intensity II, direction NE-SW, duration 7 seconds. January 20, 3^h 48^m a. m., light shock, intensity II, direction NNE-SSW, duration 7 seconds. January 23, 10^h 41^m p. m., tremors. January 28, 4^h 56^m a. m., several short shocks, direction NNE-SSW, intensity III, duration 12 seconds; January 28, 1^h 1^m p. m., pretty strong shocks, direction NNE-SSW, duration 20 seconds, intensity IV.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Science. London. Vol. 15.
Ward, Robert DeCourcy. Rainfall, Commerce, and Politics. [Review of article by H. H. Clayton.] Pp. 110-111.
Ward, Robert DeCourcy. Economic Effects of Last July's Heat and Drought. P. 111.
Ward, Robert DeCourcy. Snow Crystals. [Review of article by Wilson A. Bentley.] P. 111.
Ward, Robert DeCourcy. Weather Tetanus. [Review of circular published by Camden, N. J., Board of Health.] Pp. 111-112.
Scientific American. New York. Vol. 86.
—— The Experimental Study of the Motion of Fluids. Pp. 75-76.
Scientific American Supplement. New York. Vol. 53.
Moore, Willis L. The Weather Bureau. P. 21802.
Nature. London, Vol. 65.
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G., C. C. Electric Waves. Pp. 211-212.
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Silberrad, Charles A. Extremes of Climate in the British Empire. P. 299.
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Proceedings of the Royal Society. London. Vol. 69.
Newall, H. F. Total Solar Eclipse of 1901, May 17-18. Preliminary Report of the Observations made at Ayer Karoe, Sawah Loento, Sumatra. Pp. 209-235.
Dyson, F. W. Total Eclipse of the Sun, 1901, May 18. Preliminary Account of the Observations made at Pulo Aoer Gadang, West Coast of Sumatra. Pp. 235-247.
Maunder, E. Walter. Total Eclipse of the Sun, 1901, May 18. Preliminary account of the Observations made at the Royal Alfred Observatory Pamplemousses, Mauritius. Pp. 247-261.
Maunder, [Mrs.] A. S. D. Preliminary Note on Observations of the Total Solar Eclipse of 1901, May 18, made at Pamplemousses, Mauritius. Pp. 261-266.
Bulletin of the American Geographical Society. New York. Vol. 33.
Ward, Robert DeCourcy. The Climate of the High Plains. [Review of article by Willard D. Johnson.] Pp. 412-413.
Ward, Robert DeCourcy. Forests, Snow, and Irrigation. [Note on article by L. G. Carpenter.] Pp. 413-414.
Ward, Robert DeCourcy. [Note on] Hann's Lehrbuch der Meteorologie. P. 414.
Ward, Robert DeCourcy. The Cause of Glacial Periods. [Review of article by H. N. Dickson.] Pp. 414-415.
Aeronautical Journal. London. Vol. 6.
Maxim, Hiram S. Aerial Navigation by Bodies Heavier than the Air. Pp. 2-7.
Marriott, William. Atmospheric Currents. Pp. 7-10.
—— The International Balloon Ascents. Pp. 17-18.
American Journal of Science. New Haven. Vol. 13.
Barus, C. On Geometric Sequences of the Coronas of Cloudy Condensation, and on the Contrast of Axial and Coronal Colors. Pp. 81-94.
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T[rowbridge] J[ohn]. The Bearing of the upward and downward Movement of Air on Atmospheric Electricity. [Note on article by F. Linke.] P. 156.
Symons's Meteorological Magazine. London. Vol. 36.
Gardner, H. D. Weather and the Horns of the Moon. P. 200.
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American Inventor. Washington. Vol. 8.
Claudy, C. H. Barometers and Thermometers. Instruments used by the Weather Bureau in taking Meteorological Observations. No. 12. Pp. 1-3, 6.
—— The United States Weather Bureau. No. 11. Pp. 4, 5, 8.
Scottish Geographical Magazine. Edinburg. Vol. 18.
—— Meteorology of Moscow during 1900. [Abstract of article by Ernst Leyst.] P. 41.
Physical Review. Lancaster. Vol. 14.
Gale, Henry G. On the Relation between Density and Index of Refraction of Air. Pp. 1-17.
Popular Science News. New York. Vol. 36.
S., W. Problem of Aerial Navigation. Pp. 37-38.
Pacific Rural Press. San Francisco. No. 3.
McAdie, Alexander. Protecting Fruit from Frost. Pp. 44-45.
Ciel et Terre. Bruxelles. 22me Année.
Mennsbrugghe, G. Vander. Une "Triple-Alliance" naturelle. Pp. 529-542.
—— Douceur de la température. P. 557.
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—— Les causes de la lumière polaire. Pp. 516-521.
—— Les coups de foudre en Hollande. P. 527.
Annuaire de la Société Météorologique de France. Paris. 49me Année.
Renou, E. Résumé d'un manuscrit de Bertrand sur l'état du ciel à Paris de 1698 à 1716. Pp. 299-301.
Lalune, —. Note sur le cyclone du 7 août 1899 à la Guadeloupe. Pp. 301-306.
Lerebours, —. Colonnes lumineuses observées en octobre 1901. Pp. 308-309.
Memorias de la Real Academia de Ciencias y Artes de Barcelona. Barcelona. Tercera Epoca. Vol. 4.
Sola, Jose Comas. Observaciones del Eclipse Total de Sol del 28 de Mayo de 1900. Pp. 1-8.
L'Aérophile. Paris. 9me Année.
Blanchet, Georges. L'aviateur Kres. Pp. 272-274.
—— Le Voyage du Méditerranéen. Pp. 279-280.
Journal de Physique. Paris. 4me Série. Tome 1.
Blondlot, R. Sur l'absence de déplacement électrique, lors du mouvement d'une masse d'air dans un champ magnétique; et sur la non-existence d'une action d'un tel champ sur une masse d'air qui est le siège d'un courant de déplacement. Pp. 8-13.
Annales de Chimie et de Physique. Paris. 7me Série. Tome 25.
Moureaux, Th. De l'influence des courants "vagabonds" sur le champ magéntique terrestre à l'Observatoire du Parc Saint-Maur. Pp. 139-144.
Archives des Sciences Physiques et Naturelles. Genève. 4me Période. Tome 8.
Gautier, R. Résumé météorologique de l'année 1900 pour Genève et le Grand Saint-Bernard. Pp. 55-74.
Comptes Rendus de l'Academie des Sciences. Paris. Tome 134.
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Annales Agronomiques. Paris. Tome 28.
Wollny, E. Influence des sels solubles sur l'humidité du sol. Pp. 63-64.
La Nature. Paris. 30me Année.
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Annales de Géographie. Paris. 11me Année.
Stassano, Henri. Influence des basses pressions barométriques sur la fréquence des aurores Polaires. Pp. 1-12.
Annalen der Physik. Leipzig. Vierte Folge. Band 7.
Grunmach, Leo. Bemerkung zu meiner Abhandlung: "Experimentelle Bestimmung der Oberflächenspannung flüssiger Luft." P. 236.
Linke, F. Ueber die Bedeutung auf-und absteigender Luftströme für die atmosphärische Elektricität. Pp. 231-235.
Gaea. Leipzig. 38 Jahrgang.
—— Der klimatische Gegensatz zwischen den West und Ostküsten der Festländer auf der nördlichen Erdhälfte. Pp. 79-94.
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—— Ueber ein mechanisch registrierendes Elektrometer für Luftelektrische Messungen. Pp. 119-120.
—— Das Spektrum des Blitzes. Pp. 120-121.
Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften zu Berlin. Berlin. No. 53, 1901.
Bezold, Wilhelm von. Ueber klimatologische Mittelwerthe für ganze Breitenkreise. Pp. 1330-1344.

Das Wetter. Berlin. 19 Jahrgang.

Grohmann, —. Die klimatischen Verhältnisse des königreiches Sachsen in ihrer Abhängigkeit von Luftdruck und Windursprung. Pp. 1-14.

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Geographische Zeitschrift. Leipzig. 8 Jahrgang.

Andersson, Gunnar. Zur Pflanzengeographie der Arktis. P. 1-23.

Himmel und Erde. Berlin. 14 Jahrgang.

Weinstein, B. Die Erde das Elektromagnet. Pp. 145-169.

—— Sonnenfinsternis-Meteorologie. Pp. 189-190.

Meteorologische Zeitschrift. Wien. Band 18.

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MacDowall, Alex. B. Die Sommer von Wien. P. 589.

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Weinstein, B. Die Erdströme im deutschen Reichstelegraphengebiet und ihr Zusammenhang mit den erdmagnetischen Erscheinungen. Pp. 589-591.

—— Regenfall am Viktoria Nyanza. P. 591.

Zeitschrift für Instrumentkunde. Berlin. 22 Jahrgang.

Rothe, Rudolf. Ueber einen Thermostaten für tiefe Temperaturen und seine Anwendung bei der Vergleichung von Thermoelementen. Pp. 14-21.

Physikalische Zeitschrift. Leipzig. 3 Jahrgang.

Elster, J. Luftelektrische Messungen auf Capri und Spitzbergen. P. 194.

EARTHQUAKES, CLOUDS, AND GALES AT PORT CAROLINA, SOUTH AUSTRALIA.[1]

By GEO. H. STYLES, Harbormaster and Subcollector, Port Caroline, South Australia, dated March 21, 1901.

The weather during the month preceding the earthquake of May 10, 1897, had been thick and squally, with the wind all round the compass. On the day of the disturbance its force, which had been 6 to 8 for several days, fell to 2. The direction was northeast and the weather fine with cirro-stratus clouds.

My residence and place of observation is on the beach, latitude, 36° 30′ 6′′ south; longitude, 139° 51′ 13′′ east. The noise of the earthquake was heard for about seventy seconds, coming from north to south, and was followed by a shock which damaged every house for miles around. One house 8 miles north of Robe was thrown down and many others were rendered uninhabitable. In places on the flat country there were fissures in the ground some hundreds of yards in length, and open down to the level of the water in the wells. About 10 square feet of the limestone crust was lifted several feet by the pressure of water underneath, and the water flowed outward for two days. From Robe to Beachport the ground subsided in places 20 feet. There was an upward pressure from below which filled some wells to the brim with tightly pressed sand. Water percolated through the ground in places, as if forced through a colander. The tide ebbed some 8 feet immediately before the shock, and an hour later it rose 10 feet. Pendulum clocks stopped at the same minute from Port Augusta in South Australia, to Sydney in New South Wales. The center of the disturbance, or more properly speaking the center of its manifestation, was around Mount Benson, between Kingston and Robe, about 20 miles south of this place. The lower the land the greater the shock. Buildings damaged showed the effects of a twist (apparent[2]). Chimneys not thrown down were twisted from their bases. Hanging pictures were in many instances turned with their faces to the wall. Ornaments on a mantelshelf were thrown across the room on to a table. Persons and dogs were made giddy, and vomited. A 7-inch horseshoe magnet, hanging by its armature on a copper nail in my window, was swung round and hung by its bow, still keeping its armature. This was repeated some months later, on which occasion the armature was flung off. Other shocks followed, minor ones, force 4 to 6, averaging two per hour, during the month of May. In June they averaged four each day; in July, two daily. Since then they have gradually decreased in number, and only one was recorded last month, and one, force 4, this month (March, 1901). Their intensity lately has been 2, 3, and 4 on the Rossi-Forel scale.

* * * * * * *

During all these tremors the sky was usually covered with heavy cumulus clouds, one or two of them bright, as though lighted by the moon even during the darkest moonless nights. No two cumulus clouds ever coalesced. On one overtaking another, they were mutually repelled, and drifted away in feathery flakes. I never saw one, even the largest cumulus cloud, reach the opposite horizon. It had to melt into clear sky. We have no longer the blue sky of the old days; it is of a milky and watery color, and never deeper blue than that on Plate XI in the United States Hydrographic Office classification of clouds. * * * We have also a thin cigar-shaped cloud, parallel with the horizon. This cloud, or there may be two, is very dark, and it is sharply defined. Having no ragged edges, it is as though it had been shaped with an edged tool, and though a gale may be blowing at force 10 the cloud will be stationary. I saw one once for twelve hours, when night hid it.

* * * * * * *

A reference to the sailing directions for this place will show it to be an open roadstead exposed to the fury of the worst storms. Yet the bay is seldom rough, and then only for a few hours. During the worst weather that I have seen here for over twenty-three years, a vessel could lie in safety at the anchorage. No one has yet accounted for it satisfactorily. In my opinion, the smoothness of the bay is caused by a fresh water river, which I have found running through the sand under the sea into the bay, and also, by fresh water springs which, in many places, may be seen coming up from the bottom in the bay. Their influence may be inferred from the fact that I have tested the density of the water with a salinometer on several occasions, and have found it to be one-third fresher than average sea water. I account for the absence of wind in

[1] In printing the above letter the Editor has omitted a few sentences suggesting possible magnetic and electric relations, but has retained the interesting meteorological facts.

[2] Mallet demonstrates that these twists are probably merely the resultant of the straight line motion of the earth combined with the irregular form, or unequal strength, or fastenings of the damaged object.—*C. A.*