

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 spectographic 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. Sclater at the opening meeting of the British Ornithologists Club, on October 19.

laid before the Trustees at their next meeting, and be ready for issue very shortly afterwards. Thus, after a period of twenty-five years, this most important piece of ornithological work has been brought to a conclusion. No human product is perfect, and the Catalogue has been, and will be, the subject of many criticisms. One obvious defect in it is its want of uniformity, the various authors having been permitted, owing to the wise discretion of the authorities, very liberal opportunities for the expression of their own views in their respective portions, although a general adherence to one plan has been rightly insisted upon. But when the enormous amount of labour required for this work, and the absolute necessity of employing more than one author upon such a huge task are considered, it will be obvious that greater uniformity was practically unattainable. In the case of the "Catalogue of Reptiles and Batrachians," where the series of specimens and species was not so large, the herpetologists are fortunate in having had the whole of the work performed upon a uniform system by the indefatigable energy of a single naturalist.

The "Catalogue of Birds," as complete in twenty-seven volumes, gives us an account of 11,614 species of this class of Vertebrates, divided into 2255 genera and 124 families. It has been prepared by eleven authors, all members of the British Ornithologists' Union, and with one exception, I believe (who is not a resident in England), now or formerly members of this Club. I think it will be universally allowed that we have, in this case, a great and most useful undertaking brought to a successful conclusion.

Another good piece of ornithological work, likewise the product of a member of this Club, which has just made its appearance, is Mr. Beddard's volume on the "Structure and Classification of Birds." It seems to me to be a most useful manual on this subject, profusely illustrated, and full of convenient references to further information on various points which it would have been impossible to compress into a single volume. It will be found to be a mine of wealth to those who choose to dig in it, and contains a good summary, not only of the results arrived at by Mr. Beddard himself, but also by Garrod and Forbes, his illustrious predecessors in the office which he holds.

Mr. A. H. Evans, whose volume upon Birds for the "Cambridge Natural History" we have been long expecting, informs me that this work is finished, except the index, and will be shortly published. We shall all welcome its appearance with the greatest pleasure. A second work that Mr. Evans, together with Mr. Scott Wilson, is engaged upon is the "Aves Hawaiienses," of which we have long been waiting for the final part. This, I am assured, is now in a forward state, and is likely to be issued without further delay.

From information received from Mr. Rothschild, I am pleased to be able to say that his somewhat parallel illustrated work on the "Avifauna of Laysan," of which the last part was issued in 1893, will also be shortly brought to a conclusion, and that the third and final part will be issued in the course of next year. Taken together, these two works will form a most valuable contribution to our knowledge of the Avifauna of the Northern Pacific. I must also not forget to mention, amongst recent contributions to our science, the excellent work of Dr. Meyer and Mr. Wigglesworth on the birds of Celebes—one of the most elaborate and complete ornithological monographs on the birds of a special district ever prepared. Celebes, I may remark, as a debatable land between the Australian and Oriental regions, was in special need of the full treatment and discussion which it has here received from the authors of this work.

But the brethren of the B. O. C. and their friends, I think I may say, are at present not less active in the field than in the cabinet. We are fortunate in having with us to-night the two principal members of the new expedition to Socotra and Southern Arabia, which will leave England on the 28th inst. It will, of course, take up natural history in every branch, but with Dr. Forbes and Mr. Ogilvie Grant as its leaders, and a trained taxidermist in attendance, we need not fear that the interests of Ornithology will in any way be overlooked. In Socotra itself much has been already done, but little or nothing has been ascertained ornithologically of the southern coast of Arabia, and we know, from Bent's writings, that even in this commonly supposed barren district, bird-life is abundant in certain spots, which we trust may be within reach of the Expedition.

Besides the Socotran Expedition many other explorations by various members of the B. O. U. are in progress or in contemplation. Captain Boyd Alexander, who has worked so well in the Cape Verde Islands, is struggling through the middle of Africa from the Cape to Cairo. Under present circumstances he seems likely to come out successfully, and will, no doubt, bring information on birds, if not specimens, with him. Mr. Lort Phillips hopes to return to his favourite quarters in Somaliland during the course of the present winter, and expects to get together the supplementary materials still required for the preparation of his proposed work on the birds of that most interesting country. Mr. John Whitehead, who has added so much to our knowledge of the zoology of the Philippines, proposes to return to the same country very shortly, in order to continue his researches in a field which he knows so well and in which he takes such great interest. Before leaving, he has placed in the hands of the editors of *The Ibis* a series of valuable field-notes on the birds collected during his last journey. These will appear in the forthcoming volume of our journal. Mr. Alfred Sharpe, C.B., who is shortly returning to his post in Nyasaland, promises to continue the employment of collectors in different parts of that Protectorate, the zoology of which he, following in the footsteps of Sir Harry Johnston, has already done so much to investigate.

Finally, I may remark that, as will be seen on turning over the pages of contents in the last volume of *The Ibis*, we have correspondents interested in our favourite subject in nearly every part of the world, and that the great difficulty of the editors is to compress so many valuable contributions within the compass of an annual volume.

Before resuming my seat, I wish to say one more word. Our Government, in connection with that of Egypt, has just taken possession of an enormous district in Africa, probably nearly equal to half Europe in extent. It sternly warns all intruders off, even when they are alleged to be of "no political influence." When it comes to regulate the administration of these new territories, it is to be hoped that the interests of natural history will not be entirely overlooked. Although the Upper Nile districts have been traversed and investigated by many well-known naturalists, there is still very much to be done in these teeming regions of animal-life. We Englishmen are ready and willing to undertake, by individual efforts, much work that in other countries is provided for by State explorers; but it is not too much to expect that our Government should at least help us by providing adequate facilities and occasional assistance, and even, perhaps, by contributions to the expensive process of bringing the results thus acquired completely before the world.

THE ECONOMIC EFFECTS OF SHIP CANALS.

IN a paper submitted to the American Academy of Political and Social Science by Mr. J. A. Fairlie, on "The Economic Effects of Ship Canals," it is pointed out that while the construction of the North Sea Canal doubled the tonnage of the shipping of Amsterdam in the first six years after it was opened, the effect was purely local, as will be that also of the Manchester Ship Canal; and that although the Welland, Corinth and Kiel Canals have larger possibilities, their actual consequences have as yet been small. With the Suez and Sault Saint Marie Canals the results have been both important and far-reaching, and have affected the trade of the world. Both these canals have led to a rapid change in the material and character of the vessels used; to important changes in the sources of production; to the development of the growth of wheat in the countries which they serve; and to a large reduction in the cost of bread and other food in this country.

The Suez Canal opened in 1870 with a traffic of 486 vessels having a tonnage of 436,000 tons; in 1891, the record year, the traffic had increased to 8,700,000 tons. The new route by effecting a saving of 3000 miles on the voyage from the ports of Western Europe to the East, or almost half the distance to Bombay, brought about a complete revolution in the character of the shipping business to the East. By the Cape route coaling places were few, and the facilities for coaling expensive; the consequence was that owing to this, and the large space occupied by coal, to the exclusion of paying cargo, sailing vessels were more profitable than steamers. By the canal, steamers can coal at Gibraltar, Malta, Port Said and Aden; consequently,