and personally, along with Mr. R. Buist, aided its establishment under the Committee of Proprietors.

Much that is useful for the purposes of administration may be learned from Norway, especially in connection with the Society for the Advancement of Norwegian Fisheries in Bergen, a place so classic to marine zoologists, from the days of Michael Sars to those of Fridtjof Nansen. Nowhere in Scotland can we point to a series of open-air reservoirs of pure sea-water, such as at Arendal, in which larval fishes can be raised to post-larval and subsequent stages; though at Stonehaven an enclosure of this kind formerly existed, and was used about thirty years ago in experimenting with young salmon (smolts). Yet no place is better fitted—both scientifically and economically—for such an arrangement than St. Andrews, as has indeed been often pointed out. The Norwegians are also fortunate in having the services of an able and original naturalist—trained from boyhood in marine zoology, besides others of European reputation. Sweden, though rich in names well known wherever zoology is studied, *e.g.* Lovén, places the direction of the fisheries under the Academy of Agriculture, the Governors of the provinces, and the Intendant; while the Inspector of the Sea-fisheries of Gothenburg and Bohus submits a special report to the Academy. The arrangements seem to work fairly, but it is doubtful if any feature of the system would be of advantage to this country.

No central authority for the whole of Germany yet exists, each of the States having Inspectors of Fisheries. Prussia, however, has the Special Commission at Kiel, the scientific work of this body being very much in its own hands. It has done good service in regard to the scientific aspects of the marine fisheries. The encouragement held out by the Deutsche Fisherei Verein to fresh-water fisheries is noteworthy and commendable.

One of the most satisfactory arrangements is seen in the Fishery Board of the Netherlands, in the composition of which all interests have been consulted. Moreover, the recent appointment of a scientific Superintendent of the Fisheries (viz. Dr. P. Hoek, an able zoologist) is important. The names of Hubrecht and Hoffman, who represent scientific zoology on the Board, are a sufficient guarantee that both tact and talent are at the service of the State. The solid scientific work done in the department by Profs. Hubrecht and Hoffman would alone give the Dutch Board a reputation, and when we add the names of other workers who have aided it, the position is considerably enhanced. Further, the mode by which scientific questions are referred to special committees—say of zoologists or physicists—and their reports thereon dispassionately discussed at meetings of the whole Board, obviates the possibility of the mistakes caused by a committee having perhaps only a single head to direct it in a particular inquiry.

The Italian system is satisfactory so far as the composition of the Board goes, though it seems to be a large one for efficiency, and the somewhat irregular nature of the meetings would hardly suit the methodical system generally followed in this country. The short period of office (three years), is perhaps not of much moment if re-election of the right men takes place. The fine Zoological Station at Naples under Dr. Dohrn (who, however, is too closely occupied to serve on the Central Committee of the Fisheries), gives the Italian Government a source of independent and reliable information, and of a different kind from that derived from the servants of a Board. The establishment of hatching stations, and the series of local committees throughout the country are features worthy of note, especially if due care be taken in the composition of the latter, so as to avoid the entrance of those who trade, it may be, on the credulity or ignorance of the fishing population. W. C. McINTOSH.

SCIENTIFIC SERIALS.

L'Anthropologie, paraissant tous les deux mois, tome i. No. 1, 1890 (Paris).—The first number of the new French review of anthropology, formed by the amalgamation of the older *Revue d'Anthropologie* and the *Revue d'Ethnographie*, begins with an article by Dr. Topinard, one of its joint editors, on the skull of Charlotte Corday, which ranked among the most interesting of the curious contents of the anthropological section of the Paris Exhibition, to which it was presented by Prince Roland Bonaparte. The author explains that, in making choice of this special skull, his object is not to compare its craniological characteristics with the moral disposition historically attributed to the individual to whom it had belonged, but simply to make it the text for an exposition, which might serve our own and future students as a lesson for the examination and description of an isolated skull after the precise methods taught by Broca, and having regard to the present condition of our science. In accordance with this object, Dr. Topinard, confining himself almost entirely to craniometrical determinations, of which he gives a most comprehensive series, together with several well-drawn illustrations, only occasionally enters into the comparative relations presented by this cranium to other isolated crania. From this exhaustive lesson in craniometry it would appear that the skull of Charlotte Corday closely accords with the typical form of the female skull, established by Broca as characteristic of Parisian women, deviating only from the normally perfect feminine cranial type in presenting a certain flatness of the frontal region, and some traces of jugular apophysis.—The Bronze Age in Egypt, by M. Montélius. The author, in opposition to the opinions of Lepsius and Maspéro, believes that the use of iron was not known in the valley of the Nile as early as bronze which was probably fabricated 6000 B.C., and that the use of the former metal was not sufficiently common to justify us in speaking of an Iron Age in Egypt before 2000 B.C. He, moreover, believes that we must consider the era of Egyptian civilization as belonging mainly to the Bronze Age.—A short notice of the works of Alexander Brunias, by Dr. E. T. Hamy.—On the rock-sepulchre of Vaphio, in the Morea, by M. S. Reinach. The exploration of this tumulus was undertaken last year at the cost of the Archæological Society of Athens under the direction of M. Tsountas, and although the contents have not yet been fully examined, there can be no doubt of their extreme importance to archæology, as it has been proved beyond question that this rock-sepulchre had remained intact till the present time. It appears from the report of M. Tsountas that the poniards and other implements, together with many of the numerous funereal objects brought to light by the explorations at Vaphio, are similar to the remains obtained at Mycenæ. Among these finds special interest attaches to two golden goblets carved in strong relief, representing both clothed, and almost nude, figures, engaged in the hunting and taming of wild bulls. M. Reinach proposes in a future number of this journal to discuss the Vaphio tumulus more fully, but in the meanwhile he appeals to English archæologists to test the accuracy of a statement published in 1813 by the German traveller Baron von Stackelberg, that the so-called Treasury of Atreus at Mycenæ had a few years earlier been ransacked by Veli Pasha, who was said to have disposed of part of its treasures to Lord North. Dr. Schliemann questions the truth of this report, but M. Reinach is of opinion that it bears evidence of authenticity, deserving the notice of Englishmen, and he hopes, in the interests of archæological science, that some of these precious objects may yet be found in one or other of the great English collections.—We may remark, in conclusion, that the present review surpasses its predecessors in the excellence of its printing and its illustrations, while it has the great advantage of being edited by MM. Cartailhac, Hamy, and Topinard. In the space allotted to the consideration of the scientific literature of various countries, to which more than half the entire volume is devoted, there are various notices of Russian, Hungarian, and other works, not generally accessible to the ordinary reader; but we trust that in future numbers the reports of English works and memoirs will not, as in the present number, be drawn exclusively from the Quarterly Journal of the Royal Geographical Society of London.

American Journal of Science, March 1890.—Sedgwick and Murchison: Cambrian and Silurian, by Prof. James D. Dana. The relations of these two geologists to one another, and to Cambrian and Silurian geology is given. The full paper appeared in NATURE of March 6 (p. 421).—Notes on the Cretaceous of the British Columbian regions; the Nanaimo group, by George M. Dawson.—Celestite from Mineral County, West Virginia, by George H. Williams. A large number of celestite crystals, from an extensive railroad cutting into a bluff of lower Helderberg limestone, has been investigated.—A method for the determination of iodine in haloid salts, by F. A. Gooch and P. E. Browning.—On the mineral locality at Branchville, Connecticut, fifth paper, by George J. Brush and Edward S. Dana; with analyses of several manganesian phosphates, by Horace L. Wells. A new member of the triphylite group—a sodium-manganese phosphate, which has been called natrophilite—has been found, and the rare mineral hureaulite identified in the Branchville minerals.—A simple interference experiment, by Albert A. Michelson. Two pieces of plane glass, silvered on

the front surfaces, are fixed against a block of wood, so that the angle between the two surfaces is slightly less than 90°. This simple apparatus will give the interference phenomena produced by means of Fresnel's mirror or bi-prism.—An improved wave apparatus, by John T. Stoddard. This is a method of demonstrating to a class the formation of the compound curves representing the combination of two simple sound waves.—On a recent rock-flexure, by Frank Cramer.—On the origin of the rock-pressure of the natural gas of the Trenton limestone of Ohio and Indiana, by Edward Orton. By the rock-pressure of gas is meant the pressure in a well which is locked in so that no gas can escape; and the author concludes that the rock-pressure of the gas of the Trenton limestone is due to the pressure of a water column under which it is held in the arches of the rocks. This explanation seems applicable to all gas fields.

THE *American Meteorological Journal* for January contains a continuation of Faye's theory of storms, and of Ferrel's convectional theory of tornadoes, both of which have been already referred to; the latter paper is concluded in the number for February. Of the other articles in these two months the principal are:—The mathematical elements in the estimation of the Signal Service Reports, by W. S. Nichols. He points out that attempts to measure the accuracy of the daily weather forecasts are liable to give rise to a confusion of ideas, and, confining his attention to rainfall, he lays down certain rules for testing the value of the predictions to the community when judged from the stand-points of quantity and quality, as well as the accuracy of the information.—On the use of the "sling" thermometer in the prediction of frosts, by Prof. H. A. Hazen. With the view of protecting delicate plants from destruction by frost, the author advocates the determination of the dew-point in the evening, and if it is found to be as low as 25°, and the air-temperature at 45° or lower, with a clear sky, frost may be expected, and the plants should be protected by smoke from burning straw, before the early morning.—On globular lightning, by Dr. T. C. Mendenhall. The author quotes many interesting instances of this rare phenomenon, the earliest case recorded being at Stralsund in June 1670; and he describes several instances in which it has been observed at sea. Photographs of the phenomenon are much wanted.—Diminution of temperature with height, by Prof. H. A. Hazen. He has recently spent several weeks on the summit of Mount Washington (6300 feet above sea-level), and finds that the diurnal range of temperature, which is very small, is not due to the heating of the air by the sun, but only to the convection currents caused by the warm rocks. The object of the paper is to endeavour to throw light on the true explanation of storm phenomena.—An interesting summary, by A. L. Rotch, of the Meteorological Conference held at Paris in September last, in connection with the International Exhibition. This is the first general account which has appeared in English.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 6.—"On the Development of the Ciliary or Motor Oculi Ganglion." By J. C. Ewart, M.D. Communicated by Prof. M. Foster, Sec. R.S.

The most conflicting views have for some time been held as to the origin, relations, and homology of the ciliary (motor oculi, ophthalmic, or lenticular) ganglion. By Remak, Schwalbe, Marshall, and others, the ganglion of the ophthalmicus profundus has been described as the ciliary ganglion, and this ganglion has frequently been regarded as the ganglion of the motor oculi nerve, and hence as homologous with the Gasserian and other cranial ganglia. The ciliary ganglion having been shown by van Wijhe to be quite distinct from the ganglion of the ophthalmicus profundus, the old view of Arnold has been recently revived, and already van Wijhe, Hoffmann, Onodi, Dohrn, and Beard have indicated that they regard the ciliary as a sympathetic ganglion. Hoffmann bases his belief on certain observations on the development of the ciliary ganglion in reptiles, while Onodi has adopted this view chiefly because in the higher vertebrates the ciliary ganglion receives a communicating branch from the sympathetic. But Beard, while considering the ciliary a sympathetic ganglion, states that in sharks he has seen nothing in support of "the mode of origin for the ciliary ganglion described by Hoffmann," in reptiles.

In studying the ciliary ganglion in Elasmobranchs I have been specially struck with its tendency to vary not only in the same genus or species, but in the same individual. Of the numerous specimens examined, I have only once found the ganglion entirely absent (in an adult *Raia radiata*), while I have occasionally (in *Acanthias*) found two well-developed ganglia on each side. Usually in sharks I found the ganglion lying in connection with the inferior branch of the motor oculi, while in skates it was generally in contact with the ophthalmicus profundus, or lying midway between the motor oculi and the ganglion of the profundus. In form the ganglion varies extremely, rounded or conical in some cases, in others it was represented by two or three groups of cells lying parallel to or in contact with the motor oculi.

In some cases ganglionic cells had wandered from the ganglion a considerable distance along the ciliary nerves towards the eyeball.

Although in sharks the ciliary ganglion often lay in close contact with the motor oculi nerve, no ganglionic cells were ever found either in the trunk of that nerve or on any of its branches. In skates the ganglion was usually more intimately related with the ophthalmicus profundus than the oculo-motor. In all cases the ciliary ganglion had at least two roots, one from the motor oculi, and one or two from the ophthalmicus profundus. In skates the profundus root always proceeded directly from the profundus ganglion, and the profundus ganglion was frequently found to be connected by a communicating branch with the Gasserian ganglion.

Both in sharks and skates, in addition to the ciliary nerves from the ciliary ganglion there were ciliary nerves proceeding from the ganglion and from the trunk of the profundus, and in some cases large ganglionic cells had wandered from the profundus ganglion along the ciliary nerves; occasionally a few large cells had migrated some distance along the main trunk of the profundus. In all cases the majority of the cells of the ciliary ganglion were only about half the size of the cells of the profundus ganglion.

In skate embryos under two inches in length no indication of the ciliary ganglion was discovered, and in shark embryos about ten inches in length the ganglion was frequently represented by small groups of cells in the vicinity of the inferior branch of the oculo-motor nerve. In sharks the first steps in the development of the ganglion were not observed, but in skates it was possible to make out all the stages. The first indication of the ganglion was in the form of a slender outgrowth from the inferior border of the large ophthalmicus profundus ganglion, which met and blended with fibres from the descending branch of the motor oculi. The *outgrowth from the profundus ganglion* was crowded with cells; the *fibres from the motor oculi*, like its root and trunk, were absolutely destitute of cells. At a somewhat later stage the cells had accumulated at the junction of the outgrowth from the profundus ganglion with the fibres from the motor oculi. It looked as if the blending of the two sets of fibres had formed a network which resisted the further migration of the ganglionic cells. In typical cases, at a still later stage, all the ganglionic cells had left the outgrowth from the profundus ganglion to form a rounded mass from which the ciliary nerves took their origin. In some cases some of the fibres which connected the profundus ganglion with the Gasserian seemed to reach and end in the ciliary ganglion. It thus appears that the ciliary ganglion stands in the same relation to one of the cranial nerves (the ophthalmicus profundus) as the sympathetic ganglia of the trunk stand to the spinal nerves, and that the ciliary ganglion may henceforth be considered a sympathetic ganglion. Further investigations may show that the ganglia in connection with the branches of the trigeminus (fifth) nerve may also be considered as belonging to the sympathetic system. In conclusion, I may say that I have found the vestiges of the ophthalmicus profundus ganglion in a five-months human embryo lying under cover of the inner portion of the Gasserian ganglion, and satisfied myself that the ophthalmicus profundus of the Elasmobranch is represented in man, as suggested by several writers, by the so-called nasal branch of the ophthalmic division of the fifth. To as far as possible clear up the confusion that has arisen from mistaking the ophthalmicus profundus nerve for a branch of the oculo-motor or of the trigeminus nerve, and the ganglion of the ophthalmicus profundus for the ciliary ganglion, it might be well in future to speak of the profundus as the *oculo-nasal* nerve and its ganglion as the *oculo-nasal* ganglion.