As to the maximum depth at which they are found, Prof. Forel has taken them in Lake Leman as deep as 100 and even 150 metres; at the greatest depths only *Diaptomus*.

The optic nerve of those animals probably suffers from too bright light, and so they descend whenever the light of sun or moon becomes too strong; still, they require some light to seek their prey. In their migrations they traverse a considerable thickness of water. What is the limit of light in freshwater lakes? The author showed in 1877, that the transparence varied with the season; it is much greater in winter than in summer. Under the most favourable conditions, a bright object sinking in the water of Lake Leman disappears at about 16 or 17m. depth. Paper sensitised with chloride of silver gave as *light-limit* in Lake Leman 45 m. in summer, and 100 m. in winter. Asper, using more sensitive plates (prepared with bromide of silver emulsion), found the *actinic* rays still active in the Lake of Zurich at 90 m. and more. All this, however, does not determine the limit of absolute obscurity for the retina, and especially for the optic nerve of lower animals.

With regard to the origin of this pelagic fauna, Prof. Forel confidently rejects the idea of local differentiation of littoral species in each lake, producing the pelagic fauna of the lake. The very remarkable character of generality, the almost absolute identity of the pelagic entomostraca in all European lakes point to dissemination and mixture.

How has this dissemination occurred? Active migration from one lake to another is inadmissible, considering obstacles and power of locomotion. On the other hand, a passive migration in the state of winter eggs, attached to the feathers of birds of passage, ducks, grebes, gulls, &c., explains the transport sufficiently. Pavesi has argued against this common origin and mode of dissemination, on account of irregularity in the pelagic population of different Italian lakes, certain species being absent in certain lakes, while they are represented in neighbouring lakes. But this irregularity seems to the author to correspond perfectly with the accidental and fortuitous character of the mode of dissemination referred to. "If this mode of transport be admitted, the differentiation of pelagic species is no longer necessarily localised in the lake in which we find the animals, any more than in the present geological epoch. This fact is very important for explanation of the pelagic fauna of certain lakes the origin of which is comparatively modern; for our Swiss lakes, the glacial epoch forms an absolute limit which prevents our supposing a local differentiation of ancient tertiary species, and their transformation into our present species; the origin of the pelagic faunas of certain Italian lakes of volcanic nature, is still more modern. But since we are no longer limited to a local differentiation of autochthonous species, we find more time and more space for this process of differentiation."

Prof. Forel believes the cause of differentiation of pelagic fauna will be found in a combination of two facts, viz., the daily migrations of entomostraca, and the regular local breezes on large lakes. There are two such breezes in calm weather, one blowing from the land at night, the other from the water by day. Crepuscular animals of the shore region, which come to swim on the surface at night, are carried out into the lake by the surface-current of the land breeze. By day the light sends them down, and thus they escape the surface current of the breeze that would bring them back to the shore. Carried each night further out, they become finally relegated to the pelagic region. Differentiation by natural selection then operates, and after a few generations, there remain only the admirably transparent animals and excellent swimmers we know. This differentiation once effected, the pelagic species is transported by the migratory birds from one country to another, from one lake to another, where it is multiplied, if the conditions are favourable. Thus we may find, even in lakes too small to possess an alternation of breezes, true pelagic Entomostraca that have been differentiated in other larger lakes by the play of such breezes. The differentiation of most pelagic species may thus be easily accounted for.

There are two species, however, the author points out, whose origin is not so explained; these are the most beautiful and interesting of pelagic Entomostraca: *Leptodora hyalina* and *Bythotrephes longimanus*. These two Cladocera have no known parentage in the freshwater species forming either the shore fauna of lakes or the marsh or river fauna. We must, with Pavesi, seek a marine origin for them. *Bythotrephes* probably descended from a common ancestor with Podon, its nearest parent, and the *Leptodora* from a primitive Daphnis.

How did the passage from salt to fresh water take place? Pavesi supposes closure of a fjord and gradual transformation of the lake water in consequence. Prof. Forel further suggests as possible, passive migration and successive transport to lagoons less and less salt; and there may have been other ways. We have not the elements for settling the question. "But the adaptation to fresh water once accomplished, the dissemination of these forms of marine origin has certainly taken place like that of other pelagic fresh-water forms, and those two species have so been transported into lakes which have never had direct communication with the sea."

There are evident analogies, Prof. Forel remarks in closing, between the lacustrian and the marine pelagic fauna; the differences appear chiefly in relative size and proportions. In the sea all is on a large scale; in lakes, on a small; the number of species and of individuals, the size, the extent of the migrations, the area of extension. But, with this exception, the general laws are the same in the two analogous faunas.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

FOUR chairs in the University College, Dundee, have been filled up as follows:—Mr. Steggall, Fielden Lecturer in Mathematics, in Owens College, Manchester, was appointed Professor of Mathematics; Mr. Carnelly, Professor of Chemistry in Firth College, Sheffield, was appointed Professor of Chemistry; Mr. Ewing, Professor of Engineering in the University of Tokio, Japan, was appointed to the Chair of Engineering; and Mr. Thomas Gilray, M.A., Head Master in English at Glasgow Academy, to the Chair of English Literature and Modern History. The salary guaranteed to each professor is 500*l*.

THE University of Zürich will, at the end of the current winter term, celebrate the fiftieth anniversary of its foundation.

SCIENTIFIC SERIALS

The Journal of Anatomy and Physiology, vol. xvii. Part 1, October, 1882, contains:—On the lymphatics of the walls of the larger blood-vessels, and lymphatics, by Drs. George and Elizabeth Hoggan.—On micrococcus poisoning, by Dr. A. Ogston.—On omphalo-mesenteric remains in mammals, by Dr. W. Allen.—On the action of saline cathartics, by Dr. M. Hay.—On a hitherto undescribed fracture of the Astragalus, by Dr. F. J. Shepherd.—On a secondary astragalus in the human foot, by Prof. W. Turner.—Note on the rectus abdominalis et sternalis muscle, by Dr. G. E. Dobson.—On a case of ectopia vesicæ, &c., in a newly-born infant, by Dr. F. Ogston.—On nickel and cobalt; their physiological action on the animal organism. Part i., Toxicology, by Dr. T. P. A. Stuart.—A kerato-thyro-hyoid-muscle as a variation in human anatomy, by S. G. Shattock.—On Cesalpino and Harvey, by Prof. Humphry.

The Proceedings of the Linnean Society of New South Wales, vol. vii. part 1 (Sydney, 1882), contains: Wm. A. Haswell, on the structure of the paired fins of Ceratodus (plate 1).—Notes on the anatomy of *Ædirhinus insolitus* and *Turacæna crassirostris*.—Wm. Macleay, on Port Jackson Pleuronectidæ, with descriptions of new species; on the fishes of Palmer River; on an Alpine species of Galaxias.—E. P. Ramsay, the zoology of the Solomons, Part IV.; on a new species of Mus from Ugi Island; contributions to Australasian oology (plates 3-5); on the zoology of Lord Howes Island; on *Apogon guntheri* of Castelnau; on some Fijian bird's eggs.—Alex. Morton, notes of a cruise to the Solomons.—Prof. F. W. Hutton, note on *Fossarina petterdi*; list of New Zealand freshwater shells.—Rev. Dr. Wools, the plants of New South Wales, No. 8.—Rev. J. E. T. Woods, botanical notes on Queensland; on a new species of Stomopneustes, and a new variety of *Hipponoe variegata*; on fossil plants of Queensland.—J. Brazier, fluviatile shells of New South Wales; a list of Cypræidæ of the Victorian coast.—Wm. Mitten, on some Polynesian mosses.—Rev. C. Kalchbrenner, new Australian fungi.—Dr. J. C. Cox, on the edible oysters of Australia.

Journal and Proceedings of the Royal Society of New South Wales, vol. 15, 1882, contains: On the climate of Mackay, by H. L. Roth.—Notes of a journey on the Darling, by W. E. Abbott.—The astronomy of the Australian aborigines, by Rev. P. MacPherson.—On the spectrum of the recent comet; on

new double-stars; on the transit of Mercury, November 8, 1881, by H. C. Russell.—On the inorganic constituents from epiphytic ferns, by W. A. Dixon.—A census of the genera of plants native to Australia, by Baron Ferd. von Mueller.—On water storage and canalisation for the colony, by F. B. Gipps.

Rivista Scientifico-Industriale e Journale del Naturalista, September 15.—Luni-solar influence on earthquakes, by F. L. Bombicci.—On the transformation of electricity into voltaic currents, and the application of these currents, by G. Govö.—Doderlein's ichthyological manual of the Mediterranean, by E. Riggio.

Archives des Sciences Physiques et Naturelles, September 15.—On the rotatory polarisation of quartz (third part), by MM. Soret and Sarasin.—The pelagic fauna of freshwater lakes, by F. A. Forel.—Researches on the quantity of carbonic acid contained in the atmospheric air, by E. Risler.—The air thermometer arranged with a view to a determination of high tempera tures in practice, by H. Schneebeli.—Remarks on M. Louis Lossier's work, entitled "Electrolytic Calculations," by C. E. Guillaume.—Geometric proof of the theorem of Wheatstone's bridge. by the same.—Emile Plantamour.

Bulletin de l'Academie Imperiale des Sciences de St. Petersbourg, Part xxviii., No. 2.—New researches on artificial double stars, by O. Struve.—Topographical observations of Jupiter, by J. Kalazzi.—On the oxidation of isodibutylene by hypermanganate of potash, by A. Boutlerov.—Observations of the planets Jupiter, Saturn, and Neptune in their oppositions in 1881, by A. Sowitsch.—Determination of the mass of Jupiter by means of observations of the reciprocal distances and the directions of his satellites, by O. Backland.—Action of zinc-methyl on chloral, by B. Rizza.—De Marci Antonini Commentariis, by A. Nauck.—Hydrological researches (continued), by C. Schmidt.

Zeitschrift für wissenschaftliche Zoologie, Bd. 37, Heft. 2, September 27, 1882, contains: Contributions to the anatomy of *Ankylostoma duodenale* (Dubini) = *Dochmius duodenalis* (Leuckart), by Wm. Schulthess (plates 11 and 12).—On the ontogeny of *Reniera filigrana* (O. Schmidt), by Wm. Marshall (plates 13 and 14).—Contribution to a knowledge of the structure and functions of the heart in osseous fishes, by Kasem-Beck and J. Dogiel, of Kasan (plates 15 and 16).—Contribution to a knowledge of the cestoid worms, by Dr. Z. von Roboz (plates 17 and 18).—Comparative embryological studies of Elias Metschnikoff, No. 3, on the gastrula of some Metazoa (*Echinus miliotuberculatus*, *Lineus lacteus*, *Phoronis hippocrepina*, *Polygordius flavocapitatus*, *Ascidia mentula*, and *Discoporella radiata* (plates 19 and 20).

Morphologisches Jahrbuch eine Zeitschrift für Anatomie und Entwickelungsgeschichte, bd. viii. heft 2, 1882, contains:—Contribution to the Angiology of the Amphibia, by Dr. J. E. V. Boas (with plates 6 to 8).—On the nasal cavities and the lachrymo-nasal canals in the amniotic vertebrata, by Dr. G. Born (with plates 9 and 10).—New foundations for a knowledge of cells, by Dr. A. Rauber (with plates 11-14).—Observations on the development of the crown of tentacles in Hydra, by H. Jung.

SOCIETIES AND ACADEMIES

LONDON

Linnean Society, November 2.—Sir J. Lubbock, Bart., in the chair.—Prof. J. C. Ewart, G. Fry, and Lord Walsingham were elected Fellows of the Society.—Mr. A. P. W. Thomas drew attention to a series of specimens under the microscope, and diagrams illustrative of the life history of the Liver Fluke (*Fasciola hepatica*). His experiments show that the embryos of the Fluke, as free Cercariæ, burrow into and develop within the body of *Linnæus truncatulus*, and thereafter pass with the herbage into the stomach, and ultimately liver of the sheep. Salt added to the sheep's diet is found to act as a prophylactic.—Mr. W. T. Thiselton Dyer exhibited specimens and made remarks on the plant producing *Cassia lignea*, and on the native implements used in the collection and preparation of the Cassia bark in Southern China.—Mr. C. T. Druery showed two proliferous forms of *Athyrium filix fœmina*, a family hitherto remarkable for its unproliferous nature. Both examples appeared simultaneously; not the least significant feature being their extreme precocity, since bulbil-bearing ferns are proliferous-usually only on their mature fronds.—Mr. F. Crisp exhibited preparations in illustration of the views of Drs. Loew and Bokormy on the difference between dead and living protoplasm, viz. the power of the living organism to reduce silver salts in a very dilute alkaline solution.—Prof. E. Ray Lankester exhibited and made remarks on a series of marine organisms dredged by him, last summer, in the fjords of Norway. Of these may be mentioned a branch of *Paragorgia arborea*, three feet across, specimens of the same in spirit, as also of *Lophelia prolifera*, *Amphiheria ramea*, *Stylaster norvegicus*, *Primnoa lepadifera*, and *Paramuricia ramosa*, both dried, and also with the polyps preserved in spirit. The collection also included some very large new forms of Foraminifera specimens of *Rhizocrinus Lofotensis*, of the aberrant mollusca *Neomenia* and *Chætoderma*, and of *Rhabdopleura Normani*, besides a large series of sponges and Asteroidea.—Mr. T. Christy exhibited a living specimen of the Japanese peppermint plant, which yields the Menthol of commerce, this being the first plant grown in this country. Mr. Holmes mentioned that although this mint did not differ in botanical characters from *Mentha arvensis*, it had a strong peppermint odour and flavour, which were not found in the specimens growing either in Europe or India. He therefore proposed that the plant should be named *M. arvensis*, var. *piperaneus* by way of distinction.—Mr. J. G. Baker showed a specimen of *Lycopodium complanatum* collected in Skye by Prof. Lawson.—Sir J. Lubbock then read his tenth communication on the habits of ants, bees, and wasps, a notice of which appeared in our last issue, p. 46.—A paper was read on medicinal plants of North-West Queensland, by W. E. Armit. Among these is a species of *Aristolochia* and a Croton; also *Grewia polygama*, a specific for dysentery; *Careya arborescens*, used for poultices; *Erythreæ australis*, and *Andropogon citriodora*, tonics in febrile complaints; and *Euphorbia pilulifera* and *Datura australis*, valuable in cases of asthma.—A remarkable malformation of the leaves of *Beyeria opaca*, var. *linearis*, from Yorkes Peninsula, South Australia, was described by Mr. Otto Tepper.—Dr. F. Day exhibited specimens in illustration of a paper read by him, on variation in form and hybridism in *Salmo fontanalis*.—Mr. H. N. Ridley afterwards read some teratological notes on a Carex, a Grass, and an Equisetum

Zoological Society, November 14.—Prof. W. H. Flower, F.R.S., president, in the chair.—A letter was read from Mr. E. L. Layard respecting a specimen of *Schœnicola platyura* received by the British Museum from the late Mr. Cuming.—Prof. F. Jeffrey Bell exhibited some examples of *Lymnæus truncatulus*, lately discovered to be the chief host of the larvæ of the sheep-fluke.—Prof. Flower exhibited and made remarks upon the skull of a young chimpanzee from Lado, in the Soudan, sent to him by Dr. Emin Bey, which exhibited the deformity called "Acrocephaly," associated with the premature closure of the fronto-parietal suture.—Mr. H. E. Dresser exhibited and made remarks on specimens of *Melittophagus boehmi*, Reichenow, and *Merops dresseri*, Shelley, which he showed to be identical.—A communication was read from Mr. W. A. Forbes containing some supplementary notes on the anatomy of the Chinese Water Deer (*Hydropites inermis*).—A communication was read from the Rev. L. Baron, containing notes on the habits of the Aye-Aye of Madagascar in its native state.—Mr. G. E. Dobson read a paper on the natural position of the family Dipodidæ, which he maintained to be with Hystricine, and not, as generally supposed, with the Murine Rodents, and to be most nearly allied to the Chinchillidæ.—Prof. F. Jeffrey Bell read a paper on the genus *Psolus*, relating its literary history, and giving an enumeration of the described species. Attention was directed to the extensive distribution of *P. fabricii*, and to the variations during growth. After the description of other known forms, two new species (*P. peronii* and *P. ambulata*) were described; for the latter a new sub-genus was suggested, and the genus itself was divided into three sub-generic groups.—A second paper from Prof. Bell contained an account of a Crinoid from the Straits of Magellan, obtained by Dr. Coppinger during the voyage of H.M.S. *Alert*, which was referred to a new variety of *Antedon eschrichti* of the Arctic seas.—Mr. W. H. Neale read some notes on the natural history of Franz-Josef Land, as observed in 1881-82, during the stay of the *Eira* expedition in that land.—Dr. Gwyn Jeffreys read the fifth part of his list of the Mollusca procured during the expeditions of H.M.S. *Lightning* and