gives the position for 1900 as R.A. 10h. 6'8m., Dec. +20° 16m., which is 9m. following, and 38' south of that given by Denning. Some peculiarities of the photographed trails were that they attained a maximum and then diminished as rapidly as they increased, sudden changes due to explosion were well shown, the trail was sometimes surrounded by a sheath of light, and lastly, in one case the trail remaining after the meteor had passed was recorded.

ASTRONOMICAL CONGRESS AT BUDAPEST

AS was announced in NATURE of August 25, the International Astronomical Association (*Astronomische Gesellschaft*) held its seventeenth Congress at Budapest at the end of September.

The meeting was an unusually large one, and the reception by the Hungarian colleagues and the scientific and political authorities was exceedingly cordial. There were present, amongst others, the directors of the Observatories of O'Gyalla (von Konkoly), Hérény (von Gothard), Kalocsa (Father Fenyi, S.J.), Vienna (Weiss), Munich (Seeliger), Karlsruhe (Valentiner), Heidelberg (Wolf), Göttingen (Schur), Jena (Knopf), Berlin (Foerster), Breslau (Franz), Bamberg (Hartwig), Turin (Porro), Upsala (Dunér). Besides these, many well-known astronomers attended, such as Müller, of Potsdam; Nyren, of Pulkova; Pechüle, of Copenhagen; Schröther, of Christiania; Kreutz, director of the International Bureau at Kiel, and of the *Astronomische Nachrichten*; Bauschinger, director of the Institute of astronomical calculations of Berlin, and many others. The absence of English and French astronomers, many of whom form part of the Society, was much regretted, and perhaps it is due to this fact that the Congress, out of natural reserve, abstained from raising the question of the fundamental stars and constants, resolved, perhaps too hastily, by the Conference at Paris in 1896.

The first meeting was opened by President Seeliger on September 23, in the large hall of the Academy of Science, where all the subsequent meetings were also held. Von Wlassics, the Minister of Education, who afterwards offered lunch to the members of the Congress, the burgomasters of Budapest, and Baron Eötvös, President of the Academy, well known for his experiments on gravitation, attended.

In the meetings of September 25, 26 and 27, besides other affairs of the ordinary business of the Society and the confirmation of the members of the Presidency, retiring by seniority, many scientific subjects, briefly referred to here, were discussed. Prof. Schür described the new reductions of the observations of planets and comets, made at Bremen by Olbers. Such reductions are made after the original notes of Olbers, placed at the disposal of the Göttingen Observatory. Dr. A. Stichtenoth, together with Prof. Schür, takes part therein. In the first place are discussed the determinations of time made by Olbers through observations of the setting of the principal stars behind the vertical side of the tower of the observatory, then the measures of the radius of the circular micrometer adopted, by the medium of the observations of couples of stars applied to the comparison with one particular comet; and lastly, these same planetary and cometary observations. In the published papers the times of the observations and the distances along the circle of declination of the comet and the comparison stars from the centre of the ring will be given. It is hoped that it will be possible to place these important materials at the disposal of astronomers during next year.

Dr. Bidschof, of the Imperial Observatory of Vienna, gave an account of some catalogues completed by him. These contain a list of the nebulae that were determined micrometrically at the observatory of Vienna up to the end of 1897, besides a stellar catalogue, containing the results of the new observations of the southern stars of Santini, executed at the Viennese observatory.

Dr. Brendel, of Göttingen Observatory, referred to the publication of Gauss's works. Soon after the death of Gauss the editing of his works was confided to Prof. Schering, of the Royal Academy of Göttingen. Schering published six large volumes, but did not succeed in completing the publication, so that, besides the great part of astronomical subjects published in the sixth volume, and the "Theoria Motus," printed in the seventh, the numerical discussion of the perturbations of the motion of Pallas, which will occupy the remainder of the seventh volume, remained unedited. Concerning this, it is necessary to note that, Gauss having left an enormous quantity of material (above half

a million of figures) on this subject, without sufficient explanation, the reconstruction of the mode of these calculations becomes very difficult, though not impossible. The so-called libration, connected with the curious phenomenon, by which seven evolutions of Jupiter correspond exactly to eighteen of Pallas, presents special interest. The eighth volume will contain additions to all the materials of mathematics and physics dealt with in the fifth. Finally, the ninth volume will be concerned with biographical matters.

Prof. Franz demonstrated that the lunar globe previous to its solidification must have been elongated in the direction of the earth by the tides produced by our planet. Whilst the theory of tides and the physical libration assigns to such elongation the small amount of 0'0001 of the radius, Gussen, from the measure of two lunar photographs in different librations, obtained the considerable elongation of 0'0500. To eliminate such contradictions between the theory and the observation, Prof. Franz has measured five lunar photographs from the Lick Observatory in various combinations, and found an elongation of the lunar globe of 0'0027. Thus a nearer approach to the theory is reached, which, however, cannot result in complete accord, through the want of homogeneity in the lunar mass. Hansen put forward the hypothesis that the opposite part of the moon was deeper, so that it had gathered on itself water and air, thus rendering animal and vegetable life possible. On this hypothesis a lively and interesting discussion ensued between Profs. Foerster and Franz.

Dr. Witt, of the Urania Observatory of Berlin, observed that a simple glance at the stereoscopic views of the moon shows a considerable elongation.

Dr. Marcuse, formerly delegate of the Geodetic Office of Potsdam, in the Sandwich Islands, for the study of the variation of latitudes, called attention to the necessity of generally extending the methods of photographic registration of the observations of latitudes, applying them in quite a general manner to the geographical determinations obtained in travelling. He considers, having had occasion from 1893 to superintend the construction of a photographic zenithal telescope, and afterwards to use it, that the photographic registration of the measures of altitudes and transits can be easily obtained by means of a convenient universal instrument, adapted to visual as well as photographic measuring; and that with it, surety and precision are gained. An instrument for that purpose is being constructed.

Dr. Max Wolf, of Heidelberg, so well known for his photographic discoveries of small planets, spoke on the researches made by him on an objective worked by Dr. Pauly in Jena, with the aperture of 21'2 cm., and the focal distance of 445 cm. It is formed of the new glass of Jena, and must possess better chromatic corrections than the old systems. In fact, the investigation with the spectroscope has shown that the colours are exactly comprised from the extreme red to the blue; only towards the G line the colours begin to deviate. A comparison of the curve that represents the position of the focal points corresponding to the various colours, with analogous curves given by objectives of Fraunhofer, Grubb and Clark, shows the superiority of the objective of Pauly to the best anterior ones. While the deviation of the focus in the middle of the blue scarcely reaches to 0'00003 of the focal distance, that of 0'00065, determined by Clark, is far the least considerable of those remaining. The correction of sphericity is also small. Many delicate couples of stars are separated; e.g. η Coronae (distance 0'4), μ_2 Bootis (0'9), 1 Coronae (0'4), λ Cassiopeiae (0'6), μ Cygni (2'9), ξ Hercules (0'5), σ_2 338 (0'7), Σ 2695 (0'9), Arcturus in the angle of position 120° appears lengthened; ζ Bootis and 52 Arietis could not be resolved. The size of the stellar discs amounts to 0'24 for the sixth magnitude, to 0'15 for the eighth. Dr. Pauly added some explanations on the manufacture of the new objective. The first attempts to eliminate the secondary spectrum go back to the year 1886; but then the glass used was not suitable. Only for two years has it become possible to obtain a new glass perfectly well adapted, the dispersive properties of which insure absolute elimination of the secondary spectrum. The pictures of the sun and moon are surprising, especially of the moon.

Prof. Porro presented a paper by the new member of the Association, Prof. Vito Votterra, of the Turin University, on the mechanical theory of the motions of the terrestrial pole. In this paper are recapitulated the results of a more extended work, which will be published in *Acta Mathematica*.

Following upon this communication, Prof. Porro gave an account of the present state of the calculations being made at New York and Turin for a new reduction of the observations of Piazzi, and for the compilation of a stellar catalogue founded on the same. According to arrangements made between Dr. Auwers and Prof. Schiaparelli, the work is divided between Dr. Herman S. Davis, of the Columbia University Observatory, and Prof. Porro. Mrs. Coreita R. Davis shares in it at New York, Dr. Vittorio Balbi at Turin.

A third notice given by Prof. Porro concerns the eighteen tables, in which he has had reproduced in facsimile the original sketches of the constellations, drawn by Francesco Bianchini in the seventeenth century.

The sketches contain the first essays on exact relative ocular determinations of the stellar magnitudes, executed by a method not differing essentially from that suggested and applied a century and a half later by Herschel. Argelander and Schiaparelli had deplored the loss of these papers, which ought to be of service for the historical study of the variable stars. The speaker had been able to find the manuscripts in a code of the Capitular Library of Verona, to which Bianchini, when dying, had bequeathed all his books; and had found that, without giving to the afore-named study the contribution expected by Bianchini and Montanari (of which also observations are reported), the papers themselves furnish the first document of exact determination of the relative magnitudes of the stars, which is recorded in the history of astronomy, resolving the query propounded by Argelander in his paper, "*De Fide Uranometriæ Bayeri*."

Dr. Fritz Cohn, of Königsberg, described some general results of a new reduction of the most ancient meridian observations of Bessel. Of the observations made by Bessel in the years 1814-19, none had been published till now, save the known Fundamental Regiomontan Catalogue of Maskelyne's thirty-six stars for the epoch 1815. Bearing in mind the date of the observations and the name of the observer, it had been thought desirable to undertake a reduction of the materials gathered together. As the fundamental problem it seemed necessary to show the systematic errors of the Besselian method, and eliminate the damaging effect. Inasmuch as the presentation of the systematic errors in Bessel's catalogue depends considerably on the method of reduction adopted, it was needful to seek for a method that should limit as much as possible the influence of the systematic errors on the results. Applying a method studied purposely to such an end, a considerable improvement of Bessel's catalogue was obtained. But a perfectly satisfactory result could not be obtained till the cause of the error was discovered in a different distribution of the passages of the stars between day and night, and until such cause could be exactly calculated. After such a result it would be desirable that also in other series of observations of fundamental stars, especially ancient ones, search should be made of eventual systematic errors, because it is to be expected that from the consideration of these the accuracy of the results would gain considerably.

Prof. Foerster read a brief notice on some questions connected with the length of the year and the calendar. The numerous numerical data on which his discourse was founded do not lend themselves to a recapitulation of the interesting matter treated with the usual ability by the illustrious director of the Berlin Observatory.

On the measurement of the brightness of the nebulae and the clusters of stars, spoke Dr. Holetschek, of Vienna. He has been occupied for several years in determining the luminous impression made by the light of a comet through the weakest telescope in which the comet itself is visible, and eventually by the naked eye, noting the stars that are visible with equal facility or with equal difficulty in the same conditions. In this manner it has been possible for him to represent such luminosity with numbers, and now he has begun the application of the same system to nebulae and clusters of stars also. Manifestly, the method does not lend itself equally well to all classes of similar celestial objects: in particular it is not adapted for nebulae illuminated diffusely and uniformly, and for clusters of stars spreading over a wide space, as those in the Classes VII. and VIII. of Herschel.

Applying his method to objects of the first two classes of Herschel, Holetschek has found, for instance, that the brightness of the Pleiades corresponds to magnitude 1.5, that of the Presepe of Cancer to 4, of the nebulae of Andromeda to 5.3.

Messier having compared the brightness of the comet 1779 to that of four different nebulae, of brightness 6.5; 7; 8.7; and 9.6, the author has been able to extract good values for the brightness of the comet. In the determinations executed between 1886 and now, he did not succeed in recognising any variations in the brightness of the nebulae under observation.

Prof. R. von Kövesligethy, of Budapest University, referred under the title "*Ueber die Beiden Parametergleichungen der Spectral Analyse*," on the studies just finished by him in the field of spectral analysis, the scope of which is to found astrophysics on mathematical bases. He shows how the two fundamental equations of the theory of heat are destined to have the same importance in astrophysics as the principles of mechanics have in astronomy, and that it is only now necessary to determine by observation the quantities that figure in such equations. To such an end the equation of emission is formed very simply in function of the length of the wave, and of two parameters that depend on the nature of the bodies; and it is not difficult to prove that the proceeding is severe, recurring to the proposition of Clausius on the radiation and to the equations of dispersion. Besides, it represents perfectly a series of bolometrical measures of the spectrum. The author insisted on the application of his theory to very important questions, also of mathematical astronomy, as the determinations of the parallaxes, the volume and densities of the heavenly bodies.

Father Fenyi, S.J., spoke on the observations of solar protuberances at the Kalocsa Observatory from 1884. He noted, first of all, that the greatest heights of the protuberances observed evidently depended upon the greatest amount of solar activity. With regard to the nature of the protuberances, he observed that they appear in the absolute vacuum, according to the theory of Schmidt, by which the density of the critical stratum around the sun could be determined with accuracy; but hydrogen cannot have a greater density than that of the critical stratum, and hence the maximum of density possible to hydrogen at every height can be determined. If this density be determined only for a height of 25', it is seen directly that no trace of hydrogen can exist there; because on a volume equal to that of the sun a single molecule alone would fly from it. The theories that contradict this result are, therefore, to be rejected.

Prof. Hartwig, of Bamberg, called attention to the star SS Cygni, which, together with U Geminorum alone, forms a special class of variables, that offers special occasions, by its connection with new or temporary stars, to the study of these mysterious stellar bodies. The character of this class consists of an unexpected lighting up, followed by a rapid increase of magnitude, after which comes a slow return to the usual brightness. The spectrographic study of SS Cygni seems possible for the large instruments now in activity, and would certainly furnish useful information on the causes of similar mysterious phenomena.

Another communication was made to the Congress by Prof. Kreutz, who referred to the actual state of the calculations of cometary orbits.

Among the numerous visits made by the members of the Congress to noteworthy places in the city and in the kingdom of Hungary, special mention should be made of the O'Gyalla Observatory, where the splendid hospitality of Dr. von Konkoly was not less admired than his munificence in preparing and presenting to the State a magnificent collection of instruments, designed by him and constructed under his direction, and of the Institute of Physics of the Budapest University, where they attended the experiments on gravitation of Baron Eötvös. The general impression that remained was of sincere admiration for the very notable progress made in the field of science by the country of Hungary, whose name was given to a new planet discovered by Wolf.

FRANCESCO PORRO.

RECENT PROGRESS IN ORNITHOLOGY.¹

AS the editors of *The Ibis* have already remarked in their preface to the volume for the present year, one of the leading ornithological events of 1898 is the completion of the "*Catalogue of Birds*." The twenty-sixth volume of this work, prepared by Dr. Bowdler Sharpe and Mr. Ogilvie Grant, the only one required to finish the series, will, I am assured, be

¹ Address given by Mr. Slater at the opening meeting of the British Ornithologists Club, on October 19.