

**THE TELLURIC LINES IN THE SOLAR SPECTRUM.**—M. Štefánik is proceeding with his researches on the direct observation of the infra-red portion of the spectrum, and publishes an account of his most recent results in a communication to the Paris Academy of Sciences (*Comptes rendus*, No. 17). After briefly reciting the history of our knowledge of the telluric bands and lines, the author describes the two spectrometers with which he carried out his researches at Chamonix, at the Grands-Mulets, and on the summit of Mont Blanc. In each case he employed the red screens which he has previously described, and by this means was able to see the region of the spectrum which extends from about B to  $1\ \mu$ . On July 21, at the Grands-Mulets, he observed the setting sun with his prism spectro-scope, and found that as the sun sank lower the group  $a$  was unequally strengthened in parts, whilst several feeble bands became visible between  $a$  and A. The groups Z, X, and  $\Pi$  were successively reinforced, notably more so as the sun sank into the haze gathered at the horizon. Similar observations made with the grating spectro-scope at the summit of Mont Blanc on July 30 gave similar results, and a feeble band appeared between the groups A and Z. The increase in intensity of the groups Z and  $\pi$  was so considerable that their telluric origin was very obvious. Zenith observations revealed changes which in general were of the opposite character. At all three stations M. Štefánik obtained a number of photographs when the sun was highest and at the horizon, respectively, with both spectroscopes.

**THE NUMBER OF THE VISIBLE STARS.**—The total number of stars usually supposed to be visible in the largest telescopes and on the best photographs is about one hundred million, but according to a computation recently made by Mr. Gore this number must be accepted as the outside maximum. To obtain his results Mr. Gore made a number of counts on the photographic prints given in the late Dr. Roberts's volume of stellar photographs, and found that the average number of stars per square degree was 4137 in the Milky Way, 1782 near the Milky Way, and 408 in the non-galactic regions. Combining these results with the estimated areas of galactic and non-galactic regions published by Prof. E. C. Pickering, he obtained as the grand total of visible stars the number 64,184,757. This is probably smaller than the actual total, as some of the fainter star images would probably be lost in the reproduction of Dr. Roberts's photographs.

Clusters and nebulae were avoided in making the counts, so that Mr. Gore's total will have to be increased on this account. In another count the average richness of the irregular clusters came out as 5752 stars per square degree, but this is far below the average richness of the globular clusters, one of which,  $\omega$  Centauri, shows 25,000 stars per square degree (*Observatory*, No. 376).

**STARS WITH PECULIAR SPECTRA.**—In No. 4129 of the *Astronomische Nachrichten* Dr. H. Ludendorff discusses the spectra of the stars R Coronæ Borealis, 12 Canum Venaticorum, and 72 Ophiuchi, which he and Dr. Eberhard have photographed with the three-prism spectro-scope (No. iv.) of the Potsdam Observatory. The remarkable feature in the spectrum of R Coronæ is the non-appearance of the hydrogen lines H $\beta$ , H $\gamma$ , and H $\delta$ ; as the H and K lines are broad, the absence of He cannot be affirmed, but on a smaller scale spectrogram the ultra-violet lines of hydrogen do not appear. From the measurement of about thirty or forty lines on each of five spectrograms, Dr. Ludendorff finds the radial velocity of this star to be about +24.6 km. as compared with Prof. Frost's value of +14 km. The present values were, however, obtained during a period when the star was at its normal brightness, whereas Prof. Frost's referred to a period when it was fainter. It thus appears that the radial velocity may vary during the epochs of magnitude changes.

In the spectrum of 12 Canum Venaticorum, Dr. Ludendorff suspects changes in various chromium and iron lines. The magnesium line  $\lambda$  4481 also appears to vary, and, whilst he can find no reason for the variation, Dr. Ludendorff suggests that this may be analogous to a similar phenomenon which Sir Norman Lockyer has pointed out in the spectrum of  $\alpha$  Andromedæ, both stars being of the Markabian type.

**AN INTERESTING VARIABLE STAR.**—In No. 4126 of the *Astronomische Nachrichten* Prof. Barnard publishes the results of his visual observation of a variable situated in the brightest part of the cluster M3 (N.G.C. 5272).

Observations were made on 112 nights since March, 1899, and from the results the period was found to be 15.77594 days. The maximum magnitude of this object is about 12.0, and it varies through about two magnitudes.

**CATALOGUE OF DOUBLE STARS.**—Prof. Doberck continues the results of his double-star observations at the Hong Kong Observatory in Nos. 4130-1 of the *Astronomische Nachrichten*. The present list is similar in form to those previously published, and contains the results for about 170 stars.

### THE TENTH INTERNATIONAL GEOLOGICAL CONGRESS.

THE tenth International Geological Congress met this year in Mexico, and the proceedings connected with it extended altogether over a period of nearly two months. Elaborate arrangements for the reception and entertainment of the members were made by the Mexican authorities; the President of the Republic, General Porfirio Diaz, himself manifested a lively interest in the work of the congress, and desired that everything possible should be done to make it successful. Over and above this, liberal financial assistance was rendered, the Mexican Government bearing half the cost of the steamer and railway fares of those attending the meeting.

In all, more than six hundred membership tickets were issued; members resident in Mexico of course predominated, and second place was taken by those from the remainder of the North American continent; of European countries, Germany was most strongly represented, which was perhaps natural in view of the large number of Germans who are engaged on the Mexican Geological Survey. It was surprising to find so few British representatives present, considering the great attractions which the country offers both to the geologist and to the mineralogist; all told, there were not more than five members who could reasonably be said to be representative of British science, and not one of these was officially delegated to the congress. This apparent indifference did not pass without comment on the part of the Mexican officials.

Several fairly long excursions, which will be referred to later, were arranged to take place before the meetings, but the formal proceedings of the congress began with the meeting of the council on the morning of Thursday, September 6, when the general arrangements were finally settled, and a programme of papers, &c., was drawn up for approval at the opening session; this took place the same forenoon in the hall of the old Minería (now part of the National School of Engineering). This meeting was presided over by President Diaz, who also, at the conclusion of the business, formally declared the congress open. In addition to the speeches of welcome, and addresses by the retiring president and the president-elect, the only business consisted in the approval of the proposed programme and of the proposed executive committee. The principal offices in the executive were filled by the election of the corresponding officers of the provisional committee in Mexico, as follows:—*president*, José G. Aguilera, director of the National Geological Institute (the Geological Survey); *general secretary*, Ezequiel Ordoñez; and *treasurer*, Juan D. Villarelo, both of whom are also on the Survey.

The first of the ordinary meetings (which were held in the newly-completed National Geological Institute) took place on the afternoon of Thursday, September 6, under the presidency of Prof. Credner (Leipzig). A letter was first read from Mr. Karpinski (St. Petersburg), accompanying a copy of his memoir on "Les Trochilidés"—doubtful fossils occurring only in the Devonian—after which Mr. G. H. Heilprin read a communication on "The Occurrence and Interrelation of Volcanic and Seismic Phenomena," in which he maintained the view that shocks of tectonic origin are scarcely to be dis-

tinguished from those of volcanic origin; seismic phenomena are often preceded and accompanied by magnetic disturbances. This view was combated, however, by Prof. Lawson and Dr. Becker, while Mr. H. F. Reid held that the available data are quite insufficient for deciding the point. Dr. K. Renz (Breslau) next read a paper, "Ueber das ältere Mesozoicum Griechenlands," adducing reasons why certain marbles hitherto referred to the Cretaceous might be transferred to the Trias.

Several papers the titles of which appeared on the programme were abandoned or postponed owing to the absence of their authors.

It had been arranged that the meetings of the congress should take place only on alternate days, the intervening days being devoted to sight-seeing and excursions, so the second meeting did not take place until the forenoon of Saturday, September 8, when Prof. Diener (Vienna) occupied the chair. The first business was a statement by Dr. Adams (Montreal) regarding the general geological map of North America, of which copies (each consisting of four large sheets, scale 1:5,000,000) had been previously distributed to the members. This map has been prepared in accordance with the instructions of the Geological Society of America, which at its last meeting, in Ottawa, appointed a committee (members:—J. C. Russell (president), J. G. Aguilera, Bailey Willis, F. Adams, C. W. Hayes) to carry the matter through. The expense was borne by the Geological Survey of the United States, the Mexican Government assisting by purchasing a large number of copies for presentation to the members of the present congress. Explanatory notices are provided by Messrs. Bailey Willis and Aguilera. The nomenclature adopted is that of the United States Survey, and at the meeting this called forth a certain amount of criticism from Prof. Lawson (California), especially with reference to the use of the term "Algonkian."

The remainder of the forenoon meeting, and the greater part of the afternoon meeting, were devoted to papers and discussion on "The Climatic Conditions during the Geological Epochs." The first contribution was made by Prof. J. W. E. David (Sydney), who discussed the glacial phenomena more especially of Australia, but also of India, South Africa, and South America. He was followed by Prof. Frech (Breslau), "Ueber die Klimaänderungen der geologischen Vergangenheit." From Palæozoic times up to the present there has always been a correlation between the climatic evolution of the earth and the proportion of carbonic anhydride and of water vapour present in the atmosphere. Increases are due to volcanic exhalations, and diminutions to the formation of organic and, more especially, of inorganic compounds.

At the afternoon meeting of September 8, presided over by Prof. Frech, the general discussion was opened by Dr. E. Philippi (Berlin), and was continued by Messrs. C. Burckhardt (Mexico), Frech, A. Rothpletz (Munich), C. Diener, F. v. Kerner (Vienna), Vorwerg (Herischdorf), A. P. Coleman (Toronto), and M. Allorge (Oxford); it is impossible, however, to give in the space now available even a short review of the discussion. The general results were summed up by the chairman, who considered that the following might apparently be accepted as well-ascertained facts:—the existence of a Permo-Carboniferous Glacial epoch; uniformity of climate during the Triassic and the Jurassic; the existence of zones of climate since the Middle Cretaceous, and a gradual diminution of temperature during the Tertiary and the Quaternary.

This was followed by a paper by General L. de Lamoignon (Grenoble) on "Le Climat de l'Afrique du Nord pendant les Périodes Pleiocène et Pleistocène," after which Prof. Stefanescu (Bucharest) gave a description of the skeleton of *Dinotherium gigantissimum* (Stefanescu), a new species discovered by him in 1888, and, finally, a study by Mr. Hilgard on "The Causes of the Glacial Epoch" was contributed by Mr. M. Manson.

The discussion on climatic conditions was reopened at the next meeting on Monday, September 10, when Dr. Becker presided. The point chiefly dealt with was the question as to the causes which led to extensive glaciation in parts of the earth's surface where, under present conditions, an extensive snowfall is difficult to explain. The principal speakers were Messrs. W. M. Davis (Harvard),

H. L. Fairchild (Rochester), Heilprin (Washington), David, and Frech.

The remainder of the forenoon meeting on September 10, and part of the afternoon meeting (under the presidency of Prof. Tschernyschew, St. Petersburg), were devoted to the subject of the formation of ore deposits, but many of the papers announced in the programme were abandoned. The first paper was by Mr. H. F. Bain (Illinois), on "Some Relations of Palæogeography to Ore Deposition in the Mississippi Valley," and led to some discussion as to the possibility of soluble salts of the heavy metals reaching the sea, there to be deposited by secondary action. In his communication "Sur la Relation entre l'État pyrolytique (Grünstein) des Andésites et la Genèse des Filons liés à cette Roche," Mr. B. v. Inkey (Dömötör) showed that the formation of the Grünstein which is so characteristic for the metalliferous veins of Hungary (and also, as Prof. Kemp pointed out, for those of the Sierra Nevada) is due chiefly to the chloritisation of the black augite and hornblende of the original andesite, and results from an action quite different from the kaolinisation along the veins themselves. This paper also gave rise to considerable discussion. Prof. J. F. Kemp (New York) read a paper on "Ore Deposits at the Contacts of Intrusive Rocks and Limestones, and their Significance as regards the General Formation of Veins," holding that the evidence indicated that part of the material for the mineral formation must have been brought in by water, which probably came from the intrusive magma. Other papers, which, however, did not give rise to much discussion, were contributed by Mr. Villarello (Mexico), "Sur le Remplissage de quelques Gîtes métallifères"; Mr. W. H. Weed (Washington), "The Origin and Classification of Ore Deposits"; and Mr. Lindgren, "The Relation of Ore Deposits to Depth."

Three papers illustrated by lantern pictures followed; the first, by Mr. G. Andersen, dealing with the Swedish Antarctic Expedition, was contributed by Prof. Sjögren; the second, by Mr. Heilprin, dealt with the eruption at Martinique; whilst the third, by Dr. Tempest Anderson (York), dealt with that of St. Vincent.

At the Wednesday's meeting, September 12, presided over by Prof. Rothpletz, Prof. Königsberger (Freiburg i. B.) read a paper, "Ueber den Verlauf der Geoisothermen in Bergen, und seine Beeinflussung durch Schichtstellung, Wasserläufe und chemische Prozesse." In the course of this he showed how, by means of a special apparatus devised by him, variations of underground temperature might be measured accurately, and indications obtained by which volcanic eruptions might be foretold. This led to a discussion in which Messrs. Becker, Schmidt (Stuttgart), Günther (Munich), and von Kerner (Vienna) took part. Thereafter Prof. Keilhack (Berlin) discussed the mode of formation of the onyx bed at Etna, Oaxaca (Mexico), and Mr. Diaz (Colima) gave particulars regarding the volcano of Colima, pointing out that there was, apparently, a periodicity in its activity. It was announced that the discussions on "The Nomenclature and Classification of Rocks" and on "The Relations between 'Tectonique' and Eruptive Masses" would not be proceeded with.

Various resolutions of the council were approved, namely, that the new subject for the Spendiarioff prize be "The Description of a Fauna with Reference to its Geological Evolution and its Geographical Distribution"; re-approval of the proposal to create a model institute of geophysics; the institution of a special commission to study the variations of the geothermal degree.

The concluding items were a lecture by Mr. Sabatini (Rome) on "La dernière Éruption du Vésuve," and another by Dr. Tempest Anderson on the same subject; these were accompanied by lantern illustrations.

There was no afternoon session.

The last meetings took place on Friday, September 14. At the forenoon session, Mr. C. W. Hayes (Washington) presiding, the most important matter dealt with was "The Earthquake of San Francisco," introduced by Prof. Lawson, whose paper was followed by a discussion in which Messrs. Frech, T. L. Ransome (Washington), and H. F. Reid (Baltimore) took part. The other papers were on "Interglacial Periods in Canada," by Prof. Coleman; "Geologic Classification in the North-Central

Portion of the United States," by H. N. Darton (Washington)"; "A Meteorite Crater of Arizona," by Prof. Fairchild.

The afternoon meeting was presided over by the president, Mr. Aguilera. Only two papers were communicated, one at the beginning by Prof. David, on "The Occurrence of Diamond in Matrix at Oakey Creek, Inverel, New South Wales," and one at the end by Mr. E. O. Hovey (New York), on "La Sierra Madre Occidentale de l'État de Chihuahua," which was illustrated with lantern views. The intervening period was taken up with reports and general business. Prof. Reid gave a *résumé* of the report of the International Glacier Committee, of which he is president. No report having been received (though asked for) from the committee on the geological map of Europe, a motion was carried regretting the omission. The secretary read a report by Sir Archibald Geikie, president of the committee on cooperation in geological investigation, which was approved. It was announced that the committee of the Spendiarioff prize had awarded this to Prof. Tschernyschew for his work on "Die obercarbonischen Brachiopoden des Ural und des Timan." Prof. Frech presented the report of the committee on the "Palæontologica Universalis," and its proposal to extend the scope of its publications was unanimously approved; several new American and Mexican members were elected to the committee.

Prof. Sjögren then invited the congress to hold its eleventh session at Stockholm, and in 1910 instead of 1909. The invitation was accepted with acclamation, and it was agreed to leave the date to be fixed by the Swedish committee. (In view of the British Association meeting at Winnipeg in 1909, the later date would be preferable, so far as British geologists are concerned.)

Hearty votes of thanks to the Mexican Government and the organising committee were passed on the motion of Prof. Stefanescu and Mr. Sabatini. They were responded to by Mr. Aguilera, who thanked the foreign geologists for coming so far to make the congress a success, and invited them all to meet again at Stockholm. This closed the formal business of the congress.

A number of very interesting excursions had been arranged in connection with the congress. They were of two kinds—one-day excursions between the meetings, and long excursions of from three to twenty days' duration, which took place before and after the congress proper. The former were free of expense to the members, and for the others an inclusive charge which averaged about fifteen shillings *per diem* was made, the greater part of the expense being borne by the Mexican Government.

The first one-day excursion was devoted to the City of Mexico itself, the members being driven about the town and shown the museums and other public institutions. On the Sunday a long day was devoted to Cuernavaca, and this proved to be probably the most interesting of all. After journeying for some miles over the plain in which Mexico stands at an altitude of nearly 7500 feet, there is a stiff ascent of the range which bounds this plain, the railway reaching an altitude of almost 10,000 feet. Cuernavaca lies nearly 5000 feet down on the other side, and the steep, winding descent is very picturesque. From near the summit magnificent views are obtained over the lower plain, from which rise numerous volcanic cones and ranges apparently but little changed from the time of their formation; the whole stretches out before the observer just like an immense relief map. On the map, the distance from Mexico to Cuernavaca is barely forty miles; by rail it is seventy-five, and the double journey takes more than nine hours. The town itself has one of the finest situations in Mexico, and is a favourite resort. Cortes built his country palace there, and on its terrace the congress was entertained to a banquet by the Municipal Council.

Another day was spent in visiting the Toltec remains at San Juan Teotihuacán. Here there are two pyramids (of the sun and the moon), and the remains of many other interesting structures. After inspecting these, the members lunched in the "Grotto Porfirio Diaz," a large, natural cavity formed under an ancient lava flow in the neighbourhood.

The last of these excursions was to the celebrated silver

district of Pachuca, where visits were paid to various mines and works; in these the celebrated "patio process" was seen in operation on a large scale.

Four of the long excursions took place before the congress opened. One, of nine days' duration, was to the south, and visited, in addition to various districts of more purely geological interest, the famous Mitla ruins near Oaxaca. Another, of three days, went east to Vera Cruz, on the coast, returning by Orizaba over the celebrated picturesque route of the Mexican Railway (known as "The Queen's Own" from its British origin), with its difficult engineering and striking scenery. The remaining excursions had special attraction for vulcanologists. On the one, the principal points of interest were Jorulla and Toluca, though the whole excursion lasted for thirteen days; while the last, of twelve days' duration, had Colima as its principal attraction.

In connection with these excursions, the greatest pains had been taken to make the visits as enjoyable and profitable as possible. Special trains, conveyances, and riding horses were provided; detachments of the famous *Rurales* (a kind of military gendarmerie) attended to the safety and comfort of the travellers; where hotels were not available on the cross-country journeys, camp equipment was sent in advance, or the proprietors of *haciendas* were called upon for hospitality. The travellers, therefore, performed their journeyings under exceptionally favourable conditions. It was not possible to carry out the full programme in every case, however, as the excursions took place during the rainy season, which this year has been somewhat exceptional. At the same time, the difficulties or dangers were not nearly so great as, it appears, the sensational accounts in some European papers would lead one to believe was the case.

The principal excursion took place after the congress, from September 15 to October 4. The field covered extended from Mexico City right up to Arizona in the north and down to Tampico in the east, and the distance travelled amounted to three or four thousand miles. The members taking part were accommodated in two special Pullman trains, which served both as means of conveyance and as hotel. The route was arranged so as to include a very wide range of interesting ground, so that all tastes were catered for. Numerous mines were visited—sulphur, silver, copper, lead, and coal—also oil wells; various smelting and separation processes were seen in operation; extinct craters were inspected, and fossiliferous beds were searched for specimens; and, in addition, there was the general interest peculiar to the country itself, to say nothing of the splendid hospitality everywhere encountered. It is impossible to enter into details of the trip, but two striking features may be mentioned. The first is the great stretch of semi-arid region towards the north of the Republic, through which the railway passes for hundreds of miles. This is practically level, and consists of a series of "Bolsons," which at first sight look as if they must have been of lacustrine formation. The evidence is entirely against this, however, and the supposition is that, though the first depositions may have taken place in shallow lakes, these were soon obliterated, and the great bulk of the deposit was levelled out simply by the rush of surface water during the rainy seasons. From the plains thus formed the mountains rise with startling abruptness, as from a sea, sometimes with fantastic outlines, so that the traveller could almost imagine he was sailing some distance off a mountainous coast, like that of Norway. Even more interesting were the opportunities afforded for studying geological structure on a large scale. The mountain ranges are generally bare of vegetation and overlying material, so that the contortion, folding and faulting of strata, formation of anticlinal valleys, &c., can be observed with the greatest ease. This was particularly noticeable along the railways in the neighbourhood of Monterrey, and it was a matter for regret that arrangements had not been made for the train to stop at various points to enable the photographers of the party to make proper exposures; good photographs of many of the structures observed would have possessed all the lucidity of geological diagrams, with the additional advantages which pertain to truthful representations of actual structures.

A special side excursion had been arranged for those members of the party specially interested in mining and metallurgy. These, as the guests of the Copper Queen Co., left the main body at El Paso, on the frontier, and travelled west to Bisbee (Arizona), Cananea (Sonora, Mexico), Douglas (Arizona), and Nacoziari (Sonora), visiting the various copper mines and smelting works at these places, and then rejoining the main party.

Although by that time the rainy season was supposed to be nearly over, the members taking part in the northern excursion also had some experience of the difficulties caused by "wash-outs," &c., in a country like Mexico, and at several places the programme had to be curtailed owing to delays to the trains.

The last event of all was an excursion of a week's duration made by a party of sixty or seventy members, who left Mexico City on October 6 to visit the Isthmus of Tehuantepec as the guests of Sir Weetman Pearson, whose firm have constructed the railway and docks which now serve as a means of communication between the Atlantic and Pacific coasts of the Republic at its narrowest part.

As has been indicated, the members of the congress were everywhere received with the greatest hospitality, on the excursions as well as in the capital. One of the many social functions during the meeting may perhaps be allowed special mention; this was the reception of the members by President and Madame Diaz in the famous Palace of Chapultepec ("The Hill of the Grasshopper"). After having been welcomed by their hosts, they spent some time admiring the magnificent views from the upper terraces, including the city and the distant snow-capped peaks of Popocatepetl and Ixtaccihuatl. In the evening they were entertained to a banquet on the lower terrace; they had been invited "to tea," but tea appeared to be the one thing which was not provided.

The meeting of the congress was in all respects a very great success, and for this the Mexican officials, both of the Government and of the congress, deserve the highest praise. While all did well, it is no disparagement to the others to say that thanks are specially due to the general secretary, Mr. Ordoñez, for the admirable manner in which he filled that responsible and trying position.

#### METEOROLOGICAL NOTES.

THE frequency of thunderstorms in relation to the sun-spot period is discussed by Dr. Aksel S. Steen in a reprint from the "Hann-Band der meteorologischen Zeitschrift." The author has dealt with data from Norway, Sweden, and Denmark, using material from twenty, twenty-eight, and eight stations in each country respectively, extending from the years 1873 to 1903. The result of the inquiry is to show that the curves for the frequency at each of these regions have maxima at about the times of the sun-spot maxima, and minima at about sun-spot minima, but underlying this variation one of half the period is apparent. In combining the results of all the three stations, the curve still shows the eleven-year variation with the change of shorter duration.

Dr. Steen suggests that similar observations covering other regions should be discussed to see if they exhibit similar changes.

Another reprint from the same "Hann-Band" deals with the yearly air movement as determined by registering anemometers over some European stations, and is contributed by Dr. Felix M. Exner. The author discusses, in the first instance, wind observations made at Pola, Vienna, Potsdam, Zurich, Santis, Bremen, Obir, and Sonnblick.

His method of analysis is to calculate the resultant of the sixteen wind directions and to reduce them to north and west components. Thus winds from the west or east were considered as +W and -W, while those from the north or south were treated as +N and -N. The resulting west and north components were then determined for each year, and expressed in units of hundreds of kilometres.

It is shown that, according to the sign of the west component, with the exception of Pola, all the stations are under the influence of the general air circulation from the west. In the case of the north component, such a

general result is not obtained. It is positive in Vienna, Zurich, and on the Sonnblick, sometimes positive in Pola and on the Obir, but generally negative. Local causes are suggested as to the origin of some of these results. At Potsdam, Bremen, and Santis the north component is negative, and these are considered as good undisturbed stations.

The proportion of the north to the west component is generally less than 1 or -1, so that the resulting wind direction is from the S.S.W. The author next investigates the atmospheric pressure values in relation to these variations of wind direction and velocity, and concludes that the yearly northern pressure gradients vary considerably, and that these changes harmonise in a satisfactory manner with those of the air movements. The paper is accompanied by numerous sets of curves showing the similarity of the variations discussed.

Prof. H. Hildebrand Hildebrandsson contributes an important article in the same "Hann-Band" on the circulation of the upper layers of air above the maximum of the North Atlantic Ocean. Prof. Hildebrandsson refers to the recent important researches of Messrs. Rotch, Teisserenc de Bort, Hergesell, Clayton, and Maurice, and, finally, says that "our results concerning the general circulation of the atmosphere are verified by direct observations made by means of kite flying and free balloons."

The article is accompanied by two very instructive maps showing for summer and winter the mean direction of motion of the upper clouds in relation to the isobars. These charts bring out clearly the east-to-west motion throughout the year of the upper currents over the equator and the west-to-east motion in the higher latitudes, indicating an enormous whirl of air round the pole.

In another reprint from the same source we have a discussion of two long series of evaporation measures made at the Kremsmünster Observatory; this discussion was undertaken by Prof. P. Franz Schwab, director of the observatory. The observations divide themselves naturally into two groups, the first series being commenced in 1821 and ending in 1845, while the second began in 1885 and is being continued to-day.

Prof. Schwab in a series of tables brings together the monthly and yearly values, and treats the daily and annual variations at some length, comparing the latter with results obtained at numerous other stations.

Dietrich Reimer (Berlin, 1905) has published an excellent mean rainfall map of Germany, with explanatory notes, which have been prepared by Prof. G. Hellmann. This map which is on a scale of 1 : 1,800,000, shows the distribution of the mean yearly rainfall over the land from 3000 stations, the observations from which the values were derived extending from 1893 to 1902. To gain some idea of the distribution of these stations, it may be stated that Prussia and the other North German States are represented by 2341 stations, Bayern by 252, Saxony by 166, Württemberg by 90, Baden by 49, Hessen by 32, and Elsass-Lothringen by 70. Thus in North Germany there is one station for every 163 square kilometres, and one for every 25 square kilometres in South Germany. The map gives twelve different shades (ten in blue and two in yellow), and shows at a glance the geographical distribution over this part of Europe.

In the introduction to the meteorological report for the year 1903, published by the Survey Department, Finance Ministry, Cairo, we read that "The meteorology series for Abbassia closes with the end of 1903, and that for Helwan begins from January 1, 1904." In this volume we have in the appendices the first instalment of a few discussions relating to the data collected at Abbassia since it was started. These are quite brief, but the discussions will no doubt serve to indicate points for future study. Thus, for instance, the large differences in evaporation recorded at the observatory are well worth careful study, and they will no doubt be found to be closely associated with changes of other meteorological elements when a longer series of observations becomes available. The present report includes all the meteorological data collected at the observatory and various out-stations, together with daily readings of the various river-gauges situated at different parts of the Nile. The reader's attention should, however, be