

ordinates begin to change rather suddenly; but there is no sign of a change before B. Shortly after B, I still can conceive myself under the co-ordinates formed on A B, by a mental effort. After about a hundred yards the new co-ordinates have entirely displaced the old.

At the corner of 13th and Spring-Garden streets in Philadelphia I had an experience like that of Professor Newcomb. For a long time I could not approach the place, riding or walking, without my co-ordinates changing by 90°. I cannot account for it. Gradually it wore off, and now no change takes place.

JOSEPH JASTROW.

Johns Hopkins university, Nov. 6.

INTERNATIONAL GEODETIC ASSOCIATION OF EUROPE.

Verhandlungen der vom 11 bis zum 15 September 1882, im Haag vereinigten permanenten commission der europäischen gradmessung. Redigirt von A. HIRSCH und T. VON OPPOLZER zugleich mit dem general bericht für die jahre 1881 und 1882. Berlin, Reimer, 1883. 6+155 p., 2 maps. 4°.

THE proceedings of the annual meeting of the committee at The Hague, Sept. 11 to 15, 1882, have just been published. The permanent committee consists of the following members: Lieut.-Gen. Ibañez of Madrid, president; Dr. von Bauernfeind, vice-president; Dr. Hirsch of Neuchâtel, and Dr. von Oppolzer of Vienna, secretaries; Mr. Faye of Paris; and Major-Gen. Baulina of Florence. The delegates, eleven in number, represent most of the countries of Europe. Some invited guests also attended the meeting. The session was opened by the minister of state, Rochusson of Holland, who extended to the members a cordial welcome, which was responded to by President Ibañez.

The last meeting was held at Munich in 1880; but the commission resolved to omit the contemplated meeting for 1881, in order to give its members an opportunity to attend the Geographical congress at Venice: the reports therefore submitted by the several representatives cover the work done, or in active progress, during the two years 1881 and 1882. Secretary Hirsch alludes to the loss sustained by the association since its last conference, in the death of Dr. Carl Bruhns, a member of the commission since 1864; in the death of Gen. de Ricci, one of the veterans of Italian geodesy; of Col. Adan of Belgium, and Professor Stamkart of Holland. The latter had shown that the mean level of the North Sea had not changed during the past hundred and fifty years with respect to the zero of the tide-gauge at Amsterdam. And, last, the association had to mourn the loss of Professor Plantamour of Geneva, whose labors in as-

tronomy and physical geography are so well known, and to whose zeal the recent developments in levels of precision and the progress made in pendulum observations are so largely due.

The Italian commission was increased by Professor Fergola of Naples, by Professor Celoria of Milan, and by Lieut.-Col. de Stefanis of Florence. Austria nominated Capt. von Kalmar and Professor Herr as commissioners; Holland completed its representation by Professor Schols of Delft; and Roumania sent Major Capitancanu. The honorary president and founder of the association, Major-Gen. Dr. Baeyer, who, on account of ill health, was unable to attend, presented a report of the labors of the Geodetic institute of Prussia during 1881-82. He makes mention of the success of the experiments¹ to determine the difference of temperature between the bars of platinum and brass of the Brunner base-apparatus by means of thermo-electricity. The researches for local deflection of the vertical were extended from the Harz to the shores of the Baltic and the North Sea with the result of proving it a region of predominating negative (A.—G.) deflection, varying between 4" and 7". A list is presented of seventeen works published by the institute during the interval. Several of these relate to levels of precision; and the pamphlet by Dr. Sadebeck, entitled 'Literature of the practical and theoretical measurement of arcs,' deserves special mention. In a discussion closing the first session, relative to the probable error in the assigned length of the pendulum, it was stated, that, to judge from the accord of the several swings, it might be estimated at about one micron, but that the oscillations of the pendulum support introduced a constant error, seriously influencing the accuracy of the result; the *direct* measure of the motion of the support entering the result being only a fortieth of the correction to be applied. By this method the accuracy is estimated at .01 mm. The proposition by Cellier to swing successively on the same stand two pendulums of the same form and construction, but of very unequal weight, promises complete success towards correcting the defect in question; and the experiment is now being carried out. The second session was chiefly occupied with the reading of reports, and with a discussion respecting the value of the prismatic transit instrument. Six of these instruments employed in the Italian survey gave entire satisfaction, especially with regard to perfection of their images. The dis-

¹ Published in *Astronomische nachrichten*, no. 2451.

cussion was continued in the next session with remarks about the greater variability of the error of collimation in the prismatic transit; but its superiority in its low Y's over the common form of the instrument was recognized. In connection with the pendulum of reversion, Hirsch refers to the observations of Mr. C. S. Peirce of the U. S. coast and geodetic survey, at Geneva, Berlin, and Hoboken in America, which prove experimentally the theoretical conclusion of the complete elimination of the resistance of the air by the use of Bessel's pendulum of reversion,—a conclusion indorsed by Ferrero from experiments made in Italy. In the fourth session, Villarcieu explains the construction of his new apparatus for the relative measure of the intensity of gravity, and the commission recommends a direct comparison of the new apparatus and of the apparatus of Cellier at a number of stations. A discussion followed on self-registering tide-gauges and river-gauges; Mr. Diesen stating, that in Holland as many as sixty-four instruments were in operation, or being put to immediate use. Professor Nagel was elected a member of the permanent commission. In the following session the business programme for the seventh general conference of the European association for the measurement of arcs was formulated and adopted: viz.,—

1. Reading of the annual report of the permanent commission.

2. Reports of the progress of geodesy by the representatives of the several countries.

3. Reviews of the present state of geodetic operations, subdivided as follows:—

Astronomical longitudes, latitudes, and azimuths (reporter, Backhuyzen); Triangulations (reporter, Ferrero); Base-lines and base-apparatus (reporter, Perrier); Levels of precision (reporter, Hirsch); Tide-gauges (reporter, Ibañez); Gravity apparatus (reporter, von Oppolzer); Refraction (reporter, von Bauernfeind); Geodetic publications (reporter, Bae-
yer); Arc of the parallel in Europe (reporter, Faye).

The proposition to meet at Rome in October next is adopted, pending the favorable acceptance by the Italian government.

The remaining part of the pamphlet is occupied with reports in detail of the progress made during the years 1881–82 in the countries represented. Their contents may be briefly summarized as follows:—

Baden, Germany.—Levels of precision, and publication of the results of the Rhenish triangulation.

Bavaria, Germany.—Observations of terres-

trial refraction, lateral and vertical; spirit-levelling, total development to date 2,578 km.; oscillations of the ground, and pendulum observations at the Bogenhausen observatory.

Denmark.—The fourth volume of the geodetic survey is promised towards the close of 1883.

France.—Connection by new triangulation of the base-lines of Melun and of Perpignan; extension of the Algerian arc of the parallel into Tunis; measures of latitudes and of differences of longitude by telegraph. Volume xii. of the 'Mémorial du dépôt de la guerre' is in press, and a table of logarithms of eight places of decimals is in preparation.

Hesse, Germany.—Levels of precision, mean error per km. equals 2.27 mm., from 32 differences in levels, connected by 14 conditional equations.

Holland.—Connection of lines of spirit-levellings with lines of adjacent countries; total length levelled, 283 km.

Italy.—The reconnaissance for the primary and secondary triangulation completed; geodetic levelling and tidal observations; determination of a latitude, an azimuth, and of several differences of longitude, by telegraph; comparative pendulum observations at Rome.

Austria.—Measure of astronomical latitudes; telegraphic determinations of differences of longitude; pendulum experiments; triangulations and astronomical work in general; occupation of points, and attempts of measures of angles, in the high Alps (among these Ankogl at an elevation of 3,263 m.; station Grossvenediger, of 3,659 m.; and of Grossglockner, of 3,798 m.); extension of triangulations in Bosnia, Herzegovina, and Dalmatia; continuation of levelling operations in Austria proper, and in Hungary; observations of the intensity of gravity in the deep mine of Pribram. The work executed in this country is too extended and diversified to be given here in detail: it is graphically represented in a finely executed map in color-print.

Portugal.—Continuation of the triangulation and of tidal observations.

Prussia.—Revision and completion of principal lines of levels. The following important results are recapitulated: Atlantic higher than the Mediterranean from levels between Swinemunde on the Baltic, and Marseilles, *via* Switzerland, 0.664 m.; Swinemunde to the Mediterranean, *via* Amsterdam and Ostend, 0.658 m.; and Santander to Alicante, in Spain, 0.662 m. The discussion of the tidal observations at Swinemunde showed no

change in the relation of land and water during fifty-four years; and the mean level of the Baltic results with a probable error of ± 6.1 mm. The levellings to Constance and to Amsterdam are published, and the mean level of the North Sea is found 9.3 cm. above that of the Baltic. Computation of polar coordinates between geodetic and astronomical points. Determination of latitudes and azimuths. Maximum local deflection of the vertical reaches $6''.1$ in the meridian, and $12''.7$ in azimuth.

Roumania. — Astronomical determinations of positions.

Russia. — Connection of the triangulation of Bulgaria with that of Russia; astronomical determination of differences of longitude, connecting Bulgaria with Pulkowa, and Tifis with the triangulation of the Caucasus; pendulum observations continued in the Caucasus; extension of the levels of precision (double measures) up to date, 4,123 km., and of single lines 618 km.

Saxony, Germany. — Publication of part i. of the third section of the astronomical and geodetic observations, comprising ten stations; recomputation of the base at Grossenhain.

Switzerland. — Additions to the triangulations to connect astronomically determined positions, and two new base-lines at Weinfelden (length 2.5 km.) and at Bellinzona (length 3.2 km.), both measured with the Spanish apparatus of Ibañez; mean error of measure, $\frac{1}{3000000}$ for the Aarberg base of 1880, $\frac{1}{3000000}$ and $\frac{1}{5000000}$ for the other two bases respectively. The coefficient of expansion of the iron bar of this apparatus had increased during twenty years $\frac{1}{3}$ part. After sixteen years of labor, the operations of levels of precision have been brought to a close.

Spain. — Determination of the length of the triangle side, Mulhacen-Tetica (82827.546 m. ± 0.115 m.), of the great quadrilateral connecting Spain with Algeria; adjustment of the triangulation connected with the base of Olite; junction of the Balearic Islands with the mainland, and observation of one side, of 240 km. in length (Desierto to Torrellas), during the night, by means of electric light; tidal and levelling operations; determination of the longitude between Madrid and Badajos; gravity measures at Madrid.

Wurtemberg, Germany. — Connection of lines of spirit-levellings with levels of the Black Forest.

Belgium. — Comparison of results of the adjusted triangulation.

Norway. — Results of the difference of longitude of Christiania and Bergen, and of two base-lines with probable errors of $\frac{1}{1570000}$ and $\frac{1}{1500000}$ of their length; adjustment of a base-connection with a primary line involving fifty-three conditional equations.

In conclusion, Yvon Villarceau presents a paper on observations made at Paris with an isochronic regulator in connection with his new method for relative measures of gravity; the apparatus, however, had not yet been brought to the desired perfection. C. A. S.

TRYON'S CONCHOLOGY.

Structural and systematic conchology (etc.). By GEORGE W. TRYON, Jun. Vol. ii. Philadelphia, the author, 1883. 430 p., 69 pl. 8°.

THE second volume of Mr. Tryon's work has appeared with commendable promptness. It contains a discussion of the Cephalopoda, Pteropoda, and the Gastropoda, beginning with the pectinibranchs, as far as and including the nudibranchs. The classification is, of course, the same as that criticised by us in the first volume, and cannot be said to improve on closer acquaintance. Some of the allocations seem particularly inadvisable. For instance: Scissurella, usually regarded as of family rank, is combined without reserve with Pleurotomaria in one family. The Bellerophonitidae are retained in full family rank; and yet they are with great probability, as suggested by Meek, only large, symmetrically rolled Emarginulas, which latter are put in a different suborder, with the true Limpets, to which they have no close relation, and divorced from the Haliotidae, which they more nearly resemble.

The order Polyplacophora is defined (p. 103) as having the "shell multivalve, consisting of eight pieces inserted upon the back of the animal, and surrounded by a mantle border;" yet with the Chitonidae are placed, to form this order, a family Neomeniidae, which, to say nothing of other differences, have no shell at all.

The order Pectinibranchiata is defined as having pectiniform branchiae in a cavity above the neck, 'having an external opening upon the side of the neck,' dioecious, and with spiral shells.

The order Scutibranchiata is described as having pectiniform branchiae in a cavity above the neck, *or at the lower edge of the mantle around the foot*, dioecious; shell spiral *or conical*, holostomate.

The portions in italics are intended to cover the Docoglossa, which do not belong with the