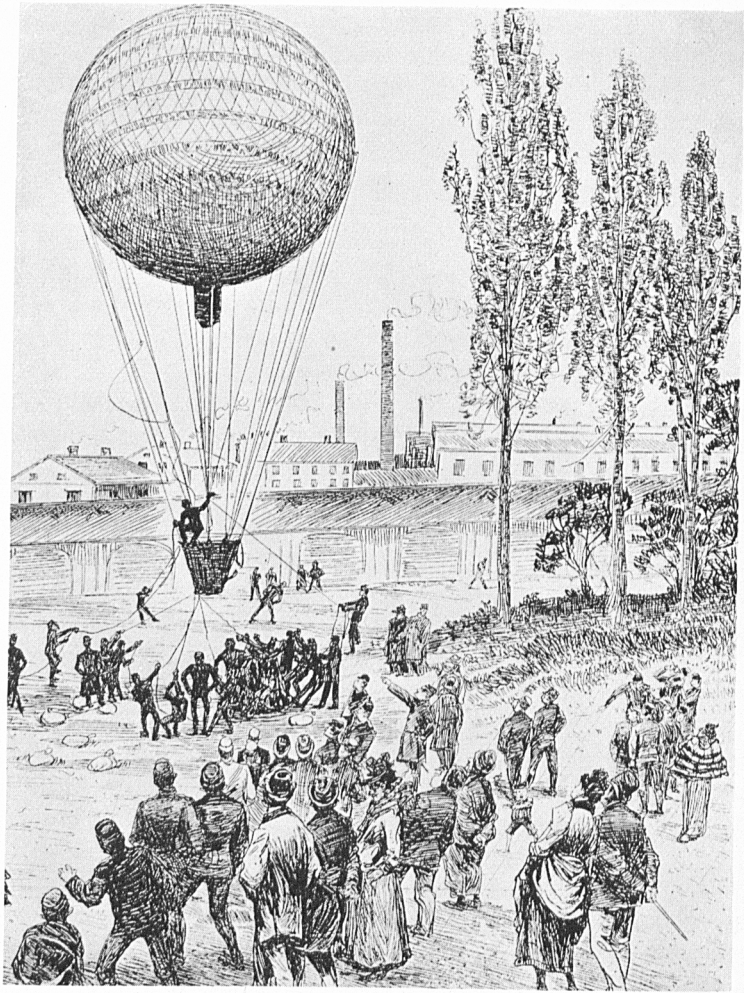
But he assisted in preparing the technical equipment in other branches too. Among other things he carried out extensive investigations respecting the friction of the drag-lines, the tightness to gas of the balloon-cloth, etc. Together with Dr. Ekholm he carried out a number of experiments respecting the carrying-power of the balloon. When, in 1896 at Danes Island, the balloon had been filled with gas, and the Expedition waited in vain for a favourable wind, it proved that the silk was not so gas-tight as had been calculated. It is true that the investigations respecting the tightness of the cloth, carried out by Strindberg, had been fully satisfactory, but it was through the seams that the gas streamed out, and when these leaks were closed, new ones were formed.

After the Expedition had returned to Sweden in August, and Dr. Ekholm had resigned his position as a member, Strindberg was frequently exhorted to follow his example. He would not allow himself to be persuaded, however, for he considered that he ought to keep the promise he had given, even if the quality of the balloon was not quite satisfactory. He also entertained the opinion that, on the next occasion, the journey would be successful, and that the participators would return unharmed, an opinion on which he showed his reliance by becoming engaged, in October 1896, to Miss Anna Charlier, a daughter of K. V. L. Charlier, Postmaster at Klippan in Scania.

In 1897 everything was in readiness to renew the attempt, Dr. Ekholm's place being filled by K. Fraenkel, C.E. None of those taking part in the Expedition entertained any fears as to its success. And when mention had been made of possible defects in the balloon, Strindberg one day said to Andrée: "The weather for the journey now is as good as we can ever hope to have, and, in spite of all repairs, the balloon will never be better than it is."

And when the moment for the start had come he

Ernst Fraenkel



ANDRÉE STARTING IN THE 'SVEA,' 1893

placed himself boldly by the side of Andrée and Fraenkel in the car.

Fraenkel

Dr. Ekholm had withdrawn from further participation in Andrée's Polar Expedition for the reasons already mentioned. But, instead of trying to replace Dr. Ekholm by another scientist, who, in some degree, possessed Ekholm's qualifications, Andrée determined to choose a young sportsman, Knut Fraenkel.

Knut Hjalmar Ferdinand Fraenkel was born in Karlstad on the 14th February, 1870. He was the son of Lieutenant A. F. Th. Fraenkel, of the Corps of Royal Engineers, and of Laura Fraenkel, *née* Löfgren.

Lieutenant Fraenkel had a post at the construction work of the State Railways. This led to his being moved from one place to another, in accordance with the requirements of his labour, when new sections of the State Railway system were to be built. When Knut Fraenkel was still quite young, the family resided in Jämtland, and the scenery round about, which offered every opportunity for life in the open air, enticed him to forest and field, and it was here he laid the foundation of a physique which became uncommonly strong and hardy.

Knut Fraenkel was no bookworm, and the subject in which he, later on, most distinguished himself at school was gymnastics, in which, owing to his skill, he was allowed to take part in the exercises of the upper classes. His first instruction in ordinary subjects was given him by a tutor, but an eye-affection necessitated his studies being carried on with the greatest caution. In 1882 the family moved to Östersund, and Knut Fraenkel became a pupil at the college there. Four years later he entered the Higher Public School at Hudiksvall.

Meanwhile he developed more and more into a muscular young man, who was not afraid of any fatigue, and who was very happy to experience adventures during his wanderings. The fells of the north of Sweden had great attractions for him, and, for his climbing expeditions, he always chose those places which were most difficult of access, and which offered the prospect of most adventure.

Next to gymnastics, history was his favourite subject, and he had a great admiration for Charles XII. He studied military history with enthusiasm, and on one occasion he wrote: "I read wild accounts of Charles XII and his Caroleans, and I shall soon believe that I am one myself." It is also related that once, when he was on a visit to Stockholm, a friend called on him, to whom he was asked to show the town. The first thing he did was to go to Kungsträdgården Park and compel his friend to take off his hat before the statue of the hero-king. Fraenkel's interest in history gave birth to a warm and living love of country, and a royalism which sometimes found expression in a somewhat original way.

In 1889 Fraenkel came to Stockholm and there pursued his studies at the Palmgren Co-educational School. He was unsuccessful when he sat, in the spring of 1891, for his matriculation examination, but a second attempt at Christmas, the same year, had happier results.

It had long been Fraenkel's intention and hope to become an officer, but an operation for a nervous complaint which he was obliged to undergo compelled him to change his mind, and to enter the Stockholm Technical University, in order to study the same branch as his father's. This was in 1892, and the following summer he was doing practical work as an apprentice at the railroad which was being constructed in Upper Norrland. This practical instruction attracted him more than the theoretical—a feature

characteristic of his personality. During his work on the railway-line he made himself much liked for his ability and his boldness.

In 1896 he passed his final examination as Civil Engineer at the Technical University, and afterwards took part in a course of instruction, preparatory to entering the Corps of Royal Engineers.

The experimental ascents made by Andrée in the balloon "Svea," which were being carried out just about that time, greatly interested the young Fraenkel. The boldness and enthusiasm characterizing these ascents awakened his lively admiration, and when Andrée published the plan of his Polar flight, Fraenkel was seized with a desire to form one of the party. In 1897, when a vacancy arose, he applied for the position. Andrée took a liking to the young man, this powerfully built, vigorous and interested engineer, and, like Strindberg before, Fraenkel was now chosen in preference to other applicants to occupy the post of third participator in the Expedition.

He, too, went to Paris to study balloon ascents, doing this in company with Lieutenant Svedenborg, who had been taken as the reserve man. During his stay in Paris, March–April 1897, Fraenkel made seven balloon ascents, in the course of which he was exposed to many exciting adventures, which, however, did not intimidate him.

When, together with Andrée and Strindberg, he stood ready to leave Danes Island, he did not doubt of the practicability of the plan. He, who had always been filled with a certain love of adventure, and who had always read with enthusiasm of the work done by great men, was now to have his longing for doing great deeds satisfied. His ambition, beneath which there was concealed no sordid aim, had now found its great goal, for which he was prepared to sacrifice even life itself.

II

TRIAL JOURNEYS WITH THE BALLOON "SVEA"

ANDRÉE's interest in aeronautics dates from the spring of 1876, when he was on a trip to America. He has himself related that during the journey he read a collection of popular lectures, "The Laws of the Winds," by C. F. E. Björling. In this book his attention had been specially caught by the account of the trade winds, and it struck him that they might be greatly utilized for the purpose of propelling air balloons. He speaks with enthusiasm of this "magnificent, regular system of winds, which only waited for aerial vessels—giant balloons carrying cargo and passengers."

In America he visited a very well-known aeronaut named Wise, an elderly man who pursued this, at the time, not altogether harmless sport zealously and most successfully. Wise taught Andrée the first principles of the aeronautic art; he showed how balloons are made and did everything he could to sustain the interest of the young Swede in aeronautics. On one occasion he offered to let Andrée make an ascent in company with another person. Andrée was very pleased on receiving this invitation, especially as he was allowed to attend to the filling of the balloon with gas. There was no ascent, however, as an accident caused the balloon to burst, "and the gas went up in the air alone," as Andrée writes with regretful irony.

His next attempt, a few weeks later, gave the same negative result. On this occasion, financial difficulties

were the cause, and several years were to elapse before he had the opportunity of enjoying the charms of flying in a balloon.

Meanwhile, he made exhaustive studies of balloons and aeronautics, and of other subjects which he imagined might be useful for balloon journeys.

In the spring of 1893 the Lars Hierta Foundation granted Andrée money for the purchase of a balloon, which was supplied by the French aeronaut and balloon constructor, Gabriel Yon. This balloon, which had a volume of 1,054 cub. m. (37,230 cub. ft.), was calculated to be able to rise about 3,000 m. (9,700 ft.), and it was christened " Svea."

With this balloon he made nine different ascents, of which he has given detailed accounts in Communications to the Royal Academy of Sciences.

When reading these Communications it excites great interest to see the minute care with which Andrée prepares every ascent, and how he equips himself so as to be able to take observations in the most widely different spheres, all of which shows that he regarded aeronautics as strictly scientific work, and not as a form of sport, or as an expression of foolhardy love of adventure. With the assistance of various kinds of instruments he studied, among other things, the temperature and the humidity of the air at various heights, the character of the currents of air, the conditions attending rainfall, etc. Photographing from the air also occupied a great place in his studies, and to illustrate the richness of detail in his observations it may be mentioned that he carried with him a small mirror in which he studied his face, in order to observe possible alterations in the colour of the skin at various heights above the surface. On the 15th July, 1893, at 3.34 a.m., the " Svea " rose with Andrée on board for the first time, the ascent being made from the barrack-yard of the Royal Svea Engineers, in Stockholm. One of the first observations Andrée made

respecting his balloon was that, on account of certain technical difficulties, twelve hours were required to fill it with gas.

During this first ascent, which lasted somewhat more than 2½ hours, he was carried about 44 km. (26 miles) and attained a height of 3,390 m. (13,500 ft.). At this height he heard distinctly dogs barking. During the descent he made the observation that, when the gas was allowed to escape in part from the balloon, the lower part of the latter was forced in by the pressure of the air, so that, in some degree, it acted as a parachute. At the end of the account of his first ascent Andrée writes some words which are of great interest, as, in a way, they cast a sudden sharp light on a detail of organization in the coming Polar expedition. He writes:

"As regards the scientific observations, it is a matter of course that, in certain respects, more might have been done had there been two persons in the car. The ideal number would be three even, viz. 1 observer, 1 secretary and 1 balloon expert."

By the 9th August Andrée was ready to make his second ascent; this lasted nearly seven hours in which time he traversed 100 km. (60 miles) and reached a height of 3,648 m. (11,800 ft.). On this occasion, too, twelve hours were needed to fill the balloon. His account of the journey, embracing detailed descriptions of the humidity and carbonic acid content of the air, of optical phenomena, of acoustic observations, etc., displays great familiarity with the manœuvring of the balloon, at the same time that it shows his ability to acquire and utilize experiences quickly. The account also contains a description of the method employed for photographing from the air. Among other things, he gives his views of the importance of aerial photography for mapping, at the same time that he is able, with the help of one of his photographs, to correct an existing map. Respecting the movement of the

balloon, he observed several times that it was made to rotate. This was especially the case when, on one occasion, he was rising rapidly. On descending, he was once more able to observe the parachute-like phenomenon noticed in the first journey. He also paid attention to the fact that the falling velocity of the balloon increased when it entered the shadow of a cloud.

The third balloon journey, which was undertaken on the 19th October, was extremely exciting and dangerous, as, in consequence of the strength of the wind, Andrée was carried right across the Åland Sea, to the Finnish archipelago. It is true that, when he started, the wind was in the direction of the Baltic, but as Andrée considered it faint and as, in addition, he calculated on more favourable wind conditions when he came into higher air strata, he determined to start. Like the former Communications, his account of this journey is full of observations on temperature, humidity, clouds, optical phenomena, etc., in addition to which there are studies on respiration and thirst at different heights.

After falling somewhat while beneath the cloud, when he had concluded his observations, he found himself on his way across the sea. He could not reach the Swedish mainland, the wind driving the balloon over the Baltic. He then determined to seek the assistance of a vessel towards which he was moving. In spite of the fact that the drag- or guide-rope was floating on the water, the balloon went at a great speed, but Andrée succeeded in diminishing this by lowering the anchor. The speed was still too high, however, but he reduced it further by attaching two empty ballast sacks to one end of the landing-line and allowing the latter to drag across the surface of the water. The sacks opened with their mouths towards the water, and offered considerable opposition to the onward movement.

It was now Andrée's intention to get the steamer to catch one of the ropes of the balloon and in that way stop its further progress. But the captain of the vessel appeared to be desirous of carrying out the salvaging work by laying his boat athwart the course, and catching the balloon by the rigging or in some other way. Andrée understood the danger of such a manœuvre of course, especially when he thought of the risk everyone would run if the steamer's funnel came into the neighbourhood of the balloon. He was therefore obliged to refuse all assistance from the vessel, and then directed his efforts to reaching land on the other side of the sea.

Now, as it was necessary to increase the speed of the balloon, he endeavoured to hoist up the landing-line with the sacks, but was unable to lift it, and so he had to cut the line free. His speed increased and he approached Finland at the rate of about 30 km. (18 miles) per hour. He also tried in vain to hoist up his anchor, and found himself obliged to let it still move through the water. He met a couple of vessels with which he exchanged greetings. At 3 p.m. he saw that he would have to increase his speed still more, and so he cut the anchor free.

During this journey across the sea, Andrée noticed a peculiar movement of the balloon, viz. its repeated risings and sinkings, the explanation of which he finds in the circumstance that, in consequence of a diminished amount of gas, the balloon, in some degree, acted like a kite which is driven alternately upwards and downwards by the wind.

When we remember that the coming Polar balloon journey was to be characterized by the employment of guide-lines, it is of great interest to quote here how he summarizes his experiences from this Baltic voyage:

"I have dwelt on the circumstance because, as far as I know, this was the first time a systematic guide-roping over the water had taken place, so that there

was nothing to tell us how a balloon would act under such conditions. The result is in the highest degree satisfactory, for it shows *that a guide-roping balloon of a suitable form can be supported by the same wind that drives it onwards*,[1] and this journey across the Baltic Sea has also shown in practice what might have been assumed from theory, viz., *that a guide-roping balloon, with the same consumption of ballast, can traverse greater distances than a free balloon of the same dimensions.*[1] I scarcely need point out of what extreme importance this is with regard to the possibility of making long balloon journeys for geographical purposes."

When describing his landing and rescue he emphasizes the fact that, at the close, he was prepared to sacrifice some of the heavier instruments in order to get the balloon to rise. Happily he was not obliged to do this. Towards the close, the darkness prevented him from making any time-determinations; he could, however, fix the time when he landed, as it took place with such great violence that his watch stopped, this happening at 7.18 p.m. All the instruments were severely damaged and he lost a collection of photographs.

The landing took place on a lonely islet where, according to his own words, he had to spend "an extremely unpleasant night." At eleven next morning his helpless position was observed and he was rescued.

During this journey the balloon had floated in the air 10½ hours, and had travelled about 284 km. (170 miles), during 202 km. (120 miles) of which he had been assisted by the guide-lines.

We have only a few observations to note respecting the fourth ascent, which was undertaken on the 26th February, 1894. Andrée had now moved his starting-place to Gothenburg, where he succeeded in filling his balloon in the short time of 2¾ hours. In consequence

[1] The italics are Andrée's. A "guide-roping balloon" signifies a balloon provided with drag- or guide-ropes.

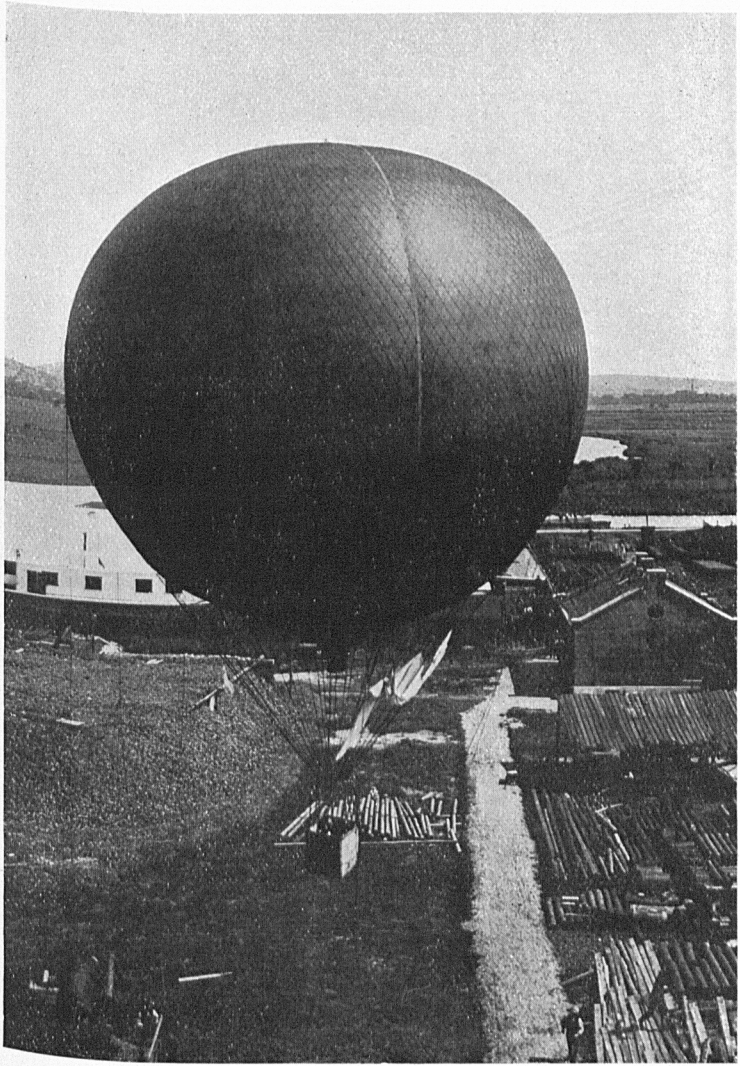
of an unexpected gust of wind, the balloon on rising was in danger of being thrown against a great pile of timber; this compelled Andrée to empty so much ballast that the balloon rose to a height of about 1,700 m. (5,500 ft.) before he found time to take his first temperature observation. During this journey the maximum height reached was 3,282 m. (10,700 ft.). When about to land, some 35 km. (21 miles) south of Jönköping, and after a journey of 148 km. (89 miles), he attempted to check the movement of the balloon by means of the anchor, and then once more made the observation that any great resistance on the surface of the earth to the motion of the balloon causes the latter to deviate more or less from its main direction. When at last the anchor held, the balloon was damaged by a branch of a tree, and the gas began to pour out. At the end of his Communication he writes:

"When I had assured myself that the balloon lay there safely, I made haste to go back to the buildings I had previously passed. There I met a woman and a boy who had locked themselves in, and they did not dare to come out before they were quite assured that I was an ordinary man."

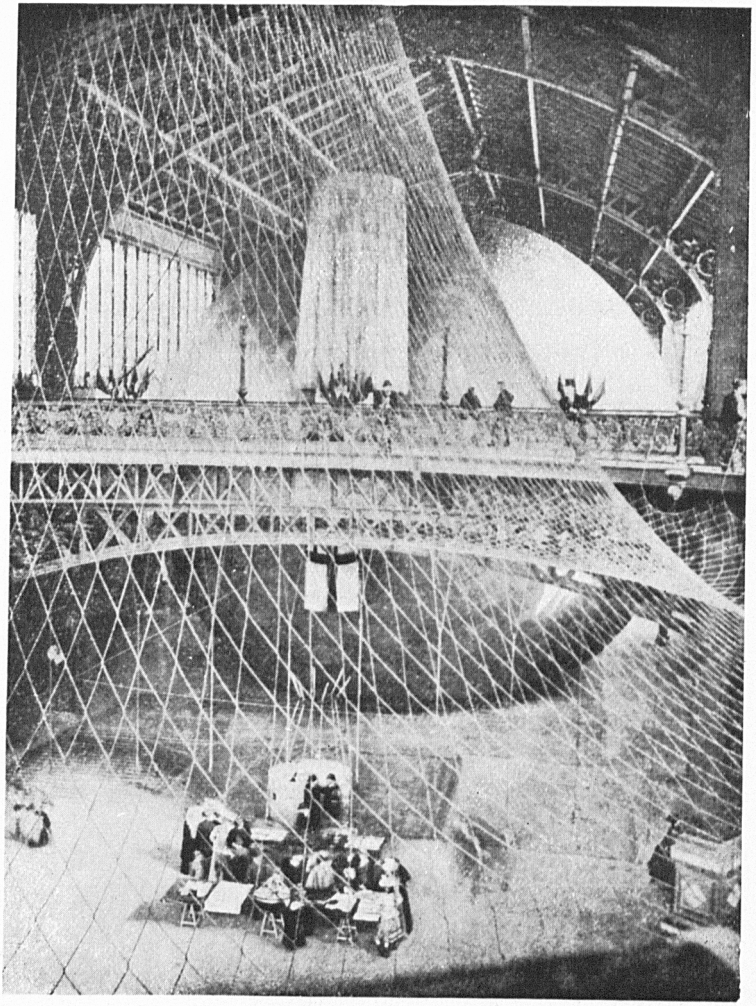
The fifth ascent, on the 7th April, was connected with some experiments with a captive balloon, "in order to discover to what degree a captive balloon is suitable as an observatory for meteorological investigations, etc."

During his journey on this occasion with a free balloon Andrée attained his greatest height, viz. 4,387 m. (14,250 ft.). When at the height of 4,035 m. (13,000 ft.) he experienced headache for the first time, in addition to which "the beating of the pulse produced a faint singing noise on the left side of my skull."

The sixth ascent was undertaken on the 14th July, and the Communication revealed a novelty which once more carries the reader's thoughts to the Polar



THE BALLOON 'SVEA' STARTING FROM GOTHENBURG, JULY 14th, 1894



THE BALLOON WITH ACCESSORIES EXHIBITED IN PARIS

flying. Andrée on that occasion dealt with the problem of the "dirigeability" of the balloon, and he gave a very detailed description of the method employed for the purpose. He based his theory on the Baltic Sea experience, when he had found that the guide-line was able to compel the balloon to make fairly great lateral movements.

For the purpose of steering the balloon he attached to it three new details—one a three-armed guide-line so arranged that, without fastening to any objects, it would be able to drag along the ground and reduce the speed of the balloon. In addition there was a steering-sail and an arrangement which enabled him to alter the position of this sail in respect to the wind. Andrée had the satisfaction of being able to state that the balloon proved "steerable in a high degree," as he expresses himself. In some of the trials the deviation from the main direction amounted to more than 30°, and he concludes his account of the experiment with the following words:

"It seems to me, therefore, that this journey, together with that across the Baltic, fully proves the possibility of performing extensive journeys over both land and sea by means of large and suitably-shaped balloons provided with sails and guide-lines, and also that of then being able to control the movement of the balloon, so that the traveller will not be entirely dependent on the wind, but will, in an essential degree, be able to follow the route he wishes."

During this trip, Andrée threw down so-called balloon-cards, which were afterwards to be sent to him by the finders, and on which notes should be made respecting the place where they had been found, so that it would be possible to ascertain the route followed by the balloon.

The account Andrée gives of his seventh balloon journey—on the 4th August—is very brief, and embraces, in addition to descriptions of the clouds,

temperatures and winds, a comparison with similar balloon ascents in Germany and Russia.

The eighth ascent (on the 29th November) is remarkable in two respects. First of all it was a record journey, Andrée, in 3¾ hours, traversing a route between Gothenburg and Gottland, a distance of 400 km. (240 miles), which is equal to that between Stockholm to the interior of Estland. Secondly, in order to land he employed a newly-invented, so-called " bursting apparatus " which made it possible for him to empty his balloon of gas in one or two minutes. By means of this arrangement he succeeded in stopping his balloon at the place he himself wished instead of, as so many times before, being dragged for long distances at the risk of injury both to himself and the balloon.

Andrée carried out his last ascent by " Svea " on the 17th March, 1895. This journey once more enabled him to take tests with his balloon-cards, which proved to be of great importance for determining the direction the balloon had taken.

During the course of these nine balloon journeys, Andrée carried out extensive scientific investigations. The number of observations made amounts to more than 400, and in a total floating time of 40 hours he had been carried a distance of more than 1,400 km. (900 miles). When we take into consideration that he was alone during these flights and that, consequently, he was both navigator and observer, we shall undoubtedly agree with one of his biographers who says that " Andrée, in this respect, had made a hitherto unheard-of world record."

III

THE PLANNING OF THE POLAR EXPEDITION

On the evening of the 16th March, 1894, after a meeting of the Swedish Anthropological and Geographical Society, Baron A. E. Nordenskiöld turned to Andrée and asked him to accompany him for some distance on his way homewards, as he wished to discuss a matter which ought to interest both of them. So they went out into the evening mist, and walked up Drottninggatan towards Nordenskiöld's home in the old buildings of the Academy of Sciences, near Adolf Fredrik's Church.

Andrée experienced lively emotion at this request of the renowned Polar explorer, the discoverer of the North-East Passage, the man who on board the "Vega" had circumnavigated Europe and Asia. It seemed clear to him that the old Polar veteran meant to speak about the employability of a balloon on Arctic expeditions, for what else could he have to speak about with Andrée?

Nordenskiöld said that he had many times pondered over the possibility of employing captive balloons in the service of Polar investigation, for the purpose of making observations, laying down maps, etc. At the moment he was himself interested in an expedition to the South Polar regions and had thought specially of the possibility, with the assistance of a captive balloon, of surmounting the ice-barrier surrounding a great part of the Antarctic continent, that most mysterious of all quarters of the globe.

After they had discussed Nordenskiöld's plans both long and well, Andrée spoke of his idea of making an expedition over the Polar ice in a free balloon. Nordenskiöld listened with fixed attention, and at last broke out with:

"Well, that does not sound at all bad; continue working at the plan and count on me when you have something really ready."

That evening saw the birth of the Andrée Polar plan. What had previously only been a daring hope, ripened in the sun of the encouragement given by the celebrated Arctic explorer and became a fixed determination.

Just at that time Andrée was in the midst of his experimental journeys with the balloon "Svea," and he now attacked a problem which specially interested him, viz. to give dirigeability—*i.e.* the possibility of being steered—to a balloon by means of drag- or guide-lines and sails.

As currents of air move as a rule in spiral paths, a free balloon which cannot be steered always risks being carried back almost to its starting-point. On the other hand, a balloon which has dirigeability, even if this covers only a few degrees, has the possibility of cutting obliquely through the current of air and thus traversing a certain region in an essentially shorter time than that required by a balloon which cannot be steered.

These steering experiments gave results which considerably surpassed Andrée's expectations, and during his balloon journey from Gothenburg to Gottland he had an opportunity of displaying what aeronautics could do as regards speed and safety. At the exhortation of Nordenskiöld, Andrée made public for the first time his plan of a Polar expedition by balloon at a meeting of the Academy of Sciences, on the 13th February, 1895, and two days later he gave what was mainly the same account in the presence

of the Swedish Anthropological and Geographical Society.

In the introduction to this lecture he points to the peculiar difficulties which meet explorers in penetrating the ice-filled Polar Sea. The attempts made to penetrate the central parts of the Arctic Ocean by means of vessels had hitherto been without result. Andrée, it is true, mentions the fine attempt then being made by Nansen to drift with a stoutly built vessel with the slow-moving currents of ice right across the Polar Sea, but he points out that, up to the present, no knowledge had been gained concerning the success of this new method of research.

The only means of crossing the pack-ice towards the North Pole was really by using the sledge, but even the repeated attempts that had been made with this method of transport had met with very scant success.

He continues:

"Has not the time come to revise this question from the very beginning and to see if we do not possibly possess any other means than the sledge for crossing these tracts? Yes, the time for doing so has certainly come, and we need not search very long before we find a means which is, as it were, created just for such a purpose. This means is the air balloon; not the dreamed-of, perfectly steerable air balloon, so devoutly longed for since we have not yet seen it, but the air balloon which we already possess and which is regarded so unfavourably because attention is merely paid to its weak point. Such an air balloon is, however, capable of carrying the explorer to the Pole and home again in safety; with such a balloon the journey across the waste of ice *can* be carried out.

"These words may seem bold, and even reckless, but I ask you to suspend your judgment on the matter until you have heard my arguments. For I am assured that then your judgment will be different. You have merely to get rid of preconceived opinions

and then allow facts to have all the weight they may possess.

"I wish, first and foremost, to emphasize that the problem of reaching the Pole or to traverse the Arctic wastes of ice in general is not a purely scientific problem, but also a technical one. It is true that the result we wish to obtain is of importance for natural science in the first place, but the discovery of the means by which this result is to be gained is, in its very nature, a task for the technologist. Since it has proved that there exist difficulties of a certain character, and since it has also been shown that these difficulties cannot be overcome by the technical means which have hitherto been at our disposal, then it is to the technologist we should turn to ask if he is able to give us some better means by which these difficulties can be surmounted. Hitherto he has been unable to answer this question in the affirmative, but if we now address the same question to a balloon-technologist he will, undoubtedly, after hearing the indispensable conditions that are to be fulfilled, give an answer in the affirmative.

"These conditions seem to me to be the following:

"1. The balloon must possess carrying power sufficient to sustain the weight of three persons, all the instruments necessary for taking observations, provisions, etc., for four months, and ballast, all of which together may be calculated as weighing about 3000 kilogrammes (6,600 lbs.).

"2. The balloon must be so gas-tight that it can remain floating in the air for a period of thirty days.

"3. The filling of the balloon with gas must take place in the Polar tracts.

"4. The balloon must, to some degree, be steerable."

As regards the first three conditions, Andrée was able to refer to the general aeronautic experience at the time when he brought forward his proposal.

He pointed out, for example, that for the Paris

Exhibition, 1878, there had been made a balloon 36 m. (117 ft.) in diameter and with a capacity of 24,500 cub. m. (865,000 cub. ft.). In this visitors made ascents. When this balloon was filled with hydrogen it had a clear carrying capacity of 12,000 kg. (28,800 lbs.), *i.e.*, four times the weight now calculated for the Polar balloon. The Paris balloon made 1,500 ascents, carrying on each occasion from 30 to 40 passengers.

Respecting condition No. 2, too, there could be made satisfactory comparisons which showed that a balloon of the calculated size of the Polar balloon would not lose more than 50 kg. (110 lbs.) of its carrying power during a period of 30 days—an assumption which Andrée's experience during the Polar journey far from confirmed.

The filling of the balloon with gas could very well take place in the Polar regions, as the demands made by the needs of military balloons had led to the construction of transportable hydrogen gas apparatus, by means of which a balloon of the size of Andrée's could be filled with gas in the space of 30–40 hours. And besides this, hydrogen could very well be conveyed to the starting-point in a compressed form in steel cylinders.

With regard to the fourth and last condition, viz. the relative dirigeability of the balloon, Andrée had merely to direct attention to the experiment carried out during his trial journey by the balloon "Svea" on the 14th July, 1894, described in another chapter. By providing the balloon with an adjustable sail and with drag- or guide-lines, Andrée succeeded on the occasion mentioned in making the balloon deviate 27° from the direction of the wind. Now and then this deviation amounted to as much as 40°.

"It may be thought that a deviation of 27° is not worth very much, but the following consideration will show that, in reality, it is of rather great importance,

especially in the case of balloon journeys for long distances. Let us suppose, for example, that the balloon is sailing with the wind blowing direct from Gothenburg to Stockholm. If the balloon has no steering apparatus it cannot, of course, do anything else but follow the line uniting these two cities. But if the balloon has a steering arrangement by means of which it can be made to deviate 27° from the direction of the wind, then, under the same wind conditions as those just mentioned, it can be steered from Gothenburg to any point at all on the east coast between Västervik and Söderhamn."

In his lecture, Andrée mentions the details of the technical equipment of the balloon expedition as follows:

"The balloon must be of double silk and have a volume of 6,000 cub. m. (212,000 cub. ft.) and be filled with hydrogen. It shall be provided with a system of sails and with several drag- or guide-ropes, all of which must be made of impregnated cocoa-nut fibre, so that they can float on the water; then the balloon will retain the same height above the water as it will over ice or land. In addition, it must be provided with a large number of freely hanging, heavy ropes—ballast lines—which will serve to be employed partly as ordinary ballast and partly as automatic life-saving apparatus, in the event of the balloon unexpectedly descending to a very low height. Such a movement as this may happen in consequence of a fall in the temperature of the gas or from some other cause, *e.g.*, a strong gust of wind directed downwards. When, consequently, the lower parts of these ballast lines sink on the surface of the land, the balloon will be relieved of a corresponding weight and the fall of the balloon will stop before the car comes into contact with the surface. All the ballast lines are to be provided with numbers marked on metal plates attached to them, and the time and place when any rope is cast

loose should be carefully noted, so that, if the ropes are afterwards found, information may thus be obtained respecting the movements of the ocean currents and the ice-fields.

"The carrying-ring should be provided with a floor and railings, so that it can be used for manœuvring and observation.

"The gondola should be very capacious, containing a dark-room for photographic purposes; it should be warmly lined and contain berths for three persons. Its roof should be arranged as a place for observation and, like the carrying-ring, should have a railing. In addition, it should be provided with buoys, and it should be suspended in such a way as to be rapidly—preferably by a single manipulation—released from the balloon if necessary, so that the aeronauts may be able to take refuge on the sea by descending to the surface of the water when a vessel is in the neighbourhood, and then, if the wind be strong, releasing themselves from the balloon.

"The equipment should also include sledges, a canvas boat, tent, arms and ammunition, and provisions for four months—all this so as to make it possible for the voyagers to save themselves should anything happen to the balloon.

"But I wish to expressly emphasize that the expedition must not be equipped in such a way as to deprive it of its character of a *balloon expedition*, for the journey is to be carried out by *balloon*, and the travellers are to rely on *the balloon;* the life-saving apparatus, consequently, is to have no other purpose than that of life-boats and buoys on board a ship."

Having regard to the development which mapping by means of photographing from the air has undergone since Andrée's death, it deserves to be noted that in this sphere, too, he was a pioneer, for he says:

"It is not possible during such a rapid journey as one by balloon usually is, to correctly map out the

tracts that are crossed in the usual way. The mapping-out can only be done by photographing, and this system must then be employed on a rather large scale."

"As shown by the following estimate, the expenses of the entire expedition need not amount to more than about £7,100.

Balloon, 6,000 cub. m. (212,000 cub. ft.), with car, steering apparatus, landing apparatus, etc.		£2,000
Balloon house with canvas walls		830
Gas production :		
Hydrogen apparatus for 150 cub. m. (5,298 cub. ft.) per hour	£400	
Raw material, zinc and sulphuric acid (with calculated loss of 20%)	620	
		1,020
Instruments :		
Photographic equipment (2 apparatus and 3,000 plates, etc.)	£200	
Other instruments, charts, maps, etc.	260	
		460
Provisions :		
Electric batteries, sledges, etc.		270
Carriage		1,380
Technical expert for gas production and filling		330
Other, unforeseen, expenses		830
Total		£7,120

"THE MAIN OBJECT OF THE EXPEDITION SHALL BE TO EXPLORE AS MUCH AS POSSIBLE OF THE NORTH POLAR REGION IN GEOGRAPHICAL RESPECTS.

"The expedition is to leave Europe in the early summer, 1896, at such a time that it can arrive at the

Norwegian islands in the middle of June. These are situated near the north-west point of Spitzbergen. The balloon-house shall be erected on one of these islands, or some other suitable place, and there the filling of the balloon and other preparations will take place, so that only a couple of hours will be necessary to make everything clear for the start.

"The weight of the balloon must be so balanced that when the balloon is free it will stay at a mean height of about 250 m. (800 ft.) above the surface of the earth, *i.e.*, *below* the lowest region of clouds but *above* the mists at the surface of the earth.

"The start will take place in the month of July as soon as the weather is favourable, *i.e.*, at a moment when the air is sufficiently clear and when there is a fresh southerly or almost southerly wind blowing. Such a wind should be one of the chief conditions to enable the balloon to penetrate as quickly as possible far into the unknown regions, and in a direction towards the Pole. This being a point of main importance for the success of the expedition, the greatest attention should be devoted from the beginning of the journey to the effect the guide-lines and the steering apparatus have on the movements of the balloon, and in manœuvring nothing must be omitted that can promote the approach of the balloon to the Pole.

"How soon the Pole can be reached depends, of course, on the velocity and direction of the wind. Under favourable conditions it can be done in a very short time. With a wind velocity like that which, on the 25th November, 1870, carried a French balloon from Paris to Livfjeld in Norway, and that which on the 29th November, 1894, carried my balloon from Gothenburg to Gottland, there would be required about 10 hours for the journey to the Pole. If, on the other hand, the balloon does not move at a greater speed than 27 km. (16.2 miles) per hour, which is the speed that can be obtained with the average wind

velocity at a height of 250 m. (800 ft.) above the surface of the earth, then about 43 hours would be needed for a journey from Spitzbergen to the Pole.

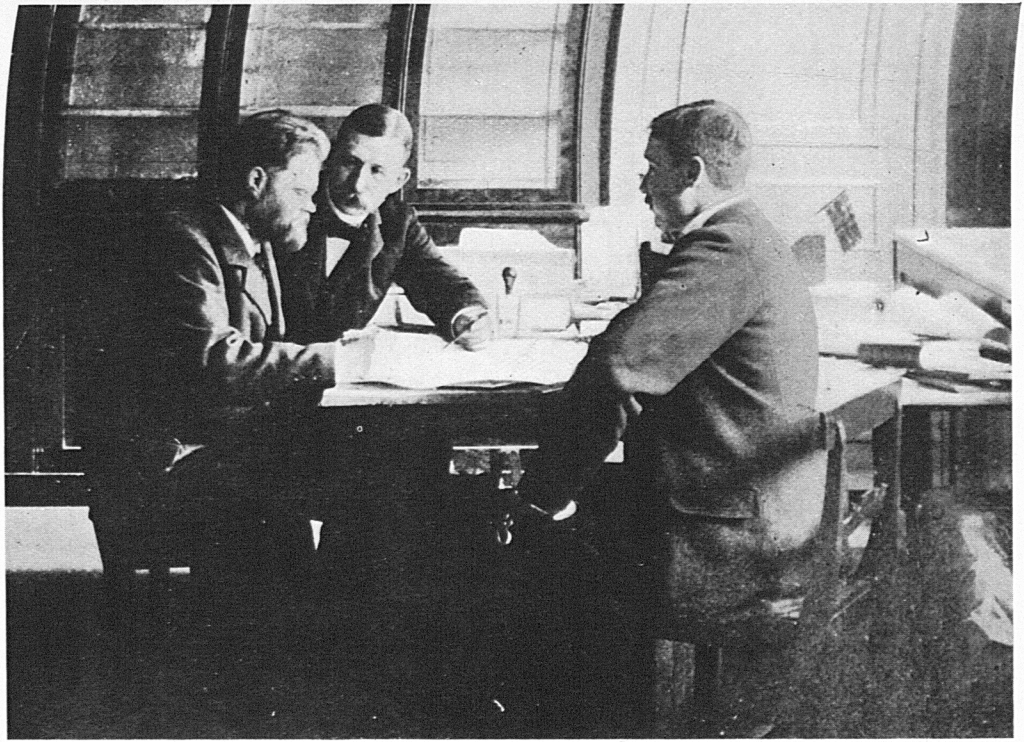
"A moderate speed is better than a great one, in so far that, with the former, a greater number of observations can be taken and with more exactness than in the latter instance.

"If the journey lasts 30 days, then, according to the above calculation of the probable average speed of the balloon, it will extend to a distance of about 19,400 km. (11,640 miles). The journey from Spitzbergen across the Pole direct to Bering's Straits—a distance of 3,700 km. (2,220 miles) will not take more than 6 days, *i.e.*, one-fifth of the time during which the balloon can remain in the air."

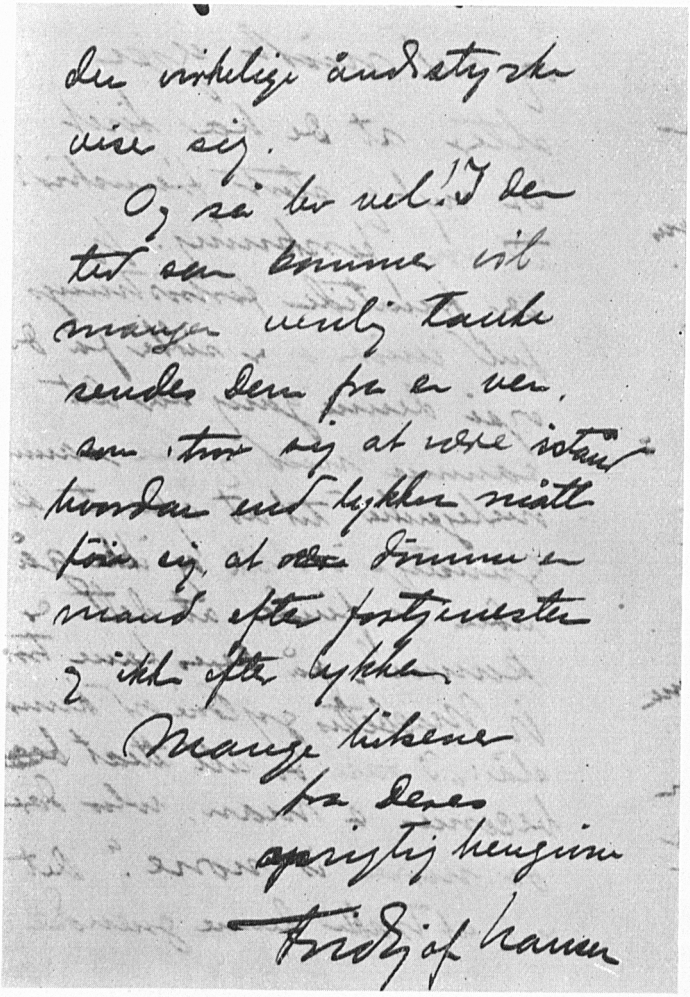
Continuing his lecture, Andrée points out that the physical features of the Polar districts present, in many respects, special advantages for travelling through the air in the summer-time.

"The continuous sunshine is also of service to aeronauts, as it maintains the temperature of the balloon and air at an extremely equable level, so that there will be little alteration in the carrying power of the balloon. The lowest temperature observed at Cape Thordsen in Spitzbergen during July 1884 amounted to 0.8° (33.44° F.), and the highest was 11.6° (about 53° F.). The lowest mean temperature of any day in July was 2.2° (about 36° F.), and the highest was 8.2° (46.7° F.). In these tracts, consequently, the daily variation of temperature at that time of the year is very inconsiderable, and so the movements of the Polar balloon will not be disturbed by great changes of temperature.

"It is of not less importance that the rainfall (all forms of moisture) in the Arctic tracts is very inconsiderable. Someone has made the remark that a journey like this might be annihilated by a single snowfall which weighted the balloon with, *e.g.*, 30 kg.



ANDRÉE, STRINDBERG AND EKHOLM DISCUSSING THE BALLOON JOURNEY



CLOSE OF A LETTER FROM FRIDTJOF NANSEN TO ANDRÉE

Translation

And so farewell! In the time that is coming many friendly thoughts will be sent to you from a friend who believes that he is able, whatever fortune may bring, to judge a man according to his merits and not according to his success. Many greetings from your sincerely devoted Fridtjof Nansen.

(66 lbs.) of snow per sq. m. (10.76 sq. ft.), and that for this reason a balloon journey in the Polar regions would have little prospect of success. Well, it would, undoubtedly, be very dangerous to have the balloon weighted down to such an extent by snow. But from the observations of the Swedish Spitzbergen Expedition it is seen that this will not happen, for not even the *sum* of the rainfall during June, July and August amounts to 30 kg. (66 lbs.) per sq. m. (10.76 sq. ft.), and the rainfall for the month of July, when the journey ought to be made, does not amount to more than 6.8 kg. (15 lbs.) per sq. m. If, in addition, we consider that the moisture (snow) which falls at temperatures above 0° (32° F.) soon melts, and that which falls at temperatures below 0° (32° F.) will blow away (for the balloon will not move as quickly as the wind), and finally, that the snow or ice which may possibly gather on the balloon is exposed to evaporation, which, in these tracts and at this period of the year removes from two to three times as much moisture as falls, then we easily see that the rainfall conditions are very favourable and by no means constitute a hindrance to a balloon journey in the Polar tracts."

Finally, Andrée emphasizes the fact that it was true no lengthy balloon journey like the one he now proposed had been carried out before, although instances were not wanting of balloon journeys which lasted several days. In France, for instance, two distinguished aeronauts, Vilfrid de Fonvielle and Maurice Mallet, had undertaken a five days' journey with a balloon of approximately the same size as Andrée's "Svea." They travelled only during the daytime; in the evenings they landed at some village or town, anchored their balloon, placed guards and then went to the nearest hotel, where they spent the night.

"Summing up his statements, the lecturer considered that it is not only possible to carry out a balloon-

journey across the Polar tracts, but that there is very much in favour of making an effort to do so. The attempt to penetrate to the Pole by means of vessels or sledges had hitherto resulted in little progress. Every minute of latitude which we conquer by the same means as those hitherto used will probably cost thousands of pounds in money and make great demands on human life.

" Is it not then more probable that we shall succeed in sailing to the Pole with a good balloon than that we shall be able to reach it with sledges as our means of transport or with vessels which are carried like erratic blocks, frozen fast to wandering masses of ice? Yes, I am certain that it will be justly acknowledged that we have far greater prospects of being able to penetrate into Polar tracts by means of a balloon than in any other way. It cannot be denied but that, by means of a single balloon journey, we shall be able to gain a greater knowledge of the geography of the Arctic regions than can be obtained in centuries by any other way.

" And who, I ask, are better qualified to make such an attempt than we Swedes? As a highly civilized nation, characterized for ages by the most dauntless courage, dwelling in the neighbourhood of the Polar regions, familiar with its climatic peculiarities, and by nature itself trained to endure them, we can hardly altogether help feeling that we have a certain obligation in this matter. And this so much the more that we have to maintain the goodliest traditions in the field of natural science in general, and, not least, in that of Polar research, and that we have in our midst not only old experienced men who have done great deeds in these regions, but also a whole band of young and determined men who have already dwelt and laboured there, and among whom there would be little trouble in enlisting comrades for such an expedition. Are we not, therefore, called upon, before other nations, as

being most fitted to execute this great task? And I believe I am not mistaken when I think that, just as we hope and expect that the peoples of Central and Southern Europe will explore Africa, so they, too, expect of us that we shall explore this white quarter of the globe!"

. . . . . .

That the plan thus put forward was more favourably received by the public than Andrée had ventured to hope was the result, in the first place, of A. E. Nordenskiöld, at the meeting of the Academy of Sciences, laying the authoritative weight of his words in the scale on behalf of the proposal. He gave his full and unconditional approval to it, and summed up his opinion in the following words: "You have heard my words. It is a long time since I embraced a proposal for a Polar expedition with real enthusiasm, but I do so on this occasion, and that for several reasons."

It is only justice to recall that Andrée's aeronautic plans, from their very first publication, met with the liveliest interest and most effective support on the part of many of the leading men in the scientific world of Sweden at that period. G. R. Dahlander the physicist, for instance, Andrée's teacher and friend, had favoured his plans from the very first. Professor Gustaf Retzius, the celebrated anatomist and anthropologist, certainly the most influential man among natural philosophers in Stockholm, had, through the Foundation "Lars Hiertas Minne," richly supported Andrée, not only when he undertook his experimental journeys with the balloon "Svea," but also when he first embodied his Polar plan. After this plan had become known through the lecture at the Academy of Sciences on the 13th February, 1895, another celebrated scientist of that period, Professor Mittag-Leffler, took steps to induce the French Academy of Sciences to discuss the question of the balloon expedition and to appoint a Committee to investigate the matter. The

result was that the Committee issued a, on the whole, favourable report.

In certain other circles abroad, too, Andrée's plan awakened good-will and interest. Thus it gained the good-will of Dr. O. Baschin, meteorologist at the Meteorological Institute in Berlin, and himself an aeronaut.

On the other hand, there was heard not a little amount of criticism of the undertaking, appearing not unfrequently in the form of satire. A "prominent scientific man who had also made a practical study of the art of navigation" considered that, in the neighbourhood of the Pole, it would be impossible to determine one's geographical position! Other prophets of evil predicted that birds would peck holes in the balloon, and that the travellers would be shot by savages, or would freeze to death amid the unheard-of cold around the Pole, or be suffocated in the attenuated atmosphere.

In one Austrian newspaper could be read the words: "Jener Herr Andrée, der mittelst Luftballon zum Nordpol und zurück fahren will, ist einfach ein Narr oder ein Schwindler." ("This Mr. Andrée, who wishes to go to the North Pole and back by means of an air balloon, is simply a fool or a swindler.")

After the February lectures in the Academy of Sciences and the Geographical Society, Andrée stood with his Polar plan revealed to the public, but without the financial means necessary to realize the undertaking. Then there happened a very dramatic and, for him, extremely fortunate incident. On the 10th May there came into his office at the Royal Patent Department, Alfred Nobel, the inventor of dynamite and afterwards, by his last will, the founder of the Nobel Prizes. Eight years earlier this original man had had a great debate with Andrée, during which, for the space of three hours, they discussed everything between heaven and earth and found that they held

different opinions on almost every matter. They had then parted with a hearty shake of hands. Nobel now came in with a gleam in his eye and asked if Andrée recognized him. The latter answered that he very well remembered their former discussion and that he was ready to continue from the point where they had finished. But Nobel said he had come on a very different errand. He had read about the proposed Polar expedition and wished to contribute a sum of money towards its realization. His donation of £1,100 made him the first donator towards the Polar expedition.

A week later he learned that money was coming in slowly, and then he increased his gift to £3,600, *i.e.*, one-half of the calculated cost, on condition that the other half was contributed within two months.

Nobel's extreme munificence changed the situation altogether. Andrée then applied to King Oscar, who offered him a sum of £1,660, and a few days later Baron Oscar Dickson gave him an equal amount. On the 4th June the sum necessary for the expedition was fully covered, by Professor and Mrs. Gustaf Retzius donating the £270 still required.

On the 29th July Andrée gave an account of his intended expedition in the presence of the International Geographical Congress in London. During the discussion that followed, there were many prominent speakers, among them Admiral Markham and General Greely, the Arctic explorers, who opposed the plan, but at last Andrée found an excellent advocate in Colonel Watson, the former chief of the English Military Aeronautic Corps. Colonel Watson considered that a balloon could very well keep in the air for a considerable period during an Arctic summer journey which would be favoured by slight variations of temperature and constant daylight.

IV

THE BALLOON AND ITS CONSTRUCTION

By G. V. E. Svedenborg

The balloon was manufactured by H. Lachambre, of Paris, under the strictest supervision of, among others, Per Nordenfelt, a Swedish engineer. It was then given a spherical form. During the winter 1896–97 the balloon was increased in capacity by the addition of two zones placed one on each side of "the equator." When, therefore, it made the ascent in 1897, the balloon was somewhat elliptical in form, with a capacity of 170,000 cub. ft.

The upper portion was made of three-double Chinese silk of the best quality, and the lower part was constructed of double silk of the same kind. The seams were sewn with silk and were covered, both inside and out, with strips of single silk glued fast to the balloon. The upper, three-double part of the balloon was varnished twice on either side. The lower part was varnished once on the inside and twice on the exterior. To the lower part of the balloon there were sewn fast strips of cloth, both inside and outside, for the purpose of carrying off water.

The balloon was not provided with a top-valve and, in this respect, probably differed from all other balloons provided with valves. It had, instead, two manœuvring valves, arranged at different heights near the equator, and worked by means of lines. When the balloon did not contain more gas than that above the upper valve, it could not remain floating in the air. In addition, there was a bottom valve closing automatically.

All these valves were too small to allow of the rapid escape of large quantities of gas, which would be necessary when landing. The balloon was, therefore, provided with a bursting-arrangement which made it possible to tear asunder the balloon-covering. The gas filling-hose was arranged on the lee side of the covering. After the balloon had ascended, this hose was employed to show the degree of over-pressure in the balloon by its distension.

Above the balloon there was placed *a net* of Italian hemp, which had been soaked in acid-free vaseline, in order that it should not be capable of absorbing water. At the bottom, the net ended in 48 carrying-lines which attached it to the carrying-ring.

To avoid the inconvenience of moisture and hoar-frost settling in the flat boxes formed by the meshes of the net, the upper part of the Polar balloon was covered with a calotte, or cap, arranged outside the net; this calotte was made of single, varnished silk. The action of such a calotte is extremely advantageous in the case of a balloon which employs drag-lines (guide-ropes), for, by its means, the balloon is now and then given slight shocks, or jerks, which shake the snow, etc., loose from the calotte. The calotte is also intended to serve as an insulator of heat, thereby preventing the cooling or overheating of the gas.

The car (gondola or basket) was plaited of wicker and Spanish cane, and was covered with a tarpauling. It had the shape of a covered cylinder. A port by the edge of the slightly arched roof gave admission to the interior of the car. The interior formed a single room in which the belongings of the Expedition were kept, and where three berths were arranged.

The car was attached to the carrying-line by means of six heavy ropes. In the intervals between these lines there were attached pieces of cloth which, together, formed the so-called "skirt," the object of which was to afford protection against wind, and to prevent the

aeronauts and any loose articles which happened to be on the roof of the car from falling overboard. Inside and out, the "skirt" was provided with a number of pockets suitable for instruments and smaller implements. At the height of the eyes of those who were standing on the car-roof there was suspended elastically an *instrument-ring*, on which were arranged the Expedition's instruments.

A rope-ladder led from the roof of the car up to the *carrying-ring*, the upper side of which could be reached by a hatch-covered hole in the roof. In the carrying-ring there were arranged baskets and hanging pockets of cloth which contained most of the belongings of the Expedition, the provisions especially. To the carrying-ring, too, which was of very strong construction, there was attached a system of drag-lines.

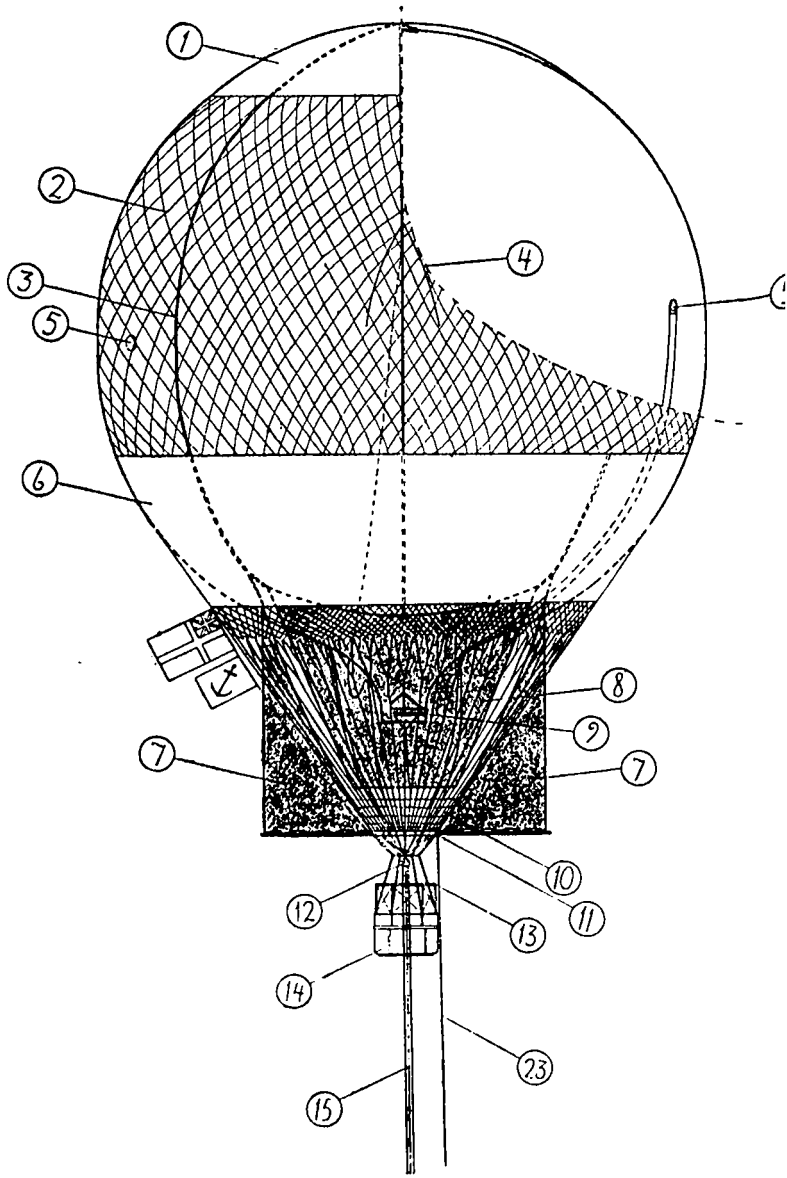
The drag-lines (guide-ropes) and the ballast-lines (*i.e.*, ballast in the shape of ropes) were intended, in the first place, to keep the balloon at a fairly constant height above the surface of the earth.

If the balloon becomes a little wet, or cooled some degrees below its normal temperature, it soon grows "unwilling" and "tired," *i.e.*, it loses some of its carrying-power. Such diminutions in carrying-power were to be counteracted by the drag-lines in such a way that, when the balloon sank, a great part of the weight of these ropes would be sustained by the ground. The sinking of the balloon must cease when a sufficient length of the lines rested on the earth, and the balloon had thus been relieved from a corresponding weight. If, on the other hand, the carrying-power of the balloon was increased, *e.g.*, by the action of the rays of the sun on the gas, the balloon would not be able to rise to any great height, for, the higher it rose, the greater would be the length of drag-line it had to support.

The total length of all the drag-lines together was 1,100 yards and their weight 16 cwt. At a normal

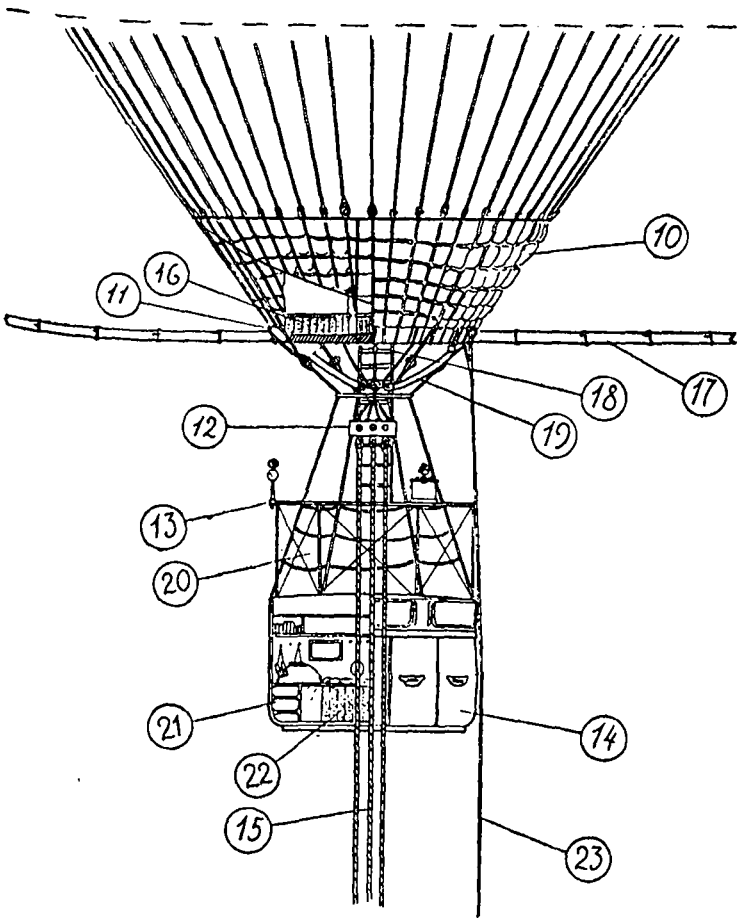
height of the balloon (*i.e.*, about 160 yards above the ice), 680 yards of drag-line, weighing 10½ cwt., would be suspended in the air and 420 yards, weighing 6½ cwt., would drag along "the ground." These drag-lines or guide-ropes were three in number. To prevent them becoming entangled with each other they had been made of varying lengths. For the purpose of more certainly avoiding the danger which might arise should the balloon descend suddenly, there were attached to the balloon eight ballast-lines, 77 yards long, which hung freely suspended. These, when the height of the balloon above the surface of the earth became less than 77 yards, began to act in the same way as the drag-lines. As the total weight of all these ballast-lines was 880 lbs., and as 10½ cwt. of the drag-lines hung in the air, the balloon, consequently, could lose as much as about 18½ cwt. of its carrying-power before the car touched the earth.

Each drag-line consisted of an upper part of hemp, and a lower section of cocoa-nut fibre. Each of the cocoa-nut fibre lines was provided, at a distance of 55 yards from that end which rested on the earth, with a slenderer part, or neck, intended to make the line weaker just there. The object of this was that, if the line should catch fast in anything, it would not be able to hold fast the balloon, but would break instead. As, however, each line had not more than one "weak" point, it might happen that the balloon would still be held fast, in consequence of a line, which had already broken at the weak point, once more fastening. To be able, in such a case, to release the balloon without having to cut free the entire line, there had been arranged, at the point of union between the hemp part and the cocoa-nut fibre part, a screwing-device, in such a way that it could be unscrewed by means of twisting the rope. This twisting could be brought about with the help of a special mechanism arranged close by the balloon, provided with a powerful gearing.



ANDRÉE'S POLAR BALLOON

Diagram based on Andrée's drawings and descriptions. In the detailed drawing of the car, the left part is seen in section.



1. Calotte.
2. Net.
3. Carrying-line for sail.
4. Bursting-arrangement.
5. Manœuvring valve.
6. "Belly-band."
7. Side sail.
8. Middle sail.
9. Bottom valve.
10. Packet pockets in carrying-ring.
11. Carrying-ring.
12. Mechanism for attaching guide- or drag-ropes.
13. Instrument-ring.
14. Car.
15. Guide- or drag-ropes.
16. Packing basket in carrying-ring.
17. Bamboo pole for attaching the side sails.
18. Rope-ladder between roof of car and carrying-ring.
19. Tackle for manœuvring the guide-ropes.
20. "Skirt."
21. Packing basket in car.
22. Berth in car.
23. Ballast rope.

When, on starting from Danes Island, these screw-arrangements screwed loose in consequence of the kinks which had got into the lines and of some of the lines having probably caught fast in a stone, this was the result of the torsion in the tautly-stretched ropes acting in the same way as the mechanism just mentioned would have done.

But the drag-lines had another task besides that of balancing the balloon, for it was by their help that the steering of the balloon was to be carried out. Andrée's own description of the steering-arrangement is as follows:

"A balloon, which floats perfectly freely in a current of air, moves in exactly the same direction and at precisely the same speed as those of the current of air. This agreement between the current of air and the movement of the balloon makes it useless to provide the balloon with such accessories as sails, rudder, etc. To make a balloon deviate from the direction of the wind, it will, therefore, be necessary to procure for the balloon another speed, either greater or less than that of the wind. If it is possible to give the balloon a greater speed than the wind has, it can be steered in all possible directions, even right against the wind. But if the balloon can only be given a speed less than the wind's, it cannot be steered against the wind, but it may be made to deviate more or less from the direction of the current of air. For it is evident that if a balloon which moves slower than the wind is provided with a sail sloping to the direction of the wind, then the wind will force the balloon along in a direction at an angle to its own course, just as it does with a sailing boat, and it is clear that, by altering the position of the sail, it must be possible to bring about modifications in the amount and direction of this deviation. It is, thus, clear, that if a balloon is provided both with sails and with heavy guide-ropes, which latter prevent the balloon from moving as fast as

the wind, it will be possible to steer it within certain limits. But this steering will not be effected—as is done with sailing boats—by arranging the sail in a certain position to the wind, but such arrangements will be made instead as will allow the entire *balloon* to be rotated around its vertical axle, whereby the sail will present itself to the wind at varying angles.

"This rotation of the balloon is brought about by means of lines and blocks, which move the attachments of the guide-ropes to the one side or the other of the central position, *i.e.*, the position the balloon assumes when it is running right before the wind. When, consequently, the balloon is rotating, then the system of sails which is attached to it will partake of this rotation, and will assume an oblique position in relation to the wind. The amount of this deviation which it is possible to obtain depends, of course, on a number of circumstances, such as the friction of the drag-lines, the velocity of the wind, the size of the sail in proportion to that of the balloon, etc."

The sail-system of Andrée's Polar balloon consisted of three sails, a central sail and two side ones. The former was arranged below the balloon in the space bordered by the balloon, the carrying-lines and the carrying-ring. The lateral sails were arranged at the sides of the central sail and in the same plane, but outside the carrying-lines. The entire sail-area amounted to no less than 818 square ft., or nearly one-fourth of the great circle (= projection) area of the balloon. During the experimental steerings of the balloon "Svea," the sail-area was one-eighth of the great circle surface, and even then Andrée succeeded in obtaining a deviation of almost 30° from the direction of the wind. The dirigebility of the Polar balloon, consequently, ought to have been not inconsiderably greater than that of the "Svea." The upper part of the sails leaned backwards, so that the pressure of the air would contribute to lift the balloon.

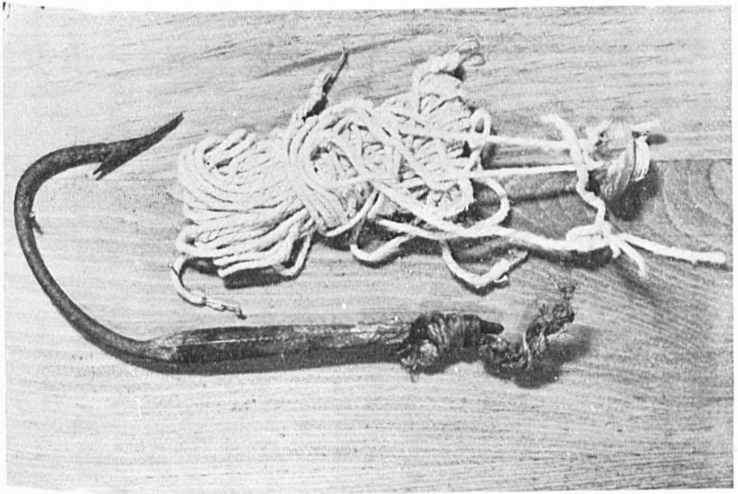
Below the equator of the balloon and on its leeward side, outside the net, there was arranged a broad girdle, the so-called "belly-band." The object of this was to protect the lower part of the balloon from the pressure of the air, for, during the course of his experiments with the "Svea," Andrée had discovered that the pressed-in part acted as a sail, thereby affecting the steering of the balloon in a way which could not be controlled.

For the purpose of landing, *two anchors* were taken, each weighing 66 lbs., and three grapnels, varying in weight between 26 and 13 lbs., one of them belonging to the bursting-arrangement.

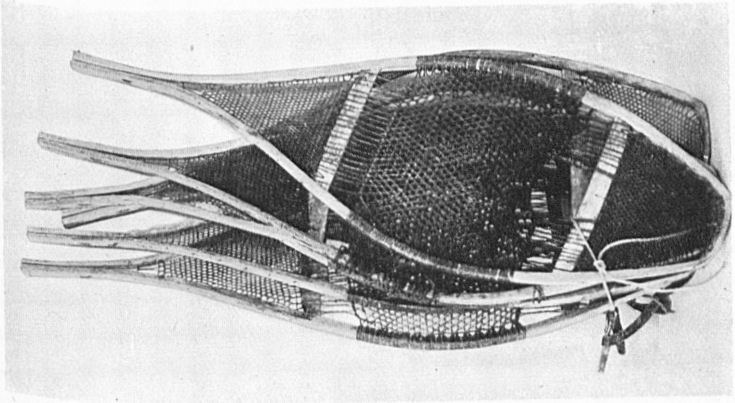
On starting, on the 11th July, there was also taken sand-ballast weighing about 7 cwt., in addition to which much extra ballast was present in the form of ammunition, necessaries of life and instruments, taken in excess of the equipment absolutely necessary. Andrée considered he might just as well take reserve equipment as sand, for, under certain crcumstances, he might be able to utilize such reserves.

The provisions were calculated for $3\frac{1}{2}$ months—$1\frac{1}{2}$ months in the balloon and 2 months on a sledge-journey. They were kept in boxes made of aluminium or thin plates of copper and so shaped that they could be conveniently placed within the above-mentioned pockets in the carrying-ring. The total weight of all provisions amounted to 15 cwt., of which about 4 cwt. consisted of water and spirit for cooking purposes, carried in aluminium vessels. In addition to the above supply of provisions there was also a reserve, so that, on its start, the Expedition was provided with food, and the like, for a total of six months.

The danger of fire made the preparation of the food on board a balloon filled with hydrogen gas a very difficult problem, but a friend of Andrée's, Ernst Göransson, C.E., succeeded in solving it in a most ingenious way. The *cooking-apparatus*, constructed by



ANDRÉE'S FISHING LINE, MADE OF STRING, PINS AND A COD FISH-HOOK



THE EXPEDITION'S SNOW-SHOES

THE EXPEDITION'S COOKING APPARATUS, CONSISTING OF A PRIMUS STOVE AND UTENSILS FOR COOKING AND FOR MELTING SNOW

THE PLANKTON DREDGING NET USED BY ANDRÉE DURING THE JOURNEY OVER THE ICE, MADE OF BALLOON-CLOTH AND A TEA-STRAINER

him, hung 26 ft. below the car, and was heated by a spirit-lamp, which by means of special devices, could be lit and extinguished where it hung by the persons in the car. A mirror, placed at an angle of 45° in front of a hole in the apparatus lying level with the flame, allowed the cook to see if the lighting had been successfully carried out or not.

For the purpose of giving the outer world information with regard to the progress of the balloon journey, the Expedition carried buoys and carrier-pigeons. *The buoys* consisted of balloon-shaped balls of cork, wound round with a copper net, and containing a closed metal cylinder intended as a letter-box. Each such buoy weighed about 4½ lbs. It was the intention that these buoys, twelve in number and carrying communications placed in the metal cylinder, should be thrown overboard at various places in order that they might drift with the ice or with ocean-currents, until they were possibly observed and picked up. One of the buoys was larger than the others; this was to be thrown down at the northernmost point reached by the Expedition.

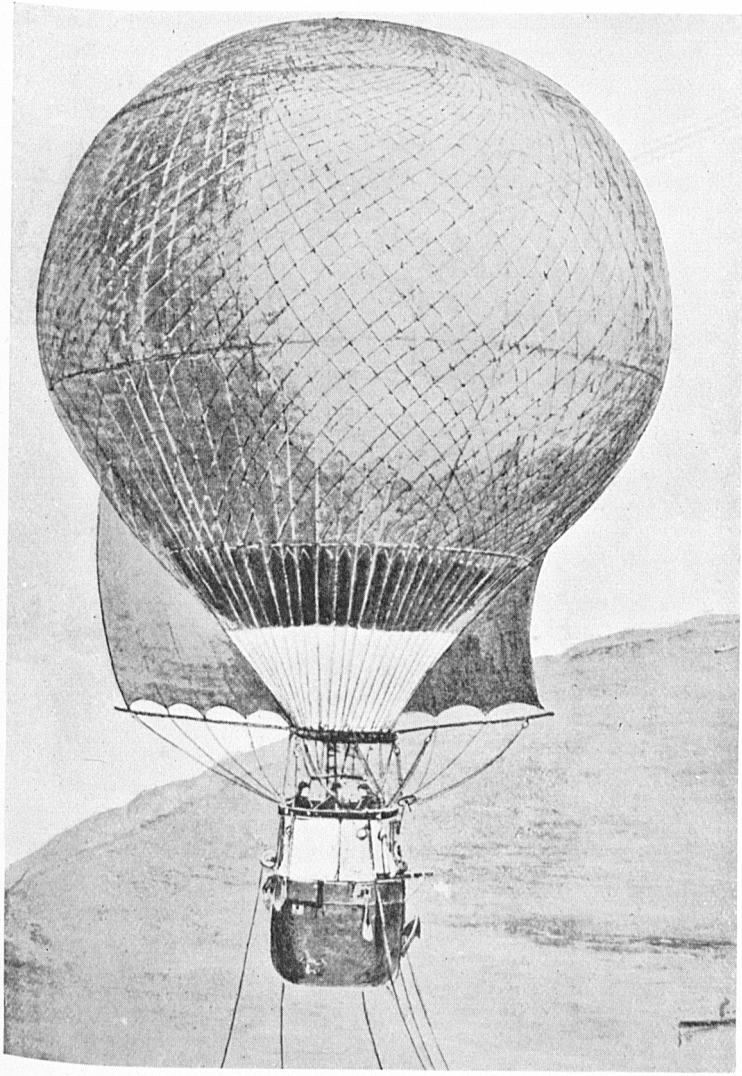
The carrier-pigeons were presented to the Expedition by the kindness of the *Aftonbladet*, an evening Stockholm paper. The pigeons carried despatch-holders in the shape of parchment-cylinders fastened to the central tail-feather of the bird. The balloon carried 36 pigeons in small baskets, made for the purpose.

For the eventuality of the Expedition's being compelled to land and make its way home across the ice, *three sledges* were taken. In addition, a number of depôts were also made. At the starting-point, at Pike's House on Danes Island, there was placed a large supply both of preserved provisions and of ammunition. A smaller depôt was made at the Seven Islands, off the north coast of Spitzbergen. This was done with the kind assistance of Mr. Teodor Lerner in the little steamer "Express." The position of this depôt

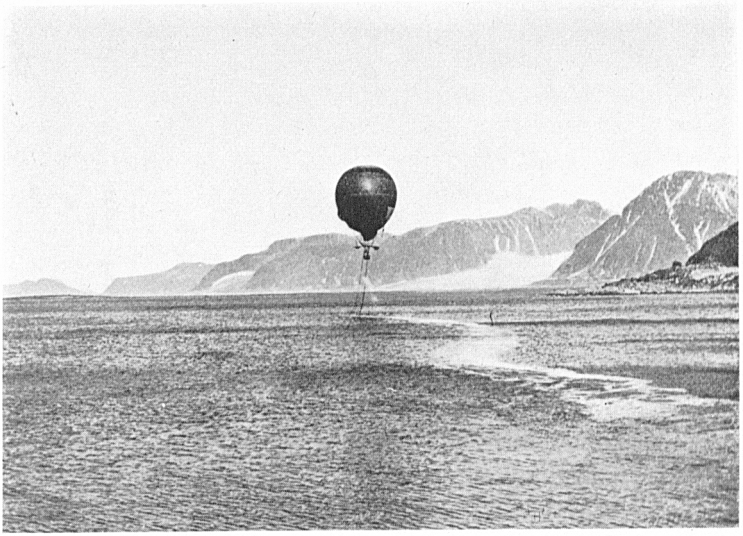
was shown by a mark easily observable from the north. Besides these, supplies of provisions, etc., were placed in Nordenskiöld's house at Mossel Bay, and a specially richly supplied depôt was made at Cape Flora, on Franz Joseph Land.

In order to protect the Polar balloon from damage by weather and wind, not only while it was being filled with gas, but also during the time when the Expedition was waiting for a favourable wind for its journey, it was necessary to have a *balloon-house*. The construction of this was entrusted by Andrée to Ivar Svedberg, Chief Engineer. The task was carried out in an extremely meritorious way, the building being so constructed that it was possible to allow the balloon, at the moment of starting, to leave the house rapidly and without injury, protected to the last minute against gusts of wind by a provisional, adjustable leeward-wall. The power of resistance possessed by the balloon-house is made evident by the fact that it could stand, almost quite undamaged, the Polar storms of the winter 1896–97, although such an eventuality had not been thought of by the constructor. Both the erection of the building and its partial demolition when the start was made were carried out in perfect accordance with the calculations, and without any difficulty at all.

The *hydrogen-gas apparatus* necessary for filling the balloon was constructed by Ernst Ek, C.E., in accordance with the directions given by Andrée. The gas was obtained by the action of sulphuric acid on iron shavings. The concentrated acid, which was transported from Stockholm in pressed steel tanks, was first diluted with sea-water, after which it was allowed to act on the iron shavings in a special developing vessel. The gas thus obtained was washed, purified and afterwards dried in a special apparatus, and was then led through an observation box, provided with anemometer, thermometer and a hair-hygrometer, into the balloon. At Spitzbergen, in 1897, there was developed during



ANDRÉE'S BALLOON, THE 'EAGLE'



THE 'EAGLE' OVER VIRGO HARBOUR

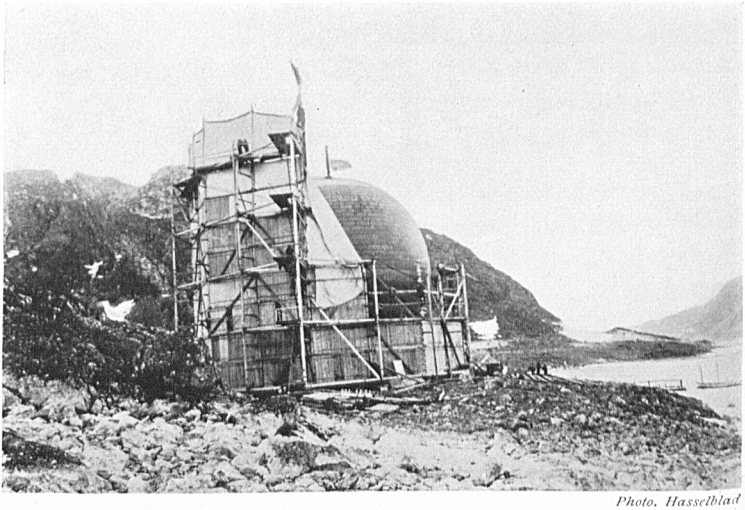


Photo. Hasselblad

THE 'EAGLE' ON THE POINT OF STARTING, JULY 11th, 1897

the 86 hours the apparatus was at work, a total of 182,000 cub. ft. of gas, *i.e.*, about 21,200 cub. ft. per hour. The development of the gas went on quietly and well, and its quality was the best imaginable. The tests that were made, to a total of more than 100, showed not the slightest trace of free acid, nor of hydrogen sulphide in the gas.

Every detail of the equipment was submitted to the most careful supervision on the part of Andrée. Now and then it happened that one or other of his friends proposed alterations, but Andrée was always able to answer that he had already considered the eventuality and had made the necessary experiments in that connection. Then he explained the reasons that had induced him to employ the detail which had been criticized.

Only in one instance had Andrée decided to follow advice that was given him, but he did so against his own conviction. It was in regard to the above-mentioned screw-connections of the drag- or guide-ropes. He wrote about this: "The fear was expressed that the drag-lines would fasten in something, and that we should never get loose again. That danger formed the kernel of the objection, and it was the obstinacy with which the criticism was continued that induced me to construct the so-called 'screw-connections or splicings'—an invention which, perhaps, it not without ingenuity, but which, in my own opinion, is altogether unnecessary, and has no other advantage than that it affords a certain sense of security." Had Andrée, in this instance, followed his own intentions there would have been no screw-connections, and then he would have begun his journey at Danes Island in possession of his guide-ropes. The sequence will show us of what importance this would have been for the course of the journey.

V

ANDRÉE'S FIRST JOURNEY TO SPITZBERGEN

ANDRÉE's first journey to Spitzbergen to carry out his plan of flying to the North Pole by balloon began in Gothenburg on the morning of the 7th June, 1896, when the Expedition's vessel, the carrying-steamer "Virgo," glided out of the harbour amid jubilant cheers from the thousands of people assembled to witness the start.

The "Virgo" had a crew of thirty men under the command of Captain H. Zachau. The members of the balloon expedition were: S. E. Andrée, Chief Engineer at the Patent Department and Leader of the Expedition; Nils Ekholm, D.Phil., Assistant at the State Central Meteorological Institute, the meteorologist and astronomer of the Expedition, formerly the Chief of the Physical-Meteorological Station at Cape Thordsen, where Andrée had also been stationed, and Nils Strindberg, B.A., physicist and assistant technologist. Strindberg was also an extremely clever photographer and had constructed an ingenious camera for use during the expedition, for which he had procured the photographic equipment.

Besides these three, there were on board a balloon-technicist, Mr. H. Lachambre, who had supplied the balloon, and two carpenters who were to erect the proposed balloon-house at Spitzbergen.

The medical man of the party was Dr. C. Ekelund. In addition there were Professor Svante Arrhenius, the celebrated chemist, who seized the opportunity, as the

hydrographer of the expedition, to undertake a summer journey to the Arctic regions, and G. Grönberg, B.A., the zoologist of the company.

At Tromsö there came on board a Geological Expedition, consisting of Gerard de Geer, State Geologist, and Lieutenant O. v. Knorring, who had been invited by Andrée to go by the "Virgo" to Spitzbergen.

The voyage to Spitzbergen was at first favoured with fine weather and ice-free water, but off Hornsund they encountered floes which necessitated several alterations of the course, this, in its turn, greatly delaying their progress northwards. It was not until the 20th June that they reached Isfjorden (Ice Fjord), where a short stay was made and where the Geological Expedition disembarked. When the journey was continued the passage grew better; they met no ice worthy of mention, and on the 21st June the "Virgo" anchored in the strait between the Norsk Islands.

They had now reached their destination, and the very next day the three members of the intended balloon journey carried out seven-hours' reconnoitring in order to discover some suitable place for the erection of the balloon-house. During the course of this search, both Norsk Island and Amsterdam Island were inspected, but were found to be not very suitable. Finally, on the north side of Danes Island they discovered some hollows, open towards the north, but otherwise well protected. One of these was chosen as the starting-point of the balloon expedition, as its position seemed to satisfy all the demands that the plan could make. Besides this, close to the place in question, there lay a building which had been erected by Mr. Pike, an Englishman, who had given permission for the building to be used. Respecting the advantages of this situation as compared with others, Andrée writes:

"The ground is firm, free from snow, and dry.

The place intended for the balloon-house lies close by the shore, so that there will be hardly any carriage of timber necessary. Farther along the beach the land lies lower. If the hydrogen-gas apparatus is erected there the gas will at once easily flow into the balloon. The place is surrounded by heights on every side towards which the start shall *not* be made. Thus the balloon-house does not run the least risk of being exposed to strong pressure from the wind. In the neighbouring bay the vessel is protected against every wind and current, and against pressure from the ice. The depth is not so very great, but it is sufficient to allow of the vessel's being moored so near the shore that the unloading can take place with comparative ease."

On the 23rd June the "Virgo" was very carefully taken into Danes Hole, where it anchored about 160 yards from the shore by Pike's House, and the unloading of the vessel began at once.

Between the 25–28th June the hydrogen-gas apparatus was carried ashore, and this was followed on the 30th by the balloon, which was in a very good condition. The impregnation of the ballast-lines was at once begun. The work of erecting the balloon-house, which, in consequence of the work of discharging the vessel, had hitherto gone on but slowly, now made rapid progress, and by the 1st July the building was up to the first floor. On the 5th, the car was unpacked and was found to be all right, too.

Then the second storey of the balloon-house was begun, and the chief parts of the gas-apparatus were this day placed in position. The period between the 8–11th July saw the completion of the second and third storeys and the commencement of the fourth. The guys for the house were fastened, some in the rock and others to large stones embedded in the ground.

Andrée's Diary here contains the following memoranda:

"When I had finished my watch at two o'clock last night (11–12th July), I went on shore to sleep in the car. I had the sleeping-sack for bolster, and the blankets as a covering. There was a fresh wind blowing and the car was arranged in such a position that it might sway a little with the wind. I had with me the first part of the 'Journey of the Vega,' and read a few pages, afterwards placing the book on the bookshelf which had been newly set up. In this way I dedicated, as well as I could, the new vessel."

Then came a tourist-steamer, "Express," which was obliged to stay until the 17th on account of a storm. On the 13th the men began to put down the floor of the balloon-house, which, during the heavy winds of the last few nights, had shown that it could stand the strain. The balcony of the house was put up, and the two spars for the top wire erected. It proved that an alteration had to be made in the car, the makers not having followed the drawings. The same day the hydrogen-gas apparatus was made as good as ready and a friction-test of the drag-lines was carried out by means of a little steam-sloop. The test showed that, with water-friction, these guide-ropes were able to bring about a diminution of some 50 per cent. in the rate of speed.

A trial-balloon, filled with hydrogen from a special gas-apparatus, the property of the University of Stockholm, was christened "Sverige" and sent up amid cheers. It rose right up into the clouds, and so it was impossible to see the direction it finally took. In the evening of the 19th we practised splicing, tying knots, etc., "in order that we should not be too clumsy in such things," writes Andrée. The next day the balloon was taken out of the balloon-box and after being thoroughly examined was found to call for no remark.

On the 21st, the balloon was spread out and the valves put in their places; this, however, was attended

by some difficulty, as they had not been constructed in accordance with the order. After some adjustment they acted, however. The next day began with a heavy snowfall which made everything wet through. At two o'clock on the 23rd the filling of the balloon with gas was begun. The gas-apparatus worked irreproachably. An extensive sampling of the supply of preserves was made, and gave, in general, good results.

On the 24th and 26th there came two tourist steamers, "Erling Jarl" and the above-mentioned "Express," both of them bringing mail. At four o'clock on the 27th the filling of the balloon was completed, one of the most difficult and most important parts of the work. Then began the packing of the provisions and instruments into the car, and the steering-device was fixed in its place. As regards the latter, there was detected a fault in the make which necessitated the employment of a reserve steering mechanism instead of the one intended.

During the first days of August the Expedition waited in vain for a suitable wind. Everything was ready for the start, the preparatory work had been carried out without any very great difficulty; one goal, long wished for, had been reached and the only thing wanting was a wind that could carry the air-balloon to the Pole. "Everything has turned out exceedingly well and according to our wishes," writes Andrée, "so that, if Nature will only do its share, the matter would soon be clear."

According to the agreement made with the owners of the "Virgo," the vessel was not to be detained longer at Spitzbergen than until the 20th August, and the conditions of insurance did not permit of a longer stay being granted than until that date. With these facts before his eyes, Andrée writes on the 4th August:

"Last night, however, I was obliged to face the thought that perhaps we might not be able to start

this year. Zachau cannot wait longer than to the 20th, as otherwise the vessel will lose its insurance. We must, consequently, begin to get things on board again on the 14th. And Ekholm thinks, too, that we cannot make an ascent later."

On the morning of the 14th August a vessel entered Virgo harbour. Andrée and his men recognized it at once and, amid hurrahs, rowed out to the ship to greet those on board.

It was the "Fram," Fridtjof Nansen's celebrated vessel, now on its way home after a unique voyage across the Polar Sea. With a crew of ten men under the command of Captain Otto Sverdrup the "Fram" had left Christiania on the 24th June, 1893, to endeavour to carry out, under the leadership of Nansen, the latter's gigantic plan of first freezing fast in the ice and then drifting with it right across the Polar Sea.

Everything was all well on board, but two men were wanting, viz., Nansen and Lieutenant F. Hj. Johansen. To their astonishment the Andrée-men heard that, after the "Fram" had drifted with the ice about one year and a half, Nansen and Johansen had left the vessel on the 14th March, 1895, for the purpose of making their way on skis farther to the north, and, if possible, reaching the North Pole, while the ship was to continue its journey with the ice.

Now the "Fram" had happily returned, but where were the two men? The joy felt at the successful journey across the Polar Sea was troubled by the uneasiness felt respecting the fate of the explorers. The riddle was solved when, on the 21st August, the "Fram" put in to Skjærvö in Norway and, with its crew, met Nansen and Johansen, who had reached the Norwegian mainland as early as the 13th of the same month.

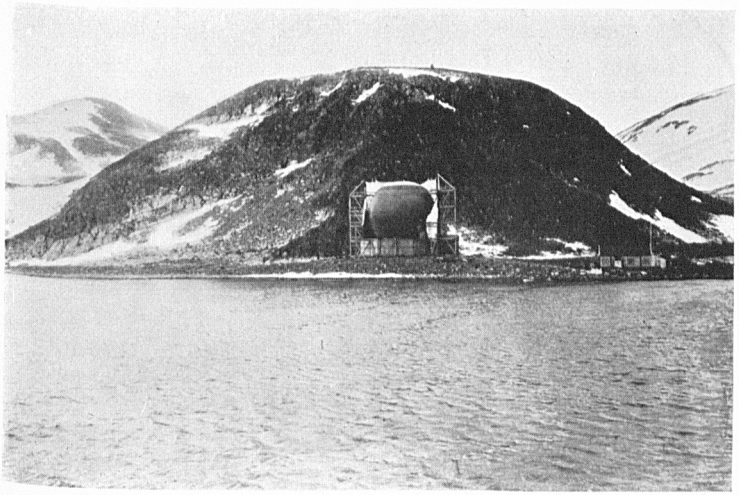
During the period 6–14th August, the meteorological journal of the expedition bears witness that the wind-conditions rendered impossible every thought of

an ascent during that time. And on the 15th, Andrée notes in his Diary: "to-day we have ground the scissors with which the balloon is to be cut open."

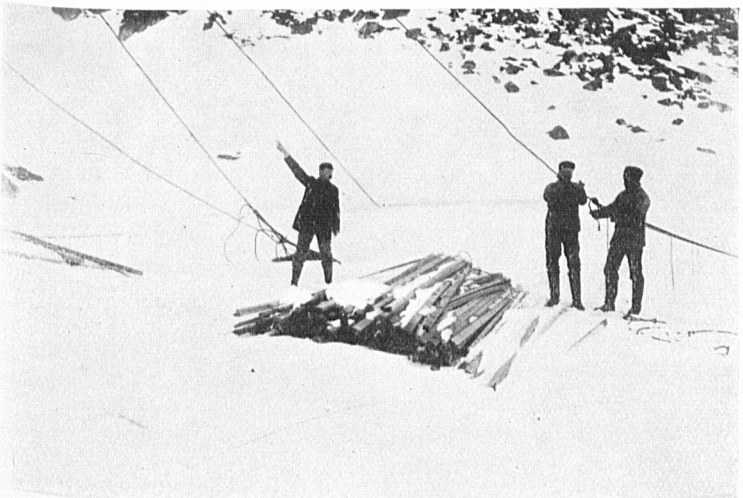
The next day, eight carrier-pigeons were released, with a despatch stating that the thought of starting that year had been definitely abandoned. On the 17th August the balloon was emptied of gas, and on the 20th the "Virgo" lifted anchor and began the voyage home.

Andrée's first attempt to realize his proud aeronautic plan had, consequently, been unsuccessful in so far that it had been found impossible to make an ascent. If we search for the cause of this, we discover two circumstances to which regard must be paid. The first was that Andrée started at a very late part of the summer. If we compare the time when this first attempt was made with that when the Expedition started the following year, we see that, in 1896, he was not ready to start before about the 1st August, *i.e.*, almost three weeks later than the day when he began his journey in 1897. In an article in *Ymer*, 1895, Dr. Nils Ekholm has pointed out, that from the point of view of weather, the month of August is less favourable than July. The other circumstance is nearly connected with the lateness of the time, as Andrée, in consequence of the conditions of insurance mentioned above, had no more than three weeks in which he could wait for a favourable wind.

The result of all this was that no ascent was made, a fact which Andrée himself was the first to deplore. But he did not allow himself to be depressed by this reverse; he merely put off his plan until the following year, and on his return to Sweden, resumed his position as Chief Engineer at the Patent Department.



DANES ISLAND AND THE BALLOON HOUSE, JULY 11th, 1897



ANDRÉE DIRECTING OPERATIONS AT THE BALLOON HOUSE

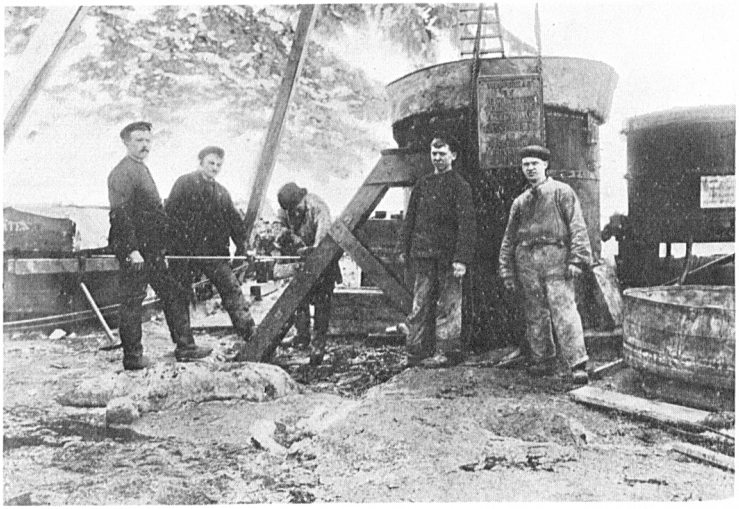


Photo Hasselblad

ASSEMBLING THE HYDROGEN GAS APPARATUS

Photo. Hasselblad

TESTING THE 'GAS-TIGHTNESS' OF THE BALLOON

VI

THE BASE ON DANES ISLAND

For the purpose of Andrée's second journey to Spitzbergen the Swedish Government had placed the "Svensksund" gunboat at the disposal of the Expedition. The vessel left Gothenburg Harbour at 6 p.m., on the 18th May, 1897.

The commander of the "Svensksund" was Count C. A. Ehrensvärd, then Captain in the Swedish Royal Navy, now Admiral and Chief of the King's Staff. In addition to Andrée and Strindberg, the balloon Expedition consisted of Knut Fraenkel, C.E., who had replaced Dr. Ekholm and who, since the beginning of 1897, had studied aeronautics in France; there was also Lieutenant G. V. E. Svedenborg, now Lieutenant-Colonel, who was attached as reserve in the event of any of the other members being prevented from taking part in the Expedition.

The gunboat carried the balloon, the balloon-net, the car, the drag-lines and the hydrogen-gas apparatus. The remaining part of the equipment—the provisions for the balloon party, a steam-engine, etc.—were sent by the cargo-vessel "Virgo," which had been placed at the disposal of the Expedition this year too.

The "Svensksund" arrived at Tromsö on the 24th May. It was not until three days later that the "Virgo" came, and then the two vessels went on to Spitzbergen together. The voyage passed without adventure; the sea was practically speaking ice-free, and it was not before they entered Virgo Harbour that they encountered any ice. There, however, it

was packed closely, and it was only with great difficulty that it was forced. The vessels moved forwards, but only very slowly.

The nearer the party approached its starting-point, the greater became the interest displayed in the question of the balloon-house and its condition. This was, too, a matter of the greatest importance, for if the building had been blown down, it would delay the start very considerably, and might even postpone an ascent altogether. Finally, Andrée caught sight of a couple of flagstaffs which pointed out the position of the house, of which the two upper storeys soon became visible.

By the 30th May the Expedition was safely in harbour and the two boats anchored off Pike's House.

The balloon-house was not altogether undamaged, but, fortunately, it had not received much hurt, and it was a relatively easy task to put it into its former condition.

While this restoration was going on, the cargo of the two vessels was landed. By the 14th June the balloon had been placed inside the balloon-house, where it was filled with air, the better to be able to varnish the seams interiorly. This work went on until the 19th, when the filling of the balloon with hydrogen-gas began, under the direction of Engineer Stake. This work was completed by the 22nd.

The balloon was the same as that used when an ascent had been attempted in 1896, but it was now of increased volume, it having proved that the weight of the cloth was greater than had at first been calculated. Its tightness was investigated by narrow strips of linen, dipped in acetate of lead, being placed above the seams. The presence of any leaks was shown by a black patch arising on the strip of linen.

By the 16th June the "Virgo" had unloaded and started for home. On the 25th there arrived the steamer "Express," known from the year before, and

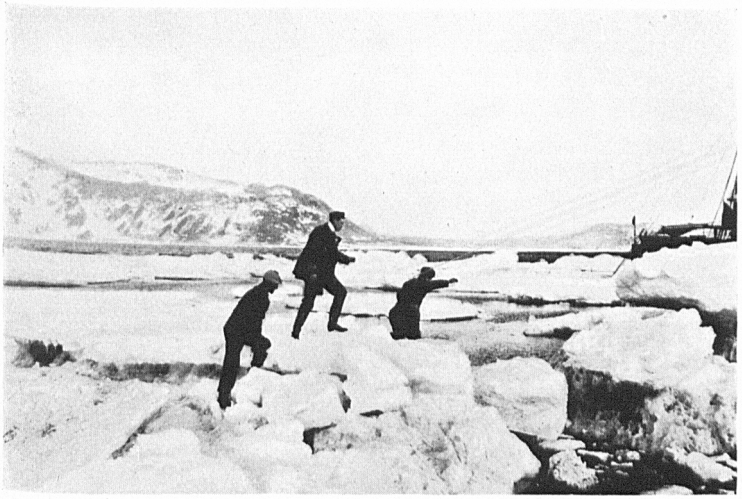


Photo. Hasselblad

COMMUNICATIONS BETWEEN THE 'SVENSKSUND' AND THE LAND WERE OFTEN MADE BY MEANS OF THE FLOATING ICE

Photo. Hasselblad

THE 'SVENSKSUND' (*left*) AND 'VIRGO' IN VIRGO HARBOUR

Photo. E. Christell

ANDRÉE'S CAMP ON DANES ISLAND, 1928

(To the right, remains of balloon-house and hydrogen gas apparatus, to the left remains of Pikes House)

on the 27th there came another tourist steamer, "Lofoten," carrying mail. An agreement was made with the captain of the "Express" that, after the departure of the balloon, Svedenborg should be allowed to go by the steamer to the Seven Islands, for the purpose of making a depôt of provisions as far north as possible.

No great difficulties were attached to the preparatory work for the ascent of the balloon. Here, Andrée had great help from his experience of the year before, but, in spite of this, things were not altogether in order before the 1st July. The reason of the delay was that the testing and varnishing of the balloon had taken much time, and had necessitated the services of so many hands that much other business had to be put off.

During the night between the 6th and 7th July there arose a violent storm with heavy squalls which made the balloon move with such violence in the balloon-house that there was constant danger of its being injured.

The lengthy period of waiting, and the storm, led to the loss of a great amount of gas, so that the balloon had to be supplied with this quantity. The question had arisen of the Expedition availing itself of the wind which blew from the south-west on the morning of the 7th, but the breeze dropped considerably during the course of the day, and swung round to northerly, and it remained mostly northerly during the following days too.

VII

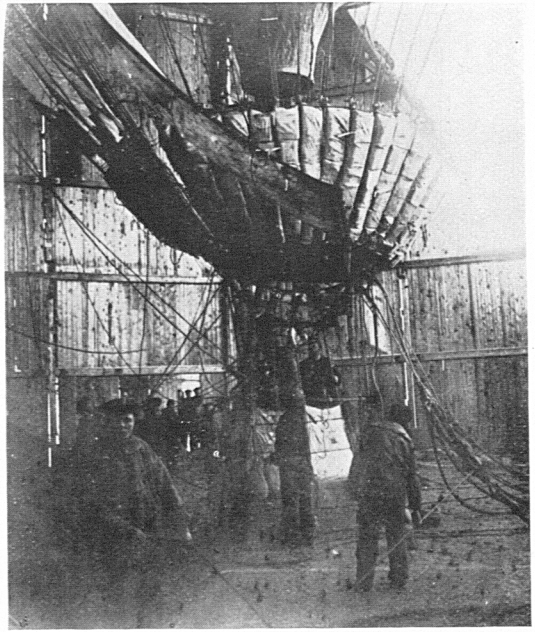
THE JOURNEY OF THE "EAGLE" ("ORNEN") 11–14 JULY, 1897

It is the 21st June, 1897, at nine o'clock in the evening. Nils Strindberg is sitting alone in the balloon-house close by the balloon, which is somewhat more than half filled. He is writing to his fiancée. A hard, north-east wind is wailing in the upper parts of the building and among the cliffs above it. He is watching by the hydrogen-gas apparatus, but now his hands are free, for the filling goes on smoothly. His thoughts are with his sweetheart in Stockholm, and he recalls the happy days gone by and dreams of his future, of which he knows nothing. He is hopeful, however, for the balloon is varnished and ought to be much more gas-tight than last year. The expedition has all the advantage of the summer, with its good, favourable winds and long sunlight. Why should not the enterprise succeed? He himself believes in it firmly.

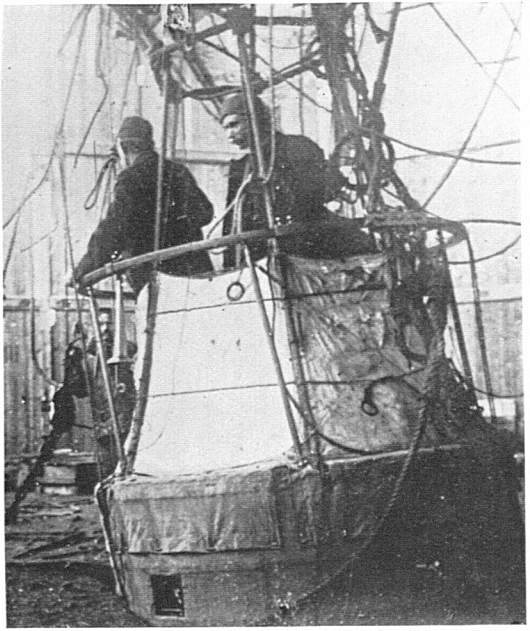
But twenty days were to elapse before the balloon he was watching rose and began its journey. Unfavourable meteorological conditions prevented the start until the 11th July.

11th July.

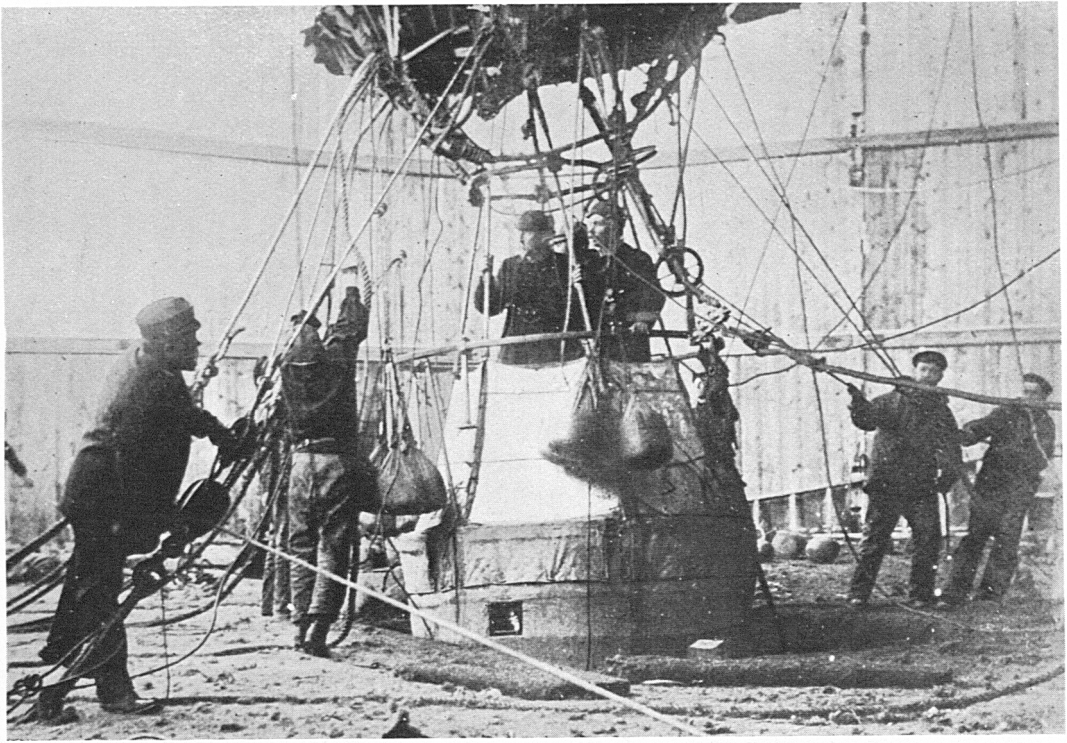
It was only three o'clock in the morning on the 11th July when the water in Virgo harbour, which, previously, had been as smooth as a mirror, was ruffled by the first cat's paws from the south-south-west, and by four the wind had grown quite fresh, with now and then a squall, while the clouds moved northwards at



THE CAR ABOUT TO START
(Note the sails and the packet-bag in the carrying-ring)



THE CAR AT THE MOMENT OF STARTING



READY TO START, JULY 11th, 1897

a good rate. Everything pointed to the south wind being steadier on this occasion than before, and that this supposition was general was confirmed by the fact that two Norwegian sealers put into Virgo, seeking shelter from the storm from the south, which they were certain would last some days.

Andrée was called early in the morning and went on shore to examine things a little more in detail, and said at eight o'clock that he would like to think the matter over for an hour; all personal belongings were to be packed up, at once, however, letters finished, etc. During the course of the morning the heavens grew still clearer, so that between eight and nine it was quite so in the north, while the clouds from the south sailed across the sky in quick succession. The velocity of the wind, which close to the surface of the earth varied between 5–10 m. (16–32 ft.) per second, was clearly considerably greater at a height of 300–400 m. (975–1,300 ft.). Thus if the direction and strength of the wind were fairly favourable for an ascent, its very squally character spoke against it.

In log book 2 kept by Strindberg and found on White Island, there are nine pages written by him in shorthand. On the first of these, written on an ice-floe at 1 o'clock a.m. on the 21st July in 82° 38′ 7″ N. lat. and 29° 40′ E. from Greenwich, and addressed to his fiancée, there is given a detailed account of the hours before the start.

Strindberg says that it was glorious when it was at last determined that a start should be made. Andrée, Fraenkel, Strindberg, Svedenborg and Machuron were ashore examining the balloon from the roof of the balloon-house. After they had discussed the possibilities of starting for a while, Andrée asked what the others thought. "Shall we try or not?" Fraenkel answered at first somewhat evasively, but then said that they should start. Strindberg answered, "I think we ought to attempt it," and Svedenborg was

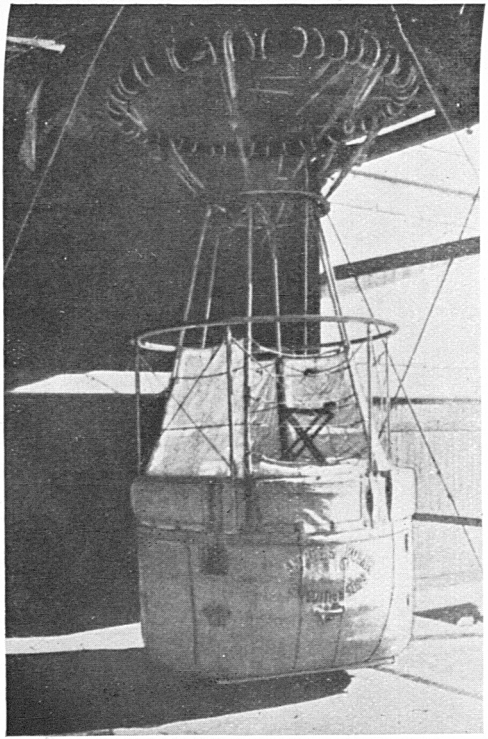
of the same opinion. Andrée was serious and said nothing, and then they all went on board again. They did not know yet what was going to be done, but when they were on board, Andrée said at once to Ehrensvärd: "Well, we have been considering whether to start or not; my companions insist on starting, and as I have no absolutely valid reasons against it I must agree to it, although with some hesitation. Will you send all hands on shore to begin the work of dismantling the balloon house?" And then everyone woke up. The sailors had never worked so willingly before, nor had the carpenters. But now they were happy!

Strindberg stayed on board awhile, talking to Ehrensvärd and the doctor, and getting together his things and some instruments that were still on board. Andrée went on shore to direct operations.

The harbour now presented a lively picture. Two sealers had just come in and one had been lying there before. The latter had to shift anchorage so as not to be in the way of the balloon. The weather was gloriously beautiful and the wind south-south-west.

Strindberg went ashore, packed some articles into the car of the balloon and arranged some things here and there. The work of removing the front side of the house went on briskly, and one plank after the other was thrown down. The balloon stood there steady and secure, protected against the winds by the canvas on the fourth and fifth floors, and Strindberg took some photographs of the work. Then he went on board the "Svensksund" again for a moment, together with Svedenborg, to fetch some things they had forgotten and to compare chronometers for the last time. When they came on board, breakfast was just being served and they were persuaded to sit down to table in company with the chief and the doctor. The chief took in a bottle of champagne and a toast was drunk to a prosperous journey. Everyone enjoyed the breakfast, but when Strindberg went ashore again, time did not

THE 'EAGLE' RISING FROM DANES ISLAND
ON JULY 11th, 1897



THE CAR ATTACHED TO THE BALLOON IN
THE BALLOON HOUSE AT DANES ISLAND

THE 'EAGLE' ON ITS WAY TO THE NORTH

THE 'EAGLE' DISAPPEARING TOWARDS THE NORTH

allow the others to have anything to eat before the start, and they had to satisfy themselves with sandwiches and ale in the car.

When Strindberg came on land once more, the work had made good progress and the balloon was being allowed to lift a little. A few little balloons were sent up to test the direction of the wind, which proved favourable. It was quite an inspiring sight when the balloon had been lifted to such a height that the carrying-ring of the car left the ground. Andrée gave orders; everyone was willing and helpful, and everything went well. Strindberg walked about taking photographs up to the last minute.

The balloon had now risen to such a height that the carrying-ring was a good distance above the ground, the whole being held fast by three ropes. The moment had come to make fast the car. When this had been done and a sufficient number of bags of ballast had been taken on board, the time had come to say "good-bye." This was done heartily and touchingly, but without any sign of weakness. Then Andrée cries: "Strindberg and Fraenkel, are you ready to get into the car?" Yes, they were, and so they got in. Strindberg's thoughts turned for a moment to his fiancée and his dear ones at home. What would be the end of the journey? His heart swelled with emotion, but he had to restrain himself. Machuron, whom Strindberg had found most congenial, stood nearest the car, and Strindberg, with some emotion, asked him to give his love to his fiancée.

But he had to see that the camera was in order and to be ready to throw out ballast, etc. And there they stand, all three of them, on the top of the car. There is a moment's solemn silence. Machuron says: "Attendez un moment, calme" ("Wait a moment! be calm!"). The right instant has come. "Cut away everywhere!" cries Andrée. Three knives cut the three lines holding fast the carrying-ring, and the

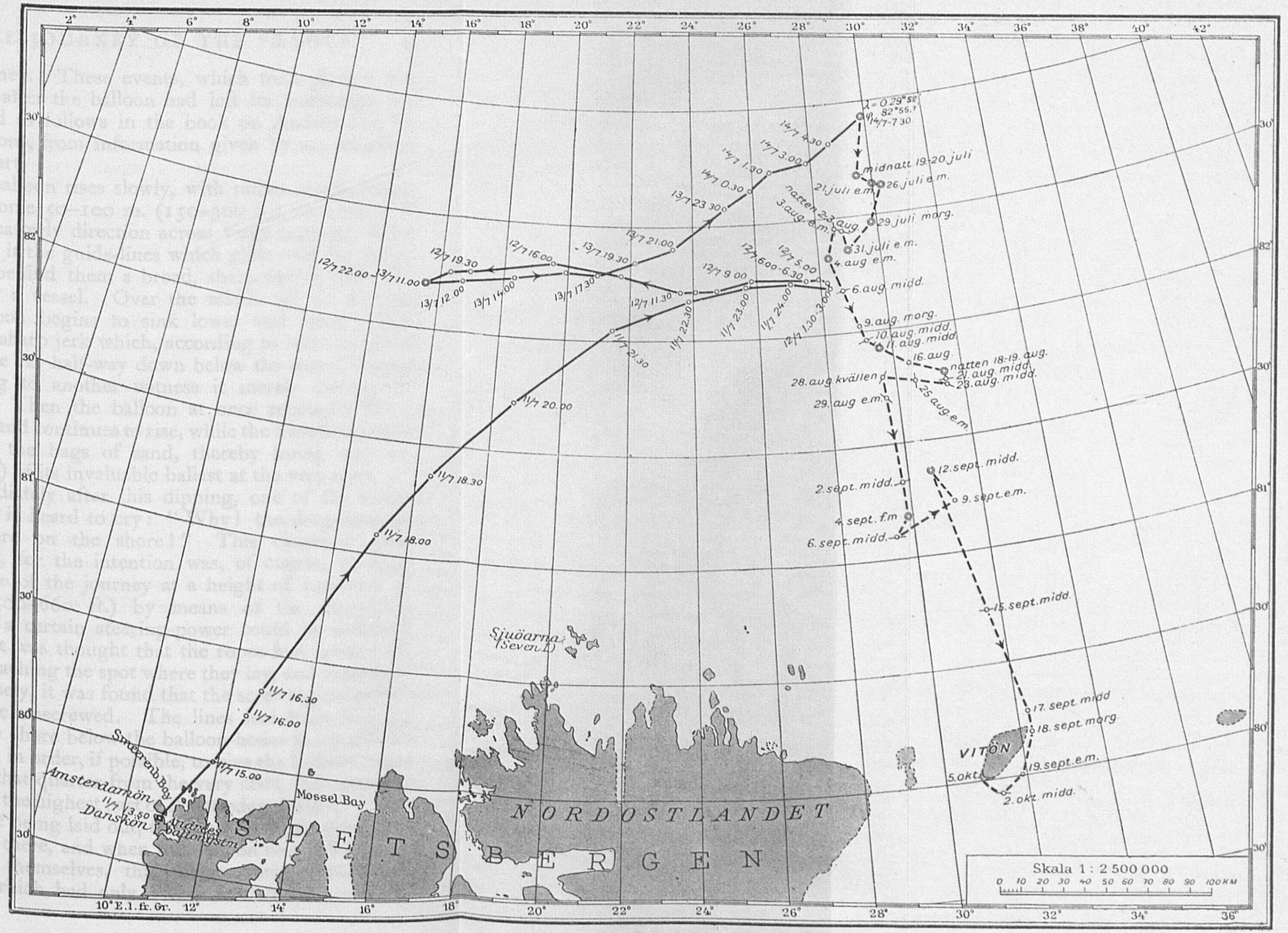
balloon rises amid the hurrahs of those below. The three men answer with a " Hurrah for old Sweden ! " and then they rise from out the balloon-house. A peculiar sensation, wonderful, indescribable, overpowers the travellers to the Pole. But they have no time for much thought. Strindberg takes a few more photographs and then sees that the balloon is sinking. Ballast is thrown out, but the car dips into the sea a moment. Then they rise again, and everything seems to be going all right. They can still hear the hurrahs of the lookers-on. Strindberg takes two or three more photographs and prepares to write a few last lines to his fiancée. He intended to throw the card down on Holländar Naze, but had no time to do so.

According to the notes in Strindberg's memorandum-almanac, he and his comrades entered the car at 1.43 p.m.,[1] and three minutes later on, the balloon rose and was now christened " Ornen " (" Eagle ").

In the description just given of the start, it is peculiar that Strindberg says nothing of the fatal loss of the drag- or guide-lines and very little of the dipping of the car into the water in Virgo harbour, an incident which was of such importance for the continuation of

[1] As stated in the introduction to this book, the following description of the balloon journey is based, partly on Strindberg's memorandum-almanac, and partly on Andrée's diary. Exact determinations of time are given in these books for most of the notes, but different methods of calculating the time are employed. In order to obtain uniform chronology, all the times given have been expressed in Greenwich mean time (G.M.T.). This has been done as follows :

Andrée's time-determinations are based on Kullberg's chronometer, 5567, which, on July 11, showed 0 h. 51 m. 45 s. All the time-determinations given in Andrée's diary during the balloon journey—with the exception of those stated as being G.M.T.—have been reduced by the subtraction of 52 minutes. Strindberg's times are based on Kullberg's chronometer, 5566, which, according to the chronometer journal in his memorandum-almanac, showed on July 11, 8 m. 35 s. G.M.T. has been obtained by the subtraction of 9 minutes. On the occasions when Andrée and Strindberg have employed astronomical time, this has been expressed in standard time (G.M.T.), calculating 24 hours.



MAP OF THE COURSE OF THE ANDRÉE EXPEDITION, JULY 11th to OCTOBER 5th, 1897

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Flight of the 'Eagle,' July 11—14 ---------- Journey over the ice, July 14—Oct. 5

the journey. These events, which took place a few minutes after the balloon had left its anchorage, are described as follows in the book on Andrée and his companions, from information given by eye-witnesses to the start.

The balloon rises slowly, with rather erratic movements, some 50–100 m. (150–300 ft.), and drives in a north-easterly direction across Virgo harbour, drawing after it the guide-lines which glide over the water, leaving behind them a broad, sharp furrow like that made by a vessel. Over the middle of the harbour the balloon begins to sink lower and lower; then comes a sharp jerk which, according to one statement, forces the car half-way down below the water, though according to another witness it merely sweeps the surface. Then the balloon at once rebounds like a vast ball and continues to rise, while the travellers empty eight of the bags of sand, thereby losing 207 kg. (450 lbs.) of its invaluable ballast at the very start.

Immediately after this dipping, one of the sailors on shore is heard to cry: "Why! the drag-lines are lying here on the shore!" This causes a great sensation, for the intention was, of course, to make the whole of the journey at a height of 150–200 m. (about 500–660 ft.) by means of the drag-lines, whereby a certain steering-power could be obtained. At first it was thought that the ropes had broken off, but on reaching the spot where they lay, and examining them closely, it was found that the screwing-on section had come unscrewed. The lines had been laid out along the shore below the balloon-house in an easterly direction, in order, if possible, to give the balloon a turn towards that quarter from the very start, thus enabling it to clear the highest part of Amsterdam Island. When they were being laid out, they had evidently got a kink here and there, and when the balloon rose these began to twist themselves, this, in its turn, causing the screws, which had only a very few threads, to come

unscrewed, so that the lower two-thirds of the three ropes fell to the earth together. This had evidently taken place at the instant when the balloon was seen to give a jerk. The loss of these ropes meant that the ballast had become further diminished by some 530 kg. (1,160 lbs.).

Various opinions have been expressed as to the actual cause of this mishap. One thing is certain, however, and that is, that the loss of the guide-lines caused the whole of the balloon journey to take place altogether in another way than had been intended, for the travellers now found themselves in an almost ordinary free balloon which would be compelled to obey the direction of the wind.

Simultaneously with these events the balloon rotated a turn and a half around its vertical axle, in consequence of the ballast-ropes, attached to the lee-side of the carrying-ring and which were being pulled through the water, acting more powerfully than the now lost drag-lines. The sails, which were attached to the balloon, and which had been hoisted while in the balloon-house, had now to be lowered as quickly as possible, as otherwise, in the hard wind that prevailed, they would have prevented the balloon from turning right again. Immediately after the balloon had dipped, Fraenkel was seen climbing into the carrying ring in order to clear the sails which were being lowered by Andrée and Strindberg.

Andrée has made no notes in his diary for the first few hours after the start, evidently being too much occupied with the navigation and technical management of the balloon. In Strindberg's memorandum-almanac, however, there are short communications and time-determinations with regard to what happens.

Thus, he says briefly: "guide-rope lost." Immediately afterwards, Holländer Naze was passed at 1.56 p.m. After 18 minutes they are athwart the middle of Vogelsang Island and are sailing onwards at a

height of 600 m. (1,850 ft.). According to what could be observed from land, the " Eagle " then swung off to the east across the north point of the island, where it disappeared in a cloud. While passing over the point, Strindberg threw down the tin containing the farewell words to his fiancée which he had forgotten when they were driving across Holländar Naze. As Strindberg had said that he intended letting this last greeting fall at this latter place, a search was made there immediately after the " Eagle " had gone. As far as we know, however, no one has looked for the little tin on Vogelsang Island.

It is clear that the cloud into which the balloon disappeared immediately it had passed over Vogelsang corresponds to Strindberg's note stating that fog was forming. It was then 14.20 (2.20 p.m.), and the temperature + 1° (about 34° F.). It is silent and still and the average speed of the balloon amounts to 9 m. (29 ft.) per second. Only four minutes after the balloon had entered the above-mentioned cloud there is a note that the " Eagle " had sunk to such an extent that the remaining parts of the guide-lines touched the water. The cause of this was that the balloon had come out of the sunshine into shadow. This sensitiveness to temperature conditions, and especially to clouds and fog, displayed by the " Eagle "—as by all other balloons—will play a decisive part during the continuation of the journey.

In order in some degree to make good the loss of the lower parts of the guide-lines, the travellers began to repair them three-quarters of an hour after the start. One of the ballast-lines was drawn up, most probably to splice it on to one of the guide-lines.

While this work is going on, photographs are taken at hours marked on the films. For the sake of certainty it is stated that, unfortunately, the first two had been focussed incorrectly. It is evident that during the last few minutes the balloon has risen

considerably, for it is stated that 3.3 cubic m. (116 cubic ft.) gas were lost at a height of 500 m. (1,600 ft.). The course at this high level is somewhat more northerly than before. Clouds now begin to surround the balloon in every quarter except to the north-east and over Spitzbergen. The bearings are taken of a cape at Wiedje Bay and of the North Point of Vogelsang.

Tired after all the events and exertions of the first hours, the Polar travellers drained the first of the bottles of ale they had managed to take into the car in the hurry of departure. Then they set to work again vigorously at splicing the guide-line, work which was later on stated as finished by 4.24 p.m. The height of the balloon is still 500 m. (1,600 ft.) and the wind south-south-west. Strindberg once more takes the bearings of the same points on land as before, and they approach the drifting ice, which can be seen clearly in the north and north-west. During the whole of the time endeavours have been made, but in vain, to catch sight of the "steamer," by which is probably meant the "Express," which was to make a depôt on the Seven Islands immediately after the start.

A few minutes later on, the balloon begins to be surrounded by a light fog, which is not dense enough, however, to prevent photographs being taken of the first pack-ice that is visible. It is now 4.16 p.m.

The inland ice is seen beautifully on the east side of Wiedje Bay, the temperature now rising to + 5.9° (42.6° F.). The merry mood of the Polar travellers finds expression while "relieving nature":

A shout to Fraenkel, who is below in the car:

"Look out, Fraenkel!"

"What's up?"

"You'll get a shower-bath!"

"All right!"

After some minutes more the balloon has come into the immediate neighbourhood of the edge of the pack-

ice, a projecting point of which is passed at 4.54 p.m. For the next half-hour the balloon follows the edge of the ice at a distance of 500 m. (1,600 ft.) Spitzbergen disappears in the mist. Far below, a sea-gull is seen accompanying the balloon. The "Eagle" begins to sink slowly. "Descendons doucement par un sinusoid" ("We are slowly sinking in a winding curve"), writes Strindberg just after 5.29 p.m.

Under the "Eagle" the sea is full of finely divided ice and has a beautiful dark blue changing tint, clearly distinct from the colour previously observed. At 5.36 p.m. the balloon is at a height of 240 m. (760 ft.), and the first four carrier-pigeons are released. The messengers flew off approximately to the west, but they never reached their destination. When Andrée hung up the empty cage a shower of pease fell into the car and evidently excited some mirth.

Immediately after the balloon sails over the ice in good earnest. The ice-floes become somewhat larger and are well rounded off. About 6 p.m. they pass ice characterized by Strindberg as being lately broken up. The "Eagle" floats at a good rate of speed in a north-north-easterly direction.[1] This shows that the fresh breeze which prevailed at the start is still blowing and carrying the balloon at a good rate in the desired direction.

The travellers now take their first dinner, consisting of sandwiches and broth with small bits of macaroni, which they had brought with them warm. Meanwhile the balloon drives onward at about the same speed and in the same direction as before. The ice under the balloon consists exclusively of unpacked floes without any glacier blocks. A soft

[1] The determination of the speed is made according to different methods. At greater heights it has been calculated by observations with an ordinary level-mirror, and at lower heights probably by means of heaving the log. In both cases the determinations have not been very exact.

whistling is heard for a long time in the large balloon valve. It is quiet and hot in the sunshine: only a few birds are to be seen, otherwise there is no sign of life. The only sounds heard are the shrieks of the birds, the whistling in the valve and, now and then, a crash from the ice.

At 6.41 p.m. there is observed a jagged highland in the south-east and the balloon has reached a height of 600 m. (1,850 ft.). On Andrée relieving nature, Strindberg expresses the hope that the balloon will rise still more on account of ballast being lightened.

About 7 p.m., however, the mists begin to thicken close below the balloon and to the north, but it is still possible to see that, south of a line in an easterly direction, the sea is free of ice.

A quarter of an hour later, Andrée descends into the car to rest. He has been very busily engaged ever since the early morning. He has determined that the expedition shall start; he has directed the work for the start; he has experienced the first and fatal minutes of the journey, and he has seen the destruction of the guide-lines with the help of which he had intended to steer the " Eagle " towards the goal he had determined to reach. We may be sure that he was the most zealous man in that little car in the splicing of what was left of the guide-lines, and as chief on board he has directed the navigation of his vessel. The condition of things in the evening being as quiet as it is, he considers that he can at last snatch some necessary rest.

During the whole of this eventful day, the 11th July, Andrée has not had time to make more than a few brief remarks in his diary, and these are now partly illegible. On the inside of the cover of his diary we find, however, a rough copy of the message to be sent by the first buoy-post. He uses this rough copy too, when on another leaf of the diary he writes the communication which was put into the first buoy thrown out. But, as will be shown later on, this buoy was

not despatched until a couple of hours after Andrée had gone to rest. Besides the above, at 6.39 p.m. he has made a note about "guide-line" and "steering arrangement," but it is impossible to decipher the words. Then follow some remarks respecting the going of the chronometers.

Strindberg and Fraenkel have now the watch alone, and Strindberg keeps the journal of what takes place. The balloon is floating onwards at a height of 680 m. (2,200 ft.) above a thin layer of clouds through which the ice sometimes becomes visible. The height is increased to 700 m. (2,270 ft.), but the temperature is still + 1° (about 34° F.). The ice is now seen only along the horizon to the south-south-west, while the clouds have thickened below the "Eagle." Everything is silent and quiet; nothing is heard but a faint murmur from the south-east and east, and the whistling from the valve. The sun shines warmly, but light breaths of air are felt every now and then. Fraenkel and Strindberg speak in a whisper so as not to disturb Andrée. Far away to the south-east land is visible, probably North-East Land. The sky is the whole time clear above the balloon, but, underneath, the clouds drive onward in a direction which is somewhat more easterly than that of the balloon. As the ice is not visible, it is impossible to determine the course and the speed.

The journey continues along a horizontal level at the height of 680 m. (2,200 ft.). When, at 8.23 p.m., the ice becomes visible for a moment between the clouds, the course is determined as being N. 45° E. (magnetic). "We are now travelling horizontally so finely that it is a pity we are obliged to breathe, as that makes the balloon lighter, of course. And so Fraenkel and I go and spit, too!" writes Strindberg.

The hours pass while Andrée sleeps. Strindberg makes his sun observations, while Fraenkel writes them down in Strindberg's memorandum-almanac. A

note is made of each little event, the hour and minute being given, for instance, whenever "nature is relieved."

Just before 9.43 p.m. the balloon has sunk somewhat, so as to touch the upper edge of the clouds at a height of 500 m. (1,600 ft.). The danger of coming out of the sunshine and thus causing the balloon to fall still lower induces them to throw a buoy and about 8 kg. (18 lbs.) of sand overboard.

As was mentioned above, the communication intended for a buoy-post, and which Andrée handed to Strindberg before he went to lie down at 7.06 p.m., was not sent off until later on. We know this, as this buoy has been found, and the date given in it is July 11, 10 p.m. This hour agrees with the above-mentioned note that a buoy had been thrown overboard, so that, in all probability, it was buoy No. 4, mentioned there.

The story of this buoy-post is briefly as follows. The buoy was found at Lögsletten on the coast of the Norwegian Finnmark on the 27th August, 1900, by a woman who was looking for wreckage. According to her statement the buoy had driven ashore just before she found it, so that it had been carried by the waves 1,142 days after it had been thrown from the balloon. During the whole of this long period, the buoy, with its valuable contents, had not suffered any damage. It is preserved side by side with the message in the State Historical Museum, Stockholm. The communication is as follows!

"Buoy No. 4 The first thrown out
on the 11th July, 10 p.m. G.M.T.

"Our journey has hitherto gone well. We are still moving on at a height of 250 m. (830 ft.) in a direction which at first was N. 10° E. declination, but later N. 45° E. declination. Four carrier-pigeons were sent off at 5 h. 40 p.m. Greenw. time. They flew westerly. We are now in over the ice, which is much

broken up in all directions. Weather magnificent. In best of humours.

Andrée Strindberg Fraenkel

Above the clouds since

7·45 G.M.T."

If we examine the original despatch a little more in detail we easily note that the time given as " 10 p.m. G.M.T." and the last words, " above the clouds since 7·45 G.M.T.," are not in Andrée's handwriting, but in Strindberg's. It is the latter who has added these lines after Andrée had handed his communication to him. It is now possible to determine when this was done. After the four pigeons had been sent off at 5·40 p.m. the balloon had, as already described, risen and then floated at a height of from 500 to 600 m. (1,600–1,950 ft.). Consequently, Andrée must have written his communication immediately after the carrier-pigeons had been sent off, *i.e.*, about 6 p.m. He has then given the despatch to Strindberg with the order to put it into the buoy and to send off the latter at a suitable time. When, about ten o'clock in the evening, the " Eagle " was sinking through the clouds, the buoy was thrown out in company with the 8 kg. (18 lbs.) of sand in order to lighten the balloon. It is really remarkable that we are now aware in such detail of what took place on board the " Eagle " in respect to this buoy-post which, after drifting amid ice and sea for more than three years, was found one day late in the summer on the naked coast of Finnmark, and which, until the present moment, formed the most detailed communication hitherto received from the three men who disappeared across the island outside Virgo harbour on the 11th of July, and whose fate can now be so clearly read from their own notes.

Immediately after the buoy had been sent off, the note was made, with a note of interrogation: " a shot heard." It must have been the ice cracking. A few

minutes later, the ice gleams through the clouds, and it is seen to be still very broken. Exactly at 10 p.m. the course can be approximately determined as N. 60° E. Twenty-two minutes later five rungs of the rope-ladder are thrown out as unnecessary ballast, and eight minutes later on, six more rungs are thrown overboard in addition to 8 kg. (18 lbs.) of sand from the same sack as before. Meanwhile they have passed a fairly large opening in the clouds.

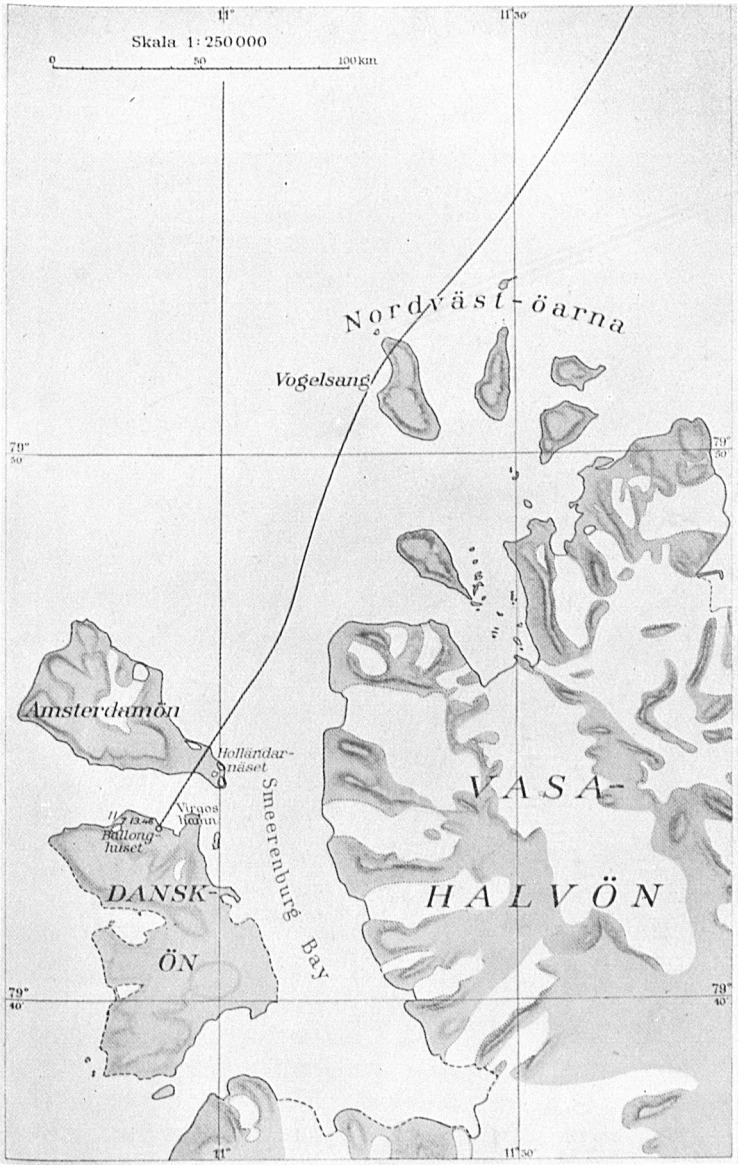
Immediately afterwards, buoy No. 7 is thrown overboard. Strindberg notes in his memorandum-almanac the communication it enclosed: "This buoy has been thrown from Andrée's balloon at 10 h. 55 m. G.M.T. on the 11th of July 1897 in about 82° latitude and 25° long. E. fr. Gr. We are floating at a height of 600 metres.

All well

Andrée Strindberg Fraenkel."

This buoy, too, with its message, reached its intended goal, Stockholm. It was discovered in Kollafjord, on the north coast of Iceland, on May 14, 1899, and does not seem to have lain long on the shore before it was found on the beach at Hlit farm on the west side of the fiord, 672 days after it had been thrown from the "Eagle." The buoy, when found, was rent on one side, and the copper wire, which had supported a little flagstaff, was wanting. From Kollafjord the buoy was sent to the Governor in Reykjavik, who forwarded it to the Minister of Iceland in Copenhagen, by whom it was sent on to Stockholm. When the despatch was published everyone was astonished to find how brief it was, although the leaf on which it was written afforded good space for more. Now we understand very well that the situation did not allow of Strindberg's writing in any detail.

Eight minutes after the buoy had been sent off with its message, a note is made that the clouds are moving at a height of no more than 470 m. (1,530 ft.) and that



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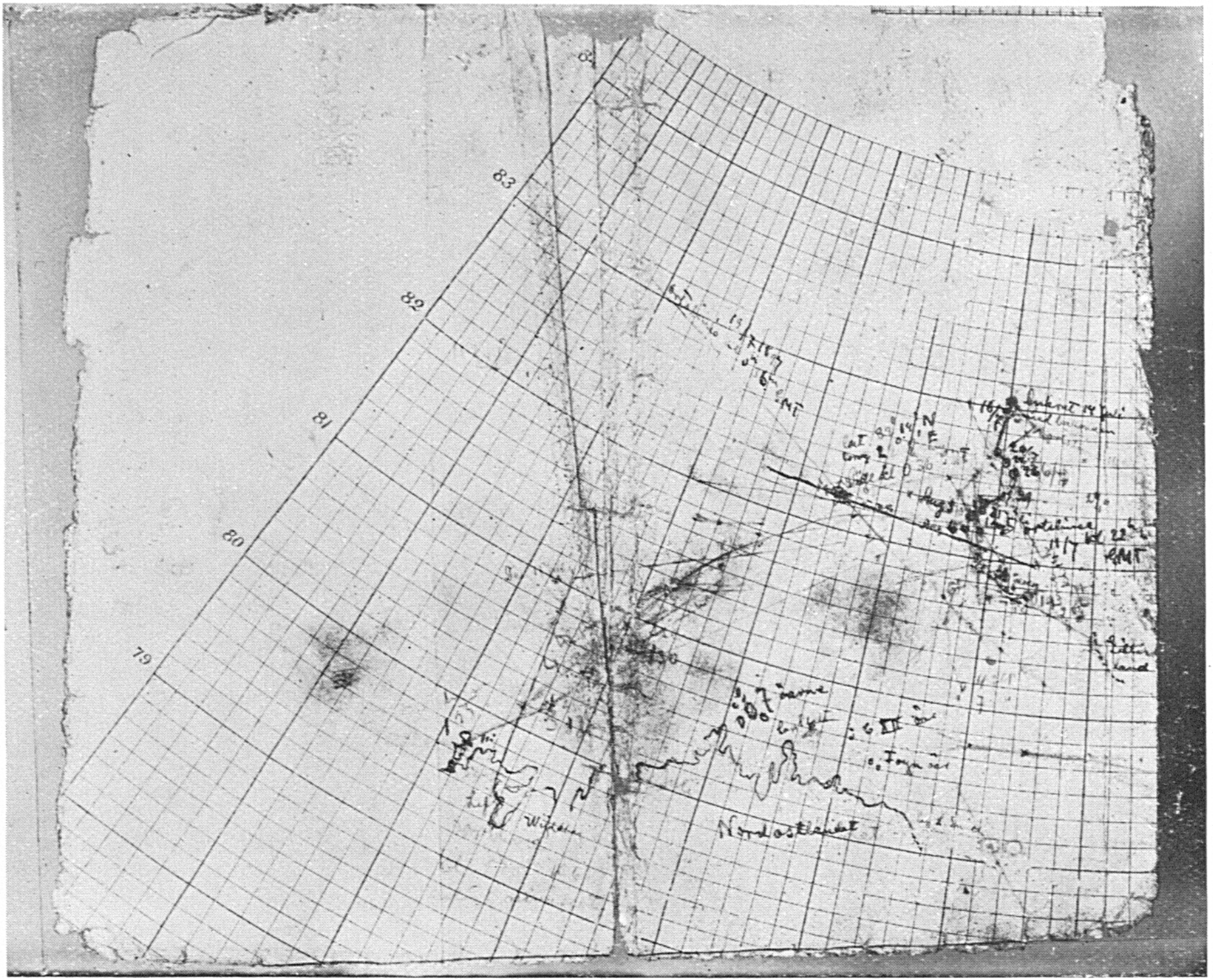
MAP OF DANES ISLAND WITH ENVIRONS AND THE FLIGHT OF THE 'EAGLE' DURING THE FIRST HOUR OF ITS VOYAGE



STRINDBERG'S MAP OF THE BALLOON JOURNEY

the temperature is + 0.6° (33.1° F.). After another 8 minutes, the balloon floats at 460 m. (1,490 ft.). Strindberg wonders whether it is cloud or land that is seen in the east-north-east, but it soon proves to be cloud. His attention is again directed towards the horizon in the east, where the shadow of an alto-cumulus cloud looks as though it might be water and ice. Its extension is about 90°, he writes, from right below the sun to N. 110° E.

12th July.

It is not without reason that Strindberg is so interested in the cloud which the balloon is on its way to meet. Now it is midnight, 11 minutes past 0 o'clock of the 12th July. The course is stated to be direct east, and immediately afterwards there is a note that the balloon is entering the shadow of the cloud in question. The result of this is at once apparent. After the lapse of four minutes, the guide-lines take the ice, and the guide-roping[1] begins. Onward sails the balloon, surrounded by a slight fog; the quiet sail at high levels is ended and the situation is quite altered. The balloon journey begins an entirely new phase. "The sun has disappeared," writes Strindberg, "but we are keeping a very level course."

As was the case when passing through the little cloud over the island of Vogelsang, the balloon has sunk quickly after the warming rays of the sun no longer reach her. The guide-roping continues in a direct easterly course, at a speed of about 3 metres (9 ft. 9 in.) per second, at a height varying between 100 and 20 m. (330–65 ft.). At one o'clock a.m. it is considered necessary to throw out 12 kg. (about 26 lbs.) ballast. Like an evil omen, there is seen a bird, black and distant, and below them gape the wide rifts in the pack-ice, extending mainly in an east and west direction.

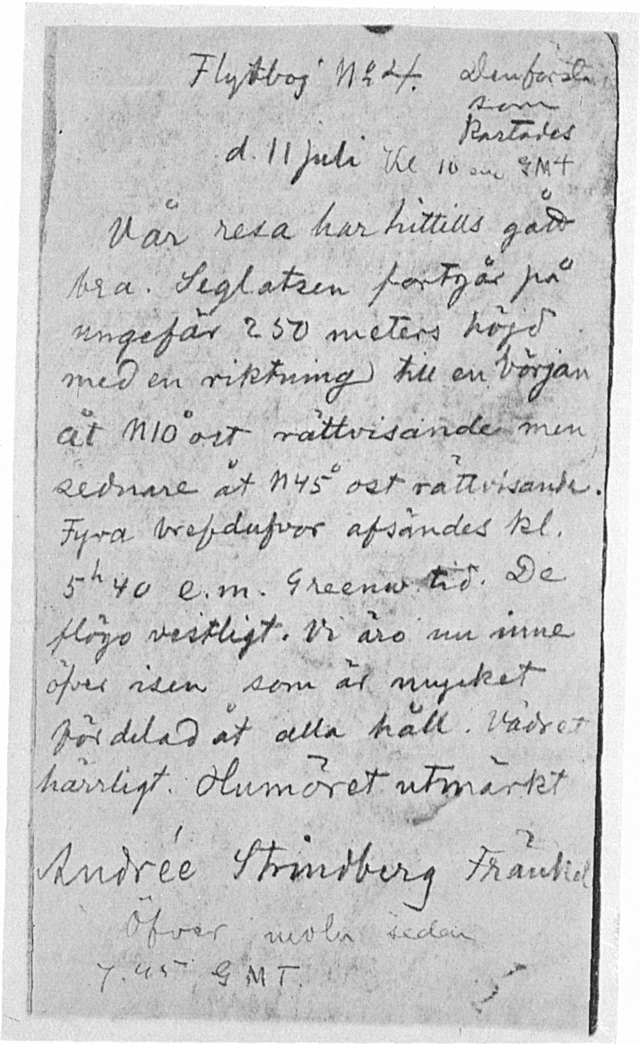
[1] "Guide-roping" the balloon means that by allowing the guide-rope to drag over the ice the balloon is steered by means of that and the sails, as before mentioned.

The fog thickens around the "Eagle," so that it becomes impossible to see more than 2–5 kilometres (1.2–3 miles) in any direction. The field of vision covers nothing but ice and water. At 1.26 a.m. the balloon comes to a standstill; this, apparently, in consequence of a calm. Another buoy is thrown overboard. Its number is not stated, nor is it said if any written communication was enclosed. A note is made that there is a current of air from the south-south-west.

Andrée was called about 2 a.m., and Strindberg and Fraenkel go to lie down, while the chief takes the watch alone.

Andrée's notes begin at 2.59 a.m. and embrace, first of all, observations respecting the course and speed of the balloon, these being afterwards entered in Strindberg's memorandum-almanac. These notes make extremely interesting reading, as they cover just the period which was of such importance for the expedition, *i.e.*, when the wind began to cast round and carry the "Eagle" from its intended course to one directly westward. The following table, therefore, summarizes these observations from the moment when, in consequence of the balloon's having come into a region of clouds and fog, it sank from the considerable height it had, and brought the high-level part of the journey to a conclusion.

Time.		*Course.*	*Speed.*
0–1 a.m.		E.	3.3 m. (10 ft. 10 in.)
1.26 ,,			0
2.59 ,,		N. 20° W.	inconsiderable
3.08 ,,		N. 15° W.	0.5 m. (20 in.)
3.35 ,,	N. 24 W.	N. 27° W.	0.5 m. (20 in.)
3.51 ,,		N. 32° W.	0.4 m. (15.6 in.)
4.01 ,,		N. 25° W.	
4.13 ,,		N. 28° W.	
4.28 ,,		N. 50° W.	0.8 m. (31.2 in.)
4.56 ,,		N. 60° W.	0.32 m. (12.50 in.)
5.18 ,,		N. 80° W.	
5.26 ,,			1.4 m. (54.6 in.)

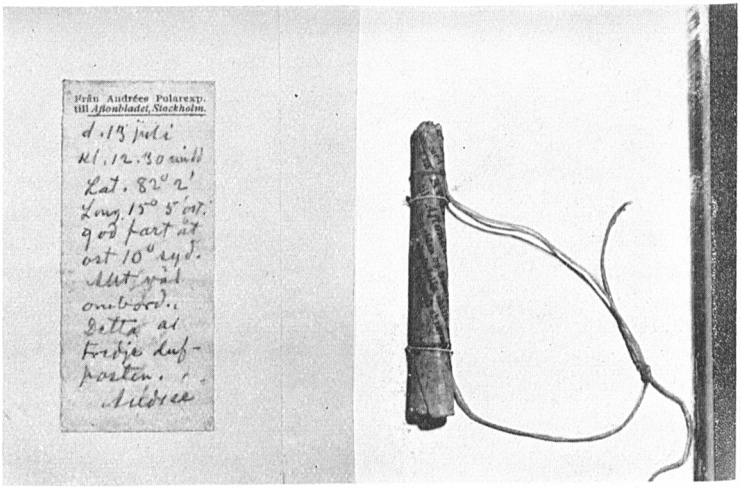


Flytboj No 4. den första som kastades
d. 11 juli kl 10 em GMT
Vår resa har hittills gått bra. Seglatsen fortgår på ungefär 250 meters höjd med en riktning till en början åt N10° ost rättvisande men sednare åt N45° ost rättvisande. Fyra brefdufvor afsändes kl. 5h 40 e.m. Greenw. tid. De flögo vestligt. Vi äro nu inne öfver isen som är mycket fördelad åt alla håll. Vädret härrligt. Humöret utmärkt
Andrée Strindberg Frænkel
Öfver moln sedan 7.45 GMT

MESSAGE IN BUOY NO. 4

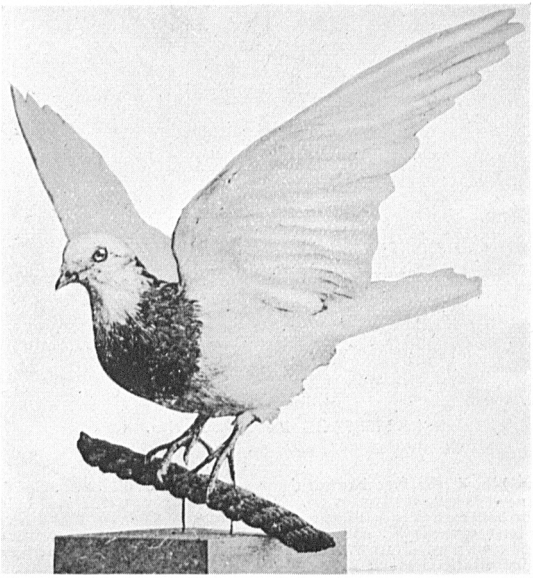
Translation

Buoy No. 4, the first that was thrown. 11 July 10 o'cl. p.m. GMT Our journey has hitherto gone well. We are sailing onwards at a height of about 250 metres in a direction at first towards N. 10° East due course, but later towards N. 458 East due course. Four carrier pigeons sent off 5 h. 40 p.m. Greenw. time. They flew westwards. We are now over the ice which is much divided in all directions. Weather magnificent. Humour excellent. Andrée-Strindberg-Fraenkel. Above the clouds since 7.45 G M T

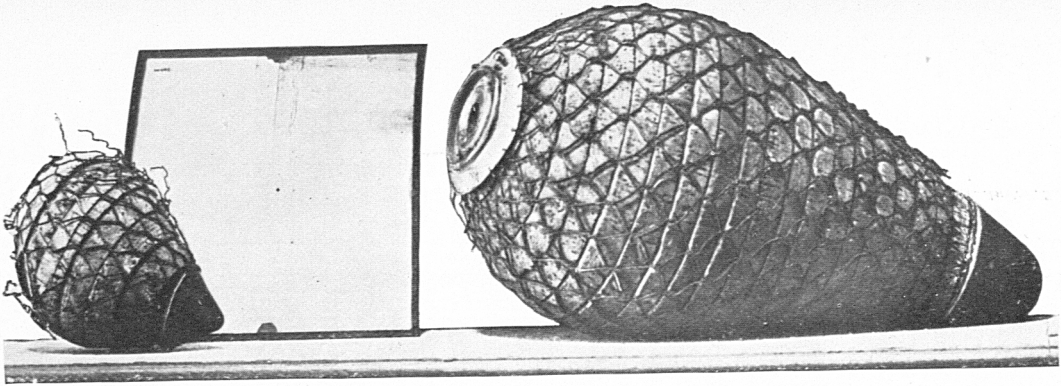


THE PIGEON POST THAT ARRIVED

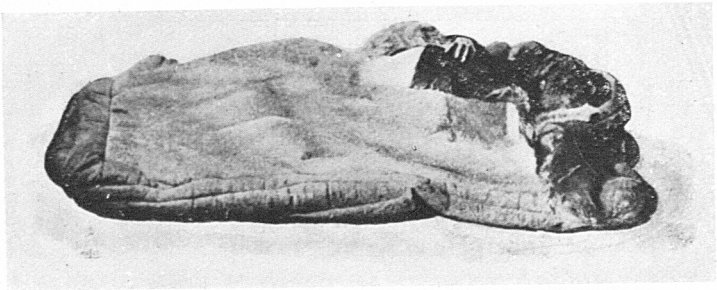
"13 July, 12-30 o'cl. midd. Lat. 82° 2′ Long. 15° 5′ east—Good speed to east 10° south. All well on board. This is the third pigeon post. Andrée."



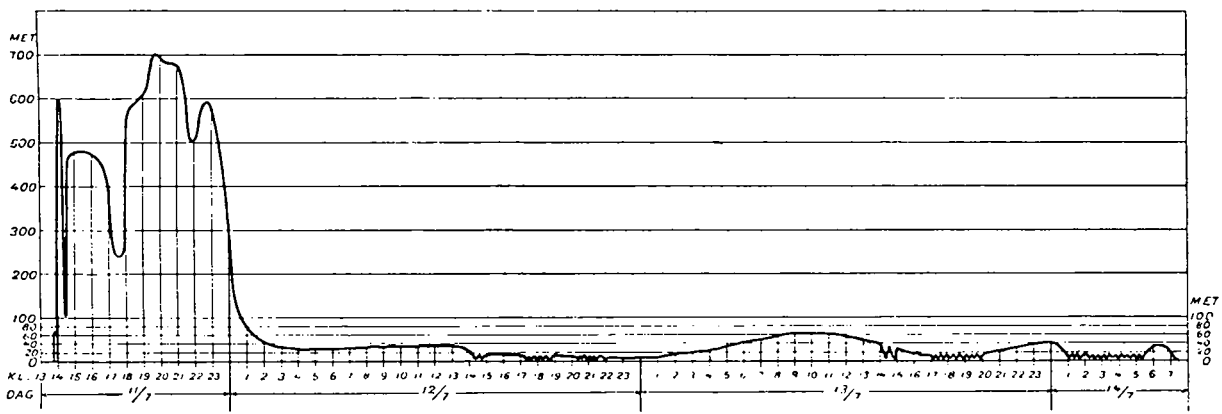
THE CARRIER PIGEON DESPATCHED FROM THE 'EAGLE' ON JULY 13th, 1897, AND FOUND SOON AFTER



LARGE POLAR BUOY AND BUOY NO. 7



SLEEPING SACK



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HEIGHT OF THE BALLOON DURING ITS FLIGHT (IN METRES ABOVE SEA LEVEL)

The balloon now drifted slowly with the three men directly westwards. Alone on the roof of the car, Andrée makes very brief notes in his diary respecting his observations. He thinks he hears a "Greenland pigeon," and he describes a fulmar which circles around the balloon without showing any signs of fear. At 3.58 a.m. the fog lightens somewhat, and then the balloon rises a little. Some part of what Andrée and his companions had first taken for open water he now understood had merely been snow-free and water-covered ice. There are large expanses of ice of a light, dirty yellow tint, and of the same colour as the fur of the polar bear. The ice shows few, or, more correctly, no signs of pressure. If the surface were hard, a horse and sledge could traverse it. There is no land in sight, but the horizon is not clear. He finds the journey in all truth a wonderful one. He feels cold, but will not awake his sleeping comrades, as they need rest. Neither bears nor seals are to be seen. Andrée adds that when the "Eagle" descended, the lines did not lie properly. This remark must evidently refer to the occasion when the balloon sank from a height of about 500 m. (1,600 ft.) to one of 20 m. (65 ft.). The faulty arrangement of the ropes causes the car to move backwards, and the sails press the balloon down. Thus the same condition of things exists now as was brought about when the "dipping" into Virgo harbour took place. The single spliced guide-line the "Eagle" carries cannot counteract the rotating action of the ballast-lines. This is a pity, for it is evident that the movement of the balloon does not correspond to what the existing conditions allow. This opinion is confirmed, too, by the determination of the speed as being 0.8 m. (31.2 in.) per second, when taken at 4.28 a.m. One hour later the speed falls to 0.32 m. (12.50 in.) per second, the course now being N. 60° W. (magn.).

About five o'clock, a seal (*Phoca barbata*)—which

may have been a walrus—was photographed for the first time. Two others were in sight, one of which was startled, while the other paid no attention to the balloon. The ice is now crossed by lanes of open water. The course is N. 80° W. (magn.) and the temperature + 0.2° (32.4° F.). The car now frequently sinks to a height of no more than 15 or 20 m. (roughly, 50–65 ft.), but by half-past five a.m. the speed of the balloon has increased somewhat. Ever since Andrée was called at 2 a.m. the sky has been one even expanse of clouds. Just before 6 a.m. the balloon once more came to a standstill and did not begin to move again for forty minutes, when it went straight to the westward. During this time, Andrée observes a fulmar (*Fulmar glacialis*) quite near the car. Strindberg, who had slept until a few minutes past seven, now comes up to Andrée and takes over the observations until 5 p.m. There is a slight mist, which restricts the outlook to a distance of 1 kilometre (a little more than 1,000 yards) in every direction. Round about them extends ice of the same description as before.

Seventeen hours have now passed since they started from Danes Island. They had had no other meal than the one taken at 6 p.m. on the 11th July, and so a much-needed breakfast is prepared. Göransson's cooking-stove, which, to avoid the danger of fire in the car, hangs beneath it, is primed at 8 a.m. and lowered to its place again while it is doing its work. In the interval of boiling the coffee, a barrel on board—the "barrel-of-all-work" or "universal barrel"—is altered from a "night-stool" into a "day-chair." After eighteen minutes the coffee is ready, and the three comrades take breakfast together in the pleasantest of moods. Andrée sucks the tongs clean which had been used to open the tin of condensed cream, and he also notes that he had observed another fulmar, and a "rainfall of pease," but without stating in what way the last contributed to their comfort.

At about 10 a.m. the sun peeps through the fog and makes it possible for Strindberg to take an observation of longitude with the help of a level-sextant and Andrée's chronometer. The speed of the balloon is now inconsiderable, but it increases until, immediately after 11 a.m., it has risen to 5.2 m. (17 ft.) per second. The temperature is −0.2° (32.4° F.), and the direction still westwards.

At 11.13 a.m. some carrier-pigeons are sent off. One of them tries to settle on the guide-rope and afterwards circles around the balloon. Two others settle on the ice, but at last they all disappear into the fog to meet an unknown fate.

About midday—to be exact, at 11.51 a.m.—they pass an ice-field which is more than a kilometre (about 1,100 yards) across, from which nearly all the snow has disappeared, leaving numerous pools of sweet water on the surface. A light fog still prevails, from which there falls a fine drizzling rain. Between 12 and 1 p.m. the height of the balloon is from 60–65 m. (195–212 ft.), and the average speed 3.5 m. (11 ft. 4 in.) per second. The temperature still keeps about 0° (+ 32° F.).

They now pass a "lead" or channel in the ice, about 80–90 m. (260–290 ft.) wide, extending in a north and south direction as far as one can see in the mist, *i.e.*, about 2 km. (2,200 yards).

A couple of minutes after Strindberg has noted: "blood-red ice, perhaps a remembrance of a bear's dinner," the balloon sinks at 3.06 p.m. so deep that the car bumps twice against the ice.

The position is clearly critical during the following hour. Every attempt is made to make the balloon rise. The heavy knives for cutting the guide-ropes, 25 kg. (55 lbs.) of sand and some other ropes are all thrown overboard. At 3.16 p.m. a little iron anchor and a little block are flung out, and are followed, after half an hour, by a ballast-line and the scraper that had

been intended to take "earth-samples" with. But as all these efforts seem unable to bring about the desired effect, the balloon continuing to drive onwards at such a low height that there is a danger of the car being smashed against the ice, resource is had to the large "Polar buoy," which is thrown overboard at 4.51 p.m. without any communication inside. This last sacrifice must have been the heaviest they made, for, behind the determination to part with the "Polar buoy" there must have lain a doubt, or even a feeling of certainty, that the expedition would not reach its goal. But the attempts made to lighten the balloon enough to make it rise again prove unsuccessful, for immediately after Strindberg has written that the big buoy had gone, the car hits the ice forcibly several times in succession. The speed of the balloon is now about 2.6 m. (8 ft. 5 in.) per second, and the course N. 100° W. The reason that the "Eagle" does not rise is because it is heavily weighed down by the fog.

Like two of the three buoys previously thrown overboard, the large Polar buoy, too, has been found. This took place on the shore of King Charles' Land, on the 11th September, 1899, two years and two months after it had been thrown from the "Eagle." It was found 50–60 paces up the beach, or just as far as it is considered that the ice presses up on the north side of King Charles' Land. The buoy when found was pressed a little askew, the copper wire on the upper part had been torn away on one side and some of the layers of cork were injured. All the more or less acute examinations and theories carried out and published after the buoy had been found, respecting the spot whence it had started its drift, have now been replaced by the certainty which speaks from Strindberg's own notes.

Strindberg's memoranda finish awhile, and he resumes them at 5 a.m. the next morning. Andrée once more continues the observations and allows him-

self no rest until midday of the 14th July, *i.e.*, after the expedition had landed.

The following hours are filled with difficulties. The balloon drags the car in a westerly direction through the mist and fog across the ice, against which it often strikes. At 5.14 p.m. there is a note: eight "touches" in 30 minutes. It is not strange, then, that one or other of the travellers loses patience and gives expression to his discontent at not being allowed " to eat in peace at least." The fog reigns uninterruptedly. At 6.35 p.m. the car bumps against the ice every five minutes, but the temper of everyone on board, however, is noted as " good."

The situation becomes still worse. The fog continues and the balloon sinks still lower, so that the car bumps against the ice every other minute, while the speed, in a west-south-westerly direction, amounts to 1.75–2.5 m. (5 ft. 9 in.–8 ft.) per second. At each 50 m. (160 yards) the car leaves its mark on the ice. As Andrée expresses himself, the ice is " stamped." Finally, at 10 p.m., the " Eagle " comes to a standstill. The balloon is then heavily weighed down and everything is dripping.

It is in this situation that Andrée, keeping watch alone in the car of the " Eagle," and after having entered the hour, 11 h. 45 (= 22.53 p.m.), writes the following lines:

" Although we could have thrown out ballast, and although the wind might, perhaps, carry us to Greenland, we determined to be content with standing still. We have been obliged to throw out very much ballast to-day, have not had any sleep nor been allowed any rest from the repeated bumpings, and we probably could not have stood it much longer. All three of us must have a rest, and I sent Strindg. and Fr. to bed at 11.20 o'clock (5567), and I mean to let them sleep until 6 or 7 o'clock if I can manage to keep watch until then. Then I shall try to get some rest myself.

If either of them should succumb it might be because I had tired them out.

" It is not a little strange to be floating here above the Polar Sea. To be the first that have floated here in a balloon. How soon, I wonder, shall we have successors? Shall we be thought mad or will our example be followed? I cannot deny but that all three of us are dominated by a feeling of pride. We think we can well face death, having done what we have done. Is not the whole, perhaps, the expression of an extremely strong sense of individuality which cannot bear the thought of living and dying like a man in the ranks, forgotten by coming generations? Is this ambition?

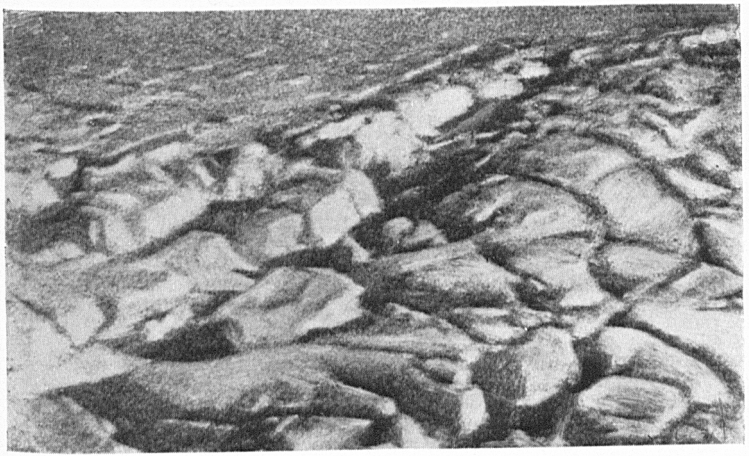
" The rattling of the guide-lines in the snow and the flapping of the sails are the only sounds heard, except the whining in the basket."

Of all that it has hitherto been possible to decipher of the documents found on White Island, these lines are the only ones that throw a light on Andrée's deeper feelings and thoughts respecting the expedition he is leading—the expedition in the presence of which the civilized world stood wondering and questioning, and from which relations and friends at home were anxiously awaiting news. After a silence of thirty-three years there is heard the reply to all these questions given by the living words which Andrée and Strindberg have themselves written, and which have been so long hidden by the ice.

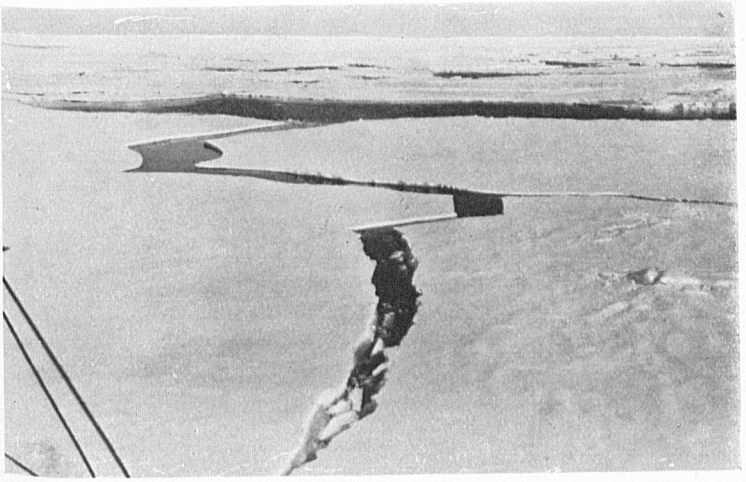
13th July.

And so there comes the day besides the note-date of which Andrée, in one place, has written: " Sick."

The balloon remains fast during the whole night. Half an hour after midnight, Andrée notes a northerly wind with a velocity of 2.7 m. (8 ft. 8 in.) per second. The temperature remains as before, about 0° (32° F.). The balloon sways, twists and rises and sinks incessantly. It wishes to be off but cannot, for now the



POLAR ICE FROM THE AIR



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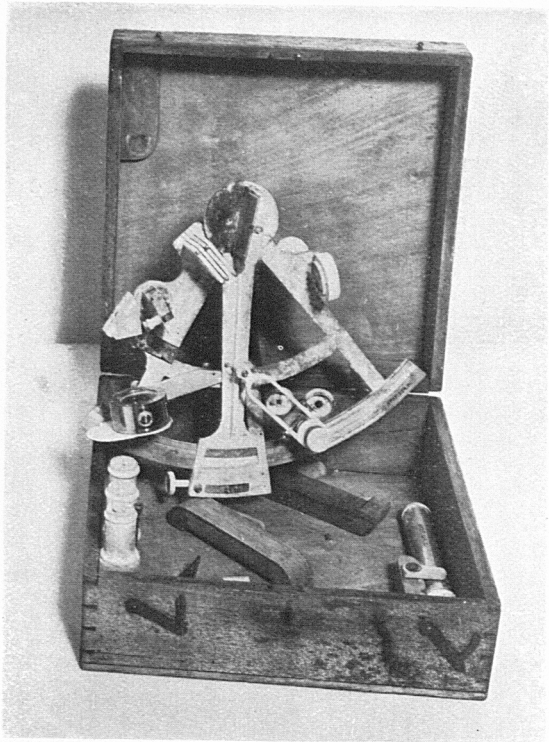
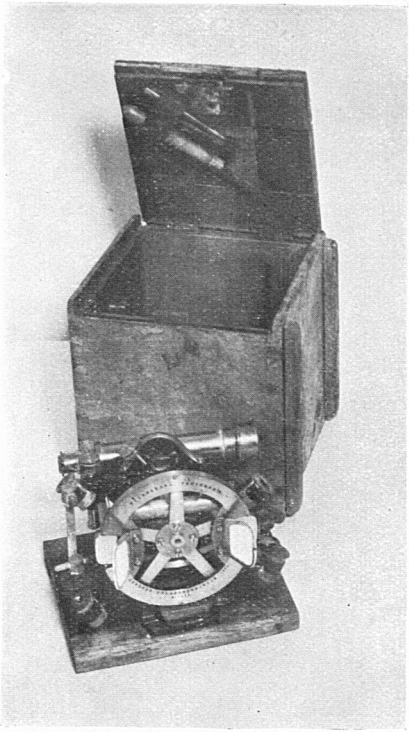
LEADS IN THE ICE 80° 25′ N. Lat., 15° 45′ E. Long.



THE EXPEDITION'S LEVEL-SEXTANT



THE EXPEDITION'S 'UNIVERSAL INSTRUMENT'

wind is only 2.1 m. (6 ft. 8 in.) per second. At half-past three in the morning, however, the north-westerly wind has increased somewhat in strength. No living creature has been seen the whole of the night; no bird, no seal, not a walrus, not a bear. About six o'clock Strindberg is afoot once more, and continues his notes in the almanac, while Andrée goes on with his diary. Before Strindberg starts work he devotes a little attention to his personal equipment. Before, he had nothing on his feet except wool-lined sporting boots and a pair of woollen socks, but with these he felt cold. Now he puts on first of all the woollen stockings, then "raggsockor," or socks of wool and hair, and last of all snow-boots. All this he finds a warm and pleasant foot-wear.

About 9 o'clock a.m. the fog lightens enough to allow the sun to peep through. Now and then blue patches of sky are seen, a refreshing sight after all the "stampings" during the night. The carrying-power of the balloon increases finely, too, in consequence of the improvement in the weather. Strindberg even ventures to wonder if there is any prospect of a high-level journey.

A few minutes before 9.30 a.m. Strindberg awakened Fraenkel, and at 10.55 a.m. the balloon at length made itself free by its own efforts, with a jerk which gave the car a good bump. The balloon has, then, sat fast no less than 13 hours in this spot, which Strindberg calls "the second resting-place." The reason why the "Eagle" did not come loose during the whole of this period, in spite of the north-westerly wind in the morning having increased to 3.6 m. (11 ft. 7 in.) per second, was that one of the guide-lines had laid itself behind and underneath a block of ice and fastened itself there very securely when the wind gradually went round from 90°–100°.

The determination of their position, made possible by the fog having lightened so much as to allow the

sun to be visible, showed that, during these 13 hours, the balloon was lying at 82° N. lat. and 16° E. long.

It may here be remarked that if the "Eagle's" guide-line had not fastened around the ice-block, the wind which had blown during the night would have carried the expedition back to northern Spitzbergen.

The high-level journey that Strindberg hopes for does not take place, however. The sun has again disappeared in the clouds. But the "Eagle" is free, and while it drives onward in an east-north-easterly direction at the rate of about 3 m. (9 ft. 9 in.) per second, preparations are made for a much-needed dinner. The Göransson cooking-apparatus is put in order to prepare a chateaubriand. Fraenkel, who is evidently in charge of the housekeeping, looks greedily for water to clean the dishes with. This means, most probably, the melted snow-water which he sees lying on the ice beneath him. The bill of fare for the dinner, which was taken at about 12 o'clock midday, was as follows:

"Diner du 13 Juillet:

Potage Hotch Potch.
Chateau Briand.
The King's Special Ale.
Chocolate with Biscuits.
Biscuits, raspberry syrup and H_2O."

"A good and invigorating meal!" writes Strindberg.

Immediately after this there is noted that the tracks of a bear are visible on the ice. The weather has now become colder. The wet rigging is coated with ice.

Perhaps it is a result of the strengthening meal that the Polar travellers now summon up all their energy and send off a group of carrier-pigeons with despatches. At 1.08 the four pigeons, the third post, are set free. The birds first of all settle on the instrument-rings and the guide-lines before flying off.

After strange adventures one of these messengers

at length came to Stockholm. On the 15th July, 1897, when the Norwegian sealer "Alken" was in 80° 44′ N. lat. and 20° 20′ E. long., Skipper Ole Hansen was called on deck between one and two in the morning, as "a peculiar bird" had settled on the peak of the ship. It had come from the southwards pursued by two ivory gulls (*Pagophila eburnea*). The skipper, who thought the bird looked like a ptarmigan, climbed up the rigging and shot it with a ball. It fell overboard and it was not thought worth while to lower a boat to get it. But when, later in the day, they met another sealer, the opinion was expressed, however, that it might be one of Andrée's carrier-pigeons, and although they did not know that Andrée had begun his balloon journey, the skipper returned to the place where he had shot the bird and sent out two boats to look for it. And, strangely enough, one of the boats actually found the bird, and when the skipper saw that it really was a pigeon, he examined it more closely and then found the letter-cylinder. This was made of parchment soaked in paraffin and had outside the following message written in Norwegian: "From Andrée's Polar expedition to *Aftonbladet* (an evening paper), Stockholm. Open the cylinder from the side and take out two letters; of these the one in ordinary hand is to be wired to *Aftonbladet*, the one in shorthand is to be sent by the first post to the paper." In the cylinder there was found the short letter which is shown in the accompanying illustration. It reads as follows:

"From Andrée's Polar Expedition to
Aftonbladet, Stockholm.
13th July
12.30 midday, Lat. 82° 2′ Long. 15° 5′ E. good speed to E. 10° south. All well on board. This is the third pigeon-post.
ANDRÉE."

The shorthand despatch was missing, however, which Strindberg, in accordance with an agreement, was to send with each pigeon-post, placed in the same cylinder as Andrée's communication. People have wondered very much why this despatch was missing, but, knowing what we do now, it is not strange that Strindberg was unable to devote any time to writing it.

The poor pigeon, which had been a day and a half without food, was so tired out that it had sat with its head under its wing, and could certainly have been caught alive.

But no long rest or peace was to be vouchsafed to the crew of the "Eagle." It is true that Andrée went down into the car to sleep after the pigeons had been released, but Strindberg is certainly right when he says that Andrée will probably not get any proper rest. For the balloon has now sunk so low that the car has again begun to strike against the ice. As far as Strindberg is concerned, he hits on the plan of climbing up into the carrying-ring, where he thinks it is "confoundedly pleasant." He feels himself so safe and at home up there. He knows that up there the bumps will be felt less, so that he can sit there calmly and write without having to hold fast. It is true that the vibrations of the guide-ropes are felt up there, which is not the case in the car, but this is as nothing compared to the unpleasantness caused in the car by the bumping.

At 2.06 p.m. the fog is again bad. There comes from it a fine drizzle which fastens on the ropes like hoar-frost, a condition of things which, of course, is extremely dangerous, as it quickly increases the weight of the balloon. Strindberg makes a note, too, of a few blows against the ground, and a quarter of an hour later, after the sun has disappeared in the fog, of "stampings" in quick succession. The course is now easterly, and the speed 2.7 m. (8 ft. 9 in.) per second.

While the balloon slowly drags the car across the hummocks in this way, and while the Polar climate, with its ice and hoar-frost, makes itself remembered, Strindberg makes a list of the clothes he has on. His scanty equipment consists of:

One Jaeger-wool jersey,
One Jaeger hunting shirt,
A pair of Jaeger pants,
A blue "army suit,"
A woollen-lined leather waistcoat,
A pair of rather thin woollen stockings,
A pair of "raggstrumpor" (socks of mingled wool and hair),
One cap (woollen),
A pair of fur-lined snow-boots,
A pair of woollen mittens.

Once more something has to be done to lighten the balloon, if possible, so as to get the car off the ice. A choice is made of buoy No. 9 and a box of medicine, and these are thrown overboard. The guide-ropes then lie right, and scrape back to their proper places if they happen to cross each other.

At 4.35 p.m. there is a note that one of the pigeons which had been released four hours ago had returned and circled around the balloon a couple of times. Then the bumping against the ice begins once more: "constant touches," writes Strindberg.

But worse is to come! Constantly recurring, violent blows, constant fog, notes Strindberg, while the vessel drives over the ice in an easterly direction, at a speed of about 2 m. (6 ft. 6 in.) per second. As usual, the ice would be easily trafficable as far as smoothness is concerned, but not as regards the openings.

At 6 p.m. something catches fire in the car, but it does not seem to have been anything very serious, for nothing more is said about it.

Another half-hour passes. The course is more northerly, but the speed is nothing to speak of. No birds are to be seen or heard, and Andrée thinks: "I suppose there is no land near." He receives a severe blow on the head but, at the same time, is encouraged by finding that the balloon still contains much gas. It has fallen in to no more than up to one-third of the band round the middle.

Strindberg, who, about 7 p.m., also tried to find some rest in the car, was made sea-sick by the concussions against the ice. He and Fraenkel climb up again into the carrying-ring, and Strindberg makes repeated notes respecting the speed of the balloon.

It is now about 8 p.m. A determination has been come to, to make a vigorous effort to get the "Eagle" up and sail. An examination is made to find what articles can be done without, and it is resolved to get rid of six small buoys,[1] weighing altogether 12 kg. (26 lbs.), the winch, weighing 16 kg. (35 lbs.), 75 kg. (165 lbs.) of sand, the above-mentioned "universal barrel," 5 kg. (11 lbs.), and, finally, various provisions, amounting to no less than 200 kg. (440 lbs.). All this is thrown overboard. Up to that moment the guide-ropes had not left the ice since the first high-level sailing had taken place. Now, however, the "Eagle" rises sufficiently to allow the sails, which lay athwartwise and taut, to carry well, and the speed is increased. The balloon goes finely after the sails had been set in the way described, and another 50 kg. (110 lbs.) of ballast is thrown out. "Altogether it is quite splendid!" writes Andrée.

Now there is a moment's calm. About 9 p.m., Fraenkel considers he may go to bed. Andrée and Strindberg take the sun's height together, the former down in the car, the latter up in the carrying-ring.

[1] As the numbers of these buoys have not been given, it is difficult to say whether any of them have been found or not. See a later commentary respecting this matter.

While Strindberg sits there he opens his knapsack and puts on an extra pair of balloon-cloth trousers and an Iceland jersey, intending to snatch a little sleep. But first of all he reads the last letter he received from his financée, and has quite "an enjoyable moment." After a number of observations at 10.20 p.m. Strindberg makes no further notes before the landing on the ice-floe on the morning of the 14th July. Meanwhile, Andrée's good-humour finds expression in a note respecting an enormous polar bear which is visible 30 m. (92 ft.) right below them. The bear got out of the way of the guide-ropes, and shuffled away as soon as he came up on to the ice. "But he did not try to climb up to us!"

According to the common calculations of Andrée and Strindberg, the expedition had now travelled about 120 km. (72 miles) in a direction which was approximately N. 60° E. due course, *i.e.*, 60 km. (36 miles) northward and 105 km. (63 miles) to the east, and, consequently, they had now reached 82° 35′ N. lat. and 22° 5′ E. long., *i.e.*, if one calculates 15 km. (9 miles) to the degree of longitude. According to the checking computations and calculations, an account of which is given in the following pages, the position, however, would correctly have been 82° 29′ N. lat. and 24° 13′ E. long. from Greenwich.

Through the fog, the ice and water now appeared to be lifted up along the line of vision. This makes the water bewilderingly like land, and has many times deceived Andrée. The ice is beautifully smooth, and Andrée believes it is certainly not half a yard thick, lying, as it does, so low in the water.

The voyage through the air, which had begun so successfully, now seems to be approaching its end. It is only 10.30 p.m. when the car again begins to strike the ice violently, and the fog is dense. The ice sometimes exhibits great pressure, and is sometimes smoother and covered with pools of melted water,

while it is traversed by many channels. To crown their misfortunes, the long guide-rope breaks short half an hour before midnight. There is no land in sight, and no birds, seals or walruses can be observed. The only thing that can be caught sight of in the freezing fog is the ice, with its large, open "leads" or channels.

And thus ends that fatal 13th of July!

14th July.

The first few hours of the new day pass amid the same comfortless monotony and the same hopeless conditions. We are struck by the fewness of the notes as compared with those written before. In a few brief words the ice is characterized as being beautifully level, and divided by much open water, although there are no great expanses of sea. It seems not improbable that, during the last few hours, when the dense fog does not lighten, when the balloon does not rise and allow them to sail onwards, and when the car constantly strikes against the ice during the course of a slow drift towards the north-east, Andrée is considering the idea of breaking off the balloon journey and descending. He therefore pays special attention to the ice and looks for some sign of land.

Just before 1 a.m. he writes a monotonous succession of "touch," a fresh "touch," another "touch." The only sign of life that displays itself is one of the pigeons that had previously been sent off, but which has returned, and now flies about the balloon. "Perhaps she has acted like Gleisher's (Glaisher's ?—*Trans.*) pigeon!" says Andrée, when he sees this peculiar incident.

The few remarks become still briefer. Between 1.34 a.m. and 5.37 a.m. nothing can be read except: "adjusted the steering arrange . . . south in maxim . . . course N. 80° E., 3 h. 15 a.m. (= 2.23 a.m.) immediately after the side sails had been out on the

14th July. Course N. 60° E., 4 h. 27 (= 3.35 a.m.). Course N. 55° E., 6 h. 5 m. (= 5.13 a.m.)."

From this we should be able to deduce that certain attempts had been made to get the balloon into a better position, with the assistance of the means for guiding the balloon offered by the steering apparatus and the sails. But this, too, had been unsuccessful.

Finally, there is an entry: " 6.20 (= 5.28 a.m.) the balloon rose high, but we opened both valves and were down again at 6.29 (= 5.37 a.m.)." At 8.11 p.m.: " We jumped out of the balloon."

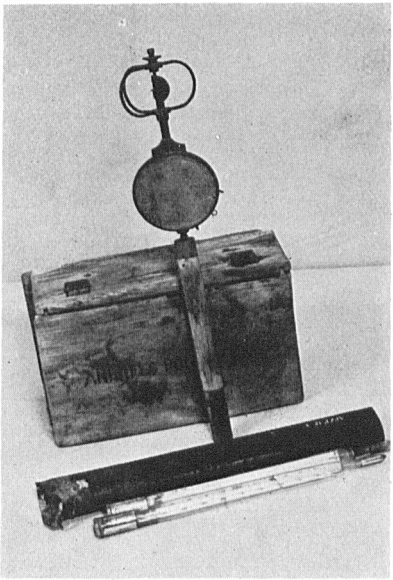
Respecting these, the last words written during the " Eagle's " journey, it should first be remarked that " 8.11 p.m." undoubtedly contains an error, and that " p.m." should be " a.m." It would then be 7.19 a.m. by Greenwich mean time. In Strindberg's almanac we read: " Anchored on an ice-floe 7.30 a.m. 14 July —19 h. 30 m." These last figures give the astronomical time, and correspond to 7.22 a.m.

The times given also show that Andrée, Strindberg and Fraenkel did not leave the car until more than an hour and a half after the valves had been opened in order to bring down the balloon from the height to which it had unexpectedly risen. What happened during these hundred minutes is unknown. According to a note in Andrée's diary for the 15th, the balloon, on descending, was heavily weighted with ice, formed from the fine drizzle issuing from the fog.

The landing must have taken place successfully and in the very best way. This is shown, partly by the circumstance that, as will be seen in the following pages, the members of the expedition carried with them quite uninjured on their wanderings across the ice even the most sensitive instruments in their equipment, and also partly by the fact that the remaining pigeons were also saved in their baskets, as it is stated that it was not until the morning of the 20th that they flew away.

Andrée's Polar Journey in the "Eagle" is now ended. Tired and famished, the three men landed on the terrible floating ice at about 82° 56′ N. lat. and 29° 52′ E. long., Gr.

On the basis of Andrée's and Strindberg's own words, words risen from the dead, we have followed the varying fortunes of the expedition during the 65 hours it journeyed by the "Eagle." We have been able to follow the drift of the balloon hour by hour, and have become acquainted with the actions and words of those on board, from the instant when, amid ominous signs, they left Danes Island and, delivered into the capricious hands of the winds, disappeared amid the clouds for ever from the eyes of their countrymen, until the moment they landed on the ice, more than 360 km. (216 miles) from the nearest land—that, too, frozen and inhospitable! We have learned to know Andrée and his comrades as calm, courageous men, not only during the few hours of quiet vouchsafed to them, but also amid days and nights filled with danger and hardships.



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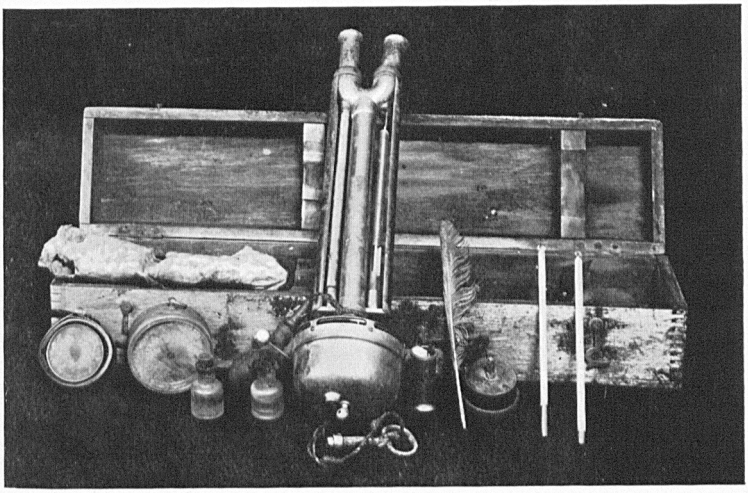
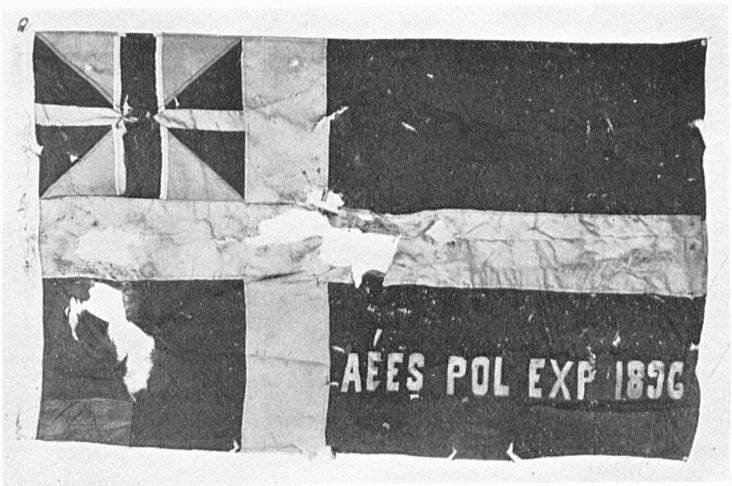
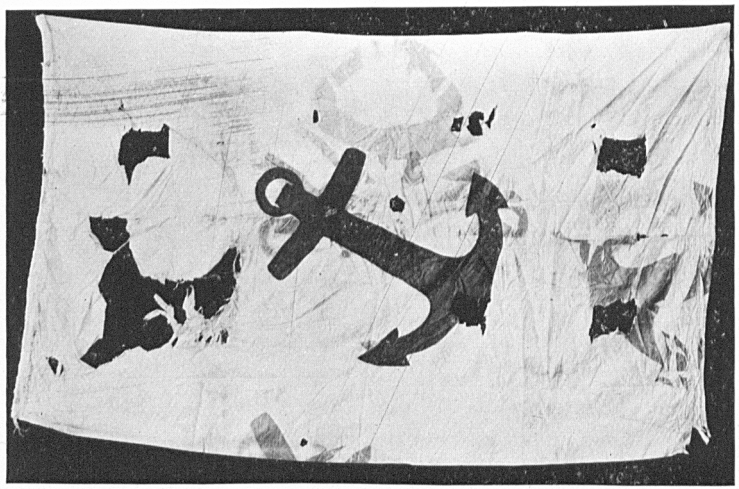


PSYCHROMETER WITH ACCESSORIES, AND ANEROID BAROMETERS



THE EXPEDITION'S SWEDISH FLAG



THE BALLOON FLAG

VIII

THE WEATHER EXPERIENCED DURING THE BALLOON-JOURNEY

By A. Wallén

Having consideration to the great rôle meteorological conditions necessarily play in a Polar journey by air-balloon, we must expect to find these phenomena thoroughly discussed in the plan drawn up by Andrée for his Polar Expedition. And yet we do not discover very much said about them there, the only factor to which any great importance is ascribed being the direction of the wind. It is clear that this latter point was one of decisive importance for aeronautic technics of that day; the wind was the motive power which was to be employed, and its character, therefore, simply was the one important, the primary, factor.

A short account has been given, in the chapter dealing with the preparations made for the Polar journey, of the meteorological premises on which Andrée based his intended journey. As may be seen there, he considered that the meteorological conditions existing in the Arctic regions during the month of July were very favourable for a balloon-journey, but he paid little attention, however, to the existence of fog, or to that of its near relative, hoar-frost.

As mentioned in the section on the Base at Danes Island, there took part in the first, uncompleted expedition of 1896, a well-known Swedish meteorologist, Nils Ekholm. In 1895 he had published an account of the studies he had pursued respecting the weather conditions in that part of the world which was

to be the scene of the coming journey, and in many points it supplements Andrée's remarks.

Supported by the investigations he had made, Ekholm considers that the tract between Spitzbergen and the North Pole lies on the borders between a region of a high atmospheric pressure in the east and one of low atmospheric pressure in the west, and that this would lead to the prevalence of winds from the south. He points out, however, that the actual state of things is very variable, owing to the occurrence of travelling cyclones. If the ascent began when such a cyclone happened to make its appearance north-west of Spitzbergen, two possibilities presented themselves. The balloon would either be carried by a southerly wind towards the vicinity of the Pole, and there, most probably, be forced to circle around it several times and afterwards be borne towards Siberia or Russia, or else it might remain for a brief period in the neighbourhood of the region of high pressure and, by means of its sails or its steering arrangement, force its way into it. There was no danger of the presence of any lasting calm which would keep the balloon imprisoned within inhospitable tracts, as the equilibrium existing in such a weakly developed, far-reaching, high-pressure region was a factor easily disturbed.

As regards the question of fog, Ekholm had drawn the conclusion, from what was then known respecting this phenomenon, that it hardly appears more than a couple of times during the months of July and August in the regions lying north of Spitzbergen and Greenland.

Knowing what we do to-day respecting the weather conditions north of Spitzbergen, Ekholm's theory respecting the rôle played by travelling cyclones must, on the whole, be considered as in accordance with modern views; this especially as regards the month of July. And later investigations concerning temperature and rainfall (snow, mist, etc.) have, in the

main, confirmed the opinions entertained by Andrée and Ekholm. These observations have shown, however, that fog is of very common occurrence between Spitzbergen and Franz Joseph Land, and that a district extends from the place last mentioned towards the Pole where fog prevails for more than twenty days during the month of July. It is true, of course, that Polar expeditions in our days, by means of air-ships, possess another technic than those employed by Andrée, and they are more independent of wind conditions than aeronauts were thirty years ago. Consequently, fog has now become the element playing the greatest rôle in these journeys, and it is considered to be a generally accepted rule that flights across the northern Polar tracts should not be undertaken later than in May or, if absolutely necessary, at the beginning of June, although, from a purely climatic point of view, April appears to be the best month. But in spite of this, fog and hoar-frost (deposited by the fog) have been fatal to Polar flights undertaken even at this early period of the year. It must, therefore, be considered as certain that Andrée and Ekholm had under-estimated the factor of fog and its consequences even for a balloon of their type. In the following pages we shall see that the telling words of Nansen hold good for them too—the words, with which he has characterized the Polar fogs: "Ugh! This infinitely tenacious Polar sea fog! When it covers you with its mantle and hides from your eyes the blue above you and the blue around you, and turns everything to a grey, wet fog, day in and day out, then there is required all the buoyancy of soul one possesses in order not to be depressed by its close embrace. There is fog and fog and nothing but fog wherever we turn our eyes. It rests on the rigging and every patch of the deck is soaked by its dripping. It rests on one's clothes and at last makes them wet through. It lies on one's soul, it lies on one's senses and every-

thing becomes a grayness within a grayness." And these remarks were made on board a ship; how much truer must they not have been in an air-balloon which is embraced and pressed to the ground by this wet covering!

The statements given by the memoranda in the diary, respecting the weather during the balloon-journey, present us with a picture, above all, of the conditions of wind and temperature, and those were, of course, the chief factors. To judge by all appearances, the temperature was quite normal, and the very inconsiderable variations that occurred were typical of that Polar region. The temperatures shown by the dry bulb thermometer varied extremely little—between 33.8° F. and 30.9° F. As a rule, the temperature remained about half a degree or so above freezing-point, and there is no trace of any great differences. The wet bulb stayed about half a degree lower than the dry bulb thermometer, but the difference gradually disappeared, and its figures were the same as, or even a little higher than, those of the dry bulb instrument. The relative moisture, consequently, rose from 88 per cent. to 100 per cent.

With the assistance of a knowledge of the path taken by the balloon and the information given us by the Diary and log-book, we are able to obtain a fairly detailed idea of the winds and weather that prevailed. At Virgo Harbour, during the days immediately preceding the start, winds from the southwards were very common. It seems probable, however, that, just there, southerly winds appear locally to an abnormally great extent, just as they do, as a rule, along the western coast of the Spitzbergen archipelago. Taken as a whole, the wind conditions along the coasts of Spitzbergen are distinguished by the frequency of the occurrence of local winds which often attain a considerable velocity, but which blow only within a limited tract. An example of this is given by

the winds which blew on the 11th July, the day when the ascent was made. A Norwegian Polar skipper, Johan Posti, of Alten, who was with his sloop "Solblomsten" north of North-East Land, nearly in 81° N. lat. and about 20° 30′ E. long., entered in his log-book that an easterly storm prevailed, and that the same wind continued the following days until the 13th July. But, on the north-west coast of Spitzbergen on the 11th, there blew a southerly wind. Posti adds that he was fully aware that the easterly wind was of but a local character, and came from the icy fells of North-East Land. Edvard Johannesen, another Norwegian sealing-skipper, who was north of Spitzbergen during the month of July, has noted a south-easterly wind on the 11th July.

The very scanty notes of the party respecting the distribution of the atmospheric pressure in this neighbourhood during the days about the 11th July tell us very little indeed of the matter. Probably, however, there existed on the 11th a not very pronounced low-pressure area west of Spitzbergen, while a fairly high atmospheric pressure spread across the tract lying between Jan Mayen, Beeren Eiland, Spitzbergen and Franz Joseph Land. Spitzbergen and the sea immediately to the north of the archipelago had a rising barometer, and the weather, consequently, was probably most influenced by this last-named factor, which, we may suppose, was also the origin of the rather heavy southerly wind that blew over Virgo Harbour on the 11th July.

It was with this southerly wind that the "Eagle" started at 13.46 o'clock on the 11th July. The first stage lasted until, after a journey of almost 2.5 hours, the travellers took their last bearings of land at 16.21 o'clock. The wind had been the whole time south-west, often squally and with an average velocity of 29.7 ft./sec. The sky was covered with clouds except towards the north-east and over Spitzbergen.

The second stage lasted almost five hours, *i.e.*, until 21.18 o'clock, the wind blowing the whole time fresh from the south-west. Its average velocity was 42.56 ft./sec., but probably exceeded this figure somewhat considerably, now and then increasing, most likely, to more than 66 ft./sec. The balloon moved, however, at a considerable height—660–770 ft., so that this velocity need not have been impossible. Heavy clouds and fogs became more and more frequent, but the balloon floated above them, where the sky was clear and sunshine prevailed.

The next stage lasted almost two hours, and ended at 23.06 o'clock. The wind had now veered round, becoming more westerly; the average direction was west-south-west. The velocity of the wind had diminished, but the mean rate was about 33.3 ft./sec., in which connection it should be observed that the height of the balloon was now lower, the average being a little more than 550 ft. There was still a fairly dense layer of clouds, immediately above which the balloon moved, only occasionally catching glimpses of the ice beneath. During the following stage, which lasted a little more than 1.5 hours, or until 1.26 o'clock on the 12th July, the wind continued somewhat westerly or, rather, on an average, direct west. This alteration in the direction of the wind, which had taken place during the evening, must still have been the result of the high atmospherical pressure which, as we have seen, prevailed there. The weather was, in general, cloudy and foggy near the surface of the earth, but as long as the balloon travellers were above the fog they could see alto-cumuli clouds in the east. The balloon, however, soon sank to heights of less than 110 yards, thereby coming into the fog, which prevented them from seeing any distance.

The wind, which had been falling greatly in strength, died away entirely during the night, and the next stage of the journey embraces a period of dead calm lasting

almost 1.5 hours, or until 3.00 o'clock. The balloon was then in 82° 11′ N. lat. and 28° 15′ E. long. Grw. The fog continued and the field of vision was extremely limited. During the two short stages which immediately succeeded, and which did not occupy a longer total period than 3.5 hours, or until 5.58 o'clock, there prevailed a very faint wind, which, during the first of these stages, was south-east with an average velocity of 4.62 ft./sec., and, during the second, was a little stronger, with a mean velocity of 7.26 ft./sec.

Now and then the fog lightened somewhat, and after this second stage there was again a dead calm for nearly an hour, or until 6.40 o'clock.

After this calm there followed a new, long stage, with a constant, almost easterly wind, and which lasted for more than 15 hours, *i.e.*, until about 10 o'clock in the evening of the 12th July. During this period the average velocity was 10.9 ft./sec., and the balloon was carried almost 115 miles towards the west (15° 30′ E. long., Grw.). In this connection we must first see to what extent the distribution of the general barometrical pressure had altered during this period. At Green Harbour the barometer fell rapidly from 20 o'clock on the 11th July, when it stood at 29.718 in., until 8 o'clock on the 12th July, when its height was 29.28 in., after which it probably rose again somewhat during the course of the day, until at 20 o'clock, at Advent Bay, it stood at 29.297 in. The lowest atmospherical pressure was probably reached during the course of the day, when, at Virgo Harbour, there was a dead calm at 12 o'clock, which, in the evening, was succeeded by a faint wind from the west-south-west. It seems probable to me that a uniform low-pressure area, open northwards, had, westwards of Spitzbergen, moved on towards the north-east, passing near the island. The result of this was that the balloon remained for a long period

north of the central point of the low-pressure area, amid faint easterly winds, and on the outskirts of the rainfall area, which was distinguished by fog and an inconsiderable rainfall. By 13 o'clock in the morning the atmospheric pressure at Spitzbergen had risen to 29.406 in., and by 20 o'clock to 29.874 in. The low pressure, consequently, had moved onwards. During this drift of the balloon westwards the weather continued to be very foggy, sometimes with a fine rain, but with glimpses, now and then, of a clearer sky. The balloon, which was weighed down by the fog, floated at a low height and very often struck against the ice.

During the next stage the balloon lay still, in consequence of one of the guide-lines having fastened around a block of ice. This stage lasted for 13 hours, or until 10.57 o'clock on the 13th July. The fastening of the balloon in this manner is, to a certain extent, connected with the fact that the wind, under the influence of an approaching low barometrical pressure, had swung round to the north-west. With this north-westerly wind, the velocity of which rose to about 16.5 ft./sec., the balloon, if it had been free, would probably have been carried a long way back towards its starting-point. But we find, however, no noteworthy change of temperature, or in the weather, which latter still continued to be foggy.

The next stage lasted 6.5 hours, or till 17.33 o'clock on the 13th July. The wind now came, on an average, from the west, but was rather faint, the mean velocity being 12.87 ft./sec. The fog lifted a little towards midday, but soon returned, and the hoar-frost from the mist began to form on the cordage. During the next stage (until 21.06 o'clock), too, the wind was almost westerly, with a slight tendency to the south. The mean velocity was 12.87 ft./sec. The last stage lasted until 7.21 o'clock, on the 14th July, when the journey came to an end. The wind now was, on the whole, south-westerly, but the mean

velocity had increased to 17.49 ft./sec. By 0.50 o'clock the barometer had risen 0.234 in. during the previous twenty-four hours. The south-westerly wind did not last long, however, but, according to the memoranda made after the landing, veered round to the north-west during the course of the day.

When the first communications from the Andrée Expedition came by the pigeon-post which was sent on the 13th July, great astonishment was awakened by the fact that the party had not traversed a greater distance, and many persons expressed a doubt as to the accuracy of the communication. In consequence, Ekholm investigated the most probable meteorological conditions prevailing during the first two days of the balloon-journey. In his article he stated the reasons why the balloon could not have travelled farther. He began by assuming that a low-pressure area had lain north-west of Spitzbergen on the 11th July, and had moved on eastwards, north of Spitzbergen, during the two days, 11–13th July. Ekholm marked on a sketch-map the position of this centre of depression on the 11th July as being quite near the east coast of Greenland, and, on the 13th July, north-west of Franz Joseph Land. The balloon, consequently, would have penetrated and remained for a long time within the centre of the low-pressure area with its dead calms and its varying winds, besides which, Ekholm supposed that the cyclone area had been of a longitudinal form, extending in a north–south direction, so that the area of calm around the centre had extended all the way down to Spitzbergen. From what has been said above, it seems possible that the uniform low-pressure area had come farther from the south, and had passed close to Spitzbergen, whereby the balloon, during the long period of its movement towards the west, had the whole time lain north of the centre, and within the area of faint, easterly winds with rain and fog which are its characteristics, especially

if the low pressure had lain open towards the north. The direction taken by the low-pressure cyclone was probably towards the north-east, thereby bringing the balloon into the vicinity of its centre; during this movement the wind was first of all north-west, then west, afterwards more southerly and, finally, north-west. In any case, if either of these interpretations of the wind conditions is that which best agrees with the actual state of things, we may confidently express the opinion that the balloon travellers were very badly treated by the weather, which turned out more unfavourable after the start than they had reason to expect. But it cannot be denied that the opinion they had formed at home, of the weather conditions to be expected during a Polar journey in an air balloon, had been altogether too favourable, and, above all, that too little consideration had been paid by them to the frequency of fogs in these Arctic tracts—a circumstance, the fatal results of which the travellers were, unhappily, soon to experience.

IX

BALLOON-TECHNICAL COMMENTARIES ON THE JOURNEY OF THE "EAGLE," ON THE 11–14TH JULY, 1897

By K. A. B. Amundson and I. Malmér

The question of discussing the journey of the "Eagle" from a balloon-technical point of view may suitably be divided into two periods which differ essentially in their course. The first period—*that of the free journey*—lasted from the start at Danes Island at 12.46 o'clock on the 11th July until immediately after midnight on the 12th July. The second period—*the guide-rope period*—begins at the time last mentioned and continues until the final landing of the balloon on the ice at 7.19 o'clock a.m. on the 14th July.

The journey should preferably be followed with the assistance of a sketch-map and diagrams, when we now discuss the balloon's course, position and height above the sea at different times. The fact that the balloon as soon as it had started, fell to such an extent that the car dipped into the water—apart from the lessening of the speed of the balloon caused by the drag- and ballast-ropes—was probably chiefly occasioned by the southerly wind after it had crossed the height to leeward of the balloon-house, taking an oblique downward direction towards and across the water. The amount of ballast thrown out on that occasion amounted to 455 lbs. of sand, and thanks to this and the well-known loss of the lower parts of the guide-ropes, the balloon rose to a height of 1,980 ft. Of course it may now be said that the amount of ballast sacrificed was

unnecessarily great, but the men in the balloon had probably not then observed the loss of the drag-ropes. This great diminution of the weight altered the entire plan of the journey, according to which the ropes, being dragged along the surface, were first of all to have made possible a certain steerability of the balloon and, secondly, to confer an automatic stabilization of the flight-height within limits lying as low as 495–660 ft. above the surface of the earth. The journey was thus changed from the very beginning into a free flight, at a relatively great height, with a consequent loss of gas.

On starting, the balloon was calculated as being able to carry a ballast-weight of 2,715 lbs., distributed as follows:

Ballast-lines	889 lbs.
The freely hanging part of the guide-ropes	1,067 ,,
Sand, 15 sacks of 50.6 lbs. each...	759 ,,

The weight of those parts of the drag-ropes which were lost at the start amounted to 1,166 lbs., while the weight of the remaining parts suspended from the balloon was 561 lbs. Merely the loss of these guide-ropes gave the balloon an additional rising-power amounting to 506 lbs., consisting of the difference between the weight of that part of the drag-ropes which was intended to act as the free guiding-part, and the weight of those parts of the drag-ropes which remained hanging from the balloon. After throwing out 455 lbs. of ballast, consequently, the balloon would have had a rising-power of 506 lbs. + 455 lbs., *i.e.*, 961 lbs. This rising-power would, under normal atmospheric conditions, have been sufficient to raise the balloon to a height of 2,442 ft. As a matter of fact, after eighteen minutes the balloon had attained a height of 1,980 ft., which it seems to have retained until it began to fall again as a result of the cooling of

the gas. The fact that the balloon attained a height of only 1,980 ft. may possibly point to the carrying-capacity at the very start having been somewhat less than had been calculated, but it may also have resulted from the cooling of the gas.

If we presuppose that, at the start, the balloon was well filled, this first rise must have caused a loss of gas amounting to about 11,480 cub. ft., with, consequently, a diminution of the carrying-capacity of about 792 lbs. at the surface of the earth.

During the period of free flight, in the course of the afternoon, the balloon twice sank, unexpectedly, somewhat considerably; on the first occasion until the guide-ropes, now only about 363 ft. long, touched the water; on the second, to a height of 792 ft. Otherwise the journey during this period continued at a height lying between 1,650–2,310 ft.

The first of these falls was caused by the balloon's passing through a cloud; the second was evidently the result of the cooling of the balloon by slight fogs. When these mists had disappeared and the sun had grown hot, the balloon once more rose in stages to as much as 2,310 ft. During this ascent, a note was made on two occasions that there was a "whistling" in the valve; the first time, the duration of this whistling is called "a long while"; on the second occasion no note is made respecting the length of time. The whistling is expressly stated to have come from the "large valve," *i.e.*, the automatically-acting safety-valve at the bottom of the balloon. As the gas could not force its way through this valve before a certain over-pressure of the gas in the balloon had been reached, the whistling proves that the balloon was now much distended by the gas. If we take into consideration that, when the ascent had just begun, a relatively large amount of gas must have been lost, then the remaining gas must have become somewhat considerably heated during the flight in the heat of

the sun. The whistling from the valve has evidently been a normal phenomenon, caused by over-pressure in the balloon. It is clear that the men there did not attach any great importance to it. Still, in consequence of the heating of the balloon during its flight at this height, there must have been an additional loss of gas, although it is impossible to determine the amount.

Just before 21.43 o'clock the balloon has fallen somewhat down to the upper surface of the clouds, at a height of 1,650 ft. In order to prevent a continued descent there are now sacrificed a buoy, No. 4, and 17.6 lbs. of sand, or, together, a ballast-weight amounting to 22 lbs.; between 22.22 o'clock and 22.30 o'clock there are thrown overboard 11 rungs of the rope-ladder and 17.6 lbs. of sand, while, at 22.55 o'clock, buoy No. 7, is thrown out, too, this making a total loss of 28.6 lbs. At 23.11 o'clock the balloon is floating at a height of 1,518 ft.

Immediately after midnight, between the 11th and 12th July, the balloon enters the shadow of a cloud, and then begins to fall rapidly in consequence of cooling, so that, within four minutes, it has sunk so low that the drag-ropes touch the ice. This lightening of a part of the weight of the drag-lines arrests the fall of the balloon, and the journey is continued with a part of the lines dragging along the ice.

From this moment the free journey is ended. A new phase begins, during which it seems that the men wish to continue the journey with the ropes dragging along the ice, in closer agreement with the original plan. There still remains sufficient ballast to permit of the balloon rising if this should become desirable. During the hours spent in the free journey, preparations had been made for such a dragging-action of the ropes, by splicing two lines so as to lengthen them into a guide-rope.

The total loss of ballast during the first period (the

free journey period)—if we neglect that which consisted of that part of the drag-ropes which, from the very start, was intended to rest on the ice or on the water [1]—amounted to—

At the start.....	506 lbs.
On dipping into the water	455 „
Later on, 2 buoys, 11 ladder-rungs, 35.2 lbs. of sand, probably a total of about	1,012 „

By this diminution of the ballast-weight, compensation had been gained for the lessened carrying-capacity of the balloon, caused partly by loss of gas—probably not less than 792 lbs.—and partly by the cooling of the gas. Of the weight, 2,715 lbs., originally calculated as ballast, there was still left about 1,703 lbs. In addition to this, there was extra ballast consisting of a certain part of the equipment which could be thrown overboard should such a step become necessary.

The guide-rope journey begins. About 1 o'clock the balloon is following an easterly course at a speed of 10.9 ft. per second and at a height of 66–330 ft. below the clouds. The fog grows denser and, first of all, 26.4 lbs. of ballast have to be sacrificed; this is followed by a buoy (4.4 lbs). At 1.26 o'clock the balloon stops for a while on account of a calm.

It is evident that there exists no possibility at all of steering, the guide-ropes—although one of them has been made longer by splicing—being unable to counterbalance the effect caused by the ballast-ropes dragging against the ice. The result is, that the balloon assumes a position directly opposite to that which would permit sailing. The sails—which at the beginning of the free flight had been lowered as having

[1] This part of the drag- or guide-ropes cannot be considered as ballast in the real sense of the term, for its task was to prevent the gas from rising too much when the gas became heated, and was not meant to serve as ballast which was to be thrown overboard.

then no task to fill, but which had evidently been hoisted again to serve as auxiliaries in the intended steering during the guide-rope period—now do nothing but press down the balloon as a result of their adjustment.

The balloon stops once more, on this occasion for 40 minutes, but then continues its journey at a height which does not exceed 215 ft. At 15.06 o'clock the car begins to bump against the ice, so that the travellers are obliged to throw out the guide-line cutters, 55 lbs. of sand, ropes and anchor, a block, etc., and, as this is of no avail, the Polar buoy; a total of about 330 lbs. After a couple of hours the bumps increase incessantly in number until, after 18.33 o'clock, there comes a bump every minute or every minute and a half. At 22 o'clock the balloon stops, weighed down altogether and dripping with water.

Between 1 and 15.06 o'clock no ballast seems to have been thrown overboard, and the balloon appears to have continued at a comparatively good speed and, approximately in equilibrium, balanced by the dragging-ropes. The loss of gas during this period, consequently, seems to have been moderate. The reason that, in spite of ballast being afterwards thrown out, the balloon was unable to remain floating was the increasingly dense fog, which weighed the balloon down heavily.

When the 13th July begins, the balloon has been lying fastened since 22 o'clock on the 12th. It is unable to rise, and the wind is too weak to set it moving. A little later, the fog lightens and the sun shines through, with the result that, at 10.55 o'clock, the balloon breaks free unaided. The reason it had been held fast for 13 hours was that the drag-line had fastened, below and round a block of ice.

The balloon now moves slowly forward at a low height. The fog grows dense again and there begins to fall a fine rain, accompanied by the formation of

hoar-frost on the balloon. The result is that the car commences to strike against the ice once more. A buoy and a chest of medicine are thrown out, weighing together probably about 22 lbs. The balloon then seems to have risen a little, and the memoranda state that the ropes "scrape themselves straight," *i.e.*, arrange themselves next to each other in proper order. But the balloon sinks once more, and the blows against the ice become worse and worse.

At 18.30 o'clock, however, Andrée observes that the balloon still contains much gas, for it has fallen in only as far as up to one third of the belly-band or equator. Assisted by the data which are known respecting the dimensions of this belly-band and its position on the balloon we are able to make an approximate calculation of the loss of gas hitherto suffered. This calculation shows that the loss in question must have been about 16,954 cub. ft. Of course the statement "one-third of the belly-band" is no very exact determination of measure. If we assume that the balloon had, instead, fallen in up to a line marking the middle of the equator, the loss of gas would have been about 21,192 cub. ft. Such an erroneous calculation can certainly not have been made, so that the loss could not have amounted to much more than 16,954 cub. ft. If we take as a starting-point the loss of gas, caused by want of tightness, which was found while the balloon was standing in the balloon-house, and which, according to Svedenborg's calculations, corresponded to a diminution of the carrying-capacity by not more than 185 lbs. per 24 hours, *i.e.*, a loss not exceeding 2,685 cub. ft. during the same time, and if we assume that the loss of gas caused by want of tightness was equally great during the journey, then we come to a resultant estimate that, during the journey, as far as it had hitherto lasted—about 50 hours—the loss of gas caused by want of tightness amounted to about 5,907 cub. ft. If there be added to this the

amount of gas—probably about 11,477 cub. ft.—which was lost at the first ascent to a height of 1,980 ft., then we obtain a total of 17,378 cub. ft., *i.e.*, very nearly the amount obtained by our calculations based on Andrée's above-mentioned observation. The loss of gas during that part of the flight at a great height, when whistling was noticed through the bottom-valve, could, evidently, not have been very great.

If the probable loss of gas up to the moment at which we have arrived be put, in round numbers, at 17,660 cub. ft., it would correspond to a diminution of the carrying-capacity by 1,210 lbs. The temperature, during the whole of the guide-rope period, remained at about 30° F., so that the carrying-capacity of the balloon cannot have been affected to any great extent by variations of temperature. The weight of the ballast hitherto lost amounted to 1,395 lbs. As the car constantly struck against the ice, the carrying-capacity of the balloon—apart from the ballast-weight just mentioned—must have been further diminished by a total amounting to the weight of the ballast-lines and the remainder of the guide-lines, *i.e.*, 1,450 lbs. The carrying-power of the balloon, consequently, is about 2,794 lbs. less than at the moment of starting. The blows against the ice are not, of course, a result of the diminution of the carrying-capacity alone; they are due, in part, to the checking of the balloon by the dragging of the ropes against the ice. As the speed of the balloon at this phase of the journey was extremely small, the influence of such checking of speed must certainly have been very little, however.

Assisted by these calculations we are able to deduct that the diminution of the carrying-capacity of the balloon was the result, to a very great extent, of the balloon being weighed down by water and ice. We might also venture to make the deduction from Andrée's observation, if we read it in connection with the above calculations of the loss of gas, that the

gas-tightness of the balloon did not decrease to any great extent after the start. This deduction is supported by the fact, already pointed out, that between 1 and 15.6 o'clock, on the 12th July, it had not been necessary to throw any ballast overboard.

At 20 o'clock a great effort is made to get the balloon to lift and sail. There are thrown overboard six little buoys, of a total weight of 26.4 lbs.; the winch (35.2 lbs.); 165 lbs. of sand; a barrel weighing 13 lbs., and provisions to a total weight of no less than 440 lbs. The whole amounts to 680 lbs. Now the balloon rises sufficiently to allow the sails, which have been set athwart and made taut, to carry well, but only after an additional 110 lbs. of ballast have been thrown out. For one moment a real guide-roping journey goes on.

During this time the height is not mentioned otherwise than by Andrée saying, on one occasion, that they have seen an immense polar bear about 100 ft. below the balloon.

But the flight seems to have come to an end very soon. At 22.30 o'clock the car once more begins to strike violently against the ice. The fog is dense. At 23.30 o'clock the spliced guide-rope breaks.

The next day, the 14th July, the first hours pass in the same way, with continual blows against the ice, while the balloon drifts slowly onwards towards the north-east. After 1.34 o'clock a fresh attempt seems to have been made to direct the course by means of the steering-arrangement. The effort appears to have been unsuccessful, as the side-sails were cut away later on. The scanty notes give no details respecting these measures.

Finally, there is a note that, at 5.28 o'clock, the balloon, from some unknown cause, has " risen high " in the air—the height is not mentioned—but that it has been brought down again a few minutes later by opening both the regulating valves.

What took place during the time immediately afterwards and until 7.19 o'clock, when the members of the Expedition "jumped out of the car," is unknown.

From Strindberg's photographs, taken immediately after the landing, it seems, however, as if that manœuvre had been carried out normally.

The balloon, whose bursting-arrangement has not been used, is lying on the ice, still filled to one-half with gas, and with the car and the ropes behind it, in the direction of the wind. The so-called belly-band is visible in its proper position on the wind side. Three thick ropes, one of them thicker than the others, and two thinner lines, are seen in the photographs lying extended behind the car. The thinner ropes are evidently the anchor cables. The number of the guide- and ballast-ropes—from the beginning, eleven in number—was considerably less when the descent was made. Nothing is said in the memoranda respecting this great loss of ropes, nor whether it was suffered willingly or unwillingly. It may be connected with the sudden rise of the balloon, mentioned just before the end of the balloon-journey.

A short summary of the course of the journey shows that, from the start to the landing, the "Eagle" had remained afloat 65 hours 33 minutes, *i.e.*, almost three days.

The free journey carried the balloon in 10 hours 29 minutes, at a good speed, mainly in a north-easterly direction, to a distance of about 240 miles from Danes Island.

The guide-rope journey lasted 55 hours 4 minutes, during which period, however, the balloon lay still on three occasions for a total of about 14 hours. The journey was marked by a slow rate of speed; the course taking the balloon first about 114 miles, mainly in a westerly direction, then eastwards and, finally, north-eastwards, the total length of this phase of the journey

amounting to about 258 miles. The place where the party finally landed, situated in 82° 56′ N. lat. and 20° 52′ E. long., Grw., was at a distance of no more than 54 miles from the spot where the free journey had ended 55 hours earlier. It was about 288 miles from the place where the flight had begun.

The route followed by the balloon, between its start and landing, points to its having moved along in the neighbourhood of a barometrical minimum, lying immediately north of Spitzbergen, and travelling in a north-easterly direction. The balloon has afterwards been driven about, ever since the beginning of the second day, by the winds, varying in direction, which prevail around the centre of a cyclone.

After the time when Andrée made the above-mentioned observation, and until the end of the balloon-journey, there was thrown overboard a total of 677 lbs. of ballast. It is evident that the weighting of the balloon by ice-formation had increased considerably during the last 13–14 hours of the journey. The total diminution of carrying-capacity from the beginning to the end of the journey amounted to about 3,476 lbs. The decrease in carrying-power caused by the loss of gas probably amounted to about 1,320 lbs. When this loss reached about 2,200 lbs., the balloon, at the close, must have been weighed down by the ice on it. Andrée, too, remarks in his Diary, that, on landing, the balloon proved to be much covered by ice.

It may, therefore, be considered as certain that the reason why the "Eagle" was unable to remain floating any longer was its being covered by ice in the damp and cold Polar air. When planning the journey, Andrée had reckoned on the deposition of snow and water on the roof of the balloon, and had endeavoured to reduce its importance by arranging a cloth calotte, or cap, above the top of the balloon. Strangely enough, the fog, and the deposition of ice this would cause, do not seem to have been taken into calculation. At the

end of his log-book, and under the remarkable heading of "Proposed alterations for the next Polar Balloon Expedition," Strindberg makes, *inter alia*, the suggestion that it ought to be possible to warm the gas a little by boiling water in the car, and condensing the steam in a sheet-iron box inside the balloon. The bringing forward of this idea is an additional support for the correctness of the explanation just given of the inability of the "Eagle" to remain in the air. Strindberg's plan aimed at keeping the balloon covering so well heated, when the external air was near the critical temperature of 32° F., that the deposition of ice in the netting would be prevented.

In the same place in his book, Strindberg also proposes that the future balloon shall be made of silk-cloth similar to that used for the "Eagle," but that the volume should be raised to about 211,920 cub. ft. The cloth employed in the manufacture of the balloon has evidently given rise to remark, while an increase in the cubical content has, equally clearly, been found justified by the necessity of carrying a greater weight of ballast. An increase of volume also diminishes the proportion between this and the superficial area of a balloon. This, in its turn, would lessen the importance of the deposition of water, or ice, in its ratio to the carrying-capacity of the balloon.

One of the corner-stones of Andrée's stately plan for his Polar Expedition was the idea of the drag- or guide-ropes, with their twofold task of regulating the height of the flight of the balloon and, at the same time, of affording a means of steering it. With the loss of the lower two-thirds of the guide-ropes there vanished, practically speaking, the possibility of applying the steering principle. As the length of the remaining drag-ropes—363 ft.—did not very much exceed the 231 ft. of the ballast-ropes suspended to the opposite side of the carrying-ring, all the ropes, as a rule, dragged across the ice at the same time, when

the balloon was low enough, thereby preventing the adjustment of the balloon necessary for steering purposes. Little or no steering could ever have been attempted. The remaining parts of the drag-ropes, in combination with the ballast-lines, have, of course, helped to bring about an automatic regulation of the height—although within certain limits—during the drag- or guide-rope section of the journey. The experience gained during this phase seems to have been, however, that the practical realization of the guide-line idea did not fully satisfy the demands caused by the abrasion against the ice. Strindberg, in his above-mentioned proposed amendments, makes the remark that the guide-ropes should be shod with metal.

One is inclined to ask oneself the question: What would have been the difference in the course of the balloon-journey had the guide-ropes not been lost at the start? During earlier discussions of the plan, the apprehension had already been expressed that the drag-ropes, had they remained entire, would have so checked the speed of the balloon that the latter would have been forced down into the water, and the Expedition would have met with disaster at the very start. But such fears are doubtlessly exaggerated. Throwing out ballast would have saved the travellers from their unpleasant but, most certainly, not critical situation, just as it did in the real case. The experience gained during the free journey shows that a part of the guide-ropes might be allowed to drag through the water without any attendant risk, and this even when a strong breeze was blowing.

A suitable regulation of the amount of ballast thrown overboard would have enabled the aeronauts to avoid the free part of the journey altogether, and to re-establish the guide-rope journey at the very commencement. The loss of gas caused by the free journey would thus have been obviated. There

would have been a greater chance of the automatic regulation of the height succeeding. It would have been possible to obtain a certain power of steering the balloon, so that, for instance, the course, at the very beginning of the journey, might have been set somewhat more to the north, although the speed would, of course, have been considerably less, on account of the dragging of the ropes against and through the water. But these steering possibilities were, undoubtedly, over-rated by Andrée.

But it is of little use to discuss what might have occurred had circumstances been other than they were, for, in addition to the uncertainty always attached to calculations of the strength and direction of the wind, there remain the fog and hoar-frost, in company with the spectre of an icy coating ready to cover the balloon, to stultify every estimate.

Nothing remains to be said but that the balloon might have remained afloat in the air for some days more, still, only under two presuppositions—that the guide-ropes had not been lost, and that the balloon had not been weighed down by the fog.

X

THE JOURNEY OVER THE ICE TOWARDS FRANZ JOSEPH LAND

WORN out and famished, Andrée and his companions landed on the ice-floe just before 7.30 o'clock on the morning of the *14th July*. A checking of the place-determinations made at the landing-place shows that it was situated in 82° 56′ N. lat. and 29° 56′ E. long. Grw. In spite of fatigue and hunger the three men were unable to allow themselves any rest. Seven hours' hard work had to be done before they could refresh themselves.

As mentioned in a previous chapter, the landing was carried out so successfully that no part of the equipment in the car seems to have been damaged. Even the remaining pigeons were saved. What Andrée, Strindberg and Fraenkel now had to do was to make the first preparations for that phase of their expedition which now awaited them. Their first camping-place on the floating ice had to be arranged.

From what it is now possible to deduce, there was made on the very first day a division of labour as regards the making notes and minutes. Andrée describes in his diary the general course of the expedition; Strindberg, the physicist, keeps the log-book in which all the astronomical observations and their calculation are entered; Fraenkel keeps the meteorological journal. At the close of his log-book Strindberg also enters the packing-lists, the stocktaking account and the arrangements made for the meals. In his memorandum-almanac, so rich in information respecting the balloon

journey, he also makes brief marginal notes on certain days. Finally, he writes to his fiancée in shorthand, during the first days of the wandering across the ice, a couple of letters entered in his second log-book, containing descriptions of what had passed. It is from all these notes, but first and foremost from Andrée's diary, that the following chapter on the journey across the ice has been compiled.

In his diary Andrée has noted down after each day's wandering, in short sentences, sometimes in but few words, the events and observations he has considered most important. Sometimes he seems to have also made some notes during the dinner-rest or when the Expedition, for one reason or another, stopped for any long time during its journey onwards across the drifting ice. There is no chronological succession in the notes made on each special day. Scientific observations, remarks concerning the happenings on the journey, the character of the ice, the arrangements made for the food, remarks about bears and birds, etc., occur next to each other in this grand document in which the wonderful fortunes of the Expedition and Andrée's manly figure stand forth in living light. A valuable support in the attempt to give a connected and chronologically successive account of the course of the Expedition, based on the diary, has been obtained in part from Fraenkel's meteorological journal, in which he has noted his observations with date and hour after the party had risen for the day and then after they had pitched camp, and also from Strindberg's " repas pendant le voyage " (meals during the journey) entered by him at the end of his log-book No. 2. In this book there is given the hour of the different meals during the journey, but, unfortunately, these notes embrace only the period 4–15 Aug. Strindberg's extremely valuable stenographic entries are only four in number and conclude with an introductory description of the events of the 26th July.

FRAENKEL WITH ONE OF THE EXPEDITION'S SLEDGES

FRAENKEL'S LAST SLEEPING PLACE AT WHITE ISLAND

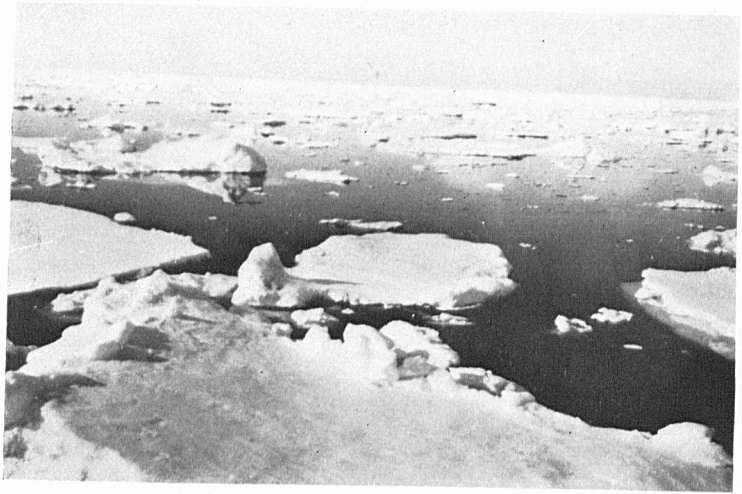
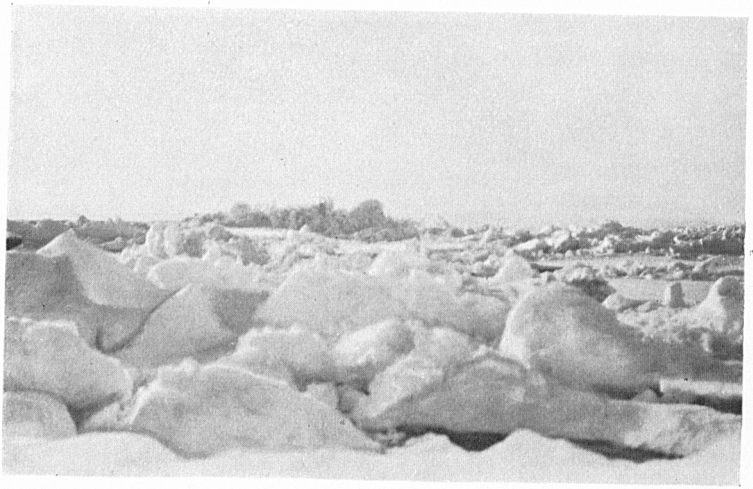


Photo. E. Christell

THE SCATTERED PACK ICE



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HUMMOCKS IN 80° 49′ N. Lat., 22° 30′ E. Long.

Respecting the hours given in the above-mentioned documents, Andrée's statements have been taken as referring to the same watch as the one he used during the journey of the " Eagle " and have, therefore, been reduced by, on an average, one hour in order to obtain the same Greenwich Mean Time which, it is evident, Strindberg and Fraenkel employed. Possible errors of a few minutes in the approximate figures for the hours play no rôle at all in the description of the general course of the Expedition.

No notes give us any detailed information as to what happened on the 14th July after the landing. In his diary Andrée has left pages 21–23 and 25–26 blank, probably to fill them with a description of this on a later occasion when he had more time. But such a moment was never granted him, for we may be sure that every succeeding day was sufficiently filled with painful labour.

What was the spot like on which Andrée and his companions landed with the " Eagle " and from which, after a few days, they were to begin their long wandering and drifting with the ice? In the account of the balloon journey they have themselves made us acquainted with it.

The " Eagle " descended on a sea filled with drifting ice. The three men were now so far towards the north, and had penetrated so far among this pack-ice, that floes of different sizes and shapes formed connected fields of considerable extent. Leads, or channels, varying in length and breadth, traversed the ice in different directions. It was also filled with walls of hummocks, some long and high, some short and low, formed by the drifting and the pressures which were a result of it. As it was high summer, the snow had melted to such an extent that great expanses of the ice were covered with pools of water. It was this alternation of snow-covered and naked ice, of pools of water and leads, which had several times during the

course of the balloon journey led the Polar travellers to believe that they had open water beneath them. There were, however, no very great stretches of such water, but here and there extended large and level surfaces of ice. The three men were surrounded by this chaos of ice, ice moving and drifting, pressing and screwing, sometimes breaking asunder into large leads, sometimes assembling into far-stretching masses. For hundreds of miles in each direction spread this scene. Such pack-ice, which is neither ice nor water, but a mixture of both, is one of the most fearful expanses a man can ever traverse.

On *the 14th July*, the day when they landed, the three men at length sought rest about midday, between 14 and 15 o'clock. The next day, *July* 15, they rose about 11. Arctic weather prevails. The sky is entirely covered with clouds and a fine drizzle is falling; the air is fairly clear, however, the temperature remains at about freezing-point and there is a calm or, perhaps, there is a faint north-west wind blowing. An astronomical place-determination is taken as accurately as circumstances allow. As mentioned above, this determination, corrected, is 82° 56′ N. lat. and 29° 52′ E. long. Grw. According to the charts Andrée had with him, and which formed part of the find from White Island, there lay at a distance of 192 miles from them, in a south-south-west direction, North-East Land belonging to the large Spitzbergen group of islands. In a south-easterly direction, at a distance of 210 miles, was Franz Joseph Land, where Fritjof Nansen spent the winter of 1895–96 with his companion Johansen, and from which he returned to Norway as the world-renowned leader of the Fram Expedition. On the English chart there was given "Gillis Land," which was nothing other than the Giles Land (= White Island) named after the Dutchman Giles, and which had been placed by the discoverer in an approximately correct position, but which, later on, had in conse-

quence of a misunderstanding been erroneously placed not less than one and a half degrees of latitude farther towards the north. The actual Giles Land, the now world-known White Island, was given as White Iceland. No human being had hitherto visited the expanse lying between the "Eagle's" landing-place and the groups of islands just mentioned. Andrée could, consequently, very well imagine the possibility of some unknown land presenting itself to his sight. We shall, too, often find him on the look-out for such land.

In consequence of the above-mentioned circumstances, one of the most important resolutions made during the entire Expedition had now to be taken; a resolution which was of decisive importance for the fortunes of the three men. They had to determine whether they should remain in the place where they were and drift with the ice, or begin a wandering across it. In the latter case they had also to determine towards which land they should go. After the unwritten pages in his diary, Andrée on the 15th enters, respecting this fateful deliberation, merely the words "determined to start from the point where we were." Nothing is mentioned as to where they thought of directing their steps, but from the succeeding remarks in Andrée's diary it is possible to deduce that they had fixed on Franz Joseph Land, and Strindberg's shorthand notes for the 22nd July say that they are starting for Cape Flora in the archipelago in question. The reason for this disastrous determination was, probably, first and foremost, that, at the point mentioned, there was a large depôt for the Expedition. In addition, Franz Joseph Land, in consequence of Nansen's wintering there, was known by Andrée and his men to be a place where it was possible for human beings to support the cold and darkness of the Polar winter. Finally, the island-group offered much of scientific interest, both of

geographical, geological and other natural physical features. This latter fact was, most certainly, of no small weight when the Expedition determined to direct its steps to Cape Flora. They knew not that their attempt to reach this goal would be prevented by an invincible ocean-current.

Andrée and his companions having made up their plan, preparations were commenced for the sledge journey. We know from a preceding chapter that, remembering the possibility of such a journey, Andrée had taken with him in the " Eagle " a complete equipment embracing among other things three sledges, a canvas boat, a tent, a sleeping-sack, arms and ammunition, provisions for about six months, etc.

As before-mentioned, 440 lbs. of the provisions and equipment (including the " scraper ") were thrown overboard during the balloon journey. But the main part of the equipment, weighing together many hundredweight, still remained uninjured in the car which stood there on the ice.

The whole of the week which followed the landing, *i.e.*, the period 15–21 July, is spent by the Expedition on the ice-floe on which the " Eagle " had descended, preparing for its journey over the ice by putting in order the sledges and the boat, and packing everything they considered they ought to take with them. These days, when the three men did not seem to entertain any doubt of a favourable termination to the plan they had made, were, in spite of all the work, calm and filled with a sense of security. After the exertions of the balloon journey, the 15th and 16th seemed to Strindberg to be really agreeable days. Neither is the party alone there on the pack-ice. An auk flew past them to the south-south west; they saw a fulmar, and as early as on the 15th a bear. A fulmar thought nothing of driving away and pursuing one of the pigeons.

On *the 16th July* weather prevails similar to that of

the day before, but the fog seems to be denser and the south-westerly wind somewhat stronger. The ice begins its pressings. In the evening there falls the first snow, but not in great flakes. The night before the 17th the snowfall continued.

The 17th July is passed in the same way as the 16th. The next day, *the 18th July*, the air is clearer and visibility becomes greater. As before-mentioned, all the pigeons had flown away in the morning. The three men look out for land, but none is seen in any direction. On the other hand, they observe seals and a fulmar. *The 19th July* makes its entry with the same weather. Andrée notices how the netting of the balloon on the ice has sunk into the 29-inch-thick layer of snow which covers the surface. Twice Andrée goes on to the roof of the car of the fallen balloon and examines the horizon carefully in every direction. But no land meets his eye. Nothing but a little auk is seen to east of the camp. But the day was to be marked by a great event. At six o'clock Andrée shoots his first bear. It had come from the north-east. The welcome booty was cut up and the offal thrown into a lead or into a pool of melted snow on the ice. Within half an hour two fulmars make their appearance to enjoy the remains. A little auk, too, swam about in the water near the camp but became afraid and flew off to the north-north-west.

On *the 20th July* the weather seems to have been clear and the wind has swung round to the south-west, but the temperature still remains about freezing-point. In the sunshine the Expedition get some of its things dry after the fog, drizzle and snow of the previous days.

The next day, *the 21st July*, preparations for the ice-wandering are so far advanced that the sledges can be packed. The canvas boat they had brought was tested in the sea with excellent results. Nisse Strindberg now begins his duties as the cook of the party, an occupation fully as responsible as the one he had

formerly carried out as astronomer. He fries some pieces of the bear's-meat very cleverly over the "Primus."

"Do you want to wash yourself, Nisse?"

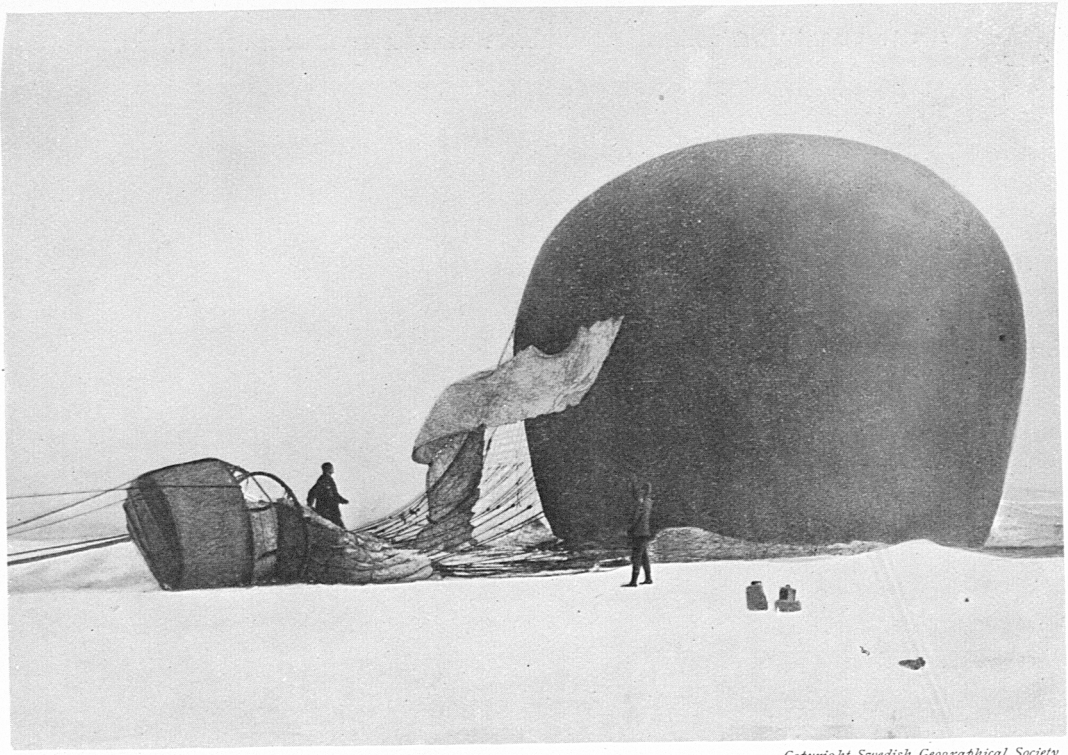
"Wash myself? No, I washed myself the day before yesterday. What is left is that kind of dirt which sticks on by itself."

During the week they remained on the landing-floe they had, according to Strindberg's observations (which have now been checked), up to midnight between the 19th and 20th July, driven with the current not less than 18 miles in a south-south-westerly direction and, from the time mentioned until the afternoon of the 21st July, about 4.8 miles to the south-east.

Then begins *the 22nd July*. There is fog again; a faint south-south-easterly wind is blowing and the temperature keeps between 33° F. and 32.9° F. A last hand is put to the packing and about 19 o'clock in the evening the sledges stand ready and the three men are prepared to start.

Then they begin their march. Yes, now they are off! Strindberg wonders if they shall succeed in reaching Cape Flora, for the sledges are very heavy to pull.

Now the three men learn what it means to travel across the Polar ice. A little mishap occurred at the very start. When they were going to leave their ice-floe with their first sledge, this ran askew and slipped down into a pool of melted snow water. Strindberg stepped down into it up to his knees and held fast the sledge to prevent it sinking. Andrée and Fraenkel went across to the other floe and they succeeded in getting the sledge up, but Strindberg's sack, which lay on top of it, became wet inside, of course. There he had his letters from his fiancée and her portrait—his dearest treasure during the approaching winter. He knew now that he would have to spend this up in the Polar regions without the possibility of communicating with his friends and relations in Sweden. After they



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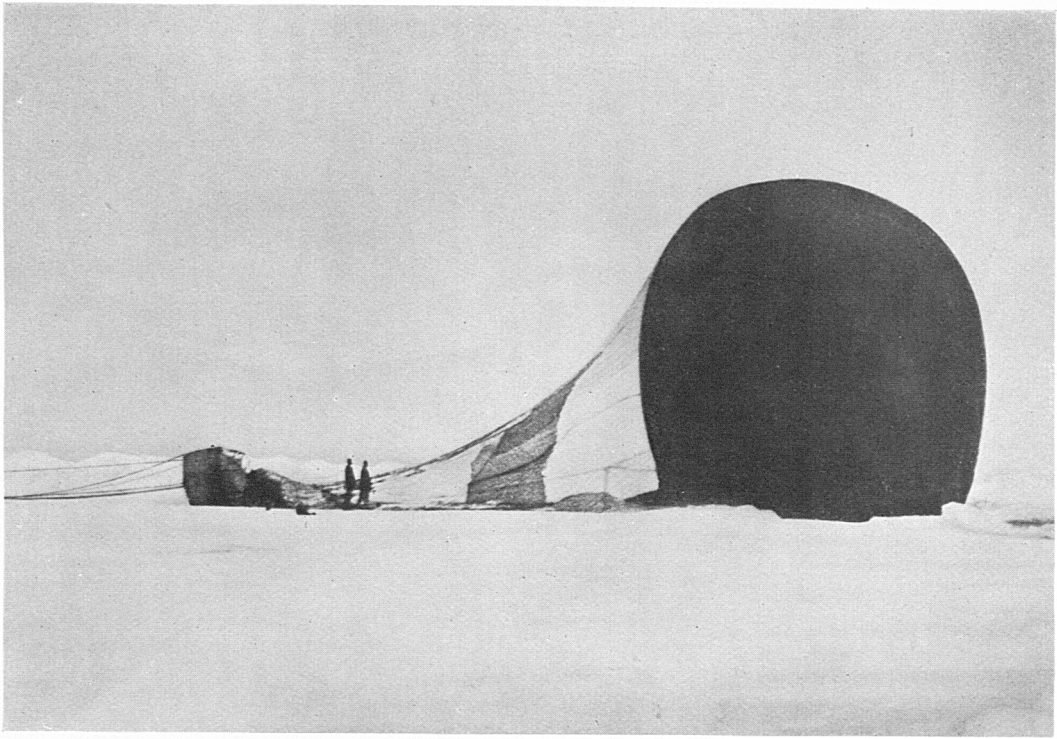
THE 'EAGLE' IMMEDIATELY AFTER LANDING ON THE ICE FLOE, JULY 14th, 1897

The balloon is partly deflated and the car is trailing on its side

From a film taken by Andrée in 1897 and developed in Stockholm in 1930



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THE 'EAGLE' IMMEDIATELY AFTER LANDING ON THE ICE FLOE, JULY 14th, 1897

This photograph was taken somewhat later than the previous one.

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

had got the sledge up again they encountered leads, or channels, in which there floated drifting ice-floes. With the assistance of these they had to pilot themselves across the water. This was done by bringing the ice-floes close to each other, so as to form a series of bridges. But it was slow work getting the big, heavy floes into movement and into the right place. When the party had at length crossed they encountered a large, open field of ice over which they could march two or three miles with their sledges without any great difficulty. But the sledges were terrible, each of them being loaded with between 300 and 440 lbs. of equipment. During the course of the day it cleared up and the sun shone out. After having pulled their heavy loads some three hours, they had to alter their tactics and all three helped to pull one sledge at a time. After having made their way onwards thus for an hour they stopped and formed their camp on a picturesque floe of hummocks. They raised their tent and all three lay side by side in the sleeping-sack. It was a tight squeeze, but there was good fellowship. Before Strindberg fell asleep he wrote a letter in shorthand to his sweetheart, telling the events of the day. How much could he not have added respecting everything that had happened that day! But he is tired and must sleep, and with a " good-night " he ends his first epistle from his pilgrimage over the ice. It is midnight then.

The next day, *the 23rd July*, the three comrades awoke at 11.30 o'clock. The weather at first was good, the sun shone from between the clouds, the faint south-westerly wind continued and the temperature kept, as before, about 32° F. Later on it became windy and misty.

The first thing to be done was to have a meal, then to break camp and pack everything on to the sledges. This took a couple of hours, so that they did not start until some minutes after 13 o'clock.

As on the preceding day, they at once encountered

difficulties. It is specially troublesome and dangerous to cross the leads which now, wide and difficult, meet their way. Andrée and Strindberg differ in opinion as to the plan to be adopted. Finally, they seem to have determined to ferry themselves across, with the sledges lying athwart the boat. But this is very risky, writes Andrée. After having cleared some leads in this way and having followed the tracks of a bear on the ice between them, they snatch a hasty midday meal. Some birds, four great auks, two ivory gulls and a fulmar, break the monotony of the surroundings, where ice, water and fog melt into one uniform oppressive dreariness. The snow is wetter than on the preceding day, but the heaped-up hummocks—"torosser" (ice-humps)—as Andrée calls them, are insignificant. Towards the afternoon the party find ice on the pools of snow-water, but it could hardly have carried them. In spite of all difficulties they succeed after dinner in putting a mile or two behind them. About 22 o'clock in the evening they make their camp for the night in the shelter of a hummock-wall, 13 ft. high. Strindberg at once begins to prepare supper. He makes soup of pease, rusks, soup-tablets and Rossan meat-powder, but it was not nice, the cook himself thinks, "for that Rossan meat-powder had a bad taste." But one is not dainty up there amid the Polar ice, so they managed to get the soup down. They had a little butter too. Just as on the preceding evening he writes to his fiancée before he sleeps. But the lines are few and the sentences short and broken. The day has been a hard one.

On *the 24th July* the men break camp at 13 o'clock, midday, as they had done the day before; the wind is southerly but the temperature has fallen almost a degree below 32°F., and it is snowing slightly. Once more they encounter leads and pools of water on the ice, and pressure-hillocks. They march by the side of such a great channel almost the entire day, but they

are obliged to undertake difficult and dangerous ferryings across smaller fissures and leads. Andrée notices that the water in a little pool is salt. The most difficult things to-day, however, are the humps or hummocks. The sledges turn slowly and they are strained to such a degree when they are drawn across these walls of piled-up ice-blocks, that fears are entertained of the durability of their material. Unheard-of pains are needed to drag these heavy sledges forward, although the weather is favourable and the snow on the ice firmer than the day before. The question is raised, consequently, of lightening them, but nothing is determined.

So begins a new day, *the 25th July*. It is the birthday of Strindberg's fiancée; a fourfold hurrah is given in her honour. At last at 12.30, after ten hours' weary work, they stop, utterly worn out after the tiring day. An open place on an ice-floe measuring not less than 1,100 yds. in diameter is chosen as the camp for the night. In spite of fatigue, Strindberg sits down as soon as they have stopped, and in his neat stenographic hand writes his congratulations to his sweetheart, expressing his feelings on her festival day. His thoughts go to her and to his people at home. He wishes he could inform his dear Anna of the excellent condition of health in which he is and that she has nothing to fear for the well-being of himself and his comrades. They are certain to reach home at last. "Yes, how all this occupies my thoughts so much now during the day! One has plenty of time to think, and it is sweet to have such pleasant memories and such happy prospects for the future to occupy my thoughts." A little later Strindberg continues his letter while he sits sucking a caramel, "a real delicacy." He refers his sweetheart to Nansen's pictures so that she may get some idea of the appearance round about their little camp. There is nothing but ice—ice in every direction, hummocks and ice-fissures alternating

with melted ice, all everlastingly the same. For the moment it is snowing a little, but it is calm, at least, and not very cold (30° 5 F.). At home in Sweden, of course, the summer weather is more agreeable, thinks Strindberg, and so he goes on to his Anna: "Yes, it is strange to think that it is not possible for us to be home again even by your next birthday. And perhaps we shall have to winter for another year more. We do not know yet. We are now moving onwards so slowly that perhaps we cannot reach Cape Flora this winter, but, like Nansen, will have to spend the winter in an earth-cellar." He suffers at the thought of the despair his sweetheart will feel if the Expedition did not reach home even by next autumn. "And you may believe that I am tortured by thinking of it too, but not for my own sake, for it does not matter if I have to suffer hardships now, as long as I can come at last."

Between these two occasions when Strindberg is sitting writing, the three comrades enjoy their meal. Coffee was an additional luxury that evening. A bottle of fruit syrup was also brought out. Nisse Strindberg "dropped," as Andrée expresses himself, and the latter washed out the bottle twice to get the last of the syrup. Then Fraenkel endeavoured to get a little further syrup taste out of it unnoticed.

Now the tent is in order, Fraenkel has taken the meteorological observations and they are going to turn in. They are all rather tired. Before dropping off to sleep they have a short discussion as to their mental characteristics and faults. Then Strindberg finishes his letter and it becomes silent in the tent. But during the night heavy shocks are felt against the floe on which they are lying, in spite of the field being very large.

The men in the tent awakened the same day at about 12 o'clock, but as it was raining they stayed within and slumbered, all three of them. Then they rose and Strindberg cooked a little food: cocoa and condensed milk; in addition, biscuits and sandwiches

were taken. It was not until between 16 and 17 o'clock that they were ready and started. Now they employed a new method of travelling amid the fog, through the wet snow, and across the bad country, and they tried to make their way onwards by the side of the water-channels on as smooth ice as possible. But they fared no better than that Nisse Strindberg "fell in" and was in imminent danger of drowning. He was dried and wrung out and dressed in knickerbockers. In spite of all this they are in good humour, and the three comrades keep up a really pleasant conversation the whole day. Andrée speaks of the events of his life; how he entered the Patent Department, etc. The first Ross' gull appears and, in the leads, the seals are frequent although they are never observed in numbers together. This leads to conversation about this and that on seals in general. Suddenly they find themselves in front of a wide channel, and stop. Andrée and Fraenkel go on a reconnoitring tour, while Strindberg remains with the sledges. He sits down and again writes a few lines to his sweetheart. He dreams of how things are there at home. "Here one day passes like the other. Pulling and toiling at the sledges; eating and sleeping. The most delightful hour of the day is when one has gone to rest and allows one's thoughts to fly back to better and happier times. But their immediate goal now is our wintering-place. We hope to have things better in the future. Now the others are coming back and we shall continue the drudgery with the sledges. Au revoir. . . ." During the night, a big and a little bear paid a visit to the camp. Of this their tracks in the snow bore witness the next morning.

On 26th July a great alteration took place. According to Strindberg's place-determinations, they could only have come a poor mile or two, in an east-south-easterly direction, since the afternoon of the 21st July. Andrée and his companions perceived, too, that they

were no longer able to draw such heavily-laden sledges as before. The plan of the journey must be revised, and, according to Strindberg's last shorthand note, the equipment was to be so divided that each of them could pull his own sledge. The method they had hitherto employed of pulling forward one sledge and then going back to fetch the others in turn cost too much time, and was too laborious. For this purpose they determined to part with some of their provisions and equipment, but it is with strange feelings that they face this necessity.

They started about 17 o'clock in the evening with a rafting, but when they had once reached the other side they stopped and devoted the remainder of the evening and the whole night to carrying out the alterations that had been determined. The sledges, which are in a very bad condition and broken here and there, have to be looked at and mended. A trial was made to sheathe them with iron.

Then there was a stocktaking of the supply of provisions. At the end of Strindberg's log-book there occur, as before mentioned, lists of the equipment. The first of the equipment-lists in Strindberg's log-book has no date, but refers in all probability to the stocktaking now in question. He has put down

Provisions.

72 large tins of biscuits and bread
14 small tins of biscuits
2 boxes Bovril
1 Pemmican
73 milk
12 Lactoserin
24 Rousseau's meat-powder
20 Butter
13½ tins Cloetta's meat-pow. cocoa.
9 large round (5 butter, 4 whortleberry)
1 apples
1 sugar

¼ *of this*	⅕ *of this*
18 big	14
4 small	3
18 milk	15
3 lactoserin	2
6 Rousseau	5
5 Butter	4
3 Cloetta	3
2 large round	2

Whether it was the fourth or the fifth part of the provisions remaining on landing they had determined to take with them is not stated. But what was taken, however, was calculated to last 45 days.

In addition, it is of very great interest, when forming an opinion of the development of the Expédition, to read the lists left by Andrée, partly of what his own sledge carried before and after the rearrangement, and partly of the contents of Fraenkel's sledge after the reloading. The main portion of the articles given in these lists is included in the finds from White Island.

Load on Andrée's sledge the 26 before altering load :	lbs.
4 ice-planks	18.7
3 bamboo-p(oles).....	4.4
1 carrying-ring plank	2.2
1 boat-hook	3.3
1 bottom-tarpauling	2.2
1 sack private	38.5
1 Δ basket	64.–
1 pot boot-grease	7.75
1 hose	7.75
1 large press	17.5
1 shovel and 1 reserve cross-piece	4.–
1 basket with contents	143.–
1 d:o	146.–
	459.3
Grapnel with rope	4.4
	463.7

Load on Andrée's sledge, 27/7 after altering load :	lbs.
1 basket provisions	90.2
1 d:o.....	115.5
1 sack private.....	34.1
1 d:o ..... half private	7.7
	247.5
1 medicine chest	19.8
	267.3
1 tent	17.6
	284.9

Load on Fraenkel's sledge after altering load.

Boat.....	138.6
1 sack private.....	37.4
Ammunition	38.5
Altazimuth...	6.6
Stand for d:o.	3.3
div. instruments	17.6
div. charts, etc.	6.8
1 photogr. app.	1.7
1 cooking-stove	8.8
1 field-glass	2.6
3 blankets	9.9
Sleeping-sack	19.8
Matches	6.6
	298.2

By these lists it is seen that the weight of Andrée's sledge was reduced from about 464 lbs. to 286 lbs. and that Fraenkel's sledge weighed about 297 lbs. Regarding Strindberg's it is stated in his almanac that it weighed the same as those of his companions. Of the provisions that were left the three men ate during the course of the day as much as they could get into their stomachs. "Great indulgence in food on making reduction," writes Andrée. The day is marked by other events as well. Strindberg shoots his first bear, and bear's-beef is found to be excellent after the meat has lain in sea-water for an hour. But that which gave them the greatest pleasure was the wind, which had now swung round from southerly to northerly. "Hurrah," cries Andrée at this change, by means of which, as he hopes, the ice-drift will become southerly so that it will help them onward towards their goal.

After the above-mentioned rafting immediately after starting from the camping-place, there was no time for any further march, for it was not until six

in the morning that the repacking was finished and they could go to rest.

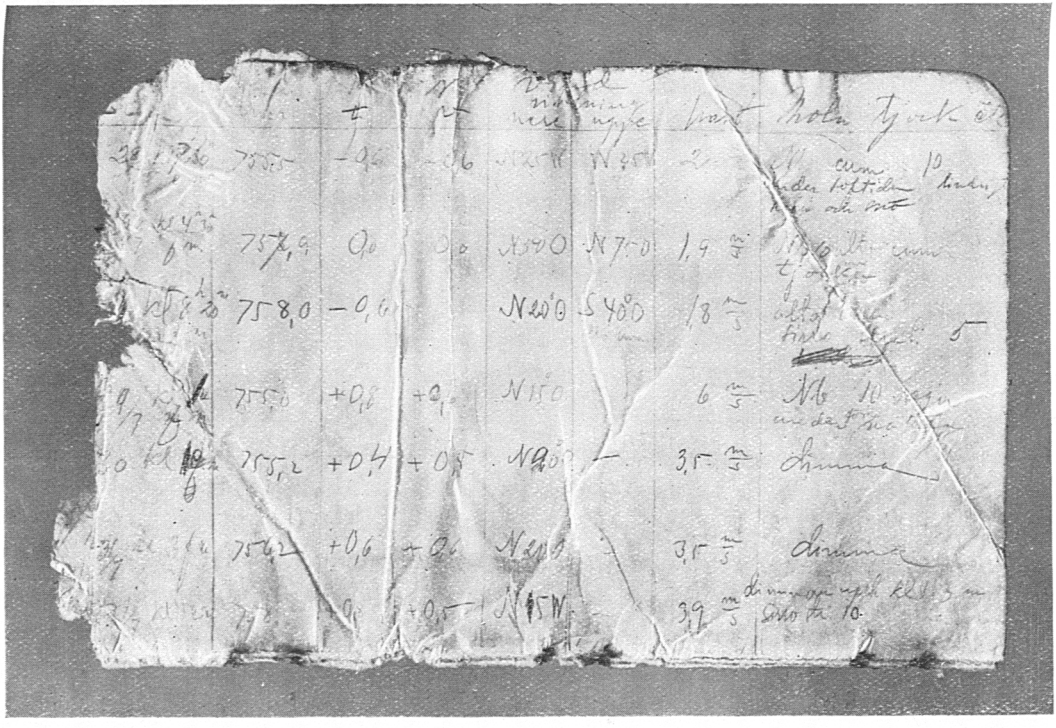
When they wakened the same day, the 27th July, about 15 o'clock in the afternoon, still another alteration was made in the packing. The meat-powder and the like were further reduced and more bread was taken. This was probably the result of Fraenkel's having an opportunity of shooting another bear, which, together with the one killed the previous day, supplied the Expedition with a considerable addition to their meat-reserves. In spite of a whistle and a hunting-horn being used, the bear in question did not become afraid, and Fraenkel was able to put in a beautiful shot at a distance of 125 ft. It was not only the meat that was useful, but the skin, too, was saved to mend the sleeping-sack with.

When at last they did start, towards midnight before the 28th July, a fourfold hurrah was given for the Swedish flag which they had brought from the balloon, where it had waved over the carrying-ring, and which now flew above the sledges. At the close of Andrée's notes for this day, mention is also made of a bottle of champagne, etc. Many circumstances point to this note's referring to the start. When they leave their camping-place and everything they had determined to part with, a bottle of champagne is emptied and they eat a few biscuits and honey. It is a matter of course that this bottle had been intended for a more joyous event than the one which now faced them. But it is in truth a grand thing to see with what sunny humour and with what joy of life they move away from their belongings and their provisions, ready to replace, by means of an uncertain hunting of bears and birds, the food they saw they were unable to carry with them. They give a cheer for the Swedish flag, the symbol of their land, and they empty the bottle of champagne. Then Andrée sweeps the tent with the straw-cap of the bottle. It is characteristic of Andrée and of his way

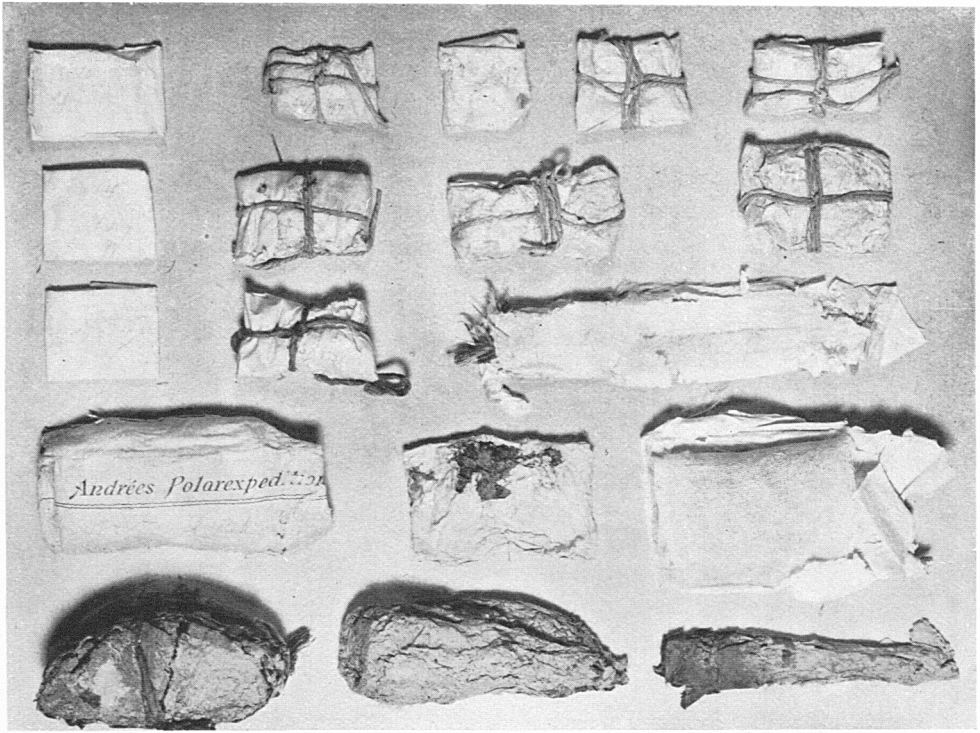
of keeping his diary that, immediately after the note respecting the solemn ceremony with the champagne, he puts the remark, "sennegrass between the stockings." With all their simplicity, these words illustrate, far better than long amplifications, the Expedition's struggle for existence, and all the care that had to be devoted to its equipment in order that it might be able to continue its wanderings towards land and safety.

A north-westerly wind had now risen and was greeted with joy, as they hoped it would cause a drift of the ice in the desired direction. Their journey that night was a heavy and fatiguing one, however, for not less than 14 leads had to be crossed. They were able to pass one by means of rafting on ice-floes; in the two other instances it was impossible to move the pieces of ice, and the boat had to be employed instead. This day the temperature had fallen to 30° 4–28° 6 F., and so ice had formed on the pools of water and cut into the boat, thus making rowing almost impossible. The frost had brought about one improvement, however, as the ice-edges along the leads and pools, which had previously been eaten away by the water, now grew firmer. But the country across which they journeyed was extremely difficult in consequence of all these channels and from the presence of walls of hummocks. Strindberg's sledge broke during the course of the day, but Andrée and his comrades were satisfied with their results, however, when they at last crept into their sleeping-sack on the morning of *the 28th July*, after a day's work which, for Fraenkel especially, had been one of fatiguing exertions. He even complained of fatigue, adds Andrée.

All hands were awakened at 19 o'clock in the afternoon. The temperature was 30° 9′ F., and a faint north-westerly wind was blowing. First of all, the sledges had to be looked to and sheathed, and some of Fraenkel's things needed repair. At first the



PAGE FROM FRAENKEL'S METEOROLOGICAL JOURNAL, WITH OBSERVATIONS MADE DURING THE PERIOD JULY 28th TO 31st, 1897



SAMPLES OF VARIOUS KINDS COLLECTED BY ANDRÉE DURING THE SLEDGE JOURNEY

going was dreadful, but in the evening they had magnificent ice to cross, and the weather, too, was excellent. "Paradise": large smooth ice-floes without hummocks or leads or more melted ice than was needed for drinking. "Parade-ice" ("paradise"), writes Andrée, and he cites Fraenkel's words, that "what old mammy sends us is always confoundedly good, anyway." The fresh wind is bitingly cold, but still it is welcome as long as it drives the ice towards the south. This day the men began to wear snow-shoes. A number of bear-tracks were passed, but not a single lead had to be crossed. Then, suddenly, they encountered a channel, "a broad beast," and a halt was made. At 11 o'clock, *the 29th July*, all go to rest after having been at work 16 hours. "We learn the poor man's way; to make use of *everything*. We also learn the art of living from one day to the other." After Andrée has made some further notes, evidently intended as an aid to memory for a later, more detailed account of the journey, it is time to sleep.

After a rainy and windy early part of the night they rise before one in the morning of *the 30th July*. The day began as usual with greasing boots. The division of labour in the camp is now carried out in its entirety. Nisse Strindberg is the cook as before, and Fraenkel has been given the task, in addition to his meteorological service, to be the housemaid too, to arrange the tent and lay the table. While they break camp, Fraenkel puts away the beds in the tent and Strindberg boils and fries, while Andrée reconnoitres the surroundings in preparation for the day's march. The hunting-booty is now used in such a way that bear-steak is prepared twice a day, at the start, and after arriving at the next camping-place. The sleeping-sack makes itself reminded everywhere; as it is made of reindeer-skins, rein-hair is encountered everywhere. "Lose one you find a thousand," asserts Andrée.

The day was extremely fatiguing, a great number of water-channels having to be crossed. The party make use of every method in doing this. Between the leads, however, the ice, which was very thick, was good, so that in spite of everything they cover a rather long distance. But on the smooth ice, too, there existed treacherous collections of melted-snow water, and Andrée "flopped" into one of them. Things were worse, however, when Fraenkel began to suffer from snow-blindness. A factor of the very greatest importance was that the direction of the ice-current now proved to be carrying the Expedition away from the course it wished to follow. In order to reach Franz Joseph Land they were obliged, as already mentioned, to keep a south-easterly direction. But as the current carried them southwards, and even with a slight trend to the west, the travellers have to-day determined to go towards the east. They mean to continue in this direction in order thereby to be able to move on in the direction of the resultant, or median line, between the ice-drift and the course of their journey.

In addition there occurs the following, which Andrée has considered worthy of being noted down. While Strindberg was preparing a dish of Mellin's food, Fraenkel asked what he was getting ready. On being answered, "Dessert," Fraenkel said, "Jolly, then it must be eaten!" Further, Strindberg determined to try to make his hands clean. He washed one of them with a wet stocking, but found the task so difficult and time-wasting that he let the other hand be. "The difference was like that between a mulatto and a nigger," says Andrée. About 14 o'clock in the afternoon they at length retired to rest quite worn out.

On *the 31st July* the Expedition started at 4 o'clock in the morning. The temperature was 30° 9′ F. and a light north-north-easterly wind was blowing. A

dense fog prevailed which prevented them from choosing the best way, and they were compelled the whole day to force their way onwards across a very difficult country. Not less than ten channels had to be crossed during the first six hours. To complete their misfortunes, the snow that day was deep. "Tramp on our knees in deep snow. Tramp-tramp on our knees. The discoverer of attractions of flopping—Nisse," writes Andrée in reference to this march, which must, of course, have been tremendously fatiguing, with not only snow and open leads, but also half-frozen and snow-covered, water-soaked portions of the ice were treacherous and placed hindrances in the way of the three men's onward march towards their distant goal. They also came into an enormous pressure-belt, almost a couple of miles wide, and they had nothing else to do than to hew their way onwards. Thus passed the whole day. It was not until the evening that they got clear of the hummocks and came a good distance to the east. But their courage and vital will do not diminish, neither do the good-humour and the feeling —the mood—of the three comrades. "The Polar district is certainly the birthplace of the principle of the greatest stumbling-blocks," writes Andrée, as he thinks of all the difficulties which he and his companions are able to overcome only by the exertion of all their energy. During the course of the day the fog lightened and the sky cleared. They then climbed a lofty, pyramidal block of ice to reconnoitre, but saw neither land nor sea. The ice, which in certain places measured 13.5 ft. in thickness below the water, had, here and there, been deprived of its covering of snow, so that it lay bare and in many places was made dirty by particles of clay. Andrée noted that in such places the melted-snow water had not such an insipid taste as the pure snow-water, but possessed a slight taste of clay. Larger quantities of clay were also observed upon the ice, and were found to consist of grains of varying

form, sometimes as large as a walnut. Samples of these were taken for a later scientific investigation.

Towards the evening they followed the fresh track of a large bear. This animal had also gone down into the "soup," as Andrée terms the pools of melted-snow water, "so that not even he is protected from making mistakes in this regard." A Ross' gull, an ivory gull and some fulmars made their appearance. These are the only birds that have been visible during the last few days.

At the camping-place, towards the evening, Strindberg makes an astronomical place-determination, the result of which shows that they are now in 82° 22′ N. lat. and 29° 12′ E. long. Grw. These values show, on being compared with those obtained previously, that the Expedition has drifted with the ice towards the west more quickly than they have marched towards the east. "This is not encouraging," writes Andrée, "but we shall continue our course to the east some time more, as long as there is a bit of sense in doing so." "Out on the ice one cannot at all notice that it is in movement, with the exception that, at our resting-places, the leads change while we are sleeping."

At last, at 18 o'clock in the evening, they crept into the sleeping-sack.

At 19 o'clock that day, the last of that month in which they quitted Danes Island in the "Eagle," Strindberg has an opportunity of writing some lines to his sweetheart. It was then a pretty long time—from the 25th July—since he spoke to her last, and much had changed since then. He begins by describing the determination to alter the loads on the sledges. Then it is clear he is interrupted, and after this he has written nothing to the one who was so dear to his heart, whom he constantly had in his thoughts and to whom he was so glad to address his words during the first days on the ice. Is it the situation of the Expedition, which, every day, becomes more difficult, is it the ever-

increasing efforts its members must make to save their lives, is it all this that prevents him from continuing to note down his impressions?

Sunday, *the 1st Aug.*, makes its appearance with beautiful weather. Andrée, Strindberg and Fraenkel rise at 5 o'clock in the morning. The last-named takes his meteorological observations. The temperature is 32° 9′ F., a faint north-westerly wind is blowing and cirrus-stratus clouds cover no more than ten per cent. of the heavens.

After Andrée—as on the preceding days—had greased his hands with bear-blubber in order to keep them soft, and while Strindberg and Fraenkel pursued their work, the former as kitchenmaid, the latter as housemaid, Andrée makes a very careful examination of the stratification conditions and the structure of the ice, and makes a sketch of one of the two leads which ran, the one in a N. 40° W., the other in a N. 30° E. direction. Then he mends the sleeping-sack with bear-skin.

At half-past seven they were ready to start and had extremely good ice until midday, when they were given an hour's hard work in order to cross some pressure-hummocks. Then the ice became good again, and the whole day they had not to use the boat a single time to cross channels, for these were narrow and often provided with level edges. The cause of this favourable character which the ice now seems to have assumed is considered by Andrée to be that they are approaching the edge of the great Polar stream, and that their district was lying to leeward of the tide-water under Franz Joseph Land.

Animal life is now becoming richer. Three Ross' gulls appeared, two of them being fairly unafraid, unlike what has previously been the case. Fulmars and seals were common, and they crossed two tracks of bears. In the evening they saw the back of a new animal which looked like a snake 33–39 ft. long, of a

dirty yellow colour and, in Andrée's opinion, with black stripes running from the back for some distance down the sides. It breathed heavily, almost like a whale, " which I suppose it really was," adds Andrée. Later on in his diary he corrects this supposition, having gained the certainty that it must have been a walrus he had seen.

In the afternoon, between 13 and 15 o'clock, the fog grew denser but lightened later on, so that the zenith became clear, while it hung round the horizon in the form of a light mist. The day was one of the richest in results. Andrée estimates the distance they covered at 4.2 miles; Strindberg at 4.8 miles.

The remarkable thing, however, is that the correction of Strindberg's astronomical observations shows that, during this and the following day, they did not advance at all in the desired direction, but that, instead, they had drifted back towards the north.

In agreement with what had now become the practice, they used a medicine-chest, a photographic-apparatus and a chest of boxes of matches as seats when they took their supper that evening. A slight uneasiness probably made itself visible, for their supply of bear's-meat was almost finished.

Andrée's last note in his diary for the 1st Aug. is that " stockings are dried best by putting them on over the wool-and-hair stockings on the feet," and he adds that his chronometer probably loses 4.7 sec. per day.

On *the 2nd Aug.* the comrades awoke at half-past eight more tired than usual. " It seems as if good country was more fatiguing than half good," says Andrée. For breakfast, Strindberg cuts the last piece of bear's-meat into small pieces, " so that it might at least *look like* being a lot."

When they started at about 11 o'clock it had cleared and was quite calm, so that it felt warm, even if the temperature in the shade kept a degree or so below

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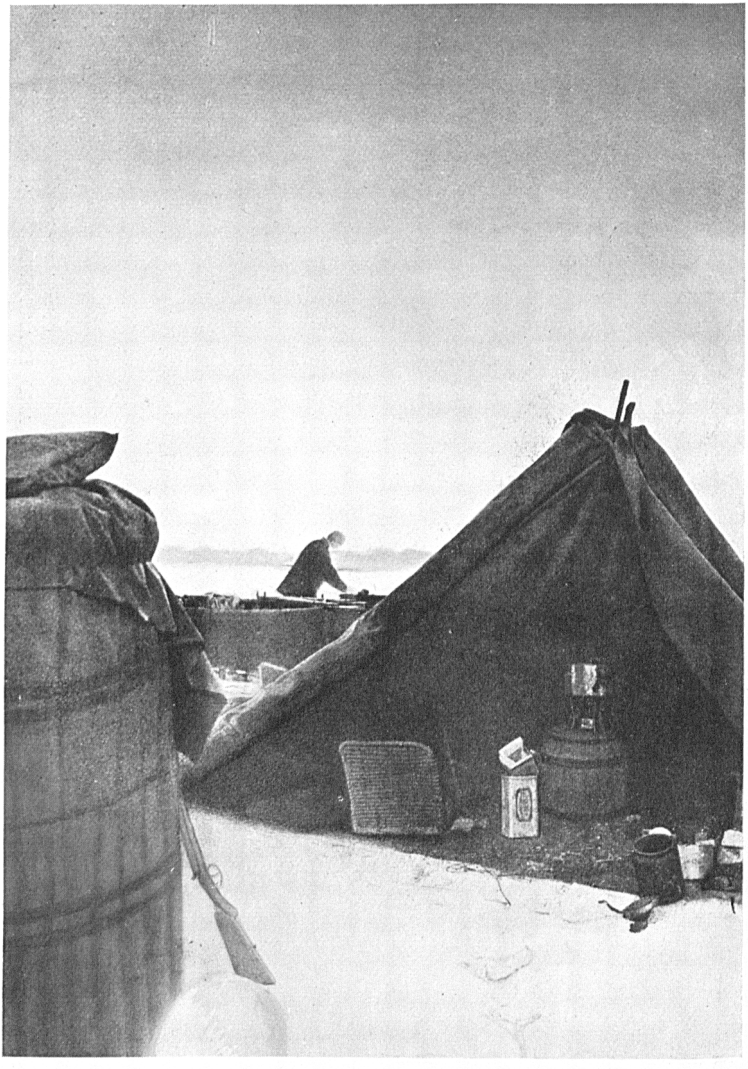
ANDRÉE STANDING ON THE CAR OF THE FALLEN BALLOON AND EXAMINING THE HORIZON, JULY 19th, 1897

From a film taken in 1897 and developed in Stockholm in 1930



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THE CAMP AT THE LANDING-PLACE OF THE 'EAGLE'

To the left the car, to the right the tent; a glimpse of the boat can be seen between them. In the tent are seen, besides provisions and cooking utensils, the cooking apparatus in the middle and a basket of provisions to the left.

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

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FRAENKEL'S SLEDGE WITH THE BOAT BEING DRAWN OUT FROM BETWEEN BLOCKS OF ICE

To the right Andrée, to the left Fraenkel.

From a film taken by Strindberg in 1897 and developed in Stockholm in 1930

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FRAENKEL'S SLEDGE WITH THE BOAT BEING PUSHED ACROSS A WALL OF PRESSURE ICE

An automatic photograph showing all three men (to the left Fraenkel, to the right Andrée, in the middle Strindberg.)

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

freezing-point. Scarcely an hour after they had broken camp a fresh bear came within shooting distance. In their eagerness both Strindberg and Fraenkel missed, while Andrée dropped the bear with a single shot in the breast at a distance of 125 ft. It proved to be an old, worn-out he-bear with rotten teeth. On this occasion they took the fillet too, and in addition the kidneys (3¼ lbs.), the tongue and the ribs. As soon as this was done a labb became visible, two gulls made their appearance and circled round the remains of the bear. Andrée and his comrades now hoped that a fresh bear would be enticed to follow them by the carcass of the one that immediately preceded him, "so that we shall always have fresh meat at our heels." The country had been extremely difficult the whole day, so that Andrée believes that, in spite of all their drudging, they had not gone more than 2,200 yards in ten hours when, at 1 o'clock at night on the 3rd Aug., they crept into their berths. Before going to rest, Andrée mended a stocking, and, in connection with the care of his own person, he adds that on that day he had washed his face for the first time since the 11th July.

On *the 3rd Aug.* they rose at 11 o'clock, after having been greatly plagued by the heat in the tent, for they still had sunshine and quiet weather. They determined, therefore, to "lie outdoors." Respecting the old he-bear, they discovered when it was brought to table that it was "as tough as leather galoshes." The forks they used also appear to have suffered from the treatment to which they had been exposed, for "the story of their development," illustrated by the various specimens, was photographed. Fraenkel's fork seems to have been in bad case, for Andrée makes a new one for him.

After the work of breaking camp, and packing the sledges, etc., they start. It is still so warm that they pull without any coats on. The weather also allows

of drying clothes on a large scale. But the ice is terrible and extraordinarily difficult. It consists of small floes, separated by large hummocks and channels, while the leads are covered by new ice. The only advantage of the frost that has formed the new ice is that the edges of the ice close by the leads have become more solid. Against the still open water-surfaces they see that the air is filled with a fine rain of water or needles of ice. Their attention is also attracted by a piece of drift-wood a little more than a yard long, which is lying on the ice. They also notice a skua, a gull and a Ross' gull.

As always, they are in good humour. Fraenkel and Strindberg joke about Andrée's old bear of yesterday, which is declared by Fraenkel to have been the oldest bear of the Polar regions and to have probably been "an escaped menagerie bear." As they passed the traces of a bear with two cubs they were able to hope for tenderer meat to compensate for the old and tough steaks they had got from this ancient he-bear.

They had constantly to pass the leads.

"Is it easy to get across?" asks one.

"Yes, it is easy with difficulty!" answers another.

Amid the jesting there ripens, however, one of the most serious and most weighty determinations for the entire Expedition—that which was now come to by Andrée and his companions.

In consequence of the difficult condition of the ice, the Expedition, during the course of the previous day, had been compelled to keep a more southerly course than the direct easterly one along which they had previously endeavoured to make their way. The beautiful weather allowed a place-determination to be made during the course of the day, and it showed that their position was 82° 27′ N. lat. and 28° 30′ E. long. Grw. Under the presupposition that Strindberg's observations are correct, the Expedition, in spite of all its efforts, has, since the 14th July, advanced no

more than about 33 miles towards the south-south-west, and, since the 31st July, about 7.8 miles towards the north-north-west. The ice-drift has been too strong for them. These facts, so formidable if thought be given to their plans to do their utmost to reach Cape Flora, caused the party to discuss the situation with the greatest thoroughness. At 1 o'clock, consequently, early in the morning of *the 4th Aug.*, Andrée reconnoitres in the extremely clear air, examining with his field-glass the horizon in the north, east and south-east in order to discover land or sea, but without being able to find either. Nothing but ice, and difficult ice, is visible in all directions. "In consequence, we determined to give up our endeavours to come eastwards. We can surmount neither the current nor the ice and have absolutely no prospect of doing anything by continuing our tramp to the east. We are therefore determined to begin our next wandering with the course on the Seven Islands, which we hope to reach in 6–7 weeks."

What does this determination imply? To be able to form an opinion on the matter we must remember Andrée's remark on the 31st July, that "we shall continue our course to the east some time more, as long as there is a bit of sense in doing so." Now they are compelled by natural conditions to surrender this conviction and to give up their hopes of reaching the large depôt at Cape Flora. They choose, instead, as their goal, the smaller depôt on the Seven Islands lying off the north coast of Spitzbergen. They hope to reach these after a journey of 6–7 weeks. Since the start from the landing-place on the 22nd July, the sledge-journey has now lasted 13 days. They have devoted their best strength to this journey, first drawing the terribly heavy sledges, and then the sledges when they had been made somewhat lighter. Now they change their course and their goal, and worn-out as they certainly must be, they see before them a month

and a half's march across the pack-ice before they can hope, with the help of the current, to reach land at the Seven Islands.

With this prospect before them they go to their berths at 3 o'clock in the morning on the 4th Aug. Andrée writes that the bread and rusks, etc., are wet through. The last entries for this day are an observation respecting the movement of the ice, and a scientific explanation of the phenomenon in connection with the great Polar stream, the existence of which had been proved by Nansen. A more eloquent testimony to their strength of soul, unbroken energy and unconquerable courage can hardly be imagined. The men who now stand upon the ice are the same as those we learned to know during the journey of the "Eagle." Unheard-of efforts and hardships have not lessened their firm determination to bring their Polar Expedition to a happy conclusion.

XI

TOWARDS THE SEVEN ISLANDS

After the decision that determined the future of the Expedition, which was come to during the night between the 3rd and 4th August, Andrée and his companions rose about half-past 13, after enjoying a most necessary sleep. Three-quarters of the heavens were covered with alto-cumulus clouds; the temperature was a little above freezing-point, and a light west-north-westerly breeze swept across the ice.

The Expedition stands face to face with a new phase of its existence.

Half an hour after rising, the party breakfasted on bear-beef, hard bread, lactoserin-cocoa and biscuits. Then they break camp, for the first time directing their steps towards the Seven Islands, the course lying S. 40° W.

This day, too, was a bad one. Andrée makes a number of notes respecting the thickness of the ice, which is given as 3.46 ft., and he takes a sample (No. 3) of algæ from the foot of the ice. The members of the Expedition also notice that the easiest crossings over the leads are by the highest hummocks, the edges of the leads there being nearest to each other. Naturally, these bridges are fearful, says Andrée, but still they are bridges. Broad channels without an ice-floe but with heaped-up edges are the worst, and they are mentioned in connection with a hearty expletive. But if there is no fog they can manage.

After six hours' march the three men take a plain dinner, consisting of biscuits, butter and cheese,

besides snow-water. For a further six hours they battle onwards; then they stop, pitch their camp and take supper. It is four o'clock in the morning of *the 5th August.* After this poor meal, Strindberg comes with bear-soup and Potage d'Oseille (Stauffer), sandwiches, biscuits and cherry syrup and water. Afterwards, a complete inventory is made of the provisions they still have left.

Stock-taking of provisions 5 Aug., 5 o'clock in the morning.

Hard bread, 11 tins of 2.4 lbs.	26.4	lbs.
12 biscuits, 12 tins	34.1	,,
+ Mellin's Food	33	,,
Butter, 17 tins of 2 lbs.	34	,,
Chocolate powder, 9 tins of 2.2 lbs. ...	20	,,
Milk extract, 10 tins of + lb.....	5	,,
Lactoserin, 10 tins	5	,,
Pemmican	6.5	,,
Sugar	11	,,
1 tin Stauffer preparat.	10	,,
Coffee	4.5	,,
1 tin chocolate.		
3 tins lime-juice tablets.		
Whortleberry jam	2.2	,,
9 tins sardines.		
3 tins paste.		
Soup tablets, 3 + tins.		
2 bottles syrup.		
1 bottle port-wine.		
6 snowflakes.		
Flour	2.2	,,
Salt—2 tins.		
Cheese	1	,,

Of these provisions, there were packed on Andrée's sledge—

In the front basket :		In the rear basket :
Cocoa powder extract...	4 tins.	3 snowflakes.
Coffee	1 ,,	2 Mellin's Food.
Butter	5 ,,	5 biscuits.
Milk	8 ,,	2 bottles.
Lact. ser.	4 ,,	4 butter.
Bread.....	4 ,,	1 paste.
Sardines	5 ,,	2 salt.
Bird paste	1 ,,	2 soup tablets.
Cheese	½ ,,	1 flour.
		1 Lact. ser.

On Strindberg's sledge was packed—

In the front basket :	In the rear basket :
6.6 lbs. cocoa powder extract, (Mosquera).	3 tins Mellin's Food-powder, 19.8 lbs.
4 tins butter (7.9 lbs.)	2 tins hard bread.
2.2 lbs. coffee.	2 Albert.
1 bottle raspberry-syrup.	1 Cracknel biscuits.
Biscuits, 1 Cracknel.	1 Oscar.
1 Albert.	2 snowflakes.
1 Congo.	1 pemmican, 6.6 lbs.
5 hard bread.	2 cocoa powder extract (Mosquera).
1 tin sugar (11 lbs.).	4 butter.
1 tin snowflakes.	2 milk.
1 tin Stauffer preparat.	5 Lactoserin.
1 tin Chocolate and lime-juice.	1 paste (liver).
1 tin (2.2 lbs.) whortleberries.	1 soup tablets.
4 small tins sardines.	

> "The result of the stock-taking shows," writes Andrée, "that we must be careful, especially with the bread."

During the day the temperature has fallen and is now 28·1° F. "The temperature is falling still lower and each degree makes us creep deeper down into the sleeping-sack."

It is evening the same day. Fog prevails when the men creep out of the tent. They take breakfast: mixed bear's-meat (ribs, chops and kidney), bread (¼ piece), coffee and biscuits.

The start takes place at 20.30 o'clock with the

same course as the former day. Some drops of rain fall.

During the early part of the night the Expedition makes its way onward among greatly divided ice. The pools of fresh water and the leads are numerous; after the low temperature of the night, new ice seems to have been formed on the former. "Glanzplurr," Andrée calls them. That the difficulties are great in this cruising among the floes and all this water is also shown by the fact that, on some occasions, they had to creep "on all-fours to-day as in the spring of our youth." On several occasions Andrée notes the thickness of the fresh-water ice as amounting to 2.3–3.96 ft. In consequence of the ice being scattered and of the great amount of water, animal life is fairly rich. Large seals have crept up on to the ice, where, too, there are many bear-tracks, fulmars and a Ross' gull.

Eight hours after the start they take a dinner which is as Spartan as that of the day before, being only biscuit, butter and bread in very scanty quantities.

The most remarkable thing during the day, however, was probably their four hours' long rafting across an expanse of water or a lead which was about one mile wide. After this exertion of strength, the bold men were rewarded by having better ice and, towards the morning of *the 6th Aug.*, excellent ice. "Paradise," writes Andrée, "large level ice-floes with fresh-water pools full of syrup and water, with here and there a young polar bear with tender meat."

In the morning of the 6th Aug., at 9 o'clock and after 15 hours' labour, supper is taken in accordance with approximately the same bill of fare as that for the preceding day, *i.e.*, mixed bear's-meat and, in addition, 1.6 lbs. bread and biscuits, besides gruel made of Mellin's Food. Then there came rest for the three men that day too.

Towards the evening of the 6th Aug. they are once

more afoot. Fraenkel takes his meteorological observations. The sky is quite covered with clouds, and it is mild, 34.1° F. The wind has unfortunately swung round from northerly to the south-south-west. At 9 o'clock breakfast is served, once more with mixed bear's-meat, which is now excellent, having become old; bread, coffee and biscuits. After a couple more hours everything is ready, and they set off with the sledges.

The ice is excellent, with large, level floes and many but easy crossings. "What joy when the needle pointed across a level of some hundred yards." The snow on the ice is troublesome, however, for it is granular and has a consistence like that of powdered sugar, so that their feet glide and they easily slip, while the sledges cut deep into the snow. But they are not altogether spared hummocks, for one large one, at least, running in a north-west direction, has to be crossed. When the sledges made dreadful somersaults here, Fraenkel remarked that "the journey could not be called altogether hop-e-less." A new difficulty arises, too, by the leads altering while the Expedition is making its way across them. Two Ross' gulls show themselves during the day, but they are shy. They only once came near the party and then flew away.

The dinner—if one may give that name to the small rations of bread, biscuits, butter and water, which are regularly eaten after the first six hours' wandering—is enjoyed at 5 o'clock in the morning of *the 7th Aug.* The chief meal of the day, supper, consisting of 2.2 lbs. bear-meat, pease-purée (Stauffer), bread and biscuits, is served at 11 o'clock.

Andrée considers that they have succeeded in travelling the longest distance hitherto covered, probably not less than 3 distance-minutes (about 3.5 miles), "but," he adds, "the wind is right against us and has probably driven us just as far back." They

are very tired when they go to their berths at 1 o'clock in the forenoon. In the evening at 2.30 o'clock (the 7th Aug.) they at last awake and then feel quite refreshed. Fog still prevailed; the wind had freshened, but had swung round more to the west (S. 70°, 75° W.) and the temperature had fallen about one degree below freezing-point.

It was not until one hour after midnight at day-break of *the 8th Aug.* that breakfast was ready: bear-cutlets of 2 lbs. each with two pieces of bread, lacto-serin-cocoa and 6 biscuits each. "A little reindeer-hair in the food is recommended, for while taking it out one is prevented from eating too quickly and greedily." This hair came from the sleeping-sack.

At 2 o'clock at night they break camp. The ice is about the same as it has been during the two previous days. Hummocks and leads with large floes have to be crossed. It is warm work pulling the sledges, and Andrée wishes he had a summer-jacket. Andrée himself does not use snow-spectacles except in strong sunshine, he presses his eyes together instead. The wind is right in their noses and it is cooling. It is right against them, "but if it does what it has hitherto done, *i.e.*, presses together the leads, then it can keep on for a week or two."

A couple of little auks, with a cry that Andrée has never heard before, are seen in a lead; two Ross' gulls also make their appearance. A little later on in the day the Expedition comes for a change into a dreadful country with fresh water "where the fresh-water pools are often more difficult to pass than the salt-water channels, for their edges are eaten away below, and the depths are so small that the boat cannot be used." A photograph is taken of this region of ice and water, and Fraenkel, "who other-wise complains of the want of change, did not like what was offered him." In consequence of a per-manent catarrh, the noses of all three are running.

At last, a little before midnight, they allow themselves to have a proper meal, with .9 lb. bear's-meat and two pieces of bread per man, gruel made of Mellin's Food and biscuits.

On the next day, *the 9th Aug.*, Andrée puts down the exact times for one of the phases of their camp-life.

2.0 Primus started.
2.18 the steak ready and the coffee-making begun.
2.29 the steak eaten.
2.48 the coffee (1 heaped tablespoonful in addition to the old grounds and 2½ pints water and a little milk) ready.
3.0 the coffee drunk.
4.30 broke camp (course towards S. 40° W.).

Before they break camp, Andrée makes a sketch of the stratification of the ice and remarks that "the ice, it is true, looks like old ice, but that one must not allow oneself to be fooled by the like." Later on he sees a hummock of ice formed in a lead; this took place at right angles to the direction of the wind which had produced the pressure.

The going is dreadful and the country consists of large, uneven fields full of brown ice, new and old, large and small walls of hummocks between which there occurs an alternation of snow-drifts, collections of water-soaked snow and pools of melted-snow water, but not many large leads. It is extremely fatiguing for the pullers; the snow, especially, is difficult but "for the sledges the going is not difficult, for the snow supports them and the sweet-water leads were often not so very sweet to cross." Fraenkel is attacked by diarrhœa for the second time and he is depressed both in body and soul. Andrée gave him opium, and both Andrée himself and Strindberg were tired out.

A skua was visible and a "fine beautiful bear approached us, but fled before we had a chance to shoot. This was a great grief for us and a pity too, for soon we shall have no more bear's-meat left. Strindberg and Fraenkel went after him, but in vain." Strindberg's gun was out of order and they had several hours' work getting it right again. "Its mechanism is dreadfully carelessly constructed," remarks Andrée.

They have been awake and at work for 18 hours when, at 7 p.m., they creep into their sleeping-sack. That evening they had no bear-beef either, but contented themselves with Cloetta's meat-powder, chocolate and bread, biscuits and butter.

The 10th Aug. breakfast was taken at 8 o'clock. Then they made a complete list of the loads of the three sledges. As before, Andrée enters in his diary his own and Fraenkel's lists, while Strindberg writes down his load in the log-book. The main part of the articles put down in these lists form part of the find at White Island, and so it is of special interest to read them.

Andrée's sledge.		Strindberg's sledge.	
1 little sack	7.7 lbs.	Front basket	97.9 lbs.
In front basket...	81.7	Rear basket	101.2
In rear basket ...	82.0	Private sack	35.2
1 private sack ...	34.0	Snowshoes, 3 pairs.....	13.2
1 medicine chest	20	Boathook	3.3
1 tent	20	Spade	2.2
2 tent poles	3.3	Grapnel with line	4.4
Meat.....	11	Tool-sack	17.6
1 gun	3.5	Photogr. app.	13.2
1 b. ammunition	14.3	Stand of theodolite ...	2.9
1 sextant	4.8	Boot-grease	5.5
1 ? sack	13.2 photogr.	Sewing-things	10.8
		Little field-glass	0.7
	295.5 lbs.	Large field-glass	0.7
			308.8 lbs.

Fraenkel's sledge.

Boat.....	138.6 lbs.	1 cooking app., food, etc.		26.4 lbs.
~~cooking app.~~		1 chest of matches ...		6.6
~~spirit~~		1 sextant.		
~~food~~		1 aneroid bar. ...	1·1	10·1
1 sack private.....	37.4	1 psychrom.	6·8	
1 hose	7.7	1 change-sack.....	2.2	
3 pieces wood	4.4	Spirit (for films.—*Trans.*), table-things, etc.		17.6
1 ammun.	7.7	2 cushions, guncase and cleaning-box		3.7
1 altazimuth	6.6	1 drift-wood		4.4
2 field-glasses.....	4.4	1 tarpauling		5.5
3 blankets	10.			342.7
1 sleeping-sack	20.			338.4 lbs.
~~1 sextant~~				
1 sack books	6.6			
2 oars	10.			
3 poles	4.4			
1 gun	4.4			
1 sack sennegrass	2.2			

This stocktaking and the partial reloading which took place in connection with it made several hours' work. Strindberg also takes an astronomical place-determination there at the camp, which gave the result 81° 56′ 5 N. lat. and 29° 5′ E. long. Grw. "It is remarkable," writes Andrée, "that we have travelled so far in latitude, in spite of the wind having been right against us for several days."

It is not until about 14 o'clock that they start, and then, in consequence of the place-determination, their course is S. 50° W. To-day the country is extremely difficult, even if the going is good. They encounter absolutely untraffickable water consisting of broad channels filled with lumps of ice and snow, so that neither sledge nor boat can be used there.

Strindberg's observations having shown that the Expedition has come south of 82° of latitude, they are given for dinner that day at 4 o'clock, in addition to the usual hard bread, biscuits, butter and cheese, some sardines as well. Then it began to drizzle and, towards the evening, to snow.

Andrée is greatly interested by a find he makes on the ice, of small stones and leaves, etc. He describes the place in detail and takes samples. "This find should make it possible," says Andrée, "to determine where this great amount of brown and hard ice which we constantly see has its place of origin. Before this I have not found anything on the brown-yellow ice other than fine clay, and now I find on the same ice a whole sending of plants, sand, small stones, etc."

After seven hours' terribly tiring march the Expedition pitched camp. The same reason that gave them sardines at dinner made the supper at 22 o'clock in the evening richer than usual, in spite of the supply of bear's-meat being very small. The bill of fare was as follows: bear's-meat (1.65 lbs.) with Batty's sauce, soup and biscuits, almond-tart (Gateau d'Amandes), Stauffer. "Now Strindberg is sitting mending trousers in the seat, and Fraenkel is oiling guns. Fraenkel's stomach pains are now over." So end Andrée's notes for the 10th Aug.

During the last few days, Andrée's entries in his diary have been more detailed and connected than it was possible to make them before; during the days immediately following they become still more detailed, and for the purpose of giving a continuous narrative of the wandering over the ice they can be used to a far greater extent than has hitherto been the case.

The 11th Aug. began with nearly four degrees of frost and a fresh north-easterly wind. After breakfast at 10.30 o'clock, consisting of bear's-meat, bread, coffee and biscuits, the Expedition started. It was "a regular Tycho Brahe day. First thing in the morning I came into the water, and so did my sledge, so that nearly everything became wet through. Strindberg ran into Fraenkel's sledge and broke the boat with the grapnel. All the sledges turned somersaults repeatedly during the course of the day. Mine was twice turned completely upside down. The going

was good but the country terrible. *All* imaginable difficulties happened, and when the evening came we were not at all happy."

"A peculiar incident happened on crossing a lead. We stood quite at a loss what to do, for the edges of the ice were wretched, and the channel so shallow that the boat could not float. Our ordinary methods failed us altogether. Then, while we were speaking, the ice-floe beneath Fraenkel broke and so we obtained a bit of ice of considerable size, and with the assistance of this piece we then made the crossing quite cleverly. We have not been able to keep the course, but have been obliged to go both to the north and to the east, but endeavour to go S. 50° W."

"But something has happened, however, Fraenkel shot an ivory gull." Andrée describes the bird in detail.

After having made some observations in the afternoon respecting the structure of the ice and taken a sample (No. 7) at the edge of a melting-ice hole, Andrée states that Strindberg's place-determinations show that they are in 81° 57′ 7 N. lat. and 30° long. Again they think they see Gillis Land, for Fraenkel believed he had caught sight of land. It was so much like land that they turned their course in its direction, but then it was found to be merely a large and peculiarly shaped hummock, or wall of pressure-ice.

The place-determination according to Strindberg's observations, which have now been checked, is almost exact. Since the start towards the Seven Islands, consequently, the Expedition had come 30 miles towards the south-south-west instead of to the south-west, although they had held the latter direction the whole time. It is also remarkable that, during these last few days, viz. between the 4th and 6th Aug., they had been at about the same place as that where the "Eagle" was between 1.30 and 3 o'clock in the morning on the 12th July.

In the evening, some hours before midnight, the thermometer had fallen to 17.6° F., the lowest temperature hitherto noted during the Expedition's journey. The wind had also swung round to the north-west and was blowing at a velocity of 25 ft. per sec. It was not until about 2 o'clock in the morning of *the 12th Aug.* that supper was ready. It consisted of bear's-meat (1.65 lbs.) and cocoa. The distance they made that day had not, according to Andrée's calculations, exceeded 2.1 miles. A month had now passed since Andrée and his comrades had gone on board the " Eagle " at Danes Island.

The three men rise at about midday on the same day. The temperature is still low and the wind west-south-west. Strindberg fries, in the usual way, the ivory gull that Fraenkel had shot the day before and was found to taste excellent. Then they took a sounding through the ice, which was 4 ft. thick, but bottom could not be found with their line, which was 176 fathoms long. A sample (No. 8) was taken from the line when it had been drawn up 110 fathoms.

During the close of the day's march they at last got better country after the terribly difficult ice they had had during the last few days. The course had been S. 50° W., and, according to Strindberg's calculations, they were now so near the above-mentioned Gillis Land, as it was called on the map, that the Expedition might " even expect to catch glimpses of it. But neither that nor any other land was visible."

The question of food now began to come to the fore, as the Expedition had only as much bear's-meat left as would suffice for a single meal, and as an attempt to shoot a seal had failed.

It rains on the tent when they go to bed at 3.30 in the morning, on *the 13th Aug.* Andrée thinks that, thanks to the better country, they had covered 2.5 distance-minutes (about 3 miles.) that day, although the march-time had been shorter than usual.

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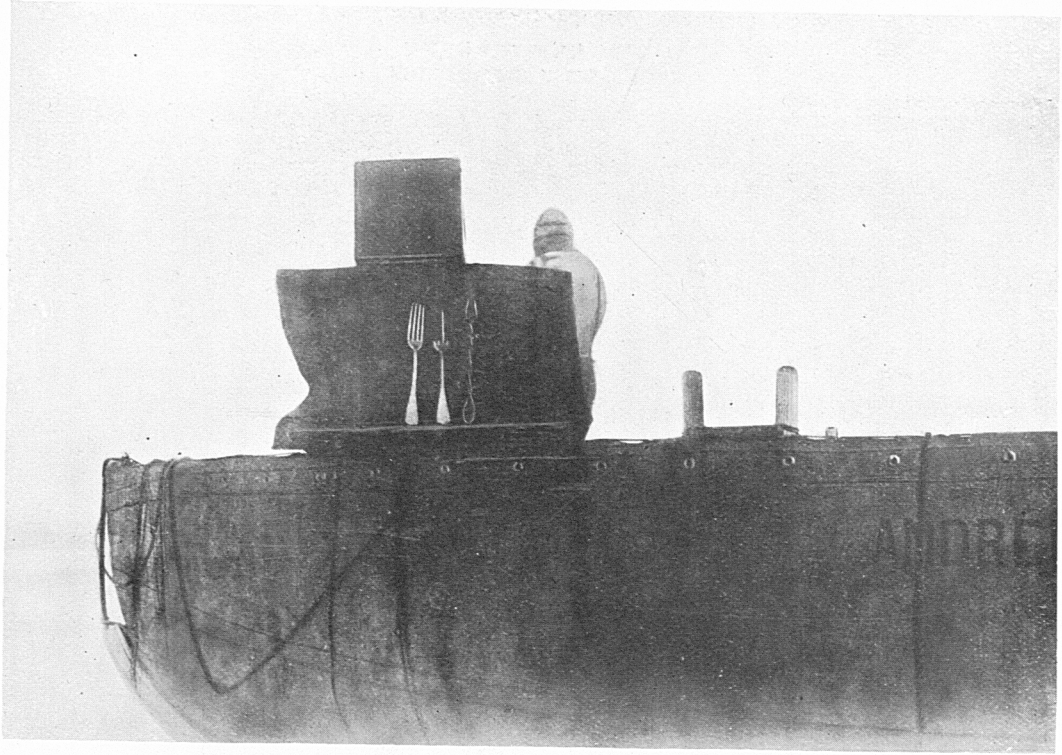
ANDRÉE AND A SHOT BEAR

Probably taken on July 19th, 1897

From a film taken on the ice in 1897 and developed in Stockholm in 1930



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"WE PHOTOGRAPHED THE STORY OF THE DEVELOPMENT OF OUR FORKS. I MADE A FORK FOR FRAENKEL" (Diary, Aug. 3rd, 1897)

The latter fork is seen to the right of the two others.

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

Andrée's boots now begin to be so cut to pieces that he fears "their fate will soon be sealed." The rain that falls also induces him to make preparations for manufacturing a waterproof.

The minute after they had crept into their berths they once more heard the loud breathing of an animal which Andrée supposes is a whale, but later on understands to have been a walrus.

On *the 13th Aug.* the last pound of bear's-meat was eaten at breakfast, and at 17 o'clock they start. The ice was pretty good. They endeavoured to shoot a seal, but were unsuccessful. It was but poor compensation to catch a little fish that Andrée observed in a lead. "It was pretty unafraid and seemed to be astonished at our sight." Andrée killed it with the shovel and gives a detailed description of it. Just when they had crossed the lead, Strindberg cried out: "Three bears!"—"We were at once in motion and full of excited expectation. Warned by our preceding disappointments, we now went to work carefully. We concealed ourselves behind a hummock and waited, but no bears came. Then I chose myself as a bait and crept forward along the plain, whistling softly. The she-bear became attentive, came forward, winding me, but turned round again and lay down. At last it was too cold for me to lie immovable in the snow, and then I called out to the others that we should rush up to the bears. We did so. Then the she-bear came towards me, but was met by a shot, which missed. I sprang up, however, and shot again, while the bears that were fleeing stopped for a moment. Then the she-bear was wounded at a distance of 80 paces, but ran a little way, whereupon I dropped her on the spot at a distance of 94 paces. My fourth shot dropped one cub. Then the third one ran, but was wounded by Fraenkel and dropped by Strindberg, who had had a longer way to go, and so could not come up as quickly as I.

" There was great joy in the caravan, and we cut our bears into pieces with pleasure, and loaded our sledges with not less than 138 lbs. fresh meat, for 23 days. Among the experiences we have made with regard to the value of the parts of the bear, it may be mentioned that we found the heart, brain and kidneys very palatable. The tongue, too, is well worth taking. The meat on the ribs is excellent. The work of cutting up the bears, etc. gave us so much to do that we did not march much this day. The wind has swung round to the south-east, so that we hope to drift westwards. To-day the weather has been extremely beautiful, and that was a good thing, for otherwise the work would have been ticklish. When a bear is hit, he brings out a roar and tries to flee as quick as he can. We have been butchers the whole day. I have been trying the business of tanning, in order to get skin to mend the sleeping-sack with. The skin of the forelegs seems to be the most suitable, being the lightest. With a fairly clear air to-day we have not seen land in any direction."

In the evening, Andrée shoots an ivory gull too, and notes that this kind of bird has three cries: (1) piyrrrr, with a soft " r " and a trill, (2) pyöt-pyöt, and (3) one resembling the croaking of a crow.

Dinner, at 3 o'clock in the morning of *the 14th Aug.*, was a banquet: fresh bear's-meat, heart, brain (3.3 lbs.), short ribs of bear, bear-soup with bear's-meat in it, bread and wheat-meal biscuits. " At 6.30 o'clock we went to our berths after having washed our hands and eaten ourselves " prop-full ! "

When the three men rose about 16 o'clock in the afternoon, they enjoyed a hearty breakfast of mixed fried meat: bear's-meat, ribs, heart, brain and kidneys; ivory gull, bread, coffee and wheat-meal biscuits. They lay still the whole day in consequence of rain and wind from the south-east. Andrée is now busy making the waterproof he had planned; the sleeping-

sack, coats and spectacles are mended, and the knives are sharpened. One or two ivory gulls settle near the remains of the bears, outside the tent. Both Strindberg and Andrée have an attack of diarrhœa, however, and the former is "bandaged all over with cotton-wool and bindings, for a cut-wound in the hand and a boil on the upper lip, after the sore has been washed with a solution of sublimate." At about midday they go to their berths again, but, from Strindberg's notes, they seem to have risen again at 18 o'clock in the evening in order to eat a little more. They eat masses of bear's-meat and bear-soup, with boiled meat, and then take a little bread and biscuits. With this meal Strindberg ends his "repas pendant le voyage"—meals during the journey—and merely writes that "these meat dishes varied during the remainder of the journey."

On the next day, *the 16th August*, the start took place amid wind and snow. They take out their leather jackets and their "baschliks" (warm outer caps, worn above the one nearest the skull), but hardly need them. The country grew difficult, but the going was good. Andrée believes "that nearly all the ice is hummocks." In his opinion the whole of the hilly country consists undoubtedly of old hummocks, although even on the level floes one can notice oblique stratifications, pointing to the fact that the floe contains pieces of ice lying on edge. "I have seen the same thing to-day in various places in the old yellow floes."

In the afternoon, about 11 o'clock, on *the 17th August*, the weather cleared up for a while, but still no land could be discovered. Simultaneously, Strindberg appears to have taken a place-determination, in consequence of which they determined to alter their course the next day to S. 60° W.

As may be deduced from what has been said above, the course of the Expedition, as far as it can be deter-

mined, is directed more and more to the west. The reason of this is that the current carries them more quickly southwards than they can manage to march towards the south-west, the result of this being that, since the 11th August, the party has drifted some 12 miles directly south-east.

The march that day was fearful, the results of their efforts being that " we have not advanced 1,100 yards, but, with the greatest difficulty, have dodged on from floe to floe. The ice here is fearfully pressed together, and shattered into small floes. We ferried five times before midday, *i.e.*, in $4\frac{3}{4}$ hours, and had to begin again as soon as we had eaten. We must be near the sea, the ice being so divided. The horizon almost perfectly clear towards Gillis Land, but we did not see any land in that direction. I believed that unpressed ice is found only near the egress of the Polar stream into the open sea (and is) formed by the freezing of the sludgy water." In the water between the floes there were many seals, a skua and a little auk.

As was mentioned above, they were obliged, after dinner, to make their way across leads and pools of water; three ferryings and a rafting had to be undertaken. Their difficulties in doing this were increased by the constant formation of new ice, and by the floes being in perpetual movement. After they had pitched their camp late in the evening, Andrée writes that, after all its labour, the Expedition had hardly advanced a thousand yards in the direction of their course.

" While we were sitting inside the tent, and Strindberg and Fraenkel were getting supper ready and I was mending my pants, I heard a noise outside the tent, and when I looked through a crack in the opening, I saw a bear close to my nose. I did not leave off sewing, but merely said: ' Look, there is another bear for us,' whereupon Fraenkel took hold of one of the guns (which, by a chance, had been taken into the tent for cleaning) and crept out. The bear then

stood a few steps from him and . . . in order to attack, but was met by a ball that made him fall dead after he had gone a few paces. We continued our work and our supper before we even looked at the cadaver, but afterwards, when we inspected the animal, we found it was a large he-bear, undoubtedly the finest of all we had shot. We took out the brain, kidneys, tongue and some pieces along the back, altogether about 22 lbs., in order to supplement our supply of fresh meat. Strindberg took the lunar distance to check the chronometers and determine our position. He also set out some fishing-gear for the night-hook, with meat (of bear)." The wind is now easterly, and they are happy, for they hope they will be able to drift in the proper direction. It has been a fairly clear horizon towards Gillis Land, but they have seen nothing of it.

The 19th Aug. At about 19 o'clock in the afternoon, Fraenkel takes his usual "morning" observation. The sky is covered with clouds, the wind is north-easterly, and has a velocity of 112 ft. per second, the temperature is 30.6° F. For breakfast, Strindberg has tried frying with bear-fat, which makes Fraenkel think: "Fancy how delightful if we can get sandwiches to eat!" Of the bear shot the day before they took no more than the brain, kidneys and the best bits, altogether 17½ lbs. After a few hours more they make a start, and march all night and a part of *the 20th August.* It is not stated when they pitch camp, but Andrée gives the following summary of the day's march.

"We have done a good day's work, probably 3 miles. Leads large but regular and with large —— (strips) between them. The country exceedingly tiring, the new snow preventing us from seeing the irregularities, which constantly give the sledges unexpected jerks. The fresh-water pools, not yet frozen, compel us to go round a lot. I am quite done for by

the day's work. The reconnoitrings are carried out by me, and are very troublesome. I have often to go a long way among ice-humps and over pools and along the leads. The worst are the fresh-water pools, which turn in innumerable windings, real labyrinths, and which are united by means of wide fissures, which do not become visible before one is close to them. I almost always throw my gun over my shoulder when I go off reconnoitring, and Strindberg and Fraenkel sit waiting and shivering. Sometimes they reconnoitre in one direction and I in the other. The reconnoitring for a road in the uneven country is almost as trying.

"We have encountered an immense lead, running N. 20° E. Wild crossings must often be made. The sledges capsize, or remain hanging over an abyss, while the puller tumbles down. Then comes the order "Lie still!" and there he lies, a long while, as sledge-holder, until the others can come to help him. The sledges must often be pulled at great speed at one part of the crossing, and slowly during another part. They must often be swung round on the middle of a point, or in the middle of a pass. The axe and the spade must often be employed in order to make a road. Tracks for one or both of the runners must be hewn. Perhaps the sledges have to be entirely unloaded, or else they are balanced across the boat. A line at each end of the boat makes it possible to pull it forwards or backwards. The quays break just when the weight of the sledge rests on them. The sledge, with its valuable cargo, is in a position of the greatest danger."

At 10 o'clock in the morning of *the 21st Aug.* the temperature has fallen to 25° 7′ F., and the faint wind is north-north-westerly. The Expedition stands ready to start just after 12. Andrée thinks it is a glorious day, and the air is light.

"Faint north wind, but the half-frozen leads and

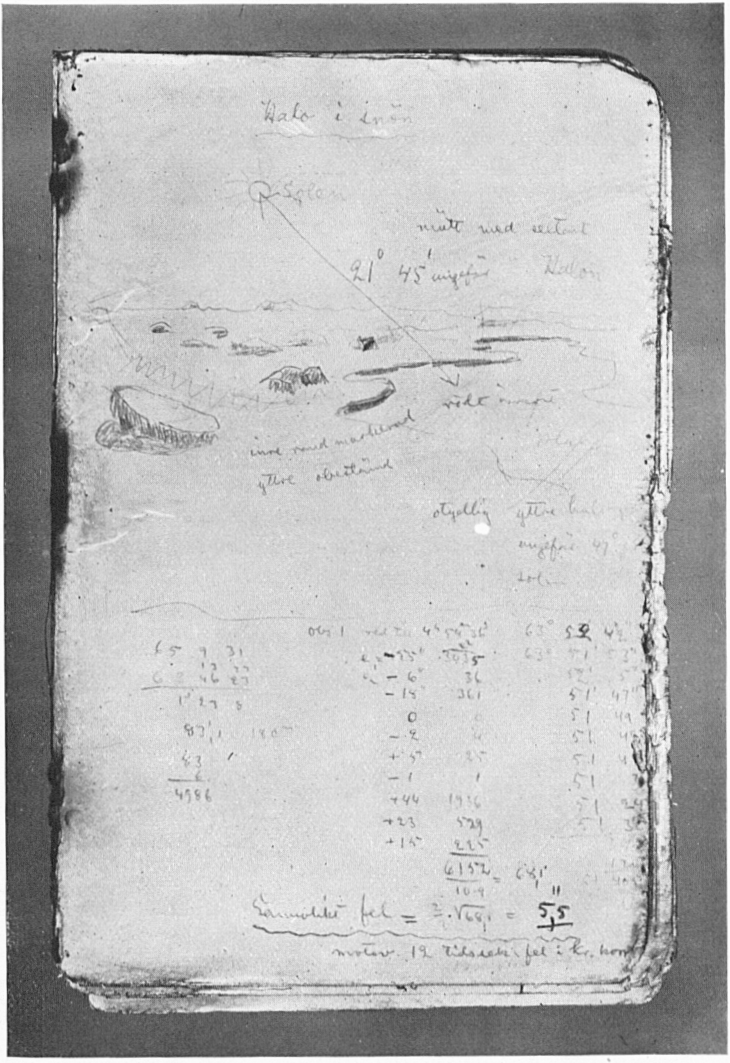
pools of water have caused us an immense loss of time. A single ferrying took two hours. I believe that we have hitherto not had such a large district of ice so hummocky and so broken. Sample 10 was attached, frozen fast and half-dry (grey) to the fractured surface of a piece of ice which was pressed up close by a lead. This evening, on my proposal, we tasted what raw meat was like. Raw bear, with salt, tastes like oysters, and we hardly wanted to fry it. Raw brain, too, is very good, and the bear's meat was easily eaten raw. Just as we were pitching our tent, three bears came to attack us. We took up a position near a hummock. Strindberg shot the old one with one ball. Fraenkel shot the other with two. I fired four shots at the other cub and made hits with all, but all his wounds were not so serious but that he could manage to get away among the fissures and pools. We took the best bits, *i.e.* two-thirds of the tongue, the kidneys and the brains. We also took the blood, and Fraenkel was instructed to make blood pancake (my proposal). He did this by using oatmeal and frying it in butter, after which it was eaten with butter and found to be quite excellent. Of the bear-cubs, one was rather big, the other (a female) was smaller. All the cubs we have seen have been young ones from the previous year."

For their supper, Strindberg hit on the plan of making soup of the algæ found along the edges of the ice. Experiments with this new dish, as well as with a cake made of Mellin's Food, water and yeast, gave excellent results, and as regards the sea-vegetable soup, Andrée thinks it "should be considered as a fairly important discovery for travellers in these tracts."

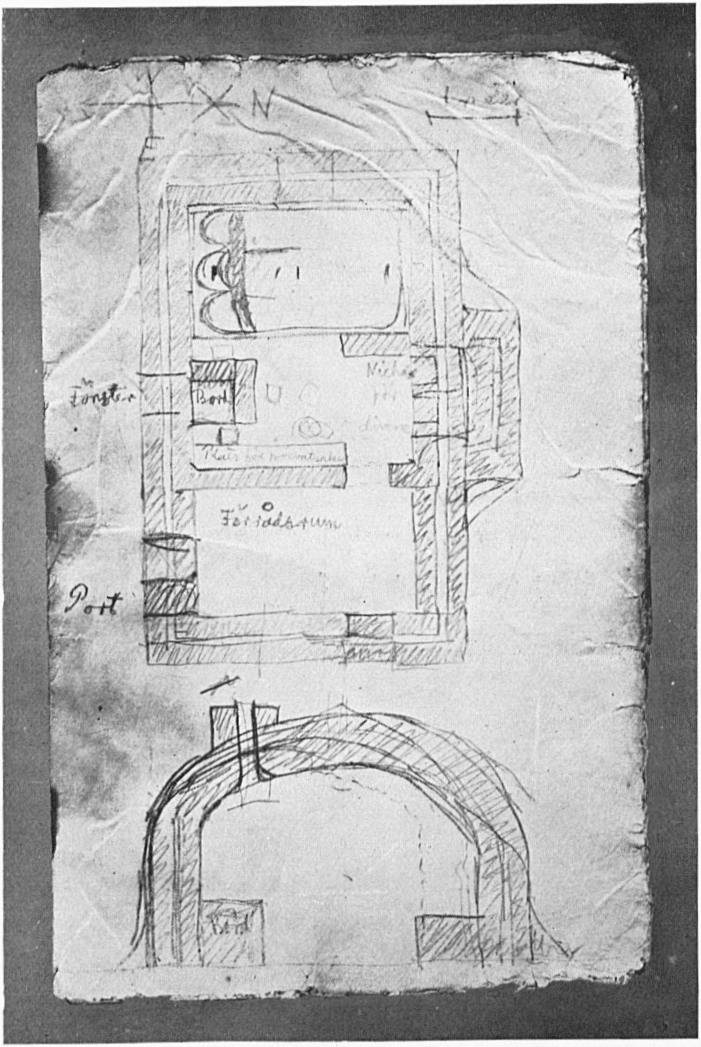
Early on *the 22nd Aug.* the temperature is 19° 6′ F., with a faint east-south-easterly wind. The start takes place about 5 o'clock. A young ivory gull—full-grown—was shot by Andrée, weighing about 1 lb. In his diary he gives a full account of its appearance

and of the cry of the ivory gull. "It seems to be the young ones that give the cry 'pyot-pyot,' which was noted down on the 14th August as that of the ivory gulls. When the mother is anxious, or gives a warning, she makes the cry 'piyrrrr,' but then with a sharp '*r*' and in close succession."

"The country to-day has been terrible, and I repeat what I wrote yesterday, that we have not previously had such a large district with ice so hummocky. There can scarcely be found a couple of square yards of ice which does not present evident traces of pressure, the entire country consisting of a boundless field of large and small hummocks. One cannot speak of any regularity among them. The leads to-day have been broken to pieces and the floes small, but, in general, it has been easy to get across. Now they are so frozen that neither ferrying nor rafting can be employed. To-day a lead changed just when we had crossed it (five minutes later and it would have been impossible), and we had an opportunity of seeing a very powerful pressing. The floes came at a great speed, and there was a creaking around us. It made a strange and magnificent impression. The day has been extremely beautiful. Perhaps the most beautiful we have had. With a specially clear horizon we have again tried to catch sight of Gillis Land, but it is impossible to get a glimpse of any part of it. Our course has been S. 60° W., as on the previous days, and the day's march has probably brought us about 3 min. (about 3½ miles) in the direction of our course. The clear air was utilized by Strindberg to take lunar distances. He saw haloes on the snow; an inner, more sharply defined, with the inner boundary red, where, however, the colours could not be determined quite absolutely. Observed from the ground, these haloes seemed to be the extremities of parabolas or of ellipses. Magnificent Venetian landscape with canals between lofty hummock edges on



PAGE OF STRINDBERG'S LOG-BOOK, WITH A DRAWING OF THE HALO OBSERVED ON AUGUST 22nd, 1897



STRINDBERG'S PLAN OF THE SNOW-HUT ON THE ICE-FLOE

both sides, water-square with ice-fountain and stairs down to the canals. Divine."

During the march, Fraenkel pulled so hard that his knee went out of joint, but it came in again at once and "there was no harm done," as Andrée expresses himself. Strindberg had a pain in one toe from some unknown cause. One comfort in all the troubles is, that bear-ham several days old is splendid.

On *the 23rd Aug.* the Expedition does not rise until about 10 o'clock and it starts one hour later. They made algæ soup, with large portions of algæ together with fried bear's-meat and a couple of spoonfuls of Mellin's Food, which formed a soup that Andrée thought was excellent but which Fraenkel and Strindberg did not like so much, although they considered it could be used as emergency-soup.

The difficult ice-district continues until 16 o'clock, when they found smoother going. "A lead opened just when we were about to cross and we had once more to employ ferrying. Two bear-tracks were crossed. Fraenkel considers that the fresh-water pools often, or sometimes, penetrate the entire thickness of the ice. Strindberg called our attention to the fact that the lateral fissures are sometimes connected with these fresh-water pools in such a way that we may suppose that the fresh water of the pools weakens the ice to breaking-point on the pressings." A number of samples of clay with plant-remains are taken and examined carefully. Fraenkel also finds a piece of rotten drift-wood sunk into the snow, and a piece of this, too, is also kept. Additional samples contain algæ, such as Strindberg uses for the soup, and the eyes of the ivory gull shot the previous day are preserved "in order to be able to examine their construction against snow-blindness. It is not easy to preserve all these samples from damp and accidents," writes Andrée. An improvement in the situation has occurred, however, by the ice on the lakes of fresh water now begin-

ning to bear here and there; this is a good thing, for the men are in despair at the roundabout ways they are compelled to take on their account. The day's march was probably about 3.6–4.2 miles and they are all terribly tired. The rich supply of meat has allowed an increase of the rations to 6–6.6 lbs. per day for the whole party, while the bread-ration has been diminished to 3 oz. hard bread and 6 oz. biscuits per day, and "we thrive very well on it," says Andrée.

At midday on *the 24th Aug.* there prevails a fresh south-south-east wind and the temperature is 34.2° F. "The ice conditions still dreadful. We are now in a difficult hummock district miles in breadth. I caught a hasty glimpse of a fish. It was about 4 in. long, dark-grey on the back and provided with a couple of small wide transverse stripes (far apart) across the back. Like the former it was found in a lead connected with a salt-water pool and it was immediately below the surface (about 8 in.). It moved slowly like the former, but glided in beneath the bits of ice."

During the course of the day some further samples were taken of the clay with plant-remains, found on the ice and which come from the coasts of Siberia and the shallow seas off them. Andrée devotes a touching attention to sample 17 especially. "It was washed in a tea-strainer, whereby, perhaps, some small quantity (of clay ?) was sluiced away, but otherwise everything was included. The leaves were dried by being placed in layers in a 'bandage' and dried against the breast." After having made this find Andrée notices that "the ice is perforated everywhere and filled with things that are certainly well deserving of a special Polar expedition merely on their account. But then one should be provided with appliances, so as to be easily able to enlarge the holes and take up the objects. The natural philosopher would find the interior of the

ice to be almost as rich in contents as that of the crust of the earth or that of the sea." Some additional samples are taken and a watchful interest is devoted to everything that comes in their way. "We have several times seen a black little bird with white on the wings like a black guillemot, but black under the belly like a little auk. It has a kind of twitter, and we have not seen it fly but only dive. What kind of bird is it? Fulmars and ivory gulls sail around us pretty often."

For supper the bear's-meat is fried without butter and they find it excellent. The provisions are rationed very strictly. Butter is taken only at dinner. The quantity of meat per day is 2.8 lbs. per person at breakfast and supper, and .9 lb. for dinner. The amount of bread is 2.5 oz. per day and person, and of biscuits 5 oz. Luckily "bear-tracks were seen to-day, and the day before yesterday two such traces were observed. This means for us that we have wandering butchers' shops around us." The condition of the party, however, is far from good. In all its brevity, the following lines, entered between the scientific notes and the grim jest of the wandering butcher's shop, give us an idea of the three men's sufferings and labours. "Last night Fraenkel had severe diarrhœa, but this, probably, was the result of catching cold. He suffers sometimes from cramp, perhaps on account of over-exertion. Strindberg's tender foot has been cured by rubbing boot-grease on the stocking. Cramp relieved immediately by massage-treatment."

That day they pitched their camp towards the early part of the night, for Fraenkel has entered in his journal a meteorological observation for 1 o'clock, *the 25th Aug.* But some hours' labour still remained for the three men before they could seek rest, for in the notes for the 27th there occur a couple of detailed stocktaking lists, dated the 25th Aug. 2 a.m., and

showing the loads on Andrée's and Strindberg's sledges.

Fraenkel's next observations are dated 25/8, 20 o'clock. The south-easterly wind has grown calmer and the temperature is 31.6° F. At 9.45 o'clock the Expedition starts.

The ice to-day is much better, and the going excellent. "Many leads, but they have been easily crossed, and between them the floes have been large and pretty level." "A bird was seen, most like a skua. He was quite black with the exception of underneath, where he was blackish-brown. Flew as silently as a spirit and dived down here and there for food. I shot one of those mystical little auks, but he was white all the way up the side in front of the wing, so that, at a distance, he looked like black guillemot, and, in addition, the tips of the feathers were white on the inner half of the wing. Three-toed without spur, the beak quite black. The sea-serpent was seen, but looked different. He still appeared to have two bends, but now he seemed to be grey everywhere, and when he dived a two-cloven fin was seen at the end."

Andrée also comes to an insight as to the origin of the stratified layers of the ice which he has so often observed and wondered at. He illustrates his opinion by means of sketch and text. He also notes that, on melting, the projecting tops and edges of the ice are covered with clay as much as 1 in. in thickness.

On *the 26th Aug.* the camp is pitched about midday. To the sample (No. 19), taken previously during the course of the wandering, of a piece of turf from a hole in the ice there is added an additional sample, No. 20, of a great find, embracing clay, leaves, bits of drift-wood and shells. Andrée summarizes the events of the day as follows: "Fraenkel fell into the water to-day, and has diarrhœa, and Strindberg has a pain in his foot, and I have diarrhœa, but we covered a

good distance to-day in any case. This evening, I have made fishing-hooks of pins and have fished with meat and fat. We shall see if I get anything to-night," he ends.

The men are awake again early, at 1 o'clock in the morning on *the 27th Aug.* There is a fog, the wind is a faint north-easterly and the temperature 29.8° F. Andrée examines his fishing-lines, but all the six hooks, which were at a distance of 19 in. from each other and were about 16.5 ft. below the surface, were all untouched. The thickness of the ice at this place was 4.125 ft.–4.75 ft. Where there had been pressure the thickness rises to 8.75 ft.

At 2.30 o'clock they break camp; the sledges are in order and the Expedition starts. The weather clears and becomes magnificent. "During the whole of the forenoon we had good going and good floes, although the leads were numerous. But in the evening the difficult country began again. It consisted of small and, in part, antheap-like hillocks standing very closely together, between which the sledges incessantly capsized and caught fast. However, we certainly made 3.6–4.2 miles to-day and had one of our best days." "To-day we have seen ivory gulls and a bird which was probably a little auk. This evening, too, I have put out the long line for fishing. Fraenkel has again had very bad diarrhœa and has got opium. I have had diarrhœa too to-day, but I imagine I am well again now without any medicine. Strindberg is greatly occupied calculating lunar distances." Of the other events of that day Andrée notes that he has mended Strindberg's photographic apparatus and the spirit-tin, and that he has had much trouble with the large sample No. 17. He still devotes his liveliest interest to the question of the stratified ice, which is nothing else than an illusion, for it arises "from the periodic melting and freezing of the water at the edges of ice which already exists."

A little change in the food arrangements is made the same day. As they have begun to use Mellin's Food in the coffee and chocolate, they consider they can still further diminish the bread-rations, and the only vegetable food they have eaten that day has been four cakes of Schumacher hard bread and six Albert biscuits.

The 28th Aug. It is cold. At 9 o'clock in the morning Fraenkel notes 22° 1′ F. and a fresh north-north-easterly wind. The fishing-line has been out in the water all night but, as before, without result.

At first the ice, which is in lively movement, is good to begin with, but is pressed and traversed by leads across which the Expedition must ferry. On the other hand, the fresh-water pools are now in general frozen so hard that the smaller ones can be crossed direct. About midday they come to terrible ice with large hummocks with deep, perpendicularly-sided pools between. In the evening the ice was "typical Polar floe-ice. Scarcely a square yard that is not hummocky, and the entire surface is covered by old, low hummocks and pieces of ice which, by melting, filling up with snow and freezing, and by the grinding of the snow, have been rounded off into innumerable small hillocks varying very much in form and size, and between which there are frozen pools of water, with ice which is still level but which, by its bulging, etc., shows that it, too, will soon form a link in the billowy part of the surface." The study of this ice "leads the thoughts irresistibly to the geological phenomena in the crust of the earth, whose late sedimentary strata correspond to the pools of water."

In the evening the temperature has fallen to 21° F. and the north-westerly wind is still fresh with a velocity of 16.5–19.8 ft. per second. Andrée says, however, that they have not suffered from it; "the tent and sleeping-sack begin to be difficult to manage. Fraenkel is bad again. Yesterday he got an opium

tablet[1] against diarrhœa, and this evening he has got a morphine tablet against the pains in his stomach. We shall see if he can become a man again."

"Seals, fulmars and ivory gulls are visible now and then; the two last mentioned come so near that one is tempted to kill them with a stick."

The course has still been kept at S. 60° W., and as the wind has been north-west, Andrée and his comrades hope that they have drifted towards the south. As a matter of fact, since the 11th Aug. they have drifted in a wide arc towards the east-south-east, so that they are now no more than 12 miles south from the point on which they stood six days before. All their efforts have, practically speaking, been in vain.

On *the 29th Aug.* at 12 o'clock the temperature is still low, 22° 8′ F., and the north-westerly wind has a velocity of 9.9 ft. per second. It now begins to feel cold. The Expedition starts at 15.30 o'clock and then tries to keep a course towards S. 45° W. The ice, however, like that of the day before, is mostly hummocky ice and the leads are numerous and large and therefore very difficult to cross. It is, consequently, no easy matter to keep a fairly steady course between the leads. The ice and snow, too, have become as hard as glass, so that it is difficult to draw the sledges over them. Strindberg's sledge is badly broken and they could just manage to mend it. "We come slowly onwards and I imagine we shall have to make a late autumn journey to reach Mossel Bay," is the only remark Andrée writes in the presence of this gloomy perspective. A bear appeared, but "unfortunately he went off at a gallop when he saw that he was noticed."

[1] The find made on White Island includes, too, the medicine-chest of the Expedition that was left the party after the other chest had been thrown from the "Eagle." In the chest there were several medicinal preparations in small tablets.

"To-night was the first time I thought of all the lovely things at home. Strindberg and Fraenkel, on the contrary, have long spoken about it. The tent is now always covered with ice inside, and the bottom, which is double, feels pretty hard when it is being rolled together. I sweep it clean morning and evening before and after the cooking."

The 30th Aug. It has become still colder. At the start, about 16 o'clock, it is 20° F. and the wind is fresh. The ice is the same, and the course difficult to keep, the leads being troublesome to cross.

"At last we found ourselves on a floe from which we could not come without rafting. As we had not more than 20 minutes left of our march-time, we determined to pitch our tent and see if the ice possibly moved during the night. Scarcely had we erected the tent before Strindberg cried out, 'A bear on top of us.' A bear then stood ten paces from him. I was lying inside the tent sweeping the floor and so could do nothing, but Fraenkel, who was outside, caught hold of a gun and gave the bear a shot that made him turn, badly wounded. To save cartridges he was allowed to run a bit, but at last he had to be finished off with three more shots. The bear, however, had managed to get down into a broad lead, and rolled himself about there, but he could not swim far. I threw a grapnel past him and brought him in to the edge of the ice. This, however, was so thin that we hardly dared to stand on it, but at last I succeeded in putting a noose around his neck and one around a foreleg. Strindberg prised with the boat-hook and so we hauled him up on to the ice pretty easily. The situation was photographed, and the bear was cut up. Once more we have now 66 lbs. of meat, *i.e.*, meat for 14 days if we calculate two lbs. each, morning and evening, and 11 oz. for dinner. These quantities are carried next to the body, so as not to be frozen. Two Ross' gulls visible."

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A WELCOME KILL

To the left Fraenkel, to the right Strindberg.

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

Copyright Swedish Geographical Society

A YOUNG IVORY GULL PUT UP NEAR THE TENT IN ORDER TO BE PHOTOGRAPHED

Probably the specimen shot by Andrée on Aug. 22nd, 1897

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

They pitched camp while the night was early. The cold was a little less now, being 25° F.

When they awakened in the afternoon *of the 31st Aug.* it was still 25° F., but the north-west wind had increased in strength and had a velocity of 35.5 ft. per second. They start in the evening. "The sun touched the horizon at midnight. The landscape on fire. The snow a sea of fire." But the Polar summer is definitely ended, and hereafter the days will rapidly decrease in length and the dark nights lengthen as rapidly.

The country is, however, fairly good. "We could for the first time cross broad, new ice. First I crept across on all-fours to test if it would hold. Then we went across in several places." Ferryings had to be undertaken over the broad leads, however, but the difficulties increase, as the ice is in lively movement. "It is fine to work the sledges onward through the middle of the crashing pressure-ice round about us. Sometimes a lead closes just when we need it, sometimes it opens suddenly the moment before or after a crossing. Fraenkel's sledge was badly broken and had to be repaired on the spot. I had diarrhœa badly, perhaps in consequence of a chill. In the evening I took both morphine and opium."

"When we awakened on *the 1st Sept.* we felt we wanted rest and repairs. The sleeping sack, etc. had to be mended, and we needed to be out of harness for a day. Everyone sewed, and we chatted, ate and drank. We were in the best of humours, especially when Strindberg announced that we were in 81° 16′ N. lat., and that thus we had been drifted rapidly southwards by the prevailing strong N.W. wind. We even took sandwiches and coffee with our bear's-meat dish at dinner. In the evening we sounded.

"We shall now try to keep day and night order. We have found that the last bear's-meat which had not been kept in water in any other way than by

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pulling the bear through the water was juicier than usual, and so, in the future, we shall treat all the bear's-meat in that way. Now in the evening, the *2nd Sept.*, the wind has swung round to S. 60° W., but, fortunately, is not very strong. I have now begun to use wool-and-hair stockings at night, and to-night for the first time I shall creep into the sleeping-sack top." During the night Andrée had to leave the tent on account of diarrhœa, and "then found a bear standing a little way off looking with open mouth at the camp. He seemed, however, to have found the matter suspicious, for he jogged away and so cheated us both of brains and kidneys, to say nothing of kidney fat and blood-pancake."

The 3rd Sept. At 10 o'clock the temperature has risen somewhat, so that it is only 27.7° F., but the south-easterly wind continues. The thickness of the ice is about the same as that of the previous days, viz. 3.3 ft.

The ice-floes were rather level and fairly free from great hummocks, although pressure was noticeable everywhere, and the ice was covered with fresh snow which made the work of pulling the sledges very heavy. Farther on in the day, however, the Expedition found itself surrounded by broad leads of great extent, and it was compelled to trust itself entirely to the boat.

"We succeeded in loading everything on it, and then rowed for three hours at a pretty good pace towards the Seven Islands (our goal). It was with a rather solemn feeling when at 1 h. 50 o'clk. (13 o'clock) p.m. we began this new way of travelling, gliding slowly over the mirror-like surface of the water between large ice-floes loaded with giant-like hummocks. Only the shriek of ivory gulls and the splashing of the seals when they dived and the short orders of the steersman broke the silence. We knew that we were moving onwards more quickly than usual, and, at every turn

of the leads, we asked ourselves in silence, if we might not possibly journey on in this glorious way to the end. We called it glorious, for the everlasting pulling of the sledges had become tiring, I fancy, the last few days, and it would be a great relief for us to travel some days in another way. But at 5 o'clk. our joy came to an end; we then entered a bay in the ice which, immediately afterwards, was closed by a floe, so that we could go neither onwards nor backwards. We were satisfied, however, for things had gone well; the boat was excellent, and there was room for all our luggage."

During the course of the day Fraenkel shot a bird, which was probably a young black guillemot and which Andrée describes in detail.

At 20 o'clock in the evening they encamp. The following remark by Andrée possibly refers to this evening: "We experimented with the Berossine chocolate yesterday, and it was found to make a very good chocolate if $2\frac{1}{2}$ oz. of it is boiled together with 10 cups of water and $5\frac{3}{5}$ oz. of the biscuit soup." During the night Andrée lay in a single blanket instead of a double one, but found it pretty cold.

"*4th Sept.* Strindberg's birthday. Festal day. I awakened him, giving him letters from his sweetheart and relations. It was a real pleasure to see how glad he was. To-day we have had some extra food on account of the day. The breakfast consists of bear's-meat beef with bread and Stauffer's pease soup with bear's-meat and bear's-fat. At dinner, fried bear's-meat, kept warm inside our waistcoats. Supper, bear's-meat, bread and goose-liver paste, Stauffer cake with syrup sauce, syrup and water, speech from Nils, Lactoserin chocolate. Strindberg kept his birthday by falling very thoroughly, sledge and all, into the soup. We had to pitch our tent after three hours' march, and then had a very troublesome and time-wasting business to dry him and his things. Much

of the bread and biscuits and all the sugar damaged, but we had to keep it in any case, and that was done by drying a part of the bread slowly and using it as before. The remainder was fried along with the bear's-meat and the sauce. The sugar was poured into the chocolate and coffee in its liquid form. The biscuit-mud was mixed with cold water, and then boiled together with the chocolate. It was a pretty big misfortune, but the worst is, that it makes life more uncomfortable for us." "The accident to Strindberg's sledge did not lessen our festal mood, but we were jolly and friendly as usual. The altazimuth became wet through with salt water, but was washed out with fresh water and dried, and did not seem to have suffered any damage. Strindberg's chronometer also seems to have escaped. Ivory gulls swarm around us and keep up an awful row." On the same day Andrée also writes: "On such a journey as this there is developed a sense both of the great and of the little. The great nature, and the little food, and other details."

On *the 5th Sept.* the three men started in the evening, in spite of their resolution to endeavour to keep day and night order. It is 25° F., and there is a faint westerly wind; the ice was fairly supportable, but the going was terribly heavy, and the leads were pressed together by a south-west wind.

"Animal life seems to be becoming richer. A bear had been close to us during the night. Twelve ivory gulls sat beside the tent on a piece of ice. Fraenkel shot three of them with a single shot. A little auk and two black guillemots visible. Half a dozen seals in the same soup, etc. After four hours' extremely fatiguing march we came to a broad channel which we could not pass, and so I determined to launch the boat and try to move on rowing. This was a fortunate determination, for we came more and more among divided ice, and we kept on rowing until

6.45 o'clock a.m. on the 6th, in a direction varying between S. 60° W. and S. 30° W. It was very refreshing to be able to use this way of travelling. The intervals between the floes were several miles wide, and only in part covered with ice-sludge, which was a good thing, for ice-sludge is a very tough mixture to row along in. We had no wind to struggle against, and rowed on without the slightest pause until, at the time just mentioned, we went ashore on an ice-floe to pitch our tent. Respecting the ice of the a.m., it is to be remarked that I measured one floe with a thickness of as much as 19.67 ft. below the water, and only about 19 in. above the water, and that, in the fracture of this block, one could see that although, apparently, it was homogeneous, in reality it was composed of pressed thin floes that had thus frozen together."

Andrée continues to describe his observations of the ice and his opinion regarding its formation, and notes that the ice-floe on which they encamp after the boat-journey had a length of about 330 ft. and a breadth of 248 ft., and that, round about, it had a border of a projecting edge, which extended 2 in. deep below the surface of the water.

When they awakened on *the 6th Sept.*, in the afternoon, after a long and strengthening sleep, the leads around the camp had frozen together, and they had terrible work to move 165 ft. to the next floe. The temperature was 21° F., and at first there was a fog, but of no great depth, for Fraenkel remarks "clear sky above." A little later it became entirely clear. When, after much trouble, they had crossed to the next floe the country was reconnoitred and they found that they might possibly advance in another direction than the one they had taken. So they turned back and then met a walrus, "whose noise and behaviour in other ways and whose habitus showed us that we had met 'the sea-serpent.' Consequently they were

walruses we had heard and seen all the way while up in the car-place.

After a short row we came into much thicker snow-sludge which, at last, became almost a yard deep, and in which the boat absolutely could not be forced forward. The situation became critical, but one of us succeeded in jumping 'ashore' and pulling the boat to where we had to stop and pitch our tent. This sludge is something fearful. It arises by cakes of thin newly-formed ice being pushed on top of each other, layer after layer, like tiles, or like cards in a pack."

The next day, *the 7th Sept.*, "we tried again and, after about 5 hours' work, we advanced about 1,100 yards on our course, but then we had to wait again. During the time we busied ourselves making a sail out of the bottom tarpauling of the boat, a helm of the shovel and the table. Our meat supply is beginning to come to an end, and we shoot two ivory gulls to supplement it. We do not like to shoot unless we can get at least two ivory gulls per shot. They are delicate birds, but I think they cost a lot of ammunition. For the last few days Fraenkel has had a pain in his left foot. I give him massage morning and evening and rub on liniment. To-day (9 o'clock p.m.) I have opened a large pus-blister, washed it with sublimate solution and put on a bandage. Now I hope it will heal, for it is hard for us to be without Fraenkel's full strength. This is more than needful with our trying work. Our attacks of diarrhœa seem to have stopped."

After the long notes quoted above, Andrée has entered a couple of incomplete notes, which are very difficult to decipher, respecting the position of the Expedition, and in this connection mentions that "we are probably more to the north than before, for we have had several days' wind, from directions lying in the neighbourhood of S.E.

This drift-path, which has been calculated on the basis of Strindberg's observations, entered in his log-book, shows that, from midday on the 6th Sept., during the *8th Sept.* and until the afternoon of the 9th Sept. the Expedition, in spite of its endeavours to come south-westward, had been carried some 18 miles by the ice-drift in a direction which was exactly opposite, *i.e.*, towards the north-east.

Immediately after the place-determination in question, Andrée continues, "just now I had to leave off writing, in order to fire a shot and drop two ivory gulls. Such birds always gather round our camp. Oh, if we could shoot a seal or a bear just now. We need it so much."

In the evening of *the 9th Sept.* the three men are ready to again attempt a march. The temperature is 29.8° F. and the south-easterly wind has a velocity of 16.5 ft. per sec.

"Fraenkel's foot is now so bad that he cannot pull his sledge, but can only help by pushing. Strindberg and I take it in turns to go back and fetch Fraenkel's sledge. This taxes our strength. We could not manage more than six hours' march, especially as the country was extremely difficult. Just when we stopped, I happened to fall into the water, for an ice-floe which, to all appearance and on being tested with the boat hook, seemed to be solid, and on to which I jumped, proved to consist of nothing but a hard mass of ice-sludge which went to pieces when I landed on it. I flung myself on my back and floated thus, until the others reached me a couple of oars, with the help of which I crawled up again, Hitherto I have had no idea that ice-sludge can appear in so many varying forms. It most frequently consists of thin cakes pushed up on top of each other, and these, naturally, possess a certain ability to float and to cohere, but little bearing-power."

As a result of this event, Andrée gives his opinion

as to the method of formation of the thin ice and of its importance for Polar ice in general. Then he adds: "large seals are swimming about in the water here, but we cannot shoot well enough to kill them on the spot, and if this is not done, they sink."

Then there are no more notes in Andrée's diary before *the 17th Sept.*

The wandering across the ice has become more and more difficult every day for the three comrades. Illness has attacked all three of them. Even if Andrée says little about it, it is clear that, in consequence of his diarrhœa and his bad foot, Fraenkel is much exhausted, and his power of resistance against fatigue greatly diminished. Although Strindberg himself has had a bad foot, he and Andrée have assisted their sick comrade to pull his sledge in their despairing efforts to reach the Seven Islands. When, in consequence of the ice-drift, they determined to alter their former course, Franz Joseph Land, towards the Seven Islands, it was done in the hope that the current would help them onwards. They were tired, but their strength was as yet unbroken. Since then, the forcing of the hummocky ice, the crossing of leads and pools of water, the cold, the forced rationing of food and the approach of the Polar autumn had greatly tried their strength. The worst was, however, that the ice-drift had not helped them onwards to their goal. From the 4th Aug. to the 9th Sept., in spite of their almost supernatural efforts, they have been carried about 81 miles towards the south-south-east, instead of an estimated equally long distance towards the south-west. The formidable power of the pack-ice has proved too much for their powers. Without one word of complaint, without a hint of uneasiness or of lost hope of rescue, Andrée leads his brave companions onwards, at the same time making his scientific observations and drawing deductions as to the ice and the other natural phenomena around him.

The three men still retain their good-humour, but it has turned hard and grim.

For the last few days before *the 9th Sept.* Andrée has not kept his diary as regularly as before, and now he stops doing so. Strindberg became silent long ago; he merely continues to enter a few scattered brief marginal remarks in his almanac. He has quite enough to do, too, in taking astronomical observations and calculating the result. And each time he finds the result it is only a fresh disappointment, and time after time their hopes of having advanced towards the south-west are shattered. Fraenkel alone continues with one or two meteorological observations daily.

Thus ends in Andrée's diary the second phase of the pilgrimage across the ice towards land, from the spot where the " Eagle " descended.

XII

CAUGHT IN THE ICE

"SINCE I wrote last in my diary, much has changed, in truth." These are Andrée's first words *on the 17th Sept.*, and he continues: "We laboured onwards with the sledges in the ordinary way, but found at last that the character of the new-fallen snow did not allow us to continue quickly enough. F.'s foot, which still did not allow him to pull, compelled me and Strindberg to go back in turns and pull forward Fraenkel's sledge too. One of Strindberg's feet was also a little out of order. Our meat was almost at an end, and the crossings between the floes became more and more difficult in consequence of the ice. But, above all, we found that the current and the wind irresistibly carried us down into the jaws between North-East Land and Franz Joseph Land, and that we had not the least prospect of reaching North-East Land. It was during the 12th and 13th Sept., when we were obliged to lie still on account of violent N.W. wind, that we at last discovered the necessity of submitting to the inevitable, *i.e.*, wintering on the ice. Our position is not specially good."

From the account already given it is clear that the drift of the ice has overpowered the three men. In spite of all their efforts they have been unable to make their way onwards in the direction they wished. For two long months they have struggled forward amid the ice, first towards their large depôt on Franz Joseph Land, and then towards the smaller one on the Seven Islands. In neither effort have they been successful. Now they stand, worn-out and ill, with

insufficient supplies of food, with broken sledges and worn-out clothes, face to face with the necessity of surrendering themselves to the mercies of the pack-ice at the beginning of the Polar winter. They are caught in the ice and delivered into the hands of a drift which is governed by wind and wave. But they do not relax their efforts in this extremely critical situation. They endeavour by every means in their power to take such steps as will enable them to support life. They have no idea whither the ice will carry them during the coming months. The only thing they know is, that they are drifting down towards the sea between North-East Land and Franz Joseph Land.

After the 9th Sept. Andrée ceased for a week to make any notes. On the 10–12th Sept. the three men must have continued their endeavours to penetrate towards the south-west. On these days there blew a fresh north-easterly wind, which possibly gave them the hope that the current would carry them in the right direction. But strangely enough, according to the place-determinations, they have been carried towards the north-north-west instead. In the evening of the 11th, however, the wind swings round to a hard north-west and the temperature falls to 17.6° F. On the 12th and 13th Sept. the velocity of the wind increases to 33–46.2 ft. per second, and the temperature is still low. As was just stated by Andrée, the Expedition must have lain still these last two days on account of the storm. In Strindberg's memorandum-almanac there is a note for the 13–15th Sept.: "Stopping on account of bad weather and snow." When the determination was come to that the Expedition should remain on the pack-ice, the three men first of all chose a suitable place for wintering on, for they lay on a low and little floe full of fresh-water pools, which showed that it was composed of small fragments which would easily fall to pieces when spring came. Their first step, therefore, was to make their way across to a neighbouring floe which was

larger and stronger, and richer in hummocks than the one on which they were for the moment. "We came to the new floe by rafting with the boat, and soon found a suitable building-plot consisting of a large piece of ice which we hollowed out to some extent. The sides and the parts that were wanting we supplied by filling up with blocks of ice and snow, over which we threw water and this made it solid and durable."

On *the 15th Sept.* it still blew a hard north-north-west and the temperature was 25° F. The skies were quite covered with clouds. On that day "we at last succeeded in getting a seal, as I had the luck to put a ball right through its head, so that it was killed on the spot and could easily be brought 'ashore.' Thanks to this we had tolerably large rations for the next three weeks. We ate all the seal except the skin and the bones. I do not except the stomach and the contents of the stomach, and the intestines and the liver. But the contents of the stomach consisted of hardly anything else than empty (Cretacean) shells of the same animal that had stopped up the hydrogen-gas apparatus.[1] Every part of the seal tastes very nice (fried). We are especially fond of the meat and the blubber. May we but shoot some scores of seals so that we can save ourselves! The bears seem to have disappeared, and of other game there are visible only ivory gulls, which, it is true, are not to be despised, but which cost too much ammunition. The ivory gulls come and sit on the roof of the tent. Remarkably enough, the fulmars seem to have disappeared, and of other birds, only a little auk or possibly a young black guillemot have been visible during the last few days. Fraenkel's foot is better now, but will hardly be well before a couple of weeks. Strindberg's feet are also bad. I have made in order a landing-net to catch plankton, or anything else that can be found in the water; we shall see how it succeeds; a fortunate result of the attempt may, I think,

[1] This refers to the hydrogen-gas apparatus at Danes Island.

somewhat improve our difficult position. Our humour is pretty good, although joking and smiling are not of ordinary occurrence. My young comrades hold out better than I had ventured to hope. The fact that during the last few days we have drifted towards the south at such a rate contributes essentially, I think, to keeping up our courage."

For, since the 12th, they have drifted not less than 45 miles south-south-eastwards, *i.e.*, the average speed has been about 1.2 miles per hour. In consequence, Andrée writes: "Possibly we may be able to drive far southwards quickly enough, and obtain our nourishment from the sea. Perhaps, too, it will not be so cold on the sea as on land. He who lives will see. Now it is time to work."

The day has been made remarkable by the additional fact "that we have seen land for the first time since the 11th July. It is undoubtedly New Iceland that we have had before our eyes."

New Iceland is White Island.

The 17th Sept. In the forenoon they took the bearings of the island, of which Andrée makes a drawing. The island is then at a distance estimated at six miles. "Large glacier blocks are visible in front of and along the glacier. The upper border (was) very even, and the arching of the island not broken by any tops. Its appearance is shown by the appended drawing.[1] There is no question of our

[1] Eleven months after Andrée had written these lines regarding White Island, a Swedish expedition under the leadership of A. G. Nathorst passed by the island along almost the same path as that over which the three men drifted. Nathorst gives the following account of the island—whose secret none then dreamed of—which is in entire agreement with Andrée's:

"In the morning of the 18th August there was visible forward a peculiar vaulted light, which seemed to resemble land, but we had been so often deceived that, at first, we did not know what to believe. In the forenoon, however, this patch of light seemed to be really like land and was then photographed by Hamberg; we thought it was Kjeldsen's White Island, at the base of which there is visible a glacier-foot. Afterwards the weather became misty, and now the glacier

attempting to go on shore there, for the entire island seems to be one single block of ice with glacier-towers. But it seemed to be not altogether inaccessible on the east and west points. We saw a bear under the land, and in the water I saw a couple of flocks (of four) of those 'black guillemot youngsters'." "Our arrival at New Iceland is remarkable, because it points to a colossal drift, viz. of more than one degree of latitude since the 12th Sept. If we drift in this way some weeks more, perhaps we may save ourselves on one of the islands east of Spitzbergen. It makes us feel anxious that we have not any more game within shooting-distance. Our provisions must soon and richly be supplemented if we are to have any prospect of being able to hold out for a time." They see nothing around them but a couple of little auks, ivory gulls, ten at a time, and seals, but the latter "were greatly afraid." No walrus appears, and the water seems poor in small animals, for dragging with the landing-net gave no result.

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had the appearance of actual land, far away, while the vault of light, then, should be the clouds above it. But when it cleared up still more between 11 and 12, it turned out that our first opinion was correct, and wonderful was the picture that appeared before our eyes. We had in front of us a dazzlingly white island, rounded like a shield, consisting entirely of snow-covered glacier-ice which, on the shore, terminated in a perpendicular glacier-foot. Not a single mountain-top lifted itself above the covering of ice; the ice was dazzingly white from its summit to its foot; it was as though one had caught a glimpse of the Antarctic continent, although in miniature. A bank of mist lay the whole time over the island, the highest part of which was lost in the cloud, without allowing any definite distinction to be drawn between the two. Once or twice the sun was seen to shine through the openings in the clouds above the white covering, and the small, dazzlingly white patches told us that the view of the whole island in clear weather must be indescribably magnificent. But I am afraid that this seldom occurs; and to-day the weather was winter-like, with gusts of snow. We went up towards the island, following the east coast northwards. Here and there, immense fissures were visible in the ice which allowed us to surmise that the under-lying rock was uneven. The glacier-foot was equally precipitous everywhere, and no landing could be thought of."

The 18th Sept. In Sweden on that day there was celebrated the 25th anniversary of King Oscar II's ascension to the throne.

" Jubilee day was a lucky day for us. The weather was beautiful and our work went on quickly. I had succeeded in shooting another seal, this time with small shot. He was not quite dead, but we got him in any case. Afraid that he would give out all his breath at the last minute and go to the bottom, I gave him a new small-shot cartridge in the back at very close quarters. The small shots were afterwards found between the blubber and the flesh and, consequently, had not had any deadly—if even damaging —effect. Then I cut up the seal and found among other things that the bones of the skull are as thin as eggshell, so that it should be possible to kill a seal easily with small shot in the head. Of the inner parts of the seal we have now tried and eaten the following: the brain, the intestines, liver, lungs, meat, blubber, kidneys, heart, stomach, contents of stomach, blood. We had the Swedish flag hoisted, and finished the day with a ceremonial meal." According to Strindberg's log-book the menu was:

" *Banquet,* 18 *Sept.* 97,
on an ice-floe immediately east of (White Island)

Seal-steak and ivory gull fried in butter and seal-blubber, seal-liver, —brain and kidney. Butter and Schumacher-bread.

Wine:

Chocolate with Mellin's Food-flour and Albert biscuits and butter.
Gateau aux raisin,
Raspberry syrup sauce.
Port-wine 1834 Antonio de Ferrara, given by the King.
Speech by Andrée for the King with royal Hurrah!
National Anthem in unison.
Biscuits, butter, cheese.
A glass of wine.

Festive feeling.
During the day the Union-flag floated above the camp."

"The general feeling was one of the greatest pleasure, and we lay down satisfied and contented. We had had New Iceland in sight all day westward of us, and had thus drifted to its eastern side. The upper contour of the island was rounded like a loaf from that side too, and the shore consisted of the edge of a glacier. We were within 1,100–2,200 yards of this edge." Strindberg measures the height of the island and takes the bearings of its southern and northern points, to be able, by taking new bearings the next day, to determine if they had drifted. It is now evening and 25.5° F., and faint north-north-westerly wind.

"Sunday *the* 19*th*. Yesterday seems to have been the first link in a series of Jubilee days, for to-day we have succeeded in increasing our supply of provisions so much that it will last until the close of February. I managed to shoot two seals (small shot No. 00) and one great seal (ball) to-day. I cannot describe how glad I felt and how pleased my comrades seemed to be, and how they looked forward to the future with hopes considerably strengthened. The greater part of the day we were busy cutting up, etc.,—the running off the blood and storing it playing a very prominent part, for we have found that Fraenkel can make excellent blood-pancake of seal-blood (10½ oz.) and seal-fat (5¼ oz.) cut into small pieces, and 1 oz. flour with a pinch of salt and a pinch of yeast-powder. In addition we have discovered that the weight of this mixture is not notably diminished in the frying, as is the case, on the contrary, with meat, whose weight when ready is reduced by about one-third of the raw weight. Finally, the pancake does not produce that loathing which was experienced for the first few days a couple of times by Strindberg and me, when we ate seal-meat and blubber. It seems as though, to a certain extent, the pancake supplies the want of bread. The best variation, however, is given by the ivory

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ANDRÉE (*left*) AND FRAENKEL (*right*) WITH THE SHOT BEAR

From a film taken by Strindberg in 1897 and developed in Stockholm in 1930

Copyright Swedish Geographical Society

BREAKING CAMP

To the right Andrée and Fraenkel with the upturned boat.

From a film taken by Andrée in 1897 and developed in Stockholm in 1930

gulls, of which to-day Fraenkel has shot one and Strindberg four with two shots. We still drift, but, as it seems, slowly, for to-day we still have White Island in sight, our bearings for the day being, on the average, N. & W. for the different extremities. It presents a charming view in the sunshine which illumines the glacier both from the edge and from above, thus giving the island the appearance of being transparent. The edge of the glacier contains very blue glacier ice and also brown sections. Of surface moraines there is no trace, and the only dark patches one can discover are shadows. These, together with the formation in general, show that the ground beneath the glacier is not altogether level. Large glacier-calves float round the island, or stand there aground. We photographed the island. To-day Strindberg has been very busy house-building, in accordance with a method he has invented. This consists of snow and fresh water being mixed, after which the entire mass is built up into a wall and allowed to freeze. The work is both solid and neat. In a couple of days we shall probably have the baking-oven (*i.e.*, the sleeping-room) ready."

The wind had now swung round to southerly, but the temperature had fallen to 21.6° F. At 15 o'clock in the afternoon it was clear enough to allow Strindberg to take a place-determination.

"*The 20th Sept.* turned out to be a regularly unlucky day. The cooking apparatus (Primus stove), which had hitherto not troubled us much, became at once mutinous and refused to do service. The soup stood there mixed but could not be boiled. Great sensation. Fraenkel did this and that and experimented with blubber lamps, but got so little heat that he thought it best to take the unburned fat out of the lamp and cut slices out of it, which he laid on Schumacher's bread and offered us. That was satisfactory, for it tasted splendid—it tasted just like bacon and bread, and we

ate it willingly. By and by I succeeded in getting the apparatus so far in order that we managed, though with some difficulty, to boil the soup so that it could be eaten. It contained 1.3 lbs. seal-meat, 5½ oz. seal-blubber, 2 oz. Mellin's Food and the rest water. After it had been boiled we ate it with an appetite. The seal-meat seems almost to melt away on boiling; after boiling a few minutes it becomes exceedingly tender and delicate. Just when we had finished the meal and that untiring architect Strindberg had gone back to building, he cried out 'A bear!' Fraenkel and I, who were still busy with our cooking apparatus difficulties, hurried out and then had the pleasure of seeing a magnificent bear quite near us. Strindberg and I were a little eager, I suppose, for each of us missed, while, on the contrary, Fraenkel with his shot gave the bear his death-wound. Great joy. We had increased our supply of food until on in April—to the close of winter—and in addition had obtained a magnificent skin. The bear is the Polar traveller's best friend. He had come to us from a distant little floe 660–990 ft. away, swimming over a water so frozen that when we afterwards rowed out to it, we had to force our way through the ice with oars and shovel. When he was shot he had just drawn back to his lead, but I suppose he did not like to go in again and swim the long way back, for he turned towards Fraenkel and seemed ready to make an attack. When shot he slipped down backwards into the water and at once gave up the ghost. We pulled him 'to land' by means of a grapnel, then we got a noose around his neck and a hind paw and then easily got him out of the water. Our joy was great, for the bear was a big and magnificent animal. He was treated accordingly, was given a noose around each front paw and one round the neck, so that, when being pulled along, he glided along hair downwards, and was drawn amid hurrahs to the camp. There Fraenkel and Strind-

berg rapidly carried out the first part of the cutting up, while I returned to my tinker's employment."

Before the bear was cut up and Andrée returned to his work, however, the three comrades had been out among the thin ice to fetch a large and peculiar bird which Andrée had shot after having been seen a couple of times. He gives a detailed description of the bird, which Strindberg and Fraenkel consider to be "only a young ivory gull, and perhaps they are right."

All the while, White Island could be clearly seen in the north, for they had now driven to the south-eastern side of the island.

On preparing the supper they had renewed trouble with the cooking-apparatus, although not so much as before.

"We got bear-steak and the bear-blood pancake ready (10 oz. bear-blood, 7.4 oz. bear-kidney fat, ·37 oz. flour, salt and yeast-powder, a pinch of each). The latter, however, under extremely exciting circumstances. More than half the mass (the lower) was solid, but the upper part was in a very fluid condition. The apparatus went out! Strindberg with uplifted matches. Fraenkel ploughs bottom-furrows in the pancake in order to get the fluid part to run down to the bottom and there solidify somewhat satisfactorily. The pancake was torn into pieces and turned as quickly as possible, and so on, the final result being a delicate cake. Then the cooking-stove went out. But we had not had coffee, and we wanted coffee, and so the bother began again. Now all three of us were at work. Fraenkel held the cooking-stove. Strindberg held the matches ready, I stirred and managed the cleaning-needle, and so we went on making the coffee with increasing (lessening) hopes, which at last were crowned with excellent coffee. To-morrow we shall try to find out what it is that troubles the cooking-apparatus. It was most unlucky

that the reserve-parts for this were not brought with us from Pikes House! We have now so much meat, blubber, etc., that it is difficult for us to protect it well during the night in the event of visits from bears. We pile it up near the edge of the tent, and fence it round with all other kinds of things. The question of getting the house in order is becoming a burning one here, in the cold. During the last two days the weather has been very pleasant, but, on the other hand, they have not passed without signs of differences arising between us. I hope, however, that this seed will not grow and develop."

The 21st Sept. The three comrades were tired after the preceding long working-day and not much was done. Strindberg and Fraenkel worked at the house, Andrée cut up the seal and shot three ivory gulls. The cooking-apparatus was repaired, after it was found that the cause of the trouble were impurities in the burner, and then they made seal-blood pancake of frozen blood, salt water, bit of meat, seal-blubber, a pinch of yeast-powder and another of salt. "It tasted excellent," thought Andrée.

The 22nd Sept. The temperature remains at the same height as during the preceding days—28.4 F., but during the day the wind swung round from north-east to south-south-east. The thickness of the ice was measured at a different place than before and was found to be greater, as it amounted to 5.6–9.9 ft. The fog and the misty air continue, so that Strindberg is unable to obtain reliable latitude-determinations of the positions of the camp and White Island. "Clear weather here seems to be rare," says Andrée. The patchy black guillemots and the ivory gulls were frequently seen and several specimens were observed of the ivory gull youngsters. Strindberg shot a seal with small shot, and a couple of ivory gulls too were dropped. The party had to be careful with its shooting, however, for they miss the seals pretty often, as

the animals do not, as a rule, come so near that they can be hit in the head with small shot.

Like an omen of coming misfortune, "we were disturbed during the night by hearing the floe break, as we thought, right under the building. We were afraid that we had run aground, but our bearings have shown that we are moving, although we seem unable to get away from this island. Probably we are lying in some kind of backwater which the current from the north creates at the S.-eastern and S.-western corners of the island and its southern side."

The 23rd Sept. The temperature has now fallen to 24.8° F.; the sky is covered with clouds as before.

"To-day all three of us have been working busily on the hut, cementing together ice-blocks. As mortar we employ snow mixed with water, and of this mass, which is handled by Strindberg with great skill, he is making a vaulted roof over the last parts between the walls. We have got on very well, and the hut begins to take form a little. After a couple more days of such weather and work it should not take long before we are able to move in. We can probably carry our supplies in there the day after to-morrow. This is very necessary."

"We have now a very good arrangement of the day with 8 hours' work, beginning with 3 hours' work, after which breakfast ¾ hour and then work until 4.45 o'clock, when we take dinner and supper at one meal."

They have also tried the meat of the great seal and have found it excellent. One of the best improvements in the cooking is that of adding blood to the sauce for the steak. This makes it thick and it tastes as if they had bread. Andrée considers that blood contains much carbohydrate, for their craving for bread is considerably less after they began to use blood in the food. Of bear, great seal, seal and ivory gull they have found every part eatable, excepting

bear-liver of course. For want of time they have not yet cut up and weighed the animal they have killed, but Andrée thinks that they now have meat and ham until on in the spring. They must, however, shoot more to be able to have larger rations and to have more material for fuel and light.

Now six days pass without Andrée making any notes. When, *on the 29th Sept.*, he once more takes a pen, the Expedition is still on the south side of White Island. The leads have now closed and so the seals have disappeared. The polar bears, on the contrary, have increased in number. On the 27th—when the weather was mild and when it even rained for the sake of a change—and during the night before the 28th, two bears had visited the camp. "These night-bears seem to be a kind of thief-bears. The one that visited us yesterday night dragged away our big seal twice, and we should have lost it had not Strindberg succeeded in coming so near the bear as to frighten him and making him drop his booty. I tried to hunt a bear in my stocking-feet but did not succeed. This morning, just as we came out, Fraenkel saw a bear which we succeeded in enticing to us who were waiting behind our hut. Strindberg shot him through the throat and he fell down at once, but after some moments he rose again and began running, pushing his fore-quarters in front of him along the snow. I then gave him my shot, which laid him on his hind quarters, but this induced him to fresh efforts and he began to run. F. at last got his shot into him and then the bear lay there in a pool, after which we hauled him up amid hurrahs. It was a big old he-bear."

It awakened great apprehensions when they found that the floe on which they had built their winter quarters began to grow less in the immediate neighbourhood of the hut. The pressure of the ice, too, drives them nearer and nearer White Island. A large,

old line of hummocks separates them from the shore, and Andrée hopes that this wall will prevent a continued pressure of the ice. "This sounds magnificent when there is pressure, but otherwise it does not appeal to us."

On the 28th in the evening, the Expedition moves into the hut, which is christened "The Home." They were pretty comfortable the first night they spent there, but they hoped it would become much better. They were obliged to keep their stock of meat inside the hut during the night to protect it against the bears.

There are no notes in Andrée's diary for *the 29th and 30th Sept.*, but from Fraenkel's meteorological journal we know that then the temperature fell so that in the afternoon of the 30th it was less than 17.6° F.

Then comes *the 1st Oct.* During the afternoon the temperature falls to 14° F. It was a good day. "The evening was as divinely beautiful as one could wish. The water was alive with small animals and a bevy of seven black-white guillemot youngsters was swimming there. A couple of seals were seen too. The work with the hut went on well, and we thought we should have the outside ready by the 2nd. But then something else happened. At 5.30 o'clock in the morning we heard a crash and thunder, and water streamed into the hut. And when we rushed out we found that our large, beautiful floe had been splintered into a number of little floes, and that one fissure had divided the floe just outside the wall of the hut. The floe that remained to us had a diam. of only 80 ft., and one wall of the hut might be said rather to hang from the roof than to support it. This was a great alteration in our position and our prospects. The hut and the floe could not give us shelter, and still we were obliged to stay there for the present at least. We were frivolous enough to lie in the hut the following night too. Perhaps it was because the day was

rather tiring. Our belongings were scattered among several blocks, and these were driving here and there, so that we had to hurry. Two bear-bodies, representing provisions for 3–4 months, were lying on a separate floe, and so on. Luckily the weather was beautiful, so that we could work in haste. No one had lost courage; with such comrades one should be able to manage under, I may say, any circumstances."

With the catastrophe early in the morning of the 2nd Oct. there is concluded the last phase of the ice-wanderings of the Andrée Expedition. They have maintained themselves on the pack-ice since the 14th July. During this period the three men tried for many days to wander towards Franz Joseph Land, and then for many days towards the Seven Islands. The ocean current had placed insurmountable hindrances in their road, which had prevented them from reaching either of their goals. Ever since the moment they sprang from the car of the "Eagle" and placed their feet on the ice they had been the prisoners of the ice. But it was not until after a struggle lasting many weeks that they were defeated and were obliged to surrender. Now the ice-floe on which they intended to spend all the winter, or a great part of it, had broken and lay splintered around them. "The Home" was in fragments, and their belongings were scattered. "Exciting situation," are the only words Strindberg writes for the 3rd and 4th Oct. No one loses courage. Such men can manage under, we may say, any circumstances. White Island with its shield of ice lay before them!

XIII

ON WHITE ISLAND

By Professor Nils Lithberg

"Our ice-floe has broken during the night close to the snow-hut." This is the laconic note made by Strindberg in his almanac on the 2nd October respecting the tragic end of the hopes attached to the hut on the ice-floe, a hut, the drawings of which he had made and whose builder he had been.

Andrée describes the event in somewhat greater detail. "At 5.30 o'cl. in the morning of the 2nd, we heard a crash and thunder, and water streamed into the hut, and when we rushed out we found that our large, beautiful floe had been splintered into a number of little floes, and that one fissure had divided the floe just outside the wall of the hut. The floe which remained to us had a diameter of only 80 ft., and one wall of the hut might be said rather to hang from the roof than to support it."

The situation being what it was, it is clear that there was nothing else to be done than to remain in the hut during the night between the 2nd and 3rd October, even if Andrée himself designates this as evidently a frivolous action. We do not know if by these words he refers to any specially dangerous episode occurring in the ice-hut during the night, but for the 3rd and 4th October, Strindberg has written in his almanac: "exciting situation." Events now seem to have developed in quick succession. On the 5th October Strindberg writes: "moved to

shore"; for the 6th: "snowstorm, reconnoitring,"[1] and for the 7th: "moving."

The remarks by Andrée's own hand fail us here. When the scattered relics of his body were discovered by the crew of the "Bratvaag," there were found, among other things, in the left inside pocket of his jacket a memorandum-book and a lead-pencil. This book contains the last notes written by his hand, but unfortunately they have come to us in a very fragmentary condition. The place where Andrée sank into his last slumber, and which was marked merely by the clothes that had covered the upper part of his body, lay so high up against the slope of the cliff that the ice which covered them has certainly melted several times during the 33 years that have elapsed. As a result, the book has been incessantly exposed to the action of the air and the summer heat, and mould has grown richly from the glue of the covers of the book. In consequence, only the outer edges of the pages have been preserved, while the parts of the leaves lying towards the back of the book have become in many places entirely pulpified. In spite of the extreme care that has been devoted to preserve the written parts, it has not been possible to save more than a few fragments of Andrée's last words to the coming generations, and these fragments it has been difficult to decipher. And these last words have not been many, for the text embraces no more than 4½ pages. His notes appear to have ceased entirely shortly after the landing on White Island on the 5th October.

Highest up on the first page there seems to have been the number of the year 1897. The text on this page appears to refer to the events on the ice-floe. The first line ends with the word "cutting-up," and thus speaks about work carried out on some hunting-

[1] The Isbjörn Expedition, in its statement to the Press, gave this word as "Resignation."

booty. Two lines lower down can be read: "The hut hung," which can hardly refer to anything else than the position, already mentioned, when the ice-floe broke. In addition we find "field-glass (?)—observation" and "the lowland"—notices which we may suppose deal with an orientation made from the ice. Finally, last on the page, there is the word "island," and this can refer to nothing but White Island.

On the following page mention is made of the morning of the 5th, and as the page begins with the words "in the evening 5," this should seem to mean the time when the notes were made. It is the day when Strindberg states that the moving to shore took place. This is in good agreement with the statement in the text found lowest down on the page, that they had christened a place—undoubtedly situated on White Island—by a name of which we can now merely distinguish: "M . . . place." There is something tragic in this lost text. How grand would it not be if we were now able to give to a place on the map of the world the name it received on the occasion of the first landing which, as far as we know, has ever been made by any geographical explorer on White Island—the landing made by Andrée and his men on the 5th October, 1897! Besides this, mention is made on this page of the book of "glaciers and northern lights."

The following page is dated the 6th, and the 2½ pages of the text of the Diary which now remain have, consequently, described the events of the day or days immediately after the moving to land. On the third page, mention is made of heavy wind. In addition, the text seems to have contained notices concerning the physical features of the island, as mention is made of "stone-brash," "gravel" and, possibly, "great ridges." The page concludes with this text: "in darkness . . . in the snow-hut . . . (t)ransport of the goods . . . neighbourhood. This

was . . . (d)one." We remember that, in his almanac for the 6th October, Strindberg has noted: "Snow-storm, reconnoitring" and, for the next day: "moving." Under such circumstances we seem entitled to give the following reading of the fragmentary text:—Amid heavy wind with mingled snow and rain they have reconnoitred the ice-free south-west point of the island, and have found that the ground consists of stone-brash and gravel. Down by the shore the sledges still remain drawn up to the spot where the landing took place. They have, however, found a place higher up on shore which has been chosen as the camping-place—evidently the same which was found by the "Bratvaag"—and there they probably prepare, or work at, the construction of a snow-hut. Then the goods are transported from the shore to the immediate neighbourhood of the camping-place. It seems most probable that this is the "moving" noted by Strindberg on the 7th Oct. that we meet in the fragmentary text at the bottom of page 3.

On the following page mention is again made of the glaciers. And, at the bottom, there is an evident reference to the ivory gulls in the following text—with one or two proposed interpolations—". . . and intestine . . . envious now give . . . impression (not of) innocent white doves but of (real) carrion birds." This is the last of the many observations on natural features written by Andrée during his life.

We have now reached the last page of Andrée's Diary notes. Although not more than half of the side has been written on, still, from our point of view, it is the richest in contents, for here mention is made of "the tent" and "the hut," and then the notes conclude with the following lines: "drift-wood . . . to move about a little . . . (p)ermits." The contents of this seem to have been: the weather is bad and they fear they will be obliged to keep within the tent the whole day. It is evident that they are planning,

perhaps are even engaged on, the task of building the before-mentioned hut which is to give them better protection than the weak tent. Finally, they intend to collect drift-wood so as to be able to move about a little within the little space afforded them. The possibility of obtaining exercise is, of course, of great importance if they are to keep heart. So far the Diary. We now know that a hut was never erected, and that the tent mentioned on the last page of the Diary was evidently the same as that, the remains of which were discovered round about Fraenkel's remains on the occasion of the visit of the "Isbjörn" on Sept. 1, 1930. In the neighbourhood of this spot there was also found drift-wood which had evidently been carried there and piled up. It is not possible to state with exactness the day on which Andrée laid down his pen for ever. To judge by all appearances, however, his notes did not extend beyond the first week in October.

What has now been given is all that we learn respecting the arrival of the Andrée men at the place where they were to meet their final fate, the place where they were to remain hidden from the world for one-third of a century. There remains only one more word from the three. It is that written by Strindberg in his almanac on Sunday, the 17th: "home 7.5 o'cl. a.m." But from that moment there is nothing but inexorable silence; the whole desolate silence of the Polar world has enclosed the three heroes in its icy embrace. What time passed before it put an end to their existence?—It will never be possible to give a precise answer to this question.

It is not much that these comrades themselves have to tell us respecting the last phase of Andrée's Polar Expedition. What happened on the 2nd October seems to have been a catastrophe. On that day the notes in Strindberg's observation-book cease. One may object that, after the landing on the 5th, no fresh

observations were necessary; their position had now become fixed, but on the 3rd Oct. all Fraenkel's notes in the journal of meteorological observations he had hitherto kept come to an end. By a freak of fortune, Andrée's first Diary ends at the same time. Strindberg has made daily remarks in his almanac up to the 7th Oct., and Andrée has continued his description of the lot of the Expedition to about the same date.

On Tuesday the 5th the party has succeeded in landing on White Island. They stand on solid earth for the first time since the 11th July. The next day comes the first snowstorm, yet they do not capitulate to fate, but still try to place their hopes on the future, and they reconnoitre, although they know with certainty that they are now imprisoned in one of the most inhospitable tracts of the Polar world. The very next day—it is now Thursday—the 7th, they move the sledges with their supplies higher up the shore to where they have pitched their tent, and they prepare to build a hut and to collect drift-wood for the winter. Then their voices become silent, to be heard only once more in Strindberg's short note on the 17th. Has the situation, from being "exciting," as Strindberg expresses himself, developed into one that is serious, so serious that it has made them lose heart? This is the great note of interrogation at the close of Andrée's, Strindberg's and Fraenkel's journey, but, strictly speaking, it is, too, the last and the only one. If a vague answer to this query is anywhere to be obtained, it must be sought for in the remains of the camp that have now been brought back to Sweden.

. . . . . .

White Island forms the easternmost edge of that island-world which is designated by the name of "Svalbard" [the ancient and now resumed Norwegian name of the Spitzbergen group of islands]. According to information given by Peder Eliassen, captain of the "Bratvaag," as good as the whole of the

island is covered by an ice-cap, the height of which amounts to 200–300 metres above the sea. Only in two places can naked ground be seen; one of these lies on the north-east side of the island; the other in the south-western corner. The naked land at the place last mentioned extends along the coast for a distance of several kilometres. It rises from the shore towards the ice-cap, where the height of the land may be estimated at 40–50 metres above the sea. The breadth of the island varies. At the spot where Andrée's camp was found it is a couple of kilometres across; about the middle of the naked stretch of land a point projects into the sea. The ground consists partly of solid rock, covered here and there by blocks of stone, and partly of sand and gravel. On the level part there rise a few low mounds of rock. On the occasion of the visit of the "Bratvaag" on the 5–6th Aug., there lay here in a few places caps of snow or ice. Such a crust of ice existed at Andrée's camp. It lay in the shelter of the edge of a shelf of rock which rose about 3 metres above the ground below; in form it was round, with a few projecting tongues. Its length was about 40–50 metres. Its greatest thickness then was probably about 2 metres, thinning off towards the edges. The surface consisted of a layer of ice about 1 inch thick, but the mass formed one hard, opaque sheet of ice.

This shore is everywhere low, so that it is possible to land almost anywhere there. Immediately below the camp-place the landing possibilities were especially favourable. At one spot there was a little bay where a boat could land. Here the edge of the rock runs down to the shore, and close to the bay lies a piece of solid rock which rises about one metre above the surface of the water with a perpendicular face towards the sea. Here the depth is about one metre. Eastward of the bay, too, there is a similar piece of solid

rock, and in these two places it is an easy matter to make fast to the rock and carry things ashore.

The finds made by the vessels "Bratvaag" and "Isbjörn" during the latter part of the summer of 1930, enable us to draw pictures of the scene displayed by the island during the days or weeks immediately following the landing of the Andrée men. A detailed account of the contents of the camp will be given in a later chapter, where those who wish to investigate special parts of the epilogue of the Andrée Polar Drama will find technical descriptions of finds and facts. Here we shall give in advance an account of such dry estimates, and endeavour to give the reader some idea of the material we have at our disposal when we attempt to dispel the darkness of the tragedy which is veiled by the growing gloom of the October nights on White Island, 1930.

The first object found by the sealers of the "Bratvaag" was a piece of a cooking apparatus, lying down by the beach. On searching higher up, something dark became visible among the ice, and, on going to the place, the men saw the canvas boat of the Andrée Expedition. It was here the camp-place lay about 200 metres from the shore, and the height above the sea was estimated at about 10 metres. Near the south-east side ran a rocky border which rose in three ledges up towards the place where Dr. Horn afterwards raised a cairn. The situation of the cairn is about 10 metres higher than the level spot below. It was against this edge of rock that the ice-cap, mentioned above, had been deposited. This covering, which, on the visit of the "Bratvaag," still had a diameter of 40–50 metres with a greatest depth of about 2 metres, had, when the "Isbjörn" arrived, melted to such a degree that its length in a S.E. direction was about 30 metres and its breadth from west to east about 10 metres. Its greatest depth then was estimated as being a little more than half a metre,

a thickness which was found a little way below the edge of the rock.

When the men began to hew the canvas boat free from the ice, it proved to be lashed fast to a sledge which stood with its head pointing N., *i.e.*, inland. Close by, the "Bratvaag's" crew found another sledge, which lay with its head towards the west, *i.e.*, also turned inland. Later, the "Isbjörn" found the third sledge, which lay turned towards the N.W.

On the ridge of rock which bounded the place to the S.E., the "Bratvaag's" skipper found a number of articles of clothing, which afterwards proved to have come from Andrée's dead body. At the same place, and by the same men, there was found a four-sided "enclosure" which, to the S.E., was bounded by the rock-wall; on the N.W. by a bone of a whale, and, on each of the other two sides by stocks of drift-wood. Inside this square there was found at the same time a man's skeleton, which, on examination, was discovered to be Fraenkel's. The comparison between the sketch-maps from the "Bratvaag" and the "Isbjörn" which was made at Tromsö by representatives of each Expedition showed that Andrée's remains, too, must have lain within the enclosure.

According to the unanimous opinion of the crew of the "Isbjörn," the task of the whale-bone and the stocks of drift-wood had been to hold fast a tent-cloth; they had been laid on a skirt of the latter, which they had loaded down so that it should not be blown away by the storm. No proper tent-cloth was observed, but what was found is stated to have been balloon-cloth or oiled tarpauling. Here and there within the square were found a number of pieces of wood which seem to have been employed as a substructure for the tent-floor. Here and there were also found remains of some kind of red-rubber cloth, which was considered as having formed the bottom of the tent. This description given by the sealers agrees very well with

the account given by Andrée of the Expedition's tent, in which he says that the tent was made of balloon-silk. The floor was of a trebly varnished silk, the other parts of silk had been varnished but once. The whole was sewn together in such a way as to form a kind of sack. The whole weight of the tent amounted to 5.3 kg. According to the accounts of the Expedition which are still preserved, a calico model had been made by C. G. Rylander of Stockholm, evidently in accordance with special instructions given by Andrée, and the actual tent had afterwards been made of varnished balloon-cloth. In addition there were found within the square two bamboo-poles, one about two metres long, the other about three metres. These were supposed to have been tent-poles.

It was about in the middle of the tent that Fraenkel's remains were found, and behind them, close to the north-eastern wall, lay a sleeping-sack of reindeer skin, frozen and wrinkled. It was on the low ridge of rock just above the sleeping-sack that the " Bratvaag's " people found Andrée's body. Andrée and Fraenkel had thus expired within the tent, lying at an inconsiderable distance from each other; they had been lying on the floor of the tent, and the sleeping-sack lay in their immediate neighbourhood.

A number of articles of the equipment were also found in the tent; for instance, right over Fraenkel's skeleton there was a provision-basket lying upside down, with a piece of canvas fastened to it, which had served as a lid, and among the clothes from the trunk of Andrée's body were discovered, among other things, several stockings, mittens and the torn remains of a white blanket with a blue border. Of this blanket, pieces were also found in other places close to the floor of the tent; these pieces have probably belonged to more than one blanket. Finally, among the things found near Andrée's skeleton there may be mentioned an axe, a tin of lanoline ointment enclosed in a tin-

box; the long fishing-line fashioned of a string and some bent pins which, according to his notes in the Diary, Andrée had made on the 26th Aug., and with which he had in vain tried to catch something on the 27th. Between the two bodies there lay one of the single-barrelled guns. One find which, in the first reports of the discovery, awakened attention, was that of a Primus stove which stood on the rocky shelf above Andrée's skeleton, and which was still almost full of paraffin. This Primus stove had belonged to the cooking-apparatus of the Expedition, the greater part of which was found in the tent or in its immediate neighbourhood outside. Close to the Primus stove stood an aluminium cup, and one gained the impression that the rocky ledge had served as some kind of shelf. This was confirmed, too, by the " Isbjörn's " find when, on the same ledge above Fraenkel's remains, there were found a spirit stove, a cooking vessel and an aluminium spoon. A gilt fruit-knife was also found here. Down in the tent lay other cooking utensils; among other things a pan and a plate on which were some remains of food; there were also some provision boxes. Here, too, lay a wooden box containing sewing-materials and the Expedition's supply of money, amounting to 160 rubles and 80 dollars in gold and silver.

A large number of articles lay spread about outside the tent. Among them may be mentioned the Expedition's medicine chest, containing the medicine and bandaging requisites; a wooden box containing a large supply of matches; the bronze grapnel, etc. Here also lay, spread about, considerable parts of the skeletons of the two men who had died in the tent, which had been pulled outside by animals.

At a distance of about 10 metres from the tent stood five to six stocks of drift-wood, piled up in a cleft of the rock. They had a length of 1–1.5 metres, with a diameter of about 0.15 metre. Farther away

lay another heap of smaller-dimensioned timber. Last summer, drift-wood had been observed lying all along the shore, and it must be considered as certain that the two piles of wood had been made by Andrée and his comrades. Only one single sawn-off piece of wood was found, and a couple of fragments of wood were thought to give a faint smell as of paraffin or benzine. But no trace at all has been found of a fire-place.

Finally, one of the "Bratvaag's" seamen found a grave in a narrow crevice between the rocks, some 30 metres (100 ft.) north of the camping-place, containing a man's body, which proved to be Strindberg's.

The situation, then, is as follows: The Andrée men have pitched their tent below the rock, and taken a number of the more important articles of their equipment inside, such as: the sleeping-sack, the kitchen- and dining-utensils, the money, a gun, etc. The sledges were parked outside the tent, and Strindberg's last resting-place was made some way off, on the level ground.

The greatest part of the equipment was found on, or close by, the sledges. Thus, the boat was still filled with a number of articles, amounting to more than one hundred: the two other guns, pieces of a bear which had been cut up, books (including Strindberg's first log-book), a number of scientific instruments, articles of clothing, etc. Another group of articles lay close by the spot where the "Isbjörn" found the third sledge. These articles had clearly been carefully packed in a large piece of balloon-cloth, which was lying beside the sledge, and had been torn, evidently by bears. In addition to a large number of articles of clothing, there were found here Strindberg's second log-book, a chart, showing the route the party had traversed; letters to Strindberg and Fraenkel, photographs, a sextant and a field-glass, a Halda watch and 2 chronometers. Besides these there were the remains of a sack which had contained

the Expedition's films, two metal cylinders with samples of organic remains, etc., which had been found on the ice; a number of articles of personal equipment and, finally, the Expedition's flag, of white silk, with a blue anchor.

In a word, objects of the most varying descriptions lay scattered about the camp-place. Of these there may further be mentioned merely a bundle of clothing with a belt around it, and containing a blue jacket, a woollen jersey and the following articles marked N. S.: a pair of short mittens, one pair of gloves and one stocking. As Strindberg's remains were dressed in a waistcoat but had no other garment outside this, it is likely that all this bundle of clothing had belonged to him.

Later on, we shall describe in detail the equipment of the Expedition. But we must give some space here to a couple of pages from that list, viz., those dealing with the supplies of food and clothing, for, after landing on White Island, it was on these two things the fate of the men ultimately depended.

The stock-taking lists of the Diaries give us a certain amount of information respecting the supply of provisions taken from the balloon, and to this there was constantly added food obtained by "hunting" and shooting during the course of the journey across the ice. When the ice-floe broke on the 2nd October, the Expedition was well supplied with meat. How much of this the men succeeded in bringing ashore we do not know, nor have we any knowledge of the other food supplies which were left when the party found itself obliged to land. We merely know that a fairly considerable number of the boxes containing provisions, brought from Stockholm, still remain—some opened, some unopened, one of them being half-filled with coffee. The men can hardly have suffered from want of meat, for there were found in the boat remains of the back and the ribs of a

polar bear that had been cut up. And out on the camp-place there lay two polar-bear skins. A discussion arose regarding these skins between the skipper of the "Isbjörn" and one of the sealers, the former being of the opinion that it was a summer skin, the latter holding that it was an autumn skin. The heads had been removed. Probably they had been killed at the place, for in one skin there lay a number of pieces of bones, and the sealer's opinion was that one could see by the skin that the fat had been cut away in a frozen condition. A number of sawn-off bones of polar bear were also found. In addition there was the sawn-off pelvis of a great seal, and a skeleton of another seal, *Phoca fœtida*, which had also been divided by means of a saw. Lastly, there was found quite a little heap of bird-wings, ten at least, and other bone-remains of birds; these were considered as being the relics of ivory gulls.

The party, consequently, had been well supplied with meat and had had the possibility of procuring more.

The Expedition had taken with it two single-barrelled Remington smooth-bore guns, calibre 20; a double-barrelled gun with top-lever mechanism, of which the right barrel was a smooth-bore, calibre 20, and the left a spiral-grooved, calibre 450. They had also a revolver. The three guns, which were a present from the Huskvarna Arms Factory, Limited, were all found at White Island, one of the Remington guns close by Andrée's skeleton, and the two other guns in the boat. Of the supply of ammunition, besides a number of cartridges found in the dead men's pockets, there remained at least 135 ball cartridges and 120 small-shot cartridges, packed in three nailed wooden boxes.

Neither was the party in want of fire and fuel. In addition to the matches the dead had about them, there was found in a nailed wooden box a hundred

boxes containing fusees and ordinary matches. The Primus stove was full of paraffin and they had also drift-wood. The cooking-apparatus and the Primus stove—of the B. A. Hjort & Co.'s (of Stockholm) make, well known to all Polar travellers—was in perfect order and lay there with the cooking- and snow-melting vessels. After being brought back to Stockholm, experiments showed that the stove could still make a litre of water boil in six minutes. In a pan and on a plate which were found in the tent there were still some remains of food. As regards food supplies, consequently, the situation seems to have been as advantageous as could be wished.

In judging of the clothing equipment of the three men, we are greatly assisted by the clothes in which the dead were dressed, and, aided by this, we can, to a great extent, distinguish between the articles of clothing belonging to the three, and which were lying scattered about. The accounts still remaining from the time when the articles were bought also afford us a possibility of forming some idea of the equipment in question. This seems to have consisted of 3 or 4 changes of underclothing, each including an under-shirt, a shirt, one pair of thin, and one pair of heavy drawers, one pair of thin, and another of thick stock-ings, and a pair of wool-and-hair socks. Further, there seems to have been, for each man, two woollen jerseys and a leather waistcoat, three or four pairs of gloves or mittens, a suit of rain-proof cloth, a pair of high boots, a pair of Lapp boots and puttees. Finally, each man had a woollen cap, a fur-cap and a hood of cloth.

In the main the picture we obtain from the accounts is in agreement with that given by the find at White Island. But the latter says still more, for we learn from them the quality of the articles of dress, and it scarcely corresponds to the demands one would make in view of a long stay in the Polar regions. Each

man has had a leather waistcoat and a fur cap, but, otherwise, there are no leather clothes, and the fur caps do not seem to have been used. Not only the stockings, but the under-clothing in general is of a thin quality, and, as far as the latter articles are concerned, some of them must have been thrown away at an earlier stage, so that, in certain instances, the last of the supply is being worn.

We have dealt at such length on the clothing equipment because it seems to be the weakest point in the preparations made for the Expedition. The question was discussed already when the remains of Andrée and Strindberg were being examined. One of the participators in the "Isbjörn's" expedition gave evident expression to his opinion when he declared that he was astonished at the unsuitability of the clothing for Polar travelling. Among the articles considered as little suitable for the purpose he mentioned the knitted gloves, the shirts of thin striped cotton, the thin woollen jerseys and the short socks marked N. S. The jerseys also seemed to him to be little suitable for Polar wear, both as regards material and cut. Another man on board the "Isbjörn" gave it as his opinion that "the members of the Expedition were frozen to death. They had not many clothes, and were badly equipped. They had nothing but rubbishy clothes and socks!"

We have already seen that the party was not in want of food, and that there was ammunition for a considerable time onwards; they had cooking utensils, matches and fuel, but were not equipped to meet the cold of winter on an island which was almost entirely covered with ice, and where there was no other protection from the storms coming from the sea than what was afforded by the tent. This, however, was merely of varnished balloon-cloth, and, after the long journey on the ice, was, perhaps, damaged in many places. The prospects of building themselves a snow-

hut were small, too, the little pieces of stone-brash on the shore being unsuitable for the purpose. The sealer Sörensen, of the "Isbjörn," has most certainly given the correctest answer to the final riddle of the Andrée Expedition when he declared: "I think they died in their sleep!—that the cold finished them! In any case, they have not died of hunger!"

They suffered, too, from another inconvenience, which grew more and more serious as time went on. The three men had but one sleeping-sack between them. To live for months in continual isolation from the world in one of the most desolate tracts on the globe must, of itself, have gradually become a serious psychical trial, and one that was rendered additionally trying by the three men being compelled to share the same sleeping-sack night after night, amid the disturbance and the inconveniences such a system must have occasioned, especially when any one of the party happened to be ill. And, worst of all, perhaps to have been obliged to witness the death struggles of Strindberg just in that one sleeping-sack!

For Strindberg died before the other two, and had been buried by them. During the excavation of the boat from the ice, one of the crew of the "Bratvaag" went to a little rivulet to drink water. There he found a cranium lying by itself on the level ground, and on looking about more closely he saw a couple of Lapp shoes sticking out from underneath a bed of rubble-stones. On investigation it proved that the dead man had been laid in a narrow cleft between the rocks, and the remains covered with a foot-thick layer of rubble-stones. In addition to the fact that the underclothing was marked N. S., there was found, where the left hand had been, Nils Strindberg's engagement ring. Tore Strindberg, the sculptor, remembered that his brother Nils had had an injured tooth in the right upper jaw, and this mark was found in the cranium discovered in the neighbourhood of the

grave. In the dead man's pockets no other things were found than a blacklead pencil, but, during the work of treating the clothes for preservation, there were found a little hanging trinket, consisting of a cross, an anchor and a heart; the trinket had probably been worn hanging from a string round the neck; the string had broken, and the objects found their way into the clothes. In Andrée's pockets, on the other hand, there were found a purse containing, among other things, a little silver boar that Strindberg used to carry round his neck, and a gold locket in the shape of a heart, with the monogram N. S., and, inside, the portrait of Strindberg's fiancée and a lock of hair. In one of Fraenkel's pockets was found Strindberg's almanac with his marginal notes, and, inside it, a fountain-pen which was still filled with ink.

Strindberg's death was followed by those of Andrée and Fraenkel. The two men seem to have sunk into their last slumber side by side within the tent, and, to judge by all appearances, simultaneously. In addition to Strindberg's belongings, there were found in Andrée's pockets the following articles: in the left inside pocket of the jersey, the second Diary, with a lead pencil along the edge, and a step-measurer. In addition, there were found Andrée's own chronometer No. 5567, with a gold chain from which hung a locket with the portraits of his parents, a gold heart and a gold ring with a turquoise and two garnets. In another of the pockets there lay the chronometer No. 5566, employed by Strindberg in his observations. In a jacket pocket there were found a handkerchief and the remains of a tube of some kind of ointment. In the right trouser-pocket were a pocket-knife, empty cartridge cases and a match-box. In Fraenkel's clothing there were found, besides Strindberg's almanac, a mother-of-pearl knife, a whistle of black horn, the fragments of a pair of dark spectacles,

a lead-pencil, and the remains of a tube of ointment. It may be remarked that two knives, just like Andrée's, and two whistles just like Fraenkel's, were found outside in the camp. Of these articles, therefore, there must have been one of each kind for each man.

Strindberg's grave was made in a narrow crevice of the rock. In a tent beneath the ridge of rock rest Andrée and Fraenkel, and outside, on the ice, stands a sledge with the boat firmly lashed to it, and with the head turned towards the land, just as it had been drawn up to the spot by Fraenkel. Close by stands another sledge, possibly emptied of its contents, and farther down is the third sledge. This one has its head turned towards the sea, and on, or near, it lies a large bundle of balloon-cloth filled with clothing, the rolls of films and the sample preparations that had been made, a part of the notes written by the members of the Expedition, a sextant, a field-glass, a few more objects, and then the symbol of the Expedition—the white balloon flag with its blue anchor. Far away in the world outside people are asking with anxiety what has become of Andrée and his men; their relatives and friends await with trembling every sign of life that seems to be heard from the Polar Sea. But around that which had been Andrée's Polar Expedition, and towards which the eyes of the world had once been directed, there now sweeps the snowstorm, or there flame above it the Northern Lights amid quiet nights of glittering cold. But the snowstorm and the fearful cold torment them no more. Andrée, Strindberg and Fraenkel slumber!

Our description of Andrée's camp at White Island is ended. The three men landed here on the 5th October. They pitched their tent high up on shore beneath a wall of rock, and there they drew their sledges, with the equipment. This was done on the 7th October. Then all is silent until the 17th October, when Strindberg notes a return to "Home" at 7.5

in the morning—the last memorandum any of the Expedition made.

What took place between the 7th and the 17th October? Was an attempt possibly made to discover some more hospitable spot on the island, or did the men even climb the ice in order to examine the possibilities of reaching Spitzbergen? The "Main Island" can probably be seen in clear weather from the icy fell of White Island. No other reply can be given to these questions than that the party had probably been away for a time and had returned. Then Strindberg died. The survivors have preserved the contents of his pockets. His jacket and a few other articles of clothing have also been collected, and then fastened together by means of a strap.

How long did Andrée and Fraenkel still hold out? Why did they not employ the two bear-skins as a carpet beneath their resting-place in the tent? Why was their sleeping-sack not used? Why does the third sledge stand packed with some of the Expeditions' most important belongings, as if in preparation for a journey? To all these questions there will never be a response! The only answer that can be given are the words of the Norwegian sealer: "I think they died in their sleep!—that the cold finished them!"

On the 19th August, 1898, three members of another Swedish Arctic Expedition landed on the south-western point of White Island, one among them being the compiler of this volume, J. G. Andersson, now Professor. The party could not dream that, had they continued some few miles farther along the shore, their steps would have brought them to the spot where Andrée, Strindberg and Fraenkel were sleeping their last sleep!

XIV

THE PACK-ICE

By Professor H. N. Sverdrup

Andrée's Diary contains a series of observations concerning the ice, its appearance, melting, freezing, drifting, etc.

Andrée's description of the pack-ice during the summer does not differ from the account given of it by other explorers, but seldom has there been written such a vivid description of the superhuman efforts demanded by a summer march across the drifting pack. The long walls of hummocks—pressure-ice—which, during the winter, are partially covered by snow-drifts, show themselves in the summer-time in all their frightfulness, surrounded by melted snow into which one sinks deeply. Between the pressure-walls, the pools and canals of fresh water compel the traveller to go long distances roundabout, or else the water is covered by a thin, treacherous layer of new-fallen snow. Suddenly, further passage is prevented by a fissure or a lead, and a boat must be employed with which to ferry across.

From the observations he made during the balloon-journey, Andrée had scarcely expected the march across the ice to meet with such great difficulties. We learn by his notes that he was prepared to find, on landing, that the numerous openings and fissures in the ice would create great difficulties during the course of the march, but that he considered the ice itself as fairly easy ground to get across.

It is, however, extremely difficult to judge the

character of the ice from above, for, in the uniform greyish light so characteristic of the sunshineless Arctic summer, there are no shadows, and no contrasts, to point out the inequalities. Everything looks the same; expanses with hummocks which make passage with sledges extremely troublesome and fatiguing, appear, when seen from above, to be as flat as a floor. During the flights undertaken from the "Maud," in the summer of 1923, we of the Norwegian Expedition learned to understand this, and Amundsen had the same experience during his expeditions in 1925 and 1926. If Andrée had been able to speak of his observations himself, he would undoubtedly have pointed out that the character of the ice can be hardly judged of when seen from the air, and his remarks would later on have possessed a special value for all the flights across the Polar ice planned afterwards.

It was possibly the favourable impression Andrée received of the ice-conditions which made him determine to direct his course towards Franz Joseph Land. We may be certain that it was not only the drift of the ice westwards, but also the difficulty of making his way across the ice, that compelled him to give up his bold plan.

From Andrée's remark on the 3rd August and the daily memoranda it is clearly seen that the party did not encounter ice the smoothness of which made it easily traffickable. On the contrary, it was only on one single day—the 28th July—that Andrée and his comrades could pursue their hitherto tiring march across smooth ice; it was only on one occasion that they met with what Andrée calls "parade-ice" ("paradise"). As a rule, the ice was difficult to traverse, and Andrée often describes it as terrible.

It was not only the pressure-ice, with its hummocks, which placed difficulties in the way of the march. What remained of the covering of snow, together with the eroded surface of the ice, formed a layer of powdered

sugar snow, on which the foot slipped and in which the sledges fastened. The pools and canals of fresh water compelled them to follow circuitous paths, and after the middle of August it not unfrequently happened that these waters were covered with newly-formed ice and snow, so that they were not discovered until someone fell into them. Still greater difficulties were caused by the fact that the party was constantly obliged to ferry across channels, leads or more extensive openings between the floes. The experiences Andrée made agree with those observed on board the "Fram" and, later on, by the "Maud," during the summer months these vessels spent in the drifting pack-ice. Neither from the "Fram" nor the "Maud" was it possible to march in any direction as much as two miles from the ship without encountering wide openings or leads, which were too broad to be crossed without the help of a boat.

We do not find in Andrée's Diary any direct statements as to the width of the leads or openings, but, on the 1st August, Andrée writes that the state of things, on the whole, was favourable and that the day's march must have amounted to at least 4.2 miles, while, a little later, on the 6th August, we read: "The longest distance of all, probably not less than 3 minutes" (3.5 miles). Now, 3 minutes hardly amount to 3.5 miles, which would show that a day's march of 3.5–4.2 miles was something very rare. Later on in August, on two occasions under favourable conditions, the day's march was estimated at the figures just given. If we compare this with the numerous memoranda concerning openings and leads, we find that the party very seldom covered as much as 1.2 miles in a straight line without encountering an opening in the ice, and that it never went as much as 6 miles without being forced to use the boat. Such information as this from the tracts north-east of Spitzbergen is of great interest, for, when compared with the observations made by the

"Fram" and the "Maud," it shows that, on the whole, the conditions of the ice during the summer are alike over vast extents of the Polar Sea.

There is another detail in Andrée's description of the leads which is worthy of observation. According to the experiences of the "Fram" and the "Maud," pressures are never dangerous in the summer, for the many openings between the floes allow them greater liberty of movement. When the ice-floes are driven together, one strikes against the next, and so on, and the pressure becomes distributed, but when, in the autumn, there exists new ice between the floes, it is pressed together, and the pressure is concentrated along the lines of weakness in the floe. One consequence of this is, that, during the summer, an observer cannot notice much of the movements of the ice. It is impossible for him to observe the drift of the ice direct; he notices nothing but a relative movement among the floes, and this is less in summer-time than during the autumn after freezing has begun again.

These observations are confirmed in the best possible way by Andrée's memoranda. On the 31st July, for instance, he writes: "Out on the ice one cannot at all notice that it is in movement, with the exception that, at our resting-places, the leads change *while we are sleeping*." I have italicized the last words, for they show that the alterations are slow. A little later, on the 6th August, we read: "*New difficulty:* the leads altering while we are crossing them." The italics are again mine, for, by this expression, we discover that, during the first three weeks of the march, the movements of the ice presented no obstacle to the progress of the party. The next note concerning such movements of the ice is not found before we reach the 17th August, and after the middle of August, when the new ice has commenced to freeze, it becomes evident that the ice is growing steadily more and more troublesome. During the period between the 17–31 August, Andrée

states, no less than five times, that the movements of the ice place hindrances in their path.

As regards the ice which, to some degree, was "rolling country" and relatively easy to traverse, Andrée noticed that it had, at an earlier period, been exposed to violent pressure. Such rolling surfaces are met with where the ice has already been subjected to the influence of an Arctic summer. During the course of this period the tops of the hummocks and the pressure-ice melted away to some extent, and the depressions between them are turned into pools of thaw-water. During the following autumn these pools are frozen and, instead of pressure-walls and hummocks with sharp edges and pointed tops, rounded hillocks are seen. If such a field of ice be not exposed to fresh pressure, such levelling processes may continue for another summer, leaving the ice at last quite smooth. If it be examined more closely, however, then—as Andrée observed—there will be noticed, in such level expanses, parallel, oblique markings, showing that the floe contains ice which lies on edge.

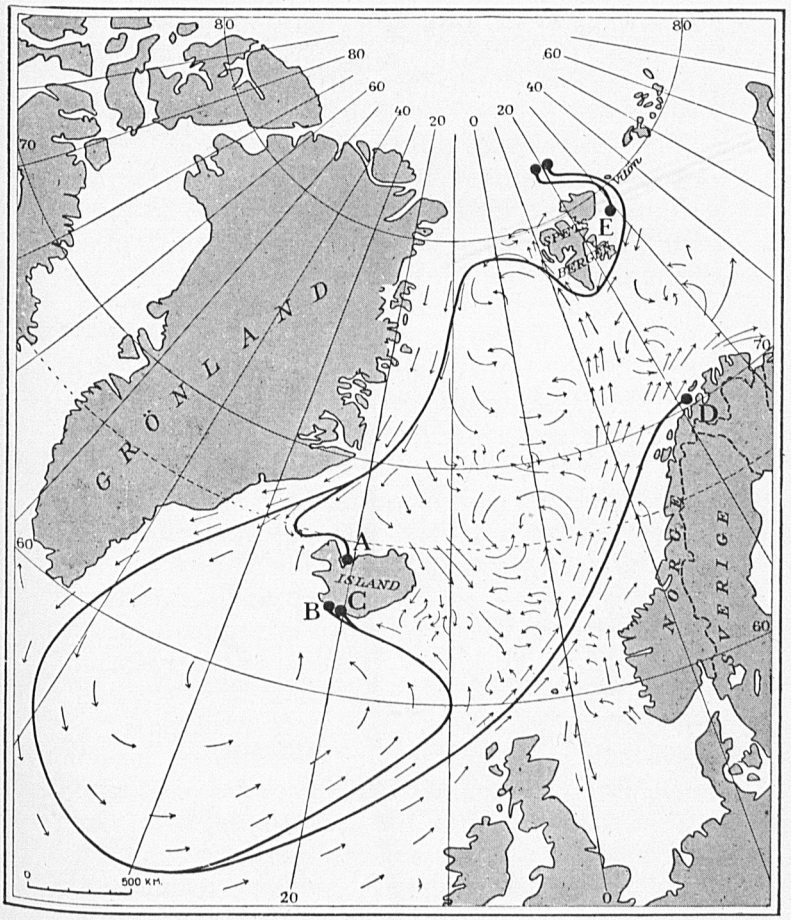
Neither the leads nor the hummocks displayed any main direction. As a rule, Andrée describes everything as forming a confused mass, although, now and then, he says that a lead, or a high wall of hummocks, runs for a long distance in a straight line.

On one occasion, Andrée expressed the idea that the pressure was caused by the tide-currents, but he did not return to the subject. He had evidently found that the theory was false, for if the tide-water currents played a decisive rôle for the pressure-phenomenon, then greater regularity ought to be looked for—an agreement in the direction of the leads and pressure-walls. Andrée does not discuss the question of pressures, but it is clear that these result from the changing winds, as is doubtlessly the case within other tracks of the pack-ice. The wind does not blow evenly across wide expanses, but its direction and strength

vary from place to place. For this reason the movement of the ice which it causes differs in different tracts and, where the differences are great, the ice-floes are either pressed together or are torn from each other.

Andrée's attention, however, was caught by another action of the wind, which was observable at the beginning of August, at least. On the 8th August he writes: "If the wind from the S.W. does what it has hitherto done, *i.e.*, presses together the floes, then it can keep on for a week or two." On this occasion the Expedition was approximately in latitude 82°. Within this tract, then, there must have prevailed a fairly strong current from the north, for the observations showed that, in spite of the south-west wind, they were moving southwards at a good rate. Andrée had been afraid that the wind would carry them northwards, but his fear was groundless. A strong current from the north could also very well explain the fact of the ice being pressed together by the wind. We cannot read from his notes if the south-west wind had had the same result on other occasions, or if a wind from any other point of the compass had shown a tendency to break up the ice.

The information the Diary gives, respecting the results of the soundings taken on the 31st August, does not allow us to form any idea as to the correctness of Strindberg's calculations, but in all probability the speed-figures given are altogether too high. It is possible, too, that the ice has drifted westwards under the influence of an easterly wind, while, at some depth beneath the ice, the current has been running eastwards, so that the relative speed of the water has been specially great. But, even after taking all these circumstances into account, the differential speed resulting from the movements of the ice and the water—that of the latter at a depth of 115.5 ft.—can hardly have been so much as 4.6 ft./sec. The greatest



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MAP SHOWING THE PROBABLE DRIFT OF THE FLOATING BUOYS FOUND

A—Buoy No. 7: B—Buoy No. 8: C—Buoy No. 3: D—Buoy No. 4: E—Polar Buoy.
The currents between Iceland and Spitzbergen are based on the observations of Nansen and Helland-Hansen.

relative speed of a current measured by the " Maud " was less than 1.6 ft./sec.

In other respects, too, it is difficult, before all Strindberg's observation-material respecting the place-determinations has been checked, to draw any definite deductions respecting the conditions of ocean-currents north-east of Spitzbergen. It is clear, however, that the wind played a great rôle in respect to the drift towards the south-south-east, for Andrée points out that, in the middle of September, there was a fresh wind from the N.W. or from a more northerly direction, and this for a considerable period. But we also know —*inter alia* from Nansen's investigation north of Spitzbergen in 1912—that the current moves eastward along the north coast of the archipelago in question.

The drift of the Expedition during the period 14th July–2nd October, together with the brevity of the remarks in Andrée's Diary respecting the direction of the currents, place the drift of the buoys which were thrown out during the balloon-journey in a new light. The question of the course followed by the buoys has been thoroughly discussed by A. C. Nathorst in the book, " Andrée and his Companions." Nathorst experienced no difficulty in marking the paths along which the four buoys might have come to Iceland or the coast of Finnmarken, but the discovery of the " Polar buoy " on King Charles' Land occasioned him and others much trouble. The fact that no one knew when and where the buoy was thrown overboard, and that no one had any idea, either, of the length of time the buoy had been lying on the shore before it was found, made the conditions for ascertaining the course and duration of its drift uncertain. Knowing what we now do respecting the place and time when the buoy was thrown overboard, the question of the length of time it had been in the water becomes one of less importance. The greatest probability is that the ice, on to which the buoy was thrown, drifted south-

wards along the eastern coast of Spitzbergen in a direction approximately corresponding to that in which Andrée and his companions were afterwards carried. It is, therefore, probable that it was thrown up on the shore as early as during the winter 1897–98.

It is evident that the other buoys also drifted southwards to the east of Spitzbergen, but, instead of being thrown on shore in that neighbourhood, they entered the current which swings round the south point of this group of islands. By this current they were carried northwards again, along the west coast of Spitzbergen and thence eastwards, in order, later on, to accompany the East Greenland current towards the south. One of them, No. 4, was caught by one of the backwaters in Denmark Sound and then drifted on shore on the north coast of Iceland, while the other three continued their path towards the Atlantic, where, finally, they entered the North Atlantic Ocean current, the Gulf Stream. One of the buoys, No. 7, was carried all the way up to Finnmarken, where it drifted ashore in August 1900, while the remaining two, Nos. 3 and 8, were borne northwards towards Iceland, where they were thrown up on shore in July 1900. Thanks to Andrée's and Strindberg's notes, I believe that we may now consider the problem of the drift of the buoys solved, in its main features at least. The probable drift is shown on the chart, where the character of the current is also marked.

Let us now return to Andrée's description of the ice. In his memoranda there is a series of statements regarding the thickness of the ice, which, in most instances, was measured at the edge of fissures. But we shall see by what follows that these memoranda are not so clear as the others in the Diary; we are surprised to find the ice-floes so small, and it is possible that the measurements do not give expression to the actual thickness of the ice.

According to the measurements undertaken by a number of other expeditions, and knowing what we do respecting the increase and the thawing away of the ice, we are entitled to expect that the drifting pack-ice encountered by Andrée would have a thickness of about 10 ft., and perhaps more. In any case, we must recollect that large openings are always formed at the skirts of pack-ice at all seasons of the year, and that, consequently, in the summer we may expect to find ice which has been formed at a late part of the previous winter or spring; such ice, of course, is not so thick as the pack-ice, unless it has been pressed together. Tracts with newly-frozen and relatively thin ice must, in any case, be rare, for such ice possesses less power of resistance than the old, and is more easily pressed together. In spite of the circumstance that much of the ice encountered during the summer-time north-east of Spitzbergen may have been formed during the previous winter, we must therefore expect the thickness of the ice to be, as a rule, about 10 ft. or more. From this point of view it is surprising that Andrée found such a slight thickness of the ice. In the memoranda which have been submitted to me there are 62 statements respecting the thickness of the ice, and only in four instances is the thickness stated to have been more than 10 ft., while it is less than 4.95 ft. in no less than 43 cases. It is clearly shown by the account given that the measurements were not made solely in respect to newly-formed ice, for clay, pebbles, etc., had been found on ice the thickness of which was given as about 39 in., and such things can be found only on old ice. There are, however, two notices in Andrée's Diary which give us reason to think that the figures he has put down do not refer to the thickness of the drifting pack-ice itself. On the 31st July there is an entry: "Thickness of ice 31.2 in.," but below there is written, within parentheses: "Depth of ice below the water 13.53 ft.," and, on the 1st August,

the thickness of the ice is stated as being 4.45 ft.; simultaneously, there is given in the Diary a sketch in which the total thickness of the ice is stated to be 15.84 ft., and, according to the sketch, the above-mentioned thickness of 4.45 ft. refers only to a projecting edge existing at that depth. If, in these two instances, the thickness of the ice exceeded 13 ft., while the measurements in the fissures merely give the thickness of a characteristic upper layer, then there is, perhaps, reason to assume that something like the same system of measurement has been employed throughout, and that the figures given can be of no service when we are to judge of the actual thickness of the ice.

Respecting the processes of thawing and freezing, Andrée gives a series of interesting observations, and we obtain a vivid impression of the irregularity with which the melting action goes on. On the surface of the ice there are formed not only pools of fresh water, but also canals—often troublesome to cross—which unite these pools to each other. Some of the pools are so deep that there are holes at the bottom, while others remain shallow all through the summer. We do not possess more knowledge now than Andrée then had respecting the special conditions which give rise to this extremely irregular process of thawing.

As regards freezing, Andrée has noticed that, during the summer, new ice is formed in the small openings at the boundaries between the fresh water running down from the ice and the salt water beneath it. This circumstance has been elucidated by Nansen, who points out that, even during the summer, the salt sea-water has a temperature below zero, and that when the fresh water comes into contact with this cold water there is at once formed a thin layer of ice on the boundary-surface.

Of very special importance is Andrée's description of the way in which, within a short period during the autumn, there is formed a thick layer of ice on the

surface of the large openings, as a result of thin layers of ice being pressed together. There is no doubt but that this pressing together of the ice on the outskirts of the Polar Sea is of essential importance for the rapid formation of ice during the autumn, but we may question whether the same factor plays any noteworthy rôle in the conditions existing higher up in the Arctic waters, as Andrée hints. Within the inner tracts the openings are too small to allow this process to become of any special importance.

During his march across the ice, Andrée became more and more interested in the many small objects found on the surface—clay, organic particles, pieces of drift-wood, shells and several other such things. It is characteristic that the memoranda respecting these finds gradually became more comprehensive and that, by degrees, speculations as to the structure of the ice occupy more of the writers' attention. The march was monotonous—a daily trudging across broken ice; ferrying over leads; tiresome crossings of irregular bridges of ice. Under such circumstances the attention is attracted more and more by details. A little gravel; a fragment of a leaf—everything becomes a real event. Andrée found a piece of ice which displayed an evident, stratified structure—layers of clay alternating with layers of clean ice—and he believed for a moment that he had discovered a piece of glacier ice. Later on, however, he noticed how the appearance of the ice altered, and was able to explain the peculiar structure as being the result of alternate thawings and freezings under definite conditions. But Andrée left unanswered many questions in connection with the occurrence of all the small particles found upon the ice, and they remain unanswered to-day. Andrée points out that the study of these fragments would certainly assist us to discover the region from which the ice came, and that the study of the stratification, which is clearly displayed, thanks

just to these particles, should increase our knowledge of the freezing and melting processes, and elucidate the bending and twisting of the ice under pressure. Such studies have hitherto not been made, so that Andrée's Diary points to new fields of investigation of sea-ice, and contains impulses to our continued labour in that domain.

XV

ANIMAL LIFE AMONG THE PACK-ICE

By Professor E. Lönnberg

The restless and peculiar world of the pack-ice captivated Andrée's attention in a high degree. Very distinctive of his character is the care with which, during the toil, the drudgery, of the sledge journey, he constantly and carefully observes and describes each feature of the strange landscape around him.

This holds good not least as regards the animal life, which from a practical point of view too, of course, increasingly awakens the interest of the three travellers, in the same degree that they find themselves more and more obliged to rely for their supply of animal food on the resources offered them by the Polar World.

The observations respecting this animal life, and its intimate connection with the anxieties of the party respecting food, will be found in Andrée's Diary, especially in the chapters dealing with the journey across the ice. In the following pages there will be given a brief biological survey of the animal life encountered by Andrée and his comrades during their stay on the pack-ice.

The *polar bear* is the chief big game of the explorer in Arctic regions. Even during the balloon-journey there was observed at ten o'clock on the 13th July an enormous polar bear swimming not quite a hundred feet below the balloon: "He got out of the way of the guide-lines and shuffled off when he had climbed up on to the ice."

Bears were frequently met with during the course

of the journey across the ice. No less than ten were killed, giving the party the important addition to its supply of provisions which enabled the three men to support the hardships of their pilgrimage.

Of the dead animals, there were taken, in the first place, the brain, tongue and kidneys, and, in addition, the best of the fleshy parts, according to circumstances. As a rule, the meat was considered as having a better taste when it had been allowed to lie a few days. "Raw bear with salt tastes like oysters. Raw brain is good too." The liver was always rejected, the men being aware that its consumption might cause poisoning. The blood, too, was used, being made into pancake, which had an excellent taste.

Andrée tries to mend the sleeping-sack with the skin, and finds that from the front legs the best for his purpose, being lightest.

Former Polar expeditions and the experience of sealers both teach us that, during the summer, the bear in those regions has its chief resort on the pack-ice, where he wanders far and wide, looking for seals—the animals which are his chief source of food. In the tracts which are seldom visited by sealers, and where the polar bear, consequently, is not driven away by human hunters, there exist great numbers of this kind of game, as long, that is, as there happen to be openings in the pack-ice, where seals can assemble and thus offer a supply of food to the bear.

The *seals*, which are now and then mentioned in the pages of the Diary after the 18th July, were probably the ringed seal (*Phoca hispida*). Among the Arctic seals, this species is best able to make its way among the pack-ice, where it is better able than other species to supply itself with food. It often satisfies itself with quite small openings in the ice, and its food chiefly consists of small animals of the crustacean order, belonging for the most part to the amphipoda class, but also to that of the schizopoda. These small

animals occur in large numbers in the upper layers of the sea, so that the seal is in no fear of suffering from want of food. The first attempt of the Andrée men to shoot a seal of the species is not made until the 23rd August, but, later on, when provisions begin to run short, the animal becomes desirable, and every part of it is consumed with the exception of the skin and the bones. The stomach and its contents, and the intestines too, are not excepted from serving as food. Consequently, efforts are made, and successfully, on the 8th September, to kill one with small shot, the thin skull of these small seals being so easily penetrable.

Walruses were probably observed several times in the course of the journey of the party in the Polar regions. The first occasion was during the second day of the balloon-voyage, when, according to the Diary, a large seal was photographed, the animal being with more likelihood a walrus.

But this animal long remained a mystery to the wanderers across the ice, however, for Andrée on one occasion supposed it to be a whale. One reason of the mistake, and of the joking remark in the Diary about "a sea-serpent," was possibly the fact—mentioned by Kolthoff and others—that walruses sometimes swim in line behind each other, and, when they appear on the surface, keep their heads so low that only the nose is visible, while their backs are now and then lifted above the water. When this happens, the impression may easily be given that what is seen is but one large animal, swimming curved into several bends. On the 25th August Andrée says that the great, mysterious creature has been seen, with two bends.

A specimen of the large seal, *Phoca barbata*, was shot on the 19th September. The occurrence of the large seal among the drifting pack-ice shows that the party had come to the vicinity of some coast, probably

White Island, or, at all events, to a shallower sea, for the large seal lives chiefly near the coasts, where it obtains its supplies of food for the most part from crustacea living near the bottom—such as crabs, a large bottom shrimp, and the like, and from among a number of other lower animals, such as mussels, worms, etc.

Of birds there were observed among the pack-ice, seven or possibly eight species, if we include an uncertain report from the 15th July—*i.e.*, not far from where the balloon descended on to the ice—when Andrée notes that "1 auk flew to S.S.W." If this observation be correct, then it must have been a Spitzbergen guillemot, *Uria lomvia*, and this is both the first and the last occasion the bird is mentioned in the Diary. The natural explanation is that this species is a pronounced fish-eater, and cannot easily procure food far in among the ice.

Another bird of this family is the little auk, or auk-king, *Alle alle*, which was seen, on the first occasion, on the 18th July, when the Expedition was in, approximately, 82° 50′ N. lat. It may possibly seem peculiar that these small birds should make their appearance so far to the north and so far from (known) land. But the explanation is easy. In the first place, we have to presume that the birds seen were not breeding. Further, we must observe that the little auk lives almost exclusively on "flea-lobsters," *amphipoda*, which are found near the surface of the water, so that the bird can easily procure food as soon as open water is accessible. We may even presume that these small crustacea are accustomed to assemble in great numbers in the leads and channels among the ice, so that the auk-king's table is better provided for there than in the open sea. Farther south there were seen little auks in the leads, which varied somewhat in appearance. On the 25th August, Andrée succeeded in

shooting such a bird, and he describes it in his Diary. It thereby became clear that the strange birds were simply and solely year-old young auk-kings. For the young ones first assume a dress which, in all essentials, resembles that of the old birds, but this they change very soon, obtaining a plumage which displays more white, with such a distribution between the black and the white as that described by Andrée. This second dress of the young birds is in pretty close agreement with the winter dress of the old ones. As soon as the young ones are ready to fly, they often make their way to places fairly far from the home-tract.

Among the other auk-birds it is merely the black guillemot or sand-eel guillemot (naturally of the Spitzbergen race, *Uria grylle mandti*), which is mentioned several times. Its name is seen the first time on the 18th August, when the party was somewhat south of 81° 47′ N. lat. On the 3rd September, in about 81° 15′ N. lat., Fraenkel shot a young one of this species which is described in some detail. Probably this young guillemot, together with a couple of other older birds which were seen two days later, had come from Charles XII's Island, where in 1898 the Nathorst Expedition found this species breeding. Other young guillemots, mentioned on the 15th September and later, too, could just as well have come from White Island, the party being then in approximately 80° 45′ N. lat., for the same Expedition saw the bird at that island in 1898.

Although it does not seem to have appeared in any great numbers on any occasion, the Fulmar, *Fulmarus glacialis*, is the bird which was observed most frequently during the journey across the ice, and from its very beginning. It is mentioned many times during July and August, but, most probably, Andrée has not troubled to make a note on each occasion when the fulmars appeared. As it is not every fulmar that has young each year, it is probable that the birds which

appeared farthest north on the pack-ice were not breeding. Such non-breeding fulmars journey far and wide, and seize an opportunity, now and then, of sharing in the booty taken by a polar bear. Later in the autumn the fulmars seem to have become more rare, for Andrée writes on the 17th September: "Remarkably enough the fulmars seem to have disappeared." As a matter of fact, there were very few birds at that time with the exception of the ivory gulls. On the 22nd September there is a note that the ordinary fulmar is seen remarkably seldom.

The common *skua* is mentioned only three times. The first occasion was on the 2nd August, when such a bird, in company with two gulls, was circling above the remains of a polar bear. Another was seen the following day. This was so far north as in, approximately, 82° 15′ N. lat. It must certainly have been the common skua, *Stercorarius parasiticus*, for Kolthoff observed this species at White Island in 1898, and thought that it possibly bred there. All the specimens he saw there belonged to the white phase. This is probably the explanation why, on the 25th August (81° 45′ N. lat.), Andrée felt doubtful of his determination when he saw a specimen of the dark phase. As a breeding bird, Kolthoff has also observed the skua in more northerly tracts than White Island, viz., on Charles XII's Island, so that the specimen seen farthest north by Andrée had possibly come from that place.

On the last-named island Kolthoff also found the great glaucus gull, *Larus hyperboreus*, breeding. But the Andrée Expedition never observed any old bird of this species, and it was not before the party had come far down towards White Island that a young one of the kind was shot by Andrée, but he states that the bird had been seen a couple of times before.

The gull which played the greatest rôle for the Expedition was, however, the ivory gull, *Pagophila eburnea*. It was seen already as far north as 82° 40′

N. lat. On the 11th August, Fraenkel shot one specimen, which is described by Andrée.

These ivory gulls were considered a great delicacy, and at one time in September, when the supply of meat was very small, they formed a valuable addition to the bill of fare. But when we remember the diet of the ivory gull itself, it seems very strange that it should taste so nice, excepting when cold and hardships form a sharp sauce, for the ivory gulls fly here and there, and, although they are able to fish, are mostly on the look-out for offal of every description, such as the remains from a polar bear's meal, the dead bodies of seals, whales, etc., however putrefied the morsels may be. They will even feast on the excrement of bears, seals and walruses. In Andrée's last notice of them, on the 19th September, they are called carrion birds.

On the 22nd August, Andrée shot and described a young ivory gull. Then the Expedition was still north of 81° 40′ N. lat.—*i.e.*, very far north of White Island, where the Expedition of 1898 had found multitudes of ivory gulls breeding. Andrée's discovery of this young ivory gull, consequently, confirms Kolthoff's observation that, as soon as they can fly, the young birds make very long excursions across the ice-filled sea.

The most interesting of all Andrée's ornithological observations, however, are those respecting the Ross gull, *Rhodostethia rosea*, for this little high Arctic gull, the most beautiful of the whole family, still offers many problems to be solved respecting the story of its life. It belongs to the circumpolar tracts, and has also been reported north of Spitzbergen. This latter observation, however, has been doubted of late years by, *inter alia*, the Rev. F. C. R. Jourdain, who has written on the bird fauna of Spitzbergen. But in Andrée's notes there are such detailed statements and descriptions of the Ross gull that his evidence is quite

sufficient. The first time the Ross gull is mentioned in the Diary is in the notes of the 25th July, when the Expedition was between 82° 35′ and 82° 40′ N. lat. and about 30° E. long. There we read as follows:—"Gull with red belly. Wings blue underneath and above. Dark ring around neck." This description is a perfectly clear and evident one of the Ross gull if, for "red," we read rosy-red, and for "blue," grey-blue, which are quite natural and allowable modifications. During the period between the 25th July and 30th August, Andrée observed at least 15 and probably 17 Ross gulls. Not much is said respecting their habits, but on the 1st August, when three were observed, he writes: ". . . two of them almost unafraid, unlike what has otherwise been the case." On the 6th August: "Shy. Visit once and then fly." But Andrée does not state if they flew in any certain direction, and might, consequently, be considered as being on passage, or if they were merely flying about over the pack-ice, looking for food in the open leads. But as they were observed for somewhat more than one month—from 25th July to 30th August—they could not have been in any great hurry.

The Ross gull was first observed and described in 1824, from specimens seen in Melville Peninsula in Arctic North America. Since then it has been met in various places (some few errant specimens even so far south as southern Europe). But the Ross gull always has its domicile in Arctic countries. They have been observed within this region, and there, in many places, specimens have been obtained for museums. Fairly many, for instance, have been found on the west coast of Greenland. But it is only in few places that the Ross gull has been seen in any great numbers together. In this respect the Point Barrow territory, on the north side of Alaska, stands first, both as regards time and extent. An International Expedition there in 1881 observed Ross gulls daily between 28th

September and 20th October. On certain days they were extremely numerous, coming in small flocks, and they flew, in general, towards the north-east. Not a single specimen was seen during the following spring and summer, but they became just as numerous again from the 21st September, 1882, that day inclusive. They were mostly young birds which, like the specimens seen the previous year, were directing their flight towards the north-east. This flight continued far into October. The "Fram" Expedition observed Ross gulls on several occasions, for instance, at the beginning of August 1894, when a number of young birds were shot in 81° 5′–81° 8′ N. lat.—Another observation which, as regards the season, has a resemblance to that made by Andrée, was made during the period 11th July–14th August, 1895, north-east of Franz Joseph Land between 82° 10′ and 81° 30′ N. lat., when Nansen saw a large number, most of them old birds. At the same date, seven Ross gulls were seen by the crew of the "Fram" Expedition as far north as 84° 27′–84° 41′ N. lat. Thus, as regards the season, these latter high Arctic observations are in agreement with Nansen's and Andrée's. The most interesting series of observations respecting this bird has been made, however, by Buturlin, the Russian ornithologist, who, in 1905, found the Ross gull breeding in large numbers in the delta-land of the river Kolyma, in north-east Siberia. Of special interest in this connection is the fact that Buturlin found that the Ross gulls leave their breeding-places as early as the 11th July and fly towards the Polar Sea.—At a later date, the "Maud" Expedition also shot Ross gulls in the Kolyma delta, and afterwards also found specimens towards the north and east of the New Siberian Islands, during August–October, 1923. It is evident that the Ross gulls which make their appearance late in the summer and in the autumn in these parts of the Polar Sea may very well have their breeding-places on the

tundras of the Kolyma delta, and in other places in north-eastern Siberia. But one can scarcely believe that the birds observed even before the middle of July, north-east of Franz Joseph Land, could have come there at such an early date from breeding-places lying so far to the east. This remark holds good still more for the specimens seen by Andrée. It is, consequently, probable that there are one or more unknown breeding-places, lying more to the west, in the Arctic portions of the Old World. It has been guessed that such breeding-places might exist on Franz Joseph Land, but it is improbable that spring can begin there at a date early enough to allow the Ross gull to breed and have its young ones ready to fly by, or before, the middle of the month of July. Nor would the Ross gull be happy breeding on the stony and rocky islands of the Polar Sea, for its right home during the breeding-season is the grassy and low-lying marshland of the tundra, as there, even in the early part of the summer, there are rich supplies of insects, with which the Ross gull feeds its young. The problem of the life-story of the Ross gull, consequently, has not yet been fully solved. Among the things, for instance, which we do not know, are: where does the main body of the Ross gulls spend the winter? Which are the paths they follow when they return from their autumn expeditions to the high Arctic regions where they have been found by Andrée, for instance?

Fishes are found mentioned in Andrée's Diary only on two occasions. The first specimen was seen on the 13th August. As it is stated that it had three dorsal and two anal fins it was, of course, a codfish, and, under the circumstances, very probably a Polar cod, *Gadus saida*. Andrée's description of it is not in conflict with this assumption. The Polar cod is found everywhere in the Polar Sea, being often met with swimming near, or immediately at, the surface of

the water; it is also observed among the ice, so that this fact, too, is in agreement with Andrée's statement. The second fish mentioned in the Diary, on the 24th August, is given such a scanty description by Andrée that its species cannot be described.

Lower animals are not mentioned in the Diary. It is only *en passant* that crustacea are mentioned, as having been found in the stomachs of seals that had been killed. Andrée writes on the 15th September: "I have made in order a landing-net to catch plankton, or anything else than can be found in the water." We do not know if any results were obtained, but, if there were, the specimens are lost. But Andrée's thought forms, however, fresh evidence of his desire, in spite of the slightness of his resources, to do as much as possible for the promotion of science. It is in this light we must read the notes in the Diary, on which this brief commentary has been made.

XVI

THE "BRATVAAG" EXPEDITION DISCOVERS THE CAMP

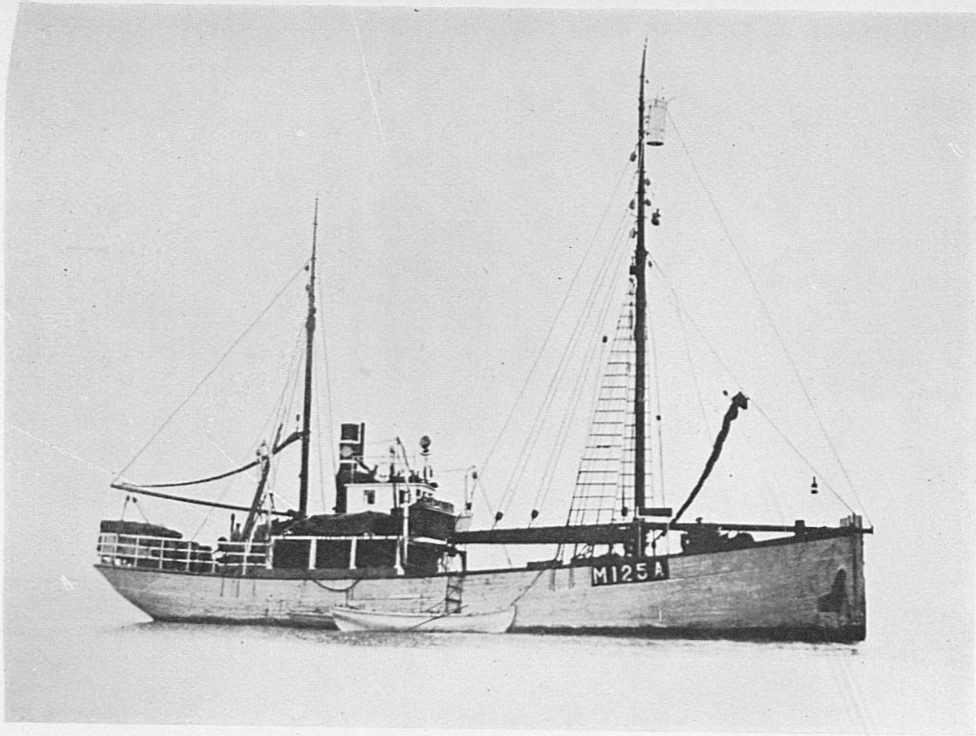
By Gunnar Horn

The Norwegian expedition to Franz Joseph Land in 1930 was undertaken by the sealing-vessel the "Bratvaag" of Aalesund, its purpose being to carry out scientific investigations of the island mentioned, and of the neighbouring tracts, simultaneously with the vessel's pursuit of the ordinary seal-fishery during its stay in the Arctic seas.

In the autumn of 1929 "The Norwegian Svalbard and Polar Sea Research Institution,"[1] of Oslo, the head of which is Adolf Hoel, Docent at the University there, had already proposed that a scientific expedition should be sent to Franz Joseph Land during the summer of 1930. The Institution mentioned has been created by Norway for the purpose of investigating the Arctic tracts, and the State pays the main part of the expenses of this work, although the body also receives contributions from scientific and private funds. The Norwegian Government had made a grant towards the proposed expedition to Franz Joseph Land, which was supplemented by a donation of a private person, Carl J. Christophersen, an Oslo merchant.

The sealer "Bratvaag" was hired as the vessel to be used for the expedition, but on the condition that all the receipts from sealing and other hunting sources should fall to the owners of the vessel. In this way the journey became a combined scientific and sealing expedition.

[1] Norges Svalbard-og-Ishavs-Undersökelser.



S.S. 'BRATVAAG'

ANDRÉE'S CAMP AT WHITE ISLAND, WITH THE CAIRN RAISED BY DR. HORN

The members of the expedition were: Gunnar Horn, Phil.D., the geologist of the "Norwegian Svalbard and Polar Sea Research Institution," who was to act as the leader of the scientific work; Olaf Hanssen, botanist; Adolf Sörensen, B.A., zoologist; Peder Eliassen, the commander of the vessel; Ole Myklebust, first harpooner; Sevrin Skjelten, second harpooner; Nils Lange, engineer; Bjärne Ekornaasvaag, assistant-engineer; Hans Laabak, steward; Karl Tusvik; Leif Nedregotten; Magnar Festö; Syver Alvestad; Johan Almestad; Olav Salen; Sigurd Myklebust and Lars Tusvik, sealers.

The sealer "Bratvaag" is owned by the M/S Bratvaag Co., Ltd., whose Managing Director is Harald M. Leite, of Aalesund. The vessel is a wooden sloop, built in 1921 for Arctic waters, and has a gross tonnage of 96 tons. It is fitted with a 120 h.p. Bolinder motor, which gives it a speed of 7–8 knots. The "Bratvaag" is not provided with a wireless apparatus, although the expedition had an ordinary radio-receiver on board.

The "Bratvaag" started from Aalesund, a lively place, known for its energetic participation in the Polar sealing and ocean fishery industries. The Polar fishing fleet of the town has increased during the last ten or fifteen years especially, and at the present time Aalesund boasts the largest and most up-to-date fleet of this class in Norway.

We left Aalesund on the afternoon of the 26th July, and arrived at Tromsö on the 30th August, a place which is pre-eminently the town of the Polar Seas, and the starting-point of many Polar journeys. It is, too, the place where many celebrated Polar expeditions receive their first welcome on their return from work well done.

We left Tromsö at eight in the evening, and followed the usual route taken by vessels through Ulfsfjorden, and the following morning we found ourselves on the

west side of Sörön, whence we steered out to sea, keeping a course on Hopen. There was some swell and a faint north-easterly breeze. On the 2nd August we took a midday altitude which gave us 70° 22′, so that we had 180 nautical miles left to Hopen, the first intermediate station. Towards the forenoon we came into a fog which lay like a mantle over the water, but it was not dense enough to prevent our seeing the blue sky above. We were now athwart Hopen, which we should have had to westward, and there was nothing to be done but to try to sound our way to the island, where we very much wanted to land. We bore off westwards, thinking that the island could not be very far off.

Skipper Peder Eliassen is on the bridge. He is a skilful Polar sealer, who, for the last twenty years, has sailed all the fishing-grounds of all the Arctic seas. Calm, cautious and liked by all on board, we could not have had a better skipper on this voyage. Ole Myklebust, from Vartdal, our first harpooner, stands in the bows and takes soundings. He has known Arctic waters for twenty-one years, eighteen of them as harpooner. Big, strong and jolly, he never misses! The lead is thrown:—63 fathoms! The line is pulled on board and, after a minute or two, whizzes down into the leaden-grey water again: 48 fathoms . . . 21 . . . 16 fathoms! The "Bratvaag" still moves on awhile, and at last we catch sight of land, a shadowy darkness amid the fog. The sea is quite calm, and the silence is broken now and then by nothing more than the whirring of the flocks of auks as they fly past. The anchor is let go, and we get ready to go ashore.

It was early in the morning of the 3rd August that we landed; Olaf Hanssen, our botanist, was in ecstasies at being able to work in such virgin tracts. The zoologist of the expedition, Adolf Sörensen, had his first station here; he carried out "scrapings" as

he sat in the motor-boat, and brought to the surface a number of interesting and remarkable animals. This was Sörensen's first trip to Arctic waters. Both the men were greatly devoted to their special branches; they were agreeable companions and very good company.

But we were unable to devote much time to Hopen. In the morning the fog lightened a little, and we could follow the land with the eye all the way to its southern point. Then it became dense again, and we went on board and set course towards King Charles' Land, east of Spitzbergen.

We were to have been off Abelön in the morning of the 4th August, but could see nothing in consequence of the everlasting fog. But then, just when it was densest, it cleared, and we saw we were just off the low coast of the island. We went a little nearer and anchored, after which we all went ashore on the low basalt cliffs which form Abelön.

In consequence of the fog and the short time we had at our disposal, we were unable to remain any long time on the island. Our goal, of course, was Franz Joseph Land, where our real work awaited us, and it was necessary for us not to come too late to our destination.

To avoid the shallows we turned south, rounded the island and then headed north again along its eastern coast, directing our course to Storön (Great Island), which lies on the eastern side of North-East Land. It is difficult to carry out scientific work in that tract in consequence of the unfavourable conditions caused by the ice. This summer, however, the conditions were ideal, *i.e.*, there was no drifting pack-ice. The season, therefore, offered a very rare opportunity of investigating and mapping these tracts—an opportunity which, unfortunately, we were unable to use to the utmost, as the main object of the expedition's journey lay elsewhere.

Storön is an ice-covered island, about eleven miles in length, lying some nine miles from the north-east coast of North-East Land. The ice-covering has the form of a shield, lying like a vault above the solid fells of the island. The naked land projects in a few places, especially on the south and north-eastern coasts.

In the morning of the 5th August we should have been off Storön, but the fog rose above our heads like a wall, and we were obliged to stop and wait for better weather. We had not to wait long, for suddenly, through a rift in the fog, we caught sight of the symmetrical ice-cap of the island, a little to our west. We set our course thither and towards the south point of the island, where a dark little naked land rose from beneath the glacier.

On the north-eastern side of Storön it seemed as though there were a rather extensive snow-free tract where walruses might be found, and so we sailed northwards to inspect the lay of the land a little. From the "Bratvaag" we could see somewhat inland a pole which must mark a depôt. Here we went on shore, and found, as we had expected, a depôt, which proved to be one made in 1928 for the purpose of giving what might be necessary assistance to the missing members of the Italia Expedition, and to Roald Amundsen and his companions. By the side of the depôt we erected a little hut for sealers and expeditions that might be in want of such shelter.

Here the glacier descended with a straight front into the sea, but it finishes with a slope towards the ice-free lowland, so that it is easy to ascend it there, and I went for some distance over the ice. There was open sea as far as the eye could reach northwards. In many places close to the island there were icebergs aground, but the much-feared Polar pack-ice was so far off that it could not be seen. We could probably come far north this year, but, fine as it would have

been to try to set a record, we had to turn eastwards again. We weighed anchor in the afternoon and steered direct east. Again we ran into fog, which seemed to be bent on persecuting us this summer. We made our course towards White Island—the easternmost outpost of Svalbard. On some charts it is also called Giles Land. On the old Dutch charts—for instance, on that drawn by the cartographers Giles and Rep in 1710—there is shown to the east of Storön, the west coast of a land—"Commandeur Giles Land, discovered 1707, ice highland." People have been doubtful as to what Giles and Rep meant by this land, but if consideration be paid to its position and the distance from Storön, it is natural to suppose that Giles Land is identical with White Island. In clear weather one can see all the way to White Island from Storön, and the Dutchmen who have been on Storön must certainly now and then have seen the white cupola of the other island. But in the many years that followed, one did not hear much about Giles Land; the whalers restricted their voyages to more accessible latitudes, and went very unwillingly to these waters, which, as a rule, must have been impenetrable for the vessels of those days, which were merely equipped with sails and which could not attempt to force the ice. In the 'sixties of the last century, some Norwegian sealers visited the tracts east of North-East Land for fishery, and in 1876 White Island was sighted by a well-known sealing-skipper, Johan Kjeldsen of Tromsö, who gave the island the significant name it now bears. Geographical investigation owes a deep debt of gratitude to these whaling or sealing skippers, who, while in the pursuit of their labours, made many important geographical discoveries and scientific observations of abiding value. Nor must it be forgotten either that it is on the basis of the experiences of Norwegian sealers, on board their vessels amid the Arctic ice,

that so many Polar expeditions have been able to carry out the valuable work they have done.

In 1887 White Island was again seen, on this occasion by Skipper E. H. Johannesen, who called it New Iceland, and in 1898 it was visited by a scientific expedition, viz., the Swedish Polar Expedition under the leadership of Nathorst. The party landed there, but the conditions of the ice made their visit a very brief one. Still, we have this Expedition to thank for important information respecting the natural conditions existing on the island. In 1925 the British Worsley-Algarsson Expedition was north of the island on board its ship the "Island," and found by its observations that it lay farther to the west than had previously been supposed. Although the island is seldom visited by sealers, one may be certain that they have landed there in certain years, for it is a good ground for walrus, and as it is the best plan to shoot the animals when they are lying on shore, it is natural that the sealers have landed when they have lain off the island to make their catch. As a rule the island is surrounded by pack-ice, and it is considered to be one of the most inaccessible places in the Svalbard archipelago, but when we steered eastward on the 5th August, the sea was almost entirely free from ice.

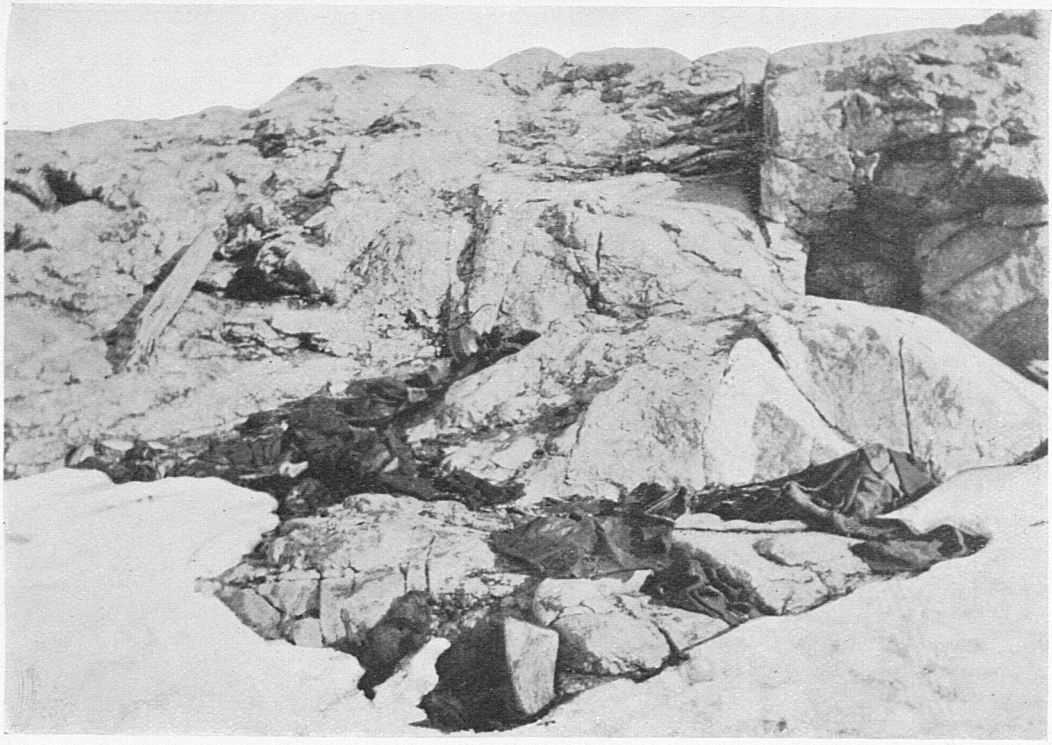
On our coming into the vicinity of White Island the fog lightened, and to the north-east we caught sight of the white cupola of ice. We had then sailed about thirty-one miles from Storön. It was with such ease, then, that we had come to "Inaccessible Island," and our joy was great to have an opportunity of visiting it, even if only for a very short time. We little imagined that our visit to White Island would lead to the solution of the riddle of the fate of the Andrée Expedition, and thus throw a light on one of the most mysterious chapters in the history of Polar exploration.

It was a magnificent and stately picture which presented itself to our eyes—a dazzling white shield which seemed to float on the waves from which it rose in precipitous walls of ice. The sea lay like a mirror, and the sun shone as we cautiously approached the island. Roundabout us lay immense icebergs aground. It is dangerous sailing here, and this so much the more that not a single sounding is marked on the chart, so that it is fortunate that the numerous shoals and reefs are pointed out by the icebergs. So Eliassen manœuvred his vessel with great caution and soundings were taken the whole time. We were now on the south-west side of the island, and, on approaching, we caught sight of a low-lying snow-free stretch of land which projected from beneath the white foot of the glacier like a dark line. Soon afterwards we anchored half a mile from land in nine fathoms water and prepared to go on shore. Geologist hammers, botanizing boxes, nets and other scientific equipment were brought out, and then we all left for land in the motor-boat. On our way we passed a herd of walruses. These had simultaneously been observed from the sloop by Skipper Eliassen, and as it was the first booty that had been seen since we started, all spirits rose. We landed in a little bay and were soon on our way inland. We found the rock to consist of granite and gneiss, partly penetrated by intrusions of pegmatite. Gravel and sand lay between the low hills, and a shallow little tarn broke the monotony. A red-brown moss formed a thin covering here and there, but otherwise the vegetation was terribly poor. Here and there lay a few snowdrifts. This stretch of ice-free land was perhaps three miles long, and in places a quarter mile wide on the south-western side of the island; thence it rose evenly towards the glacier which constituted the mighty background of this shore of a desolate Arctic island. We moved onwards towards the glacier and found on the way a little

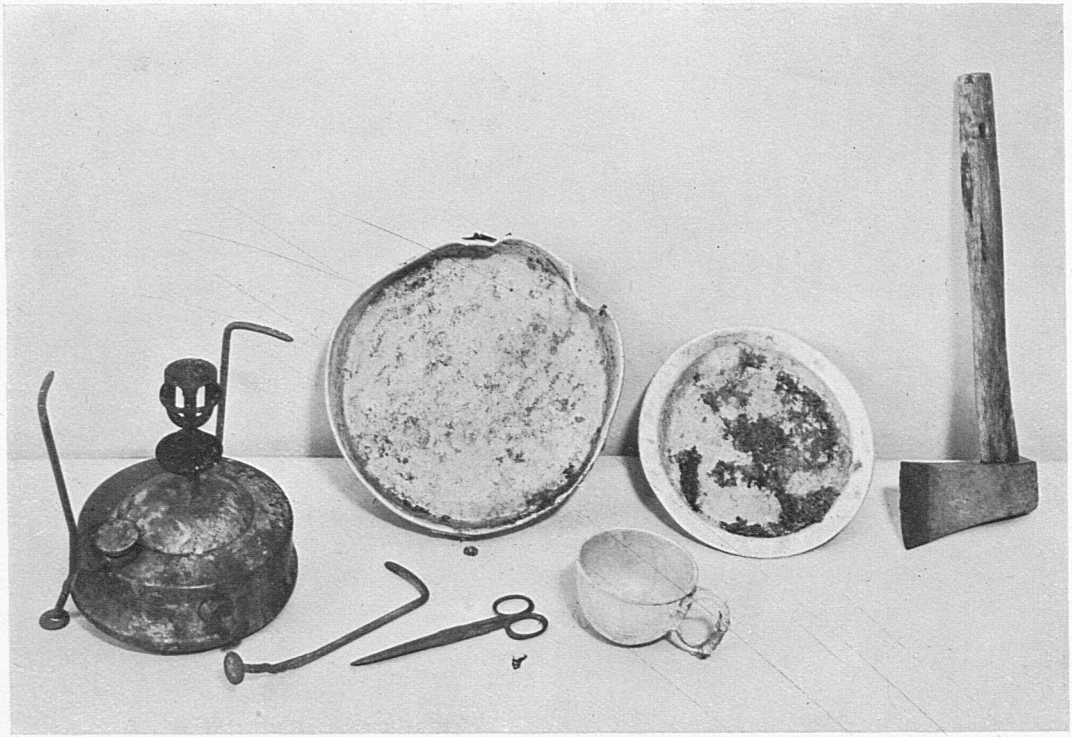
plateau on which a colony of ivory gulls (*Pagophila eburneus*) had its breeding-place. There was a dreadful commotion when we approached and disturbed the idyll. The snow-white birds rose in a cloud, and the air was filled by their hoarse cries; they did not fly far, however, as their young had just been hatched, and so we were able to come very close to them. Towards the evening we went on board the "Bratvaag" again.

Apart from the naked tract of land we had just visited, and a similar stretch on its north side, White Island is entirely covered by an immense shield of ice which attains a height of more than 660 ft. From our anchorage-place it appeared to form a very regular dome. From the south-east, on the other hand—as we afterwards saw—this covering is not fully so symmetrical. There exist several cupolas which, judging by all appearances, give a picture of the topography of the sublying solid fell.

And then came the 6th August. A glittering day, with the sun shining in a cloudless heaven. A most intense silence prevailed everywhere, broken only now and then by thunder from the glacier to our north, where it sank steeply into the sea. This noise was produced by large masses of ice loosening and plunging into the water, there to continue their existence as floating icebergs until they were melted by the waves. Otherwise this was the home of the great white silence, and it was not possible to feel otherwise than slightly depressed by the deathly quiet. We were glad to begin to work. Now the sealers began their walrus-hunt, and towards midday two whaling-boats left the "Bratvaag" in charge of the harpooners, Ole Myklebust and Sevrin Skjelten, to get their booty. The hunt was started just inside our anchorage-place and no long time elapsed ere the first walruses were caught and drawn up on shore. While the hunt was going on, the walruses began to retire behind a point



ANDRÉE'S LAST BERTH ON WHITE ISLAND



VARIOUS DOMESTIC UTENSILS—TO LEFT THE PRIMUS STOVE, WHICH WHEN FOUND STILL CONTAINED PARAFFIN

of land lying southwards, and the boats pursued them. Skipper Eliassen, in the motor-boat, was busy pulling the carcases up on land.

As the day went on, the skipper returned to the ship. He neared us calmly and quietly and told us that they had made a great find. *They had found Andrée!* And they had also found the canvas boat of the Expedition, filled with all kinds of equipment.

Eliassen had in his hands a book which had lain in the boat. The book was wet and heavy, and the leaves stuck together, but it could be opened in one or two places, and we saw that it was the Expedition's observation-book with detailed calculations of the astronomical observations. There was side after side with figures, with here and there a list of the supply of provisions, a bill of fare for the week, together with other memoranda. We were astonished to see how neatly and orderly everything was written. It was just as if the notes had been put down in a warm room, and yet the calculations had been made and written during the course of a death-march across the ice. We were aware that Nils Strindberg had been the scientific member of the Expedition, so that it must have been he who had made the memoranda. And he must have been a man of the right sort. On the first page we were able to read a part of the title: "The sledge journey 1897." There could be no doubt but that this was the Expedition's observation-book, used after they had left the balloon, probably far northwards among the ice. The news of the discovery made a deep impression on us all. Here on White Island, here where we now stood, consequently, was the place where the boldest of all Polar expeditions had come to a tragic close. We sat still a moment ere we thought of rising again. Our words were very few, overwhelmed as we were by the discovery that had just been made.

But there was no time to lose. Provided with an

iron-bar, mattocks, spades and tarpaulings, we all started for the place where the find had been made, and on the way Eliassen related the circumstances under which it had happened. It was the sealers, Olav Salen and Karl Tusvik, who had first made the find. It is these two young lads who have the honour of being the first to discover Andrée's camp. Salen is from Aalesund, seventeen years of age, and this was his first voyage to the Arctic Sea. Tusvik, from Sykkelven near Aalesund, is twenty-four years old and has had some years' experience of the Arctic regions. Intrepid and able lads, the best of representatives of their calling! It was these two young men whom Fate had chosen to find the solution of the riddle of the Andrée Expedition, and we were as glad as they at the discovery they had made. They were members of the crew of Sevrin Skjelten's boat. Skjelten is from Haram, near Aalesund, twenty-five years of age; he has been in the Arctic Seas with the "Bratvaag" ever since 1923, as sealer and harpooner. He is an uncommonly capable man with interests and knowledge above those ordinarily distinguishing a sealer. The other members of the crew were Johan Almestad and Sigurd Myklebust.

The story of the discovery was as follows:—In the forenoon, both whaling-boats had been out killing walrus, and when the animals retired eastward and southward, the boats went after them. Boat No. 2 had just shot two walruses, which were afterwards drawn up on shore to be flayed. When the work had gone on for an hour or so, Salen and Tusvik went up the strand to look for drinking water, which they thought would be refreshing after their exertions. They came to a stream across which they waded, and then, on the other side, they found an aluminium lid which they picked up with astonishment. They began to look around and noticed a dark object sticking up out of a snowdrift a little farther inland. They

went there at once and found a canvas boat, half buried in the snow. In the boat lay a number of various articles, among which, as seamen, their attention was first attracted by a brass boat-hook.

The two youths ran back to the beach and told what they had seen, and all the party returned to the spot together. After a short stay there they went back to the beach, and then came the motor-boat with Skipper Eliassen to help in the work with the walruses. But they found something else to think about. When Eliassen heard of the find he went to the place at once. There lay the boat with a full cargo of Expedition equipment, many of the objects being marked "Andrée's pol. exp. 1896." About 33 ft. north of the boat he found a human body which lay leaning back against the slightly sloping wall of rock. Close by the boat there was a sledge frozen deep in the ice. We learned all this on our way to shore.

We landed on the beach below Andrée's camp, stepping on shore close by a little rock. At some distance lay the two bloody carcases of the walruses. Some ivory gulls sat pecking at the meat. When we came they flew lazily away, but soon came back again and continued their meal. We walked up the beach. An end had been put to all hunting, of course, after the discovery was made, and we could see the sealers stand round the boat that was lying in the snowdrift. We waded across the little stream and went silently towards the camp. Behind us the sea is calm and ice-free as far as the eye can reach. Glimmering white icebergs lie aground in the neighbourhood of the island. We approach the camp one by one, without exchanging many words. The excitement is great, for in a few minutes we shall stand by Andrée's last camp.

We are here at the spot! Hither had Andrée and his comrades come, never to leave the place again. The moment was a strange, a solemn one, and some

moments passed before we began our task. We did not speak much—for what had we to say?—and gradually the whole truth broke upon us; the story of the tragedy that had been acted here. Our thoughts found their way back to that July day in 1897, when the "Eagle" rose from Danes Island in Spitzbergen with three men in the car, and was carried away by the wind on the most daring Polar expedition ever undertaken. The men never came back. The last news from them was brought by the carrier-pigeon which they had released in latitude 82°, and in their communication there stood, too, the words: "All well on board." That was their last message. Everything that happened afterwards had, for a generation, been the object of the acutest speculations. Search expeditions had sought for the vanished balloon-travellers of whom no trace could ever be found. Andrée and his comrades kept the secret of their disappearance, and gradually the world satisfied itself with the conclusion that the explorers had been lost on the ice or had fallen into the sea, leaving no trace behind them. Most people accepted this explanation. Probably no one ever imagined that Andrée would ever be found. And now here we had Andrée's camp before our eyes and the problem of his disappearance was solved.

It was strange to stand there and let our gaze wander over the same landscape and the same sea that Andrée and Strindberg and Fraenkel looked at for the last time thirty-three years before. It was as if we saw them before us. They are coming towards us down there on the ice, pulling their heavy equipment. Tired and weary they must have been when they landed after having been compelled to leave the balloon on the ice far to the north. We supposed that they must first have endeavoured to make their way to Spitzbergen, but that they had constantly been forced eastwards by the open water. Then, one day, they had caught sight of the icy back of White Island

which we now knew so well. They must have been filled with renewed courage, with fresh hopes. At last they had landed on the barren shore of the island; had felt solid ground beneath their feet in place of that awful, drifting ice. It was as if the air still gave the echo of their voices. We thought we heard the sledges scrape against the stones when, with a last effort, they pulled them up on the land in order to encamp in the shelter of the rock beside which we now stood. And they must have climbed the glacier now and then to look across the sea, though they could have seen nothing but ice and ocean. Maybe, one day of clear weather, they caught sight of Storön's white dome in the west. They knew that behind it lay North-East Land, and behind that again Spitzbergen, whence there was the path home to Sweden. . . .

But they were never to leave White Island, for here they fell victims to exhaustion and cold.

The camp lay on the north-west side of a rocky hill. When Andrée and his comrades came there it must have lain almost naked. Now we saw in front of the fell a large snowdrift, heaped there by the wind. On the snow, some few yards from the naked rock, lay the boat, with its eastern side buried in the snow. It was filled with all possible articles belonging to the Expedition equipment, and it was evident that the bears had scattered the contents around.

At the end of the boat nearest the sea lay a parcel of books. We could see nautical and trigonometrical tables, a Swedish scientific work, and evidently much more, which we did not try to open, however, for fear of damaging them in some way. Of the other objects we noticed: two shot-guns, an anemometer, aluminium boxes partly squeezed together, string, a work-box with various sewing materials, articles of clothing and a theodolite. In addition, there were a harpoon, hammers, files, a brass boat-hook and the bones of a polar bear.

There was much ice in the boat, but we could not remove it without damaging the contents, and it was evident that the boat contained much more than we could see. Of other objects lying among the snow in the neighbourhood we noticed: a square, heavy box which certainly contained ammunition; a rolled-up Swedish flag with the Union mark; trousers, a piece of black and red cloth, an oblong instrument-box and a barometer. A piece of canvas was found farther off, probably a part of the covering of the boat which had been torn loose by the wind. At about right angles to the boat lay an empty sledge, the upper rail of which was on a level with the surface of the snow, and by the side of which there was found a handkerchief with the monogram N. S. marked with red thread. About 33 ft. from the boat, and on the naked rock, lay the body found by Eliassen. It was frozen, and the legs lay in a perfectly natural position. On the feet were Lapp boots, and these lay partly beneath the snow. Higher up, the bones stuck out from among the clothes. Various articles of clothing lay scattered about, and as there was not much left of the upper part of the body and the head was missing, it was clear that bears had been there, destroying and consuming very much. We opened the jacket carefully and saw that inside, on the back of the garment, there was sown a large monogram A., from which we drew the conclusion that it was Andrée's remains we had before us. In the right inside-pocket we found a diary, of which, as far as we could see, only a couple of pages were written on. In the same pocket lay a lead pencil and a pedometer.

Not far from Andrée lay a gun, with the barrel sticking into the snow so that only the butt was visible. On top of the clothing there was a Primus stove. We shook it and it proved to still contain paraffin. When we pumped, the paraffin came out of the burner in a fine spray, and the valve at the side

was in order too. We unscrewed it a little and could hear how the gas streamed out. If it had been necessary to cook anything now we might perhaps have been able to use Andrée's thirty-three-years-old Primus. Besides these we saw a cup, cooking-utensils, parts of the cooking-apparatus, an axe and, in a little wooden box, a china pot of lanoline. A little farther off lay a bottle of white tablets. About sixty yards east of this place we found a pelvis, which we considered must be Andrée's.

But several more finds were made. About thirty-three yards north of the camp Skjelten found a grave lying between two rocks. First he saw a cranium which lay there, bleached, dreadfully smiling, among the stones, four yards from the grave. It was a typical Arctic grave. The corpse had been placed direct on the ground and then covered with stones. The feet in their Lapp boots stuck out between the stones, and, higher up, the left shoulder was visible. Above the stones there was found a shoulder-blade. It was evident that the bears had been busy there too.

We examined the place around the camp very carefully, but nothing more could be found, and so we began to dig out the things from the ice. The first thing to be done was to get out the boat, but this proved troublesome work. The ice roundabout was removed by means of mattocks and spades, and as the work progressed, it proved that the boat was resting on a sledge, to which it was well lashed. It had four cigar-shaped cushions as supports. The cushions were wound round with red ribbon. As it would have been too heavy to lift both together, the boat was first released, to do which we were obliged to cut loose the lashings. Then the boat was placed on the snow and we began to work at the sledge underneath, which was entirely embedded in the ice, so that the task of hewing it free was a long one. The empty sledge which lay near the boat was released

from the ice with relatively little trouble, and then we directed our care to the human remains.

As I said above, Andrée lay on the rocky ground, so here we met with no difficulties. We stood a long while before this simple resting-place, asking ourselves if it was right to disturb its peace. But finally we were unanimous in thinking that the man who lay there beneath the stones should also be carried home to rest in Swedish earth. But it was more difficult to release the remains of the one whom we had assumed to be Strindberg in consequence of initials having been found on the clothes. It was, perhaps, a somewhat bold deduction, but we had got the idea into our heads that it was Strindberg who lay buried here, and our presumption proved correct. First of all we removed the loose rubble stones which covered the dead man. Then it was seen that the remains had no head, and so we thought the cranium which had been found by the side of the grave must be the missing part. Everything below the stones was frozen, and as the cleft was narrow we could only work from the two ends, and it was difficult to use our implements. The skeleton was frozen fast to the ground on which it was lying, so that it had to be hewn free. When we had released it, it was laid on a tarpauling together with the other bones belonging to it. The excavation was now ended as far as circumstances allowed.

Meanwhile some other members of the party had raised a cairn just behind the spot where Andrée had been found, and on the summit there was placed a pole stayed by means of three guys. It could be seen very clearly, and it will make it easy for future expeditions to discover the place. Inside the cairn we placed a bottle containing a sheet of paper on which was written in Norwegian and English: "In this place, the Norwegian Expedition to Franz Joseph Land, on board M/S 'Bratvaag,' Skipper Peder

WRECKAGE FROM ANDRÉE'S CAMP ON WHITE ISLAND

WRECKAGE FROM ANDRÉE'S CAMP ON WHITE ISLAND

Eliassen, found the relics of the Swedish Andrée Expedition. White Island, 6th August, 1930. Gunnar Horn."

Everything had now to be carried down to the water. The bodies were placed in tarpaulings and taken first. Then came the turn of the boat. This was not a very easy task, as it was full of ice and very heavy. As before mentioned, we could not remove the ice without injuring the contents, so we first laid the boat on a tarpauling for the purpose of pulling it down in that way to the sea, but we had not gone many yards before the tarpauling began to tear, and we had to give up the attempt. Then we sent down a couple of men to bring up some oars, so as to try and carry the boat with the help of these. We put five oars below the boat and, with five men on each side, we succeeded in lifting the boat and carrying it down to the beach. Everything taken down was afterwards put on board one of the whaling-boats, which became so heavily laden that it did not lie many inches above the surface of the water. The boat was towed by the motor-boat, and an hour later we had reached the "Bratvaag." Here the boat and the sledges were placed on the boat-deck to starboard, while the human remains in their tarpauling coverings were laid on the fore-deck. Later on, Ole Myklebust made a chest, rather more than two yards long, with two compartments. The skeletons were placed in the largest—Andrée with the gun by his side—while in the other chamber were put all the small objects that had been found beside Andrée.

It was very fortunate for us that we had such calm weather when we came to White Island, for it is only possible to land in calm weather on the dangerous coast of this island, which is exposed to every wind. If there had been any swell when we arrived at the island there could have been no thought of landing, and now we had to make such use of our time as to

prevent the danger of interruption before we were finished. On our leaving the camp we had an idea that many objects belonging to the Expedition might be lying beneath the snow, but at that time the masses of ice were so thick that it was thought better to wait and, on our return journey, call and see if anything had come to the light of day after the melting of the ice, which must have taken place by that time.

As will be understood by what has been said above, the camp lay somewhat more than 200 yards from the beach and was visible from that spot. But, as a rule, a dark object against a rocky background becomes almost invisible, and it was not until their attention had been awakened by finding a piece of metal on the shore that Tusvik and Salen caught sight of the boat when they began to look around. We had not noticed any cairn or hut, and if the snow had been a couple of feet higher, everything would have been concealed. This summer, however, there was uncommonly little snow, and the thaw must have been something tremendous; there is, therefore, reason to believe that during many summers the camp has been quite hidden by the snow until far on in August. In such a case, even if the island had been examined ever so carefully, there would always have been the possibility of walking over the boat and the bodies without noticing anything at all. It is worthy of observation that Skipper Theodor Grödahl, of Tromsö, states that he touched at White Island on the 9th July this year with the motor-cutter "Hanseat," and that he landed on the south point with two men to look for traces of Nobile's balloon party, and, on the occasion, had gone across the whole of the point. There was much snow at the time and only a few patches of land were visible here and there.

We did not stay long at White Island, for the vessel continued its journey the very next day; in the afternoon we had fog again, and White Island disappeared

from view. Towards evening the fog lifted and we caught sight of a low ice cupola to port. It was Victoria Island. White Island was also visible, and over and over again our eyes sought the place which, for thirty-three years, had concealed Andrée and his comrades from an expectant world. At night we reached Victoria Island and ran up northwards along its western side, for on the north-west side there is a little beach, the only place where it is possible to land. Here the coast is shelving, as at White Island, and a mass of ice had grounded there. We made our way in, and together with Eliassen and Hanssen I climbed for a moment to the highest point of the island, whence we had a magnificent view. There was open water everywhere. In the south-west lay the bank of fog we had just passed through, and in the west lay White Island, ghostly white in the light night, with a faint veil of mist around its highest point. It seemed as though it would not let us go, but stood there in impotent ire, wrathful that we had deprived it of the greatest secret of the Polar Sea.

From Victoria Island we continued eastwards, and in the forenoon of the 8th August we caught sight of a sealer. We steered down towards the vessel, which proved to be the "Terningen" of Tromsö, skipper Gustav Jensen. He came on board and heard about the find of Andrée's remains, news which, of course, made a great impression on him. For everyone knew Andrée. He had become, so to say, a legend, and in Tromsö people very well remembered the bold Swedes who had intended to make their way to the North Pole by balloon. Jensen was soon going to return home and we resolved to send by him a communication to "The Norway Svalbard and Polar Sea Research," in Oslo, with information of the find. We did this because some time would perhaps elapse ere we returned. We had important work to carry out on Franz Joseph Land, and the plan we

adopted would allow the authorities at home time to make their preparations.

So we left the "Terningen" and set our course eastward towards Franz Joseph Land, our final goal, but which, after our late experiences, seemed to have lost somewhat of its importance. In the afternoon of the 10th August we reached land and came up under Cape Grant.

We stayed at Franz Joseph Land until the 26th, when we returned westwards towards Victoria Island, with a faint north-westerly wind and heavy swell from the south. In the morning the fog grew lighter, and the white dome of Victoria Island was clearly seen against the sky in the west. In the afternoon we passed the island on the south side and at a distance of a couple of miles. The many icebergs we had previously observed at the island were now all gone. It was probably the north-west storm we had lately had which had swept them away. In the evening we saw the icy masses of White Island in the west and, simultaneously, those of Victoria Island to the east. White Island was certainly considerably larger than the other, and its longitudinal direction seemed to run from north-east to south-west. By taking bearings we found its length to be about seventeen miles, and as the breadth is some eight to ten miles, the island is by no means a small one. When we came under its south point we could see, by means of a telescope, the white pole which stood above Andrée's cairn. A bear was walking along the beach and making a good meal, most probably of the remains of the walruses that lay there. We wished we could have gone ashore once more, to see if there was anything more to be found after the heavy thaw which must have taken place during the time we were away. But there was a heavy swell from the south which made landing impossible, nor did it seem as if the sea would very soon become calm again.

We left White Island for good, and set our course for King Charles' Land. An hour after we had passed White Island the fog grew lighter and we saw the white back of Storön rise above the horizon in the east, with its contour sharply defined against the strong light lying above North-East Land. In the forenoon of the 27th we were off the central island of the King Charles' Land group, and after paying a visit to the place we turned our course to Hopen and then to Norway. The first place we intended to call at there was Sörön, west of Hammerfest.

We had now begun to listen a little to our wireless apparatus, which we had hitherto not employed very much, as, amid the Polar summer light, it is not of much service. But now it was later on in the year, and as we came southwards the nights grew darker, of course, so that we could once more hear the news which was broadcasted. On the 29th we had a storm from the south-west and were obliged to lie and back, the seas being so heavy that it was no use to try and force the vessel through the waves. As on previous occasions, the "Bratvaag" showed itself to be an extremely good seaboat. It rode the billows like a bird and did not ship much water. A magnificent vessel, with an equally good engine.

In the evening the wind fell a little, and we began to put on speed again. In the morning of the 30th we were abreast of Björnön, and later on in the day the wind dropped still more, although the swell continued to be very heavy. In the evening we were about 120 miles north of Sörön, and then we put our wireless into operation. There was news of all sorts to be heard, and many good sending-stations, so we passed the time very agreeably, and were happy that we had come so far south again that, by means of our wireless, we were able to once more come into communication, so to say, with mankind. A little past nine in the evening Sörensen sat listening to the

weather reports. Then, all of a sudden, he heard: 'Hallo, 'Bratvaag'!" He came rushing up on deck and said that they were calling us and asking us to come home. We all tumbled down the companion-way into the cabin and heard the communication when it was sent out the second time.

The call acted on us like a bomb. *Now* we began to understand the degree to which the world must have been moved by the communication respecting the Andrée find which we had sent home by the "Terningen." Then came Sunday, the 31st August. We had got land in sight during the night and were under Sörön in the morning. At eight o'clock we hailed a fishing-vessel, to exchange bear's-meat for fresh fish, and then we heard that a number of vessels were looking for us. We went into a little place, Hasvik, in Sörön, in order to telephone and wire, and so for the first time came into actual contact with a world which seemed to be a trifle excited. From Hasvik we continued to Skjærvö, where we anchored in the evening, and Eliassen and I at once went up to the telegraph station to despatch several messages. The whole world seemed to be in communication with Skjærvö, whose name had once before flown over the globe, viz., on the return of the "Fram" in 1896. There were journalists everywhere, and we were greatly impressed by the rapidity with which every-one had found his way to the place. We were met with amiability and good-humour in every direction, though we thought that our reception was almost too great. Still, we consoled ourselves with the Arabian proverb written on the wall of a cabin on board the Austro-Hungarian Polar vessel, the "Tegetthoff," which read: "This, too, will pass!"

At Skjærvö we received orders to leave, so that we could arrive at Tromsö in the morning of the 2nd September, and were informed that a vessel of the Norwegian Marine, the "Michael Sars," would meet

the "Bratvaag" in the channel between Skjærvö and Tromsö. We left Skjærvö in the afternoon and, early in the morning of the 2nd September, met the "Michael Sars" at Grötnes. On board was the Commission appointed by the Swedish and Norwegian Governments to receive and preserve the find. They came on board the "Bratvaag" and we gave them all the information we could respecting the matter.

We arrived at Tromsö at 8.30, and then the members of the Commission went on board the "Michael Sars" again. At ten o'clock we went to Consul Arnesen's quay, where the bodies were carried on shore amid great solemnity and with a guard of honour from the "Michael Sars." A little later we moved up to the quay below the Tromsö Coast Hospital to which the remains had been carried. All the objects found by us were now transported to the Hospital, where the members of the Commission at once began their labours.

. . . . . .

In memorial lines written long before on Andrée are the words:

"No memorial can be raised above the grave of Andrée and his comrades. And the spot where it should be raised will, perhaps, remain for ever unknown."

A casual incident, a happy contingency, enabled us to discover Andrée and his comrades, and to raise a simple cairn of stones above their last camping-place at White Island. We are all glad and proud that it was just us whom Fate had chosen as the instruments of solving one of the greatest mysteries of Polar exploration, and of bringing back the Polar travellers to rest in the soil of their native land.

XVII

THE " ISBJÖRN " EXPEDITION TO WHITE ISLAND

By KNUT STUBBENDORFF

IT was a woman who first had the idea which ripened into the " Isbjörn " Expedition to White Island. She was seized with the idea at the right moment, for, of course, all the chief editors of all the newspapers in the world felt the same longing on the 23rd August—to procure news respecting the Andrée find.

And Fate arranged matters so that this lady's proposal was the origin of the sequence of well-connected events which led to the " Bratvaag's " discovery of the camp of the Andrée men being succeeded by the expedition of the " Isbjörn." The lady was Mrs. Elsa Nyblom.

The journey from Stockholm is begun by the *Lapland Express*, and on the way a wire is sent:

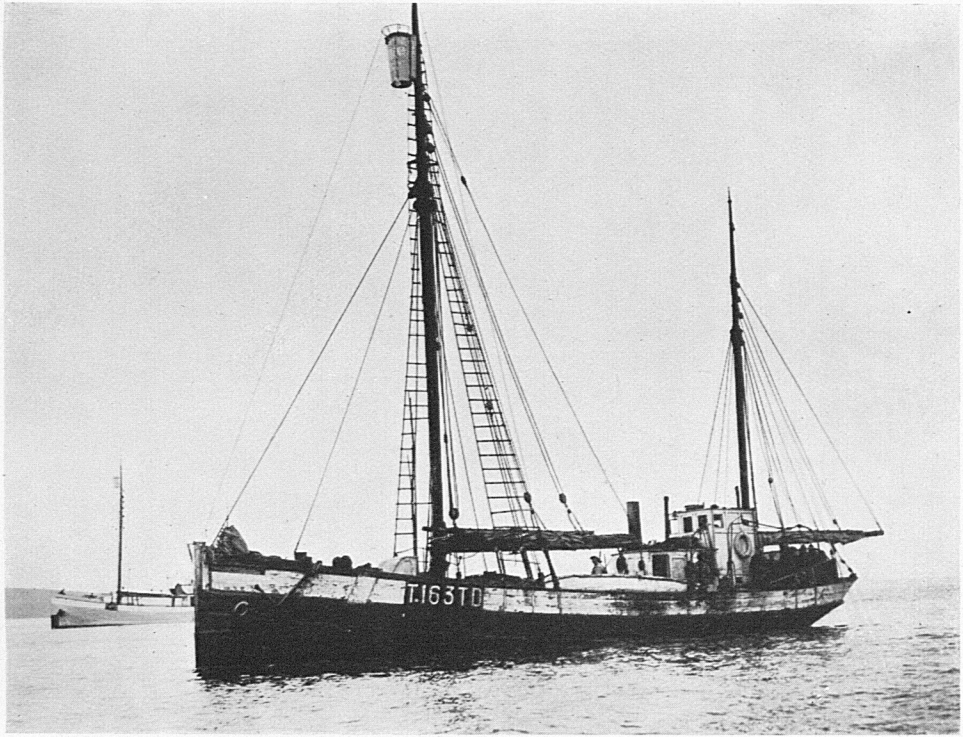
" Is it certain that the ' Isbjörn ' can start immediately ? "

When we are somewhere about Boden the answer comes:

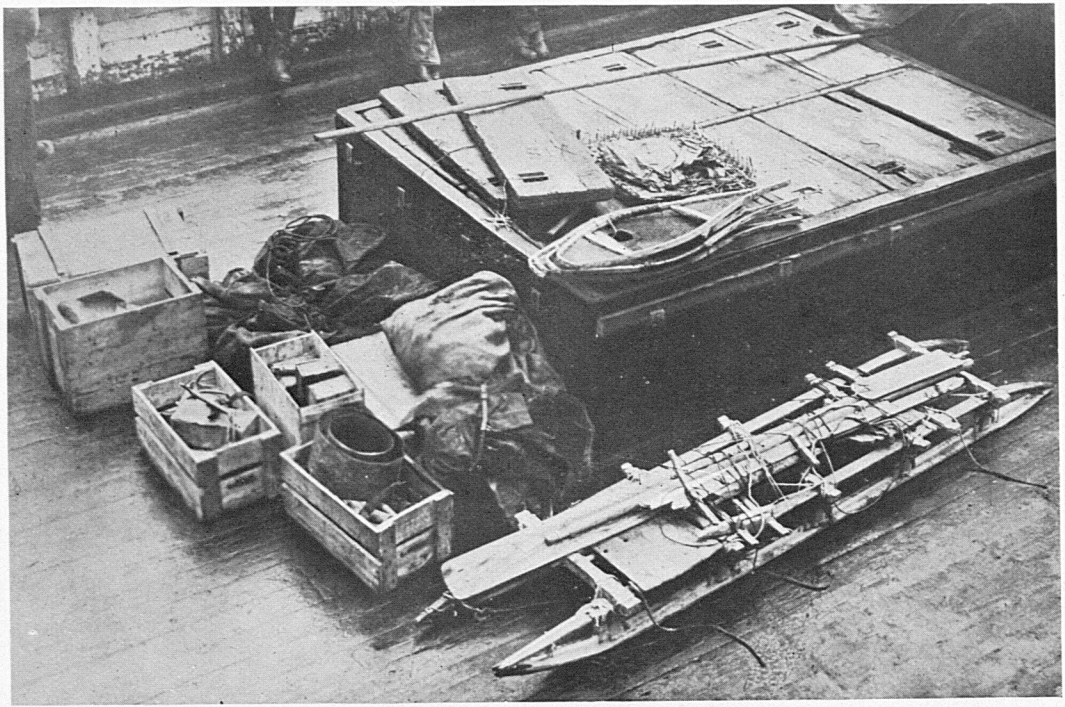
" The ' Isbjörn ' clear to start Tuesday 26 ' Isbjörn ' best wireless strongest engines telegraph agreement express."

But I did not, being wise from old experience. But in Narvik I was met by a serious gentleman who had undertaken everything.

" Now there is no other boat than the ' Isbjörn ' at liberty. The owners demand agreement wired express. An American syndicate is your rival."



THE 'ISBJORN'



THE ANDRÉE FIND ON BOARD THE 'ISBJÖRN'

I was not as yet aware who the "we" of Stockholm were. I possessed nothing but Mrs. Nyblom's idea and the remainder of the £30 which she had quickly scraped together as my starting capital. In any case, a decision was called for. The "Isbjörn" was engaged.

If one reaches Narvik in the morning—which is usually the case when one comes there from Stockholm—one must usually wait until the evening to be able to go on to Tromsö by the ordinary express-route steamer. But journalists and their helpers have discovered that it is possible to take a motor-car across the fells and catch the express boat of the evening before at Finsnäs. This is a wonderful trip of ninety miles, and we made it. In this way we saved twenty-four hours of valuable time and arrived at Tromsö on Monday evening, the 25th.

The next morning, then, the "Isbjörn" was to start.

The owner was a pleasant fellow, jolly, agreeable and a man of the world. He had awakened my interest in the "Isbjörn"; he had made me hope that I should be able to start with it from Tromsö the first of all; he had made me feel sure that I had hired the strongest, swiftest of sloops, with the best wireless on board, and—the "Isbjörn" was not to be seen at Tromsö!

My task consisted of having to go out with an Arctic sealer from Tromsö, and endeavour to meet the "Bratvaag" in the Polar Sea; to go on board and to interview Dr. Gunnar Horn.

A very simple plan in itself, of course, but difficult to carry out.

Early in the morning of Tuesday the 26th August, I left my hotel-room. In the silent and empty harbour, which smelt of dew and fish, I caught a man and a rowing-boat; I was freighted across the streaming Sound and landed on that side where Gustav Jensen dwelt. It was in Tromsdalen, which, at that moment,

was a miraculous, sun-illumined, autumn morning idyll, lying between the slate-black walls of the fell.

Gustav Jensen was the skipper of the good sloop "Terningen," and he had been on board the "Bratvaag," up there north of 80° latitude. He was the first and, hitherto, the only person who could tell the civilized world what Dr. Horn had related. He had Horn's letter to the Svalbard Office, he had seen what was on board the "Bratvaag." And he could himself speak about things.

Gustav Jensen was a forty-years man, of pleasant, deep appearance. He was the boldest relater of sailors' yarns I have ever met.

This morning his imagination had carried him so far that he could calmly assure me he had recognized Andrée, where he lay frozen in clearest ice on board the "Bratvaag."

It is possible that he had been inspired to this romantic excess by what had been said by some expert in the columns of a newspaper, as regards the remarkable preservative qualities of ice. And the expert, in his turn, may possibly have read a terrible novel by Hans Heinz Ewers.

On my return to the town and taking breakfast, I met the owner of the "Isbjörn," who informed me that he would go out in his motor-boat to meet his schooner, and arrange everything on board for a speedy start not later than the following morning, *i.e.*, Wednesday forenoon. I could do nothing but urge him to make all the haste he could, tied as I was to the "Isbjörn," as no other sloop with wireless could now be had.

When my friend the shipping-owner had gone, I went to Consul Karl Saeter, the representative in Tromsö of the Svalbard Office. I asked him if he thought that there was really anything on board the "Bratvaag," and begged for his opinion as to Skipper Gustav Jensen.

Consul Saeter gave an amiable but ambiguous reply, stating that he could say nothing positive with regard to the find. What Gustav Jensen said, Gustav Jensen had to be responsible for.

Thus referred to draw my own deductions, I found that the task I had been given in Stockholm, to go out and meet the "Bratvaag," would be insufficient. It was too uncertain.

When I was at Narvik, an acquaintance had asked if I did not intend to go direct to White Island. At Tromsö, on Monday evening and during the night, we had discussed the matter, but the insight that this was the only reasonable thing to be done had not become clear to me before now, Tuesday morning.

A telephone-call from Stockholm supplied me with important information, viz., the names of the persons and of the newspapers for whom I was working. Captain Sten Dehlgren, the Chief of the *Dagens Nyheter*, asked if I had not time to go up to White Island, to which I replied that that was part of my plan. And so our agreement was come to.

Tuesday, the 26th August, was an unpleasant day. The "Isbjörn," my sloop, had not returned to Tromsö after its last sealing-trip. Nor had the owner of the "Isbjörn" returned, and I myself began to feel some doubt as to the possibility of starting. And then, it was raining.

A group of my colleagues, happy and expectant, went on board the sloop "Heimen" with Skipper Gustav Jensen as pilot, at nine o'clock in the evening. Late that night I received the message from a friend who had gone as look-out, that the "Isbjörn" had at last come in.

The following afternoon the unloading of the boat's cargo was stopped and, with one-half of a six months' catch on board, the "Isbjörn" laid out to meet the "Bratvaag," and to continue to White Island. While we were going at half-speed through Fuglöy Sound on

Wednesday night, and were trying to repair the damaged wireless apparatus, the little "Heimland," of the third journalist-paper, came out of Tromsö and rushed past us at a good speed on its way northwards towards the Polar Sea. The "Isbjörn" was last in the race.

I was unsuccessful in my attempt to meet the "Bratvaag."

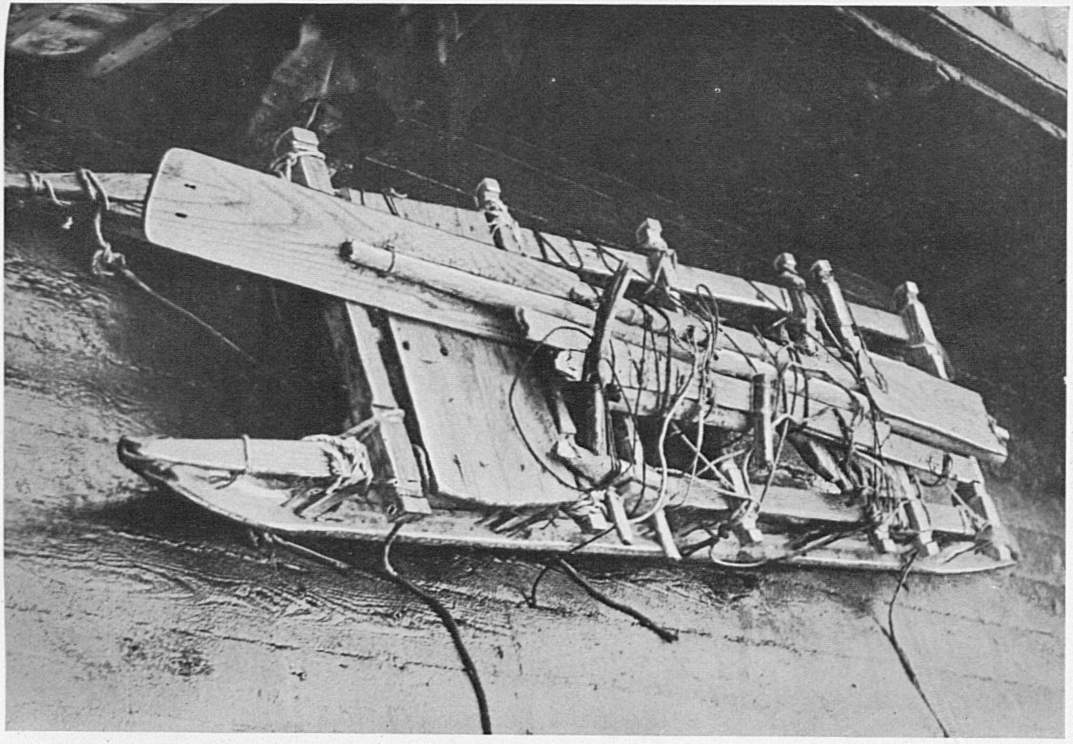
But, thanks to a wonderful chain of events, most favourable to the "Isbjörn" Expedition, we were the only ones who made the attempt to go on to White Island, and thanks to the fact of the crew understanding that something extraordinary was demanded of them, we reached our goal, in spite of an engine breaking down and a few other mishaps.

For my own part, I was almost convinced that there was not much to be done up there, for I listened every day to the broadcasting account of the work of the Scientific Commission after it had begun to examine *those remains of Strindberg and of Andrée* which the "Bratvaag" had brought home, and when their labours had not progressed so far but that a hope seemed to be entertained of the Commission's being able to discover a third *body*, in the canvas boat.

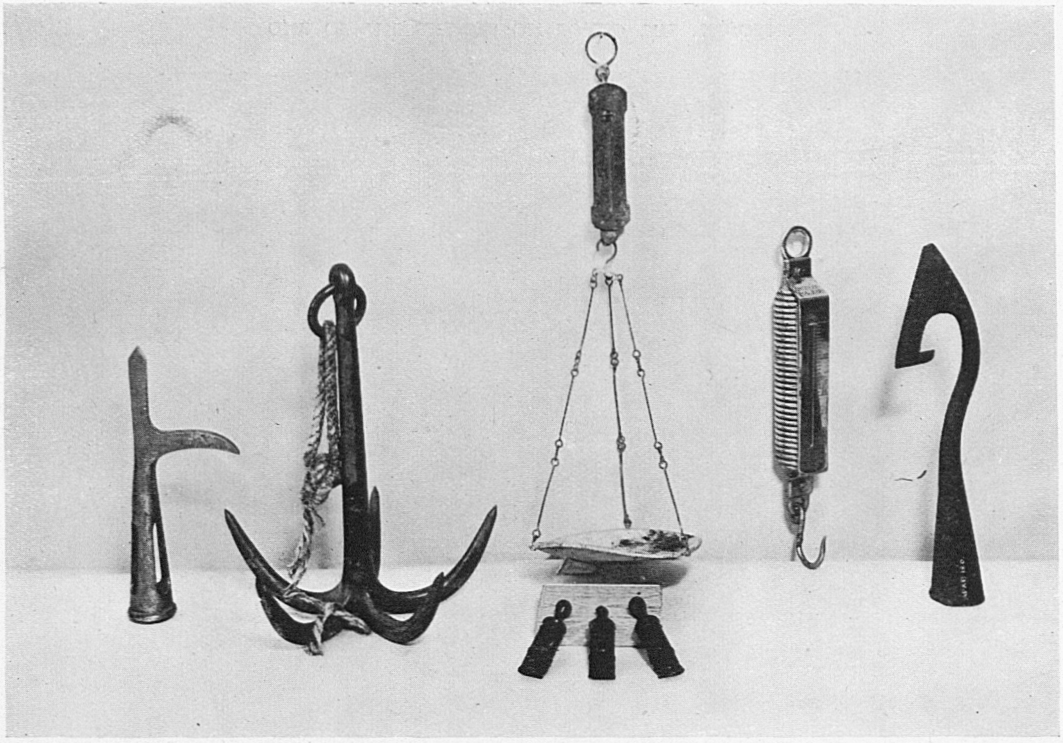
After the canvas boat had proved not to contain any remains of a third man, rumour stated that not more than two men, *i.e.*, Andrée and Strindberg, had landed on White Island and died there. It was first in consequence of the discoveries made by the Press expedition on board the "Isbjörn," that it became generally known that all three men—Fraenkel, too, consequently—had been at White Island.

The sloop arrived at White Island in the morning of the 5th September, and we went ashore, seven men strong, met polar bears on the tundra, shot three of them, and found the cairn which Horn had raised by the camp of the Andrée men.

Hitherto my undertaking had been a bit of good sport, an agreeable adventure, a change, accepted with



ONE OF THE SLEDGES ON BOARD THE 'ISBJÖRN'



SOME OF THE OBJECTS FOUND—FROM LEFT, TOP OF BOAT-HOOK, GRAPNEL, SPRING-SCALES, HARPOON—IN FRONT, THREE WHISTLES

pleasure, in the everyday life of a writer. But at White Island I encountered a responsibility which, as an experience, was perfectly new and unthought-of. In its presence I am humbly conscious of the equivocal appearance of my rôle there.

Perhaps I was unworthy of that rôle. But I was not *more* unworthy of my task than any other person would have been who, for one reason or another, had come to this camping-place of the dead, for the purpose of bringing back their remains to an impatiently waiting world. No one could have felt more deeply than I did for a moment at White Island his own littleness and the greatness of his responsibility—whether his wish to disturb the silence of this desolate island had been prompted by scientific or by journalistic craving for knowledge; whether he had desired to ensure the advantages of the undertaking for a scientific institution or for a journalistic concern. When carrying out rough-handed work at that place, even though in the fulfilment of a duty, we should all have felt equally unworthy.

On the stony tundra, with its sandy borders of dried-up streams of ice-water from the inland glacier, there rose a little rocky ridge, 16–20 ft. above the rest of the ground. On top of this rock lay a cairn, from the summit of which there stuck up a guyed pole with a cross-piece.

The little rocky ridge ran east and west, and lay about 250 yards from the edge of the water, about 1,100 yards from the edge of the inland-ice, and approximately the same distance north of the place where the abrupt fracture of the glacier dropped steeply to the sea.

We came there from the north. In front of the rock, and up to the spot where we had stayed our steps, there lay an even surface of ice, extending some 30 steps in the longitudinal direction of the rock, and 30 steps across, in a north-and-south direction. It

was disintegrated ice, with thaw-patches; it was a crust of ice in the process of melting, so that its outermost thin edges, which rested on the tundra, were as soft as old, wet snow. Various objects and fragments of bones could be seen in the uppermost layer of the ice.

At that end of the ice-cake which lay towards the land stood two half-tumbled-down heaps of drift-wood stocks, one of them resting against a loose block of stone, the other against the rocky ridge itself. At the opposite end of the ice-crust there was a broad bed of water-sluiced round stones and sand.

There lay a sledge, with clothes and fragments of articles strewn around, just as they had been left when the ice melted and the water had run off. The discovery of these objects in this desert place, these lifeless things, which swiftly carried the thoughts to their former owners and the uses to which they had been put, gave birth to an irresistible impression of the opposition between life and death. Here, then, had men, with warm blood and longing for life, been compelled to cross the threshold of the kingdom of omnipotent cold! They had lived here and—perished!

I wanted to know, How? I wanted so much to speak about, I wanted so much to describe, that white-cold desolation lying above and around the inland ice, to draw the emptiness of the tundra, and to endeavour to paint a picture of man's defiant and tenacious struggle for life, just on this spot.

But to be able to examine and to do all this, I should be obliged, with the self-assumed right of the investigator, to commit profanation. And such sacrilege implies a responsibility much greater than that laid upon me by my task as a journalist.

We photographed the place. Then we walked on to examine, but not before we had agreed that nothing was to be lifted or removed before I had determined what was to be done.

At some distance on the ice, not far from the rock

and just where the cairn stood, I discovered a backbone, a pelvis and one thigh-bone of a human being. Not long afterwards there was found a shoulder-blade close by the same place. Then, at once, immediately below, a skeleton consisting of a whole bone, a thigh-bone, a knee-bone and a foot. A little while later we found a bone of an upper arm, with rags of a striped shirt around it. Still later on, when we had been some hours at the place, there was seen dimly in the ice, and close to a piece of drift-wood, a human skull.

We did the work in this way. First we gathered everything that was lying loose, and after I had noted down the principal of these I began to think I could distinguish a certain planning of the camping-place, viz., a material-depôt at the end of the ice-crust nearest the sea, just where the sledge had stood, and then a dwelling-place close to the north side of the rock, approximately close to the spot where we had found the backbone and the pelvis. Then we began an organized hewing-out and picking away of the ice lying around the finds at these two places.

It began to dawn on me that the brief reports issued by the Commissioners, and the free deductions drawn by the papers on the basis of these communications, had created an altogether erroneous idea respecting that which had been already found, and what might possibly remain to be discovered. But after the discovery, on this first day, of parts of an almost entire skeleton, I did not believe there were many more human remains here. The next day, however, made me heedful; for an iron bar, which we brought against the side of the rock down on to what we took to be thawn-out rags of reindeer skin, struck against something which gave a sound that caused me to cry out and stop the work for a moment. I placed myself with my face to the ground to be better able to see, and to sweep away that which lay between the flakes of ice and the ice-water.

That day—the second of our stay at White Island—was devoted almost entirely to getting clear the find, which proved to be the upper part of the body and head of a man who was lying on his left side, and whose left arm was seen to be bent upwards, with the hand beneath the head.

The dead man was frozen fast to the ground, and I gained the impression that he had lain undisturbed imbedded in the ice, deep below the surface, ever since death had touched him. The head was stuck in a bowl-like depression in the rock, and was frozen fast to it. During the process of liberating both the body and the head, without breaking any part, I was obliged to make my way with a dirk into the narrow, ice-filled space between the skull and the rock. We succeeded, however, in lifting up the body with the head still attached, and placing both in a basket, which we afterwards carried down to the boat and across the fjord to the "Isbjörn."

When a coffin had been made, and we lifted the remains into it from the basket, the only way I could place the body was with the head resting against the side of the coffin. A little while later, however, the head broke off.

On the first day of our stay at White Island—the 5th September—we had found the sledge, a large bundle of balloon-cloth, or tarpauling, containing clothing; two pairs of snow-shoes, a sextant, a chest of medicine, a canvas bag with geological samples in copper boxes, tin boxes with films, two boxes of ammunition, oars and fragments of the canvas boat. In addition, we discovered Fraenkel's almanac and three memorandum books, Strindberg's log-book, and a number of other objects, which we could not examine before we went on board again. On the first day, too, we had also found the parts of skeletons already enumerated.

On the second day we found the above-mentioned

upper part and head of a man, and, besides this, a sheet-iron box containing provisions which had not been touched, some small unopened tin boxes, a meteorological journal, Strindberg's almanac-diary, and a few other articles and documents of less importance. During the evening of the second day we had hewn free the ground-plan of Andrée's dwelling and found its external limits. The hut may possibly have been a tent, with a framework of drift-wood stocks and the bone of a whale, and have been raised against the north side of the rock. When we uncovered the ground where the tent had stood, the floor was bounded to the south by the rock, to the west by a whale-bone and, on the other two sides, by stocks of drift-wood. When we left the place on Saturday evening, the 6th September, to go out to the " Isbjörn " again, we could not find any other articles there.

On the third day, Sunday, the 7th September, the weather was raw and threatening, with sudden squalls of wind, fog rising and lightening, rain and snow, alternately. We went ashore to take measurements. After working about three hours on the tundra around Andrée's camp, one of us noticed that a storm-signal had been hoisted on board the " Isbjörn," which lay drifting in the ice a mile or two from shore. The northerly wind threatened to enclose the vessel amid the floe-ice, and the risk was so much the greater that the engines were damaged.

Before leaving the island for the last time, I paid one more visit to the camping-place of the Andrée-men. I then found at that end of the ice-crust towards the sea, and at the spot where the material-depôt had lain, a pair of perfectly whole snow-shoes, which had emerged from the ice since the previous day. This was our last find at White Island. Once on board again, I gave orders to head for home.

Now followed the attempts to prepare, to preserve, to make something of the finds, in addition to the steps

which had already been taken to this end at the find-place. The objects were made free from ice, as far as this could be done, and then they were placed in the hold. The frozen books, lumps of paper and the letters were allowed to thaw in the open air, until, without damaging them further, I was able to get them loose from whatever they happened to be stuck fast to—fragments of clothing, etc. Then I kept them in my cabin, which became a trifle uninhabitable, chiefly on account of the smell, and the rolling of the sloop made it a somewhat uneasy working-room.

With regard to these documents, I had a double task to perform. First of all, I had to study them in order to discover something that might benefit my journalistic errand. And then I was thoroughly conscious that I could not allow them to be ruined. And when I took steps to try to save them from destruction, I was, of course, very well aware of the risk I ran.

So I considered matters as keenly as I could, and was in suspense as to what I should do, having no technical knowledge of the work; but after some experiments and a little thought, I discovered that the work of preparation was scarcely such a mystery as—with the respect that a layman is bound to pay to the opinions of experts—I had been afraid it was.

When the mass of frozen paper had thawed, evaporation began, of course, and on studying the progress of this phase, I discovered that, at a certain stage, the leaves of the paper were both firm and soft enough to remain entire, and to be drawn apart. I pushed a knife cautiously between the edges, which were partially destroyed and stuck together, until the leaves could be separated fairly easily—easily, at least, in comparison with the difficulty I had imagined. The first document to which I devoted my meddling attention was Strindberg's log-book, at which I worked for more than twenty-four hours without sleeping. By the end

of this time I had gained a certain experience, and my cabin was full of leaves. For, in order to take a radical step to prevent the leaves sticking together again while they were drying, I had separated them entirely from each other, placing each on coarse paper. I noticed almost immediately that, if I allowed the drying process to exceed a certain stage before I separated the leaves, it was difficult to get them apart again, while, if they were allowed to dry altogether they stuck together as if cemented.

For this reason, and as my cabin, with its berth, shelves, chest of drawers and seat, could not shelter more than a certain amount of leaves, I broke off the evaporation of the books and documents that remained, by wrapping them in ordinary white waste-paper and placing them together in parcels. In this way they remained moist until their turn came. I imagine that it was thanks to this method of procedure I was able to separate every leaf of the documents at which I worked, and that it is thanks to this system I was able to preserve the two chart-sketches of the journey of the Andrée men by balloon and across the drifting ice—documents which I did not find before we were a couple of days on our way home.

Both these charts appear to have been drawn by Strindberg, and both were hidden in those parts of the memorandum-books which, at first, I thought contained no writing and, consequently, valueless. But I had kept them in the way just described in order to examine them thoroughly later on.

The first map-sketch lay at the end of Strindberg's log-book, a long way from the place where the notes finished; the second chart lay in the unwritten part of the meteorological journal.

During my work on the documents which concerned the Andrée Expedition as such, I no longer felt that sense of responsibility, in respect to the personal belongings of other people, which I experi-

enced while I was excavating on the island, and also during the first few days on board, on the return journey. It was an exciting undertaking, which aroused the imagination to an indescribable degree, to endeavour to read, from the documents written a generation ago, the fragment of history which the fate of the Andrée Expedition at all events is.

I have seldom, if ever, experienced a more dramatic, a more touching succession of events than to begin the preparation of the wet leaves, thin as silk, and to watch how the writing, or drawing, at first invisible, gradually became discernible as the material dried, giving me a whole, connected description, written by the dead—a description which displayed unexpected and amazing details, and which allowed me to follow the journey of the balloon across the ice during the three short days from the 11th to the 14th July, 1897—which showed me the capricious and cruel sport of the drifting ice and the endeavours made by the three men to reach land, during the months that followed, until the 17th September, when White Island was discovered, and on till the 2nd October, when the ice-floe broke beneath the snow-hut.

And this brought me face to face with the living men! Their private correspondence lay unread and well preserved in my boxes. Here, in the short memoranda of the journey, they display themselves in full—as human beings and as men!

They showed me the picture of dauntlessness displayed even amid the impossible!

During these studies of the documents and the arrangement of the finds, which was carried out as well as circumstances permitted, the rolling sloop made its way back to Norway. Isolated from the outside world, I obtained only fragmentary glimpses of information respecting the opposing interests which had been brought into life by the telegraphic accounts of the "Isbjörn" Expedition. Thanks to this

expedition, which had been organized and sent out by the Press, it was possible, of course, for the eagerly expectant public to obtain, at a comparatively early stage, a picture of the most important outlines of the events which had taken place in the far north during the summer and autumn, 1897. I may be forgiven if I considered the attempts made to obstruct my accounts —written with a feeling of personal responsibility to the dead—as incorrect interferences in the self-evident duty of a journalist to carry out his work.

It was my hope to hand over in good order to the Commission at Tromsö the finds made by the "Isbjörn" Expedition. For this reason I determined to allow the vessel to lie to, as soon as we were in quiet waters in some northern Norwegian fjord, and there, free from the interruptions caused by the constant rolling at sea, to very carefully go through everything, and draw up reliable and detailed minutes of the find. On Monday, the 15th September, we had just come to a place where this plan could be executed, and I had already begun the work, when I was met by an order to continue the journey immediately and place everything, just as it was, in the hands of the Commission, which was impatiently waiting at Tromsö for my return. The next day, Tuesday, the 16th September, the "Isbjörn" Expedition was met just north of Tromsö by the "Svensksund" and the "Michael Sars," both of which lowered their flags to half-mast and then acted as our convoy. Amid a bitter rain our sloop made fast to Nemak's pier, just south of Tromsö; the men-of-war's-men lined the decks, and the coffin with the dead was carried ashore, with military honours, by four of the "Isbjörn's" crew, and placed in the hearse. Everyone from the "Isbjörn" walked immediately behind the coffin up to the Coast Hospital. After the coffin had been left there I was requested by the Commission to give at once an account of my doings in the north, and to place all

the finds in their hands. This was done within the course of some few hours.

When I had telegraphed from the "Isbjörn" all I was allowed to telegraph—and what my loyalty towards the dead permitted—and when we of the "Isbjörn" had placed the dead, and their possessions, in charge of the Government Commissioners, the expedition of the "Isbjörn" to White Island was ended.

The "Bratvaag" had shown the "Isbjörn" the way. Chance permitted the sealers of the "Bratvaag" to make the first discovery, and the organization of the Press of to-day, assisted by the splendid crew of the "Isbjörn," completed the task of throwing light—to the extent it was possible—on the fate of the Andrée Expedition.

XVIII

THE CAMP AT WHITE ISLAND

By Professor Nils Lithberg

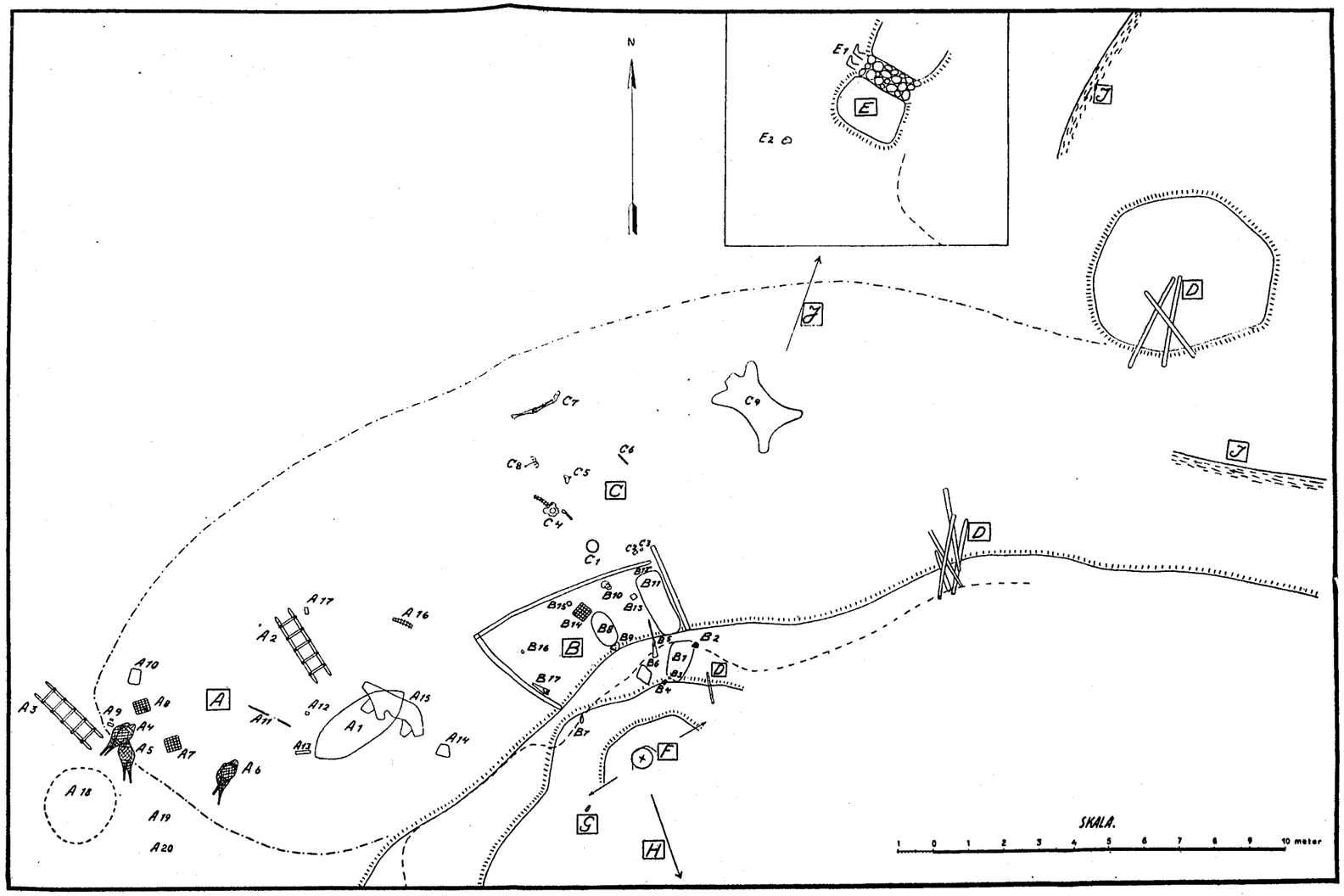
(i) *The Camp and its Equipment*

That the camp of the Andrée men was discovered just in the summer of 1930 was undoubtedly chiefly due to the prevailing favourable climatic conditions. The melting of the snow seems to have been greater than for many years past, while at the same time the opportunities for hunting and sealing appeared to have been richer here than in many other places in the Polar Sea. It was, too, during the walrus-fishery that the Andrée-camp was discovered by the sealers of the " Bratvaag " on the 6th Aug. But it is significant of the situation that, as we know now, one ship at least had landed on the island earlier in the summer and had even found objects belonging to the Andrée-camp. A skipper, Theodor Grödahl, of Tromsö, had visited the place with his ship " Hanseat." Strangely enough the object of his visit was just to find the relics of a Polar Expedition, not that of Andrée's, but of Nobile's balloon-party.

On the 9th July, at 3 p.m., he landed with two men on the south-west point of the island, the only visible part that was not covered with ice. According to Skipper Grödahl, this space had a length of about three miles along the shore, and its breadth, from the shore to the inland ice was estimated at 400–500 metres. They searched the whole of the space between the shore and the inland ice, and on a point north-east

of the landing-place there was found, at a distance of 100–150 metres from the shore, *i.e.*, just where Andrée's camp was afterwards discovered, an almost completely destroyed sheet-iron box, and by the side of it lay a peg, about 8 inches long, evidently formed by human hands. Here, too, there also lay a lot of drift-wood which it was evident had not been thrown up so far by the sea, but must have been carried there. Over this space there still lay a lot of snow, with, here and there, naked patches, and on some of these, ivory gulls and other birds were breeding. "At 7.30 p.m.," relates Grödahl, "we went on board again, and then I sent five other men of the crew on shore to look for eggs and, if possible, to find some remains of Nobile's balloon-party. I never thought a minute of Andrée; when he went on his expedition I was quite young. Had I found anything of that which has now been discovered, I should certainly have remembered him. After four to five hours my people came on board again and we were obliged to leave the island in a hurry, for there was a lot of pack-ice about."

The next day the "Hanseat" met the "Terningen," Skipper Jensen, and mentioned that they had found on White Island some objects showing man's handiwork. In the middle of August the two vessels met again; Skipper Jensen, on the "Terningen," was now able to inform the other captain that he had met the "Bratvaag" and learned that this vessel had discovered Andrée's camp. When this meeting took place, Skipper Jensen was on his way to Tromsö with the news from the Polar Sea which was, later on, to gain for him a disputed international reputation in consequence of the exaggerations in his account. We gain the impression that, in spite of everything, the Polar Sea is not so very large. The many small sealers meet and converse with each other, and gossip is as lively as if they had met in the streets at home in Tromsö.



ANDRÉE'S CAMP ON WHITE ISLAND

Reconstructed by the Norway Svalbard and Polar Sea Research Committee from sketches by Gunnar Horn and Knut Stubbendorf and from information given at the hearings of the Scientific Commission at Tromsö.

A. *The open camp around the sledges.*

A 1 Canvas-boat loaded with a number of articles. The boat was roped fast to a sledge.
A 2 Sledge found by "Bratvaag."
A 3 Sledge found by "Isbjörn."
A 4-6 Snow-shoes.
A 7, 8 Bottom of basket.
A 9 Boxes of ammunition.
A 10 Changing bag of photographic equipment.
A 11 Bamboo pole.
A 12 Square tin box.
A 13 Box for psychrometer.
A 14 Trousers.
A 15 Skin of polar bear.
A 16 Backbone of seal (string).
A 17 Box of ammunition, flag with union-mark, handkerchief marked N. S.
A 18 Balloon-cloth, articles of clothing and a number of other objects.
A 19 Heap of bird-feathers.
A 20 Bones of animals.

B. *The dwelling bounded on W. by a bone of a whale and on N. and E. by a drift-wood stump.*

B 1 Andrée's remains.
B 2 Cooking utensils.
B 3 Aluminium cup.
B 4 Primus apparatus.
B 5 Carbine.
B 6 Clothing.
B 7 Glass bottle.
B 8 Fraenkel's remains.
B 9 Skull.
B 10 Skull.
B 11 Sleeping-sack.
B 12 Box of matches.
B 13 Work-box with money in roubles and dollars.
B 14 Bottom of basket.
B 15 Medicine chest.
B 16 Fraenkel's pocket-book.
B 17 Saw, so-called "jointing-saw."

C. *In front of dwelling.*

C 1 Part of cooking apparatus.
C 2 Box of ammunition.
C 3 Chest of medicine.
C 4 Remains of skeleton.
C 5 Shoulder-blade.
C 6 Arm-bone.
C 7 Leg with foot.
C 8 Drag-anchor.
C 9 Skin of polar bear.

D. *Drift-wood logs.*

E. *Strindberg's grave, about 35 m. from F.*

E 1 The grave.
E 2 Skull.

F. *Horn's cairn.* The shore situated about 200 m. from the cairn.

G. A pair of stockings.

H. Direction to part of a skeleton about 45 m. from the cairn.

I Brook-ravines.

J Direction to Strindberg's grave, about 35 m. from cairn.

N.B.—1 metre=3 ft. 3 in.

On the 5th Sept. the "Isbjörn" arrived at the island in order to examine the site of Andrée's camp, but there already lay there another ship, the "Hakon" of Tromsö, which had been there for two days, but which had not succeeded in landing a party in consequence of bad weather. Just as the "Isbjörn" arrived, however, the "Hakon" had caught sight of a herd of some twenty walruses, and this became the object of such interest that both the "Isbjörn" and White Island were forgotten. A little later, the crew of the "Isbjörn" thought they observed a second vessel, but some of the men said it was only dirty ice, and no new vessel ever became visible. The "Isbjörn" left White Island on the 8th Sept. According to statements in the newspapers, another vessel visited the place later on. On that occasion the ice had completely disappeared, but the only things seen were the remains of a basket, clearly one of the baskets which had been found when the "Isbjörn" visited the place. It was in such a ruined condition, however, that it was not brought home.

Consequently, from what we now know, it may be said with a tolerable degree of certainty that extremely few, if any, remains of the Andrée Expedition's equipment are still to be found on White Island. In other words, we are probably sure that we now have as good as all the material that can be obtained to form a picture of the situation at the time when the Expedition perished.

(ii) *The General Features of the Camp*

The "Bratvaag's" find was made in three different places (cf. the plan-sketch): (1) the boat and a sledge lying at an angle to the first-named (A 1 and A 2 on the plan); (2) Andrée's body (B 1 on the plan); (3) Strindberg's grave (E 1 on the plan); besides this, drift-wood had been seen sticking up out of the

ice at one place. The " Isbjörn's " find was made chiefly in two places: (1) a sledge somewhat to the left of the boat (A 3 on the plan), and around it a number of articles belonging to the equipment: (2) a square (B on the plan) bounded to the left by a bone of a whale, to the north and east by a stump of drift-wood, and, to the south, by the same gradually sloping wall of rock close to which Andrée's remains had been found. In addition, there were found in two places (D on the plan) heaps of drift-wood stocks, one of which had already been observed on the visit of the " Bratvaag." The principal find within the square B was Fraenkel's skeleton (B 8 on the plan). The boat and the sledge found by the " Bratvaag," together with the sledge discovered by the " Isbjörn," formed one find-complex. A second find-complex was formed by the remains of Andrée discovered by the " Bratvaag," and Fraenkel's skeleton, with the square construction around it, discovered by the " Isbjörn." Knut Stubbendorff, the leader of the " Isbjörn " expedition, had christened the former place the " material-depôt," and the latter the " hut." As we shall find later on, however, the denomination " material-depôt " is somewhat misleading. One should rather employ the term " parking-place for the sledges." The term " hut," too, is not quite satisfactory, as one naturally thinks of a house with walls. There cannot have been any such erection here. The two drift-wood stocks and the whale-bone, lying like sides of a square, point rather to the presence of a tent, on the skirt of which the relics now found had been placed to hold the tent-cloth fast.

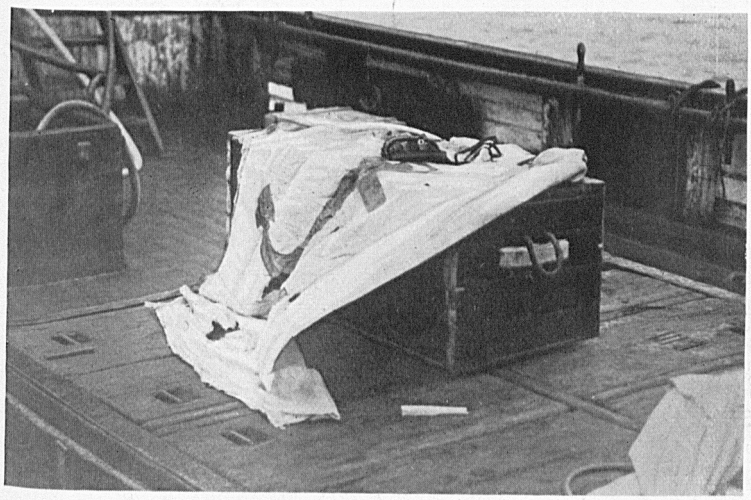
The first object found at the open camping-place around the sledges was the canvas boat. It lay in a N.–S. direction. When it was being hewn free from the ice it was discovered that, below it, there was a sledge to which it was still tied fast here and there. The sledge lay with its head towards the north. The

northern end of the boat, therefore, can be termed the bow and the southern end the stern. The boat lay obliquely in the ice so that the starboard rail was on a level with the edge of the ice, and the port rail was sticking up above it. This is probably the reason that the port-rail is now so badly injured, as it had probably been trampled down by bears in former years. The sledge below the boat was standing on the naked ground, so that when it was being released from the ice, large stones accompanied it from the solid foundation. About 6 metres to the west of the boat another sledge was found when the "Bratvaag" came to the place. The upper edge of this sledge was lying perfectly plane with the ice, and below it there was a layer of hard ice, so-called blue ice, from 30–40 centimetres thick. This sledge stood with its head to the west. Excepting the few articles of clothing—stockings, among other things—that were lying on it, it was empty. In the neighbourhood of the sledge there were also found other articles frozen in the ice, but not so deep that they could not be seen. Among these objects there may be mentioned, a Swedish flag with the union-mark, a box of ammunition, a handkerchief marked N. S., etc. Down by the runners, too, a pair of stockings were found which had never been used. No finds were made deeper down in the ice, however.

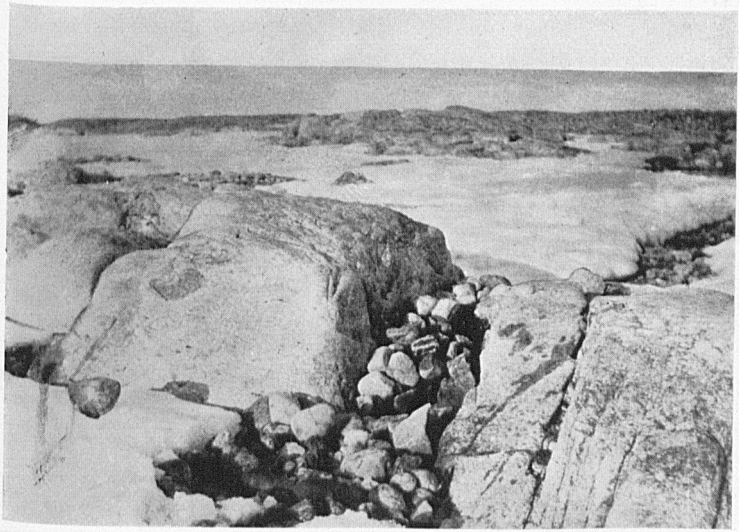
These observations must possess a certain importance if we endeavour to form a picture of the natural conditions prevailing at the time when the objects were carried to the spot. The bed of ice on which the empty sledge stood cannot, of course, have been formed after the sledge was drawn there. That the second sledge stood on the naked ground may, on the contrary, be the result of its having sunk deeper into the snow on the occasion of a thaw than the empty sledge, in consequence of its carrying the heavy boat. Another reason would be, that the boat, with its metal

fittings and its contents, absorbed more heat, whereby the melting of the snow or ice became more rapid. It is true that, immediately to the west, close to the stern of the boat, there was found a psychrometer box standing upright in the ice, about one metre above the ground, but no importance can be placed on this, as it may have been pulled out of the boat by some animal on a later occasion. It seems, therefore, as if we have a right to suppose that, when Andrée and his comrades left their belongings here, the place, just as on the occasion of the visit of the "Bratvaag," was covered by a crust of ice. How thick this cap may have been on the occasion can, of course, not be decided, as, during the many summers that have passed since then, the ice may have melted quite considerably. But as it still amounted to at least half a metre beneath the empty sledge last summer, the thickness of the ice can hardly have been less when the sledge was brought to the place.

The "Bratvaag's" find of only two sledges was perplexing. By the memoranda from the journey over the ice it was known with certainty that each man had drawn his own sledge. The riddle was solved by the "Isbjörn" when, about 7 metres S.W. of the boat, there was encountered the third sledge standing with its head in a north-west direction. This sledge stood on the naked earth, but this might be the result of the ice round about it now being almost completely melted away. It was empty, but scattered around there were found a number of objects, most of which were lying together on and around a piece of balloon-cloth. This seems to have served as a waterproof covering, which had been evidently pulled away by animals who had left the objects scattered and mixed together. Quite near the sledge there were also found two baskets about half a metre square and one-third of a metre deep. Here we clearly have the provision-baskets with which we make acquaintance in the diaries under



THE BALLOON FLAG



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STRINDBERG'S GRAVE ON WHITE ISLAND

SOME OF THE EXPEDITION'S FIELD-GLASSES, COMPASS, PEDOMETER; TWO TERCE WATCHES AND THREE OTHER WATCHES; TO RIGHT, CHRONOMETER KULLBERG 5567 WITH ANDRÉE'S WATCH-CHAIN AND CHARMS; SECOND FROM LEFT, CHRONOMETER KULLBERG 5566

the names of "front basket" and "rear basket." At the same place there were also found the three pairs of Canadian snow-shoes forming part of the equipment of the Expedition. Some 33 feet from the sledge, close beneath the rock-wall, lay the tent with its equipment, an account of which has already been given.

(iii) *The Finds made in the Camp*

After this account of the structure of the Andrée camp, we shall pay detailed attention to the equipment of the Expedition. From the Diaries we have some lists of the loads carried on the different sledges. Most of these lists refer to the provision-supplies which were carried by Andrée and Strindberg in two baskets on each sledge, the "front basket" and the "rear basket," as they were called. But there are also lists of the total loads of the different sledges, and of special interest are the lists made on the 10th August, as they give the loads for each of the three sledges on the same date, and thereby actually give us a general inventory of what the party then took with them.

On his sledge, Andrée drew a load of 134.2 kg. This consisted of "the front basket" and the "rear basket" with the supplies of provisions; a "private sack," evidently containing his clothes and other personal requisites; a little sack; a chest of medicine; ammunition weighing 6.5 kg.; a gun, a sextant, a sack of photographic requisites, the tent, two tent-poles and 5 kg. of meat.

Strindberg's sledge had a load of 141 kg. This consisted of the "front basket" and the "rear basket," the "private sack," boot-grease, a sack of tools, sewing-materials, a photographic apparatus, the stand of the theodolite, the little and the big field-glass, a spade, a grapnel with a line, a boathook, and three pairs of snowshoes.

On his sledge Fraenkel drew a load of 153.8 kg. This load consisted of the boat, the "private sack," a sleeping-sack, three blankets, a sack of "boot-hay," the cooking-apparatus, spirits and the table-service, etc., one chest of matches (evidently the wooden box found near the tent), a gun and gun-case and cleaning-box, ammunition weighing 3.5 kg., a sack of books, a universal instrument (altazimuth), two field-glasses,

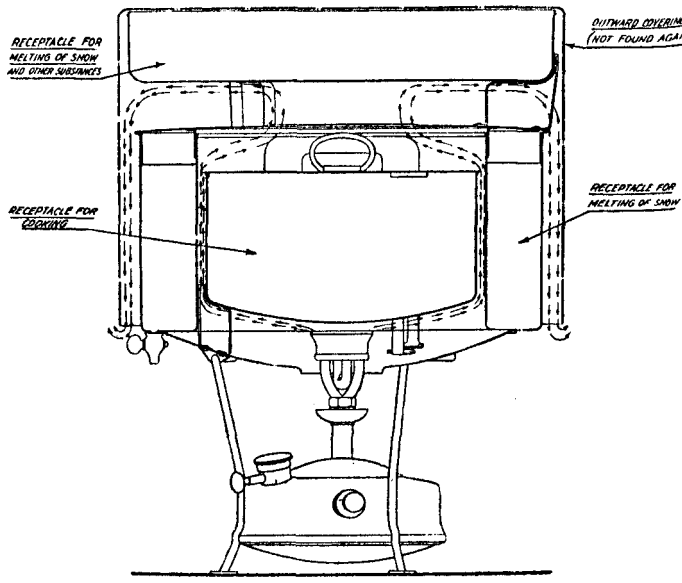
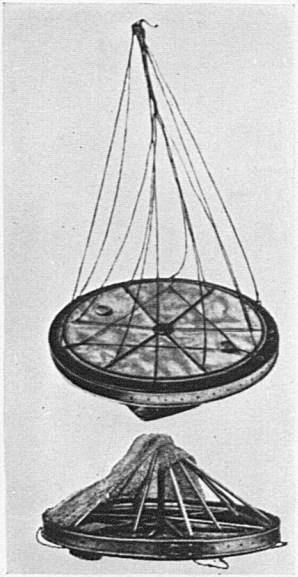


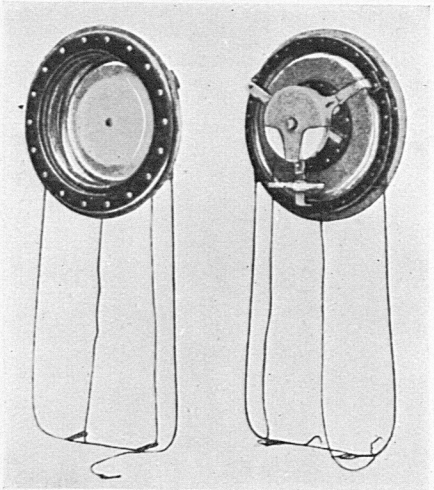
DIAGRAM OF THE COOKING APPARATUS

an aneroid-barometer, a psychrometer, a change-sack (belonging to the photographic equipment), a hose, weighing 3.5 kg., three poles, three pieces of wood, two oars, a piece of drift-wood and a tarpauling.

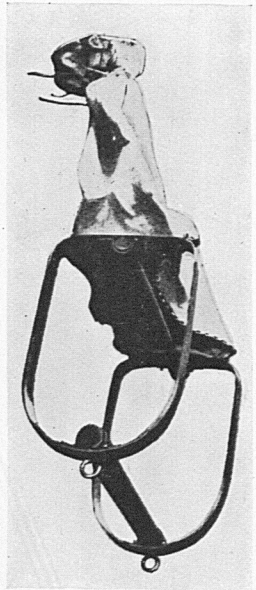
The inventory we have here corresponds in almost its entirety to the groups of objects which have now been brought home from White Island. There are some differences. There is wanting, for instance, one of the four baskets of provisions, the stand of the



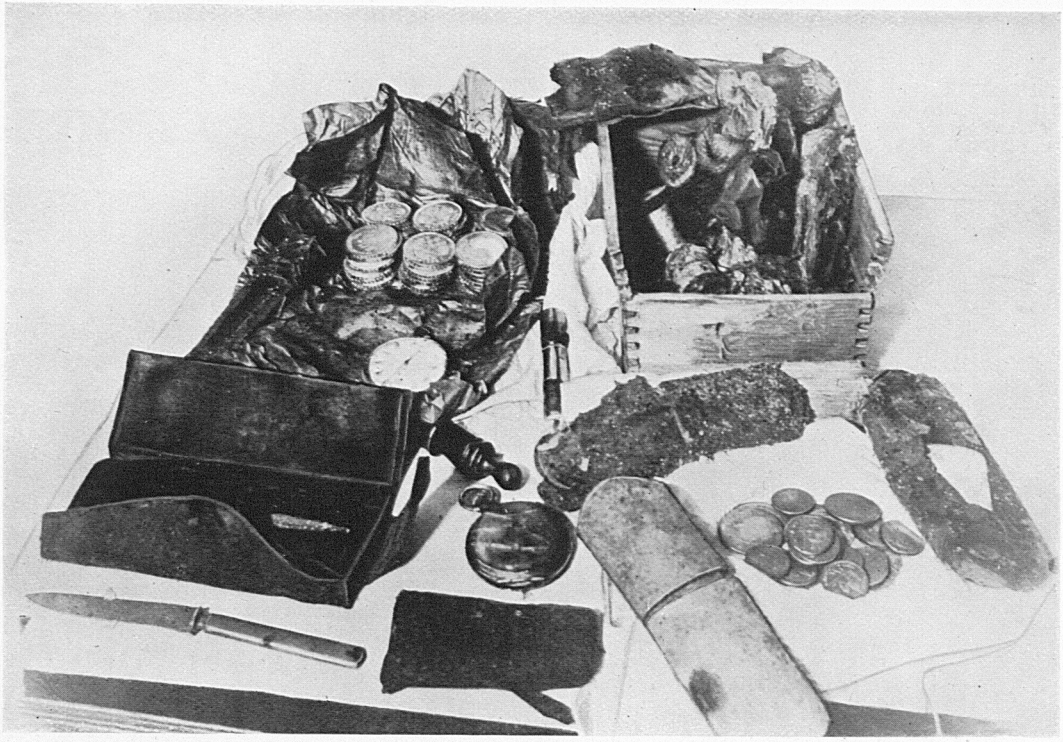
THE BOTTOM VALVE OF THE BALLOON



MANOEUVRING-VALVE OF THE BALLOON



THE SCRAPER FOR TAKING LAND-SAMPLES FROM THE BALLOON



SOME OF THE ANDRÉE FINDS ON WHITE ISLAND

theodolite, the spade and the cleaning-box for the guns; in addition only two field-glasses have been found, while on Strindberg's and Fraenkel's sledges there were two glasses for each. But, to make up for this, we have now a number of articles which are not on the lists for the 10th August; among these may be mentioned, the third gun, an anemometer and various other instruments. But otherwise the agreement is complete. The private sacks are represented by three fragments of so-called seamen's bags, each with its clamp and a hanging-lock and key for each. The medicine chest, the chests of ammunition and matches, the guns, the sewing materials, the sleeping-sack, the blankets, the cooking-apparatus and the table-service, a parcel of books and charts wrapped up in an oil-cloth which is possibly the remains of an oil-cloth sack, the photographic apparatus, the sextant and the other instruments can now be viewed again in their reality. The photographic bag or sack carried by Andrée is represented by some fragments of a sack found close by, and under, the metal boxes containing the Expedition's films.

The sledge found beneath the boat when the latter was hewn free from the ice was, consequently, Fraenkel's. It lay drawn up on shore with the head foremost, just as we may imagine that Fraenkel allowed it to stand on coming to the camping-place. As already mentioned, the boat lay on its side with the port side uppermost. On this side the lashings, by means of which it had been made fast to the sledge, had been torn off, but this was not the case on the starboard side. The lashings had been attached to the edge of the boat in two places on each side, one near the after-part and one near the bow. Under each of these four lashings there had lain a cigar-shaped oil-cloth cushion, wound round with a red tape; all these cushions lay in their original positions. The boat was filled with a large number of objects, many of

which we recognise from the packing-list of the 10th August. For example, there still lay in the after-part of the boat the altazimuth and the parcel of books; in addition, there were found a field-glass and two guns. The box with the psychrometer and two aneroid barometers in it lay close beside the boat and had evidently been pulled out by some animal; the change-sack, on the other hand, lay frozen down in the ice some distance away. Of the objects from the other sledges, the photographic apparatus and the boat-hook lay in the boat; this latter was the celebrated bronze boat-hook with the inscription "Andrée's Polar Exp. 1896," by which the camp had at once been identified. But the sleeping-sack, the blankets, the cooking apparatus—with the exception of a tank which still remained here—the table-service and the chest of matches, had been taken out of the boat, and these objects were encountered in a more or less ruined condition up in the tent. The boat contained many other things, however, which were not specified in the packing-lists of the 10th August. The rich contents may be seen by the drawings. One object which claims our special interest is a plankton drag-net made of a tea-strainer with a filtering-cloth made of a silk neck-tie, and with a rim of thin copper, which, outside, was covered with balloon-cloth. This is evidently the same plankton drag-net which Andrée, in his Diary for the 15th Sept. states that he had manufactured on the ice. Whether the above-mentioned fragments of a tarpauling-coat are parts of the oily coat which Andrée says, on the 12th Aug., that he intends to make, and states on the 15th that he has sewn, must remain a riddle. Finally, among the finds in the boat there should also be mentioned a part of the back of a Polar bear and the sawn-off ribs, also of a bear, which constitute remains of the supply of provisions.

The second connected find-complex discovered in the open camp was the balloon-cloth which had been used as the cover for a number of the equipment-articles of the expedition, and which now lay close to the sledge found by the "Isbjörn." The various objects were scattered pellmell on and around the balloon-cloth. They consisted for the most part of clothes, among which may be mentioned two shirts, two pairs of drawers and five handkerchiefs which had belonged to Fraenkel; an under-shirt, a blue-and-white striped woollen jersey, like those which were round Andrée's skeleton, a pair of stockings resembling those on Strindberg's remains, a stocking marked N. S., and another with Andrée's mark. In addition, there were found a pair of fur gloves and one odd fur glove into which had been thrust a magnifying-glass; a pair of knee-protectors of grey yarn, a fur cap, a sou'-wester, a blue-and-white checkered necktie, and other articles of dress or fragments of such things, as well as four towels marked "Andrée's Pol. Exp. 1896." Of the instrument equipment there were found, in addition to the magnifying-glass already mentioned, a sextant in its box, a field-glass in a leather case, a Halda watch and two chronographs. In this connection there may also be mentioned among the finds made here, Strindberg's second log-book and a map of the route they had taken; Fraenkel's almanac; three typewritten Memoranda by Nathorst and de Geer (the same as those found in a tin cylinder in the boat), letters to Strindberg and Fraenkel and a number of photographs. Here, too, were found the bag already-mentioned containing the rolls of films which were enclosed in metal cylinders, and a similar cylinder containing a number of specimens of organic remains which had been found during the month of August on the journey across the ice. Among the objects belonging to the personal equipment of the party may be mentioned three pairs of spectacles, a purse con-

taining, among other things, some coins and a watch-chain; two seamen's bags; a toothbrush lying in a rubber bag; a hairbrush and a box of surgical instruments. Finally, there was found here the balloon-flag, which was of a white silk bearing a blue anchor.

This survey of the chief articles found at the camp may give some idea of the variety in the equipment the Expedition took with them on their journey across the ice, and still we must suppose that they constitute only a part of what was originally carried in the balloon. The accounts which have been preserved give us an idea of that part of the equipment of the Expedition which had been purchased, but, in addition to these, there were a great many gifts given to the party either as an advertisement of the various articles presented, or merely out of interest in the Expedition. As an illustration of the widespread enthusiasm which had been aroused by Andrée's enterprise, we need but merely mention that the flag, with the union-mark, which was found beneath the ice in the neighbourhood of the boat and which was adorned with an embroidered inscription: "lev. Simon Gustafsson, Karlstad," was presented by a Swede who had emigrated as a young officer to Buenos Ayres and who was now a colonel in the Argentine army.

One is tempted to give, on the basis of the accounts or the statements which it is possible to obtain in any other way, a summary of what portion of the original equipment was brought to the last resting-place of the Expedition. But the reader is probably already fatigued with the details hitherto given, and space does not allow of such a synopsis; it is sufficient to say that the subject would be enough for a whole treatise.

But we shall give some time to an interested examination of some sides of the Expedition's equipment. This will be devoted, in the first place, to its supply

of provisions and clothing, for, after the landing on White Island, it was on this that the fate of the three men ultimately depended. A few words must also be said respecting the notes, or other documents, found, concerning the Polar world, which were made by the Expedition and which have now been found. But as the exactness of the notes concerning place-determinations or certain physical observations depends on the scientific instruments that the party carried, a few lines may be written about them too.

(iv) *The Supply of Provisions*

We obtain some idea of the Expedition's supply of provisions by the stocktaking carried out on the 26th and 27th July and that made on the 5th August, to which latter Andrée has appended the remark that "this stocktaking shows that we must be careful, with bread especially." In addition, the stocktaking of the contents of the provision-baskets on Andrée's and Strindberg's sledges, which was made several times, gives us valuable information. The provisions thus brought were constantly supplemented by the hunting-booty obtained during the course of the journey across the ice. When the ice broke beneath them on the 2nd October, the party was well supplied with meat; how much of this they were able to carry on land at White Island we do not know. Neither have we any knowledge of the supplies of provisions remaining when they were compelled to leave the ice. We obtain some idea of it, however, by the number of the tins in which they had been preserved. According to the account given by Andrée concerning the equipment of the Expedition, the provisions were kept in aluminium or copper boxes of three different sizes; one holding 5 litres, one 2 litres and one 1 litre. The total weight of the provisions amounted to 767 kilogrammes, 200 kilogrammes consisting of water and spirit, kept

in aluminium tanks. These vessels had been made by Johan Eriksson of Stockholm, but it is now impossible to say how many of each kind he had supplied. The following tins and other vessels made by Eriksson have been found at White Island: two aluminium tanks of 5 litres, with a screw-lid in the middle; these were evidently intended for fluid contents; nine aluminium tanks of 5 litres and ten lids; two copper tanks of 5 litres, with a little screw-lid in one corner. These, too, were intended for liquids. There were also two bottoms, which had evidently formed part of such vessels. In addition, three copper tanks or boxes of 2 litres; eleven ditto of 1 litre, besides two fragments and two lids. In addition there were found two preserve tins for bouillon-preparations; nine other preserve tins; two sardine boxes; three round aluminium boxes with lids, one still containing coffee; three little tins, probably for spices, and two, as yet unopened, preserve tins, one of them probably containing goose-liver paste. A great number of these vessels, the square ones especially, were much dented. We do not know if they were all still filled when the party landed. Neither do we know how many of them were, perhaps, empty by the time the Andrée men died, as they may have been destroyed long afterwards by the trampling of the bears. The appearance of the camp at this spot, however, does not give the impression of there being any want of food, but rather the contrary.

(v) *Clothing and Equipment*

On the morning of the 13th July, Strindberg made a list of his equipment. He was then dressed in a jaeger woollen jersey, a jaeger shirt, jaeger pants, a suit of blue cloth, a woollen-lined leather waistcoat, a pair of thin woollen stockings, a pair of long wool-and-hair stockings, fur-lined snow-boots, a cap and

woollen mittens. This list can be compared with the garments in which his dead body was dressed. These consisted of a jaeger wool jersey nearest the body and, above this, a jaeger wool-shirt with front and wrist-bands of striped linen, a pair of rather thin drawers and a pair of thicker ones outside these, both marked N. S.; trousers and waistcoat of blue cloth, a pair of thin woollen stockings marked N. S., and a pair of thick stockings of checked pattern, Lapp shoes with sennehay and puttees. It was evident that his jacket had been taken away. Out in the camp there was found one single jacket, and as this, as we have already mentioned, was tied by a belt together with a number of other articles of clothing marked N. S. and to a woollen jersey, it may be asserted with the greatest certainty that this jacket and the woollen jersey had been worn by Strindberg. In the camp, too, there was also discovered the black-and-white checkered cap he is wearing in the photographs of the start.

The view thus gained of Strindberg's equipment is in the main similar to those of Andrée and Fraenkel too. Andrée's remains were dressed in a jaeger wool jersey and a flannel shirt, a pair of thin jaeger drawers, and above these a thicker pair of brown wool knee-protectors of grey woollen yarn, trousers, waistcoat and jacket of blue cloth, the jacket with an embroidered A. on the inside; in addition, a woollen jersey with wide blue-and-white crossed stripes, and outside this a white sweater. We do not learn from the accounts of the find if these latter articles were worn inside or outside the waistcoat, but the latter is probably the case. On the left foot there were two thin woollen stockings marked with a star, and a wool-and-hair sock; on the right foot he had one thick stocking unmarked and a wool-and-hair sock like that on the left foot. Finally, he was wearing Lapp shoes and puttees. Among his clothes there were also found two caps of brown striped wool resembling those worn

by him and Fraenkel in the photographs we have of them.

Fraenkel's clothes consisted of a cross-striped undershirt of wool, marked K. F., a flannel shirt with grey stripes and a soft collar, a waistcoat of brown cloth, a chamois-leather waistcoat with green lining, a thick knitted woollen jersey and a brown coat with the remains of a fur collar laced on. Of Fraenkel's remains only the upper part of the body was found inside the tent; the lower extremities were discovered some distance outside and wore no trace of clothes. But out in the camp there were discovered two pairs of trousers of brown cloth, of which one pair was unused while the other was much torn, as were all the clothes around the upper part of Fraenkel's body. These trousers were buttoned as if they had been worn. Further, there were found the remains of drawers of the same grey-striped wool as Fraenkel's undershirt; it was torn to pieces in such a way that the fragments correspond perfectly to the last-mentioned pair of trousers. These articles of clothing, consequently, have most probably belonged to Fraenkel. But the pair of brown breeches, however, were not trousers like those worn by Andrée and Strindberg, but they were short knickerbockers. This explains why the lower part of Fraenkel's body had been so torn to pieces by beasts of prey, the legs not having the protection afforded by long trousers and puttees. A pair of much-damaged Lapp shoes were also found in the camp.

Aided by a knowledge of the clothes in which the dead men were dressed and by the marks on certain articles of clothing, a certain reconstruction of their personal equipment can be made from the articles of dress found scattered about on the ice. The problem is easiest in the case of Strindberg's clothes, for they were very carefully marked.

Strindberg's equipment consisted of an undershirt,

somewhat thicker than the one in which he was dressed, and marked N. S., and a perfectly similar, unmarked shirt; a pair of thick woollen drawers marked N. S.; fragments of two cotton shirts with blue-and-brown stripes, marked N. S.; two pair of thin woollen stockings resembling those his body was wearing and marked N. S.; nine thick white woollen stockings marked N. S.; one pair of knitted mittens, one of them marked N. S.; three pairs of knitted gloves marked N. S., and one pair thick gloves with long wrists of the same material as the mittens, and marked N. S. Finally, there were found three handkerchiefs with the same initials.

Of the articles which had belonged to Andrée there were found: an undershirt of wool, two pairs of drawers like the under ones in which his body was dressed, and one pair like the outer drawers on the skeleton; a pair of thin woollen stockings of two different sizes, evidently intended to be worn outside each other; eleven of these stockings, like two of those the body was wearing, were marked with a star; a number were turned inside out; some had never been used and were still sewn fast to each other in pairs. In addition, there were found three stockings of the same quality as the one he was wearing on the right foot. Finally, there was found a parcel of seven handkerchiefs tied with a ribbon; six of these were marked S. A. and one G. F. Among the clothing near his skeleton there was also found the lining of a chamois-leather waistcoat.

Of clothing that had belonged to Fraenkel there was found a shirt with the same crossed stripes as those on his undershirt, and two pairs of drawers of the same material; one of these was marked K. F. There was also a fragment of another similar pair of drawers, found in the boat; five pairs of thin blue-grey stockings, and two thicker stockings which were unmarked, may possibly have belonged to him. In addition there

were found five handkerchiefs with his monogram and one marked "G. Fraenkel." Finally, out in the camp there were discovered three fur caps, one marked A., one marked S. and the third unmarked.

In addition to the above-mentioned articles of clothing there was found, of course, some equipment that cannot be ascribed to any certain individual. These consisted of a blue-and-white striped woollen shirt and a sweater like those in which Andrée's skeleton was clad; two jerseys of blue woollen yarn—it was in one of these that Andrée's first Diary was lying—with fragments of two, possibly three, hoods of the same material; three capuchons of blue cloth, a black leather waistcoat with red lining, possibly belonging to Strindberg; two pairs of knitted gaiters, and two pairs of leg-protectors of linen with woollen lining. These may possibly have belonged to Fraenkel. By accounts still in existence it is seen that "two pairs leg-protectors" had been purchased, and this would be quite natural, of course, as he was wearing knickerbockers. In addition, there were found four pairs wool-and-hair socks and one pair of stockings, of the same material; two and a half pairs of leather gloves and one pair of knitted gloves; three knitted driving-gloves and the remains of fur gloves; one pair mittens like Strindberg's; one pair knee-protectors, unused and sewn fast to each other; the remains of one knee-protector; fragments of two or three jackets of balloon-cloth, and one pair of trousers of the same material; two sou'-westers, three pairs of boots, one pair of Lapp shoes of untanned skin, found in the boat, and, finally, three pairs of Canadian snowshoes. There were also found four neckties of silk and one of cotton, and some fragments of handkerchiefs.

After this account of the articles of dress found on White Island, it may be of interest to hear what the information the bills can give us of the personal equipment of the three participators in the Expedition.

For the three men who took part in the Expedition in 1896, all the articles purchased at the same time have been specified in the bills for each person. These things formed what may be called their standard equipment. For the Expedition, 1897, there is a bill of a perfectly similar equipment, evidently intended for Fraenkel. These equipment-lists thus obtained present some small differences from each other, but on the whole they are similar. We shall take Strindberg's equipment, 1896, for example. This consists of 3 pairs drawers, 3 pairs do. of cheaper quality, 3 undershirts, 9 pairs socks, 3 pairs stockings, 3 flannel shirts, 1 Iceland jersey, 1 sweater, 1 leather waistcoat and 4 pairs gloves, in addition to which there is 1 suit and 1 pair of English boots lined with wool. Later on he has bought 1 pair wool-and-hair socks, 2 pairs gloves, 1 pair snow-boots (evidently a term for Lapp shoes) and 2 pairs laced boots. The equipment evidently intended for Fraenkel in 1897 consists of 3 jaeger shirts, 4 pairs drawers, 4 pairs stockings, 4 pairs do. of cheaper quality, 4 flannel shirts, 4 pairs gloves, 2 pairs knee-warmers, 2 pairs leg-warmers and a cap.

The examples given may serve to illustrate the scheme made for equipping the members of the party, as far as under-clothing is concerned. The list may seem somewhat imposing, but, as we have already discovered, the quantity had no correspondence in quality. In spite of everything, the clothing supply was the weak point of the Expedition.

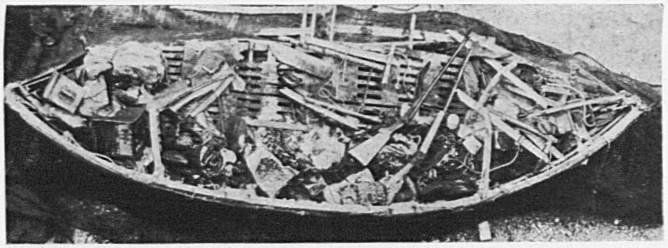
(vi) *Scientific Instruments*

The instruments the Expedition took for course- and place-determination were of the same character as those employed by seamen on the ocean, but modified so that they were suitable for use in the car of a balloon. They consisted of a universal-instru-

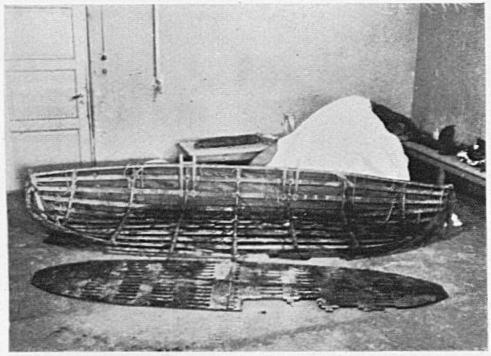
ment or altazimuth, three sextants in mercury-horizons, two pocket chronometers and a watch of Swedish make from the Halda works, and two chronoscopes and divers charts. Finally, there was taken a little and light universal instrument, a so-called travelling theodolite for observations on land. For course-determinations—the seaman's reckoning—there was taken a speed-measurer of special construction for determining the magnetic course of the balloon, by means of which, with a knowledge of the height of the balloon, the real speed could easily be calculated. The height was determined by means of a range-finder in the form of a sextant, or by means of a kind of plumb-bob. Two levelling-mirrors were used for measuring height and distances. In addition, the Expedition took, altogether, nine compases of different kinds besides a specially constructed magnetometer, by means of which it was possible to determine the direction of the magnetic attraction and its strength.

Of meteorological instruments the Expedition carried, a nautical barometer, an Assmann's psychrometer, two Koppé's hair hygrometers, a maximum and minimum thermometer in a case, an anemometer, a so-called Schalen-Kreuz anemometer, two sun-thermometers, two barographs, an aneroid-barometer, a Davy-Aragos actinometer, streamers and a cloud mirror. In addition there were three field-glasses from Zeiss of Jena, and three photographic apparatus. Two of these were intended for pictures 13 × 18 cm.; the third was a so-called Bullet-camera for pictures 8 × 8 cm. and was intended for the possible sledge-journey. Finally may be mentioned tubes for air-samples, an apparatus for collecting bacteria, and various scientific hand-books and tables.

At the close of the balloon-journey the greater part of this carefully chosen equipment was brought down to the ice. Most of the instruments just mentioned



THE EXPEDITION'S BOAT WITH ITS CONTENTS BEFORE BEING UNPACKED AT TROMSO



THE EXPEDITION'S BOAT WITH THE BOTTOM GRATING TAKEN OUT AFTER BEING EMPTIED

THE EXPEDITION'S BOAT AFTER THE REMOVAL OF THE UPPER LAYER

ONE OF THE SLEDGES AS IT WAS FOUND ON WHITE ISLAND

had been arranged on a wooden ring specially arranged for the purpose in the roof of the car and carried by supports running in ball-joints. Some of the apparatus such as the navis azimuth and the magnetometer, had been mounted on a special little table attached to this wooden ring. It is, of course, probable that a part of this equipment was left in the car when it was deserted, especially as some of the instruments had been constructed with a special view to the balloon journey. And under any circumstances, to carry these sensitive and bulky objects on a journey across the ice would have been extremely troublesome and have occasioned too great a loading of the sledges. The instruments the Expedition succeeded in bringing to White Island, and which have now been brought home from that place, are the following:

For determining the course and position: an aluminium sextant in a wooden box; the five watches; Hildebrand's travelling-theodolite in a wooden box, and Elfving's levelling-mirror; three compasses, two of which with a diopter and a number of maps and charts. Of the meteorological instruments there have been found a nautical barometer; a little aneroid-barometer; the psychrometer in its wooden box; the maximum and minimum thermometer in a green tin box, and the anemometer in its wooden box. In addition there have been brought back a field-glass and a telescope of peculiar construction with three oculars, attached to an adjustable disc. Finally, there have also been found one of the three photographic apparatus together with a number of reserve parts, and the change-sack of black and red cloth which had been taken for use when changing the film-rolls.

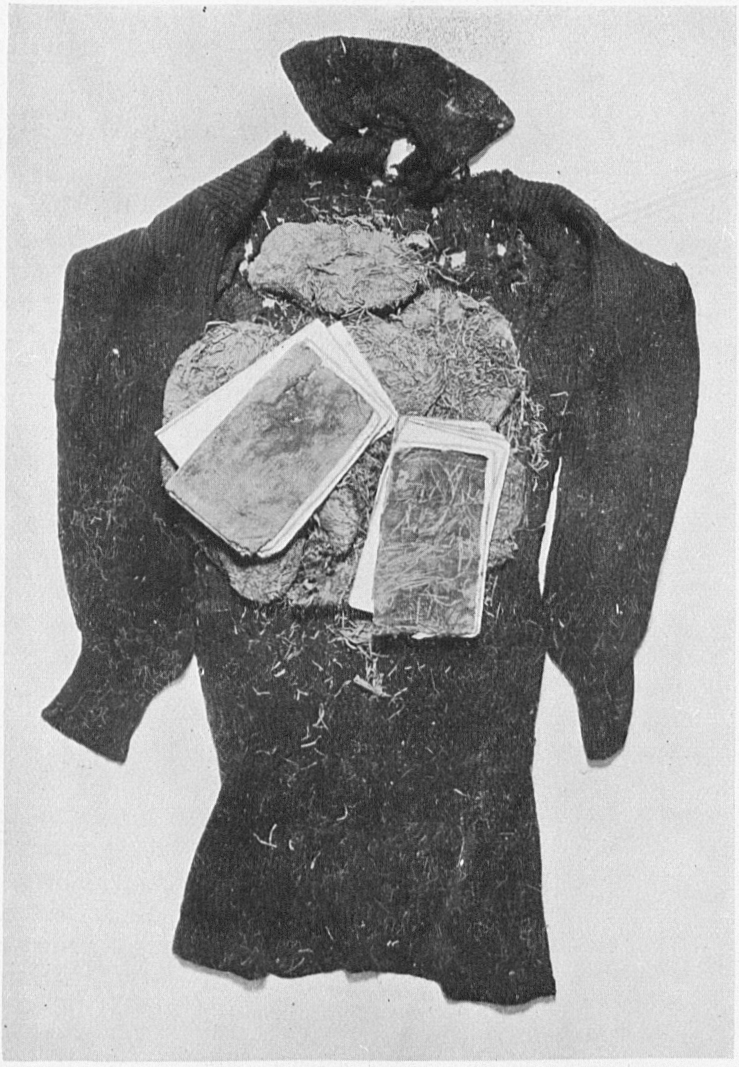
(vii) *Photographic Equipment, etc.*

The photographic equipment had consisted of 30 rolls of films 13 × 18 cm., containing 48 films in

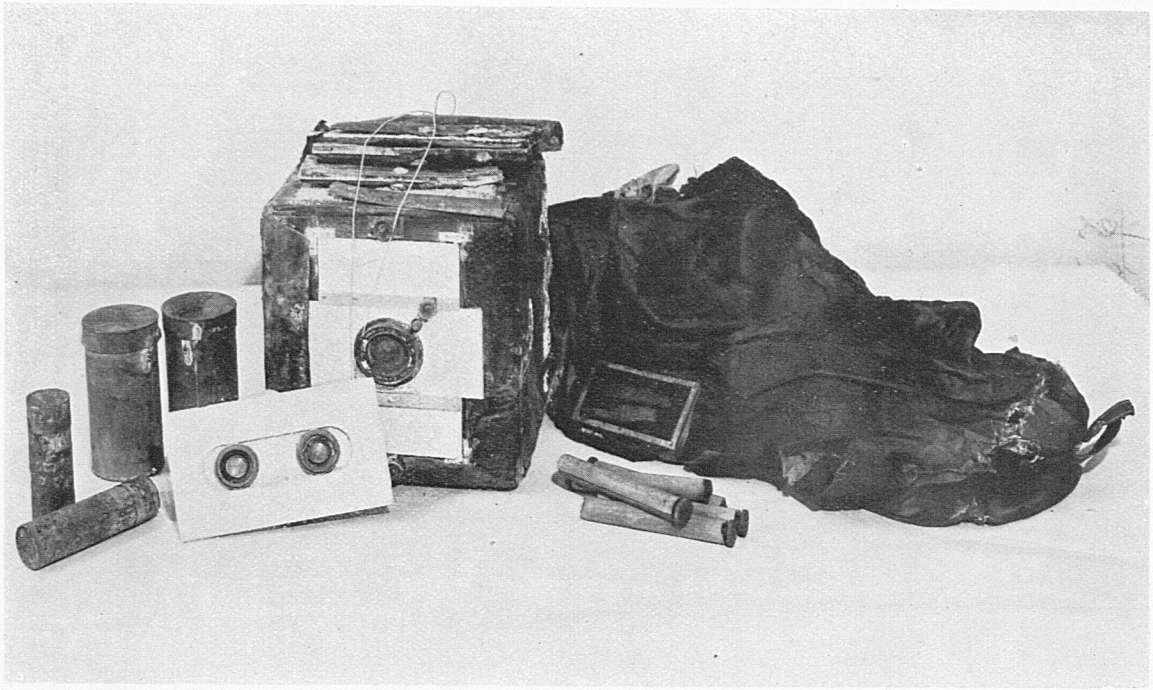
each roll, and 12 rolls of Bullet-films, 8 × 8 cm., with 20 films in each roll; they were all enclosed in specially constructed brass cylinders. Of the 13 × 18 cm. films there were found in the camp seven rolls enclosed in brass cylinders, of which two rolls were unexposed, one possibly exposed and four certainly exposed; on some of the latter traces of pictures can still be distinguished. In addition, there was a cassette with one of these rolls in the camera, and another roll lay among the "Isbjörn" find, wrapped in rags from the change-sack; the latter of these rolls is quite black; the former, while this is being written, is still waiting to be examined. Of the Bullet-films there were found eight rolls all unexposed. Finally, there was discovered the greater part of the samples mentioned in the Diary during the month of August. Sample No. 15 with "the soup algæ," from the 23/8, and sample No. 16, of the same date, with the eyes of the young gull that had been shot, were enclosed in glass tubes; the remainder had been put into envelopes and deposited in two tins; one of these was one of the brass cylinders for the film-rolls; the other was a tin box. In the first there lay, *inter alia*, wrapped in its gauze bandage sample No. 17 mentioned under the date 24/8.

Memoranda

The notes embrace: Andrée's large Diary, which was found close to his body in the tent, and the fragment of a Diary discovered in his jacket-pocket; Strindberg's almanac, with notices of the whole journey, which was found near Fraenkel's skeleton in the tent; his first log-book, embracing the period 15th July–4th Sept., discovered in the after part of the canvas-boat; his second log-book, covering the period up to 2nd October inclusive, and which, at the end, was provided with two accounts, intended for his fiancée



ANDRÉE'S LARGE DIARY AND A SMALLER NOTE-BOOK FOUND BY ANDRÉE'S BODY, WRAPPED IN SENEGRASS AND HIS WOOLLEN JERSEY



ONE OF THE CAMERAS, WITH PANEL OF STEREOSCOPIC LENSES, CHANGING BAG AND AIR-TIGHT FILM STORAGE TINS

and written in shorthand. This book was found among the objects lying around the balloon-cloth down by the "Isbjörn" sledge. Finally, we have Fraenkel's journal with meteorological observations, found close by Fraenkel's remains.

These are only some of the most important groups of finds of Andrée relics from White Island, which it has been possible to examine in any detail. It allows us, however, to obtain more than glimpses of the general basis on which the Expedition was grounded. In a certain way, too, these finds seem to bear a definite impress of the central figure of the party—Andrée's. The certificate can probably be given to the scientific equipment, and to the manner in which it was mounted in the balloon, that both instruments and method were equal to the best at that time. The vessels intended for the reception of the provisions were suitably dimensioned in accordance with the arrangement of the balloon, and they, like the sledges and many other articles, also bear witness to the great care devoted to every technical detail. It is also stated that Andrée had given exact orders with regard to his clothing and to the arrangement of his pockets. Just in such points, too, it is the technicist and the inventor who speaks.

In the midst of a struggle for life, a struggle which has had few counterparts, Andrée has had time to gather samples of earth, of algae, and other organic remains, so as still to be able, in spite of the unsuccessful issue of the balloon journey in July, to promote Arctic research. Day by day, the diaries and journals of the Expedition receive their entries. The collection of samples and the memoranda books give us a vivid sense of the presence of the man of the strong will, of Andrée, who gave his name to the Expedition. There was one weak point, however, and it was on that point the fate of the party was ultimately to

depend—the purely personal equipment—the clothes, the sleeping-sack and the tent.

But it is Andrée's own figure, the iron-willed technicist, the inventor, which, to-day, is made living again, and which comes to meet us from among these finds at White Island.

XIX

THE JOURNEY HOME

On the 22nd August the "Terningen," skipper Jensen, returned to Tromsö after its third sealing-trip for the summer. The skipper stated that, on the morning of the 8th August, they had been hailed by the sealer "Bratvaag" off Victoria Island, which reported that two days before, at White Island, they had found Andrée and one of his companions of the Polar Expedition in 1897, and the remains of their camp. They had taken on board everything they found in order to bring it home to Norway.

The news that Andrée's camp had been found on an island in the Polar Sea, hitherto known but by few, spread like wild-fire. The whole world was struck with amazement. Riddles that had been forgotten for a whole generation and the solution of which it was thought would never be obtained had, in a single moment, become reality again. People asked themselves: Is this possible? Is this a dream, or merely an unconfirmed rumour? But the rumour did not die away and it reached increasingly fantastical proportions after the Swedish Government had obtained from its Vice-Consul in Tromsö information which showed that the report was based on reliable grounds; the Swedish and Norwegian Governments appointed a Commission for the purpose of taking charge of the relics immediately after the arrival of the "Bratvaag" at Tromsö. As members of this Commission the Swedish Government nominated Gunnar Hedén, Professor at the Carolean Medical-Surgical Institute

in Stockholm, and Nils Lithberg, a Professor at the Nordiska Museum. The Norwegian Government appointed District-Physician, Bertram Dybwak-Holmboe of Tromsö, and Adolf Hoel, Lecturer in Geology at the University of Oslo. At the request of the Swedish Government the Norwegian authorities also appointed Gunnar Horn, Doctor of Engineering and the geologist of the Norwegian Svalbard- and Polar Sea Research Committee, the Chief of the "Bratvaag" scientific expedition.

On the 28th August the Swedish members of the Committee, accompanied by Andrée's nephew, Ebbe Andrée, and Tore Strindberg, the sculptor, a brother of Nils Strindberg, left by the night train from Stockholm and arrived at Tromsö in the evening of the 30th August.

The air was charged with electricity. There was a whole army of journalists, mostly Norwegian and Swedish, of course, but there were also representatives of all the great Press syndicates of the world. There were discussions; there were interviews; telephones rang and the telegraph keyboards rattled; rumours were spread and rumours were denied. The whole formed a veritable witches' cauldron, whence rose the constantly recurring question: Where is the "Bratvaag"? When will it come? What will it have on board? As soon as they had arrived, the Commissioners had to make statements to the assembled journalists. These crowded the Grand Hotel and they learned that the new-comers knew less than themselves. In a moment the pressmen were scattered and gone, but then typewriting-machines began to rattle in every room of the hotel, and every telephone communicated that the newly-arrived scientific men had nothing to communicate. This news was not very sensational, but it was always something for the news-hungry editors in every corner of the globe. The next day was a Sunday; a quiet Sabbath peace

rested over the beautiful little Nordland town, which was still gay with the flowers of autumn. But there was no peace in the journalist camp; there existed a nervous rushing to and fro for fresh news which was not to be had, and so, in want of this, visits were paid to all the ancient Polar-Sea skippers of the town, and their stories from youthful journeys to the northern ice or to the western ice were spread about the world. But in the afternoon the bomb burst—the "Bratvaag" lay in a Norwegian harbour.

The vessel had called at Hasvik about three o'clock, and after a short stay there continued to Skervöy, where it arrived about nine in the evening. In one instant the focus of the Press world had been moved to that spot. But this was not the first occasion in the history of Polar investigation that Skervöy had been the centre of interest, for it was here that, on the 20th August, 1898, Nansen's ship the "Fram" had discharged two signalling shots on its return from a three-years' stay in the Polar Seas. Down at Tromsö people were discussing how the "Bratvaag" should be received, for the vessel was expected there the following morning. Meanwhile the telephones were at work between Skervöy and Tromsö, and between Tromsö and the world, and the most contradictory rumours were started.

Monday came without a glimpse being seen of the "Bratvaag." The explanation soon came. The Norwegian guard-ship, "Michael Sars," which had been placed at the service of the Committee for the reception of the "Bratvaag," after having been recalled from Iceland, was delayed. This communication, however, was received with the greatest calmness. The tremendous excitement of the last few days had grown less, after certainty had been gained respecting the burden the "Bratvaag" carried, and also the character of the main content of that burden. The "Michael Sars" arrived in the evening, and, after a short conference

with the Scientific Commission, the vessel left with the members on board at midnight, on its way northwards. Simultaneously, the "Bratvaag" left Skervöy. On board the "Michael Sars" there were two relations of the Andrée men. The Northern Lights flung their narrow streamers across the black night of the closing summer.

At 3.30 in the morning the two vessels met in Ulfsfjorden, and the "Bratvaag" turned its prow towards Tromsö, under the escort of the "Michael Sars." How strange were the feelings with which we gazed in the early morning from the deck of the "Michael Sars"! Around us rose the sober-hued skerries, and in the landscape the snow-covered fells far inland shone now and then through openings amid the cliffs, while at their feet the quiet waters lay against the black hull of the little Polar vessel with its mysterious cargo and its flag at half-mast. At 7.30 both vessels began to move at half-speed, and after they had drawn side by side the Commission went on board the "Bratvaag." A noticeable silence now lay over everything that happened; it was as if everyone feared to disturb the slumber of the two explorers as they lay side by side in a chest of coarsely-hewn boards which stood under a tarpauling, and was lashed fast to the after-deck of the "Bratvaag." On the boat-deck to starboard lay the canvas boat in which had been placed most of the objects found at White Island, and above the boat lay two Polar sledges piled one above the other. It was found that a rumour which said that the remains of the third member of the Expedition were also on board had no foundation. Down in the cabin Dr. Horn had placed the brass boat-hook first found, on which was the eloquent inscription, "Andrée's Polar Expedition, 1896," the anemometer, Strindberg's log-book and the Diary, together with the lead pencil and pedometer which had been found in the inside pocket of Andrée's coat.

Questions were asked respecting the circumstances attending the find, and arrangements were made as to the way in which everything was to be taken on shore. And so, at nine o'clock, both vessels lay in Tromsö harbour. The Commission left the "Bratvaag," which had anchored out in the harbour, and went on board the "Michael Sars" again, which then steamed up to the quay and moored there.

The transfer to land of the remains of the Polar travellers was fixed for ten o'clock. The "Bratvaag" moved slowly up to the quay belonging to Sam. Arnesen, the Swedish Consul, where the relations, the town dignitaries, the members of the Scientific Commission and the representatives of the Press were assembled. The chest on the after-deck was made free, and the coarse tarpauling of the Polar Sea journey was exchanged for a black pall from Tromsö Cathedral. Then it was lifted from its place by the sealers of the "Bratvaag"—a group of young men with weather-beaten faces, bareheaded and with their blond hair bleached by the summer's sun. A black line becomes visible down by the edge of the quay. The line rises slowly, and there stand the sealers with their burden on solid earth. All heads are uncovered and everything is touchingly silent. Close by, the hearse is awaiting them, and behind it move in procession the waiting crowd along the mile of road that leads to the Coast Hospital. Nearest to the hearse walk the crew of the "Bratvaag" and the relations of the two dead men, and by eleven the procession has reached its destination.

It was arranged that at one o'clock the "Bratvaag" should go to the sufferance-wharf below the Coast Hospital, in order to put on shore the objects found, and at the same time the doctors were to begin their examination of the dead. The boat with its cargo and the sledges were carried up to the place where they were to be inspected. After consultation with the crew of

the "Bratvaag," everything was taken out that they had put into it, after which the boat was photographed with the contents it had when it was made loose from the ice of White Island. Meanwhile, the chest containing the remains of the two men had been opened, and now they both lay, each on his operation-board, in the large sick-ward. On the inside of the coat of one of them could be seen an embroidered A.; the underclothing of the other was marked N. S. They were wearing the same clothes as those they had when they left Danes Island on the 11th July, 1897—a suit of blue cloth, heavy Lapp boots and puttees. As regards Strindberg especially, his Lapp boots were clearly the same as those he had put on that morning in July instead of the ordinary boots he had hitherto worn.

It was true, then, that the "Bratvaag" had found Andrée's camp. But the naked reality was, if possible, more unreal than the uncertainty of expectation. These poor remains, with the clothes stained by algæ and with green tufts of moss in the creases of the stiff army-cloth, were in sober truth all that was left of the bearers of two names who, for a few short months, thirty-three years before, had filled a whole world with excitement. It was Andrée and Strindberg who had been thus restored to the world, after their long sleep amid the ice of White Island.

Andrée's remains were the first examined. After removing the jacket covering the upper portion of the body, it proved, however, that it concealed little but a number of fragments of clothing, rags of underclothing and of a blanket, of gloves and stockings, some of which appeared never to have been worn, a couple of caps, etc. In reality it was only the lower extremities that were untouched; very little indeed remained of the other parts of the skeleton, and, respecting the remains of clothing which had been found, the information was given that they had lain

strewn about, but had been picked up and placed together and covered by the jacket. A number of interesting finds were made among the clothes. Here lay one of the two Kullberg's chronometers, with a gold chain attached, and a locket, attached to the latter, contained photographs of Andrée's father and mother. The chronometer Strindberg had carried was also found in Andrée's clothes, together with a little purse of black leather containing a number of small objects which had belonged to Strindberg, one being a gold heart with his fiancée's portrait and a lock of hair. The great find, however, was the Diary. At a place, approximately corresponding to the waist, there lay a knitted blue woollen jersey rolled together, in which something was wrapped. The doctors at once guessed that it contained some document. The first thing they touched was a bundle of wet grass, senne-grass as it is called, which in northern Scandinavia is used to put inside the Lapp boots instead of using thick woollen stockings. The first book opened was a disappointment. The pages were unwritten, although it afterwards proved that one or two sides at the beginning had contained some notes respecting observations. These, however, had been made before the balloon-journey started. Great excitement prevailed when the second book was examined. Here there was writing. It had been done with a lead pencil and was fully legible. It was with the greatest surprise that we found the book to be written from cover to cover, and that the memoranda had been continued to the beginning of October. In the official report communicated to the Press the following day it said that "this book, for the present, and probably in the future, will be the chief documental source of what we can learn respecting the fate of the Expedition." This utterance has since proved to be correct. We all felt that it was a historical moment when, in a ward of the Coast Hospital at Tromsö, we brought to the light

of day the chronicle of Andrée's Polar Expedition from the place where it had lain hidden for thirty-three years.

The next question was: what steps were to be taken to preserve the book? The paper was wet through, and the leaves stuck together again as soon as the book was closed once more. If the drying continued in ever so slight a degree there was a danger of the leaves becoming attached to each other so firmly that the pencil-writing might be injured, or even entirely destroyed, when a fresh attempt was made to open the book. Another circumstance was that the first pages were already much damaged by mould, which had a good soil in the glue of the covers. The way in which the book had been wrapped up had also led to a thick growth of mould being formed along its outer edges, which already made it difficult to separate the leaves one from the other. There was only one thing to be done, and that was to open the book, leaf by leaf, the very same night, even if the work lasted until the following morning, but the task was done by midnight and blotting-paper had been laid between the pages. After nearly twelve hours' uninterrupted labour, the members of the Commission were able to go to rest with a quiet conscience. During the days that succeeded, these pieces of blotting-paper were constantly renewed, and when at last the book was quite dry, the blotting-paper was replaced by tissue-paper in order to prevent the pencil-notes from being rubbed out. The method of procedure, consequently, was very simple but perfectly satisfactory.

The next day, the 3rd September, saw the conclusion of the examination of Andrée's and Strindberg's remains. Simultaneously, their clothing had also been submitted to preparatory measures of preservation. The condition of the outer clothing has already been mentioned, and it may be further remarked that they were highly impregnated with fine sand. The

underclothing had also to be released from the soft parts of the dead bodies, not a little amount of which was still present. The method of preservation was as follows: the clothes were at once rinsed free from all external particles, after which, for the purpose of disinfection, they were placed in a bath of greatly diluted formaline. After being slowly dried for some days they were put into a hot-room in the hospital, and then they were ready to be packed up. As a result of this procedure, it was found on arrival in Stockholm, after a voyage of three weeks on board the "Svensksund," that they had not undergone any kind of change, and that the underclothing of the dead men was as soft as on the day it had come from the wash.

When this work was over, attention was devoted to the boat. The examination of the objects it contained resembled, in some degree, an archæological excavation. First of all, a plan was drawn showing the objects that first became visible. After these had been numbered and removed, a similar plan was drawn of the next layer of objects, but it was not until the third plan was made that the bottom of the boat was reached. In this way it becomes possible to reconstruct the position of the boat's load in detail. The boat was thereupon made free from sand and particles of humus, and when the loose grating at the bottom was lifted up there were found some more fragmentary objects which had slipped through from the load above. The only process for preserving purposes to which all these objects were submitted was, that they were all freed from moisture and impurities by means of brushing. A parcel of books, maps and charts lay in the after-part of the boat. These articles were opened as far as was possible and then dried between blotting-paper.

When the examination of the remains of the men was concluded they were deposited in the coffins brought from Stockholm, a zinc coffin within an outer

coffin of oak. Fate unexpectedly brought about the coincidence that it was on Strindberg's birthday, the 4th September, when the blue and yellow flag of Sweden was spread above his earthly remains and those of Andrée. The packing of the articles which had been found was almost entirely finished by Saturday, the 6th September. The Swedish vessel, "Svensksund," the same ship which, in 1897, had carried Andrée and his comrades to Spitzbergen, had been ordered to bring home the relics of the Expedition from Tromsö to Stockholm. The "Svensksund" arriving very early on Sunday morning, everything was now ready to begin the journey home; the start had been fixed for Monday evening, immediately after the conclusion of the memorial service which was then to be held in Tromsö Cathedral.

But during the forenoon of Sunday there came a fresh, sensational message from the Polar Sea. A Press combination consisting of the Hearst Newspapers, a Stockholm journal, *Dagens Nyheter*, and an Oslo newspaper, *Tidens Tegn*, as principals, had hired a Tromsö vessel, the "Isbjörn," to start for White Island, with Editor Knut Stubbendorff on board as the leader of this expedition. The ship left Tromsö in August and arrived at White Island on a Friday, in the beginning of September. After a two days' examination of the spot, Stubbendorff was able to communicate that he had made fresh important finds, which most perfectly supplemented and completed that which had been brought home by the "Bratvaag." What had happened now was nothing less than the discovery of the remains of Fraenkel, the third partner in the Expedition, together with other fragments of a skeleton which, judging from all appearances, was part of Andrée's body. In addition, there had been found more written communications respecting the fate of the Expedition. Finally, it became clear that, during the month which had passed since the visit of

the "Bratvaag," a number of objects forming part of the equipment had come to the surface from the thawing of the ice. A new thrill of sensation was felt throughout the world, and again it was Tromsö—the capital of the Polar Sea, as the place was christened once upon a time—that received the first intensive shock.

It was just when the Scientific Commission had assembled for its last official meeting that the news was brought of the new find, by representatives of the three newspapers just mentioned.

But what was to be done? Everything was in readiness for the departure of the "Svensksund," and every preparation had been made for the solemn memorial service, at five o'clock on Monday afternoon. In addition, the "Isbjörn" had received such an injury to one of its engines as made it impossible to prophesy when it could be expected in harbour. On Monday forenoon the Commission, together with the "Michael Sars" and the "Svensksund," had been requested to remain in Tromsö until the arrival of the "Isbjörn," a request which was confirmed the following day by telegraphic orders from the Government. The civic authorities, however, were unanimous in desiring that the memorial service should take place at the time already fixed.

Among the many recollections from the historical September days in Tromsö, 1930, that of the memorial service in the cathedral is, perhaps, the most lasting. It is true that, in the choir, there stood only two coffins, Andrée's and Strindberg's, but we now knew that, in a few days, Fraenkel's would be joined to them. The service, too, was "in memory of the Swedish Polar explorers, S. A. Andrée, Nils Strindberg and K. Fraenkel." Tongues of fire from innumerable lights quivered around the altar, which was adorned with a wealth of flowers. The coffins were covered with the Swedish flag, and above them hung Norwegian and

Swedish flags at half-mast. Beside each coffin there stood two guards of honour from among the officers of the "Michael Sars," and down the nave of the church stood Norwegian seamen at rigid, silent attention. On each side of the nave were the seats of the relations of the dead men and of those invited to the ceremony, while the lower portion of the church and the galleries were crowded to excess. For those who were unable to obtain admittance, arrangements had been made with loud speakers placed in the neighbouring houses where other multitudes stood listening with the greatest attention.

The sermon, preached by Dean Nissen, was based on the text from the Bible which speaks of the sea which gives back its dead. Now the terrifying, yet mysteriously enticing Polar Sea had given back to us the men who in their day had left Tromsö, the last outpost of civilisation. Many had said that it was a "madman's journey" to travel over the ice northwards in a balloon. It was possible that these men had been urged by some slight touch of human vanity, but innermost there lay an ideal craving to explore a world. They were the first who had endeavoured to penetrate the regions of the Arctic by the air. Others had succeeded them with better results, but if no one had ventured to take this first, dangerous step, these later results would never have been obtained. Sweden may be proud of having owned these three men who had not quailed before their task. The Dean's speech became a touching sermon which dealt with the secrets and the dangers of the Polar Sea, and it may be easily imagined that its deepest echoes came from Tromsö's own people; from the young, whose longing was awakened and drawn to adventures far up amid the ice; from the old, grey-haired veterans of the Arctic waters who had spent the days of their strength there, where so many of their comrades had found a last resting-place.

The Divine service was ended. The seamen of the "Michael Sars" fell in on both sides of the two coffins. But from the organ-loft there still floated the tones of Stenhammar's grand hymn:

> "Sweden, Sweden, Sweden, native land!
> My heart's desire! My earthly dwelling!"

Then the coffins were lifted and borne to a side-chapel in the church, there to await the hour when the three-men circle should be once more complete—the circle broken that day, now so long ago, when Strindberg was buried by Fraenkel and Andrée.

During the week which followed, Tromsö gradually resumed its everyday appearance. The foreign journalists had disappeared, leaving the representatives of *Dagens Nyheter* and *Tidens Tegn* as victors of the field. The Commission spent its time in hearing the official accounts given by the crew of the "Bratvaag" and in drawing up the reports and the minutes of their investigations. The daily reports came no longer from Tromsö, but from the "Isbjörn," which was steaming towards the Norwegian coast with a damaged engine, of which only one cylinder could be used.

On the Monday afternoon of the 15th September news came, however, that the "Isbjörn" had put into a Norwegian harbour and anchored at Skogvik, about 30 nautical miles from Tromsö. Later on it was stated that the vessel might be expected at Tromsö at ten the following morning. At seven on Tuesday morning the "Svensksund" and "Michael Sars" lifted anchor and steamed off together northwards through Tromsö Sound, in order to meet the "Isbjörn." The meeting took place at 7.30. All flags were at half-mast; the officers and crews manned the side, and, escorted by the two navy-vessels, the "Isbjörn" entered Tromsö harbour at nine o'clock. The "Svensksund" moored at the quay. The "Isbjörn," attended by the "Michael Sars," went on to the

Nemak pier close by the Coast Hospital, where it anchored at 9.20.

But it was no longer the same glorious autumn weather that had prevailed when the "Bratvaag" came. The night-mist had turned into a splashing rain, but along the quay there once more stood waiting the civic notabilities, the members of the Commission, and a large number of the inhabitants of Tromsö. At ten o'clock the "Isbjörn" moored by the pier. This, then, was Fraenkel's homecoming. Once more a gloomy burden was borne by the strong sons of the Polar Sea to Tromsö strand, while the men of the "Michael Sars" and "Svensksund" formed a guard of honour and all heads were bared. On this occasion it was the "Isbjörn's" people who went immediately after the hearse on its journey to the Coast Hospital.

The examination began at once. At the same time there were brought up the other finds that had been made by the "Isbjörn" at White Island, and these were now received by the Commission on behalf of the Swedish State.

The new examination did not occupy so much time as the first. Of Fraenkel's body there remained only the upper part, which was dressed in the same clothes as in lifetime; one piece of the underclothing was marked K. F. Besides this, important parts of Andrée's body had been found, but they consisted exclusively of fleshless bones. The documents discovered had been examined and preserved on board the "Isbjörn," but the other finds did not form such a uniform whole as those discovered by the "Bratvaag" in the canvas boat. By the 18th September a communication to the Press was able to state that the examination was concluded. Andrée's coffin had been brought from the cathedral during the morning of the 17th September, in order to receive the parts of the body which had been newly found. These, as well as Fraenkel's remains, were placed in their

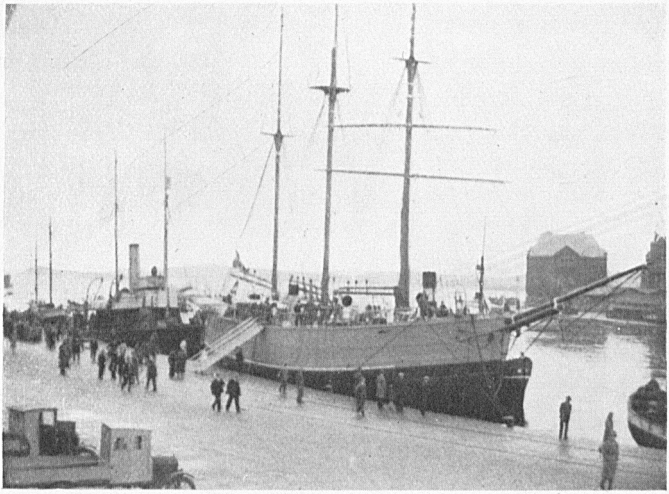
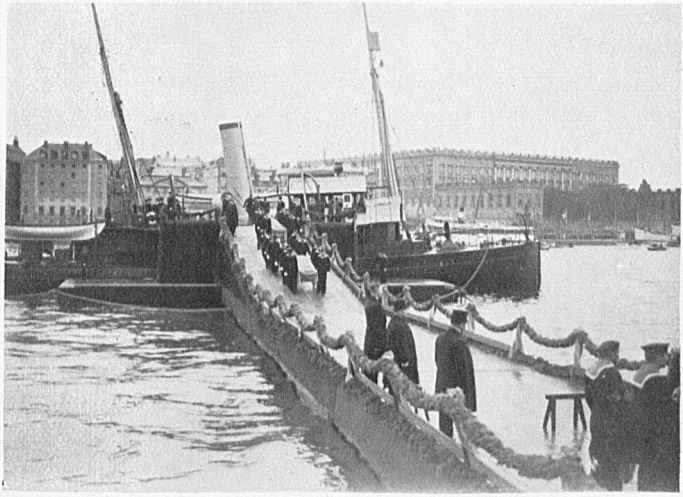
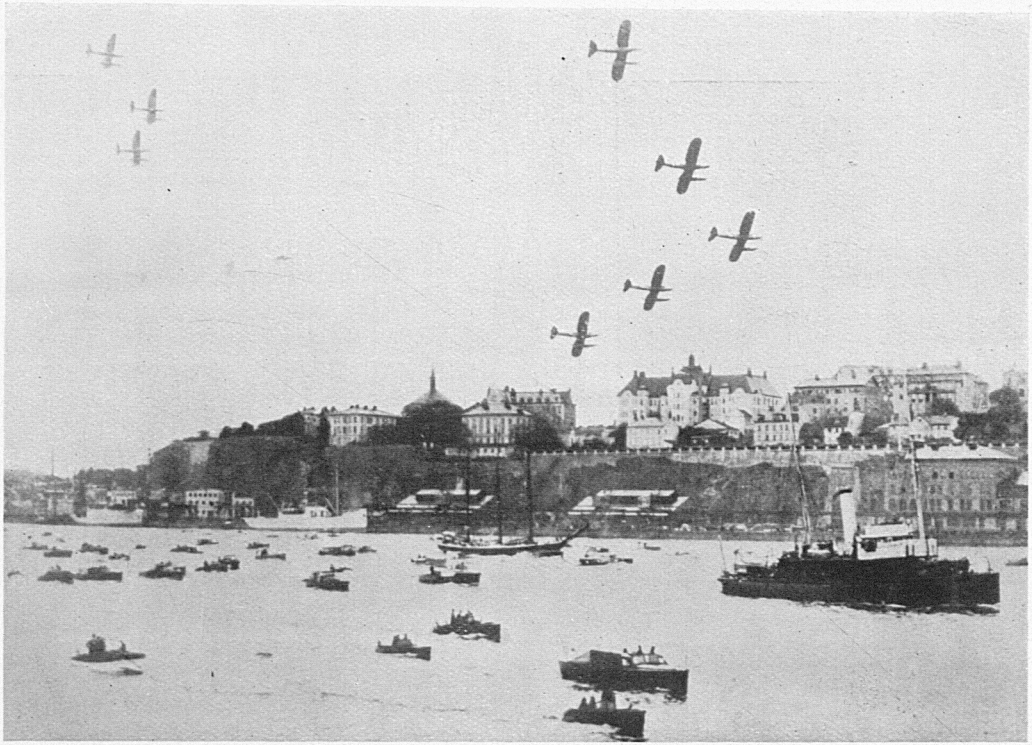


Photo. Boge, Svensk Filmindustri

THE 'SVENSKSUND' MOORED AFT OF NANSEN'S FAMOUS POLAR VESSEL THE 'FRAM' IN STAVANGER HARBOUR DURING THE JOURNEY HOME



THE COFFINS WITH THE REMAINS OF ANDRÉE, STRINDBERG AND FRAENKEL BEING LANDED FROM THE 'SVENSKSUND' IN STOCKHOLM



THE 'SVENSKSUND' ENTERING STOCKHOLM WITH THE REMAINS OF ANDRÉE, STRINDBERG AND FRAENKEL ON BOARD

respective coffins on the 18th. The same day saw the conclusion of the packing of the finds and, simultaneously, there was begun the Maritime Court Inquiry with the crew of the "Isbjörn." Early on the 19th September, Andrée's and Fraenkel's coffins were carried to the Cathedral, after which the other objects found by the "Isbjörn" were taken on board the "Svensksund." The Court concluded its examination, and everything was ready for the departure, which had been fixed for 5 p.m.

All day long every flag in the town and down at the harbour had flown at half-mast. Even by three o'clock great crowds began to fill the cathedral. At five o'clock the organ was heard to intone "The Last Journey," and the next moment the doors of the south aisle were thrown open. Andrée's coffin was borne by seamen from the "Svensksund" out to the hearse: then came the coffins of Strindberg and Fraenkel, which were placed on open cars, covered with black cloth. The procession moved towards the harbour. First came a guard of honour from the "Michael Sars," and after the coffins followed the Scientific Commission, the officers of the "Svensksund" and "Michael Sars," the official authorities of Tromsö and the members of the "Isbjörn" Expedition. The Tromsö Orchestral Society, stationed at Prostnaeset, played Chopin's Funeral March; otherwise there prevailed a mute, solemn stillness among the many thousands of people who, with uncovered heads, followed the three men on their way to Swedish soil.

The three cars drew up at the "Svensksund's" gang-board, which was flanked by two crape-hung banners of the Tromsö Skippers Society. The officers of the "Svensksund," the Commission and the Swedish Consul went on board. Then Professor Lithberg came to the ship's side and gave the home-comers the first greetings from Sweden in the following words:

"It is but a few, poor remains which Sweden now

receives of something which once filled the country, the whole world, with wondering enthusiasm. When on Tuesday, fourteen days ago, a rough-hewn wooden chest lying beneath a black cloth, and when, last Tuesday, a second chest of timber, beneath a worn-out Swedish flag, were brought on land at Tromsö, it was not the welcome home these men had expected!

"August Andrée, Nils Strindberg, Knut Fraenkel! For one third of a century your ears have not heard the Swedish tongue! And now your senses can no longer catch what we say, be conscious of what we feel. But, though guests in another country, we have had permission to spread above your coffins the colours for which you went to meet death.

"In a few weeks the people of Sweden will receive you. Yet I may here be permitted now, in the name of our native country, and above all in the name of the scientific investigation which you have honoured, and in the name of Swedish Geographical Research, to express in your presence the joy we feel that your own country is at last to receive your mangled remains.

"'Eagle' was the name you gave your vessel. But the 'Eagle' was powerless to carry out its task. Many more men were to attempt, as unsuccessfully, that which the 'Eagle' was unable to perform. And the oftener these attempts are made, the more understandable, the more living, will become the picture of Andrée and his men. It is ideas, projects, dreams that are foremost in carrying the world onwards, not execution. During the weeks just past, the Old World and the New have listened breathlessly to the messages sent from Tromsö; to-day, every Scandinavian heart beats in unison at the remembrance of three heroic sons of the North. At this moment there is passed another milestone on that path of legend which shall recall to coming generations the memory of the exploration of the wide-spreading wastes around the Pole. Now, as

often before, it is Tromsö which is the point to which the gaze of the world is directed.

"In a few moments more the dust of Andrée, Strindberg and Fraenkel will rest on a Swedish deck, to begin the journey through Norway's mighty fjord-land towards their last resting-place in the soil of their native country. The scene is shifted for the last phase of the journey of the 'Eagle.' But a fresh Norwegian achievement has been inscribed in the annals of humanity.

"May I therefore be permitted, at this solemn moment when these remains are delivered to us, to express Sweden's thanks for the untiring chivalry of the manner in which Norway has made over to us a gift of such pre-eminent value.

"When I do so, it is a special honour to be able to address the city of Tromsö and its people. Magnificent has been the way in which Tromsö has assisted us in our labours, and the honour which, during these days, the city has shown to the memories of Andrée, Strindberg and Fraenkel will never be forgotten.

"It is amid solemn silence we leave this place where our store of recollections has become so greatly richer. It is because of this last, great recollection that we now express to Tromsö our subdued but warm thanks. . . ."

The coffins were lifted from the hearse by the men of the "Svensksund" and carried on board the vessel. First came Andrée's coffin, then Strindberg's and last Fraenkel's. The members of the Commission and the Swedish Consul said farewell; only Engineer Köhler accompanied the remains as the representative of the Commission. The next moment the "Svensksund" left the quay, while the Swedish national anthem was played. Scarcely had these sounds died away ere the Norwegian anthem was played. Then came the turn of the "Michael Sars" to leave the harbour, in order to accompany the "Svensksund" down the coast. On board both vessels, both officers

and men had stood rigidly at attention while the two national hymns were being played.

The solemnity was ended. The scene of the three men's journey had been changed, and the Commission and the last journalist left Tromsö by the south-going express at eight o'clock in the evening.

. . . . . .

When, three hours after leaving Tromsö, the "Svensksund" passed Gibostad, it neared the harbour with every light burning and with its search-light shining at the foremast. Many hundred persons were assembled to give a last greeting. An orchestra on land played the Swedish and Norwegian national anthems, after which the vessel continued its journey southwards. This was the first of the series of tributes of respect which was to accompany the "Svensksund" during the whole of its voyage to Stockholm. On Monday, the 22nd September, the vessel passed Aalesund, from which place the "Bratvaag" hailed. At about half-past eleven the steamer "Norddalsfjord" left the quay at Aalesund in order to meet the "Svensksund." With the "Norddalsfjord" leading and the "Michael Sars" immediately in the wake of the "Svensksund," the Swedish vessel steered into the harbour with some twenty vessels escorting her, the "Bratvaag" heading the procession on the starboard side. The flotilla passed the quay slowly. Here, as all along the shore, there were crowds of people, and every head was uncovered when the "Svensksund" steamed by. At Tuenæste point the "Norddalsfjord," "Svensksund" and "Michael Sars" lay to, and then the procession of the vessels forming the cortège began. As each ship passed, it lowered its flag on the after-mast as low as to the bulwarks. After the defiling was ended, the "Michael Sars," too, bade farewell, after which it returned to the quay at Aalesund. The church bells were ringing the whole time this solemn ceremony was being carried out.

Early on Wednesday morning, bad weather compelled the "Svensksund" to seek shelter in Stavanger harbour. This incident became an historical episode, as the Swedish vessel anchored side by side with Nansen's old vessel the "Fram," which was on its way home to Oslo from the Exhibition in Trondhjem. The last time the two vessels had met was at Tromsö, in 1897, when Andrée was on his way to begin his Polar journey. Official visits were paid on board. Wreaths were laid on the coffins of the Andrée men, and in the evening the bells of Stavanger Cathedral rang the Swedish national anthem and other Swedish melodies.

On Thursday afternoon the "Svensksund" was able to leave Stavanger, and on Friday evening at ten o'clock it anchored in Rivö-fjord, off Gothenburg, in which city the reception was fixed for Saturday evening at 6.30. On the occasion of the solemnity, some 75,000 people must have been gathered on and around the Masthugg Quay. Torches and cresset-lights were the only sources of illumination. All the street-lamps had been put out, and no search-lights were allowed to play. Then the church-bells began to ring, and the "Svensksund" glided slowly up the river. The black gangway was run out and Lord-Lieutenant von Sydow went on board to give the Andrée men the first words of welcome from their native country, on their return home from their long journey.

He recalled the fact that it was just from that quay, and on board that vessel, they had begun their North Pole journey thirty-three years before. On that occasion the people of Gothenburg hailed their departure with jubilant good-wishes. Now the inhabitants of Gothenburg were gathered at the same place to greet their memories with a first, simple homage on Swedish soil. "At this moment," concluded the speaker, "I should like to recall some words that Andrée uttered at a farewell banquet given in his

honour in this city: 'If we succeed,' said he, 'then I should like to tell you that, when we once more stand on solid earth and are able to say, Now it is done! then our thoughts will fly here, where our Expedition has been given so much essential help and where it has experienced such general sympathy. And if things should not turn out so well, then, at our last moment, our thoughts will fly back to Gothenburg, and my thought, at least, will be: Oh, if only I could thank them once more!'

"Now it is to you, August Andrée, and to your achievement, that *our* thoughts are sent in thankful admiration; now it is we, Gothenburgers, who pay the men of the 'Eagle' our reverent homage."

After the Lord-Lieutenant had laid his wreath on the coffins, Lieutenant-Colonel G. V. E. Svedenborg greeted his old companions with words of welcome from the participators in the Spitzbergen Expedition of 1897, and from Swedish aeronauts and flying-men. More wreaths were deposited around the coffins, and then the public sang, "Our God, He is our castle strong," in unison, after which the torch-bearers defiled past the vessel to the tones of a solemn march. The "Svensksund" cast loose her moorings, laid out from the quay, and glided away into the darkness.

Öresund was passed on Monday. It was a veritable triumphal procession. North of the Sound there came to meet the "Svensksund" two vessels from Hälsingborg and the Danish Navy ships, "Hvidebjörn" and "Argus." On board the former of these was the Danish Prime Minister and the Finance Minister. Coming under Kronborg, the Danish Dannebrogen was lowered to half-mast; all the bells of Hälsingör began to ring and a funeral salute of fifteen guns thundered from the old castle. Then the "Svensksund" turned in to Hälsingborg, on the Swedish side, where words of welcome were spoken and wreaths laid on the coffins. Off Landskrona it was met by a whole

fleet of vessels with new deputations and wreaths, and the course was turned towards Malmö. The Danish escort had now taken farewell. Immediately north of Taarbaek there came another escort of nine Danish flying-machines, three hydroplanes and six destroyers, in wedge formation, three and three together. They circled in vast arcs above the " Svensksund," throwing down flowers and wreaths. A naval band played " Our God, He is our castle strong," and the " Hvidebjörn " gave a farewell salute of ten guns. The echo of the last shot died away. The noise of the flying-machines sank into silence, and only as a whisper was there heard some moments more the music of the choral, like a trembling, tender tone borne across the waters. The Danish vessels sailed away home towards Copenhagen.

The " Svensksund " still headed for Malmö and, on its arrival, there came on board representatives of the towns of Malmö and Lund of learned societies and of the Undergraduates' Corps of the University of Lund. Now came fresh greetings with convoys of ships, with wreaths and the songs of the students. Here came, too, a German aeroplane which threw down a wreath from Deutsche Lufthansa. Then the " Svensksund's " course was turned southwards again, but, under Limhamn, there came a new and unexpected greeting, in the form of a flotilla of more than fifty fishing-boats which approached, each with its flag at half-mast. The fleet arranged itself on either side of the " Svensksund." In front went a couple of boats on which were hoisted the crape-hung banners beneath which the Limhamn fishermen follow their comrades to the grave. A tug-boat brought representatives to the " Svensksund," who laid wreaths from Limhamn Harbour and from the fisher-population at the foot of the coffins. When the " Svensksund " had reached the southern mouth of the Sound, there came representatives of the towns of Skanör and Falsterbo, and

when this escort left there, boats came from Trelleborg to welcome the Andrée men.

At one o'clock p.m. on the 30th September, the "Svensksund" put in to Karlskrona, where it was to lie until Thursday afternoon, after which it was to leave for Stockholm, where the reception was arranged to take place on Sunday, the 5th October. As the vessel steamed into Karlskrona it was escorted by three aeroplanes, and, on arrival in the harbour, there came deputations with their welcomes and their wreaths. And so the journey went on northwards from Karlskrona, and from Kalmar, Oskarshamn and Nynäshamn came greetings as each town was passed.

At 6.30 on Sunday morning the "Svensksund" arrived at Dalarö, in the Stockholm skerries, now escorted by the destroyers "Ehrensköld" and "Hugin." In spite of the early hour, the entire community was afoot. All flags were flying at half-mast. Representatives of the place went out in pilot-boats to the "Svensksund" and saluted the home-coming travellers. Osakar Fredriksborg was passed at eleven o'clock; a company from the garrison stood there on parade and the military band played a funeral march. There was another pause at Vaxholm for the Andrée men to receive a final greeting during the course of their journey, and then the "Svensksund" moved slowly onwards towards Stockholm. The crowd of motor-boats that has gone to meet it grows larger and larger until it numbers between one and two hundred. At the Fjäderholm Islands there comes to meet the vessel a flying-squadron of five look-out aeroplanes and three destroyers, which afterwards circle above the ship the whole way up the "Stream." Finally, three steamers fall into line behind the flotilla, and on the stroke of two, the "Svensksund" is moored to the quay at Skeppsholmen in Stockholm.

The way the procession was to take from Skeppsholmen to the Great Church—St. Nicholas—of Stock-

holm where the burial service was to take place, was marked out by flagstaffs, whose colours drooped heavily at half-mast amid the rain-filled mist which had hung over Stockholm the whole morning. While the relations of the home-comers, and the representatives of the corporations that were to take part in the procession, assembled on the quay-steps at Skeppsholmen, the mist was transformed into pelting rain. At right angles to the quay-steps there had been laid a pontoon-pier, some fifty yards in length, carpeted in black, and with festoons of spruce and blue and yellow ribbon. Farthest out, the pier was provided with a high platform arranged to lie on a level with the boat-deck of the "Svensksund." By the quay-steps stood King Gustaf, surrounded by his staff, and next were the places of the relations of the Andrée men. A song rose, and, amid the ringing of the bells of every church in the city, the coffins were carried from the ship by the seamen of the "Svensksund" and laid before the feet of the King, who welcomed the heroes to Swedish soil in the following words:—

"In the name of the Swedish Nation I here greet the dust of the Polar explorers who, more than three decades since, left their native land to find an answer to questions of unparalleled difficulty! They went away—they vanished into the far-away. Their own fate did but increase the number of the problems! And yet they have come home again at last!

"The country's hope to be able to honour them in their lifetime after a successful journey was disappointed. We must submit to its tragic result. All that is left us is, to express our warm thanks to them for their self-sacrifice in the service of science.

"Peace to their memory!"

After a funeral salute of ten guns had thundered, the procession began to move towards the church, the coffins resting on three open cars. Along the whole way there stood a guard of honour composed of

various corporations, and tens of thousands braved the unkindly powers of the air to give, with uncovered heads, a last, silent greeting to the wanderers who had reached home at last. The Palace Hill was bordered by members of the Socialistic Trades Unions, grouped beneath their red standards. The choir of the church was richly adorned with flowers, and a white cross of blossoms rose beside each of the three catafalques on which the coffins were to lie. The King and other members of the Royal family occupied the "coronation-seats" on each side.

The burial service was performed by Dr. Widner, the Dean, and, after a hymn had been sung by the choir, Archbishop Nathan Söderblom went into the pulpit.

"Welcome home!" were his first words. "Welcome, Andrée! Welcome, Strindberg! Welcome, Fraenkel! You have been many years away. And what we now receive are merely the ruins of magnificent, well-tempered instruments fitted for indomitable longing and clear-sighted achievement." In brief, distinct phrases the Archbishop sketched the characteristics of the journey, and the congregation listened breathlessly to Andrée's remarkable words from the Diary, recovered after thirty-three years from the ice of White Island. They are the words written in the car of the balloon: "We think we can well face Death, having done what we have done." And the speaker concluded: "When, during millions of coming years, our rolling globe shall, perhaps, tell to dumb worlds the legend of the passing amid icy cold of our vanished race, will then the story of the end of the last man resemble that which has made your memory glorious? All that which passes is merely semblance. From semblance comes forth at last reality! The veil falls. The spirit lives. Jesus said: God is the God of the living. Amen."

Song anew. Fresh wreaths are laid beside the coffins. The solemnity in the church is ended.

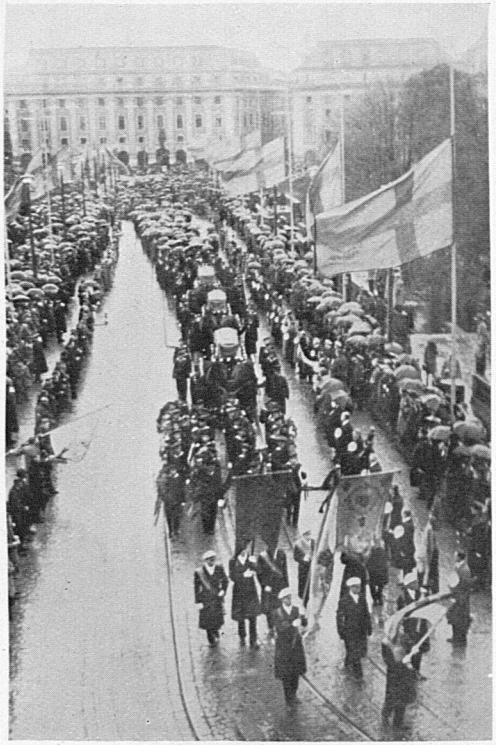
At eight in the evening there was held the great Memorial Celebration in the City Hall of Stockholm. Professor Gerard de Geer spoke, giving an account of the planning and the scientific results of the Expedition. Bishop Stadener, the Ecclesiastical Minister, on behalf of the Swedish Nation thanked the men whose various labours had brought home the Polar travellers, together with the other relics of the Expedition. The speech took the form of an expression of thanks to Norway. Then E. A. Karlfeldt, the Secretary of the Swedish Academy, spoke on " Andrée and national sentiment." He gave a rapid sketch of the three men, dwelling especially on Andrée's richly faceted personality. The speaker gave a pregnant perspective of the development of time when he said, *inter alia :* " Andrée and his men left Stockholm one day during the glorious Jubilee and Exhibition summer, 1897. Their fate has been revealed during the equally brilliant Exhibition summer in 1930. Much has happened between these years. Supposing that Andrée had now returned alive, he would find his firm confidence in science and technics glorified by inventions and discoveries of which he would never have dared to dream. His poor wing-weak and broken-pinioned ' Eagle ' has been succeeded by giant vessels with strength of another character, fitted to brave the elements. His errant pigeon has been replaced by speaking waves, carrying messages unintermediated through the heavens for almost unlimited distances. All this gives rise to a certain deep melancholy in this day's celebration, even if we remember that Andrée was the first to trace that path, a pioneer, a harbinger carrying the first fulfilment of the promise: They shall fly like eagles and shall not be tired."

The Memorial Celebration in the Blue Hall of Stockholm's City Hall was a solemnity of a most unique character. The memory that was celebrated

seemed to lie so far in the past as to give a sense of unreality, and then the thought went to the three coffins which had that day been brought back to Swedish soil, and which still stood, adorned with fresh flowers, in a side-chapel of the Great Church.

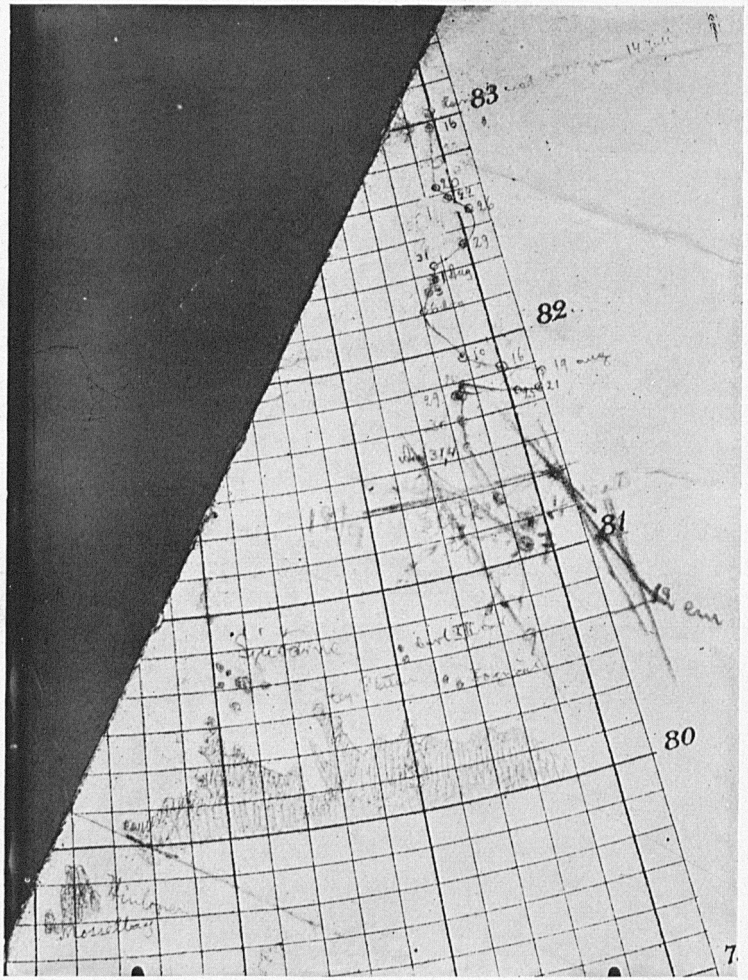
The coffins were allowed to remain in the church a few days more, in order to afford an opportunity, to those who wished to do so, to give a last greeting to the three Polar heroes. On Thursday, the 9th October, the bodies were borne to the Crematorium, where, after a short ceremony, the coffins sank to meet the fire—first Andrée's, then Strindberg's and, last of all, Fraenkel's.

The three men's story was ended.



THE FUNERAL PROCESSION PASSING NORRBRO, STOCKHOLM

THE FUNERAL CEREMONY IN THE GREAT CHURCH, STOCKHOLM



STRINDBERG'S MAP OF THE SLEDGE JOURNEY

XX

REMARKS RESPECTING THE MAP SHOWING THE ROUTE TAKEN BY THE ANDRÉE EXPEDITION

By B. Aurell

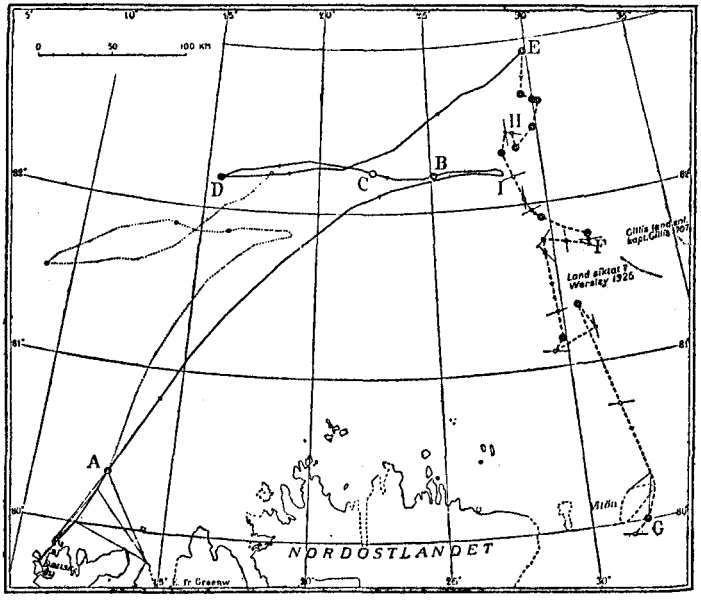
The Balloon-Journey.

The accounts that form the basis for determining the path taken by the "Eagle" are, firstly, the observations respecting the course and speed of the balloon which, at intervals of, on an average, one hour, are found noted alternately in Andrée's diary and in Strindberg's memorandum-almanac; secondly, the solar observations carried out by Strindberg in the car by means of the level-sextant, and which are mainly found in the almanac, and, finally, those taken by means of the "universal-instrument," or altazimuth, on the ice the day after the landing and which fill pages 6 and 9 of the "log-book."

The statements respecting the course and speed are in a high degree unreliable (the dotted curve shows the route-curve which has been obtained on the basis of these statements alone) and can only serve to give approximately the varying directions during the journey, but not to fix the route-curve in its entirety and the position of its projection on the surface of the earth.

The fixing of this curve rests partly on the terrestrial position-determination in point A obtained by taking the bearings of the north point of Vogelsang and Grayhoek, and partly on the astronomical observations carried out at points B, C, D and E.

The observations at points B and C, of which the former gives a latitude-determination, and the latter a determination of the longitude, were carried out while the balloon was in movement, and should be considered as relatively unreliable as compared with those carried out at points D and E. The observations at point D were carried out under calm conditions,



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MAP OF THE BEARINGS TAKEN BY THE ANDRÉE EXPEDITION.

while the balloon lay anchored, and consist of two observation-series for longitude-determination and one series for the determination of the latitude, which, under the presupposition of a normal movement of the chronometers, give together a reliable place-determination. The observations at point A, carried out by means of the universal-instrument (altazimuth) on the ice the day after the landing, consist of two series of observations, one for the longitude-determina-

tion and one for the determination of latitude, which, under the same presupposition concerning the chronometers, also give a good position-determination.

In addition to the observations just mentioned, additional ones were taken during the balloon-journey, a number of which, in consequence of incomplete data, could not be calculated immediately (time has not allowed of their calculation in respect to the varying assumptions that may be made); others again, it is clear, have been taken under such unfavourable circumstances that they ought probably to be considered as less reliable.

After calculating the above-mentioned observations, then one has, for the purpose of orienting the route-curve, three fixed points, A, D and E, and two movable ones, B and C, of which the one first mentioned is displaceable in an east-and-west direction; and the last-mentioned in a direction lying north and south. Between the fixed points and those which are to a certain degree displaceable, the route-curve has been drawn, supported by the statements respecting course and speed, and the retention of the refraction-angles of the course-lines and their relative lengths. The declination valid for the year 1897 has been calculated in accordance with the statements in Reichs-Marine-Amt's isogonic chart for 1920.

The Journey across the Ice.

In contrast with the balloon-journey, when certain statements, even though unreliable, respecting course and speed have served as a guide for determining the route of the ice-wandering, we are referred exclusively to the astronomical observations taken during the journey. It is true that we are not without statements as to the variations in the course the Andrée men endeavoured to follow during the different phases of the journey, or estimations of the distances

traversed in the direction of the course, but the conditions of wind and current have, to a preponderant degree, been the determining factors of the speed and direction of the actual line of march. As the action of these factors altogether escapes our judgment, a place-line, determined by means of astronomical observations, cannot be transported to a known distance in a known direction, corresponding to the change in the position of the Expedition between the observations, in order, in conjunction with another similar place-line, to determine a point in the route-curve. Merely in those cases, when two observations have been taken at an interval of only some few hours, and which, consequently, it is possible to regard as having been executed at the same point, have relatively reliable points been obtained. In the route-curve of the journey over the ice, such places are marked with double circles. Other points are more or less unreliable. These are marked with a single circle and a line giving the direction of the place-line. The last-mentioned, consequently, represents *the line* on which, or on the extension of which in one direction or the other, the observation has been taken.

As regards these place-determinations, the different parts of the ice-wandering differ in a high degree. During its first phase, frequent determinations have been taken, and great care has been paid to the work. During this part of the journey there are, in many instances, double and even treble series of observations. During the latter part of the ice-journey the observations become fewer and briefer, possibly as a result of cloudy weather, and sometimes a single "half-series" has had to serve in determining a place-line.

In addition to this, it should be noted that the observed solar altitudes at that advanced season of the year become lower and lower, amounting, in some instances, to no more than about 3°. The refraction

conditions, in the Polar tracts often abnormal and completely incalculable, make these low height-angles and, in a corresponding degree, the place-lines calculated by their means, in a high degree unreliable.

On the 19th August, when, in spite of the south-westerly course, the daily observations have given an increasingly easterly longitude, Strindberg begins to suspect the chronometers [1] and, undismayed, he at once begins to employ the now almost forgotten method used by old sea-farers to check the movements of their timepiece by measuring the lunar distances. It was a most wonderful thing, under the existing conditions, to attempt to carry out these precarious observations and lengthy calculations which, ever since the days of Gemma Frisius, have been considered as the most difficult and most troublesome in the sphere of nautical astronomy. On the 22nd August, when the weather is specially favourable, Strindberg repeats these observations, this time with double keenness, and obtains a result which bears witness to a respectable skill in taking observations. The mean error of the observed distance is only 3.5″ !

Thanks to these lunar distances, and to a time-angle observation taken on the 19th September, simultaneously with the tangential-bearings of White Island, it is now possible to get a fairly good idea of the movement of the chronometers, and on this basis to determine the course of the journey across the ice in regard to the longitude, *i.e.*, in an east–westerly direction.

The geographical co-ordinates for White Island have been obtained from Commander Worsley's "Under Sail in the Frozen North," London, 1927, which is probably the most reliable source to be found at present. These co-ordinates, supplemented by

[1] He had good reason for this, for even, during the long period of waiting at Danes Island, their movement had proved to be far from regular.

Dr. Horn's statements as to the form, size and orientation of the island, and by A. G. Nathorst's chart of the year 1898, have served as directives in drawing the schematic contour of White Island.

On the above-mentioned co-ordinates, and the observations of lunar-distance at point F, have been based all the longitude-determinations from the 22nd August to the 19th September, both days inclusive (point G). Other longitude-determinations during, not only the balloon-journey, but also the first part of the ice-journey, are based on a comparison with the "Svensksund's" evidently very good ship's chronometer on the 11th July and the lunar distances on 22nd August (point F).

The difference in longitude of, on an average, $\frac{1}{2}°$, which appears on a comparison with Strindberg's map of the ice-journey, results from an error made in his calculation of the lunar distances.

As was mentioned before, the place-determinations are in many instances unreliable and, in consequence, the route-curve can do no more than give a very schematic and even a misleading picture of the route followed by the Expedition. The little turn northwards above point H, for instance, *may* have been caused by the abnormal refraction-conditions prevailing during the midnight observations of the 2–3rd August and, in such a case, have had no correspondence in an actual movement in that direction. Wanting the support of an astronomical longitude-determination, point I, in the balloon-curve, may have lain more to east or more to the west. The same may be said of a large number of points in the curve of the journey across the ice.

It is possible that a further scientific treatment of all available material will give the possibility of obtaining a more detailed and a more exact picture of the course followed by the Andrée Expedition across the Polar Sea.

XXI

TREATMENT OF THE PHOTOGRAPHIC MATERIAL OF THE ANDRÉE EXPEDITION

By J. Hertzberg

It was with very small hopes of being able to develop pictures, or even of obtaining any traces of pictures, that I received the rolls of films handed to me for examination and treatment. One learns by experience that a latent photographic picture grows fainter in course of time and even disappears, especially if the time of exposure has been short—a factor which, in the present instance, had to be taken into calculation. We also know that the celluloid which forms the substructure of the film does not remain indifferent, but that it sometimes acts on the emulsion-coating, producing, in the course of time, an ever-increasing veiling-effect—a state of things which leads the manufacturer always to fix a period within which the film must be developed if the picture is to be a clear one. In respect to the Eastman-Kodak films which the Andrée Expedition took, this period came to an end in February 1898. But, on the other hand, there are examples of films which have been properly exposed and which, between exposure and development, have been preserved in a cool and dry place, or which, at least, have not been subjected to great variations of temperature, giving serviceable, even though greatly veiled negatives, after some ten and even twenty years.

But what was the state of things with the films

brought back to Sweden from White Island? Well, the first condition—that of a low temperature during the period of preservation—may be considered as being satisfied, at least until the date when the find was made, but the last-mentioned condition—that of being kept in a dry situation—was, on the other hand, less satisfactorily fulfilled. For, according to the information given me, the metal cylinders in which the films were lying when found were partly filled with water, and, when the cylinders were opened, all the films proved to be soaked with water, and, to judge by all appearances, had been in that condition for many years.

As an account of the method of procedure in my treatment of the films may be of interest, I shall here give a very brief description of it.[1]

The material I received from Professor Lithberg consisted of:

9 cylindrical cylinders of tinned iron; height, $4\frac{9}{25}$ in.; diameter, $1\frac{2}{25}$ in.
7 cylindrical cylinders of copper; height, $5\frac{4}{5}$ in.; diameter, 2.8 in.
1 film-roll, wrapped up in a piece of black and red cloth (evidently a piece of a photographer's change-bag (unexposed).
1 so-called roll-cassette, for the size $5\frac{1}{5} \times 7\frac{1}{5}$ in., containing a roll of films, some of which had been exposed. All the cylinders received were numbered and weighed.

An ocular examination in a dark-room of the contents of the tinned-iron cylinders, which were greatly affected by rust, showed that they contained film-rolls intended for loading by daylight, of about

[1] A detailed description will, later on, be published in the *Nordisk Tidskrift för Fotografi* (the Northern Journal of Photography), and possibly in some foreign photographic journals too.

the same type as those still employed for roll-films. From the way in which these film-rolls were rolled up, it could be seen, however, that none of them had ever been placed in the camera; *they were, consequently, all unexposed.*

On examining the contents of the copper cylinders, it was found that they contained film-rolls intended for the loading of the roll-cassettes which accompanied them. The films consisted of long film "ribbons" or bands, $5\frac{1}{5}$ in. broad and $34\frac{16}{5}$ in. long, intended for 48 pictures, $5\frac{1}{5} \times 7\frac{1}{5}$ in. By the way in which they were rolled it could be seen that, of the seven rolls, four had been exposed, while the other three, consequently, were unexposed. They were not protected by protecting paper interleaving them, but were wound closely on a cylindrical wooden spool. All the lengths of film down to the spool were wet, some of them to such an extent that the layer of emulsion came off from the underlying celluloid if merely touched by the finger. Fortunately, when Mr. Köhler took charge of the films at Tromsö, he emptied off the water which had not been absorbed by the emulsion-layer and the black wrapper-paper; had this precaution not been taken, the destructive action of the water, on the cylinders being brought to a milder climate, would certainly have still more dissolved and destroyed the emulsion-layer. My first step, after numbering and weighing the cylinders, was to unroll the films from the spool and to dry them. This had to be done with the greatest possible caution of course, in consequence of the decomposed condition of the emulsion-layer, and of the brittle state of the celluloid; but I succeeded, without injuring the emulsion-layer, in separating the film from the back of the underlying roll, to which, naturally, the moist layer of gelatine was firmly stuck. The unexposed films, too, were dried, as, when found, they lay in their original packings, and, consequently, were much better preserved than those which had been

exposed. They were, however, wet all the way down to the spool. Part of this unexposed film could be used for the experiments which I carried out before beginning to work on the exposed films.

These preliminary experiments, a detailed account of which space does not allow me to give, were made in order to discover the nature of the material before me, and also to find out suitable and risk-free methods. My task was to rescue from the susceptible and valuable material the traces of pictures which might possibly lie concealed there, and to waken to life the seed sown one-third of a century ago. The problem was to find a developer whose energy would be able to bring forward the hidden, latent pictures without allowing the tendency of the emulsion to "veiling" to become predominant.

Several developers were tested in varying combinations. Incomparably the best results were obtained by means of a sulphite-free pyrocatechin–caustic soda developer. In addition to possessing extremely high reducing properties, it also has that of being able to form a yellowish-brown oxidation-product on the reduction of the bromide of silver to metallic silver, whereby, in addition to the silver picture, there arises a yellowish-brown picture, the intensity of which is proportional to the precipitation of silver. This gives an intensification of the picture which, to the eye, it is true, is quite faint, but which, in consequence of the yellowish-brown colour, relatively easily absorbs blue and violet rays, a characteristic which can be utilized in the manner described below.

The film was developed piece by piece, with varying results. When the work of development was ended, there had been obtained from the 192 exposures contained by the four rolls or ribbons of film, some 50 films which showed more or less evident traces of pictures. Of these, 20 were so clear that it seemed possible they might give reproducible pictures after

proper treatment. Then, after development, followed some very circumstantial after-treatment. As mentioned above, there was obtained on development, in addition to the silver picture, a faint yellowish-brown one. By means of re-copying on a diapositive material which is chiefly sensitive to blue and violet rays, there was obtained a relatively powerful diapositive, which could be strengthened by a further recopying. To obtain a contrast-rich picture by the assistance of the material which photography now has at its service is a fairly easy task, but it is considerably more difficult to give, with correct values, in reinforced forms, the soft and extremely faint gradations which the original negative contains. I succeeded, however, in overcoming this difficulty, too, thanks to my having at hand a supply of negative and diapositive material of greatly varying gradation.

About $\frac{5}{6}$ of the film-roll which was found in the roll-cassette had been exposed. The cassette, when found, lay open; the film-roll, consequently, had been exposed for years to the destructive action of the weather and light. The roll, which, of course, was soaked through, had dried to some extent after being found, and become one compact, stiff body. It was not until I had sawn off the ends—which, on drying, had stuck fast—that it became possible to unroll the remaining central part, which was still damp. On development, it was found that the innermost turns of the film really contained pictures which, although much damaged, were, in some parts, fairly clear. The young ivory gull shown in the book is an example of such a part.

In this connection I beg to convey my thanks to Hasselblad's Photographic Company, who have most liberally supplied me with all the excellent Kodak material necessary for carrying out the work just mentioned. The same firm has also placed at my disposal all the technical help I have needed for

recopying, enlarging and retouching purposes. I also wish to express my recognition of the extremely skilfully executed retouching work which has preceded the reproduction of the pictures, and which has been carried out by Bengt Silfversparre's Chemigraphical Establishment.

THE ORIGINAL DOCUMENTS AND RECORDS OF ANDRÉE'S POLAR EXPEDITION

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XXII

ANDRÉE'S FIRST DIARY

Inside of cover

"Despatch, 11 Ju y o'cl.
... buoy .....
Our journey has .....
.....
continues at.....
ters' height .....
at first .....
due course ~~but~~ .....
towards N 45° east .....
Four carrier-pigeons sent off
5^h 40^m p.m. o'cl. Greenw. time
flew westwards. We are now
in over the ice which is
much divided in every
direction. Weather magnificent
Best of humours
Andrée Strindberg Fraenkel

Page 1

11 July
Psych ..... + 2.3 7.31 p. o'clock
..... ~~5567~~ .....
.....
..... work at
..... the rope
..... guide-rope
..... acting
..... steering arrangement
0.2 + 0.2 11 July
..... o'clock

at 40 m (130 ft.) height
barom. 448.2 mm. (17.479 in.)
$2^h\ 45^m\ 45^s$ 5567
5567 *is then* $51^m\ 45^s$ *before Gr. M time*
page 2 Dusén's barom 748 m.m. (29.162 in.)
At 35...height (115.5 ft.)
night between 11–12 July...10
Gr. M. t.
4^h 43 o'clock in the morning 12 July
acc. 5567 speed 0.4 m (15.6 in.) per sec.
and direction ..... o W magn
4^h 50 o'clock .....
+
psychrom. — 0.0 + 0.1
fog lightens a little and
the balloon is rising
much of what we have taken for
open water was probably
only snow-free and
water-covered ice
4^h 55 o'clock (5567)
movement continues incessantly
course N 25° magn
page 3 at 5 o'clock I thought I heard a little auk
and I saw a fulmar circle
... round us. He was not afraid. On
..... middle of back edge
~~he~~ ..... two white patches
and the beak or front part
of the head was black.
course ..... 5^h 5 o'clock (5567)

The snow on the ice a light dirty yellow across great expanses. The fur of the polar bear has the same colour. The ice is not much, or, more correctly, not at all pressure-ice. A horse and sledge could drive over it if the surface is hard.

No land in sight. The horizon is
not clear however. It is indeed a wonder-
ful journey through the night. I am cold but will
not wake the two sleepers. They need
rest. We have still.....
Page 4 any bear or seal. When
the balloon descended the ropes
did not lie right and this
makes the car
swing backwards and makes the sails
press down the balloon. This
is a pity for ..... does not
considerably
Speed 0.8 m. (31.2 in.) 5^h 20 o'cl.
e– 5567
course N 50° W. magn.

47	45	5^h 48 o'cl. (5567)
44	5	speed 0.32 m (12.48 in.)
3	40	the course then N 60° W
180		magn
40		

Page 5

12 July

a.m. 6 o'cl. there was taken the first photograph of
5567
great seal (walrus ?) two
of them were seen .....
..... One of them grew frightened
the other not. The ice is tra-
versed by leads of open water
.....^{h} o'cl. ..... o
Psychrom. + 0.2 + 0.2
Course N 80° W magn
The car now often descends to 15–
20 m (49.5–65 ft.) height.
17 65 speed 6^h 18 o'cl. 5567
17 15 = 1.4 m/s (4.64 ft.)

the sky is evenly clouded
and has been so ever since
I was called at 2 o'cl.
7^h [1] 50 the balloon stopped
(5567) 7 10 it still remained motionless
Psychr + 0.6 + 0.5 7^h o'cl.—
page 6 12 July morning
7^h 15 o'cl. a fulmar visible
quite near the car
The balloon not free
before 7^h 32 o'cl. (5567)
and then went direct to W.
magn
Coffee made in 18 min.
Sucking the claw-wrench
fulmar rain of pease

Observ.	5567	Chron.	level	sext.
10^h	51	24	29°	44^m
	52	32	29°	14
	52	56	30°	3
	53	24	29	45
	53	55	29	58
	54	42	30	2
	55	22	29	52
	56	5	29	31
	56	53	29	32
	57	30	29	27
	54	28	29°	43

page 7 11 July 22^h 5^m [2] Gr. M.t.
(astron)
Course N 75° W magn
Speed
Ice much divided. everywhere
much open water
.5–6 o'cl. p.m. the 12
5567 More of pressure-ice

[1] The 7 altered to 6.

[2] 4 altered to 5.

sometimes rather
8 touches in 30[m] much
5567 " at least be allowed to eat in peace."
6[h] 15 long water-lead
N–S
2 touches in 30 min.
Course[magn] S. 70° W. 6[h] 33" o'cl. 5567
speed 3.3 m. (10.9 ft.)
psych. + 0.5 + 0.6
Pressure-ice. No regular
direction

Page 8

12 July p.m.
mag. S 75° W Magn 7/6[h] 58[1]
5567
magn. S 75° W 7[h] 25 5567
incessant fog and
bumpings every 5th minute
Humour good
magn S 80° W 7[h] 3 o'cl.—5567
partially much pressure-ice.
magn S 75° W 7[h] 54 o'cl. 5567
speed 3.2 m (10.56 ft.)
Ice coarser and more
pressed than before
fog 8[h] 28
Bad surface (ice) 5567
magn Course S 70° W 8[h] 45
5667

Page 9

speed 2.5 m. (8.25 ft.) per sec.
speed 3m (9.9 ft.) per s. 9.5 o'cl.
5567
mg S 60° W 9[h] 35 o'cl. 5567
Ice smoother
fog still dense
1.75 m (68.25 in.) per sec. 9[h] 45 5567
mag S 60° W 10[h] 30 o'cl. 5567
touch every minute or every other minute

[1] 7 altered to 6.

paid visits to the surface and
stamped it every 50 meters (150 yds.)
about
10^{h} 53 the balloon stopped
with a wind velocity of 4.5 meters (14.85 ft.)
Psychr + 0.5 + 0.5 Everything
is dripping and the balloon
heavily weighted down

11^{h} 45 o'cl. *page* 10 Although we could have thrown out ballast, and although the wind might, perhaps, carry us to Greenland, we determined to be content with standing still. We have been obliged to throw out very much ballast to-day and have not had any sleep nor been allowed any rest from the repeated bumpings, and we probably could not have stood it much longer. All three of us must have a rest, and I sent Strindb. and Fr. to bed at 11.20 o'cl. (5567), and I mean to let them sleep until 6 or 7 o'cl. if I can manage to keep watch until then. Then I shall try to get some rest myself. If either of them should succumb it might be because I had tired them out.

It is not a little strange to be floating here above the Polar Sea. To be the first that have floated here in a balloon. How soon, I wonder, shall we have successors? Shall we be thought mad or will our example be followed? I cannot deny but that all three of us are dominated by a feeling of pride. We *page* 11 think we can well face death, having done what we have done. Is not the whole, perhaps, the expression of an extremely strong sense of individuality which cannot bear the thought of living and dying like a man in the ranks, forgotten by coming generations? Is this ambition?

The rattling of the guide-lines in the snow and the flapping of the sails are the only sounds heard, except the whining in the basket.

The aneroid 743^{mm} (28.977 in.) at height of 30 m (99 ft.)
13 July morning 1^{h} 20 o'cl. 5567

(3rd day of journey)
Velocity of wind 2.68m (8.71 ft.) per s. 1h 20 d°
The wind is *northerly*
13 *July* Psychr + 0.3 + 0.3 2h 8m o'cl. 5567
The balloon sways, twists and rises and sinks incessantly. It wishes to be off but cannot, for now the wind is only 2.1 m. (6 ft. 10 in.) per sec. now i.e., 2h 10 o'cl. (5567)
Page 12 Psychr. + 0.3 + 0.3
vel. of wind 3.0 m (9.9 ft.) /s } 4h 15 o'cl. 5567
dir. of wind N 40° W magn }
Not a living thing has been seen all the night, no bird, seal, walrus or bear.
Lat. 82° 2' }
Long. 15° 5' } east at 2nd resting place
13 July 11h 49 o'cl. the balloon came free
Fraenkel looking greedily
for water to clean dishes
1h 37 5567 bear-tracks
rigging iced
4 carrier-pigeons (3rd post)
sent 2 p.m. o'cl. 13 July
(5567)
The birds first of all settle on the instrument-ring and guide-line.
Page 13 13 July
Course S 75° 6h 15 o'cl. p.m. 5567
speed 2.2 m. (6.6 ft.) 6h 35 o'cl. p.m. 5567
Course S 85° E
constant bumpings violent
d :o fog
The ice as usual easy to traverse as far as *smoothness* is concerned but the fissures!
7.0 o'cl. p.m. fire in the car
Course E 20° N 7h 18 o'cl. 5567
speed 0.9 m. (2.97 ft.)
course E 20° N 7h 30 o'cl. 5567
No bird is seen nor heard and then I suppose there is no land near.

I received a hard blow on the head from (?)
The balloon contains much gas, it has fallen in only up to 1/3 of the band
Speed abt. 2.0 m. (6 ft. 6 in.)
Course E 20° N 7^h 50 p.m.
page 14 8 o'cl. Strindberg seasick
magn N 60° E 8^h 55 o'cl. 5567
Course N 80° 9^h 4 o'cl. after the sails had been set athwart and made taut
Course N 70° E 9^h 24 o'cl. 5567
speed 2.4 m. (7.8 ft.) per sec.
Until this moment the guide-lines have not left the surface since the first high-level journey was made.
The sails now lie athwart. They carry excellently and increase the speed.
The balloon goes extremely beautifully now the sails have been set so and 50 kg. (110 lbs) of ballast have been thrown overboard. The whole is really splendid.
page 15 Course^{magn} N 60° E 10^h 28^m o'cl. p.m. 13 second day of journey accord. 5567 speed 3.0 m. (9.9 ft.) speed 10^h 41 o'cl. an immense polar bear swam about, 30 meter (100 ft.) right below us. He got out of the way of the guide-lines and went off at a jog-trot when he got up on to the ice. He did not try to climb up to us. Now at 10^h 49 o'cl. p.m. 5567 we ought to have travelled abt. 120 kil (72 miles) N 60° approx. due course, i.e. 60 kil. (36 miles) northwards and 105 kil (63 miles) to the east so that our position now with
is 82° 35′ N and abt. 15 kil (9 miles) pr long. degree 22° 5′ east.
Through the fog the ice and water are visible lifted up along the line of vision and the water is consequently bewilderingly like land. It has deceived me several times.
page 16 11^h 0 The ice beautiful and smooth. It is certainly not half a yard thick for it is lying very low.
11^h 9 An east–west powerful line of pressure-ice
Course N 60° E 11^h 49 o'cl. p.m. 5567

heavy pressure-ice
14 *July* speed 1.8 m. (5.85 ft.) 0^h 20 a.m. 5567
14 July
Our long guide-line has now broken off.
Constant fog. No land and no birds, seals nor walruses.
Course N 55° E 0^h 34 o'cl. (5567)
The ice easily traversed if there were no water on and between the floes.
An immense lead running N–S was passed 0^h 42
+ 0.3 + 0.4 Psychr. 0^h 50
—0.1 correct.
Aneroid (Dusén) 749 (29.211 in.) at 40 m. (130 ft.) height.
Page 17 Dense fog and
much "open water." But still no
great expanses of water
Course N 60° E 1^h 2^m o'cl. a.m.
5567
speed abt. 3.3 m. (10.9 ft.) per sec.
Course N 55° E 1^h 20 5567
One of our pigeons flies around us now. Perhaps it has done the same as
Claisher's pigeon?
Magnificent, smooth ice 1^h 50 o'cl.
Monotonous touch new touch
another touch
Bear-tracks 2^h 6^m 5567
82° 18
23° 40 } 2^h 11^m o'cl. 5567
Page 18 2^h 25 o'cl. the steering apparatus was adjusted
at its maximum southwards
Course N 80° 3^h 15 o'cl. a.m.
immediately after the side-sails had been cut loose
14 July
Course N 65° E 4^h 27 o'cl.
Course N 55° E 6^h 5^m o'cl.
6^h 20 o'cl. the balloon rose to a great height
but we opened both valves and were
down again at 6.29 o'cl.

8^h 11 o'cl. p.m. we jumped out of the balloon.
The landing
Worn out and famished but
7 hours' hard work had
to be done before we could recreate ourselves.

page 19 The Polar ice wears out the ropes more than our exper. shows.

pages 20–21–22 unwritten

page 23 the 14
the 15 we spent at work.

pages 24 and 25 unwritten

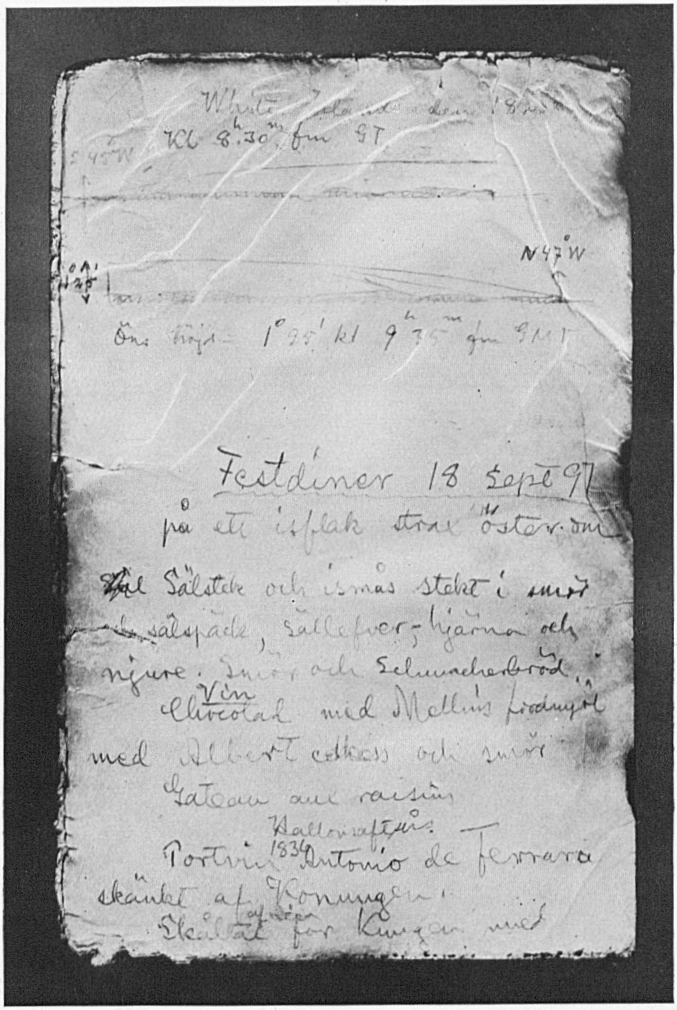
page 26 Simultaneously with what follows below, Strindb. took observations with the altazimuth and found 13° 12.5 (at bulb) consequently exactly the same values.

(See above) *Tests of obs. with level sext.*
20–21 midnight
7 7
5567

			Sect.	
10^h	45^m	17^s	13°	21.5
	47	1.5	13	16
	48	42.5	13	10.3
	50	26.0	13	12.3
	51	58 Index. Corr = −1′	13	12.3
		13° 12 1 5		
	53	41	13	12.1
	55	8	13	16.3
	56	43	13	14.5
	57	58	13	10.8
	59	21.5	13	8.5
	52	38.7	13	13.5

all only central adjustments but with independent adjustment for each observation.

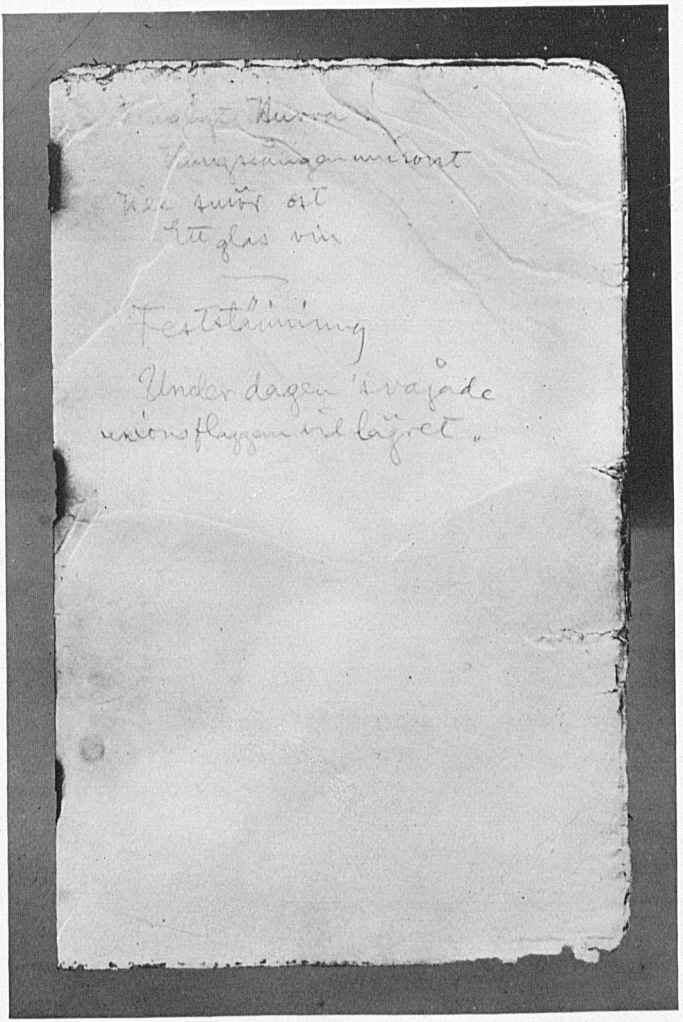
page 27 15 July 10^h 55 o'cl. a.m. 5567 all in movement and



PAGE 18 OF ANDRÉE'S DIARY, WITH ACCOUNT

Translation

White Island the 18 (word illegible)—S 45° W 8h 35m a.m. G T—N 47°W—1° 2/5'—Height of island 1° 25' 9h 35m a.m. G M T—BANQUET 18 Sept 97 on an ice-floe just east of . . . —Seal-Steak and burgomaster gull fried in butter and (?) seal-blubber, seal liver, brain and kidney—Butter and Schumacher's bread—Wine—Chocolate with Mellin's food-flour, with Albert cakes and butter—Gateau au raisins—Raspberry syrup sauce—Port Wine 1834 Antonio de Ferrara, a present from the King—by Aée (?)—Toast in honour of the King with



OF LAST HOURS OF BALLOON JOURNEY

Translation

Royal Hurra!—National Anthem in unison—Biscuits, butter, cheese—A glass of wine—Festive feeling—During the day the Union flag waved in the Camp.

we determined to start from the point where we were. In the air there is visible a steady *fine* drizzle which gives a good explanation of the fact that so much ice was deposited on the balloon.

July 15	1 auk flew towards S S W	Calm
	1 fulmar visible	the whole
	the first bear	day

Thickness of the ice = 1.07 mtr (4.2 ft.) (only below the water)

1 fulmar chased away 1 pigeon.

4.25 Hg. 10^h 43 o'cl. p.m.

16. 11.45 o'cl. a.m. 5567.

Velocity of wind 4.80 (15.5 ft.) dense fog as usual Temp. + 0.2 + 0.4 (32.45 F. + 32.72 F.) humidity direction of wind N 60° W.

Direction of clouds the same. Boat-work, ivory gull. Ice-pressures. In the evening slight snowfall, not large flakes. At 12 o'cl. at night before the 17th July it snowed.

At 18 a.m. seals and fulmars pretty long sight but no land visible in any direction.

Cakes of ice are formed at the transition between fresh and salt water at the ice-floes. 0.6 m. (23.4 in.) below surface of the water.

20/7 at 2 p.m. the netting-strings had sunk 132 mm. (5.28 in.) deep into the snow and ice. The snow layer was about 75 mm. (3 in.) deep.

At 6 o'cl. my bear came from N E. In the morning all the pigeons had flown away. At 8 o'cl. an auk-king[1] visible on the east side of the camp.

Twice I examined the horizon carefully in every direction without discovering land.

The bear remains were floating in the half melted layers. Two fulmars had come only ½ an hour after cutting up.

Excellent pumpernickel. 1 little auk in the water beside us. Became frightened and flew off towards N N W.

[1] Little auk.

Test of level-sextant with exc. result. We managed to get some things dry.

21/7 Loading the sledges. The boat in the sea—extremely good result 4.30 o'cl. p.m.

Nisse[1] fried the bear's meat excellently on "Primus." Do you want to wash yourself, Nisse? Wash myself? no, I washed myself the day before yesterday. What is left is the kind of dirt that sticks on by itself.

Aneroid Comp. $\frac{22}{7}$

page 30

Dusén 757.0 (29.523 in.) } lying
little one 764.3 (29.8077 in.) }

22/7 6.45 p.m. break camp. Nisse's sledge turned over and lay there in the water. 4 hr. march. Night-camp. Sunshine beautiful ice. Transp. on ice-floe on large scale. Hummocks. 23/7 break camp 2 p.m. Difficulties at once. Astr. obs. meteorol. Follow bear-tracks. Ferrying across with the sledges extremely risky. 4 little auks 2 ivory gulls 1 fulmar. Weather misty and windy. Snow moister. The leads more difficult. The hummocks inconsiderable. Ice on the pools. Tenting at 11 p.m. in lee of a big hummock. Nisse's cooking exp. bread, rousseau, butter, pease, soup-tablets. Hammarspik's poems. 24/7 broke camp 2.10 o'cl. several bad leads and ice-humps. The travelling bad and we were extremely fatigued. Dangerous ferryings and violent twistings, etc., of the sledges among the hummocks, etc. Followed the edge of a large lead almost the whole time.

Fulmar little auk ivory gulls, seals (unafraid), cod-
page 31 fish heads (Cranium). Good weather for pulling. Coffee extra enjoyment in the evening. Syrup bottle; Nisse dropped it out, Andrée rinsed twice and F. tried to get another taste of the syrup out of it unnoticed. The salt water in a pool on the ice. The lanes of water on the ice troublesome. Fear of non-durability of material. Question of lightening the load but no decision. Camp 12.30 o'cl. at night on

[1] An abbreviation for Nils.

good solid snow. Fourfold hurra for N's sweetheart when the 25 July broke. Division of work of putting up and taking down tent.

During the rest that followed hard shocks were felt against the ice-floe although this was at least 1 km. (1100 yds) in diameter.

25/7 Breaking camp delayed by rain. New method of travelling: along leads and on smoother ice, wet snow and bad going. Gull with red belly. Wings blue underneath and above. Dark ring around neck. Seals often in openings, never in herds. talked rot about seals. Nisse fell in and was in imminent danger of drowning. He was dried and wrung out and dressed in knickerbockers. Stopped short at a lead.

Page 32 Load on my sledge the 26th on altering load

	Kilo	lbs. (before)
4 ice-planks	8.50	18.7
3 bamboo-p (oles)	2.00	4.4
1 carrying-ring plank	1.00	2.2
1 boat-hook	1.50	3.3
1 bottom-tarpauling	1.00	2.2
1 sack private	17.5	38.5
1 △ basket	29.00	64.–
1 pot boot-grease	3.5	7.75
1 hose	3.5	7.75
1 large press	8.00	17.5
1 shovel and 1 reserve cross-piece	1.8	4.–
1 basket with contents	65.00	143.–
1 d:o	66.5	146.–
	208.8	459.3
Grapnel with rope	2.00	4.4
	210.8	463.7

Page 33 26/6 at o'cl. p.m. we began with the rafting. 1 big & 1 little bear visit during night around the tent. Northerly wind, hurra. Place-determination Long.

30° 15′–30° 47′ and Lat. 82° 36′. Strindberg's bear. Bear-beef immensely good. Meat 1 hour in seawater then all well. Sledges broken. Iron-sheathing as experiment. Mending and examination of weight and considerable reduction. Revision of plan of journey. No time for sledge-pulling. Equipment for 45 days. Strange feelings and great indulgence in food on making reduction. To sleep at last about 7 a.m. on the 27 July.

4 o'cl. p.m. 27 July. 4 o'cl. p.m. broke camp, altered packing, repairs etc. A bear was shot by F. with a beautiful shot at 38 m. (125 ft.) distance. Whistle and hunting-horn did not frighten it. Skin for mending sleeping-sack. Meat, Meat-powder, and the like reduced and more bread taken. Four hurras for Sw. flag ball. flag. At 12 o'cl. we started and passed 14 leads. 1 with compl. rafting and 2 with pushing across the boat. Impossible to move the pieces of ice. Thin ice cut into the boat and made rowing almost impossible. The eaten-away edges had fortunately become firmer. The surface extreme. difficult on account of the leads and hummocks but still we were satisfied with our day when at — o'cl. a.m. on 28 July we at length crept into our sack after a day's work that had been extremely fatiguing especially for F. Strindb. sledge.....

temp. — 2.0 (28.4 *F.*)

page 34 Load on my sledge 27/7 after reload.

1 basket provis.	41.00	90.2
1 d:o	52.5	115.5
1 sack private.....	15.5	34.1
1 d:o ½ private	3.5	7.7
	112.5	247.5
1 medicine chest.....	9.00	19.8
	~~127.5~~	~~220.5~~
	121.5	267.3
1 tent	8.00	17.6
	129.5	284.9

Load on Fraenkel's sledge.

Boat	63.00	138.6
1 sack private	17.00	37.4
ammunition	17.5	38.5
altazimuth	3.00	6.6
stand (for) d:o	1.5	3.3
div. instr.	8.00	17.6
div. charts etc.	3.1	6.8
1 photogr. app.	0.8	1.7
1 cooking-stove	4.00	8.8
1 field-glass	1.2	2.6
3 blankets	4.5	9.9
Sleeping-sack	9.	19.8
Tent	~~8~~	/
Matches	3.00	6.6
	~~144.6~~	~~318.1~~
	135.6	298.3

Page 35 Fraenkel's sledge ..... they were broken. The wind N 25 ..... made us happy, for we hoped we were drifting. Direction of the leads seemed to extend mainly about SSO–NNW. ~~In evening~~ on bivouacking eat in the tent. Champagne, biscuits and honey. I swept the tent with the strawcap of the champagne bottle. Sennegrass[1] between the stockings. Even Fraenkel complained of fatigue.

Positions July	15.3 (astr.)	83°	0	35°	5′
	16.0	82°	58	30°	0′
	19.5 ,,	82°	41′	29°	35′
	21.0 ,,	82°	39	30°	15
	26.5 ,,	82°	36	30	30
	29.0 ,,	82°	26		

28 july 8 p.m. turned out. sheathing sledges. Begin with snow-shoes. Repair of Fraenkel's gear. Paradise: large smooth ice-floes without hummocks or leads or more melted snow-water than was needed for

[1] *Molinia cærulea*, a grass used by Laplanders in their shoes.

drinking. "*Parade-ice*" Fr. "what old mammy sends us is always confoundedly good, anyway." Terrible under foot to begin with but in the evening magnificent ice and magnificent weather. The wind is felt much but is always welcome when it drives towards S E. To-day we have crossed a number of bear-tracks but not a single lead. Now however we have come to a broad beast which we must get ..... tomorrow. Now we have turned in 12 o'cl. noon the
page 36 29 after having thus been at work 16 hours. We learn the poor man's way: to make use of *everything*. We also learn the art of living from one day to the other.

Describe in detail. Difficulties with the ice, the hummocks, melted snow-water, the (melted snow) pools and the leads and the floes of broken ice.

The 30 at 2.30 o'cl. in the morning start. The night rainy and blowy. A specially laborious day. A number of leads were crossed in accordance with all methods. The ice between the leads good so that we made some distance however.

We found our berths at 3 o'cl. p.m. altogether tired-out. I flopped into the water. Nisse among (?) Mellin's food wet. Fr. asked what the matter was and on being answered dessert said jolly then it must be eaten. Fr. first signs of snow-blindness. The ice very deep. Nisse washed one hand with a wet stocking but found the work so difficult and time-wasting that he let the other hand be. The difference was like that between a mulatto and a nigger.

To-day we have held course E and mean to continue it as we drift almost direct S with a slight
page 37 trend to W. Joking about reindeer-hair [1] everywhere. Lose one you find a thousand. Silver-fork. Alum. Heels. The day usually begins with greasing shoes. I reconnoitre after the beds in the tent have been done up and the table has been laid. Fraenkel

[1] From mittens, shoes, etc.

met. obs. and oiling guns, making sandwiches and laying table. Nisse boiling and frying the food Bear-steak twice daily. Fr. = housemaid and Nisse = kitchenmaid.

31/7 5 o'cl. a.m. start. "Tramp" on our knees in deep snow." Tramp—tramp" on our knees. Discoverer of attractions of flopping = Nisse. Cut our way. The constant fog prevents us from choosing good road. Ever since the start we have been in very difficult country. The Polar dist. is certainly the birthplace of the principle of the greatest stumbling-blocks. 10 leads during the first 6 hours. Thickn. of the ice 0.8 m. (31 in.). An immense belt of pressure-ice a couple of kilometers (2,200 yds.) wide running in a direction from N 10° W.

31/7 at 6.40 o'cl. p.m. we crept into the sack. In the evening we at last got clear of the pressure-belt and made a good distance eastwards. We now hear a murmuring noise as from a sea.

Lat. 82° 22′ Long 29° 12′

both of them good determinations.

age 38

(depths of ice below water 4.1 m. (13.53 ft.). The melted snow-water on the dirty ice or surrounded by dirty ice did not taste so insipid as pure melted snow-water. Slight taste of clay.) These values show that we have driven westwards quicker than we have walked eastwards. This is not encouraging but we shall continue our course to the east some time more, as long as there is a bit of sense in doing so. Red-breasted gull visible. Clay in quantities, in the shape of small grains up to the size of a walnut (rare). We arrived at a lofty pyramidal mass of ice but from it could see neither land nor sea. Half-frozen and snow-covered little pools very treacherous. Humour and feeling[1] good. Out on the ice one cannot at all notice that it is in movement with the exception that at our resting-places the leads change while we are sleeping.

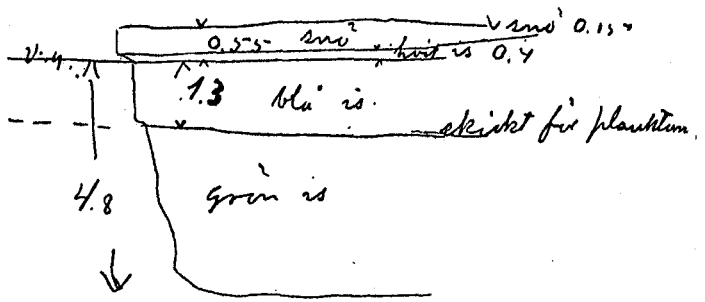
he ice as usu-ally a 0–20 m. (4–8 ft.)-thick no-cap nd the e below he clay always ard (in lock).

[1] Swedish "stämning" = mood.

Towards the evening we followed a fresh track after a large bear. He had gone down in the soup a couple of times so that not even he is protected from making mistakes in this regard. During the last few days we have seen no other birds than the one mentioned above and an ivory gull and a few fulmars.

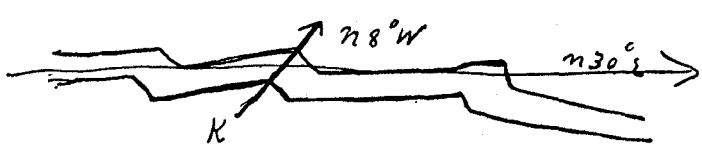
page 39 The water is (filled) with sponge-like masses.

The 1 *Aug.* 97



(*a*) 1 lead N. 40° W.
(*b*) 1 d:o N. 30° E.

1 ice-thickness 1.35 (4.6 ft) below water in lead b the fissure had the following appearance



(K = course?—*Trans.*)

In an adjacent lead K lay N 60° W. We started on 1 Aug. Sunday 8.30 o'cl. after I had mended the sleeping-sack with bear skin. We had excellent good ice until midday but then we had an hour's hard work after which the ice again became good. Our distance was probably 7 kilom. (4.2 miles) at least. Three red-breasted gulls seen and two of them almost unafraid, unlike what has otherwise been the case.

The ice seems to have become of

Page 40 a more favourable character, perhaps because we are approaching the edge of the great ice-stream and our district is lying to leeward of the tide-water under Frans Jos' Land. To-day, for instance, we have not needed to use the boat once for crossing lanes, these having been narrow and very often with even edges etc. Fulmars and seals were often seen. Two fresh bear-tracks have been crossed and we are longing for bears for the meat is finished. This evening we have seen the back of a new animal which looked like a long snake 10–12 meter (33–39 ft.) long of a dirty yellow colour and, in my opinion with black stripes running from the back for some distance down the sides. It breathed heavily almost like a whale which I suppose it really was.

Stockings are dried best by putting them on over the wool-and-hair stockings [1] on the feet. At our meal-times the seats consist of 1 medicine-chest, 1 photographic apparatus and 1 case of matches. For some days back I have greased my hands with bear-fat and in that way keep them soft.

Chronom. 5567 the 1 Aug. Corrected two Gr. Mt $= -50^{m}\ 7^{s}$ it probably loses 4.7 sec. every 24 hours.

2 Aug. we awakened 9.30 o'cl. more tired than usual. It seems as if good country was more fatiguing than half-good.

Page 41 The 2 Aug. at 12 o'cl. midd. we broke camp. The last bear-meat was cut into small pieces so that it might at least *look like* being a lot. Thickness of ice 1.2 m. (3.96 ft.). Scarcely an hour after breaking camp we got a new bear. It was an old worn-out male animal with rotten teeth. I brought it down by a shot in the chest at a distance of 38 m. (125 ft.) S-g and Fr-l both fired outers. Clear calm and hot the whole day but the country extraordinarily difficult. I do not think we made 2 km. (2,200 yds.) in 10 hours. Axe destroyed. 1 skua visible and 2 gulls circling

[1] "Raggsockor."

around the body of the bear. We did not get into our berths before 2 a.m. the 3 Aug. I washed my face for the first time since the 11 July and in the evening I mended a stocking. We hope that one bear will be enticed to follow us by the remains of the one shot, and so on so that we shall always have fresh meat at our heels. This time we took from the one we shot the fillet too (close in to the back) and the kidneys (1½ kilo—3¼ lbs) and the tongue and ribs. The 3 Aug. at 12 o'cl. we rose after being much plagued by the heat in the tent. We have determined to "lie outdoors" to-day. We photographed the story of the development of our forks. It is so warm that we do the pulling without any coats on. The ice horrible. Clothes-drying on a large scale. I made a fork for Fraenkel. the forks photographed.

page 42

3 Aug. 97.

Level-sext.			chrom. 5567	
17°	54′	10″	37	16
17	47	50	39	40
17	45	10	41	19
17	46	0	45	15
17	44	0	44	49
17	40	20	45	59
17	32	50	47	39
17	28	50	49	23
	27	20	50	45
	26	30	52	24
	389	240	447	329
17°	39′	18″	4 h 45 m 15 s.	

3 Aug. 4h 45m. Drift-wood on the ice. 1.1 m. (43 in.) long. Towards the water it is seen that the air is filled with a fine rain of water or particles of snow.

Freshwater-floe thickn. 1.4 m (54.6 in.)

"Is it easy to get across?" "Yes, it is easy with difficulty," extremely difficult ice small floes much pressure and new ice in the leads. The only ad-

vantage of the cold is that the edges hold better. Yesterday and to-day the course has been more S E than E. for that course is usually impossible. A skua was observed and a gull. A red-breasted gull
Page 43 visible. Much joking about my old bear which F. declared was the oldest bear in the Polar regions. Tough as leather galoshes. He believed it was an escaped menagerie-bear. We have passed tracks of 1 bear with 2 cubs. 2 o'cl. a.m. the 4 Aug., with the field-glass and in extremely clear air I looked N–E–SE for land or water without being able to notice either. Only ice and very difficult ice visible in all directions. In consequence we determined to give up our endeavours to some eastwards.

(Long. 29° 43′ and probably lat. 82° 17′ Decl. 0°, 8 west.)

We can surmount neither the current nor the ice and have absolutely no prospect of doing anything by continuing our tramp to E. We are therefore determined to begin our next next wandering with the course on the Seven Islands which we hope to reach in 6–7 weeks. At 4 a.m. the 4 Aug. we turned in. Bread and biscuits etc., wet through. N.B. that the movement of an ice-floe in one direction made the stomach feel empty. The great stream that Nansen has shown to exist thus produces perhaps quite other directions of currents in the neighbourhood.

Page 44 4 Aug. 3.30 p.m. break camp. Alga sample (no. 31) on ice-foot (green ice-foot but not at a depth of more than 0.5 m. (19 in.) below surface of water). Thickness of ice 1.05 (41 in.). Often the most practicable crossings lie at the ugliest pressures, the edges of the leads being nearest each other there. Of course these bridges are terrible but still they are bridges. In a lead running N 40° W we saw a pressure ∧ direct towards the channel. Wide leads free from floes but with piled-up edges all around are the very Devil. But as long as there is no fog we can get along.

Invent. of provisions.

Aée		Aée
front basket		rear basket
Cac. powder extract	4 tins	3 snowflake
coffee	1 „	2 mellin's food
butter	5 „	5 biscuits
milk	8 „	2 bottles
lact ser (dried milk)	4	4 butter
bread	4 „	1 pastry
sardines	5	2 salt
bird paste	1	2 soup tablets
cheese	½	1 flour
		1 lactose

Alga-sample No. 4 was frozen into the new ice in an opening.

page 45 Stock-taking of provisions 5 Aug. in morning.

Hard bread ..... 11 b. of 1.1 (2.4 lbs) ...	12.1	(26.4 lbs)	
12 biscuits ..... 12 bl of	15.5	(34.1 „)	
+ 5 Mellin's food	15.00	(33 „)	
butter ..... 17 b. of 900 (2 lbs)	15.30	(34 „)	
Chocolate powder 9 b. of 1 (2.2 lbs)	9.00	(20 „)	
extr.			
milk ..... 10 b. of 250 (¼ lb)	2.5	(5 „)	
Lact scr. 10 b. of	2.5	(5 „)	
Pemmican	3.0	(6.5 „)	
Sugar	5.00	(11 „)	
1 tin Stauffer prep	4.5	(10 „)	
Coffee	2.00	(4.5 „)	
1 tin chocolate			
3 b. Lime-juice tablets			
Whortleberry jam	1.00	(2.2 „)	
9 tins sardines			
3 tins paste			
Soup tablets 3½ tins			
2 bottles syrup			
1 bottle port-wine			
6 snowflake			
flour	1.	(2.2 „)	

This stocktaking shows that we must be careful especially with the bread.

page 46 Temp. falling still lower and each degree makes us

creep deeper down into the sleeping-sack. Bad day to-day the first with course N 40° W = Seven Islands.

The 5th 8.30 p.m. start. Course S 40° W. Thickness of ice (fresh-) 1.2 m. (47 in.). Some drops of rain fell. On all fours to-day as in the spring of our youth. "Glassée ice-flop" or "flop-flop." The ice much divided. A rafting of more than 1 km. (1100 yds.) 4 hours. Thickness of ice 0.7 m. (27 in.). Thickness of ice 1.1 and 1.2 m. (43–47 in.). Great seal on the ice. Many bear-tracks. Fulmars. 1 red gull. The ice after rafting first fairly and afterwards extremely good. At 6.30 o'cl. a.m. 6 Aug. we stopped. Lat. 10 o'cl. a.m. Gr. Mt. 82° 10′ 7″.

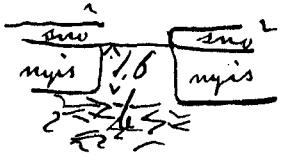
Short ribs of bear and tongue. Paradise. Large level ice-floes with fresh water-pools full of syrup and water with here and there a young Polar bear with tender meat.

The 6th 11 o'cl. p.m. Start. Ice 1.6 m. (5.28 ft.) mild. 2 red-breasted gulls. Shy. Visit once and then fly. Ice exc. favourable large level floes and many but easy crossings. What joy when the needle pointed across a level ..... some hundred meters.
47 1 pressure-line lead N 25° W. When we (and) the sledges made the worst somersaults F. remarked that the journey once more could be called not hop(e)less. Powdered-sugar ice and ice-gravel. Greatest distance of all probably at least 3 minutes but the wind is almost right against us and has probably driven us just as far back.

Two red-breasted gulls. The bear-meat is very good when it has become old. The snow difficult so-called powdered-sugar snow. One's feet glide and one easily slips, while the sledges cut deep into the snow. We are very tired now when we go to our berths at 12 o'cl. midday the 7. The wind is S 55° W and our course is S 40° W. New difficulty: the leads altering while we are crossing them. At 10.30 o'cl. p.m. the 7 we wakened at last and felt ourselves fully rested. The wind was still fresh but had swung round more from the west (S 75° W).

A little reindeer-hair in the food is recommended for while taking it out one is prevented from eating too quickly and greedily. 2 o'cl. a.m. the 8 break camp. Ice 1.45 m. (4.75 ft.). Pretty good ice. Hummocks and leads but large floes. The wind right in our noses but it is cooling. The ice has been about the same almost for the last three days. I do not use spectacles excepting in bright sunshine. I press my
page 48 eyes together instead. Two little auks visible in the water. they made a sound I have not heard before. If the wind fr. S W does what it has hitherto done i.e. pressing together the leads then it can keep on for a week or two. I wish I had a summer-jacket. It is warm work pulling the sledge. 2 red-breasted gulls. For a change we have come into a dreadful country with fresh water (photogr.) but F. who otherwise complains of the want of change, did not like what was offered him. All three of us have our noses running constantly. A permanent catarrh. The fresh water-pools are often more difficult to pass than the salt water sludge-ponds for their edges are eaten away below and the depths are so small that the boat cannot be used.

9 Aug. at 2.20 a.m. we began to get up in the tent.
3.0 primus started
3.18 the steak ready and the coffee-making begun
3.29 the steak eaten
3.48 the coffee made
4.0 the coffee drunk
5.30 broke camp



b = ice-sludge that looked like old ice. One
page 49 must not let oneself be fooled by such things. The state of the country is dreadful. The country consists of hummocks blocks and hills with snow-drifts between

and this is difficult for the pullers but for the sledges the going is not difficult for the snow supports them.

At 7.30 o'cl. I saw a hummock formed in a lane which was at right angles to the direction of the wind which led to a pressure. The country is consists of large uneven fields full of brown ice small hummocks with snow-sludge and water-pools but not many large sea-leads. It is extremely tiring. F. has diarrhœa for 2 :nd time and there does not seem much left of his moral strength. The sweet-water leads were often not so very "sweet" to cross. A black guillemot visible. A fine beautiful bear approached us but fled before we had a chance to shoot. This was a great grief for us and a pity too for soon we shall have no more bear's meat left. S. and F. went after him but in vain. We were tired out and F. was ill. I gave him opium for the diarrhœa. Afterwards we had several hours' work getting S's gun in order. Its mechanism is dreadfully carelessly constructed. We have been awake and busy for 18 hours when at 8 o'cl. p.m. we creep down into the sleeping-sack. The course always S 40° W. The 10 at 6.10 o'cl. a.m. all up. Load on *my sledge*

1 little sack.....	3.5	(7.7 lbs.)
1 front basket.....	37.1	81.7
1 rear „	37.3	82.
1 private sack.....	15.5	34
1 medicine chest ...	9.00	20
1 tent.....	9.0	20
2 tentp.	1.5	3.3
meat	5.0	11
	117.9	259.7
1 gun	1.6	3.5
	119.5	263.2
1 b. ammunition ...	6.5	14.3
	126.0 kilo	277.5 lbs.
1 sext.	2.2	4.8
1 sack	6.0 photog.	13.2
	134.2	295.5

Fraenkel's sledge.

Boat	63.00	(138.6 lbs.)
~~cooking app.~~		
~~spirit~~		
~~net~~		
1 sack private	17.00	37.4
1 hose	3.5	7.7
3 pieces wood	2.0	4.4
1 ammunit...	3.5	7.7
1 univers. ...	3.0	6.6
2 field-glass.	2.0	4.4
3 blankets ...	4.5	10.
1 sleep. sack	9.0	20.
~~1 sextant~~		
	107.5	236.8

	107.5	(236.8)
1 sack books ...	3.0	6.6
2 oars.....	4.5	10.
3 poles	2.0	4.4
1 gun	2.0	4.4
1 sack shoe hay	1.0	2.2
~~1 „ strings ..~~	~~4.0~~	~~10.8~~
~~1 „ photogr.~~	~~6.0~~	~~13.2~~
~~1 aner. .....~~	~~13.0~~	~~28.6~~
~~1 psychrom. ...~~	~~6.0~~	~~13.2~~
~~1 change sack.. 124.9~~		~~275~~
~~1 sleep. sack ...~~	~~4.9~~	~~10.8~~
	120	264

page 51

~~table things,~~ cook. app. food etc.			12.0	(26.41 lbs)
8 chests of matches			3.00	6.6
~~spirit~~				
1 sextant	~~2.2~~	~~(4.2)~~		
1 aner.	0.5	1.1	4.6	10.1
1 psychr.	3.1	6.8		
1 change-sack	1	2.2		
spirit service etc.			8.00	17.6
2 cushions, gun-case & cleaning-box			1.7	3.7
1 drift-wood			2.0	4.4
1 tarpauling			2.5	5.5
			~~155.8~~	~~342.7~~
			153.8	338.4

Long. 29° 5
Lat. 81° 56′ 5

ordinary gull visible. The ground extraordinarily difficult. absolutely untrafficable sludge-pools encountered to-day. they consist of broad channels filled with small lumps of ice and snow? Neither sledge nor boat can be moved forward there. In consequence of the place-determination given above the course was altered to S 50° W. (to the Seven

Islands). It is remarkable that we have travelled so far in latitude in spite of the wind having been right against us for several days. In consequence of our having come below 82 we have to-day had a feast with sardines for dinner and a Stauffer-cake for supper. The going to-day has been good although the road is bad. We assume that we have gone 3 kilometers (1.8 mile) or possib. 2 minutes. To-day I met for the first time small stones and leaves etc. on the ice. The character of the find-locality was as follows. 10 Aug. 4 o'cl. p.m. (N :o 5) The ice hard, uneven with hollows yellow and grayish little covered by snow. The depth of the ice below the water close to find-locality: 1.05, 1.05, 1.35, 1.35, 1.35, 1.05 m. (41, 41, 52.6, 52.6, 52.6, 41 in.). The find lay on a large floe in a hollow, 20 cm. (8 in.) deep and abt. 50 cm. (20 in.) in diameter. This find should make it possible to determine where this great amount of brown and hard ice which we constantly see has its place of origin. Before this find I have not found anything on the brown-yellow ice other than fine clay and now I find on the same ice a whole sending of plants, sand, small stones etc.

To-day there came a slight rain and then snow. We have gone into our tent after only 7 hours' march but it was so dreadfully fatiguing. Now S. is sitting mending trousers at in "the seat" and F. is oiling guns. F's stomach pains are now over.

11 Aug. was a regular Tycho Brahe-day.[1] At once in the morning I came into the water and so did my sledge so that nearly everything became wet through. S. ran in to F's sledge and broke the boat with the grapnel. All the sledges turned somersaults repeatedly during the course of the day. Mine was twice turned completely up and down. The going was good but the country terrible. *All* imaginable difficulties happened and when the evening

[1] Unlucky day.

came we were not at all happy. But something else happened, however; F. shot an ivory gull. It was snow-white with black legs and feet. The legs ~~and feet were~~ had white stripes right across them and the feet (the webs) were chequered with white stripes. Three toes with web and a toe (short) behind. At the outer edge of the wings there were some small feathers with gray patches. The beak had a yellow point but was otherwise yellowish-white with black longitudinal shadings. The bird landed quite near us.

Thickness of ice 1.45 m (4.8 ft.). I think I can assert with certainty that to-day I have seen a couple of blocks of glacier ice. One block contained 7 layers of dirt-stripes with white snow or ice between. ~~Its~~ The thickness of the block was ~~0.95 (3.14 ft.)~~ 1.05 m (3.5 ft.) and the layers were nearly of even thickness and were parallel. A peculiar incident happened on crossing a lead. We stood quite at a loss what to do for the edges of the ice were wretched and the channel so shallow that the ~~ballo~~ boat could not float. Our ordinary methods failed us altogether. Then while we were speaking the ice-floe broke beneath Fraenkel and so we obtained a bit of ice of ~~large~~ considerable
page 54 size and with the assistance of this piece we then made the crossing quite cleverly. We have not been able to keep the course but have been obliged to go both to the north and to the east but endeavour to go S 50° W. Our distance to-day probably did not exceed 3.5 km. (2.1 miles).

Sample no. 7 At 4.30 p.m. our longitude was 30° E. At midday our latitude was 81° 54′ 7 F. thought he saw land and it was really so like land that we changed the course in that direction but it was found to be merely a peculiarly shaped large hummock.

Sample no. 7 was found near the edge of a melt-hole and on the *under*-side of a thin newly formed ice-covering about 2 cm (1 in.) thick lying over the water

in the same melt-hole. On the under-side it sat in patches of about a centimeter (abt. ½ in.) in size.

12 Aug. Sounding 320 m. (176 fathoms). No bottom. Thickn. of ice 1.2 (4 ft.). Sample 8 sat on the sounding-line when 200 m. (110 fathoms) had been drawn up; At the close of the day's march we at last got better country after having had extremely difficult going for several days. Our distance to-day amounted probably to 2.5 minutes although the marching-time was shorter than usual.

The course has been S 50° V and we are now so near Gillis Land that we might well expect to catch a glimpse of it. But neither that nor any other land is visible. To-day we have eaten ivory gull without any other preparation than ordinary frying and found it tasted excellent. We tried to get at a seal as now we have not more than one meal of bear's-meat left. My shoes begin to be so cut to pieces that I am afraid their fate will soon be sealed. Now it is raining on the tent when we go to bed at 3.30 o'cl. in the morning the 13th Aug. I make preparations for manufacturing a waterproof. The instant after we had gone to bed we again heard a whale but could not catch sight of it.

13 Aug. at 5 p.m. start. Tried in vain to get a seal. The ice reasonably good. In a fissure found a little fish which was pretty unafraid and seemed to be astonished at sight of us. I killed him with the shovel. It had a length of 7.5 cm (3 in.). Gray-green, dark pricky back, red ?violet side and white belly. Black pupil surrounded by eyeball of 5.5 mm (.2 in.) diam. Three dorsal fins, 1 caudal fin, 2 anal fins, 1 couple ventral fins beneath the head, 1 couple lateral fins behind the head. Just when we had passed the fissure S-g cried "three bears." We were at once in motion and full of excited expectation. Warned by our preceding disappointments we now went to work carefully. We concealed ourselves behind a hummock and waited but no bears came.

The waiting became too long for old blood.

Then I chose myself as a bait and crept forward along the plain whistling softly. The she-bear became attentive, came forward winding me but turned round again and lay down. At last it was too cold for me to lie immovably in the snow and then I called out to the others that we should rush up to the bears. We did so. Then the she-bear came towards me but was met by a shot which missed. I sprang up however and shot again while the bears that were fleeing, stopped for a moment then the she-bear was wounded at a distance of 80 paces but ran a little way whereupon I dropped her on the spot at 94 paces. My 4th shot dropped one cub. Then the third one ran but was wounded by Fraenkel and dropped by Strindberg who had had a longer way to go and so could not come up as quickly as I. There was great joy in the caravan and we cut our bears in pieces with pleasure and loaded our sledges with not less than 42 kilogrammes (138 lbs) i.e., with fresh meat for 23 days. Among the experiences we made with regard to the value of the parts of the bear it may be mentioned that we found the heart, brain and kidneys very palatable. The tongue too is well worth taking. The meat on the ribs is excellent. In the evening I shot an ivory gull. The work of cutting up the bears, etc. gave us so much to do that we did not march much this day. The wind has now swung round to S E so that we hope to drift westwards. To-day the weather has been extremely beautiful and that is a good thing for otherwise the work would have been ticklish. When a bear is hit he brings out a roar and tries to flee as quick as he can. We have been butchers the whole day. I have been trying the business of tanning in order to get skin to mend the sleeping-sack with. The skin of the fore-legs seems to be the most suitable being the lightest. With fairly clear air to-day we have not seen land in any direction. The 14 at 6.30 o'cl. a.m. we went to our berths after having washed our hands and eaten our-

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When a bear is wounded he often utters a loud roar.

selves prop full. The she-bear stiffened in a very little while, but the cubs were soft a long time. The she-bear had bitten her tongue right through. The ivory gull has three cries 1. piyrrrr with four soft and trilling r's 2. pyöt-pyöt 3. resembling the croaking of the crow.

The 15 at 12 o'cl. midd. we found our berths after having lain still on account of the rain and for repairs. I had manufactured a rain-coat. The sleeping-sack mended, the knives sharpened. Coats mended. Spectacles do. One or two ivory gulls come to the remains of the bears. We have had rain for almost 24 hours and the wind from S E. Diarrhœa attacks S-g and Aée. Strindberg bandaged all over with cotton-wool and bindings for a cut-wound in the hand and a boil on the upper lip. Washing with sublimate solution. Eating masses of meat. the at 4 o'cl. a.m. start amid wind and snow. The skin vest and "baschlik" taken out but were hardly needed. The country very bad but the going good. We crossed bear-tracks. I think that as good as all the ice is pressure-ice. Even on level floes we see ///// parallel lines which point to the floe containing pieces standing on edge. I have seen the same thing to-day in various places in the old yellow floes. All the hilly country consists undoubtedly of old pressure-ice and here most of the country is hilly. Our long. to-day 31° E and probably latitude 81° 50. We shall therefore change our course tomorrow to S 60° W. Pretty clear now for a while but no land visible. The 17 August 10.40 a.m. a Ross' gull and two black guillemots or little auks. Our journey to-day has been terrible. We have not advanced 1,000 meters (1100 yds.) but with the greatest difficulty have dodged on from floe to floe. The ice here is fearfully pressed together and shattered into small floes. A fairly reliable latitude determination gave 81° 47″ ~~The meat of~~ Bear heart (fried) tastes a little bitter. Bearmeat in

Stauffer's soup tasted very good. The ration of bear-meat per meal is from to-morrow morning to be increased to 1.1 kilo (2.4 lbs) per person.

18 Aug. at 1.40 o'cl. p.m. start. During the night the ice had altered very much. The wind had turned more northerly. The weather beautiful. The going extremely troublesome, we ferried 5 times before midday i.e., in 4 3/4 hours and had to begin again as soon as we had eaten. The ice is much divided into small floes. Many seals in the large open waters between the floes. A black guillemot visible. The sight of F's gun had dropped off but was found again. We must be near the sea, the ice being so divided. The horizon almost perfectly clear towards Gillis Land but we did not see any land in that direction. I believe that unpressed ice is found only near the egress of the Polar stream into the open sea (and is) formed by the freezing of the sludgy water. In the afternoon we had 3 ferryings and 1 rafting. With all this work we have hardly come 1 kilometer (1100 yds.) on our course, I suppose. Thickn. of ice 1.2 and 1.7 m
page 60 (3.9–5.6 ft.). A little auk visible. While we were sitting inside the tent and S. & F. were getting the supper ready and I was mending my pants I heard a noise outside the tent and when I ~~opened~~ looked through the crack in the opening I saw a bear close to my nose. I did not leave off sewing but merely said: see there is another bear for us, whereupon F. took hold of one of the guns (which by a chance had been taken into the tent for cleaning) and crept out. The bear then stood a few steps from him and . . . in order to attack but was met by a ball that made him fall dead after he had gone a few paces. We continued our work and our supper before we even looked at the cadaver. But afterwards when we inspected the animal we found it was a large he-bear undoubtedly the finest of all we had shot. We took out the brains, kidneys, tongue and some pieces along the back, alto-

gether abt. 10 kilo (22 lbs) in order to supplement our supply of fresh meat. Strindberg took the lunar distance to check the chronometers and determine our position. He also laid out some fishing gear for the night hook with meat (of bear). The wind is now easterly and we are happy. Now too the horizon towards Gillis Land has been fairly clear but we have not seen anything of it. The difficulties in ferrying and rafting are constantly increased by the formation of new ice and the lively movement of the floes, which during the last twenty-four hours has been greater than we have noticed on any other occasion.

Se 61 The 19 at 8 o'cl. p.m. Start. Attempt at frying with bear-fat and F. said: "fancy how delightful if we can get sandwiches to eat." Of the bear we took only the brain, kidneys and the best pieces altogether abt. 8 kilo (17.5 lbs). We have done a good day's work probably 5 kilom. (3 miles) Large leads but regular and with large . . . (strips) between. The country exceedingly tiring, the new snow preventing us from seeing the irregularities which constantly give the sledges unexpected jerks. The fresh-water pools, not yet frozen, force us to go round a lot. I am quite done for by the day's work. The reconnoiterings are carried out by me and are very troublesome. I have often to go a long way among hummocks and over pools and along the leads. The worst are the fresh-water pools which turn in innumerable windings real labyrinths and which are united by means of wide fissures which do not become visible before one is close to them. I almost always throw my gun over my shoulders when I go off reconnoitring S and F. sit waiting and shivering. Sometimes they reconnoitre in the one direction and I in the other. The reconnoitring for a road in the uneven country is almost as trying.

We have encountered an immense lead running N 20° E Wild crossings ~~"lie still" different speed~~

must often be made. The sledges capsize or remain hanging over an abyss while the puller tumbles down. Then comes the order "lie still" and there he lies a long while as sledge-holder until the others can come
page 62 up to help him. The sledges must often be pulled at a great speed at a part of the crossing and slowly during another part. They must often be swung round on the middle of a point or in the middle of a pass. The axe and the spade must often be employed in order to make a road. Tracks for one or both of the runners must be hewn. Perhaps the sledges have to be entirely unloaded or else they are balanced across the boat. A line at each end of the boat makes it possible to pull it forwards or backwards. The quays break just when the weight of the sledge rests on them. The sledge with its valuable cargo is in a position of the greatest danger.

The 21 Aug. 12.10 a.m. ~~little~~ start. Ross' gull.
~~pretty~~ Magnificent day. Air light. Faint north wind but
~~clear~~ the half frozen leads and pools of water have caused us an immense loss of time. A single ferrying took 2 hours. I believe that we have hitherto not had such a large district of ice so much pressed and so broken.
Sample no. 10 Sample no. 10 was attached frozen fast and half dry (gray) to the fracture surface of a piece of ice pressed up by a lead. This evening on my proposal we tasted what raw meat was like. Raw bear with salt tastes like oysters and we hardly wanted to fry it. Raw brain is also very good and the bear's meat was easily eaten raw. Just as we were pitching our tent three bears
page 63 came to attack us. We took up a position near a hummock. S-g shot the old one with one ball. F. shot the other with two. I fired four shots at the other cub and made hits with all but his wounds were not so serious but that he could manage to get away among the fissures and pools. We took the best bits i.e., 2/3 of the tongue, the kidneys and the brains. We also took the blood and F. was instructed to make blood-pancake (my proposal). He did this by using oatmeal and

frying in butter after which it was eaten with butter and found to be quite excellent. Of the bear-cubs one was rather big, the other (a female) was smaller. All the cubs we have seen have been young ones from the previous year. Experiment with alga-soup and Mellin's food-cake (water with yeast-powder) gave exc. result. The alga-soup (green) was proposed by S. and should be considered as a fairly important discovery for travellers in these tracts.

The 22 Aug. 5 a.m. Start. Young ivory gull weight 4.75 gr. (1 lb) (full grown) was shot by me. It had black tips to the big tail and wing feathers as well as to the short covert-feathers. On the upper side and the sides of the neck there were some feathers with gray tips. The head was
64 gray-black around the beak-root, the eyes and the front part of the head, the beak black. It seems to be the young ones that give the cry " pyöt-pyöt " noted under 14 Aug. as that of the ivory gull. When the mother is anxious or gives a warning she makes the cry piyrrrr (see 14 Aug.) but then with sharp *r* and in close succession. The young bird was white underneath. But the feet were marked as stated for the older (birds). The country to-day has been terrible and I repeat what I wrote yesterday that we have not previously had such a large district with ice so pressed. There can scarcely be found a couple of square meters (yards) of ice which does not present evident traces of pressure and the entire country ~~forming~~ consisting of a boundless field of large and small hummocks. One cannot speak of any regularity among them. The leads to-day have been broken to pieces and the floes small, but in general it has been easy to get across. Now they are so frozen that neither ferrying ~~and~~ nor rafting can now be employed. To-day a lead changed just when we had come across it (5 minutes later and it would have been impossible) and we had an opportunity of seeing a very powerful pressing. The floes came at a great speed and there was a creaking round

about us. It made a strange and magnificent impression. The day has been extremely beautiful. Perhaps the most beautiful we have had. With a specially clear horizon we have again tried to catch sight of Gillis Land but it is impossible to get a glimpse of any
page 65 part of it. Our course has been S 60° W as on the previous days and the day's-march has probably brought us about 3 min. in the direction of our course. The clear air was utilized by S-g to take lunar distances. He saw haloes on the snow: an inner more sharply defined with the inner boundary red and Λ distance to the sun (the halo-radius from the inner boundary) 21° 45′; . . . outer halo (47°) where the colours however could not be determined quite absolutely. Observed from the ground these haloes seemed to be the extremities of parabolas or of ellipses. Magnificent Venetian landscape with canals between lofty hummock edges on both sides, water-square with ice-fountain and stairs down to the canals. Divine. Bear-ham several days old exquisite. I massaged F's foot He had been pulling so that his knee went out of joint but it slipped in again but he had no bad effects of it. S-g had a pain in one toe, cause still unknown.

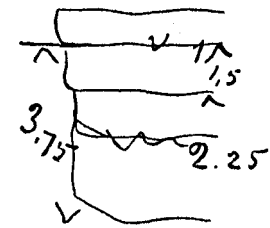
	Long.		Lat.
Aug. 6		82°	11
8.6 positions-line	29° 29′		
	28° 58′	82°	0′
		82°	20′
9.9		81°	57
10.95		81°	54′.5
11.2	..... 30°	1.....	
13.6 pos. 1.	30° 12′	... 82°	0
	31° 58′	... 81°	30
16/6	30° 55	82°	0
	31° 14	81°	30
	Long.		Lat.
Aug. 20,9		81°	44′

Aug. 23 11.30 o'cl. a.m. Start. The difficult ice-district continued until 4 o'cl. p.m. when we found smoother ice. A lead opened just when we were about across and we had once more to employ ferrying. Two bear-tracks were crossed F. considers that the fresh water-pools often or sometimes penetrate the entire thickness of the ice. S-g called our attention to the fact that the lateral fissures are sometimes connected with freshwater-pools ~~which~~ in such a way that we may suppose that the freshwater of the pools weakens the ice to breaking-point on the pressings. Alga-soup was made with large portion of algae to which was added fried bear-meat and a couple of spoons of Mellin's food water and then formed a soup which I thought was excellent but F. and S. liked it less although they considered it could be used as emergency-soup. The ice of the freshwater-pools now begins to bear here and there and that is a good thing for one can despair at the roundabout-way one is obliged to go on their account. Our day's march ought to have been abt. 7–7 kilometers (3.6–4.2 miles) and we are terribly tired. At 1 o'cl. p.m. I found a floe with masses of clay. It was examined carefully and samples 12, 13, 14 were taken. The two former contained clay and ~~an~~ organic plant-remains which were found in it. The last (14) contains only clay. Such plant-parts the ~~long~~ threads I have certainly seen in the clays before but have not paid attention. Sample no. 11 consists of driftwood which F. found sunk down into the snow. It was rotten but I took a part of it. The bread rations are now diminished to 75 gr. (2½ oz.) hard bread ~~and~~ and 150 gr. (5 oz.) biscuits but the meat rations are increased to 2.8 kilo–3 kilo (6.2–6.6 lbs) per day for all three together and we thrive very well on the diet. To-day I shot a seal in the head but without succeeding in getting it. Sample no. 15 contains soup-algae and sample no. 16 contains the eyes of the young ivory gull that was shot, in order to be able to examine its construction

page 68 against snow-blindness. It is not easy to preserve all these samples from damp and accidents.

Thickn. of ice 3.75 and 1.5 (12.35–4.95 ft.)

~~*Samples nos 11, 12, 13, 14*~~
~~*11 = drift-wood*~~



Aug. 24 at 3.40 o'cl. p.m. Start. Ice-conditions still dreadful. We are now in a difficult pressure-district miles in breadth. I caught a hasty glimpse of a fish. It was abt. 1 d.m. (4 in) long, ~~gray~~ dark-gray on the back and provided with a couple of small wide transverse stripes (far apart) across the back. It was found like the former in a lead ~~quite near~~ connected with a ~~freshwater~~ salt water pond and it was immediately below W. S. (abt. 2 d.m.) (8 in). It moved slowly like the former but glided in beneath the bits of ice.

On the surface of a very large pure pressed piece of (white) ice there was made a find no. 17 all the parts of which lay near each other. The lighter parts more on the surface. The heavier deeper. After this find I have observed that the ice is perforated everywhere and filled with things that are certainly well deserving of ~~be~~ a special Polar-expedition merely on their account. But then one should be provided with appliances so as to be easily able to enlarge the holes and take up the objects. The natural philosopher would find the interior of the ice to be ~~just~~ almost as rich in contents as that of the crust of the earth or that of the sea. Find no. 17 was washed in a tea-strainer whereby,
page 69 perhaps some small quantity (clay ?) was sluiced away but otherwise everything was included. The leaves
No. 17 were dried by being placed in layers in a " bandage "

and dried against the breast. In the neighbourhood of the find there were discovered (as everywhere among the ice) the usual yellow clay-coloured ice surfaces. Find no. 18 consists of divers little things which (at another place) were picked up on and from within the ice over a surface of 2 m^2 they do not seem to have anything to do with each other, however, but merely confirm the above remark as to the riches of the ice. We have several times seen a black little bird with white on the wings like a black guillemot, but white under the belly like a little auk. It has a kind of twitter and we have not seen it fly but only dive. What kind of bird is it? Fulmars and ivory gulls sail
18 around us pretty often. We now fry the bear's meat without butter and find it excellent. The butter is eaten now only at dinner. The meat ration pr. day at present is 1.3 kilo (2.8 lbs)—breakfast—each, all three of us and 0.4 (.9 lb) for dinner. The bread ration is 75 gr. (2.5 oz.) of hard bread and pr day and person and ~~the ration~~ that of biscuit is 150 gr. (5 oz.)
70 pr day and person. Last night F. had severe diarrhœa but this prob. was the result of catching cold. He suffers sometimes from cramp perhaps on account of over-exertion. S-g's tender foot has been cured by rubbing boot-grease on the stocking. Cramp relieved immediately by massage-treatment. ~~Yesterday~~ To-day bear-tracks were seen and the day before yesterday two such traces were observed. This means for us that we have wandering butcher's shops around us.

Aug. 25 at 9.45 p.m. Start. The ice to-day has been much better. Many leads but they have been easily crossed and between them the floes have been large and pretty level. A sample no. 19 of peat-moss was found ~~down~~ in a hole in the ice. A big find was made at the tent-place in the evening. There the clay contained leaves, bits of drift wood, shells (sample no. 20). A bird was seen, most like a skua. He was

quite black with the exception of underneath where he was blackish-brown. Flew as silently as a spirit and dived down here and there for food. I shot one of those mystical little auks. He looked like an ordinary little auk but was white all the way up the side in front of the wing so that at a distance he looked like a black guillemot and in addition the tips of the feathers were white on the inner half of the wing. Three-toed without spur, the beak quite black. ~~the seaserpent~~ The sea-serpent was seen but looked different. He still appeared to have two curves but now he seemed
page 71 to be gray everywhere and when he dived a two-cloven fin was seen at the end. To-day I have at last observed how the ~~stratified~~ ice arises that displays stratified layers of clay. It is as follows, the clay drips down from an overlying edge (a) to the one lying

below (b. c.) and remains on the edges of these and freezes fast after which the intermediate space is filled with ice and snow. The layers, consequently, do not traverse the entire piece (should however be investigated). The edges d and e, which are not sufficiently prominent do not obtain any part of the
For this layer of clay, and therefore no layer is formed on them*
** there is* F. fell into the water to-day and has diarrhœa and S.
no note in has a pain in his foot and I have diarrhœa but we covered
the diary. a good distance to-day in any case. This evening I have made fishing-hooks of pins and have fished with meat and fat we shall see if I get anything tonight. The going has been excellent. Thickn. of ice 1.1 and 1.1 (3.6–3.6 ft) on level floe (not by hummock).

N.B. that the tops and edges especially blacken and retain clay on melting. I have seen layers of clay 2–3 cm. (1 in) thick there.

Thickn. of ice 1.3 m (4.3 ft.) level floe.

The 27 at 2.30 o'cl. a.m. Start. ~~Thickn. of~~ The bait (meat and blubber) on all the 6 hooks were untouched. They were at a vertical distance of 0.5 m (19 in.) from each other and were sent abt. 5 m (16.5 ft) below the surface. Thickn. of ice 1.44 (4.75 ft.) and 1.25 (4.125 ft.) on level ice. Thickn. of ice with hummock 2.65 m. (8.75 ft). During the whole of a.m. we had good going and good floes although the leads were numerous. But in the evening the difficult country began again. It consisted of small and, in part, ant-heap-like hillocks standing very closely together between which the sledges incessantly capsized and caught fast. However we certainly made to-day 6–7 kilom. (3.6–4.2 miles) and had one of our best days. The weather has been magnificent. I repaired S's photographic app. and the spirit tin and had much trouble with sample No. 17 which is ready at last. At the edge of the water one can see how stratified ice arises. The phenomenon of stratified sea-ice is an illusion. The stratification arises from the periodic melting and freezing ~~with~~ of the water at the edges of ice which already exists. To-day I have seen in freshwater-pools isolated dark patches showing that salt water, locally and without ~~cracks~~ cracks being necessary, can come into communication with the bottom of freshwater-pools. But which water it is that opens communications is, on the other hand not known with certainty yet. To-day we have seen ivory gulls and ~~d~~—— 1 bird which probably was a little auk. This evening too I have put out the long line for fishing. F. has again had very bad diarrhœa and has got opium. I have had diarrhœa too to-day but I imagine I am well again now without any medicine. S. is greatly occupied calculating lunar distances. To-day we have not eaten more vegetable substances than 4 Schumacher-bread-pieces and 6 Albert-biscuits per man for we have begun to use Mellin's food meal in the coffee and chocolate.

On stocktaking ~~yesterday~~ the 25 Aug. 2 o'cl. a.m. we possessed

Andrée's sledge.

rear basket
2 full snowflakes
1 snowflake for 2 days
2 Mellin's food-biscuits
1 Albert biscuits
1 Kongo „
1 bottle wine
1 „ syrup
1 big tin salt
1 little „
3 tins butter
2 „ soup tablets
1 „ paste
1 „ meat (5 kilo) (11 lbs)
1 „ oatmeal
1 sack meat (5 kilo) (11 lbs)
Ball-cartridges

front basket
1 tin coffee
4 „ cac. meat-powder
4 „ butter
3 „ sardines
3 „ lacto ser. cac.
5 „ condens. milk
1½ kilo (3.3 lbs) cheese
1 tin paste
Shot cartridges

page 74 *In the boat there is*

5/7 tin butter
1/3 „ coffee
1/2 „ Albert biscuits
1/2 „ milk
1½ „ lactoserin
0.6 „ meat-powder chocolate
1/2 „ Schumacher bread

Of this there was used

Coffee for	32 times á 50 gr	(1.7 oz)
Lactoserin	33 „ 64 „	(2.2 oz)
Stauffer	13	
Soup	6	
Sea algae	6	

90

Strindb. sledge.

		tin
Whortleberry	1.....	1
Kongo	1.....	1
Hard br.	4 + 2.6	
Snowflake...1 +	2.....	3
Cloetta coc 1 +	2.....	3
Small coffee...	2.....	2
Sardines ...1 +	4.....	5
Butter .....3 +	3.....	6
Limejuice ... and chocolate		
Meat.....		5 kilo (11 lbs)
sugar.....		4 „ (9 lbs)
syrup		1 bot.
Stauffer		1 tin... 1
biscuit { Albert	1.....	1
biscuit { Cracnel.....	1.....	1
biscuit { Oskar	1.....	1
Mellin flour...	3.....	3
Pemmican.....		3 kilo (6.6 lbs)
Lactoserin ...	5 t...	4
Milk	2.....	2
Paste.....	1.....	1

75 The 28 9 o'cl. a.m. Start. The ice good but pressed and several leads, of which one rather troublesome. We had to ferry (Long line laid out last night but without result). Last night and to-day the ice has been very much in movement. The fresh water-pools are now in general so frozen that we can pass direct over the smaller ones. At midday we come into some terrible ice: large hummocks with deep perpendicular pools between. This evening the ice has been typically Polar floe-ice scarcely a square meter (metre) that is not pressure ice and the entire surface is covered by old low hummocks and pieces of ice which by melting, filling up with snow and freezing and the "grinding" of the snow have been rounded off into innumerable small hillocks varying very much in form and size and between which there are frozen ~~fresh~~ pools of water with ice which is still level but which by its bulging etc. shows that it too will soon form a link in the billowy part of the surface. The study of the appearance of the ice, the fissures, the hummocks, the slips, the pressures etc. lead the thoughts irresistibly to the geological phenomena in the crust of the earth, whose late sedimentary strata correspond to the pools of water). To-day it
76 has been ~~almost 6 degrees (~~ cold and a wind-velocity of 7 metres (23.1 ft) but we have not suffered from it. The tent and sleeping-sack begin to be difficult to manage. F. is bad again. Yesterday he got an opium tablet against diarrhœa and this evening he has got a morphine tablet against the pains in his stomach we shall see if he can become a man again. We now eat only 4 Schumacher-squares and 6 little biscuits per day but we add Mellin's food-meal to the coffee and ~~lachter~~ lactoserin and find this excellent. Our course is still S 60° W. The wind has been N W to-day so we hope we have drifted towards the south. Seals, fulmars and ivory gulls are still seen. The two last mentioned ~~flo~~ came so near that

one was tempted to try to kill them with a stick. Thickn. of ice 1.2, 1.2, 1.15 m (3.96, 3.96, 3.85 ft) (Kullb. 5567 Aug. 20,0 astr. midd. 20 Aug. corr. Gr. Mt. = − 45 m 21 s slow if amounting to = 9.7 daily) Lat. 81° 47′
Long. 28°, 4 E

Start the 29 3.30 o'cl. p.m. The ice as before but the leads are still very extensive and broke so that they are very difficult to cross. It now begins
page 77 to feel cold. We have seen a bear to-day but unfortunately he went off at a gallop when he saw that he was noticed. S's sledge badly broken and we could only just manage to mend it. We come slowly onwards and I imagine we shall have to make a late autumn journey to reach Mossel bay. The ice and the snow on it are becoming as hard as glass and it is difficult to pull the sledges across it. To-day we have tried to go S 45° W as S's lunar observations showed that we were rather more to the westward than we had imagined. But to keep a tolerably steady course among the leads is on my word no easy task however. To-night was the first time I thought of all the lovely things at home S. and F. on the contrary have long spoken about it. The tent is now always covered with ice inside and the bottom-, which is double, feels pretty hard when it is being rolled together. I sweep it clean morning and evening before and after the cooking.

The 30 5 o'cl. p.m. Start. The ice as before and the course too but this was hard to keep for the leads have been difficult to get across. Two Ross' gulls visible. At last we found ourselves on a floe from which we could not come without rafting. As we had not more than 20 min. left of our march-time we determined to pitch our tent and see if the ice possibly moved during the night. Scarcely had we erected
page 78 the tent before S. cried out "a bear on top of us." A bear then stood 10 paces from him. I was lying

inside the tent sweeping the floor and so could do nothing but F. who was outside caught hold of a gun and gave the bear a shot that made him turn, badly wounded. To save cartridges he was allowed to run a bit but at last he had to be finished off with 3 more shots. The bear however had managed to get down into a broad lead and rolled himself about there but he could not swim far. I threw a grapnel past him and brought him in to the edge of the ice. This however was so thin that we hardly dared to stand on it but at last I succeeded in putting a noose around his neck and one around a foreleg. S. prised ~~a little~~ with a boat-hook and so we hauled him up on to the ice pretty easily. The situation was photographed and the bear was cut up. Once more we
79 have 30 kilo (66 lbs) of meat i.e. meat for 14 days if we calculate 0.9 kilo (2 lbs) each morning and evening and 300 (11 oz) for dinner. These quantities are carried next to the body so as not to be frozen. Two Ross' gulls visible. The 31 at 9.30 o'cl. p.m. Start. ~~Phen~~ The sun touched the horizon at midnight. The landscape on fire. The snow a sea of fire. The country fairly good. We could for the first time over broad new ice. First I crept across on all fours to test if it would hold. Then we went across in several places. One ferrying had to be made. The leads were passable but ~~strongly~~ the ice was in lovely movement. It is fine to work the sledges onward through the middle of the crashing ice-pressures round about us. Sometimes a lead closes just when we need it, sometimes it opens suddenly the moment before or after a crossing. I had diarrhœa badly perhaps in consequence of a chill. F.'s sledge badly broken and had to be repaired on the spot. In the evening I took both morphine and opium. Thickn. of ice 0.9 and 1.10 (3–3.6 ft).
80 When we wakened on 1 Sept. we felt we wanted rest and repairs. The sleeping sack had to be mended

and we needed to be out of harness for a day. Everyone sewed and we chatted, ate and drank. We were in the best of humours especially when S. announced that we were in 81° 16′ n. L. and that thus that we had been drifted rapidly southwards by the prevailing strong N W wind. We even took sandwiches and coffee with our bear's meat dish at dinner. In the evening we sounded but the sounding line stood so obliquely (sin ∧ with horiz. $= \frac{1}{4.3} \therefore \wedge = 14°$, 5) that of our 320 m (1,050 ft) of line no more than 70 m (230 ft) were of use. Its direction was to S 80° E at the lower end. S. ~~we~~ has calculated that it is probable that there exists an eastward going-current with a speed of abt. 1.4 m (4.6 ft) per sec. Thickn. of ice 0.70–0.95–1.35 m (2.3–3.1–4.45 ft) along the edge of the same floe which is fairly level although with hummocks here and there. We shall now try to keep day and night order. We have found that ~~the water~~ the last bear's-meat that had not been kept in water in any other way than by pulling the bear through the water was juicier than usual and so we shall in the future treat all the bear's-meat in
page 81 that way. Now in the evening the 2 Sept. the wind has swung round to S 60° W but fortunately is not very strong. I have now begun to use wool- and hair-stockings at night and to-night for the first time I shall creep into the sleeping-sack top.

3 Sept. 11^h 15 o'cl. Start. Thickn. of ice 0.90 & 0.95 (3–3.3 ft) I had to go out during the night on account of diarrhœa and I then found a bear standing a little way off looking with open mouth at the camp. He seemed however to have found the matter suspicious for he jogged away and so cheated us both of brains and kidneys to say nothing of kidney fat and blood-pancake.

Thickn. of ice 1.50, 0.95 (4.95–3.3 ft). To-day ~~we have~~ we found ourselves surrounded by broad

water-channels of great extent and found ourselves obliged to trust ourselves entirely to the boat. We succeeded in loading everything on it and then rowed for 3 hours at a pretty good pace towards the Seven Islands (our goal). It was with a rather solemn feeling when at 1^h 50 o'cl. p.m. we began this new way of travelling gliding slowly over the mirror-like surface of the water between ~~high~~ large ice-floes loaded with giant-like hummocks. Only the shriek of ivory gulls and the splashing of the seals when they dived and the short orders of the steersman broke the silence. We knew that we were moving onwards more quickly than usual and at every turn of the leads we asked ourselves in silence if we might not possibly journey on in this glorious way to the end. We called it glorious for the everlasting ~~draw~~ hauling of the sledges had become tiring I fancy the last few days and it would be a great relief for us to travel some days in another way. But at 5 o'cl. our joy came to an end; we then entered a bay in the ice which immediately afterwards was closed by a floe so that we could go neither onwards nor backwards. We were satisfied however for things had gone well, the boat was excellent and there was room for all our luggage. Fraenkel shot a bird which *probably* was a young black guillemot. It had a weight of 400 gr (1.3 lbs). Long black beak with curved upper beak. The head long ~~The belly~~ The under side finely gray-shaded the whole way from the bill to the tail, most at the neck least in the middle round the belly. The back black but with mixture of white most at the head and tail least in the middle. The wings with black edges around except one little white edge on the back inner part of the wing. The middle field of the wing white with black transverse ends. The tail feathers very short and black with a little white on the covering feathers. The feet red-brown. Three toes and web.

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4 Sept. Strindb. birthday. Festal day. I awakened him giving him letters from his sweetheart and relations. It was a real pleasure to see how glad he was. To-day we have had some extra food on account of the day. The breakfast consists of bear's-meat beef with bread and Stauffer's pease-soup with bear's-meat and bear's fat. Dinner fried bear's-meat kept warm inside our waistcoats. Supper Bear's-meat, bread and goose-liver paste, Stauffer-cake with syrup sauce, syrup and water, speech for Nils, Lactoserin chocolate.

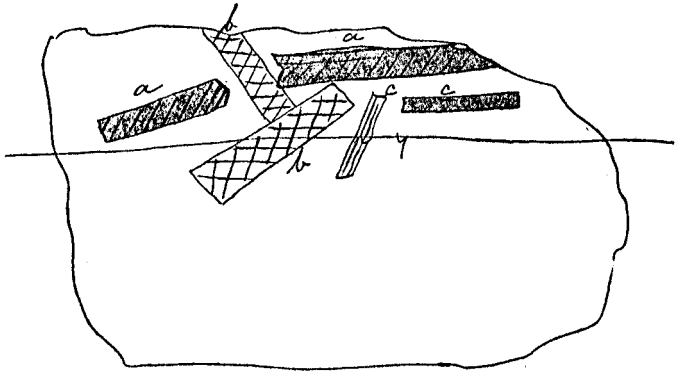
Place determination to-day has given 81° 11′ L and 29°, 6 EL ~~Thickn. of ice 1.65 = (~~ S. kept his birthday by falling very thoroughly, sledge and all, into the soup. We had to pitch our tent after 3 hours' march and then had a very troublesome and time-wasting business to dry him and his things. Much of the bread and biscuits and all the sugar destroyed or
page 83 damaged, but we had to keep it in any case and that is done by drying a part of the bread slowly and using it as before. The remainder was fried along with the bear's-meat and the sauce. The sugar is poured into the chocolate and coffee in its liquid form. The biscuit-mud is mixed with cold water and then boiled together with the chocolate. It was a pretty great misfortune but its worst side is that it makes life more uncomfortable for us. Last night I lay in a single blanket instead of a double one but found it rather cool. Yesterday the ice was ~~fairly~~ rather level and fairly free from large hummocks but it was fresher ice everywhere and covered with fresh snow which made the sledge-going very heavy. Thickn. of ice 1.65 m (5.5 ft). The accident to S's sledge did not lessen our festal mood but we were jolly and friendly as usual. The universal-instrument became wet through with salt water but was washed out with fresh water and dried and did not seem to have suffered any damage. ~~One of~~ S's chronometer also seemed to

have escaped. Ivory gulls swarm around us and keep up an awful row. We experimented with the Berossin chocolate yesterday and it was found to make a very good chocolate if 75 gr. (2½ oz.) is boiled together with 10 cups water and ~~100 gr.~~ 160 gr. (5 3/5 oz.) of the biscuit soup (Congo biscuit). The leads yesterday were pushed together an effect that the S W winds
84 always seem to bring about. On such a journey as this there is developed a sense both of the great and of the little. The great nature and the little food and other details.

5 Sept. 6.45 p.m. Start. Dreadfully heavy going but the ice fairly supportable.

The leads pushed together by the south-west wind. Animal life seems to be becoming richer. A bear had been close to us during the night. Twelve ivory gulls sat beside the tent on a piece of ice. F. shot three of them with a single shot. A little auk and two black guillemots visible. Half a dozen seals in the same soup etc. After 4 hours' extremely fatiguing march we came to a broad channel which we could not pass and so I determined to launch the boat and try to move on rowing. This was a fortunate determination for we came more and more among divided ice and we kept on rowing until 6.45 o'cl. a.m. the 6, in a direction varying between S 60° W and S 30° W. It was very refreshing to be able to use this way of travelling. ~~The~~ The intervals between the floes were several kilometers wide and only in part covered with ice-sludge which was a good
85 thing for ice-sludge is a very tough mixture to row along in. We had no wind to struggle against and rowed on without the slightest pause until at the time mentioned just now we went ashore on an ice-floe to pitch our tent. Respecting the ice of the a.m. it is to be remarked that I measured one floe with as much as 5.9 m (19.67 ft) below the water (abt. 0.5 (19 in.) above the water) and that in the

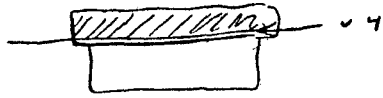
fracture of this block one could see that although apparently it was homogeneous in reality it was composed of pressed thin floes that had thus frozen together.



a a = yellow sheets.
b b = blue sheets.
c c = almost white sheets, etc.

All thereupon frozen together into one block which judging by the exterior was perfectly homogeneous.
page 86 Another thing which had already struck us on the previous march was that on the edges of the flakes there were found thrown up a number of small bits of ice which lay spread about and evidently had not come there by pressure. In some places fairly large block-bits had been flung far forwards on the floe. I said that only waves could have caused such a distribution of the ice on the floe and that the ice we were on must have been handled by the waves (the small pieces did seem to have been eaten away). This opinion was confirmed by the fact that the very next day we had found so much open water. The ice-floe on which we now put up our tent after the boat journey has given the following measures. 1.9–2.0–1.4–

0.95 m (6.3–6.6–4.6–3.1 ft). Roundabout it is edged by a projecting border which



extended 5 cm (2 in) deep below the W. S. (surface of water). The ice below it was greatly eaten away. The length of the floe was abt. 100 m (330 ft) and the breadth abt. 75 m (248 ft).

When we awakened after a long and strengthening sleep the openings around us had frozen together and we had terrible work to move 50 m (165 ft) to the next floe. ~~After~~ (The air was clear and almost 6° cold (21° F.)) after we had reached it and reconnoitered we found that we possibly might advance in another direction and so we turned back and met a walrus whose noise and behaviour in other ways and whose habitus showed us that we had met " the sea serpent " Consequently they were walruses we had heard and seen all the way up at the car place. After a short row we came into a much thicker snow-sludge which at last became almost meter (yard) -deep and in which the boat absolutely could not be forced forward. The situation became critical but one of us succeeded in jumping " ashore " and pulling the boat where we had to stop and pitch our tent. This sludge is something fearful. It arises by pieces of thin newly-formed ice being pushed on top of each other layer after layer like tiles or like cards in a pack. The mass thus formed in the water becomes " sludge." That which is assembled near the edges of the floe gradually becomes solid ice by freezing together and being mixed up with water and snow. Before it freezes together it constitutes an extremely treacherous margin which one easily ~~tumb~~ sinks through.

The next day we tried again and then after abt.

5 hours' work we advanced abt. 1 kilom. on our course but then we had to wait again. During the
page 88 time we busied ourselves making a sail out of the bottom tarpauling of the boat, a helm of the shovel and the table. Our meat supply is beginning to come to an end and we shoot two ivory gulls to supplement it. We do not like to shoot unless we can get at least two ivory gulls at one shot. They are delicate birds but I think they cost a lot of ammunition. For the last few days F. has had a pain in his left foot. I give him massage morning and evening and rub on liniment. To-day (the 9 in p.m.) I have opened a large pus-blister washed it with sublimate solution and put on a bandage. Now I hope it will heal for it is hard for us to be without F's full strength. This is more than needful with our trying work. Our attacks of diarrhœa seem to have stopped. Yesterday I had a motion for the first time for at least 4 days but in spite of that did not notice any diarrhœa. The amount of the excretion was moderate and of normal consistence. F. has frequent motions and the consistence seems to be rather fluid but he does not complain of pains in the stomach and of diarrhœa as he has done almost constantly before. On the 6 Sept at midday our lat. was 81° 4′, 9 and to-day, the 9. in p.m. our
page 89 long. is approximately. . . . But we are probably more to the north than before for we have had several days' wind from directions lying in the neighbourhood of S E. Just now I had to leave off writing in order to fire a shot and drop two ivory gulls. Such birds always gather around our camp. Oh if we could shoot a seal or a bear just now. We need it so much. Thickn. of ice 1.1–1.5–1.55 (3.6–4.95–5.1). I just shot two more gulls in one shot. 9 Sept. 6 o'cl. p.m. Start. F's foot is now so bad that he cannot pull his sledge but can only help by pushing. S. and I take it in turns to go back and bring up F's sledge. This tries our strength. We could not manage more

than 6 hours' march especially as the country was extremely difficult. Just when we stopped I happened to fall into the water, for an ice-floe which to all appearance and on being tested with the boat-hook seemed to be solid and on which I jumped down proved to consist of nothing but a hard mass of ice-sludge which went to pieces when I landed on it. I flung myself on my back and floated thus until the others reached me a couple of oars with the help of which I crawled up again. Hitherto I have had no idea that ice-sludge appears in so many varying forms ~~and~~ It most frequently consists of thin cakes pushed up on top of each other and these ~~freeze together on~~ naturally possess a certain ability to float and to cohere but little bearing-power.

The upper ice-edge on the drawing made on the 4th side before this has evidently arisen by the pushing of ice-sludge on to the edge of the floe, and on examining the floe on which we have had our tent last night I found its vertical sides all the way down to the lower edge so to say coated with plates of ice-sludge (the thicknesses of the floe are 1.4–0.8–1.15 m (4.6–2.6–3.8 ft)) and we often see solid pieces of ice in which there can be observed the sheets that originally formed its core. *The thin* ice consequently ~~is formed~~ constitutes a greater factor in the formation of the large ice than has hitherto been supposed. Is it not possible that something similar occurs in geology? Our thoughts are led unconditionally to some stratified rocks e.g. gneiss. Large seals are swimming about in the water here but we cannot shoot well enough to be able to kill them on the spot and if this is not done they sink.

17 *Sept.* Since I wrote last in my diary much has changed in truth. We laboured onwards with the sledges in the ordinary way but found at last that the new-fallen snow's and character did not allow us to continue quickly enough. F's foot which still did not

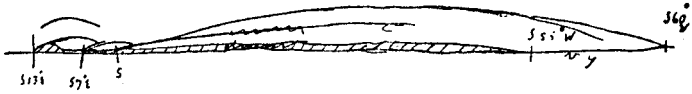
allow him to pull compelled me and S to go back in
page 91 turns and pull forward F's sledge too. One of S's feet was also a little out of order. Our meat was almost at an end and the crossings between the floes became more and more difficult in consequence of the ice-sludge. But above all we found that the current and the wind irresistibly carried us down into the jaws between North East Land and Frans Joseph's
No interval after "least" in diary. Land and that we had not the least chance to reach North East Land. It was during the 12th and 13th Sept. when we were obliged to lie still on account of violent N W wind that we at last discovered the necessity of submitting to the inevitable ~~and~~ i.e. and wintering on the ice. Our position is not specially good our supplies of provision consisting of (13 Sept.)
page 92 Rations (?)

Our first resolution was to work our way across to a neighbouring ice-floe ~~where we~~ which was bigger and stronger and richer in ice-humps than that on which we were which was low and small and full of saltwater pools, showing that it was composed of small pieces which would probably easily separate in the spring. We came to the new floe by rafting with the boat and soon found a suitable building-plot consisting of a large piece of ice which we hollowed out to some extent. ~~and whose~~ The sides and the parts that were missing we supplied by filling up with blocks ~~and~~ of ice and snow over which we threw water and thus made solid and durable. On the 15th we at last succeeded in getting a seal, as I had the luck to put a ball right through its head so that it was killed on the spot and could easily be brought "ashore." Thanks to this we had tolerably large rations for the next three weeks. We eat all the seal except the skin and the bones. I do not except the stomach and the contents of the stomach and the intestines and the
page 93 liver. But the contents of the stomach consisted of hardly anything else than empty (cretacean) shells of

the same animal that had stopped up the hydrogen gas apparatus. Every part of the seal tastes very nice (fried). We are especially fond of the meat and the blubber. May we but shoot some score of seals so that we can save ourselves. The bears seem to have disappeared and of other game there are visible only ivory gulls, which, it is true, are not to be despised, but which cost too much ammunition. The ivory gulls come and sit on the roof of the tent. Remarkably enough the fulmars seem to have disappeared and of other birds only a little auk or possibly a young black guillemot have been visible during the last few days. F's foot is better now but will hardly be well before a couple of weeks. S's feet are also bad. I have made in order a landing-net to catch plankton or anything else that can be found in the water we shall see how it succeeds; a fortunate result of the attempt may I think somewhat improve our difficult position. Our humour is pretty good although joking and smiling are not of ordinary occurrence. My young comrades hold out better than I had ventured to hope. The fact that during the last few days we have drifted towards the south at such a rate contributed essentially I think to keeping up our courage. Our latitude on the 12th Sept. was 81° 21′ and on the 15th we had drifted with a strong N W wind down to 80° 45′. Longitude in the latter case is I am certain considerably more easterly. Thus our drift in 72 hours amounts to about 2/3 of a degree of latitude and since then the wind has blown fresh from the same or a more northerly direction. Possibly we may be able to drive far southwards quickly enough and obtain our nourishment from the sea. Perhaps too it will not be so cold on the sea as on the land. He who lives will see. Now it is time to work. The day has been a remarkable one for us by our having seen land to-day for the first time since 11 July. It is undoubtedly New Iceland that we have had before

94

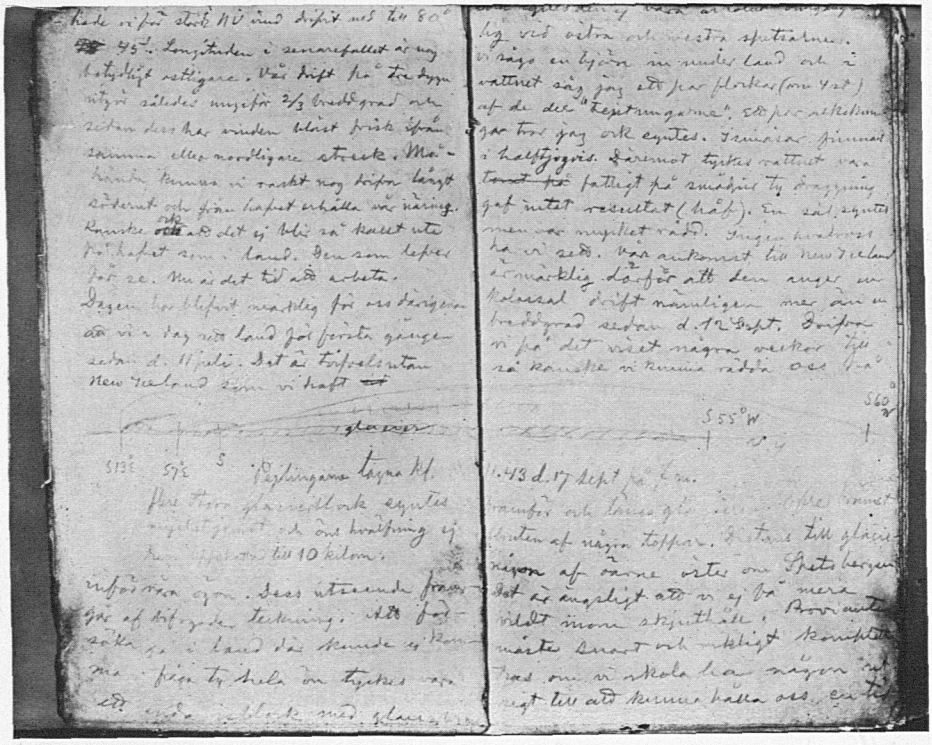
our eyes. Its appearance is shown by the appended drawing.



Soundings taken 11.43 o'cl. 7. Sept. in a.m.
several Large glacier blocks are visible in front of and along the glacier. The upper border very even and the arching of the island not broken by any tops. The distance to the glacier estimated at 10 kilom.

page 95 There is no question of our attempting to go on shore for the entire island seems to be one single block of ice with a glacier border. It appears however not to be absolutely inaccessible on the east and west points. We saw a bear under the land and in the water I saw a couple of flocks (of 4) of those "black guillemot youngsters." I think a couple of little auks were also visible. The ivory gulls are seen half a score together. On the other hand the water seems to be ~~empty~~ poor in small animals for dragging gave no result (landing-net). A seal was seen but it was much terrified. We have seen no walrus. Our arrival at New Iceland is remarkable because it points to a colossal drift viz. of more than 1 degree of latitude since 12 Sept. If we drift in this way some weeks more perhaps we may save ourselves on one of the islands east of Spitzbergen. It makes us feel anxious that we have not more game within shooting-distance. Our provisions must soon and richly be supplemented if we are to have any prospect of being able to hold out for a time.

page 96 18 Sept. Jubilee day was a lucky day for us. The weather was beautiful and our work went on quickly. I had succeeded in shooting another seal, this time with small shot. He was not quite dead



PAGES 94 AND 95 OF ANDRÉE'S DIARY, WITH A SKETCH OF WHITE ISLAND

but we got him in any case. Afraid that he would give out all his breath at the last minute and go to the bottom I gave him a new small-shot cartridge in the back at very close quarters. These small shots were afterwards found between the blubber and the flesh and consequently had not had any deadly—if even damaging—effect. Then I cut up the seal and found among other things that the bones of the skull are as thin as egg-shell so that it should be possible to kill a seal easily with small shot in the head. Of the inner parts of the seal we have now tried and eat the following: The brain, the intestines, liver, lungs, meat, Blubber, kidneys, heart, stomach, contents of stomach, blood. We had the Swedish flag hoisted
[illegible]97 and finished the day with a ceremonial meal consisting of Seal-meat with 1.5 Schum. bread, Ivory gull with wine Chocolate (lactoserine) with Mellin's food and biscuit, Stauffer's plum-cake with syrup-sauce and wine, the King's health with hurras and national anthem, Boström's cheese with the butter and biscuits. The general feeling was one of the greatest pleasure and we lay down satisfied and contented. We had had New Iceland in sight all day westward of us and had thus drifted to its eastern side. The upper contour of the island was rounded like a loaf from that side too and the shore consisted of the edge of a glacier. We were within 1–2 kilom. from this edge. S. measured the ∧ height of the island 1° 25′, and S 45° W and N 47° W at 8 o'cl. Gr. Time was obtained in the morning by taking the bearings of the southern and northern ends of the islands. We shall see in the morning if we have altered this position essentially.

Sunday the 19. Yesterday seems to have been the first link in a chain of jubilee days, for to-day we have succeeded in increasing our supply of provisions so much that it will last until the close of February. I managed to shoot 2 seals (small shot no. 00) and

1 great seal (ball) to-day. I cannot describe how glad I felt and how pleased my comrades seemed to be and how they looked forward to the future with hopes considerably strengthened. The greater part of the day we were busy cutting up, etc, the running off the blood and storing it playing a very prominent part. For we have found that F. can make excellent blood-pancake of seal-blood 300 gr (10½ oz.) and seal-fat 150 gr (5 1/4 oz cut into small pieces, 10 gr (1 oz.) flour and a pinch of salt and a pinch of yeast powder. In addition we have discovered that the weight of this mixture is not notably diminished in the frying as is the case, on the contrary, with meat whose weight when ready is reduced by about 1/3 of the raw weight. Finally the pancake does not produce that loathing which was experienced for the first few days a couple of times by S and me when we ate seal meat and blubber. It seems as though to a certain extent the pancake supplies the want of bread. The best variation however is given by the ivory gulls of which to-day F. has shot 1 and S 4 with two shots. We still drift but as it seems slowly for to-day we still have White Island in sight our bearings for the day being on the average N & W for the different extremities. It presents a charming view in the sunshine which illumines the glacier both from the edge and from above, thus giving the island the appearance of being transparent. The edge of the glacier contains very blue glacier ice and also brown sections. Of surface moraines there is no trace and the only dark patches one can discover are shadows. These together with the formation in general show that the ground below the glacier is not altogether level. Large glacier-calves float round the island or stand there aground. We photographed the island. To-day S. has been very busy house-building in accordance with a method he has invented. This consists of snow and fresh water being mixed after which the entire mass is

built up into a wall and allowed to freeze. The work is both solid and neat. In a couple of days we shall probably have the baking-oven (i.e., the sleeping room) ready. The weather allowed us to obtain a place-line at 3 o'cl. p.m. (local time) and this

[e 100] The thickness of the ice of our floe at "the great cargo-quay" has been measured and found to be 1.4–1.3–1.5 m (4.6–4.3–4.95 ft).

20 *Sept.* turned out to be a regularly unlucky day. The cooking apparatus (the Primus stove) which had hitherto not troubled us much became at once mutinous and refused to do service. The soup stood there mixed but could not be boiled. Great sensation. F. did this and that and experimented with blubber lamps but got so little heat that he thought it best to take the unburned fat out of the lamp and cut slices out of it which he laid on Schumacher's bread and offered us. That was satisfactory for it tasted splendid —for it tasted just like bacon and bread and we eat it willingly. By and by I succeeded in getting the apparatus so far in order that we managed though with some difficulty to boil the soup so that it could be eaten. It contained seal-meat 400 gr (1.3 lb) seal-blubber 150 (5½ oz) 50 gr (2 oz.) Mellin's food and the rest water. After it had been boiled we eat it with an appetite. The seal-meat seem almost to melt away on boiling, after boiling a few minutes it becomes

[e 101] extremely tender and delicate. Just when we had finished the meal and that untiring architect S. had gone back to building he cried out "a bear." F. and I who were still sitting busy with our cooking apparatus difficulties hurried out and then had the pleasure of seeing a magnificent bear quite near us. S. and I were a little eager I suppose for each of us missed while on the contrary F. ~~gave~~ with his shot gave the bear his death-wound. Great joy. We had increased our supply of food until on in April—to the close of winter and in addition had obtained a magnifi-

cent skin. The bear is the Polar-traveller's best friend. He had come to us from a distant little floe (2–300 m) swimming over a water so frozen that when we afterwards rowed out in it we had to force our way through the ice with oars and shovel. When he was shot he had just drawn back to his lead ~~and on the shot had~~ but I suppose he did not like to go in again and swim the long way back for he turned towards F. and seemed ready to make an attack. When shot he slipped down backwards into the water and at once gave up the ghost. We pulled him " to land " by means of a grapnel then we got a noose around ~~each~~ a hind paw and easily drew him out of the water. Our joy was great for the bear was a big and magnificent animal. He was treated accordingly, was given a noose around each front paw and
page 102 one round the neck so that when being pulled along he glided along hair downwards and was drawn amid hurras to the camp. There F. and S. ~~cut~~ rapidly carried out the first part of the cutting up while I returned to my tinker's employment. Before this however we had been out into the thin ice and fetched a large and peculiar bird (weight 1400 gr. (3 1/4 lbs)) that I had brought down and which had been visible a couple of times before. Its description is this. Length from point of bill to end of tail 67 c.m. (26 in.). Length of one wing from root to tip along the front edge = 75 cm. (29 1/4 in.). White beak with black point. Nearly all the feather covering striped across with light yellow-brown and dark gray-brown. The breast and belly dark-gray-brown. The feet red. Web, three-toed, back-toe. S. and F. consider it can only be a young ivory and perhaps they are right.

A part of the island could be seen dimly in N. The trouble with the cooking-apparatus was repeated during the evening although in a slighter form. We got the bear's-steak and the bear-blood pancake ready

(275 gr. (10 oz.) br.-blood, 200 gr. (7.4 oz.) br.-kidney-fat, 10 gr. (.37 oz.) flour, salt and y.-powder, a pinch of each). The latter however under extremely exciting circumstances. More than half the mass (the lower) was solid but the upper part was in a very fluid
103 condition. The apparatus went out! Str. with uplifted matches. F. ploughs bottom-furrows in the pancake in order to get the fluid part to run down to the bottom and there solidify somewhat satisfactorily. The pancake was torn into pieces and turned as quickly as possible, and so on. The final result being a delicate cake. Then the cooking stove went out. But we had not had coffee and we wanted coffee and so the bother began again. Now all three of us were at work. F. held the cooking-stove S. held the matches ready, I stirred and managed the cleaning needle and so we went on making the coffee with increasing hopes which at last were crowned with excellent coffee. To-morrow we shall try to find out what it is that troubles the cooking-apparatus. It was most unlucky that the reserve-parts for this were not brought with us from Pike's house. We have now so much meat, blubber, etc., that it is difficult for us to protect it well during the night in the event of visits from bears. We pile it up near the edge of the tent and fence it round with all other kinds of things. The question of getting the house in order is becoming a burning one here in the cold. During the last two days the weather has been very pleasant but on the other hand they have not passed

page 104

page 105

page 106

Page 107 without signs of differences arising between us. I hope however that this seed will not grow and develop.

21 *Sept.* Seal-blood pancake of frozen blood 275 gr. (10 oz.) in which is mixed a pinch of yeast powder and do. Salt 3 spoonfuls of salt water, 200 gr. (7.4 oz.) meat-bits and 150 gr. (5.5 oz.) seal-blubber. It was eatable after 8 minutes but was allowed to fry longer. We did not allow it to retain its cake form but stirred the mass while it was frying. It tasted excellent. The reason of the trouble with the cooking-apparatus was found to be that some blubber-oil had got into the snowflake and stopped up the opening by means of large and sudden depositions of carbon. During the day S. and F. were at work most on the house. I cut up the seal and shot 3 ivory gulls. The day was short for we were tired after the previous long working day.

22 *Sept.* Thickn. of ice of our floe (another place than the one before) 2.5–2.5–1.7–2.4–3.0–2.5 (7.25–7.25–5.6–7.9–9.9–8.25 ft) Str. shot a seal (with small shot) and in addition we got a couple of ivory gulls but we must be careful with our shooting for we miss pretty often as the seals as a rule do not come so near
Page 108 that we can be certain of hitting the head with a small shot. In . . . we were disturbed by hearing the floe break, as we thought right under the building. We were afraid that we had run aground but our bearings have shown that we are moving although we seem unable to get away from this island. Probably we are lying in some kind of backwater which the water-current from the north creates at the S. eastern and S. western corners of the island and its southern side. clear weather here seems to be rare, we have not yet been able to get a clear latitude-determination for ourselves and the island. The patchy black guillemots and ivory gulls are common here, we have also seen several specimens of the before-mentioned

" ivory-gull youngster." The ordinary fulmar on the other hand is seen remarkably seldom.

23 *Sept.* To-day all three of us have been working busily on the hut cementing together ice-blocks. We have got on very well and the hut now begins to take form a little. After a couple more days of such weather and work it should not take long until we are able to move in. We can probably carry our supplies in there the day after to-morrow. This is very neces-
page 109 sary, as mortar we employ snow mixed with water and of this mass, which is handled by S. with great skill he is also making a vaulted roof over the last parts between the walls. We have now a very good arrangement of the day with 8 hours' work beginning with 2½ hours' work, thereupon breakfast 3/4 and afterwards work until 4.45 o'cl. when we dine and take supper in one meal. We have now also tried the meat of the great seal and have found that it tastes excellent. One of the very best improvements in the cooking is that of adding blood to the sauce for the steak. This makes it thick and it tastes as if we had bread. I cannot believe but that blood contains much carbohydrate, for our craving for bread is considerably less since we began to use blood in the food. We all think so. We have also found everything eatable both as regards bear, great seal, seal and ivory gull (bear-liver of course excepted). For want of time
page 110 we have not yet been able to cut up and weigh our animal but I think we now have meat and ham until on in the spring. We must however shoot more so as to be able to have larger rations and to get more fuel and light.

29 Sept. We are still lying off the south-side of N. I. The ice-sludge has closed and the seals have disappeared. On the other hand the bears are coming. The day before yesterday and yesterday we had visits from the bears at night and I tried to hunt a bear in my stocking-feet but did not succeed. This morn-

ing just as we ~~had eaten~~ come out F. saw a bear which we succeeded in enticing to us who were waiting behind our hut. S. shot him through the throat and he fell down at once but after some moments he rose again and began running pushing his fore-quarters in front along the snow. I then gave him my shot which laid him on his hind quarters but this induced him to fresh efforts and he began to run. F. at last got ~~a fresh~~ his
112 shot into him and then at last he lay there in a pool, after which we hauled him up amid hurras. It was a big old he-bear. The night-bears seem to be a kind of thief bears; the one that visited us yesterday night dragged away our big seal twice and we should have lost it if S. had not succeeded in coming so near the bear as to frighten him and make him drop his booty.

Our floe is diminished in a somewhat alarming degree close to our hut. The ice pressings bring the shores closer and closer to us. But we have a large and old hummock between the hut and the shore and hope that this will stop the pressure. This sounds magnificent when there is pressure but otherwise it does not appeal to us.

Thickn. of ice 1.1–1.2–1.5–1.9 (3.6–3.9–4.95–6.27 ft) have been measured by a new fissure which has arisen in our floe. Yesterday evening the 28 we moved into our hut which was christened "the home."
111 We lay there last night and found it rather nice. But it will become much better of course. We must have the meat inside to protect ourselves against the bears. The ice in N.I. glacier is evidently stratified in a horizontal direction. The day before yesterday it rained a great part of the day which I suppose ought to be considered extremely remarkable at this time of the year and in this degree of latitude.

The 1 Oct. was a good day. The evening was as divinely beautiful as one could wish. The water was allied with small animals and a bevy of 7 black-white "guillemots youngsters" were swimming there. A

couple of seals were seen too. The work with the hut went on well and we thought that we should have the outside ready by the 2nd. But then something else happened. At 5.30 o'cl. (local time) in the morning of the 2 we heard a crash and thunder and water streamed into the hut and when rushed out we found that our large beautiful floe had been splintered into a number of little floes and that one fissure had divided the floe just outside the wall of the hut. The floe that remained to us had a diam. of only 24 meter (80 ft) and one wall of the hut might be said rather
page 113 to hang from the roof than to support it. This was a great alteration in our position and our prospects. The hut and the floe could not give us shelter and still we were obliged to stay there for the present at least. We were frivolous enough to lie in the hut the following night too. Perhaps it was because the day was rather tiring. Our belongings were scattered among several blocks and these were driving here and there so that we had to hurry. Two bear-bodies, representing provisions for 3–4 months were lying on a separate floe and so on. Luckily the weather was beautiful so that we could work in haste. No one had lost courage; with such comrades one should be able to manage under, I may say, any circumstances.

XXIII

FRAGMENT OF ANDREE'S SECOND DIARY

ALL THAT HAS BEEN DECIPHERED.

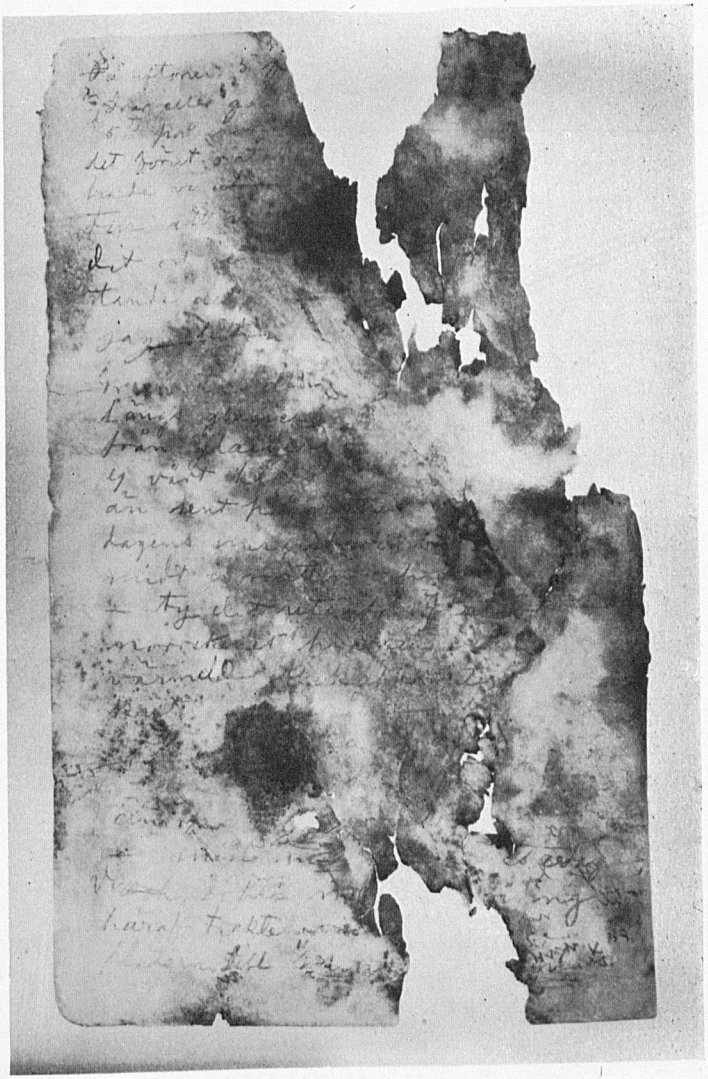
1

..... 897
..... with cutti .....
..... beginning of a.....
..... in the hut hung
..... the day passed...
.....
..... imp ..... vation
..... to
..... all to
..... we there as a matter of...
..... a not unimportant...
..... of the island correctly. But
..... could with
..... the low land. The question
..... here with everything
..... t ..... we first
..... to reach
.....
.....
..... of .....
..... should
..... and up
..... on the island.

2

In the evening 5 b .....
Eiders or geese .....
5th in the morning .....

the previously mentioned .....
we had .....
lucky that we .....
there and .....
ing it .....
T ..... t .....
.....
along the glacier .....
from the glacier.....
our hard ..... not .....
even if late at night .....
the day's energetic labour .....
middle of the night .....
..... for the in (flaming) ..... outside .....
northern lights neither .....
warmed .....
..... k .....
.....
..... my .....
We christened o(n) (acc)ount .....
of this the district .....
the place to " M .....place."
page 3 ..... during the day the 6th.....
..... heavy wind w .....
.....could not ..... much
..... undertook however a short..
..... we at last...
..... Swedes
..... to be the .....
..... icy
..... at once interes-
..... we ..... high
..... from the sea found
..... All the ground
..... stone-brash...
..... of the gravel was
..... Granite lay partly...
..... great walls



PAGE TWO OF ANDRÉE'S SECOND DIARY

..... which however were...
..... If ..... could
..... whole
..... (large)
..... darkness.
..... on the snow-
hut ..... transport of the goods
to the ..... neighbourhood. This was
a heavy ..... was done
.....g was busy ..... at .....
feared that .....
such with .....
which we f .....
of it .....
rings .....
cier .....
had set food .....
if it possibly .....
to look at tr .....
the glacier .....
ought I think ... .
than one .....
the visible .....
the sea but ..... k .....
not since .....
to. Our .....
s .....
worth .....
mon with .....
and intestine ..... envious
now give ..... impression ..... innocent
white doves but of ..... ul carrion
birds .....
..... bad weather and we fear-
..... we keep in the tent the whole day
..... so that we could
..... on the hut.
..... to escape

..... like
..... out on the sea
..... crash ..... grating
..... drift-wood
..... to move about a little
..... ermits

Translator's Note.

Many guesses have been made as to the significance of the letter M..... in the last line on page 2 of this diary. It is evidently the initial letter of the name given to the camp on White Island. A friend of the Andrée family has written to the press to say that the pet name of Andrée's mother was "Mina" (short for Wilhelmina), and that possibly Andrée, who was always devoted to his mother, called the camp by her name. Professor Lithberg strongly supports this hypothesis. It has accordingly been proposed that "Mina Camp" should find a place on the map of the Spitzbergen Archipelago, at the south-eastern point of White Island.

XXIV

EXTRACTS FROM NILS STRINDBERG'S MEMORANDUM-ALMANAC

Notes

1 millimetre	(mm.)	= 0.03937 inch.
1 centimetre	(cm.)	= 0.39371 ,,
1 decimetre	(dm.)	= 3.9371 ,,
1 metre	(m.)	= 39.371 ,,
1 kilometre	(km.)	= 1093.633 yards.
1 square metre	($m.^2$)	= 10.7643 sq. ft.
1 cubic metre	($m.^3$)	= 35.32 cub. ft.
1 gramme	(gr.)	= 0.0022046 lbs.
1 kilogramme	(kg.)	= 2.2046 ,,
1 litre		= 1.76 pints

Temperatures :—100° Centigrade = 212° Fahrenheit. 0° C. = 32° Fah. *G.M.T.* = Greenwich Mean Time. *De Geer's levelling mirror* is employed to measure velocities. *Table on page* 9 *of Almanac* : h = height, or altitude; i = index of error; *refr.* = refraction. *Fl.* = Fraenkel. *C* = chronometer. m/s = metres per sec. K = course (?).

The following communications respecting the balloon journey have been written on the memorandum-pages 25 July–25 October, but cover the period 11–14 July. The pages have here been numbered from 1–37.

page 1 Self-regist. baromet. from beginn. at 750 mm.
5566
Good-bye is said $1^h\ 50^m$ G.M.T.
Enter car 1 52^m G.M.T.
start 1 55
Guide-rope is lost
Hollander Naze 2 5
Mir Vogelsang across 2 23
h = 600 meters North Point 2 27
Fogs are forming.
$2^h\ 29^m$ (+) 1.0 (+) 0.4
Silent and still
Average speed 0.57 km/minute.
2 $33^m\ 15^s$ drag-rope touches the water.
Course N 57 E. A ballast-line drawn up $2^h\ 45^m$ (K 66)

page 2 Photographs were taken at the times given on the photographs. The first two had wrong focus.
N.B.! Self-registr. barom's
$2^h\ 5^m$ = C 66 $2^h\ 59^m$
My tin with farewell words to Anna thrown down on to Vogelsang.
3.3^m gas is lost at height of 500 m. Course somewhat more northerly during journey at great height.
Clouds round about except in N E and over Spitzbergen.
Bearings 3 m 12 s (C 66)
Point nearest Vijde Bay = S 311° W
North Point Vogels S 55° W

page 3 1st bottle of ale 3 21^m
Ice in north along the horizon.
We must now work at splicing the drag-line.
At height of 500 m direction of wind direct from S 20° W.
Bearings of same points as before $4^h\ 3^m$ o'clock.

S 47° W
S 337° W

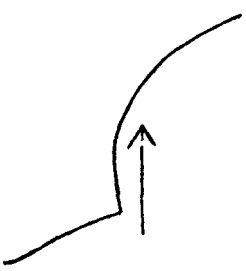
The ice which was before visible, is now (4.15 o'cl.) clearly seen in N and N W
Looked out in vain for the steamer.
$4^h\ 26^m$ faint fogs begin.
photograph at 4^{25} o'cl. of the first ice that is seen at distance of .....
$4^h\ 30^m$ bearings of the same points

347
44

Drag-line ready spliced $4^h\ 33^m$ o'cl.
The inland ice is seen beautifully on E side of Wijde Bay?
$4^h\ 42^m + 5.9 + 3.2$

Fraenk. in the car
"Look out Fraenkel."
"What's up?"
"You'll get a showerbath:"
"All right:"
Soon near ice
$5^h\ 3^m$ Photograph of the ice.
Just then passed the corner of the ice.

Level-sextant



5^h	15^m	15^s	21°	$33'$, 5	
4	17^m	50^s	20	42	
5	19^m	0^s	21	49	
5	20	40	21	31	good
5	21	53	21	31	
5	23	22	21	$28'$, 5	
5	29	08	21	18	
5	30	18	21	8	
	32	30	21	5	
	33	16	20	57	

Follow the edge of the ice at about 500 m distance
$5^h\ 37^m$
A seagull flying far below us $5^h\ 38^m$

Descendons doucement par un sinusoid ("we are slowly sinking in a winding curve").
Spitzbergen disappears from sight in the fog.
A beautiful dark-blue colouring of the water, clearly distinct from the colour before.
Finely divided ice.

Diagram I curve 2 tide = $1^h\ 5^m$ = K 66. $\overset{5\ 45^m}{h}$
Four first pigeons are released $5^h\ 46^m$ o'cl. at height of 240 m.
Took direction approximately W
rain of pease in the car when Aée put up the empty basket.

page 7 Come over the ice in good earnest. The ice in somewhat larger pieces and sharply rounded.
6 heur (o'cl.) We pass ice newly broken.
De Geer's levelling-mirror.
A piece of ice
—18 o'cl. $6^h\ 1^m\ 25^s$
Across same bit 5^m 35 o'cl. height 332 m.

$9^m\ 10^s$
1840 m in 250 s.
7,360 $\frac{m}{s}$

Course to N 27° E magnet.
De Geer 18 $6^h\ 14^m$ o'cl. 33
3100 m in 5^m 43′ 20 10 } height 560 m
343

The first dinner consisted of sandwiches and broth with small bits of macaroni which we had brought with us warm.
Course N 32° E
Speed 9.05 $\frac{m}{s}$
$6^h\ 20^m$
As good as ice-free, except a line direct eastwards.

8 The ice consists exclusively of as good as ice without hummocks.
Without glacier-ice.
A soft whistling for a long time in the large valve.
Only some birds otherwise no animals.
Quiet and hot in the sunshine.
The only sound heard is some cries of birds and the whistling in the valve.
The ice gave a report.
6 50 Highland Point 327° S W
$6^h\ 35^m$ Aée pisses at the height of 600 m.
We rise probably on account of this throwing out of ballast.
9 Mists begin below 7^h o'cl. Northwards fogs.
Course at height of 600 m N 45° E
Aée goes to his berth $7^h\ 15^m$

$$\begin{array}{rrr} h = & 21^\circ & 30' \\ & 1 & 1 \\ \hline & 21 & 29 \\ & \text{refr.} & -2.6 \\ \hline h = & 21^\circ & 26'.4 \\ 90 + 8 = & 111^\circ & 61',4 \\ \hline & & 90^\circ\ 35' \end{array} \qquad \begin{array}{r} 112^\circ\ 1',4 \\ \hline 22\ \ 1,4 \end{array}$$

$90 - h = 21\ \ 26,4$

$7^h\ 35^m$ Course N 40° E.
$7^h\ 45^m$ o'cl.
We are floating onwards above a thin layer of clouds through which the ice can be seen now and then.
Height 680 m about $7^h\ 49^m$ t = (+) 1°, 0 (+) 0°, 4
10 height 700 m
The ice is visible only along the horizon in SS W.
The clouds beneath us are denser. Silent and still.

Only a faint breeze from S E and E and whistling in the valve. The sun is hot but a faint breath of air is felt now and then. Aée is sleeping.
Fl. and I converse in a whisper. $8^h\ 8^m$. Distant land in S E.
North East Land probably.
$8^h\ 15^m$ The clouds contin. to go somewhat more to the eastwards than we.
The course and speed cannot be determined for we do not see the ice beneath us.
The sky above us has been clear all the time.

Curve 2 diagr. N: 1 at the close } $3^h\ 37^m\ 5$ has been hindered in its movement $8^h\ 20$

page 11 Curve 3 on the diagram
Chron. 66 $8^h\ 32^m$ h = 680 m
barom. $0^h\ 13^m$
Ice is seen a moment below us between the clouds.
Course N 45° E magnet.
S-g: "We are now travelling horizontally so finely that it is a pity we are obliged to breathe as that makes the balloon lighter of course.
And so Fl. and I went and spit, too $8^h\ 40^m$ + 0.8
—+ 0.4
$9^h\ 0^m$, bearings of sun S 161°, 8 W $9^h\ 0^m$
$9^h\ 2^m\ 40^s$,, ,, 162°, 2

70
60
130

page 12 The 11 July 1896

o'clock			altitude of sun	
9	5^m	52^s	14°	39,5
9	7^m	31^s	14	41′
9	8	36	14	39,5
9	9	57	14	36
9	11	17	14	36,5

$9^h\ 8^m$

At $9^h\ 41^m$ Fraenkel's and Strindberg's available quantities of piss are thrown out.
9 52 touching the upper edge of cloud at height of 600 m buoy goes overboard with about 8 kg sand.
$9^h\ 55$ A shot? is heard
$10^h\ 1^m$. See ice through the clouds still scattered ice.
(0.5 diffusion)
13 Ice visible a little while $10^h\ 9^m$.
Approximate course N 60° E.
Ice visible a moment $10^h\ 25^m$ o'cl. Same scattered ice.
10 h 31^m o'cl. 5 rungs of rope-ladder thrown out.
$10^h\ 35^m$ a somewhat larger opening in the clouds.
Course N 65° E magnet.
$10^h\ 39^m$ 6 rungs of rope-lad. thrown out.
$10^h\ 40^m$ Additional 8 kg. ballast from same sack.

Buoy No. 7

This buoy is thrown out from Andrée's balloon at $10^h\ 55^m$ o'cl. p.m.
F M T the 11 July 1897 in about 82° latitude and 25° long. E fr. Gr.
14 We are floating at height of 600 m. All (right) well

Andrée	Strindberg	Fraenkel
o'cl.		altitude of sun
$10^h\ 59^m$	29^s	14° 15^m
11 0	52	14 20
11 1	35	14 17
11 3	40	14 20
11^h	1^m o'cl.	
11^h	12^m o'cl.	

Clouds go at a height of no more than 470 m.
$11^h\ 13^m$ temp. 0° 6 0° 3
$11^h\ 20^m$ Cloud or land? N 70° E
Float at height of 460^m. It was cloud.
Course $11^h\ 48^m$ N 84° E
15 $11^h\ 55^m$ o'cl. It looks like water and ice along the horizon in E but it is only the shadow of an alto-cumulus cloud in E. Its extension is about 90° from immediately below sun to N 110° E.

$12^h\ 20^m$ Course N 90° E
We enter the shadow of Alt cum.
Guide-roping since $12^h\ 24^m$. Sailing onwards in slight fog.
The sun has gone, but we keep a very level course. 100 m in 30 sec.
Course 90° E = E.
Guide-roping across the ice at a height of between 100 and 20 m.
12 kg thrown $1^h\ 10^m$
$1^h\ 25^m$ A bird black in the distance Ice-leads (the large ones) in a direction N 80° E.

page 16 The fog prevents us from seeing farther than abt. 2–3 km in any direction.
Ice and water the ice 0.9
We have lain still since $1^h\ 35^m$
Buoy thrown out
I pooped for 1st time. Thrown down on to ice-bit
Puff of wind fr. S S W
Slept until $7^h\ 15^m$

Aée's obs.

N 20° W	$3^h\ 41^s$	negligible
N 15° W	4 0	0.5 $\frac{m}{s}$
N 27° W	4^h 27	
N 32° W	4^h 43	0.5 $\frac{m}{s}$
N 25° W	$4^h\ 55^m$	0.4 $\frac{m}{s}$
N 28° W	5^h 5	
N 50° W	5^h 20	0.8 $\frac{m}{s}$
N 60° W	$5^h\ 48^m$	0.32 $\frac{m}{s}$
N 80° W	6 10	
	6 18	1.4 $\frac{m}{s}$

page 17 11/7 $19^h\ 40^m$ o'cl. Course N 35° W

Aée's $6^h\ 50^m$ still until $7^h\ 32^m$
W $7^h\ 32^m$
$19^h\ 45^m$ { (C. 66) speed = 2,6 m/s
Course N 75 W
The air misty. Outlook not more than 1 km. in all directions.
Still the same ice.

24
22
Speed: 65 m in 25 sec.
29
31
131

$8^h = 2{,}5\ \frac{m}{s}$

Cooking-apparatus is loaded with coffee at 8 o'clock
18 and is let down.
At $8^h\ 7^m$ o'cl.
N 70° W
$8^h\ 36^m$

65 m in 21 sec. = $3{,}1\ \frac{m}{s}$

"The universal barrel" daychair and nightstool.
N 80° W
Coffee-breakfast together.
$9^h\ 9^h\ 30^m$ G M T
Aée sucked the tongs with which the cream (tin) had been opened.
Pleasant feeling prevails.

$10^h = 22^h$ { S 80° W course
Speed 3,0 $\frac{m}{s}$

19 $10^h\ 10^m$ (C. 66) Sun-altitude taken with levelling sextant and Aée's chronom. The sun then visible through the fog.
Course N 90° W

11h 20m o'cl. speed 65 m in 13 sec.
65 „ 12 „

$$= 5{,}2 \frac{m}{s}$$

The pigeons start 11h 22m. One tried in vain to sit on the drag-line. Circle a moment. 2 settle on the ice. Then they disappeared in the fog.
11h 30m Course 70° W
Psychrom. (+) 0°, 2 (+) 0°, 1
dry wet
Measurem. of speed 65m in 17 s } low
19 }
15 high
18,5 low

page 20 The 12 July
15 sec. high
18 } low
20 }
0h o'cl. (C66) we pass a field of ice above one km in extent.
The snow on it almost melted. Full of freshwater lakes on it.
Course N 60° W 0h 5m o'cl.
0h 10m temp. (+) 0°, 1 dry 0°, 0 wet.
Speed 65 m in 15 sec.
0h 10m o'cl. 16
18
18
Mean figure 17s, 4 20
Speed $\frac{65 \text{ m}}{17{,}4 \text{ s}} = 3{,}7$
14
16
19
21
157 mean

Still slight mist
Fine drizzle 12h 15m o'cl.

21 The 12 July

o'clock				
0^h	42	28	28°	40′
0	44	21	28	42
0	45	25	28	27
0	46	39	28	30

1^h 10^m o'cl. 24 sec.
26
Speed = mean figure 17
20
$3{,}55 \frac{m}{s}$ 16
18
14
17
1^h 20^m 13
Relative wind 18
18,3

22 Mean height 35 meters.
1^h 58^m o'cl. there is passed a channel about 80–90 m wide extending N and S as far as one could see (2 km.)
temp. 2^h 8^m o'cl.
(+) 0,6 (+) 0,4
at height of 40 m
speed 2^h 30^m o'cl.
$= 3°, \frac{m}{s}$ 20
19
24
Course westerly magn 16
23
18
22
18
22
24
20,6

page 23 Blood-red ice perhaps a relic after a bear's meal.
3 p.m. o'cl.

	dry	wet
3 p.m. o'cl. G M T temp.	+ 0,6	+ 0,5

Course westerly (direct, magn.)
The anemometer at 78,000 $3^h\ 9^m\ 5^s$

30
46
47

$3^h\ 15^m$ the car struck the ground twice.
page 24 The drag-line chopper and 25 kg sand and div. small ropes were thrown out 1 little iron anchor and a little block.
$3^h\ 25^m$
$3^h\ 55^m$ A ballast-line and the scraper.
5 o'cl. the big buoy went without communication.
Hard and continuous bumps against the ground resulting from the fog that weighs down.
$5^h\ 15^m$ Speed 2,5 $\frac{m}{s}$
Course S 80° W
page 25 Place-lines the 12 July 17 to 18^h (a.m. the 13)

5^h	40^m	50	22°	52′
	41	54	22	44
	43	15	22	33
	44	44	22	55
	46	3	22	36
	47	0	22	49
	48	0	22	48
	49	10	22	51
	38	176		368
mean 5^h	45^m	7^s	22°	46′

26 (Levelling sext. and C. 66)

6	6	30	23	34
	7	52	23	16
	8	50	23	32
	9	42	23	41
	10	49	23	37
	12	30	23	39
	14	40	23°	64′
	15	29	23	40
	16	33	23	51
	98	355		354
		123		27
	99^m	235		84
6^h	11^m	26^s	23°	39′, 3

27 12 June 21^h 5^m o'cl. temp.—0°, 6 on dry. Wet remains at 0° and does not descend.
Direction of the wind N 60° W

velocity 3,6 $\frac{m}{s}$

Height of car then 60 m.
In the morning the fog lightens enough to allow the sun to peep through. Now and then blue patches a refreshing sight after all the " stampings " during the night. The carrying-power of the balloon also increases finely. I wonder if there will be a high-level
28 journey? But one of the drag-ropes has caught behind and under a block of ice and as the wind swung round 90°–100° afterwards we have stayed here the line fastened very well.

12 July (astr.)

0	21	49	40	29° 1′ with levelling s.
		52^m	0	29° 8′ and C. 66

The sun disappeared in Str. Cum.

22^h o'cl. Veloc. of wind 5,2 $\frac{m}{s}$

Direct. of wind N 65° W

Called Fl 10^h 30 o'cl. (C. 66)
Began to move of ourselves with a jerk which knocked us against the ground.
11^h 4^m o'cl. C. 66 Course S 80° o

21
39
30
21
17

page 29 12 o'cl. 65 m in $\left\{\begin{matrix}24\\20\end{matrix}\right\}$ 22 sec. = 3,0 $\frac{m}{s}$

Taken while Chateau Briand is boiling in the Göransson cooking-apparatus.

diner du 13 Juillet

Potage hotch Potch
Chateau Briand
The King's Special Ale
Chocolate with biscuits
Biscuits with raspberry syrup and + H_2O

A good and invigorating meal!

Saw bear-track just after midday. This morning I put on snowboots with woollen stockings first and then wool-and-hair stockings inside and I find this to be a warm and pleasant footwear.

page 30 Speed o'cl.
1,30 (c. 66)

22
23
20
16
17
24

65 m in 21 sec. 3,0 $\frac{m}{s}$ 20

24
25
19

21,0

Up in the carrying-ring it is confoundedly pleasant.

One feels so safe there and so at home. One knows that the bumps up there are felt less and this allows one to sit calmly and write without having to hold on. In the carrying-ring the vibrations from the drag-lines are felt somewhat (they are not felt at all in the car) but instead the bumps against the ground are felt much less.

31 2.15 o'cl. Fog with fine drizzle, which settles in the form of hoar-frost on the ropes.
A bump or two against the ground.
Andrée is lying in the car to sleep but I expect he will not get any proper rest.
The sun vanished in the fog.
2^h 30^m Incessant " stampings,"

2^h 40^m Speed
65 m in 24 sec.

Speed $= 2{,}7 \frac{m}{s}$

The course is direct easterly (declination)

31^s
30^s
25
25
33
30
32
32

23.8
24 mean

32 My (S-g's) clothing-equipment, in which I am dressed 13 July 1897 is:
One Jaeger-wool jersey
" " hunting shirt
A pair " pants
A Blue " army suit "
" woollen-lined leather waistcoat
A pair of rather thin woollen stockings
" " wool-and-hair stockings
One cap (woollen)
A pair of fur-lined snow-boats
" " " woollen mittens

$2^h\ 45^m$ Buoy No. 9 and a medicine chest thrown out. The guide-lines act well and " scrape back " to their proper places if they happen to cross each other.

Speed 65 m in 23
24
= 42
25
22
22
21
23
30

page 33 Course

$4^h\ 42^m$ o'cl.

A pigeon has returned and has circled a few times in the neighbourhood of the balloon.

Close " touches," " touches."

8 o'cl. p.m.

Course easterly (declination)

Speed 3 $\frac{m}{s}$ 25
20
20
—
27
27
30
2,4 $\frac{m}{s}$ 28
32
65/28 32
56 2,4 $\frac{m}{s}$
90 22
21
Course N 70° E 30
27
27,6

34 6 little buoys 12
Winch 16
Sand 75
Barrel 5
Div. provis. 200
Speed o'cl. 23
13/7 9.30 p.m. 20
3,0 $\frac{m}{s}$ 21
21
25
21
20
2,7

I tried to lie down in the car at 7 o'cl. but in consequence of the bumping I became seasick and spewed. Fire.
35 Afterwards went up into the carrying-ring with Fl. threw provisions as ballast Fl. afterwards went to lie down at 9 o'cl. I took altitude of sun together with Aée, he was down in the car I in the carrying-ring.
Then I opened my clothes-sack and put on an additional pair of balloon-cloth trousers and an Iceland jersey, intending to sleep.
First I read Anna's last letter. It was really an enjoyable moment.

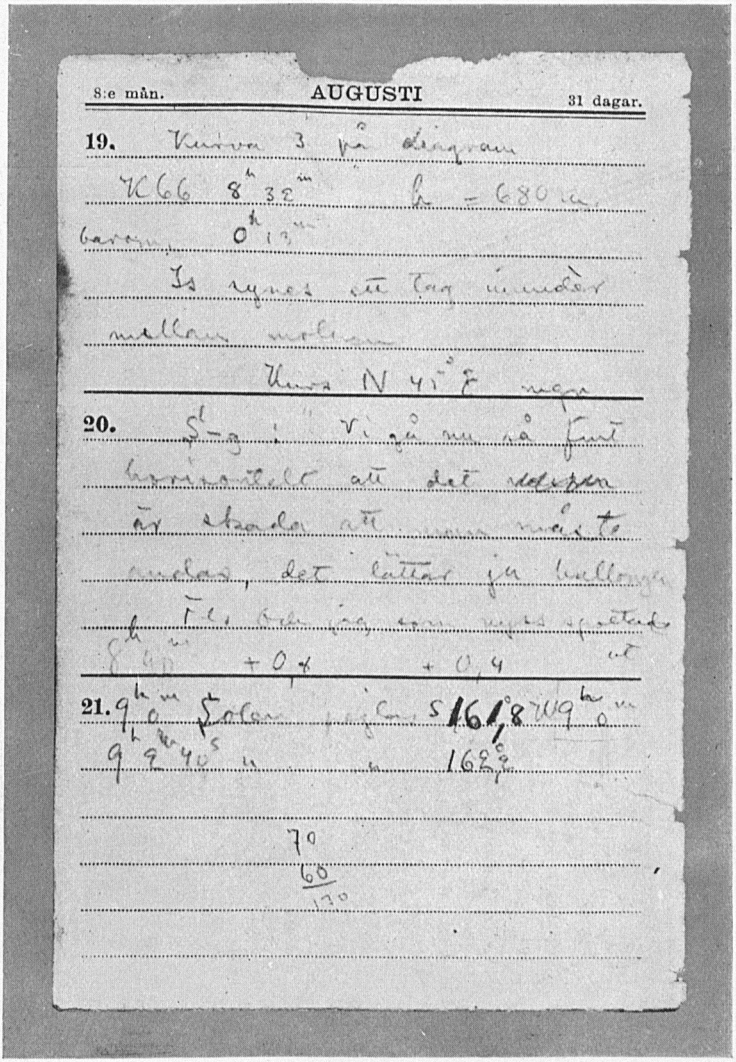
36
$10^h\ 28^m\ 34^s$ $13°\ 53'$
$-5\ 33$ $-\ 5'$
$10^h\ 23^m$ $13°\ 53'$
78 $90 + d = 110°\ 102'$
$97°\ 49'$
$81°$ lat $9^h\ 57^m$
$82°$ lat $11^h\ 8^m$
$82°\ 11'$ $12^h\ 0$
$82°$ $26^m\ 0^s\ 55^m$ $13°\ 45'$
$82°\ 11\ 1\ 37$ $24°\ 15'$

Heavy shocks.
page 37 Anchored on an ice-floe.
7.30 a.m. 14 July = 13 July about $19^h\ 30^m$
Place-determination of the anchoring place 10 o'cl. the 14th July.

NOTES IN NILS STRINDBERG'S MEMORANDUM-ALMANAC FOR THE YEAR 1897.

July
11 S.
12 M. } Journeyed in the balloon
13 Tu.
14 W. Landed
16 F. } Work on the sledges and the boat. Nice
17 S. } days.
19 M. Bear shot and cut up
22 Th. Began our sledge-journey
25 S. Anna's birthday
26 M. } Bear } quiet and altered the equipment looked
27 Tu. } Bear } at my sledge and diminished the load from 200 to 140 kg. per sledge.

Aug.
1 S. Good march 8 km.
2 M. Summer-day bad ice. Bear
9 M. Bear showed himself but has gone
10 Tu. } Passed 82° lat. Feast-day
11 W. }
13 3 bears.
19 Th. Bear (1 or 7 a.m. ?) caught ? at supper Lunar distance ?.
21 S. 3 bears just at entrance of tent of which one got away. The mother was killed by me with one shot.
22 S. Bad country ? (Illegible) minus 4 temp. ? (illegible)



8:e mån. AUGUSTI 31 dagar.

19. Kurva 3 på diagram

K66 $8^h 32^m$ h = 680 m.

barom. $0^h 13^m$

Is synes att tag innuder

mellan molen

Vind: NV 4° F mega

20. Sol: Vi gå nu på fart

hemmatt att det dåligen

är skada att man måste

undan, det lättar ju hvellopp

h Tis Kan jag som vore upstadd

$8^h 40^m$ + 0,4 + 0,4 ut

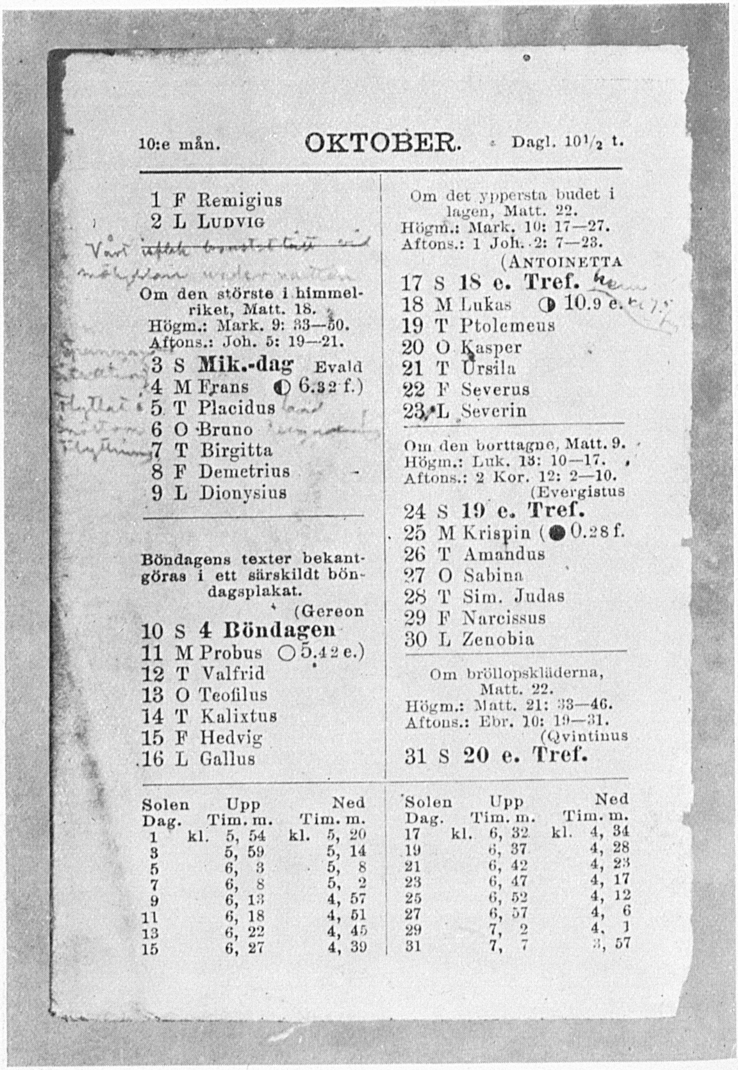
21. $9^h 0^m$ Solen $5^h 16' 8$ $7^h 49^m$

$9^h 9^m 46^s$ " " 162°

70

60

130



10:e mån. OKTOBER. Dagl. 10½ t.

1 F Remigius
2 L LUDVIG

Om den största i himmelriket, Matt. 18.
Högm.: Mark. 9: 33—50.
Aftons.: Joh. 5: 19—21.

3 S Mik.-dag Evald
4 M Frans ◐ 6.32 f.)
5 T Placidus
6 O Bruno
7 T Birgitta
8 F Demetrius
9 L Dionysius

Böndagens texter bekantgöras i ett särskildt böndagsplakat.
(Gereon

10 S 4 Böndagen
11 M Probus ○ 5.42 e.)
12 T Valfrid
13 O Teofilus
14 T Kalixtus
15 F Hedvig
16 L Gallus

Om det yppersta budet i lagen, Matt. 22.
Högm.: Mark. 10: 17—27.
Aftons.: 1 Joh. 2: 7—23.
(ANTOINETTA

17 S 18 e. Tref.
18 M Lukas ◑ 10.9 e.
19 T Ptolemeus
20 O Kasper
21 T Ursila
22 F Severus
23 L Severin

Om den borttagne, Matt. 9.
Högm.: Luk. 13: 10—17.
Aftons.: 2 Kor. 12: 2—10.
(Evergistus

24 S 19 e. Tref.
25 M Krispin (● 0.28 f.
26 T Amandus
27 O Sabina
28 T Sim. Judas
29 F Narcissus
30 L Zenobia

Om bröllopskläderna, Matt. 22.
Högm.: Matt. 21: 33—46.
Aftons.: Ebr. 10: 19—31.
(Qvintinus

31 S 20 e. Tref.

Solen Dag.	Upp Tim. m.	Ned Tim. m.
1	kl. 5, 54	kl. 5, 20
3	5, 59	5, 14
5	6, 3	5, 8
7	6, 8	5, 2
9	6, 13	4, 57
11	6, 18	4, 51
13	6, 22	4, 45
15	6, 27	4, 39

Solen Dag.	Upp Tim. m.	Ned Tim. m.
17	kl. 6, 32	kl. 4, 34
19	6, 37	4, 28
21	6, 42	4, 23
23	6, 47	4, 17
25	6, 52	4, 12
27	6, 57	4, 6
29	7, 2	4, 1
31	7, 7	3, 57

PAGE OF STRINDBERG'S MEMORANDUM-ALMANAC WITH MARGINAL NOTES FOR THE LAST FEW DAYS

Translation

2 October—" Our ice-floe has cracked during the night near the snow-hut."

3 October—" Exciting situation—moved in snowstorm."

On other side of 5 October—" land " (half illegible).

On other side of 6 October—" reconnoitring " (possibly).

Sept.
13 M.
14 Tu. } Quiet on account of bad weather and snow
15 W.
16 Th. Resolved to remain on ice-floe
18 S. Feast
19 S. Hunt
21 Tu. Bear
23 Th. Working at snow-hut
29 W. Moved into the hut although it was not ready

Oct.
2 S. Our ice-floe broke close to the snow-hut during the night
3 S. } Exciting situation
4 M.
5 Tu. Moved to land.
6 W. Snow-storm Reconnoitring
7 Th. Moving
17 S. home 7.5 o'cl. a.m.

XXV

STRINDBERG'S LOG-BOOKS

Strindberg's 1st log-book ends on the 14th July, but he wrote on all the memorandum pages up to the 25th October.

On the almanac-side he has brief notes up to the 17th October.

On the inside of the covers he has written communications in shorthand.

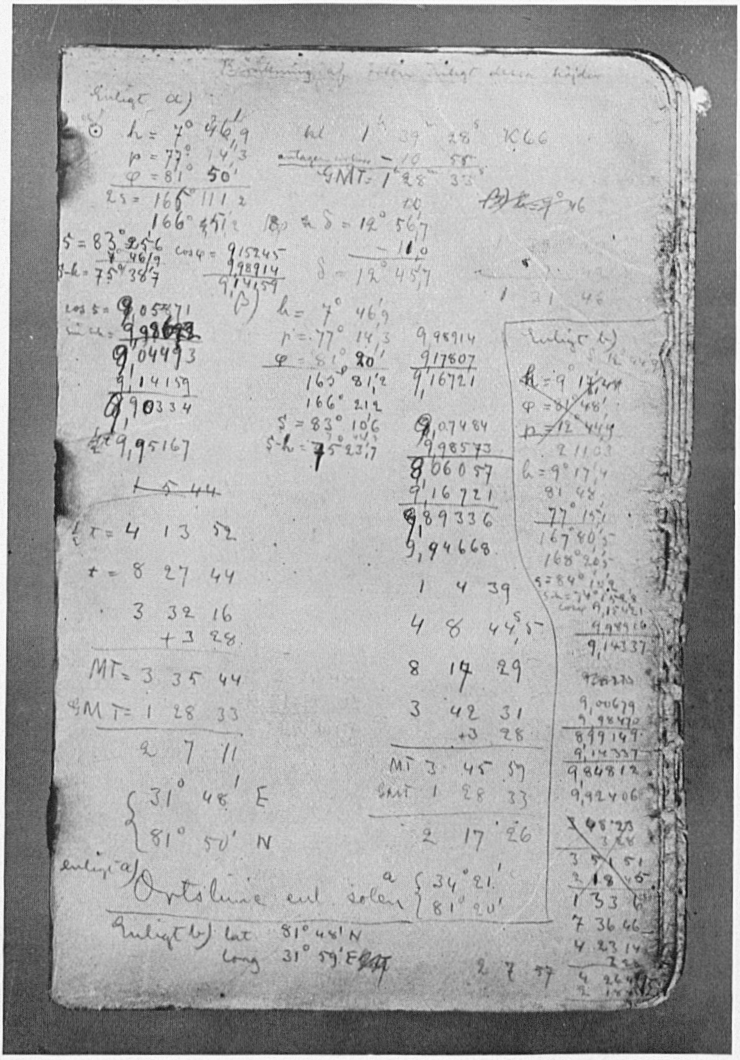
THE notes in Strindberg's log-book respecting the stocktaking of the provisions, the load on his sledge, the arrangements for the meals, etc.

Provisions.

72 big tins biscuits and bread
14 small boxes of biscuits
2 boxes of Bovril
1 Pemmican
73 milk
12 lactoserin
24 Rousseau meat-powder
20 butter
13½ tins Cloetta meat-powder cocoa
9 big round (5 butter, 4 whortleberry)

1 apples
1 sugar

¼ of this	⅕ of this
18 big	14
4 small	3
18 milk	15
3 lactoserin	2
6 Rousseau	5
5 butter	4
3 Cloetta	3
2 big Round	2



PAGE FROM STRINDBERG'S LOG-BOOK WRITTEN DURING THE SLEDGE JOURNEY

Stocktaking of the provisions on my sledge 5 Aug. at 3 o'cl. in the morning.

Front basket.

3 kg. Cocoa powder " Extract " (Mosquera)
4 tins butter (3.6 kg.)
1 kg. coffee
1 bottle raspberry syrup
Biscuits 1 Cracknel
1 Albert
1 Congo
5 Hard bread
1 tin Sugar (5 kg.)
1 ,, Snowflake
1 ,, Stauffer preparation
1 ,, Chocolate and lime juice
1 ,, (1 kg.) whortleberry
4 small boxes of sardines

Rear basket.

3 tins Mellin's food-powder 9 kg.
2 ,, Hard bread
2 Albert
1 Cracknel Biscuits
1 Oscar
2 snowflakes
1 Pemmican 3 kg.
2 Cocoa-powder Extract (Mosquera)
4 Butter
2 Milk
5 Lactoserin
1 Paste (liver)
1 Soup-tablets

Load on my sledge.

445 10 Aug. 1897.

Front basket	44.5 kg.
rear basket	46
Private sack	16
3 pair of snowshoes	6
Boat-hook	1.5
Spade	1
Grapnel with line	2 kg.
Sack of tools	8 kg.
Photograph. app.	6 „
Stand of theodolite	1.3
Boot-grease	2.5
Sewing things	4.9
Little field glass	0.3
	140.0
Large field glass	1.
	141.0 kg.

second

Find of leaves, plant-parts, bird-feathers, clay, sand, stones, etc.,

the 10 Aug. 4 o'cl. p.m.

The ice hard, uneven with yellow patches, but little covered with snow, grayish with hollows.

	near the find-place
Thickness of the ice below the water	1.05
The find lay in a hollow 20 cm. deep	1.05
and 50 cm. in diameter	1.35
	1.35
	1.35
	1.05

Stocktaking 25 Aug. 2 a.m.

front basket	rear basket
1 Congo	1 Albert
4 Hard bread	1 Cracknel
? 6 Snowflakes	1 Oscar
3 Cloetta	3 Mellin's flour
2 small coffee	2 Hard bread
1 Sardines	2 Snowflakes
3 butter	1 pemmican
1 lime juice and Chocolate	4 Lactoserin
1 meat 5 kg.	2 Milk
1 Sugar 4 kg.	3 butter
1 Whortleberry	2 Cloetta
1 raspberry syrup	1 Paste
1 Stauffer and 4 sardines	
25 Aug. a.m.	

Altitude of sun 3 Sept. a.m.

Universal instr. (altazimuth) and Kullberg 66 [chronom.]

All up 2^h 30^m a.m.
Start 5^h 45^m a.m.
Midday rest 10^h 30–11^h a.m.
Pitch tent 2^h 15^m p.m.
Silence in camp 5^h 30^m p.m.

The rear basket contains	the front basket
? box boot-grease	1 Albert biscuits
3 ? butter Lactoserin	3 butter
(sm)all field glass	2 Cloetta
?	2 Hard bread
flour ?	1 Snowflake
whole Mellin's food flour	3 bottles Syrup ?
2 ?	4 sardines
1 ,, sugar	3 B
Cracknel	1 Ammunition
2 whole hard bread	1 Mellin's food flour
1 Pemmican	⅓ bottle syrup
1 almost full Snowflakes	½ tin whortleberry
Wet bread	1 Milk
	1 Lactoserin
	6 Gateaux of 100
	8 Stauffer of 100
	1 small coffee

Repas pendant le voyage (meals during the voyage)

4 Aug. 4 o'cl. p.m.	G.M.T.	Breakfast. Bear - beef with hard bread Lactoserin cocoa with biscuits.
4 Aug. 10 o'cl.	,, ,,	Dinner. Biscuits, butter and cheese, snow-water.
Aug. 4 o'cl. a.m.	,,	Supper. Bear broth with Potage d'Oseille (Stauffer), sandwiches, Biscuits with cherry syrup and water.
Aug. 6 o'cl. p.m.		Breakfast. Mixed bear's meat (ribs chops and kidney) bread ¼ pieces Coffee with biscuits (6 st Mi (?)).
6 Aug. 2 o'cl. p.m.		Dinner. Biscuits (7) Bread (8) butter water.

6 Aug. 9 o'cl. a.m.	Supper. Bear's-meat, mixed ¾ kilo bread and biscuits. Mellin's food gruel.
7 Aug. 9 o'cl. p.m.	Breakfast. Bear's-meat, mixed ¾ kilo bread (?) Coffee with biscuits (6).
7 Aug. 5 o'cl. a.m.	Dinner. 4 bread and 7 biscuits with butter each, water.
7 „ 11 „ a.m.	Supper. 1 kg. bear's-meat, puree of pease (Stauffer) with bread and biscuits for 3.
8 Aug. 1 „ a.m.	Breakfast. Bear beef (of 0.9 kg. meat with 2 pieces of bread each. Lactoserin cocoa with 6 biscuits each.
8 Aug. 9 a.m.	Ordinary ration bread, butter, cheese and biscuits.
8 Aug. 12.30 p.m.	Bear's-meat (0.4 kg. pr man) with 2 pieces of bread Mellin's food gruel with biscuit.
9 Aug. 3 o'cl. a.m.	Breakfast Bear's-meat (0.27 per man) with Coffee (1 heaped tablespoon together with old grounds and 1.5 liter water and a little milk (and biscuits) 6 m II).
9 Aug. 10 o'cl. a.m.	Bread, biscuits, butter, cheese.
9 Aug. 6 o'cl., p.m.	Cloetta's meat-powder, chocolate and bread biscuits and butter.

10 Aug. 8 o'cl. a.m.	Bear's-meat, bread, Mellin's food gruel.
10 Aug. 4^{h} o'cl. p.m.	Dinner. Hard bread and butter sardines, Biscuits butter cheese.
10 Aug. 10 o'cl. p.m.	Supper. Bear's - meat (0.75 kg.) with Batty's sauce, broth and biscuits, Almond tart (Gateau d'amandes) Stauffer.
11 Aug. 10.30 o'cl. a.m.	*Morning.* Bear's - meat and bread Coffee and biscuit.
11 „ 8 „ p.m.	Dinner. Bread, butter, and biscuit.
12 „ 2 o'cl. a.m.	Supper. Bear's - meat (0.75 kg) Lactoserin cocoa.
12 Aug. 1.30 o'cl. p.m.	Morning. Bear's - meat (0.7 kg) and ivory gull (lact Mellin's food gruel).
12 Aug. 8.30 p.m.	Dinner. Bread butter biscuit cheese.
13 Aug. 2 o'cl. a.m.	Supper. Bear's-meat (½ kg.) 2 pieces of bread per man Potage au Cerfeuil Stauffer and biscuits (6 each).
13 Aug. 2'ocl. p.m.	Morning. 0.6 kg. bear's-meat (the last of the old bear) 2 pieces hard bread Coffee and biscuits.
13 Aug. 11.30 o'cl. a.m.	Dinner. Bread, sardines cheese cakes Fresh bear's-meat, heart, brain (1½ kg.) short ribs of bear. Bear broth with

	meat in it, with this bread and wheatmeal biscuit. fried.
14 Aug. 4.30 o'cl. p.m.	Morning. Mixed meat dish: bear's-meat, ribs, heart, brain, kidneys and ivory gull, (bread) Coffee and wheatmeal biscuits.
15 Aug. 12.30 o'cl. a.m.	Dinner. Coffee and butter bread and biscuits.
(no march on account of rain and wind)	
15 Aug. 6 o'cl. p.m.	Supper. 1.5 kg. mixed bear's-meat and bear-broth with boiled meat Bread and biscuits.

These dishes alternated during the remainder of the journey. The bear's-meat rations increased to 1.2 kg. at breakfast and supper, 0.3 at dinner after the 20th Aug. On 21st Aug. in the evening two (3) bears were shot, of which were taken the kidneys, brain and pieces from the back.

We made very good blood-pancake of bear-blood and oatmeal fried in butter and eaten with butter.

Of the Mellin's food-"sludge" we also tried to make pancakes with good results.

Proposals for alterations in the next Polar-balloon Expedition.

The drag-lines to be sheathed with metal.

The car in the carrying-ring.

The gas to be somewhat heated by boiling water in the car and condensing the steam in a sheet-iron vessel in the balloon.

The balloon of the same cloth about 6,000 cub. met. in volume.

Banquet 18 *Sept.* 97

on an ice-floe immediately east of

Seal steak and ivory gull fried in butter and seal-blubber, seal liver,—brain and kidneys. Butter and Schumacher bread.

Wine.

Chocolate and Mellin's-food flour with Albert biscuits and butter.

Gateau aux raisin.

Raspberry syrup sauce.

Port-wine 1834 Antonio de Ferrara given by the King.

Toast by Andrée for the King with royal Hurrah:

The national anthem in unison.

Biscuits, butter, cheese.

A glass of wine.

Festive feeling.

During the day the union-flag waved above the camp.

XXVI

STRINDBERG'S SHORTHAND LETTERS TO HIS FIANCÉE

" Up in the carrying-ring it is confoundedly pleasant. One feels so safe there and so at home. One knows that the bumps up there are felt less, and this allows one to sit calmly and write without having to hold on."

(The diary) 21 July 1 o'cl. a.m. Greenwich time, on an ice-floe: 82° 38'.7 N. Lat. 29° 40' E. from Grw.

.....
.....
.....
.....
.....
.....
.....
.....

I wrote my last letter to you the same day we started; you must have received it, of course. Of what happened since you have learned from the accounts in the papers, etc., but quite naturally I shall describe my personal impressions too. It was grand when it was at last determined that we should start. Andrée, Fraenkel and I and Machuron went on shore and looked at the balloon from the roof of the balloon-house. After we had discussed the possibilities of starting for a while Andrée asked us

what we th(ought): "Shall we try or not?" Fraenkel at first answered evasively, but then said that (we?) should go on. . . . I answered, "I consider that we ought to try attempt it," and Svedenborg was of the same opinion. Andrée was serious and said nothing. We all went on board again. We did not yet know what was to be done, but when we had come on board Andrée at once said to Ehrensvärd: "Well, now we have been considering whether the start should be made or not; my comrades insist on starting, and as I have no fully valid reasons against it, I shall agree to it, although with some reluctance. Will you, then, send all hands on shore to begin the work of dismantling the balloon-house." And then everyone woke up. The sailors had never worked so willingly before nor had the carpenters. But now they were happy. I stayed on board awhile talking to Ehrensvärd and the doctor and getting together my things and some instruments that were still on board; Andrée went on shore to direct operations.

The harbour now presented a lively picture. Two sealers had just come in and one had been lying there before. The latter had to shift anchorage so as not to be in the way of the balloon. The weather was gloriously beautiful and the wind a fresh S.S.W.

I went ashore and packed a few articles in the car of the balloon and arranged some things here and there. The work of removing the front side of the house went on briskly, and one plank after the other was thrown down. The balloon stood there steady and secure protected against . . .? the winds by the canvas on the fourth and fifth floors. I took some photographs of the work. Then I went on board again with Svedenborg for a moment to fetch some things that had been forgotten, and then I compared chronometers for the last time. When we came on board breakfast was just being served, and we were persuaded to sit down to table in com-

pany with the chief and the doctor. The chief took in a bottle of champagne and a toast was drunk to a prosperous journey for us. Everyone enjoyed the breakfast, and when I went on shore again, time did not allow of the others getting anything to eat before the start. We had to satisfy ourselves with sandwiches and ale in the car. When I came on land again the work had made good progress and the balloon was being allowed to lift a little. Some small balloons were let go to test the direction of the wind, which proved favourable. It was quite an inspiring sight when the balloon had been lifted to such a height that the carrying-ring of the gondola left the ground. Andrée gave orders; everyone was willing and helpful and everything went well. I walked about taking photographs up to the last minute.

The balloon had now risen to such a height that the carrying-ring was a good distance above the ground, and was held fast by three ropes. The moment had come to attach the car. When this had been done and a sufficient number of bags of ballast had been taken on board, the time had come to say good-bye. This was done heartily and touchingly but without any signs of weakness. Then Andrée cries: "Strindberg and Fraenkel, are you ready to get into the car?" Yes! and so we got in. Now my thoughts turned for a moment to you and my dear ones at home. How would the journey succeed? And how fast my thoughts came, but I had to restrain them. I asked Machuron, who stood nearest and whom I had found most congenial, to give my love to you. I wonder if a tear did not tremble on my cheek at that moment. But I had to see that the camera was in order and to be ready to throw out ballast, etc. And now all three of us stand there on the top of the car. There is a moment's solemn silence. Machuron says: "Attendez un moment! Calme." The right moment comes. "Cut away

everywhere!" comes Andrée's voice. Three knives cut the three lines holding fast the carrying-ring and the balloon rises amid the hurrahs of those below; we answer with a: "Hurrah for old Sweden!" and then we rose from out the balloon-house. A peculiar sensation, wonderful, indescribable! But one has no time for much thought. I photographed for a while and then we see that we are descending. Ballast is thrown out, but we dip into the sea a moment. Then we rise again. And now everything seems to be going all right. We can still hear the hurrahs at a distance. I take one or two more photographs and then prepare the last card to you, which I intended to throw down on Hollander Naze. But forgot it.
Good-night!
The 22nd July.

.....

It is nearly 7 o'cl. in the evening and we have just packed our sledges ready and intend to start from our landing-place. Yes, now we are starting (?) o'clock G.M.T.

We shall see how we shall manage to come to Cape Flora; the sledges are heavy to pull. Yes, now we are going.....

At the 1st camping-place 22/7 12 o'cl. midnight (before the 23rd).

.....

Well, now your Nils knows what it is to walk on the Polar ice. We had a little mishap at the start. When we were crossing from our ice-floe with the first sledge it went aslant and fell in. It was with difficulty we succeeded in getting it up. I climbed down up to the knees and held fast the sledge so that it should not sink. Andrée and Fraenkel crossed over to the other ice-floe and then suddenly we managed to get the sledge up, but I expect that my sack which was on the sledge is wet inside. And it is there that I have all your letters and your portrait.

Yes, they will be my dearest treasure during the winter. Well, my dear, what will you be thinking in the winter? That is my only anxiety.—Well, after we had got the sledge up again we piloted ourselves across some floes with channels of water between. The way we did it was by making the ice-floes move quickly so that they came near each other. This was slow work with the large floes of course. At last we came on to a large field of ice across which we wandered with our sledges two or three kilometres. Each is loaded with about 160 kg., so that they are very heavy, and during the last hour what we did was that all three of us helped with one sledge at a time. Now we have encamped on a picturesque bit of ice and have pitched our tent. In the tent we have our sleeping-sack, in which all three of us are now lying side by side. It is a squeeze, but the fellowship is good. Well, there is much I should write about, but now I must sleep. Good-night.

.....

Woke up at 11.30 o'cl.
Cooking and tidying.

Start 2.15 o'cl.
Difficult leads in the ice. Andrée and I of different opinions respecting the crossing of the channel. Scanty dinner. After the midday meal we covered some km. (one or two). Night-camp by a large hummock (4 m. high). I made soup with pease, rusks, soup-tablets and Rosseau meat-powder.....

.....

24 July, 12.5 o'cl. G.M.T. (25...)
We have just stopped for the day after drudging and pulling the sledges for ten hours. I am really rather tired, but must first chat a few words. First and foremost I must congratulate you, for on this day your birthday begins. Oh, how I wish I could tell you now that I am in excellent health and that

you need not fear anything for us. We are sure to come home by and by.....

.....

.....yes, how very much all this occupies my thoughts during the day, for I have plenty of time to think, and it is so delightful to have such pleasant memories and such happy prospects for the future as I have, to think about!

(Later) Now we have camped for the night and had coffee and eaten our sandwiches with cheese and h(...) biscuits and syrup and (.....). Just now we are putting up the tent and Fraenkel is making the meteorological observations. Just now we are enjoying a caramel, it is a real luxury. You can fancy we are not over-delicate here. Yesterday evening I gave them (for it is that I attend to the housekeeping) a soup which was really not good, for that Rousseau meat-powder tastes rather bad, one soon becomes tired of it. But we managed to eat it in any case.....

Well, we have stopped for the night on an open place; round about there is ice, ice in every direction. You saw from Nansen's pictures how such ice looks. Hummocks, walls, and fissures in the sea alternating with melted ice, everlastingly the same. For the moment it is snowing a little, but it is calm at least and not especially cold (— 0° 8). At home I think you have nicer summer weather.

Yes, it is strange to think that not even for your next birthday will it be possible for us to be at home. And perhaps we must winter here for another year more. We do not know yet. Now we are moving onwards so slowly that perhaps we shall not reach Cape Flora this winter, but, like Nansen, we shall be obliged to pass the winter in a cellar in the earth. Poor little Anna, in what despair you will be if we should not come home next autumn. And you can think that I am tortured by the thought of it, too,

not for my own sake, for now I do not mind if I suffer hardships as long as I can come home at last.

.....

.....

Now the tent is in order and we are going to our berths. We are all rather tired but in good humour. We discuss our mental characteristics and our faults, a very educative . . . I chat with.....

.....

The (2) 5,7 at 9 o'cl. G.M.T.

..... We awoke to-day about 12 o'clock, but as it was rain and . . . we remained in the tent and slumbered till three. Then we rose and I cooked a little food—cocoa and condensed milk and biscuits and sandwiches. At 4.30 o'cl. we started, and now we have drudged and pulled our heavy sledges for four hours and a half. The weather is pretty bad: wet snow and fog; but we are in good humour. We have kept up a really pleasant conversation the whole day. Andrée has spoken about his life, how he entered the Patent Bureau, etc. Fraenkel and Andrée have gone forwards on a reconnoitring tour. I stayed with the sledges, and now I am sitting writing to you. Yes, now you have evening at home and you, like I, have had a very jolly and pleasant day. Here one day passes like another. Pull and drudge at the sledges, eat and sleep. The most delightful hour of the day is when one has gone to bed and allows one's thoughts to fly back to better and happier times, but now their immediate goal is where we shall winter. We hope to be in a better position. Now the others are coming back and we shall continue the drudging with the sledges. Au revoir.....

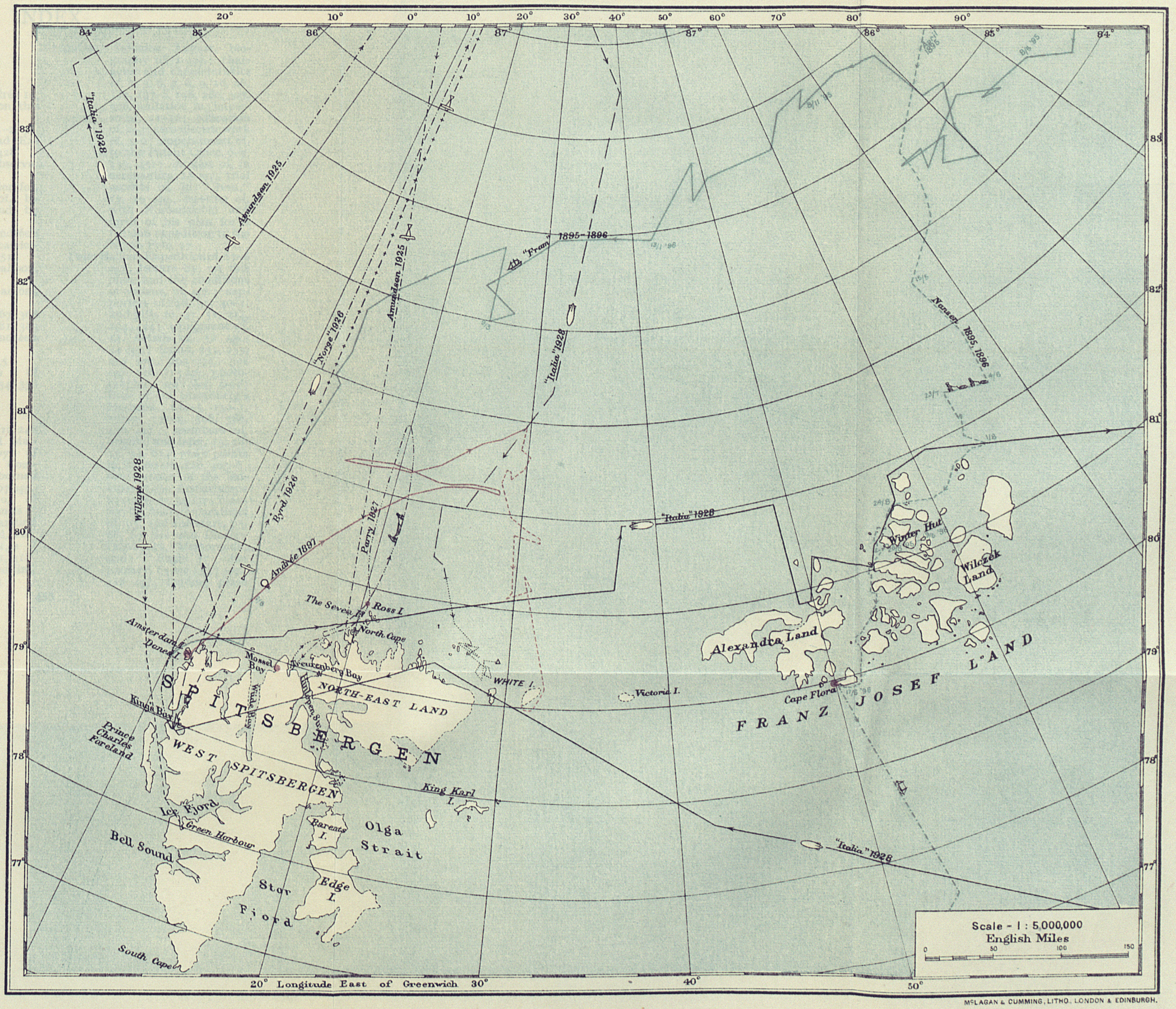
31 July, 10 o'cl. a.m.

.....

Now it is a long time since I chatted with you. Since then the situation has.....the evening.....

.....me.....large channel.....we determined to alter our equipment the next day so that each of us could pull his own sledge. The method we had hitherto employed of all three pulling one sledge and then going back and fetching the other sledges took too much time. On the 26th July we crossed the lead and then on the other side we unloaded our goods, and then we began to unpack in order to leave some of the provisions and equipment here.

MAP SHOWING THE ROUTES AND DRIFTS OF THE VARIOUS POLAR EXPEDITIONS NORTH OF SPITSBERGEN AND FRANZ JOSEF LAND



Andrée's flight 11-14 July, 1897.

" trek over the ice 14 July - 5 Oct. 1897.

Depots laid down prior to the Andrée expedition. (according to size)

The drift of the "Fram" 1895-1896.

Fridtjof Nansen's and Johansen's trek across the ice 1895-1896.

Nansen's and Johansen's journey home with Jackson's expedition 1896.

Amundsen's flight 1925.

Flight of the "Norge" 1926.

Parry's journey across the ice 1827.

Byrd's flight 1926.

Wilkins' flight 1928.

Flight of the "Italia" 15-18 May, 1928.

" " " 23-25 " "

Drift of the "Italia's" camp 26 May - 12 July "

McLAGAN & CUMMING, LITHO., LONDON & EDINBURGH.

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