

CHINA.

IMPERIAL MARITIME CUSTOMS.

II.—SPECIAL SERIES: No. 2.

MEDICAL REPORTS,

FOR THE HALF-YEAR ENDED 31ST MARCH 1897.

53rd Issue.

PUBLISHED BY ORDER OF

The Inspector General of Customs.

SHANGHAI:

PUBLISHED AT THE STATISTICAL DEPARTMENT OF THE INSPECTORATE GENERAL OF CUSTOMS,

AND SOLD BY

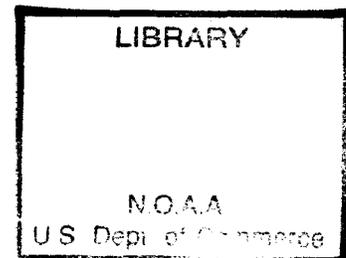
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National Oceanic and Atmospheric Administration

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INSPECTOR GENERAL'S CIRCULAR No. 19 OF 1870.

INSPECTORATE GENERAL OF CUSTOMS,
PEKING, 31st December 1870.

SIR,

1.—It has been suggested to me that it would be well to take advantage of the circumstances in which the Customs Establishment is placed, to procure information with regard to disease amongst foreigners and natives in China; and I have, in consequence, come to the resolution of publishing half-yearly in collected form all that may be obtainable. If carried out to the extent hoped for, the scheme may prove highly useful to the medical profession both in China and at home, and to the public generally. I therefore look with confidence to the co-operation of the Customs Medical Officer at your port, and rely on his assisting me in this matter by framing a half-yearly report containing the result of his observations at.....upon the local peculiarities of disease, and upon diseases rarely or never encountered out of China. The facts brought forward and the opinions expressed will be arranged and published either with or without the name of the physician responsible for them, just as he may desire.

2.—The suggestions of the Customs Medical Officers at the various ports as to the points which it would be well to have especially elucidated, will be of great value in the framing of a form which will save trouble to those members of the medical profession, whether connected with the Customs or not, who will join in carrying out the plan proposed. Meanwhile I would particularly invite attention to—

a.—The general health of.....during the period reported on; the death rate amongst foreigners; and, as far as possible, a classification of the causes of death.

b.—Diseases prevalent at.....

c.—General type of disease; peculiarities and complications encountered; special treatment demanded.

d.—Relation of disease to { Season.
Alteration in local conditions—such as drainage, etc.
Alteration in climatic conditions.

e.—Peculiar diseases; especially leprosy.

f.—Epidemics { Absence or presence.
Causes.
Course and treatment.
Fatality.

Other points, of a general or special kind, will naturally suggest themselves to medical men; what I have above called attention to will serve to fix the general scope of the undertaking.

* * * * *

3.—Considering the number of places at which the Customs Inspectorate has established offices, the thousands of miles north and south and east and west over which these offices are scattered, the varieties of climate, and the peculiar conditions to which, under such different circumstances, life and health are subjected, I believe the Inspectorate, aided by its Medical Officers, can do good service in the general interest in the direction indicated; and, as already stated, I rely with confidence on the support and assistance of the Medical Officer at each port in the furtherance and perfecting of this scheme. You will hand a copy of this Circular to Dr., and request him, in my name, to hand to you in future, for transmission to myself, half-yearly Reports of the kind required, for the half-years ending 31st March and 30th September—that is, for the Winter and Summer seasons.

4.—

*

*

*

*

*

I am, etc.,

(Signed)

ROBERT HART,

I. G.

THE COMMISSIONERS OF CUSTOMS,—*Newchwang, Shanghai,*
Tientsin, Ningpo,
Chefoo, Foochow,
Hankow, Amoy,
Kiukiang, Swatow, and
Chinkiang, Canton.

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NOTE

SUR

LA DURÉE DE L'IMMUNITÉ VACCINALE

CONFÉRÉE PAR LA VARIOLE

DANS

LE NORD DE LA CHINE.*

Par le Docteur J.-J. MATIGNON,

MÉDECIN AIDE-MAJOR DE 1^{ère} CLASSE DE L'ARMÉE,

ATTACHÉ À LA LÉGATION DE LA RÉPUBLIQUE FRANÇAISE À PÉKIN.

À LA fin de l'hiver 1894-1895, nous fûmes surpris, au moment où nous pratiquions la vaccination et la revaccination des Européens et des divers détachements qui étaient, à l'occasion de la guerre, montés à Pékin, de voir ces dernières suivies de succès sur nombre de marins espagnols et italiens, qui portaient sur les bras les traces d'un vaccin légitime datant de deux ans et sur un Français et un Espagnol, qui, quelque 20 ans plus tôt, avaient eu la variole.

Il nous parut intéressant de rechercher si l'immunité vaccinale, conférée par une atteinte de variole, était, en Chine, de courte durée, et, dans ce but, nous pratiquâmes au printemps, à l'automne et au commencement de l'hiver de 1895 des vaccinations sur les enfants des missions catholiques de Cha-la-eul, du collège français du Nan T'ang et de l'orphelinat des petites filles du Jen Tsé T'ang.

Nous choisîmes, à cet effet, ceux des enfants qui portaient les traces les plus manifestes de la variole.

122 enfants, filles ou garçons, furent vaccinés par scarification ou piqûre.

Nous eûmes 73 succès et deux cas douteux, soit 59.8 %.

Les enfants avaient un âge moyen de 5.11 ans et la variole les avait atteints à l'âge de 3.8 ans.

L'immunité, considérée pour l'ensemble des enfants, a duré 8 ans; celle des vaccinés avec succès a été de 8.33 ans.

Nos vaccinations ont été partagées en trois séries.

La première série porte sur les enfants trouvés de la mission de Cha-la-eul, sise hors de Pékin. Les vaccinations furent pratiquées fin mai 1895.

Nous avons procédé par scarifications et par piqûres. Les résultats différents que nous avons obtenus montrent nettement la supériorité de la méthode par scarification.

* Communication faite à l'Académie de Médecine de Paris, 3 mars 1896.

Le vaccin dont nous nous sommes toujours servi est de la pulpe glycinée de buffle qui nous a été très obligeamment adressé par M. le médecin de 1^{ère} classe des colonies LÉPINAY, directeur du laboratoire de Saïgon.

(a.) 36 enfants, d'un âge moyen de 10.08 ans, sont vaccinés par *scarifications*. Ils ont eu la variole à l'âge de 1.65 ans.

Résultat : 28 succès, soit 77.7 %.

L'immunité prise en bloc a duré 7 ans $\frac{1}{2}$; chez les enfants vaccinés avec succès, elle a été de 7.13 ans.

Comme *complications*, notons huit fois de l'adénite axillaire, parfois assez douloureuse, soit dans 28.5 % des cas. Cette fréquence de l'adénite peut, croyons-nous, être expliquée de la façon suivante : la vaccination a été pratiquée pendant la saison chaude ; de plus, les enfants sont très sales ; beaucoup ont écorché leurs pustules et c'est surtout chez ces derniers que s'est montrée l'adénite douloureuse. Pas de suppuration, pas de phénomènes généraux.

Chez certains enfants nous fîmes 5 scarifications ; il y eut, en moyenne, 4 pustules, soit 80 % ; chez d'autres on n'en fit que trois, qui donnèrent naissance à 2.21 pustules, soit 73.3 %.

(b.) Le résultat des piqûres fut moins satisfaisant :

19 enfants, d'un âge moyen de 13.1 ans, ayant eu la variole à 4.2 ans, reçoivent 4 piqûres.

Résultat : 6 succès, soit 31.5 %.

Comme *complication*, une adénite légère, soit 16.6 %.

Les 4 piqûres donnent en moyenne 2 pustules, soit 50 %.

La vaccine a évolué en trois jours et demi.

Nous n'avons pu, dans aucun cas, établir de rapport entre l'immunité et la gravité d'une première atteinte de variole, jugée par les marques qu'elle laisse sur la figure. Beaucoup d'enfants dont les cicatrices varioliques étaient minimales sont restés réfractaires au vaccin, alors que d'autres portant des cicatrices vicieuses de l'œil ou de la lèvre ont été parfaitement réceptifs.

Deuxième série.—Au commencement de l'automne, nous avons vacciné, par scarifications et piqûres, les enfants variolés du collège français du Nan T'ang, situé dans Pékin.

(a.) 26 enfants, d'un âge moyen de 12.7 ans, reçurent 3 scarifications. Ils avaient eu la variole à 3.9 ans.

Résultat : 19 succès, soit 79.9 %.

L'immunité globale a duré 8.45 ans ; celle des vaccinés avec succès 8.6 ans.

Les trois scarifications produisirent 2.26 boutons, soit 75.3 %.

À noter comme *complication* : 3 adénites légères, 15.7 %.

(b.) 13 enfants, d'un âge moyen de 12.7 ans, ayant eu la variole à 3.5 ans, reçoivent 3 piqûres.

Résultat : 4 succès, soit 30.7 %.

L'immunité générale a été de 9.1 ans ; celle des 4 enfants vaccinés avec succès de 8.7 ans.

Les trois piqûres donnent 1.5 pustules, 50 %.

La vaccine a évolué en quatre jours et demi.

Dans les deux modes de vaccination, nous n'avons pu noter de rapport entre la gravité d'une atteinte antérieure jugée d'après les cicatrices et la réceptivité vaccinale.

Troisième série.—Les petites filles de l'orphelinat du Jen Tsé T'ang, situé dans le nord de Pékin, sont vaccinées par scarifications au milieu du mois de novembre.

30 enfants, ayant en moyenne 9.9 ans et ayant eu la variole à l'âge de 2.7 ans, reçoivent 5 scarifications.

Résultat: 16 succès, soit 53 %, et deux cas douteux.

L'immunité des 30 enfants a duré 7.1 ans et celle des 16 fillettes vaccinées avec succès 7 ans.

Complications: une adénite légère, 6.2 %.

Les cinq scarifications ont produit 3.68 pustules, soit 73.6 %.

Nous avons pris de la sérosité de trois de ces pustules, nettement ombiliquées, dont nous nous sommes servi pour vacciner trois enfants nouveau-nés. Nous avons, chez ces derniers, obtenu par piqûres de très belles pustules vaccinales.

De l'exposé précédent nous pouvons conclure:

1°. La variole, dans le nord de la Chine, confère contre la vaccine une immunité temporaire. Sa durée est relativement courte. D'après nos statistiques, la durée maxima est de 9.3 ans; la durée minima de 7 ans. Nous ne retiendrons que la dernière, la première étant éminemment variable et fonction même de l'âge des sujets vaccinés.

2°. Les succès de la vaccination sont en raison de l'âge de l'enfant. Cette conclusion n'est que le corollaire de la précédente. Les enfants, en Chine, ont généralement la variole en bas âge. Or, plus nous les vaccinerons tard, plus nous aurons de chances de trouver des sujets réceptifs, l'immunité diminuant avec le temps. En effet, sur les enfants du collège, dont l'âge moyen est de 12 ans, nous avons 79.9 % de succès; sur ceux de Cha-la-eul, âgés de 5, 8, 11 ans, nous obtenons 77.7 % de succès; et sur les orphelines du Jen Tsé T'ang, qui ont 9.9 ans, la proportion tombe à 53.3 %.

3°. Le succès est en raison directe de la quantité de vaccin inoculé. Aussi la scarification donne-t-elle un pourcentage de beaucoup supérieur—presque 2 fois $\frac{1}{2}$ —à celui de la piqûre.

À Cha-la-eul, nous obtenons:

Scarifications: 77.7 % de succès;

Piqûres: 31.5 %.

Au collège du Nan T'ang:

Scarifications: 79.1 %.

Piqûres: 30.7 %.

Des résultats identiques sont obtenus par revaccination d'enfants vaccinés quelques années auparavant, la scarification donnant 71.1 % de succès et la piqûre 33 %.

De plus, si nous examinons le nombre des pustules vaccinales consécutives aux scarifications et aux piqûres, nous trouvons:

À Cha-la-eul:

73.3 % et 80 % des scarifications suivies de pustules vaccinales;

50 % de piqûres suivies de pustules vaccinales.

Au collège, même résultat:

75.3 % de scarifications donnent naissance à des pustules;

50 % des piqûres seulement en produisent.

4°. La vaccination par scarification offre sur la méthode par piqûres de réels avantages. En revanche, elle est plus fréquemment compliquée d'adénite; adénite légère, car il y a plutôt congestion qu'inflammation de la glande et la regression des phénomènes est rapide. Cette fréquence de l'adénite s'explique par ce fait que, après la scarification, les pustules vaccinales sont et plus nombreuses et plus volumineuses qu'après la piqûre; et partant, les chances d'excoriation ou d'infection, soit par le grattage, soit par frottement des habits, sont d'autant plus considérables. Même remarque a été faite pour la vaccination des enfants non variolés. Mais ces légers inconvénients sont largement compensés par les résultats que donne la scarification, résultats qui sont à peu près deux fois et demie supérieurs à ceux de la piqûre.

5°. Les pustules obtenues sont bien des pustules vaccinales. Nous avons inoculé avec succès leur sérosité à des nouveau-nés.

6°. Il n'y a pas de rapport à établir entre la gravité supposée d'une variole antérieure jugée par les cicatrices qu'elle laisse sur la figure et la réceptivité vaccinale.

7°. Il y a nécessité pour les Européens variolés depuis un certain temps, et habitant Pékin, centre endémique de variole, de se faire revacciner.

DR. C. C. DE BURGH DALY'S REPORT ON THE HEALTH
OF NEWCHWANG

For the Half-year ended 31st March 1897.

THREE births and three deaths occurred during the period under review.

One of the fatal cases was an infant 14 days old, who died in convulsions; another was that of a child three months old, who died suddenly in some kind of fit immediately after taking food; and the third was that of a French Sister of Charity, who was attacked with confluent small-pox, and died on the 14th day.

The general health of foreign residents was excellent, there being no other case of serious illness. There was an epidemic of mumps in January, and the ordinary number of sore throats in the early spring.

DR. E. W. VON TUNZELMANN'S REPORT ON THE HEALTH OF CHEFOO

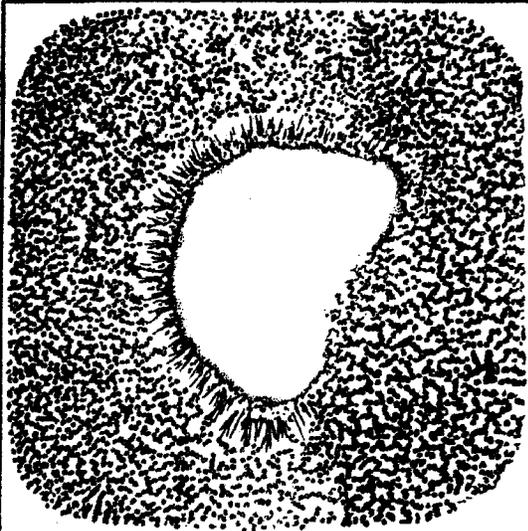
For the Half-year ended 31st March 1897.

THE health of the Chefoo community during the six months ended 31st March 1897 has been very good, save for the prevalence of the fever mentioned in my last Report. Of this there have been several cases, as described in detail below, one ending fatally.

In the preceding Report two varieties of non-malarial remittent fever were described, the one, associated with both forms of blood parasites, being of a very severe and dangerous type, the other, associated with one only, being much milder: it was inferred that the dangerous symptoms—coma, signs of cerebral cortex irritation, etc.—were due to the medusoid parasite, and that the other was associated with much less dangerous symptoms; also, that the prevalence of these causes of disease was attributable to the reclamation works. Further experience, as will be shown, has necessitated a change in these views. A fever of a very severe type has been found associated with the smaller parasite only; and cases continued to occur long after the cold weather, and the progress of the reclamation works, would have put an end to any infection from this source. On the other hand, no more cases of fever associated with the medusoid parasite have occurred, a fact which forcibly corroborates the view before expressed as to the source of this particular infection.

As regards the medusoid parasite, having had no more cases to study, I have but one important fresh observation to record, and will now describe it, so finishing for the present with this remarkable organism; and then proceed with the other organism, on the natural and pathological history of which the work of the last six months has thrown a flood of light.

While carefully going over the preparations made from the blood of sufferers from what I have before described as "medusa fever," I found in one from the 8-year old boy (not having a copy of my last Report I cannot give exact references) the strange objects depicted in Plate I, Figs. 2 and 3. It is at once evident that the linear objects with diamond-shaped and crooked ends shown in one of my earlier plates were *débris* from a similar structure. Some of the radiating branches may be seen to carry a round or oval body, not unlike a small blood corpuscle, at their distal ends; these obviously are the early stages of what I incorrectly imagined to be intra-corpuscular stages of the medusoid parasite. It is now clear that these latter, several of which are depicted in my last Report, are (presumably) gonophores—at any rate, that they are in no way associated with the red corpuscles. The medusoid parasite thus appears to confine itself to the blood plasma, the corpuscles being unaffected, so far as my observations show. Of all the numerous preparations made from blood infested with this parasite, one only contains this remarkable object, evidently a breeding phase; and this one had two of them, both close together in a thick mass of corpuscles, etc. Their huge size is a very adequate explanation of their rare presence in the finger blood. In a fatal case, such as

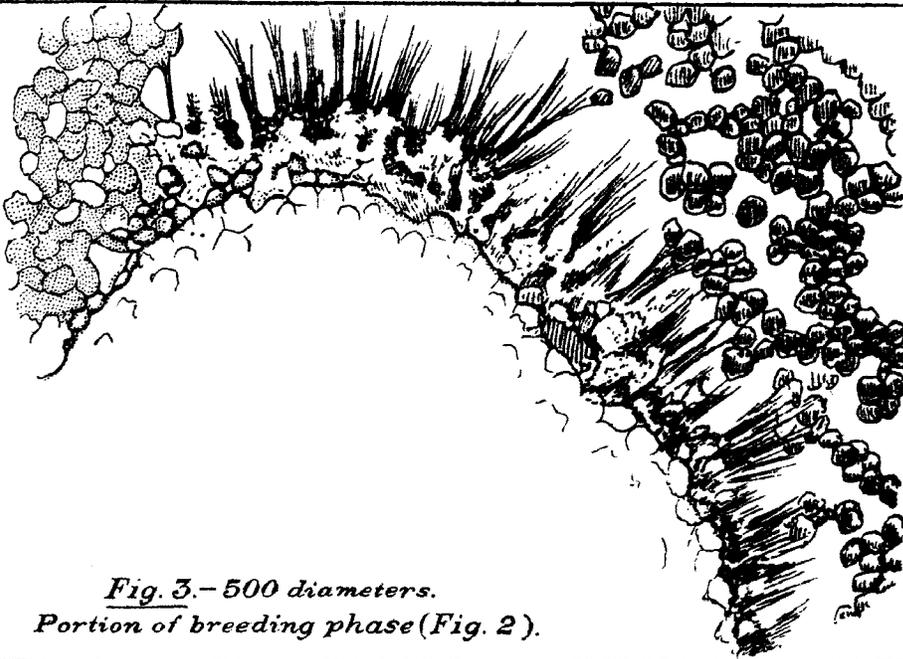


*Fig. 2.- 80 diameters.
Breeding phase.*



Fig. 1.- 250 diameters.

*1 and 2, under aspect of large specimens;
3, group of five small specimens.*



*Fig. 3.- 500 diameters.
Portion of breeding phase (Fig. 2).*

PLATE I.

Medusa Sanguinis Hominis.

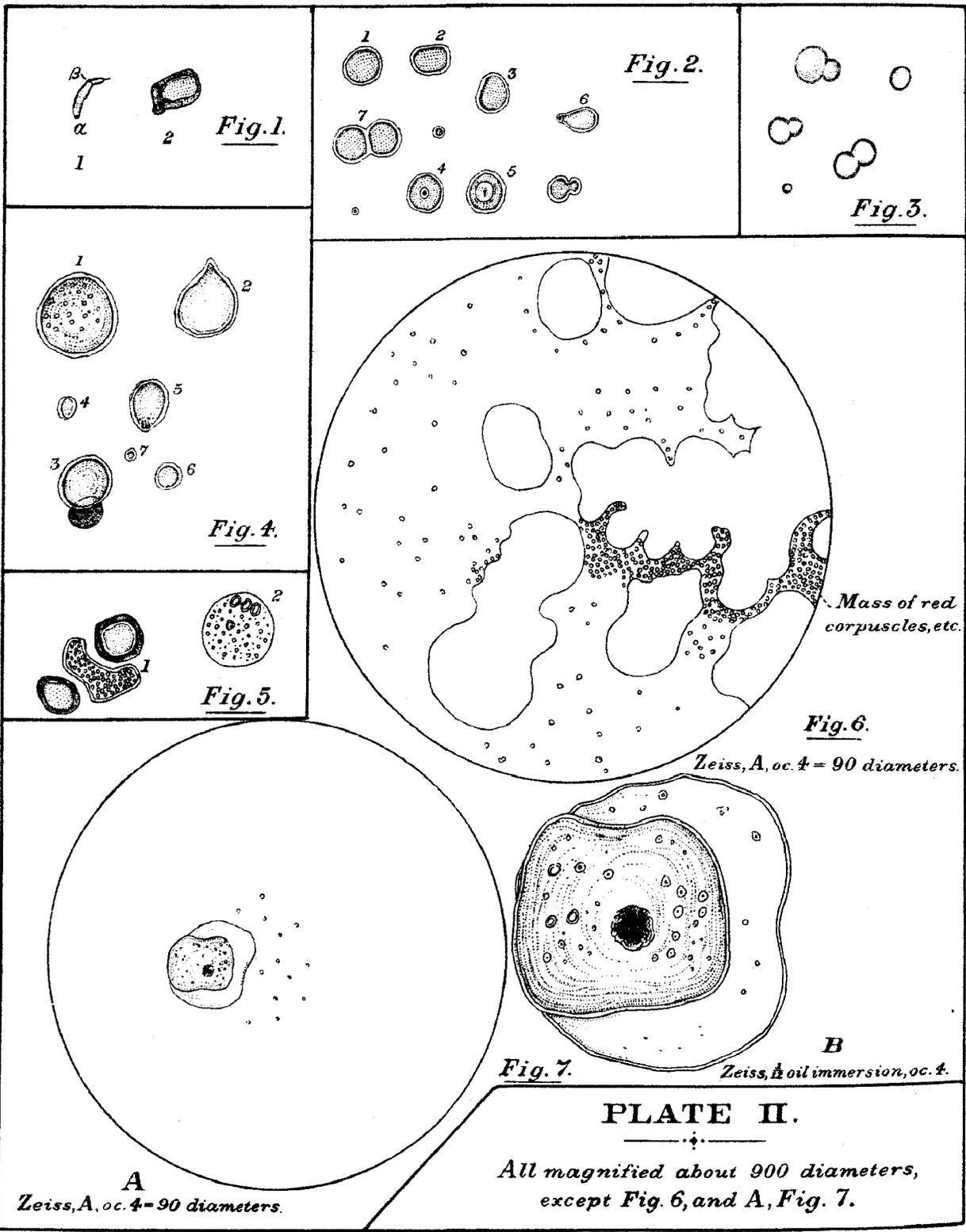


PLATE II.

All magnified about 900 diameters, except Fig. 6, and A, Fig. 7.

No. 1 of the last Report, the peripheral cerebral vessels would doubtless hold them in profusion; and the examination of the brain of such a fatal case is obviously a great desideratum.

As to the other parasite, I have found it swarming in the blood of over 200 persons, foreigners and Chinese, of both sexes and all ages, both Chefoo residents and visitors from all parts of China, the great majority being in fair, some in robust, health. Further observation, as will be narrated, indicates it to be a corticate protozoon, probably closely related to the organisms found by LEWIS and others in the blood of healthy rats and hamsters, by MITROPHANOW in the blood of certain mud-fish, etc. (termed by him *Hæmatomonas*), and by STEEL and CROOKSHANK in the blood of horses, mules, and camels suffering from a disease known as *surra*. CROOKSHANK found the *surra* organisms also in healthy rats in England, and assigns them, and probably also the fish parasites, to the genus *Trichomonas sanguinis*; this new blood protozoon, which I have succeeded in cultivating, will probably be found to belong to the same genus.

Thus the very enigmatical fact, which has naturally excited much incredulity in the medical profession in China, that a parasite of considerable size was to be found in a very large number of healthy persons, is to some extent explained, if its collocation with a similar phenomenon is to be regarded as an explanation. Its occasional pathogenic qualities will be found to be in great measure associated with and explained by the most remarkable cycle gone through in the course of its sexual reproduction, a process which was first made out in cultures, though most of the steps have since been studied in the blood of fever patients.

As to the source of infection, a pregnant hint was given by the discovery in numerous samples of Chefoo milk of the organism, usually in such enormous numbers that the sample resembled a pure culture of the protozoon, mixed with a few fat globules. This reminded me that in the summer of 1895 a cattle plague of great virulence raged throughout Shantung; the disease was "characterised by fever, petechiæ of mucous membranes, great prostration, and rapid wasting, terminating in death" (CROOKSHANK'S *Bacteriology*, section on "*Surra*"), i.e., the symptoms of *surra*. Most of the affected cattle died, but some survived; and it seems likely that the parasite would persist in the blood of these (as it does in the human convalescent from non-malarial remittent fever), infect the milk, and so its consumers. This is rendered the more likely by the further remarkable fact that boiling the milk for half an hour on three successive days does not destroy the parasites—is, in fact, an excellent method of obtaining a pure culture with infested milk.

A large variety of adult forms of this parasite have previously been described; in view of the fact that Mr. CROOKSHANK assigns the above-mentioned organisms, to which this parasite is probably allied, to the genus *Trichomonas*, characterised by possessing a stiff, immobile, spine-like process at one end, it seems advisable to describe yet one more, a very uncommon form, only seen two or three times. It was a slender, worm-like creature (1, Fig. 1, Plate II), with a distinct orifice at one end; at the other was a very fine, transparent stylet, quite straight and motionless; at β was an indistinct transverse line, marking a very slight constriction. An indistinct, darkish hillock projected from below the middle of the concave side. The creature moved slowly across the field with a worm-like motion, extending its α end and stretching the tip from side to side, while the body was straightened out and again flexed,

more than in the sketch. 2, same figure, depicts an object from an eosin-stained permanent preparation—an infested red corpuscle, containing an oblong parasite, at one end of which is a very distinct slender process tipped with a large knob. I have never observed any other such object.

A process of a-sexual reproduction has already been detailed; I have shortly to describe a much more complex sexual reproductive process, most of the structures pertaining to the several stages of which have long figured in my sketch-book, some even at the date of my last Report, though their significance has only recently been recognised.

I.—In many fresh blood preparations objects such as are depicted in Fig. 2, Plate II, are found, sometimes only one or two in each field, sometimes more, often none. They are clear, translucent, more or less spherical bodies, some oblong and somewhat flattened, occasionally flask-shaped (6), and then have a distinct terminal orifice; brownish-red tint; usually actively mobile, turning over and over, and oscillating about; with a sharp double contour, portions of the inner border occasionally growing brilliantly black, and then fading; sometimes a slight space can be seen between this inner border and the contained substance, over a small area (3). A large dimple may often be detected in this contained substance (1), the transparent limiting membrane not being correspondingly depressed. Often an orifice is to be seen, encircled by a thick lip, which sometimes seems to widen and swell out (4, 5). They are of all sizes, from rather larger than a red corpuscle down to a just perceptible dot. Some are quite motionless—these are usually to be found sunk to the lowest level in the preparation; here two are often found joined together (7), motionless, and occasionally a large clump, containing a dozen or more, is to be seen. In the latter case they are usually spread out, in a sheet, and the central ones may be so united with each other as to be quite indistinct. Occasionally these motionless spherical bodies are of a clear, brownish-green colour, highly refracting, and appear to contain air, or gas of some kind.

In permanent preparations stained with methylene blue and eosin these objects are found of a more or less deep blue colour; sometimes the deeply-stained periphery bounds a lighter blue substance, and the septum between a couple may be perfect, or more or less wanting. Frequently the centre is unstained, the deep blue periphery appearing as the wall of a hollow sphere (Fig. 3, Plate II).

Large phagocytes have been seen, containing one or two, rarely more, of these objects—sometimes of a greenish-blue tinge, when the patient has been treated with methylene blue. In permanent stained preparations these intra-phagocyte objects still take the blue stain, though sometimes imperfectly.

II.—Fig. 4, Plate II, shows several globular, clear, greenish, highly refracting bodies, evidently containing gas; double-contoured, with a brilliantly black inner border line; often marked with concentric circles, or portions of such. Some are perfect spheres, some oblong, oval, or flattened somewhat and so disc-like (4). 2 shows one drawn to a point, where the bright black inner contour ceases and the greenish interior passes imperceptibly into the background, without any opening being apparent. 5 seems to have an opening at one end, and about it are minute black specks, changing to whitish spheroids when out of focus. 1 appears to be

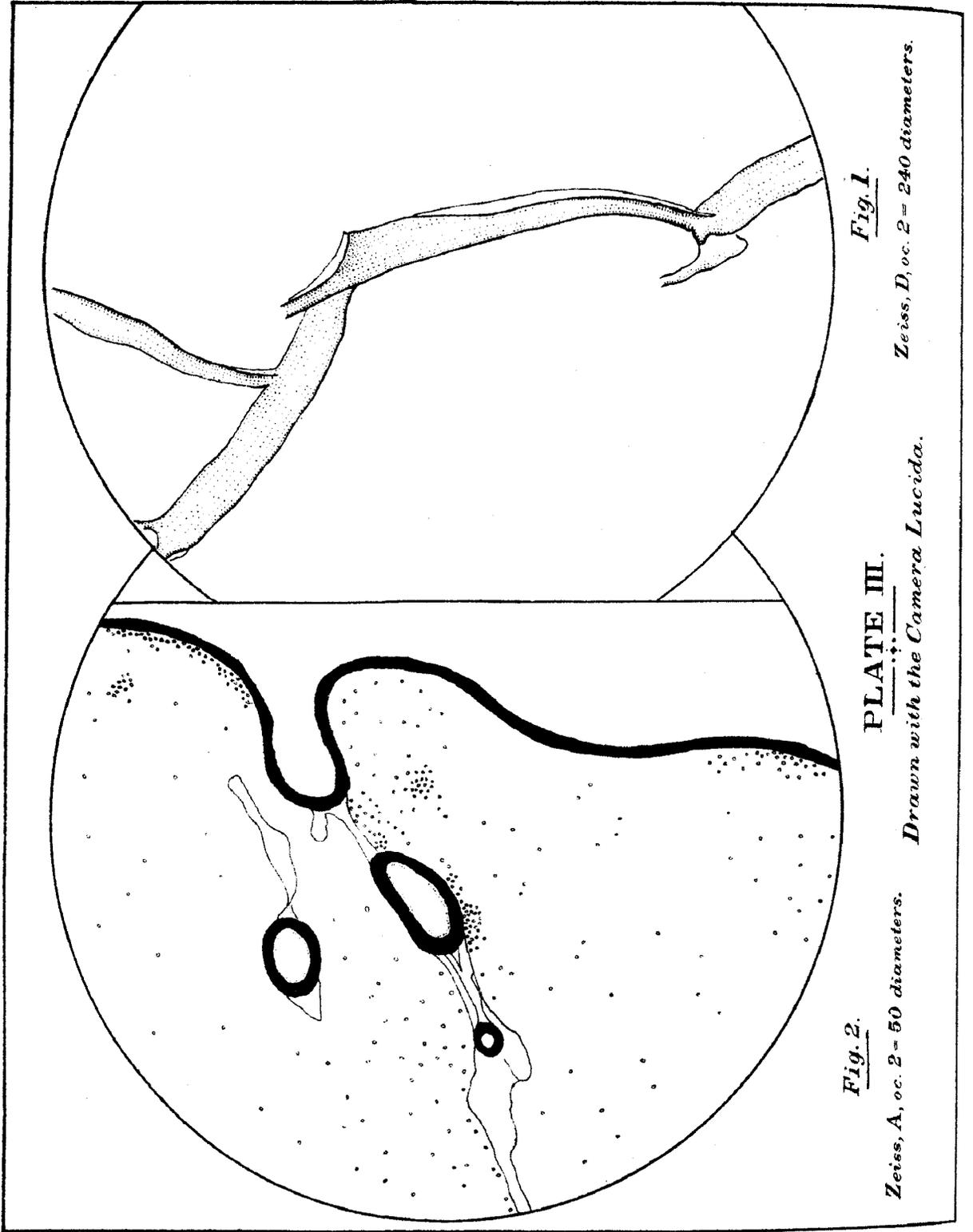


Fig. 1.

Zeiss, D, oc. 2 = 240 diameters.

PLATE III.

Drawn with the Camera Lucida.

Fig. 2.

Zeiss, A, oc. 2 = 50 diameters.

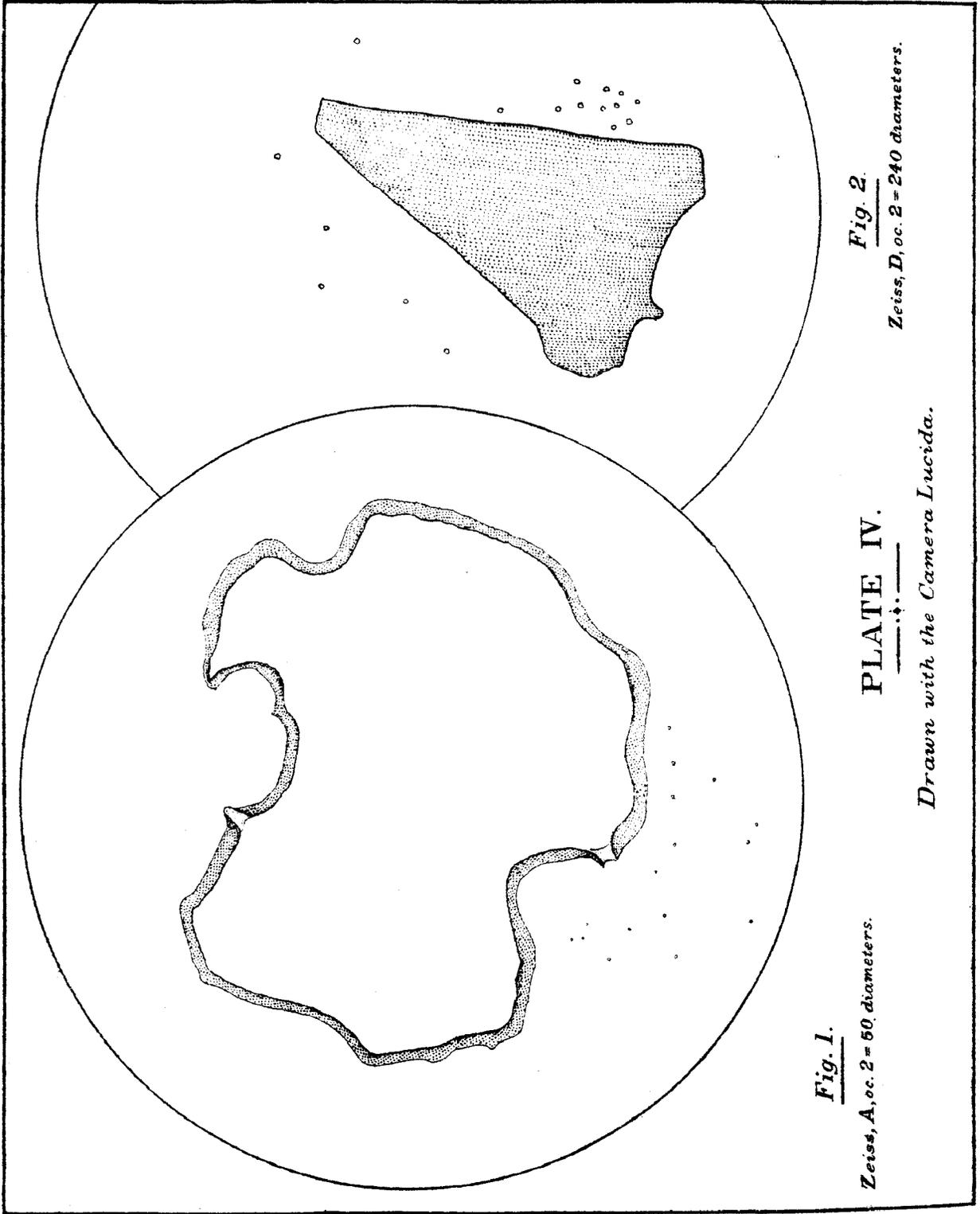


Fig. 1.

Zeiss, A, oc. 2 = 50 diameters.

PLATE IV.

Drawn with the Camera Lucida.

Fig. 2.

Zeiss, D, oc. 2 = 240 diameters.

full of these specks. A red corpuscle partly covered by 3 shows how translucent it is. These objects vary in size from considerably bigger than those shown to the dimensions of a small micrococcus; the latter, when out of focus, appear as brilliant yellowish spots encircled by an ill-defined black area; some are oblong, hardly any quite circular. All are motionless. They may be seen to grow rapidly in size, if the temperature be not too low; two adjacent ones will unite where they press on each other, the globes seeming to melt together, and thus are formed the dumb-bells, which, sometimes stained sometimes colourless, are often found in permanent preparations. My last Report contains a drawing of one such object, the nature of which was then unknown to me. Fig. 5 shows two of these globular bodies, unstained, in a permanent preparation: one is distorted by the infested red corpuscles between which it lies; both contain numerous highly refracting bodies, the larger of which appear identical with organism I.

III.—If a preparation containing the just described objects be left for a few hours, it will then be found full of the huge blebs shown in Fig. 6 (which is a copy of a drawing made with the camera lucida from a fresh blood preparation half an hour after it was made and sealed). These appear structureless, except that there is a very sharp and clear double contour (if sufficiently magnified), and that the surface is often dotted over with buds. Under a $\frac{1}{2}$ oil-immersion lens they may actually be seen to grow, so rapidly do they do so, and in a short time the preparation is entirely occupied by one huge bleb, all having run together, except where lines of red corpuscles, etc., have prevented this. As the available space near the sealed edge of the cover-glass contracts, the bleb, unable to advance itself, sends in a series of slender outgrowths, so forming a most beautiful lace-like fringe. If magenta glycerine be run into such a preparation while there is yet room for it, it causes some contraction of the blebs, whose whitish substance stands out in vivid contrast against the magenta background; after a few days, however, they will have absorbed the stain, and then appear as deep magenta-coloured masses on a more or less colourless background—a final proof, if such be needed, that they are more than the air-bubbles for which no doubt they have often been taken. Looked at with the naked eye these blebs have a satiny sheen, and often a margin marked by parallel lines, an observation which, in the absence of a microscope, might be of service in diagnosis. Often, in a recently made preparation of fresh blood containing these air-filled blebs, the air will be found here and there displaced from the containing tissue (Plate III, Fig. 2), which is then seen to be composed of extremely delicate membranous stuff, quite transparent, and devoid of discernible structure.

IV.—Fig. 7, Plate II, depicts a much less common object, a motionless, sub-circular, flat body, large enough to be distinctly visible to the naked eye; sometimes, as in the specimen sketched, a portion of it is distended with air. Under higher magnification, the flat disc is distinctly double-contoured, and the air-distended portion is seen to be concentrically striated. It is studded with granules and small spherical bodies similar to those found in III. This particular specimen had also a large, dark-reddish mass appearing to be largely composed of coiled tubules.

V.—Fig. 1, Plate IV, shows another very large object, with a wide, curled-in, free margin, of a dark brownish-black colour. Besides this marginal portion, nothing could be distinguished;

though when acted on by magenta glycerine the before transparent remaining tissue gradually absorbed the stain, and then had much the same appearance as similarly treated III bodies. Fig. 2 shows a similar object from a stained permanent preparation; the thick, deeply stained border is really the edge of a sort of shallow, vertical rim.

VI.—The various items figured in Fig. 2, Plate V, except *a*, are taken from a splenic film stained with eosin and methylene blue, prepared some 30 hours after the death of Case No. 1, recorded below. Each is a hollow, globular cell, like those in Figs. 3 and 4, Plate II, sending out one or more hollow processes, or buds. The stains have discriminated well the two tissues of the cells; the investing, somewhat thick, transparent sheath is stained blue (as also in the specimens shown in Plate II, Fig. 3), and it is to be observed that this takes no part in the formation of the tubular or conical processes, which, as shown by their red colour, seem to be an outgrowth only of the thin shell still remaining of the original cell material. This shell is largely intact in ϵ , less so in γ , while β has only a trace, and ζ (the two processes from which are vertically striated) none. *a*, same figure, shows four outgrowths, two wide, long, and rather thin, two only just commencing, from one of a couple of these cells conjoined in one of the dumb-bells already described. It was taken from a specimen of fresh blood from a febrile patient which had been immediately fixed in absolute alcohol, stained with methyl green, and mounted in balsam; so that the sketch shows the cell as it was immediately after being taken from the blood stream. Fig. 1, Plate V, from another part of the same preparation, shows a ramifying, lace-like tissue formed by the further growth and junction of such outgrowths from these cells. To the naked eye such a mass, in a fresh blood preparation, has much the same sheeny appearance as that presented by the structures III. Fig. 1, Plate III, depicts another but analogous branching growth; this specimen was from the blood of the case (No. 1) already referred to, taken early on the day before her death and quickly fixed and stained. Otherwise I have only found it in cultures, usually after a week or two of growth. If these vegetative growths be mounted dry a very distinct longitudinal striation becomes apparent; balsam disguises this.

VII.—Fig. 3, Plate V, depicts sundry objects of unknown nature found as yet only in one preparation, a splenic film from Case No. 1, stained with eosin and methylene blue (Löffler's). The preparation is full of long, slender, unbranching filaments, some of which are traceable into blue-stained bodies such as depicted: 5 and 6 recall to mind the pseudo-navicullæ of gregarinæ; the others have a flattened, almost membranous appearance. None show any distinct nucleus, though in some the staining is darker in patches.

VIII.—I have sketches of several other unknown objects, over which I do not propose to waste time. One, however, requires brief mention. In shape and size it much resembles the medusoid parasite, appearing to have, like this, a central cavity surrounded by a rim with an incurved margin. It differs in these respects: (1) it is of an intense red-black colour, and so opaque as to obscure its structure; (2) though often observed in freshly made blood preparations, no movements have ever been detected; (3) portions of red tubular structures have been seen projecting from the periphery; (4) bits of black shining tissue, like beads, have occasionally been glimpsed in its substance.

Fig. 1.

Zeiss, $\frac{1}{2}$ oil immersion, oc. 2 = 530 diameters.

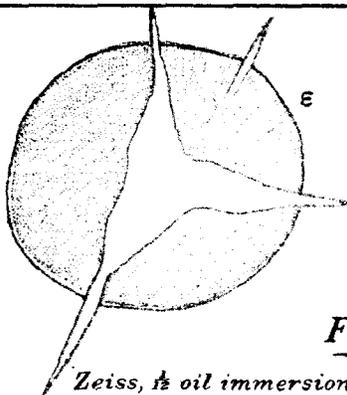
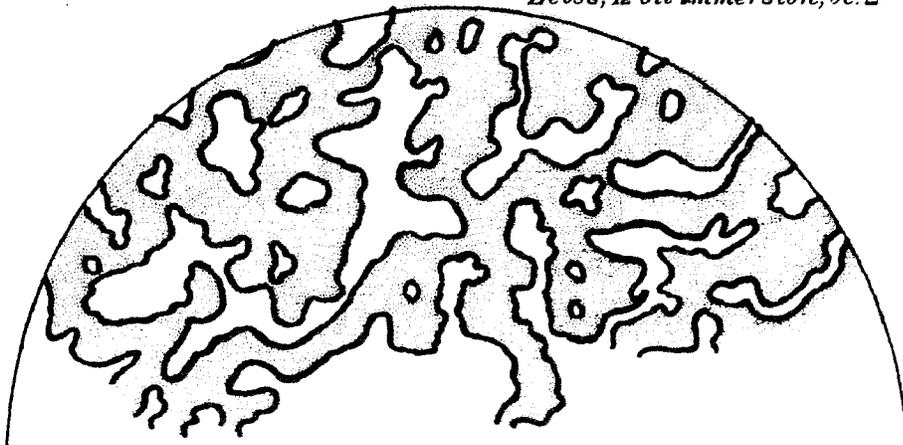


Fig. 2.

Zeiss, $\frac{1}{2}$ oil immersion, oc. 4 = 950 diameters.

Fig. 3.

Zeiss, $\frac{1}{2}$ oil immersion, oc. 2 = 530 diameters.

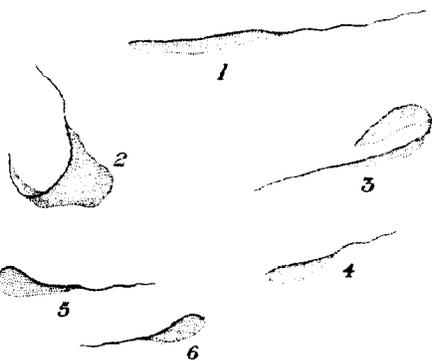


PLATE V.

Drawn with the Camera Lucida.

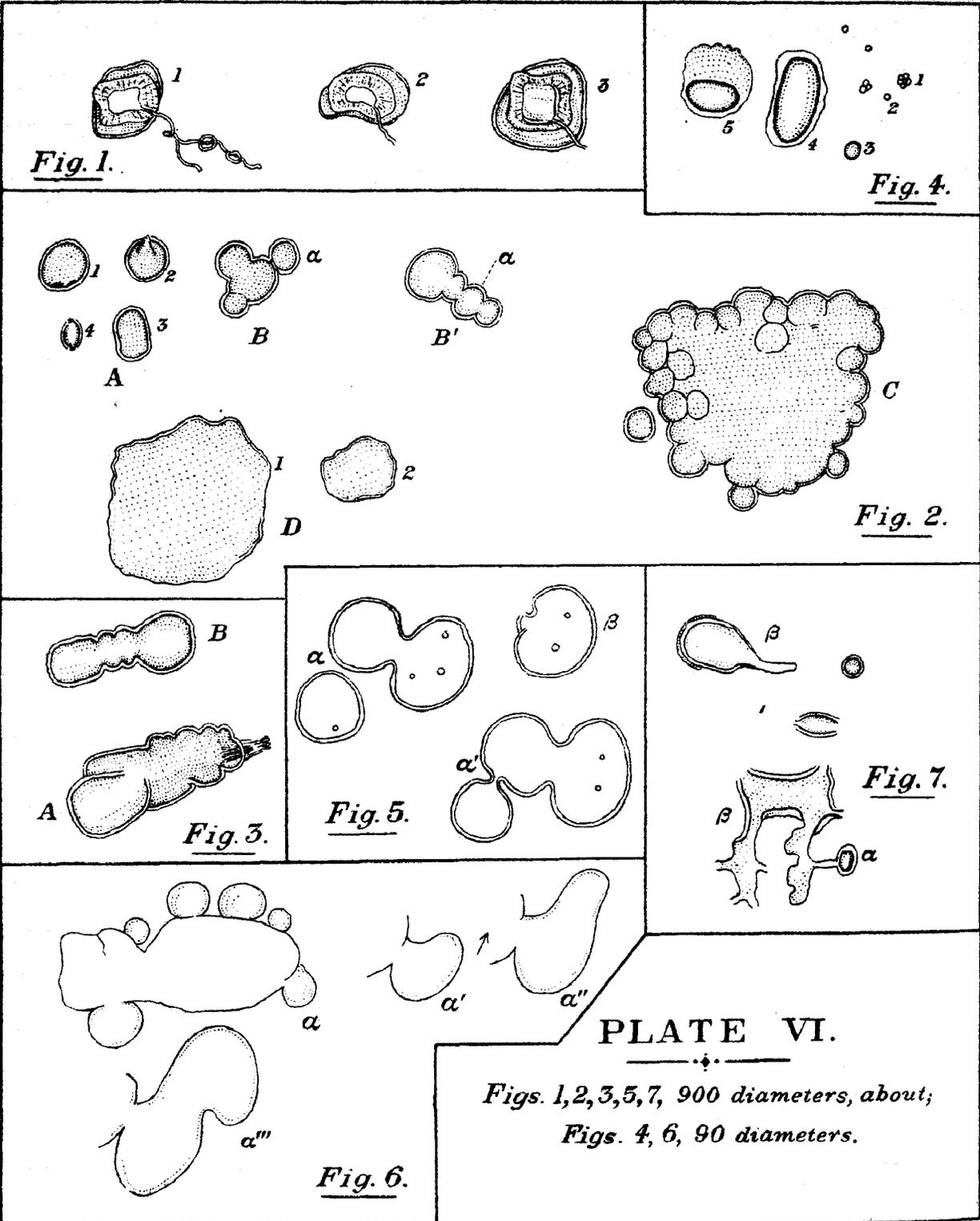


Fig. 1.

Fig. 4.

Fig. 2.

Fig. 3.

Fig. 5.

Fig. 7.

Fig. 6.

PLATE VI.

*Figs. 1, 2, 3, 5, 7, 900 diameters, about;
Figs. 4, 6, 90 diameters.*

SECTION II.—CULTIVATION EXPERIMENTS AND RESULTS.

On 19th January 1897 I mounted three specimens of blood infested with the a-sexual forms only of the protozoon: (1) in normal salt solution, (2) in the same *plus* 0.01 per cent. cocaine hydrochloride, and (3) the same *plus* 0.01 per cent. morphia hydrochloride, intending to study the effect of these alkaloids on the parasites. 24 hours later No. 1 was full of free parasites, all most extraordinarily active, more so than I have ever before or since seen them. Three in particular, each having projecting the bright trifold organ depicted in an earlier plate, were violently active, dashing about with a speed which would have taken them out of the field in a flash, had it not been so crowded; as it was they were constantly charging into less active organisms, often displacing one a distance two or three times its own diameter. No. 2 showed only a few very active parasites; remainder were languid in their movements, and many had become spherical.

On 22nd January preparation No. 2 contained only a great number of small, almost invisible spheres, so faint that I expected them to have vanished by next evening. They did not, however, do so, and in fact remained for several days in this state (room temperature about 60° F.); on the evening of 23rd January many of them had each one bright, highly refracting spot attached to them. From day to day these bright spots increased in size and in activity, for as their bud character became apparent, fairly vigorous movements were noticeable. On 1st February the preparation contained several (five or six) organisms such as that depicted in Fig. 1, Plate VI—very much larger than the parents, but of very similar structure. A long, apparently tubular, organ, much coiled, projected from a large but not very distinct central orifice, which was encircled by a squarish, translucent, corolla-like organ, just like the expanded flexible lip of the parent, but larger; through this, as well as projecting beyond it, could be seen the concentrically striated flattened body, with a sharp double contour. The creature was tolerably active at first, 1, 2, and 3 depicting changes of shape at intervals of five minutes; but became languid from day to day, and finally motionless. The long, tubular organ was never seen to be retracted, nor to undergo any considerable changes, other than in the relation of one coil to another.

This observation suggested that the parasite might be cultivated, and I tried a variety of nutrient media, bouillon, milk, Pasteur's fluid, etc., finally selecting whey, sterilised and slightly alkaline, as the best of those which were readily procurable. I always prepared it from tinned milk.

Several test-tubes partly filled with this whey having been prepared (sterilised, etc.), all but the control were inoculated by dipping into each a platinum needle which had just before been dipped into a drop of infected blood, with all the customary aseptic precautions. They were then plugged with sterilised cotton wool, placed in the incubator, and kept there at a temperature about 40° C. for so long as the observations were continued. Of late, however, I have dispensed with the incubator, as development goes on fast enough at the ordinary living-room temperature.

The erst translucent fluid becomes more and more opaque and milky; a scum forms on the surface, growing thicker from day to day; and eventually the fluid is replaced by a more or

less dense clotted mass, in which the naked eye detects numberless fine and coarse filaments, and air-bubbles of varying size imprisoned by thin translucent films of tissue.

If a drop of the fluid be mounted in normal salt solution and examined under a $\frac{1}{2}$ oil-immersion lens, the various objects depicted in Plate VI (except Fig. 1) will be seen in abundance.

The preparation contains myriads of the bodies shown in *A*, Fig. 2, which are indistinguishable from those of Fig. 2, Plate II; some are more or less spherical, some oblong. 2 shows one with a conical eminence, with a minute orifice at the apex, from which a slender, whitish, rod-like body projected; 4 is an oval body, extremely active, with an orifice at each end. They are translucent.

If such a preparation be kept under observation, some of these actively mobile corpuscles will be found to have settled down to the lowest level, where they lie motionless. Before this, however, while still mobile, one may be seen to knock up against another, and finally to unite with it; the two may be joined by a third before they become motionless and sink to a lower level. Often one corpuscle is seen to wander from one other single corpuscle or group of such to another, perhaps trying a dozen or more before finding one with which it effects its union. Thus *a*, in *B*, Fig. 2, travelled slowly round the triple group for over an hour, apparently trying again and again to fix itself on; but ultimately it failed, and wandered off to form one of the central constituents of the quadruple group *B'*.

In the lowest level of the preparation motionless groups of all degrees of complexity, from a single corpuscle up to 50 or more, will be found. The larger groups flatten out (*c*); the factors gradually melt together, losing their individuality more and more, until it is only at the periphery that any separate elements can be discerned; ultimately a thin sheet of tissue (*D*, 1 and 2) results, with a more or less wavy margin, and with no indication in its uniform substance of its mode of origin. The margin at first is only here and there clearly double-contoured, but it becomes more and more so, until at last it is obvious even under a low magnification. It is easy to realise how the rim of a structure like *D* grows up, and how ultimately an organism such as shown in Plate IV, Fig. 1, results.

The process just described is, however, not the invariable one; the processes of conjugation and growth are likely at any point to be associated with one of hollowing out of the corpuscles, or of the structures resulting from their union, and of their distension with air, so modifying the ultimate result. Thus, in Fig. 4 are shown (1) a group of six corpuscles, two of which are hollow and air-filled; (2) a single corpuscle thus affected; (3) one such which has grown to a much larger size; (4) a body like *D*, Fig. 2, almost entirely distended with air; and (5) a similar body only half distended.

B, Fig. 3, shows a later stage of *B*, Fig. 2, the whole coalesced group of four having become hollowed out and air-filled. *A*, same figure, depicts a similarly formed body, with more constituents; from its inferior aspect projects a curious, trumpet-shaped organ, tipped with a series of minute fimbriae.

The culture fluid contains also an enormous number of the large, double-contoured globes shown in Fig. 5; it seems probable that these result from the growth of solitary corpuscles of the kind just described, which have not conjugated. They grow with very great rapidity, and

where two touch they melt together (α , α'). Usually several buds are to be seen on their surfaces; β depicts an optical section of one at the spot where a large bud is being nipped off.

If milk be the culture fluid used, these globular bodies may be found growing freely from masses of granular material; and being thus fixed at one point, their vital movements are more evident. Thus, in Fig. 6, α - α''' show four several stages gone through by one such globular body in the course of an hour; it flowed, in the direction of the arrow, with a slow amoeboid motion, the advancing margin being marked by a very bright black contour, and a reflected concentric line inside this. Left for 24 hours this body traversed a considerable space, leaving a quantity of highly refracting *débris* behind it, the nature of which is shown in Fig. 7; it consisted of numerous smaller globules, buds probably, and apparently of parts of its own wall (β), highly refracting tissue with sharply defined, curled-in edges, with here and there a bud still attached (α).

If a preparation containing these rapidly-growing, free, globular bodies be left to itself for 24 hours or so, they will be found to have run together into one huge bleb, indistinguishable from those already described as forming in blood preparations (Plate II, Fig. 6).

The objects described in the preceding paragraph VIII are also to be found in cultivations, together with sundry other as yet unexplained structures.

There is one considerable gap in the cycle of development thus outlined, viz., the connexion between the a-sexual and the sexual forms. In drop cultivations, prepared by mixing a trace of infested blood with a nutritive fluid, and watched for long periods, I have several times (1) seen active free parasites, usually of the crenated kind, swell out, losing their projections, and become air-filled globes; and (2) observed branches grow out from these, as shown by α , Fig. 2, Plate V. As these branching vesicular structures are known in cultivations to originate from the I bodies (Fig. 2, Plate II; A , Fig. 2, Plate VI), the inference that these bodies are identical with the red corpuscle-infesting parasites suggests itself. It is conceivable that the difference in environment accounts for the structural differences between them—one form growing freely and rapidly in a favourable medium, while the other has to adapt itself to the very different conditions presented, first by the red corpuscle in which it commences its evolution, and then by the blood plasma, a medium probably not very favourable. However, as yet I have observed in the former nothing like the complex structure which I have described under the name of "projectile organ," which is such a striking feature of the latter.

The following observations seem to me rather to support the suggestion just made. Having secured a pure cultivation in whey of the protozoon, I have carried the process as far as the sixth generation without observing any noticeable changes in the organisms. On 12th April, however, I inoculated a flask of sterilised bouillon (itself some six weeks old) with a drop from a milk culture which was started on 18th February; by 23rd April the erst clear, translucent, red-brown liquid had become opaque, whitish, and had a thin crust on the surface. Examining a drop of this fluid (which is a less favourable medium than milk or whey) I found a considerable number of flat, circular organisms, moderately active, which appeared identical with the similarly shaped red corpuscle-infesting parasites; however, I found none with extended organ (this, I fancy, is kept retracted if the medium be unfavourable), though in some I noticed

the dancing, bright, black specks within the oral orifice which in the blood parasites is all that is visible of the retracted organ.

On 26th April the flask of milk culture of 18th February was three-fourths filled by a mass of firm, solid crust, from the lower surface of which depended shreds looking very much like bits of white seaweed, of delicate texture; the fluid portion was very watery, almost transparent. Putting a drop of it under the microscope, I found it, as usual, crowded with the I organisms. The vast majority of these were in the motionless stage; the few mobile ones moved very languidly; doubtless the fluid was full of the products of their metabolism, and so more or less toxic. Occasionally, however, a very active, flat, circular body flitted quickly into view, and usually off the field again; and in these, as in the bouillon culture, I detected the corolla-like, expanded lip characterising the red corpuscle-infesting organism.

There were a few (comparatively) micrococci in the fluid also, or what seemed to me to be such, they being unlike anything usually to be found in a fresh culture. I therefore placed the flask in a saucepan of cold water, and this on the stove for nearly an hour; the water boiled briskly for over half an hour, and the flask steamed freely.

Next evening I examined a drop of this boiled fluid, with the curious result that the organisms seemed to have been rejuvenated. Excessive activity had replaced the languor before so noticeable; the I bodies scurried about, revolved, and turned over and over, as actively as in a quite fresh cultivation. Further, many of them had from one to three or four small, whitish spheroids projecting from their surface, precisely as described, in my last Report, of the ovulating blood parasites; and as these broke away they danced off with great activity. Another noticeable point was that a considerable number were very much larger than any I had seen before—as large, in fact, as the spheres depicted in Plate VI, Fig. 5, or Plate II, Fig. 4; and this suggests that the boiling process had caused the escape of the air from a number of such spheres, and had revealed them in their real character, of enlarged I bodies.

CASES.

CASE NO. I.—Child, female, aged 12 years. Spent all her life in China, except 17 months in England; always very delicate; occasional slight feverish attacks in Kiukiang, Newchwang, Shanghai, etc.; health much improved since arrival in Chefoo in February 1896. She had that sweet, quiet, unselfish disposition which commonly makes a nurse assert that the child is “too good to live,” with that entire absence of “naughtiness” which so usually indicates lack of vitality.

By a fortunate chance I happened to examine her blood one day in August 1896, to see if it were infected with the organisms I was then finding in so many people, and I detected none in hers.

On 8th and 9th December she was very feverish; on the 10th she was kept in bed and her temperature noted; on the 12th I was called, seeing that the fever did not yield to domestic remedies as on other occasions. The only symptoms were the common ones of pyrexia, except headache, which throughout her illness she was remarkably free from. No rash of any kind.

CHART NO. 1.

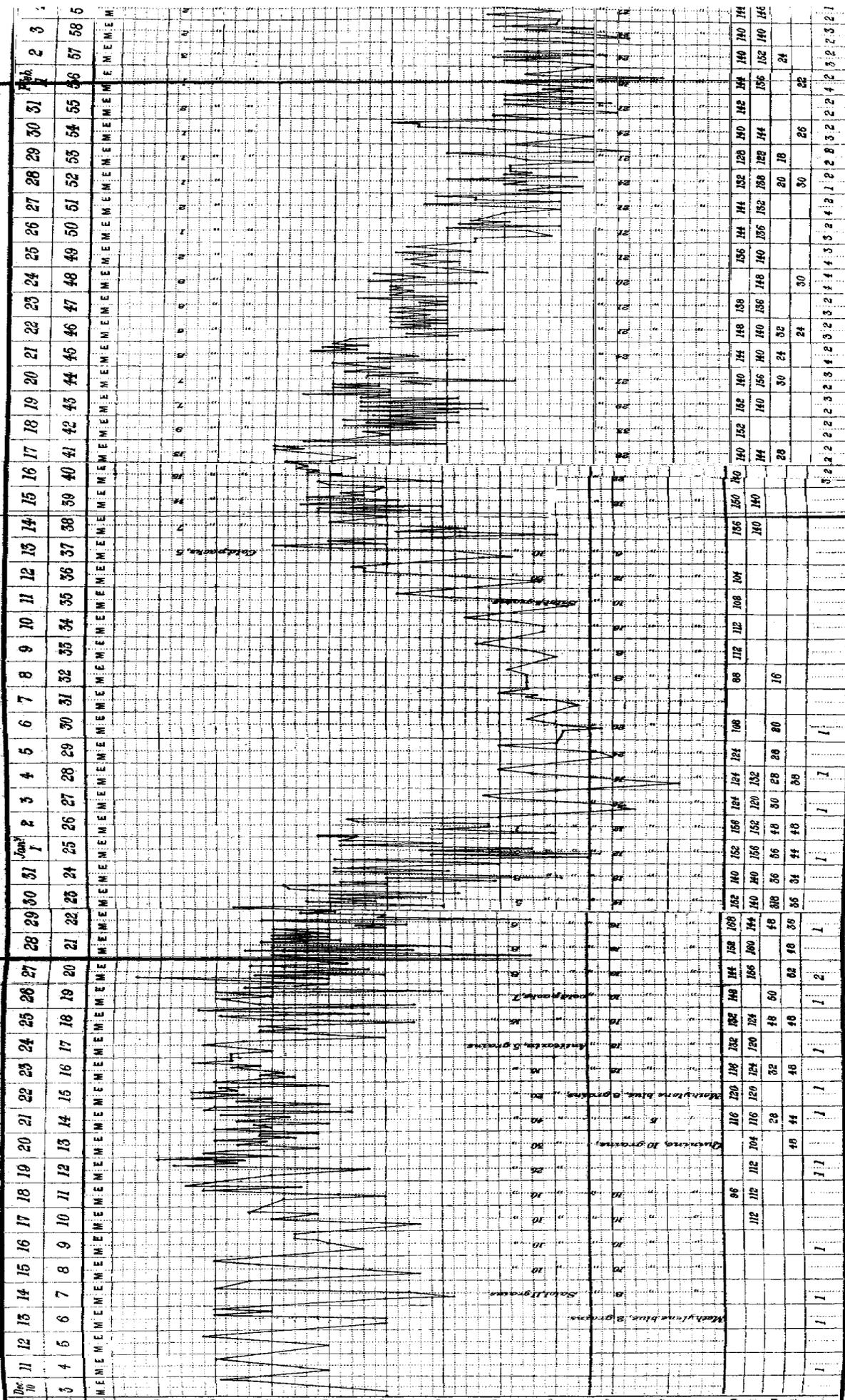
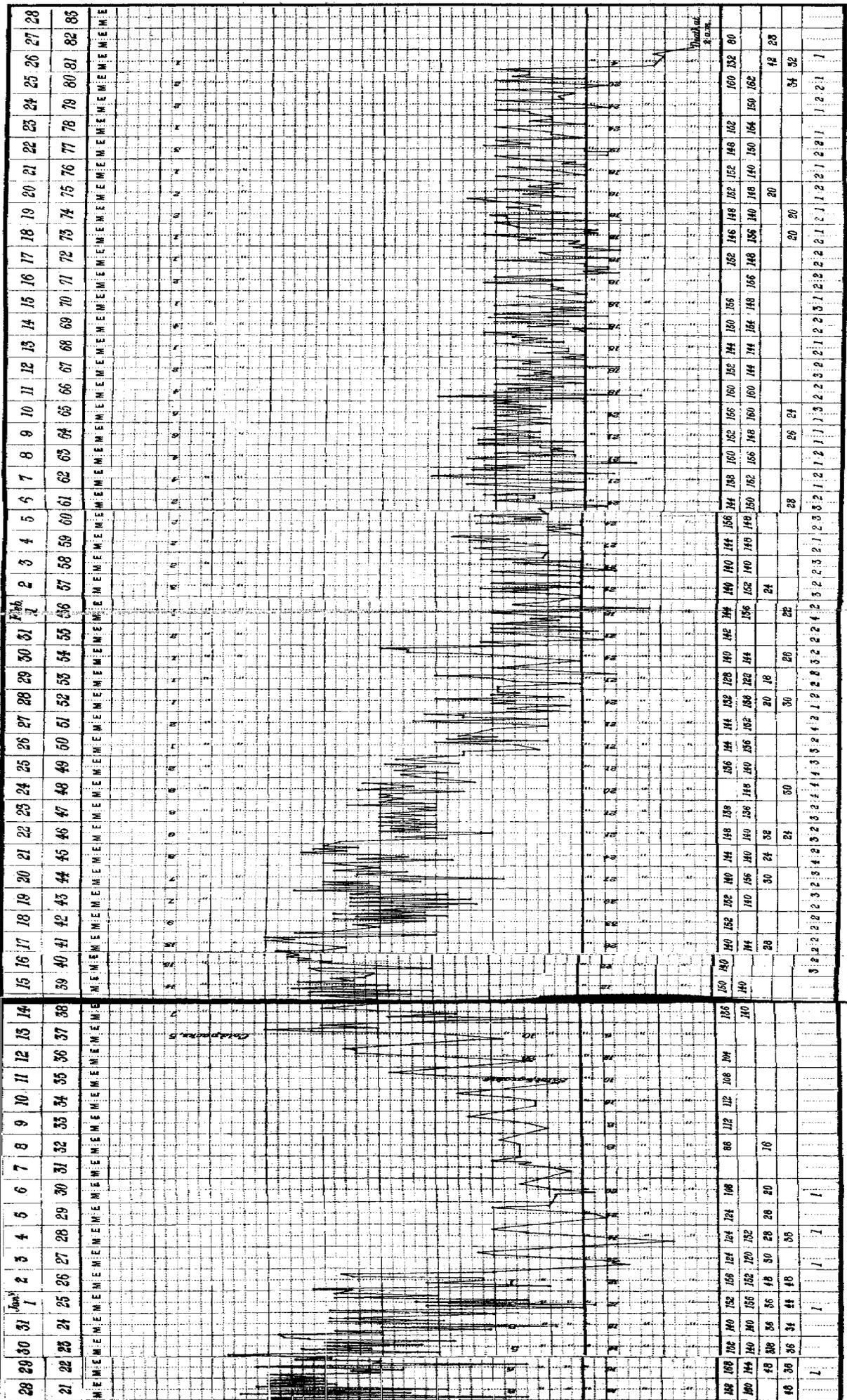


CHART No. 1.



The fever persisted in spite of sundry drugs (*see* chart); the daily remissions were at first very considerable; no chills, rigors, or vomiting accompanied the exacerbations; there were no abdominal symptoms, the bowels being moved naturally once or twice a day; no roseolæ; no tenderness or enlargement of liver or spleen. She slept well, ate little worse than usual (her appetite had always been poor), and, according to her mother, seemed much less ill than on earlier febrile occasions, although she had never had such high fever as now.

Small as is the scale of the accompanying chart, it indicates clearly enough one characteristic of this fever (still more apparent on a 2-inch per diem chart, on which the hourly variations, many of which are of necessity omitted here, appear), viz., its extreme irregularity: there are from one to five sharp exacerbations per diem; these occur at any hour, and the slopes of the rises and falls vary infinitely. This portion of the large-scale chart shows well how little direct effect upon the pyrexia the salol had; and hence its natural course is to be studied in that part of the chart which is prior to 26th December, when the cold packs began to modify it profoundly.

The use of methylene blue, in small doses, was associated with a slight improvement (*see* 16th to 18th December), but it was too slight to encourage me to persist in the use of an unconventional drug, especially as I could not positively assure the parents that if pushed it might be expected to master the fever. The cases which I had already treated successfully with this drug had been of a much less severe type, and with so fragile a patient I was much afraid of its impairing her digestive power, already slight.

It soon became necessary to feed her on predigested food and to use stimulants, as the pulse failed with ominous rapidity.

The salol, which in some cases had seemed to control the fever, failed here completely; quinine only distressed her, without affecting the fever in the least; so I resumed the methylene blue, three days after discarding it,—after finding phenacetin useless; 10 grains, given at 4 P.M. on the 22nd, produced hardly any result.

The antipyretic known as “antitoxin,” given in 5-grain doses, proved more effectual than any other drug in lowering the temperature; but its influence was very evanescent, and did not improve the patient’s general condition in the least.

On 26th December she seemed moribund; was quite unconscious; wrist pulse, 148, could just be counted; respirations, 50, quick and shallow; passing secretions into the bed; extremities cold. As a final resource I began cold packs, having hitherto been afraid of using them on so fragile a child, especially sensitive to cold. The blood was now swarming with all the before-described phases of the parasites, all extremely active; in the permanent preparations then made I find a much larger number than usual with protruded organs. I therefore also increased the methylene blue to 2 grains every two hours, which was borne well. The cold packs proved very effectual in reducing the fever, though for several days their effect was very evanescent, so that they had to be frequently repeated. On 29th December the pulse, 140, was larger and firmer; a quiet, rambling delirium, patient constantly talking in French and English, had taken the place of the profound unconsciousness before present. Methylene blue reduced to 2 grains every three hours.

On 31st December she was much quieter, sleeping a good deal. She now improved rapidly; pulse became slower and stronger. She regained consciousness, which she never again lost until 27th February, the day before her death. On 8th January I reduced the methylene blue to 1 grain every four hours; but soon had to increase it, as the evening rise began to grow higher from day to day. Salol again proved useless in controlling the fever, and the cold packs had to be resumed on 13th January. I then suspended the methylene blue for 42 hours, to see if cold packing alone would be efficacious, as it was questionable whether the striking recovery from her desperate condition about 26th December was due to the cold applications alone or aided by the drug. The result, however, was disastrous: on the day when none was given the fever required seven cold packs to keep it within bounds, and on the succeeding day 14 were required, a number greatly in excess of any previous requirement. At noon on 15th January therefore, I resumed the methylene blue, and pushed it; but it was several days before the ground lost was regained, and the number of packs reduced to reasonable limits. By 1 February she was so far improved that the temperature could be kept from rising above 100° F. by from one to three packs per diem, occasionally more. The methylene blue was very well tolerated, causing no nausea; the only ill effect was a little vesical irritability, which, however, did not distress her much; the rectum was similarly affected, so that it emptied itself whenever the bladder did; hence the frequent motions, liable to be misunderstood as diarrhoeic.

The fever seemed to be gradually decreasing, and the patient very slowly gained strength. She was always bright and cheerful; took her food regularly and well; and the extreme frequency of the pulse was almost the only indication of danger. Anæmia was excessive, and increased from day to day, in spite of two daily rectal injections of 5 grains of citrate of iron and ammonia together with 3 grains of citrate of iron and quinine, which were retained without difficulty. As regards food, she took a great variety: predigested milk gruel, broths, Mellin's food, Benger's, raw meat, cream, etc.; oysters and a very little thin bread and butter, as her appetite improved.

On 25th February I took a drop of blood from a finger for examination; on pricking a very thin, pinkish, watery fluid exuded, hardly like blood; a capillary tube filled with it was quite transparent. Later in the day her nose bled, rather profusely; a teaspoonful was collected for me; to it I added twice its bulk of 20 per cent. formalin solution; a small clot formed and for several days floated on the surface, kept there by the numerous air-filled globules which studded its substance.

During the night of 25th–26th February she was very restless, semi-delirious, thirsty; she breathed very fast, and was continually yawning and sighing. At 10 A.M. the radial pulse was barely perceptible; she was semi-conscious; the jaws were tightly clenched, and it was difficult to force them apart to administer food. At 2 P.M. she was a little more conscious; predigested fowl's blood was administered per rectum, and retained. At 7 P.M. she was deeply comatose; a glycerine enema was retained; pupils widely dilated; urine passed into the bed; surface cold. At midnight the respiration fell to 28, having been about 50, and the heart beats to 80; temperature was below 95° F. She died quietly at 2 A.M.

The fatal issue in this case seems fairly attributable to the fact that the child's vitality was unequal to the task of replacing the destroyed blood tissues. The fever was daily growing

easier to control; she was taking and digesting food well, sleeping well; only the quality of the blood steadily deteriorated, until at last symptoms of acute anæmia set in; and death appears to have been directly caused by clotting in the cerebral vessels.

At the autopsy, made at 8 A.M. on 28th February, there was still some subcutaneous fat found; the bowels were entirely healthy, no sign of present, recent, or old disease. The spleen was of normal size and weight, perhaps a little softer than normal. The liver was of natural size, but strangely white, *i.e.*, exsanguine. Only a little turbid pinkish fluid escaped from the divided splenic and portal veins.

CASE NO. 2.—Female, aged 16. The patient complained of malaise, languor, loss of appetite, etc., and being found to have fever, was taken from school and put to bed. There were never any special symptoms: no rash; no diarrhœa; nothing but those due to simple pyrexia. Quinine, as shown by the chart, had little or no effect on the temperature, except that 40 grains and 20 grains, given on two successive days, kept the temperature down to $100^{\circ}.2$ while the patient was under the influence of the drug, and made more wretched than the suppressed fever, if let alone, would have made her; it did not prevent the usual rise next day. Under salol the fever subsided and passed off, not to return—whether *post hoc* or *propter hoc* is difficult to say. Only the organisms of the a-sexual cycle were found in this case.

CASE NO. 3 is that of a member of the out-door Customs staff, aged over 60. He complained of great languor, depressed spirits, anorexia, pains in the right shoulder and right hypochondrium, etc. Pulse about 100, rather small, soft; respiration hurried, 30-36. Fig. 6, Plate II, is a copy of a drawing made from a fresh preparation of his blood.

After a few days rest he was able to return to duty. He took 4 grains in all of methylene blue, given in a cough mixture, as he had also chronic bronchitis; this may have aided in restoring him to health; he complained a good deal, however, of painful micturition.

There have been several cases such as No. 3, usually with slight fever, 100° - 101° , lasting two or three to seven days, unnecessary to describe in detail.

The one other case which I have to record is that of a 6 months old baby, who suffered from a mild attack of small-pox, discrete; the secondary fever, which had been very slight, had gone, the pustules had dried up, and everything appeared satisfactory, when the evening temperature suddenly rose to 104° . Next morning I was summoned hurriedly, about 6 A.M., only to find the child dead. It had passed a quiet night, taking its food well, from the bottle, at frequent intervals; at 4.30 A.M. it seemed to be "choking," mouth was full of mucus, which was cleared out. At 6.30 A.M. the intra-vaginal temperature was 108° F. I examined a drop of blood taken, very soon after death, from the radial artery; put briefly, it was difficult to realise that the fluid was blood.

This case illustrates well what I conceive to be the chief danger incurred by the hosts of this parasite. So long as the general health is maintained, it seems to do but little, if any, harm, only lowering somewhat the standard of health, causing shortness of wind, etc. If, however, from any cause the quality of the blood be considerably impaired, it becomes a favourable medium for the vegetative forms of the parasites; they develop with extraordinary

rapidity, and soon choke the vessels. When the parasite attacks a person before free from it it develops more or less rapidly in his blood until nearly all the red corpuscles are infected this process is apt to be associated with fever, varying from a slight attack of a few day duration to one which simulates typhoid fever, in its duration if not in its severity.

Addendum.—October 1897.

I find that the mobile blood parasites are not protozoons, as erroneously stated above but the zoogonidia of a fungus, probably belonging to the *Ascomycetes*; the mature organism is remarkably resistant to most staining reagents. Having at last had access to a reference library, I found in Professor DE BARY'S *Comparative Morphology and Biology of the Fungus Mycetozoa, and Bacteria* (English translation, 1887) the information necessary to explain correctly the facts observed. For "oral aperture" must be read "germ pore," and for "projectile organ," "germ tubule"; Fig. 56, page 111, in this book, illustrating the germ tubule of fungus spore, is strikingly like that figure in one of the plates of my previous Report which depicts the organs protruded under the influence of osmic acid. With regard to it the author says, "a mode of growth which looks peculiar and has given occasion to strange misconceptions"; that I should have furnished another of these shows how severely an investigator is hampered who has to work far away from reference libraries and other almost essential aids to research. The structure and life history of the organism above described agrees in essentials with those of a fungus spore as described in this text-book.

The fungus itself can be readily demonstrated in many blood specimens by staining blood film (fixed in absolute alcohol) for half to one hour in Neelsen's fuchsine solution (*undiluted*); mount in balsam.

Fowl's blood is an ideal medium in which to study this parasite, as the oval nucleated red corpuscles, non-mobile, can at a glance be distinguished from the mobile zoogonidia. A drop of blood be mixed with one of acid methyl green solution, mounted, and sealed, the spores, although stained, may be seen conjugating, projecting their germ tubules, sprouting characteristic hyphæ, etc. When such a specimen is some weeks old, the phenomena presented by it are so complex as to be difficult to understand, unless their evolution has been watched.

DR. W. H. PARK'S REPORT ON THE HEALTH OF SOOCHOW

For the Half-year ended 31st March 1897.

THE health of the Soochow community for the six months ended 31st March was hardly up to the average. Colds and bronchitis prevailed, three residents being quite incapacitated by the latter for several weeks. In two children the bronchial inflammation descended to the capillaries, causing capillary bronchitis, and in one it did not stop here, but attacked the lining membrane of the bowels and even the meninges of the brain, causing catarrh of the bowels and meningitis, followed by death.

Two well-marked cases of neurasthenia have been encountered, one of them, strange to say, in a Chinese. For a foreigner to develop this trouble is nothing unusual, but for a phlegmatic subject of the Middle Kingdom it seems something out of the ordinary. He brought it on in the orthodox fashion, too, by overwork. Being famous as a teacher he had a great many pupils, and in addition to the drudgery of the school-room, he spent every odd moment in that most trying of work, correcting Chinese literary essays. He is now confined to his bed in a darkened room, suffering from insomnia and a thousand nameless ills, incapable of the slightest mental exertion, and unable to see his best friends.

Alarming reports of the ravages of mad dogs have come from some of the villages round Soochow, and several people, after being bitten, have come to the dispensaries for treatment, but as they would not enter the hospital the cases could not be followed up.

Malaria abounded and continues to abound. Chills and fever cease not in this district for winter or summer, spring or autumn, heat or cold, rain or shine. Among the natives ague generally takes on the quartan type, and their regular name for it is the "three-day disease," with the nickname of "big honesty." With many of them it runs for years without a break. I know one man who says he chilled from the time he was 10 years old until he was 17, and during the whole seven years the chill came as regularly at the appointed time as the rising and setting of the sun. The "appointed time" in most cases falls in the afternoon or evening, morning exacerbation being comparatively rare. Among foreigners ague is generally stopped before it has gone far enough to declare its type, but from certain indications I judge the tertian type would predominate.

There is no way of finding out the proportion of opium-smokers coming to the hospital for malaria, as many of them buy quinine at the gate without ever coming into the dispensary; but in private practice the only two cases of ague I was called to see were in men who were confirmed opium sots.

Let not those who are thinking of coming to Soochow be deterred by these remarks on ague. We have malaria here, it is true, but, as someone has said, we get so soaked with it we rarely have anything more dangerous—pneumonia, typhus fever, typhoid fever, etc., being so

far unknown among us. Another peculiarity about malaria here is it never seems to take on the pernicious form, "congestive chills" not having been encountered during an experience of 15 years. The people live to as great an age here as almost anywhere else in the world. Septuagenarians and octogenarians are "as thick as blackberries," and one old lady has recently been heard of aged 124 years, and her husband is said to have died a few years ago aged 120 years.

The health record for missionaries, too, who have resided in Soochow since early in the "seventies," is very good indeed. One couple are on the eve of celebrating their silver wedding, and the children that have been brought up here will compare favourably with those from any other place in China. We used to fancy that our children were safer here than they would be in Europe or America, on account of the freedom of China from diphtheria; but this fancied security was shown to be a delusion in 1892, when a bright little girl was taken away by this dread disease. She developed it after a trip on a native boat, and as it was at first unrecognised, she lived for some time in free intercourse with all the rest of the children of the family, and yet not one of them contracted diphtheria. In the light of facts like these, when children remain immune after their use, too much credit should not be given to prophylactic serum injections.

DR. HENRY LAYNG'S REPORT ON THE HEALTH OF SWATOW

For the Eighteen Months ended 31st March 1897.

BUBONIC PLAGUE.

EARLY in the spring of 1896 this disease appeared for the second year in succession in the towns of Ch'ao-yang and Hai-mên, spreading to several of the surrounding villages. The epidemic raged with great virulence during the months of April and May, gradually subsiding in June; so that by the middle of July the disease, although still present, had ceased to exist in epidemic numbers.

A very moderate estimate of the number of deaths in Ch'ao-yang would be 2,000.

A foreigner who was living in Hai-mên at this time told me that the deaths there numbered at least 1,200, and that during the height of the epidemic many people fled to the hillside and camped out. After visiting the camp, he decided to remain in the town, and after some difficulty persuaded the members of his household to do the same. No death occurred in his compound. He described the camp as most disgusting, the total absence of all sanitary precautions rendering it almost unbearable.

In the port of Swatow cases of plague occurred, but never in sufficient numbers to amount to an epidemic. The disease showed itself in the same districts as in the previous year, and often in the same houses.

The disease has not shown any signs of spreading to the districts north and north-east of the port, the infected area in both years being to the south-west. From reports now to hand, we shall probably find it again epidemic in 1897 in the districts to the south-west and south-east.

I give notes of a few cases seen personally, with some particulars which show clearly how the infection may remain attached to a house and which prove conclusively the evil results that may follow on the neglect of the simplest sanitary precautions.

House infected in 1895. Early in 1896 a young woman died of plague, and the remaining members of the household removed to another place. After this the house stood empty for two months. It was then rented by a clerk and his family; previous to his taking possession a pretence had been made of cleaning the house. I was called to see the amah, whom I found had been ill for some days with bubonic plague; she had high fever, continuous vomiting, and a large bubo in the left cervical region. The wife had fever, and had a miscarriage at third or fourth month. A native doctor was in attendance on the wife. A child of 4 years of age had high fever, with a temperature of 104° ; and the husband himself was in a terribly excited and nervous condition, with fever and temperature of $103^{\circ}.5$. This, in the husband's case, was the onset of a fatal attack of plague.

On visiting the house the following day the condition of affairs was much the same, except that the husband informed me that the native doctor had left the placenta in the womb and that he was trying to persuade his wife to accept of the services of a foreign doctor.

On the 3rd day I received urgent letters asking for my assistance, and accordingly, on the 4th day, I removed the adherent placenta, the husband lending me valuable help, although he was at the time practically dying of plague. No servants could be obtained; so that all fell upon the husband, who was in sore distress. On this day the amah died and they left the house, taking refuge in that of a friend. The husband died on the 6th day; the wife and child recovered.

A woman died in the same bed and in the same house in which her daughter had died the previous year. In this case there was no sign of a bubo until the 9th day.

Cases occurred in two houses which were situated one on either side of a house whose inmates suffered severely last year.

Two children were seen in one house in a street infected last year. An attendant was obtained for them, and the healthy members of the household were removed. Result: one child died, one recovered, and no other member was attacked.

Such cases might be multiplied, but these are sufficient to show that most of the sufferers this year (1896) were victims of the neglect to carry out the simplest rules of cleanliness.

The following case is interesting as one of inoculation and as showing the suddenness of the onset of the bubo; the same history of sudden onset I have heard on several occasions:—

Case seen in the English Presbyterian Mission Hospital.—At the point of entrance of the poison was a large, black, sloughing sore; it was on the outer side of the left ankle. A large bubo appeared in the femoral glands of the same leg, accompanied by high fever, vomiting, etc. Patient stated that he was sleeping out on the road when he felt as if he had been suddenly stabbed in the thigh, and on feeling with his hand, discovered a painful gland, of the presence of which he had no previous knowledge. Patient, an adult male, died.

EPIDEMIC INFLUENZA.

The theory that this is a "marsh malarial fever," if tenable, would place malarial fevers in the category of infectious diseases, a position to which they are not entitled. That influenza is an infectious disease is now well proved; true quinine is the most useful drug to administer in the tropics, and from what one reads it stands high in the opinion of our *confrères* in Europe. In this portion of South China the common form of malarial fever is intermittent, chiefly tertian, often quotidian, and rarely quartan; remittent and continued fevers are very far below in order of frequency.

A very mild attack of influenza, unaccompanied by catarrhal symptoms, is hardly to be diagnosed from slight febricula or slight malaria.

Catarrhal symptoms, occurring as they do in some 50 per cent. of the cases, are of no mean diagnostic value; but the chief point, as far as my experience goes, is the amount of physical and nervous depression, which is in influenza, as a rule, out of all proportion to the

severity of the other symptoms, taking the case of an adult and the disease as met with in adult life.

One not unfrequently meets with cases of influenza without catarrhal symptoms in which the temperature never rises much above 101° , and in which the duration of the febrile period of the attack lasts only for two or three days, but yet it may take the patient many days to recruit his strength, whereas many persons with a similar febrile attack due to malaria would hardly consider themselves sick. In these cases microscopic examination of the blood is useful, not only from a diagnostic point of view, but also as a guide to treatment and to the deciding of the question whether or not the patient be confined to bed.

With all that is now known of influenza and its probable specific bacillus, to attribute it to malaria is a retrograde step. It is not many years since it was repeatedly stated that typhoid fever was extremely rare in China. The idea that all remittent fevers are of malarial origin is still hard to die, as witnessed by the expression "typho-malarial fever." How far residence in a malarial climate, and therefore possible malarial infection, affects the course of diseases as we know them in non-malarious countries, is a point about which more requires to be known.

The following cases all occurred in one house:—

The Chinese amah had been to her home up country to bury her mother, aged 80, who had died from influenza. She returned on 7th March, and on 8th March she was ailing, and on 9th March was confined to her bed with fever; temperature range 100° to 101.5° , with cough, muscular pains, and running nose and eyes.

9th March.—A child, 7 months, was taken with slight fever and catarrhal symptoms; temperature fell to normal on 11th March, and child appeared quite convalescent on 12th March. Temperature rose again, and child passed through a long and most severe attack of broncho-pneumonia with gastro-intestinal catarrh. During this attack respiration varied from 75 to 40 per minute and pulse 120 to 150, but often I was unable to count it; the temperature, from 101° to 105° , reaching on one occasion to 106° —this was on the 5th day of the broncho-pneumonia and 8th day of influenza. On the 14th day of the illness the maximum temperature was 104° , and the minimum 100.8° . From this day steady improvement followed, attack terminating on the 20th day. Chief points in treatment were cold baths, sponging, and phenacetin in $\frac{1}{2}$ -grain doses; diet was chiefly white of egg, brandy and egg, and essence of beef, with a very liberal supply of cold water.

11th March.—Mother was attacked; convalescent on 13th March. Catarrhal symptoms returned on 14th March without fever.

12th March.—Nurse, aged 20, ailing on 11th March, attacked 12th March, and convalescent on the 16th. Catarrhal symptoms returned on 18th March without fever.

16th March.—Child, aged 4 years, was attacked. Temperature reached normal on the night of the 17th, but rose again in afternoon of 18th; this was the onset of broncho-pneumonia, from which the child recovered on the 25th. Catarrhal symptoms returned when the temperature was falling to normal.

17th March.—Child, aged $5\frac{1}{4}$ years. Temperature fell to normal on the 19th, in the evening; broncho-pneumonia started on the evening of the 20th, and subsided on the 26th. Catarrhal symptoms returned after temperature fell to normal.

19th March.—Child, 2 years old, passed a precisely similar attack, with the subsequent broncho-pneumonia; but it was found impossible to obtain a correct record in this case.

In the same house one adult had an apyrexial attack and three other servants an ordinary one.

At about the same time two other households passed through the same experience—adults undergoing a short attack of three or four days' duration, and children all suffering from subsequent broncho-pneumonia.

In the Seamen's Hospital the following cases were admitted:—

Alcoholism	I	Gout	I
Bronchitis	I	Influenza	I
Chronic diarrhœa	I	Injury to scalp	I
Compound comminuted fracture		" wrist	I
of base of skull.	I	Intestinal obstruction	I
Diarrhœa alba	I	Jaundice	I
Eczema	I	Orchitis	I
Facial erysipelas.	I	Pneumonia	2
Fracture of both thighs	2	Remittent fever	I
" one thigh	I	Small-pox	2
" tibia and fibula	I	Sprue	I
Gastric ulcer	I	Typhoid fever	4
Gonorrhœal rheumatism	I	Urethral stricture	2

DR. B. STEWART RINGER'S REPORT ON THE HEALTH OF CANTON

For the Year ended 31st March 1897.

ON reviewing my notes of the cases of sickness which occurred among the foreign community at this port during the past 12 months, I find that fevers of different kinds hold a prominent position. The endeavour to classify these, however, is attended with some difficulty, and with the present statistics it is impossible to say how far the locality and climate have impressed some of the cases with a special and peculiar type. Taking a series of 25 cases at different times of the year, I find they may be arranged in the following manner:—

Remittent malarial fever	8
Intermittent „ „	6
Febricula	6
Typhoid fever	3
Typho-malarial fever	2

The typhoid cases were of obscure origin, the poison probably having been introduced with food.

Those of a typho-malarial nature were in patients of comparatively recent arrival in China, and in both instances the malarial symptoms were most marked and severe. The other malarial cases occurred chiefly among old residents in the East.

The febricula cases generally ran a course of about five to seven days, subsiding gradually, the temperature seldom rising above 102°.5 F.; and the attack was usually traceable to some exposure either to the sun, or wet, or cold. Quinine was generally administered; indeed, the sufferers, as a rule, take it themselves before seeking medical advice, though I am of opinion that some would recover without it.

A very typical case of ague was observed among the intermittents, in the person of a vigorous young adult. He had suffered several attacks of fever during a period of six weeks, originally contracted during exposure on the river. On the 2nd November I called to see him, and found him sitting up, as he had been free from fever for 24 hours. I found his temperature then 99°.4 F., and whilst talking to him I noticed a somewhat anxious expression of countenance, with a lividity of the lips commencing, and therefore advised him to lie down at once. He had not been in bed many minutes when his teeth chattered and body frequently shuddered all over; then a sudden tremor seized the limbs, and so powerful was the movement of the legs that it was impossible to control them, and the whole bedstead rattled and shook violently. The face now became pale and the lips livid; the features were drawn and wore an agonised expression. This condition continued for 20 minutes, when it gradually subsided, the pallor and lividity giving place to a red flush on the face, followed by a sensation of burning heat all over the

body. The temperature was shortly afterwards found to be 104° F. $7\frac{1}{2}$ grains of phenacetin were administered in hot tea as soon as the patient could comfortably swallow, and the dose repeated in half an hour, which soon produced moisture on the skin, when 10 grains of quinine were given, and followed by 5-grain doses every three hours; with the result that violent perspiration ensued, and in about 12 hours the temperature fell to normal, where it continued for 24 hours. Subsequently the paroxysms recurred three times, but each time with less severity; then the attack terminated.

A few cases of influenza occurred in the late autumn, but no epidemic of the complaint.

Towards the end of April a case of primary parotitis in an adult male was treated; it ran a simple course, and in 10 days the patient was again on duty. Curiously enough, another case in an adult occurred on the 10th May, but as this patient lived on the opposite side of the river to the other one, and as they never met, it could not be traced to contact; and indeed in neither instance could the origin of infection be discovered, as no other cases were heard of. The second case was attended with some febrile disturbance for several days, but was otherwise uncomplicated, and recovery was complete in a fortnight.

The epidemic of plague among the Chinese in the spring and summer of 1896 was said not to have been so severe as that of 1894. I have, however, no means of verifying this statement, as reliable statistics are unattainable. No case was seen among foreigners. During the height of the disease I was several times consulted by Chinese who had no real signs of the complaint. Notably, in one instance, a Chinese gentleman, in great alarm, begged me to examine a swelling on his leg which he had set down in his own mind as the commencement of the much-dreaded fatal disease, and was very surprised at being informed it was a sympathetic enlargement of a femoral gland, due to some sore places on the foot resulting from a tight shoe, and was equally relieved at finding himself quite well in a few days, after applying a little simple ointment and a loose shoe.

Some cases of dysentery and numerous attacks of diarrhoea were treated during the hot season, mostly occurring among adults; and, as usual at this time of the year, frequent sufferers from gastro-hepatic disorders required attention, though I am glad to be able to state that no case of very serious or prolonged severity has to be reported.

Inflammation of the external auditory canal had frequently to be treated, and was sometimes found due to the presence of foreign bodies, but more often to sitting or sleeping in draughts. This latter proceeding was also in several instances productive of cystitis and vesical irritation.

Conjunctivitis proved rather troublesome among a number of patients, but all the cases terminated favourably under treatment.

An outbreak of small-pox took place in the winter months. The first case was apparently contracted in Japan and was a mild attack. The second case was very severe and confluent, and probably taken through close contact with Chinese passengers on a river steamer. The patient had not been vaccinated for more than 30 years. The temperature ran high and the eruption was very copious, covering the whole of the trunk and limbs from the crown of head to the soles of the feet. The eruption was preceded in several parts of the trunk by a bright erythematous rash, particularly noticeable in the region of the axillæ, loins, and lower part of the abdomen.

The mucous membranes of the nostrils, lips, tongue, mouth, and throat were also affected, and the eyelids were closed for several days. Some delirium occurred at the end of the first week, with great restlessness at night; these conditions were treated with sulphonal and antipyrin.

This patient's condition subsequently became most distressing: he was much troubled with vomiting, swallowing was painful and difficult, a portion of each mouthful of liquid returning through the nostrils; a dry cough also gave some trouble, and the circulation was feeble. On the morning of the 11th day of the eruption he died quite suddenly from heart failure: having raised himself in bed to drink a glass of milk, he expired in the act, without a word.

The volunteer who nursed him carefully throughout the disease was immediately vaccinated, with success, and subsequently took charge of another case and accompanied him to the Small-pox Hospital in Hongkong, and entirely escaped the disease; but I regret to say that he contracted typhoid fever at the end of March, and is still under treatment for that complaint.

One or two more mild cases of small-pox were seen and transferred to the Small-pox Hospital in Hongkong.

All unprotected residents were now revaccinated, with the satisfactory result that the disease did not spread, and no epidemic occurred in the foreign community. I should here like to record the very favourable results following the use of Saigon calf lymph, fresh supplies of which were frequently obtained for me by Messrs. A. S. WATSON & Co., which I found thoroughly reliable.

A fatal case of septic pneumonia, following a poisoned wound of the middle finger of the left hand, took place early in June. The patient noticed a small, painful, yellow spot on the dorsal aspect of the finger, which he pricked with his pocket-knife, without relief, however; and a day or two later presented himself with the hand acutely inflamed. I laid open the finger freely, letting out some flakes of pus and blood, fomented the limb with carbolic lotion, dressed the wound antiseptically, and kept the patient in bed. The temperature rose to 104°.8 F. that night, and in the morning there was some pain and other evidence of pneumonia in the right lung, which spread gradually till the whole organ was involved, back and front. Rusty coloured expectoration soon commenced, and the general symptoms increased in severity till the temperature rose to 105°.8 F., and the purulent discharge continued from the wound. Brandy, eggs, milk, and broths were administered every hour. Carbonate of ammonia and spirit of chloroform were also exhibited in frequent doses, and iced water applied to the head, whilst quinine and antipyrin were the drugs employed with the hope of reducing temperature. All means failed, however, and the patient, completely exhausted, died on the evening of the 7th day of the illness.

Four births and two deaths have to be recorded, the one from pneumonia and the other from small-pox, as reported in detail above.

Through the courtesy of the medical staff of the Canton Chinese Hospital, I have been invited to attend the interesting practice of that institution, and operation cases have from time to time been placed in my hands, among which the following notes of supra-pubic lithotomy for the removal of a vesical calculus of unusual dimensions may prove interesting.

A Chinaman, aged 24, had been suffering for 14 years from symptoms of stone, and latterly his health had quite broken down. Examination showed the presence of a large stone,

which it was considered advisable to remove by the supra-pubic method. Therefore, the patient having been placed under the influence of chloroform, the bladder was filled with a weak solution of warm boracic acid and the base of the penis ligatured. An incision 4 inches long was then made, from the pubes towards the umbilicus in a straight line, and carried down through all the tissues, till the external coat of the bladder was exposed. At this point in the operation a loop of stout silk was passed through the muscular wall at the upper portion, and the organ steadied by an assistant holding the silk thread firmly and drawing it gently upwards towards the umbilicus; this proceeding not only fixes the bladder, but keeps the peritoneum out of harm's way. An opening was now made into the bladder, from above downwards, and by the aid of forceps, and the further assistance of a finger in the rectum, which had not been distended previous to the operation, the stone was gradually withdrawn. It weighed $11\frac{1}{2}$ ounces, and measured $5\frac{1}{2}$ inches by 4 inches. The section presented the appearance of a phosphatic calculus with alternate layers. For two days after the operation the temperature rose to 101° F., then subsided, and the healing process continued steadily, but slowly.

At the end of five weeks the urine had entirely ceased to flow from the wound, which had closed up, and in seven weeks he left the hospital apparently cured. Some time later, however, he returned, very ill, stating that after remaining with some friends in the city for several days he left for his home in the country, but during the exposure on the passage boat the wound reopened. He was found to be suffering from fever and hæmorrhage from the bowels, and was thereby so reduced that he died at the end of two weeks. It seems probable that had he remained quietly in the hospital a little longer, till the cicatrix had become firmer, his recovery might have been permanent.

DR. A. SHARP DEANE'S REPORT ON THE HEALTH OF PAKHOI

For the Half-year ended 31st March 1897.

THE health of the foreign residents and native population during the above-mentioned period has been generally satisfactory, and no special occurrences have to be reported.

FOREIGN RESIDENTS.

Among the diseases treated in this section of the population may be mentioned asthma, bronchitis, and phthisis; dysentery and diarrhoea; congestion of the liver and kidneys; remittent fever; laryngitis; conjunctivitis; and carbuncle. None of these, however, presented peculiarities calling for detail.

The birth of a male child was recorded during February.

NATIVE POPULATION.

As far as I can gather through careful inquiry from native sources, the town and surrounding country have been exceptionally free from disease of an epidemic type.

From one of the steamers a fireman was landed suffering from small-pox of a seriously confluent variety. He was conveyed to a village a short distance outside the town, where he died the same afternoon. Fortunately, the disease was not communicated to the people on shore, although brought in among them at the time of year they are most susceptible to variola.

The sanitary condition of Pakhoi, though admitting of much improvement, is certainly very much better than it was 10 years ago. The lower street is kept in better order, and the latrines along the higher level of the town are emptied more regularly.

The appended table shows that the total rainfall for the six months amounted to 16.89 inches, the equivalent of about 1,705 tons of water to the acre. The fall was distributed at equal intervals, so that the soil was kept moist; hence cracking of the surface of the ground and air laden with dust could not occur. The wells also held a good supply of water, and shallow ponds and marshy places were not dried up.

METEOROLOGICAL TABLE, October 1896 to March 1897. (Latitude, 21° 29' N.;
longitude, 109° 6' E.)

MONTH.	THERMOMETER.			RAIN-FALL.	MONTH.	THERMOMETER.			RAIN-FALL.
	Highest.	Lowest.	Mean.			Highest.	Lowest.	Mean.	
1896.	° F.	° F.	° F.	Inches.	1897.	° F.	° F.	° F.	Inches.
October	94	64	77.62	2.05	January	80	42	61.60	1.13
November	83	57	70.30	9.80	February	77	40	53.10	1.88
December	82	42	63.06	0.16	March	85	50	66.50	1.87

II.—SPECIAL SERIES.

No. 1.—NATIVE OPIUM	Published 1864.
„ 2.—MEDICAL REPORTS: 53rd Issue (First Issue, 1871)	„ 1898.
„ 3.—SILK	„ 1881.
„ 4.—OPIUM.....	„ 1881.
„ 5.—NOTICES TO MARINERS: Sixteenth Issue (First Issue, 1883)	„ 1898.
„ 6.—CHINESE MUSIC.....	„ 1884.
„ 7.—INSTRUCTIONS FOR MAKING METEOROLOGICAL OBSERVA- TIONS, AND THE LAW OF STORMS IN THE EASTERN SEAS	„ 1887.
„ 8.—MEDICINES, ETC., EXPORTED FROM HANKOW AND THE OTHER YANGTZE PORTS, WITH TARIFF OF APPROXIMATE VALUES	„ 1888.
„ 9.—NATIVE OPIUM, 1887	„ 1888.
„ 10.—OPIUM: CRUDE AND PREPARED	„ 1888.
„ 11.—TEA, 1888	„ 1889.
„ 12.—SILK: STATISTICS, 1879-88	„ 1889.
„ 13.—OPIUM: HISTORICAL NOTE; OR THE POPPY IN CHINA ..	„ 1889.
„ 14.—OPIUM TRADE: MARCH QUARTER, 1889.....	„ 1889.
„ 15.—WOOSUNG BAR: DREDGING OPERATIONS	„ 1890.
„ 16.—CHINESE JUTE	„ 1891.
„ 17.—ICHANG TO CHUNGKING, 1890.....	„ 1892.
„ 18.—CHINESE LIFE-BOATS, ETC.	„ 1893.
„ 19.—REPORT ON SOUND TRIALS OF SIRENS	„ 1895.
„ 20.—CHUNGKING: BUSINESS QUARTER AND MOORING GROUNDS, 1896	„ 1896.
„ 21.—CHINA'S DEFECTIVE CURRENCY: MR. WOODRUFF'S REME- DIAL SUGGESTIONS.....	„ 1897.
„ 22.—RAILWAYS AND INLAND TAXATION: MR. BREDON'S MEMORANDA CONCERNING.....	„ 1897.
„ 23.—OUTWARD TRANSIT PASS PROCEDURE AT CANTON: PROVISIONAL RULES.....	„ 1897.
