SCIENTIFIC SERIALS

THE current number of the *Journal of Anatomy and Physiology*—the second under the new system—commences with a paper by Dr. G. Thier and Mr. J. C. Ewart, entitled "A Contribution to the Anatomy of the Lens." The fibres of that organ are stated to be composed of a number of flattened bands, termed primary fibres, and to be covered with elongated flat cells resting on a structureless membrane.—Dr. McIntosh describes the central nervous system, the cephalic sacs, and other points in the anatomy of the Lineidæ, demonstrating that in the Nemerteans the nervous system is highly developed, and that the cephalic sacs are special organs of sense, their internal surface being in direct communication with the surrounding water by the ciliated duct, whilst the fibrous peduncle places their cells in continuity with the central nervous system. The paper is profusely illustrated.—Prof. Rutherford, who has been assisted by M. Vignal, records his experiments on the biliary secretion of the dog. In almost every case the animal had fasted about eighteen hours. Under the influence of curare a tube was tied into the bile duct. The amount of bile which flowed in each quarter of an hour was measured. The cholagogue action of croton oil is shown to be *nil;* that of podophylline considerable; that of aloes powerful; that of rhubarb well marked; that of senna feeble; that of colchicum considerable, by making the bile watery; that of taraxacum very feeble; that of scammony feeble; that of calomel probably *nil;* that of gamboge *nil;* that of castor-oil *nil.* The memoir, with its valuable diagrams, deserves special attention.—Dr. Galabin contributes an article on the pulse-wave in the different arteries of the body. The author, we are glad to see, has modified his previous statement as to the modification of a double wave the result of a single impulse, in the explanation of the predicrotic undulation in the sphygmograph trace. He gives an explanation of this as well as of the predicrotic wave. Some of his arguments are, we think, based on too few facts, whilst others are complicated by their pathological nature.—Mr. D. J. Cunningham has some notes on the broncho-œsophageal and pleuro-œsophageal muscles of man, first described by Hyrtl.—Dr. Stirling contributes a memoir on the summation of electrical stimuli applied to the skin, in which, from an excellent series of experiments on the frog, he demonstrates, according to the view of W. Baxt, that *reflex movements can only be liberated by repeated impulses communicated to the nervous centres.*—Mr. F. M. Balfour commences a series of papers to ultimately constitute a monograph on the development of Elasmobranch Fishes. Commencing with the ripe ovarian ovum, its description is followed by that of the segmentation, in the volume before us. This monograph will be an invaluable adjunct to that on the hen's egg, by Dr. M. Foster and the same author, and is a most promising production of the Biological school of the University of Cambridge.—Prof. Huxley writes on the nature of the craniofacial apparatus of *Petromyzon*, a specially favoured region of that author. The plates are unfortunately delayed for three months.—Mr. S. M. Bradley has a note on the secondary arches of the foot.—Prof. Turner, lastly, gives a note on the placental area in the uterus of the cat after delivery, in which he shows that in delivery not all the mucosa of the placental area comes away, its deeper structures being partly left.—Prof. Turner and Mr. Cunningham's report on the progress of anatomy concludes the part.

Archives des Sciences Physiques et Naturelles, Oct. 15, 1875.—In this number is concluded an important paper by Prof. Lemström, of Helsingfors, on the theory of Aurora Borealis, *apropos* of some phenomena of Geissler tubes. The phenomenon from which he set out was that a Geissler tube is illuminated when near the pole of an electric machine, without the tube touching the poles. Air, at a pressure of 5 to 10 mm., acquires its maximum electric conductivity, and Prof. Lemström conceives the air in the upper regions of the atmosphere, rarefied to about 5 mm., as forming a great conductor concentric with the earth; its height some 3,000 kilometres less at the poles than at the equator, and the electric density (on both conductors) 9 per cent. greater, while the force with which the electricity of the atmospheric conductor is attracted to the earth is 42 per cent. greater (at poles than at equator). Thus there is accumulation of atmospheric electricity at the poles, and the auroras are produced on its combination with that of the earth. The theory regards aurora as a phenomenon entirely of our globe; but the possibility is not excluded of an action of the sun, causing a periodical variation of auroras, through meteorological phenomena, such as evaporation on the earth's surface.—Prof. Schnetzler contributes some observations on Bacteria.—M. Cellerier investigates mathematically the simultaneous movement of a pendulum and its supports; and a *résumé* is given of the proceedings at the extraordinary session of the Geological Society of France, held in the end of August at Geneva and Chamounix.—In the "Bulletin Scientifique" there is a description of a curious phenomenon observed by M. Gumœlius in Sweden, viz., intercrossing rainbows.

Journal de Physique, November, 1875.—This number contains the second part of M. de Romilly's paper on the conveyance of air by a jet of air or of vapour. He investigates the effects of the jet when driven against the lateral wall of the receiver, the orifices of the discharge-pipe and the receiver forming, if projected on a plane parallel to them, two circles exteriorly tangent. The form and separation of the two instruments are varied.—M. Angot, in another continued paper, gives a good account of Thomson's quadrant electrometer.—There are also short mathematical notes on the verification of the law of Huyghens, by M. Abrin; and elementary demonstration of the formula of La Place, by M. Lippmann, together with the usual amount of matter abstracted from other serials.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, Jan. 6.—On the Expansion of Sea-water by Heat. By T. E. Thorpe, Ph.D., and A. W. Rucker, M.A. (Fellow of Brasenose College, Oxford), Professors of Chemistry and Physics in the Yorkshire College of Science.

The extensive contributions which have recently been made to the physical history of the ocean have shown the desirability of exact knowledge of the relations of sea-water to heat. The authors have accordingly made observations in order to determine the law of the thermal expansion of sea-water.

The only attempt hitherto made to solve this problem which can lay any real claim to consideration is due to the late Prof. Hubbard, of the United States National Observatory. The results of his investigation are contained in Maury's "Sailing Directions," 1858, vol. i. p. 237.

Muncke, nearly fifty years ago, determined the expansion of an artificial sea-water at various temperatures between 0° and 100° C.; but our confidence in the results as applicable to natural sea-water is affected by the circumstance that the solution was prepared from data furnished by the imperfect analyses of Vogel and Bouillon La-Grange.

The observations of Despretz were confined to temperatures below 13°·27, as the main object of his inquiry was the determination of the point of maximum density of sea-water. The subsequent investigations of Neumann and Rossetti were equally limited, as they were undertaken with the same view.

The water used in the authors' observations was collected from the Atlantic, in lat. 50° 48′ N. and long. 31° 14′ W.; and its specific gravity at 0° C., compared with distilled water at the same temperature, was found by the bottle to be 1·02867.

The method of experiment was precisely the same as that already employed by one of the authors in determining the expansion of the liquid chlorides of phosphorus. It was essentially that already used by Kopp and Pierre; *i.e.* the expansion was observed in thermometer-shaped vessels (so-called dilatometers), graduated and accurately calibrated.

Three of these instruments and two sets of thermometers were employed. The latter were made by Casella; the length of a degree in different instruments varied between 9 and 13 millims.; they had been compared (the one set directly, the other indirectly) with Kew standards.

Three perfectly independent sets of observations were made with the water in the state in which it was collected; but as Mr. Buchanan, of H.M.S. *Challenger*, has found that the specific gravities of different sea-waters lie between the extreme values 1·0278 and 1·0240, and since, in order to be of value in the investigation of the physical condition of the ocean, the observations on their value and the formulæ of reduction ought to be correct to the fourth decimal place, quantities of the sea-water were diluted with distilled water, so as to have specimens of approximately the specific gravities of 1·020 and 1·025; and a third quantity was concentrated by evaporation until its specific gravity was increased to 1·033; two series of independent observations were made on the expansion of each solution.

Empirical formulæ were calculated to express the results of