The conidiophores agree so well with WEHMER's description[1]) and with his picture, also with regard to dimensions, that the diagnosis need not be doubted.

The fruit-bodies appear as small globules having the colour of fresh hazelnuts; their size is only about $^1/_4$ mm. With feeble magnification they appear to be enclosed by an envelope of small, round, highly refractive, greenish globules, enclosing a dark body. The globules on stronger magnification turn out to be mycelium cells with a greatly thickened wall, which remain joined by a few thin threads. The body within is little transparent, deep red and irregularly egg-shaped. It has a thin fragile wall, consisting of two layers of flat cells in which a red pigment is found.

The space within is filled up with a dense web of colourless hyphae, the contents of which are homogeneous and between which the asci are found.

These are egg-shaped and have a very thin wall, which in mature asci is difficult to observe, but which can easily be recognised in immature ones still containing colourless spores.

The mature spores, of which eight are found in each ascus, have a deep red colour, which is turned blue by alkali (ammonia). They have the shape of convex lenses, the thickness of which differs only little from the diameter. Round the aequator a hyaline seam is found, showing fine radial striae or folds.

The perithecia consequently resemble those of Aspergillus nidulans which differs, however, by wanting the ramified sterigmata. Also the ascospores with their radially striated seam are different from those of nidulans which show a groove.

**Terrestrial magnetism.** — *"The daily field of magnetic disturbance."* By W. VAN BEMMELEN. (Communicated by Dr. J. P. VAN DER STOK).

In 1895 I published[2]) the results of a research on the change in magnetic force on days following large magnetic disturbances.

By comparing the mean daily force on a day directly following a disturbance with the force some days after, a differential vector was obtained directed chiefly South with a deflection to West or East of rather constant azimuth for each station.

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[1]) C. WEHMER. Die Pilzgattung Aspergillus, Genève 1901. p. 71.

[2]) Meteorologische Zeitschr. 1895, pg. 321.

Later considerations [1]) brought me to the result that the regular part of the disturbance phenomenon might be ascribed to the existence of a circular system of electric currents chiefly in the higher layers of the atmosphere, compassing the earth, and parallel to the lines of equal frequency of aurora borealis.

Considering with SCHMIDT [2]) magnetic disturbances to be caused by movement of smaller current-rings over the surface of the earth, the whole exhibits a strong analogy to the great cyclonic movement of atmospheric air around the poles and the wandering depressions within it, so as it has recently been described by H. HILDEBRANDSSON. It seemed evident that such a system of circular currents must undergo a daily fluctuation caused by the rotation of the earth and I tried to separate this influence by taking the difference of corresponding *hourly* values on days following a magnetic disturbance.

Though the results pointed to an influence indeed, they were too vague to lead to definite conclusions; the minuteness of this daily fluctuation as compared with the irregular changes accompanying magnetic disturbance being no doubt the cause of it.

Now in 1899 Dr. LÜDELING [3]) showed that sharp results were to be obtained, when comparing the hourly values of the horizontal components on quiet days (Normaltage) with those for all days. In his interesting paper he gives the hourly values of the horizontal components ($x_s$ and $y_s$) of disturbing force for the arctic stations for the months June and July 1883.

The vectordiagrams drawn by him show the remarkable fact that the vector for all stations moves anticlockwise, with the only exception of that for the station Kingua Fjord where the vector moves decidedly in a clockwise direction. Also at Godthaab during part of the day the same occurs.

In order to study these diagrams for other parts of the earth I computed them for Greenwich, Washington, Tiflis, Zi-Ka-Wei, Batavia, South Georgia and Cape Hoorn for the same months (June, July); also deriving on the same principles the vertical component for these latter stations and the arctic ones, I found this component to exhibit chiefly a single daily fluctuation of an amount of the same order as that found for the horizontal component.

It was easy to classify the stations in the following groups:

1) Terrestrial Magnetism V, pg. 123.

2) Meteorologische Zeitschrift 1899, pg. 385.

3) Terrestrial Magnetism IV, pg. 245.

| Station | Hor. vector moves in diagram: | Vertical component shows: Max. | Min. |
|---|---|---|---|
| Kingua Fjord | clockwise | Evening. | Morning |
| Godthaab | anticlockwise, but clockwise in the evening. | | |
| Cape Thordsen<br>Jan Mayen<br>Ssagastyr<br>Fort Rae<br>Point Barrow<br>Nova Zembla<br>Bossekop | anticlock-wise. | Evening<br>At Ssagastyr $z$ unthrusty.<br>At Nova Zembla two maxima and two minima, $z$, tends to disappear.<br>At Point Barrow and Bossekop the fluctuation is the contrary and shows a max. in the morning and a min. in the evening. | Morning |
| Sodankylä | anticlockwise, but clockwise in the morning. The E/W compon. tends to disappear. | Evening | Morning |
| Pawlowsk<br>Greenwich | clockwise | Morning | Evening |
| Tiflis<br>Washington | clockwise, but anticlockwise in the evening. | Morning | Evening. |
| Zi-Ka-Wei | No change in direction, which stays WSW-ENE. | Morning | Evening |
| Batavia | anticlockwise, but clockwise in the evening | Noon | Morning |
| South Georgia<br>Cape Hoorn | clockwise | Morning | Evening |

The change in the sense of rotation of the horizontal vector and in the times of occurrence of maximum and minimum of the vertical component proceeds quite regularly, when classifying the stations, as has been done here, by their distance from a pole, which may be called pole of aurora borealis and is located in ± 80°.5 N and ± 80° W.

Now it is remarkable that in my paper on the "Erdmagnetische Nachstörung", quoted above, I came to the result, that the disturbing force acts in planes, which cut the surface of the earth along curves converging into this pole.

In order to study the behaviour of the horizontal component the simultaneous horizontal vectors for the arctic stations (after the data given by LÜDELING) have been plotted in a series of 12 maps corresponding to the hours of $0^h$, $2^h$, $4^h$..... $22^h$ mean Göttingen time. These maps revealed the fact that one part of these vectors pointed to one focus and the rest emanated from another.

The successive places of these foci have been determined as unbiased as possible. Rectangular coördinates have been made use of with the origin in the north pole and taking for $x$ and $y$ axis the meridians 180° and 90° E from Greenwich. The unity for the values of the coordinates as given underneath is $2\ tg\ 0°.5$; accordingly the value of $\sqrt{x^2+y^2}$ represents nearly the polar distance in degrees, because the maps have been drawn in stereographic-projection. The focus to which the vectors point has been called a positive focus, that from which they emanate a negative focus.

| Mean Göttingen hour | Positive focus $x$. | Positive focus $y$. | Negative focus $x$. | Negative focus $y$. |
|---|---|---|---|---|
| $0^h$ | 7.4 | —22.2 | — 8.2 | 1.6 |
| 2 | 9.6 | —17.0 | —13.2 | — 5.4 |
| 4 | 11.2 | —11.0 | —13.2 | — 8.8 |
| 6 | 11.2 | — 6.2 | —16.0 | —11.6 |
| 8 | 8.8 | 2.2 | —12.6 | —21.2 |
| 10 | 0.0 | 2.2 | — 8.8 | —28.0 |
| Noon | — 4.4 | 2.2 | 2.2 | —23.6 |
| 14 | — 8.8 | — 0.6 | 8.8 | —23.6 |
| 16 | —11.8 | — 6.6 | 13.8 | —10.4 |
| 18 | —14.0 | —15.4 | 9.4 | — 6.0 |
| 20 | —13.2 | —26.2 | 2.8 | 8.2 |
| 22 | — 8.8 | —30.2 | — 6.2 | 6.2 |
| Mean | — 1.1 | —10.7 | — 3.4 | —10.2 |

Harmonic formulae calculated for these four series:

$$+\ \text{focus}\ \begin{cases} x = -1.1 + 13.5\ sin\ (t + 15°) + 2.1\ sin\ 2\ (t + 19°) \\ y = -10.7 + 14.3\ sin\ (t + 14° - 90°) + 2.4\ sin\ 2\ (t - 2°) \end{cases}$$

$$-\ \text{focus}\ \begin{cases} x = -3.4 + 13.6\ sin\ (t + 24° + 180°) + 3.2\ sin\ 2\ (t - 15°) \\ y = -10.2 + 15.7\ sin\ (t + 24° + 90°) + 3.0\ sin\ 2\ (t - 50°) \end{cases}$$

From the constants of these formulae it follows evidently, that both foci move in nearly the same circular path with almost constant velocity and with a mutual distance of 180°.

This being granted and calling $x_0$ the mean of the $x$'s for positive and negative focus: $x_0 = \frac{-1.1-3.4}{2} = -2.3$, and $y_0$ the mean for the $y$'s for the foci: $y_0 = \frac{-10.7-10.2}{2} = -10.5$, the values of

$$(x_0h - x_0),\ -(x_{12}h - x_0),\ (y_6h - y_0) \text{ and } (-y_{18}h - y_0) \text{ and so on,}$$

must represent the same quantity, from which we may compute a set of 12 means. The harmonic formulae representing this set is:

$$x_+ = -2.3 + 14.5 \, sin\,(x + 22^\circ) + 1.3 \, sin\, 2\,(x + 28^\circ).$$

The term of the second order, already small in comparison with that of the first order, having been still more diminished by this operation, it may be safely neglected. So we may adopt (for Greenwich time):

$$x_+ = -\ 2.3 + 14.5 \, sin\,(x + 12^\circ)$$
$$y_+ = -10.5 + 14.5 \, sin\,(x + 12^\circ - 90^\circ).$$

The centre of the circular path, which is best called "pole of disturbance" lies accordingly in

79° N. and 78° W.

For the pole of aurora borealis I accepted

80°.5 N. and 80° W.

and according to Schmidt the magnetic axis for 1885 cuts the surface in

78°.5 N. and 68°.5 W.

So we have arrived at the remarkable result, *that the daily movement of the arctic foci of disturbing force takes place in a circular path of* 14°.5 *radius around a pole practically coinciding with the pole of aurora borealis and lying very near to the north end of the magnetic axis.*

When now supposing this fluctuation of disturbing force to be caused by a field, which slides around the earth from East to West (as has already been remarked by Lüdeling in his paper quoted above) and this in analogy with our actual views regarding the field of the ordinary daily variation, we are obliged to assume the field of disturbance to revolve around the axis just found, viz.

78° N. 79° W. to 78° S. 101° E.

In order to represent the daily field, we have to study the vector-diagrams themselves. Of course the vector-diagrams of one group show mutual differences caused partly by insufficient material (for the arctic stations 2 or 3 months only) and partly by local influences, as has already been indicated by Schmidt (Met. Z. 1899).

In order to avoid irregularities bringing confusion in the result, which may prevent interpretation of this phenomenon (this being of course the principal aim), I have chosen as representative for each group one station with an obviously regular diagram.

They are: Kingua Fjord, Jan Mayen, Sodankylä, Greenwich, Tiflis, Zi-Ka-Wei, Batavia, Cape Hoorn, (Godthaab has been left out, it being rather superfluous for the horizontal component, and the vertical component not being available).

The values of the components have been graphically smoothed. Now *to obtain a representation of the daily field* the method at present common of distributing the successive hourly values for each station along the parallel of that station, has been applied, and thus I have constructed a map in MERCATOR's projection *but according to the axis of disturbance* with the lines of equal vertical component and horizontal vectors on it.

The lines of equal vertical component compass chiefly eight foci of maximum and minimum vertical force (of which two are double), tabulated hereafter. (It should be kept in mind, that latitudes and longitudes are according to the axis of disturbance). The longitude of the sun for its position on June $21^{st}$ has been taken zero.

| Latitude | Longitude | Amount | Latitude | Longitude | Amount |
|---|---|---|---|---|---|
| 71° | 161° W | −47 γ | 77° | 6 E | +57 γ |
| | | | 71° | 81 E | +56 γ |
| 52 | 156 W | + 7 | 52 | 88 E | − 11 |
| 52 | 131 W | + 7 | | | |
| −10 | 41 W | + 3 | 22 | 129 E | − 1.5 |
| South of −60 | ? W | − ? | South of −60 | ? E | + ? |

*The horizontal vectors drawn in the same map are pointing almost without exception towards the positive foci and away from the negative ones.*

Supposing the disturbing force to originate from existing electric currents, the fact that these currents must follow nearly the course of the lines of equal vertical force conducts to the hypothesis of systems of circular currents with eight foci revolving daily around the axis of disturbance.

The horizontal vector being directed to the point where the vertical component is upwards, the application of AMPÈRE's rule teaches that these currents must flow for the greater part above the surface of the earth.

Remarkable is the rapid diminution of the force with the polar distance, almost parallel to the equally rapid diminution in the occurrence of auroral display. I must emphasize an important divergence between the fields of ordinary daily variation and that of disturbance; viz. the former has its foci near the meridians of noon and midnight, the latter near the line of separation of day and night.

The axis around which the field of disturbance revolves is so nearly coincident with the magnetic axis of the earth, that it seems the field is caused by any emanation from the sun, deflected by the earth-magnet acting as a whole, and not by the surface distribution of terrestrial magnetic force.

Full account on this research will be soon given in the Natuurkundig Tijdschrift voor Nederlandsch-Indië.

**Geology.** — *"A piece of Lime-stone of the ceratopyge-zone from the Dutch Diluvium."* By J. H. BONNEMA (Communicated by Prof. MARTIN).

In a few papers which a short time ago appeared in these reports, I communicated some particulars of the Cambrian erratic blocks from the loam-pit near Hemelum; this time I intend to treat of the Under-silurian ones.

First of all, however, I wish to add something to my information concerning the way in which Under-cambrian sandstone with Discinella Holsti MOBERG is spread. I then [1]) said that I had not been able to find anything certain, in German literature, about erratic-blocks of this stone. This was a consequence of my sources of information on sedimentary erratic-blocks being incomplete. After my paper had appeared, Prof. STOLLEY [2]) was so kind as to send me an essay that had seen the light already a few years before, in which the occurrence of this kind of erratic-blocks in the German diluvium is made mention of.

No more did I find, here in the Hemelum loam-pit, the opinion confirmed expressed i. a. by STARING [3]), MARTIN [4]) and SCHROEDER VAN DER KOLK [5]), that Under-silurian erratic-blocks were almost entirely

[1]) BONNEMA, Some new Under-cambrian erratic blocks from the Dutch Diluvium. Proc Royal Acad. Amsterdam. Vol. V (1903) p 561.

[2]) STOLLEY, Einige neue Sedimentärgeschiebe aus Schleswig-Holstein und benachbarten Gebieten. Schriften des Naturwissenschaftlichen Vereins für Schleswig-Holstein. 1898. Bd. XI. p. 133.

[3]) STARING, De bodem van Nederland. 1860. II. p. 99.

[4]) MARTIN, Niederländische und Nordwestdeutsche Sedimentärgeschiebe. 1878. p. 14.

[5]) SCHROEDER VAN DER KOLK, Bijdrage tot de kennis der verspreiding onzer kristallijne zwervelingen. Dissertatie. 1891. p. 51. Stelling VII.