from the latter—and this is a new fact of great significance—no true efferent fibres arise. The efferent or motor mechanism of the cerebellum is contained in its nuclei, the system of roof nuclei being in connection with the cortex of the vermis, the nucleus dentatus with that of the lateral lobe. The cortex of the cerebellum is thus the special organ for the reception of sensory impressions, while its nuclear system may be regarded as its motor or efferent mechanism.

The functions of the cerebellum must be studied in relation to the sensory impressions it receives and to the activity of other centres. While it is the cortex of the forebrain which consciously appreciates and records our sensory impressions and initiates purposeful actions, it is the cerebellum which automatically preserves our equilibrium, guides our locomotion, and assists to regulate our finer movements. Thus its functions are in part reflex or involuntary, dependent on the sensory impulses which reach it directly or through the forebrain, and in part to coordinate and regulate the muscular contractions generated in the kinæsthetic cortex, especially those which result in movement in space and those on which the maintenance of equilibrium depends. The accuracy of equilibration is necessarily dependent on our knowledge of our position in space. This is obtained chiefly by vision, but as our visual fields are small in relation to the space in which we exist, sight must be supplemented by the power to turn the head and eyes in the three planes of space. There is conclusive clinical and experimental evidence that the coordinated execution of these movements is largely represented in the ponto-cerebellar centres. The sense of touch is also a valuable aid in spatial orientation, for though by touch the body can be aware only of the surface with which it is actually in contact, we can explore, as blind men do, our neighbourhood by the movements of our limbs. The memory of space so obtained is stored up in the kinæsthetic cortex, and disease of this region diminishes or destroys our knowledge of points on the surface of our body so far as their precise position in space is concerned, and consequently the effective movement of the limb. It has been long recognised that one of the most prominent signs of destructive lesions of the cerebellum is the inability to move a limb in a coordinate manner towards any point, but it appears probable from some not yet concluded observations of the lecturer that the faculty of localisation of points of the body in space is also defective with disease of the cerebellum. The touch sensations from the portions of our body resting on our base, the pressure sensations in our joints, and the sensations of tension in our muscles are also requisite for the automatic maintenance of equilibrium. These are some of the sense impressions which pass to the cortex of the vermis by the anatomical tracts referred to.

It would appear that the cortex of the vermis receives the sensory impressions necessary for movement in the anterolateral plane and for bending backwards and forwards; with lesions of this part there is a tendency to fall forwards or backwards. The lateral lobes, on the other hand, receive through the middle peduncles, as Majendie demonstrated, the stimuli necessary for rotation on the longitudinal axis.

From the cortex of the cerebellum, which is constantly receiving these waves of sensory impressions, the cerebellar nuclei collect the properly associated impulses which regulate and reinforce the purposeful movements and the automatic actions of the individual.

This latter position has been established by the researches of Dr. Clarke and the lecturer during the past three years.

Luciani's discovery that the cerebellum is also a source of energy to the muscles, which become asthenic and hypotonic on its destruction, is also fully confirmed by the lecturer's own work.

In conclusion, this sketch of the cooperation of the cerebellum and cerebrum was illustrated by a quotation from Boyle, who said:—"I consider the body of a living man not as a rude heap of limbs and liquors but as an engine consisting of several parts so set together that there is a strange and conspiring communication between them."

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE University of Melbourne has received a largely increased endowment from the Government of Victoria on condition of instituting a course for a degree in agriculture. The necessary arrangements for such a course have now been made, and the university is inviting applications in England and America for a professorship of botany and a lectureship in biochemistry in connection with the school of Agriculture. A new professor of anatomy is also to be appointed for the rapidly growing medical school.

THE Drapers' Company has made a further grant of 5000*l.* for an extension of the premises of the East London Technical College. In addition, the company has largely developed its scholarship scheme. Next year nineteen scholarships will be awarded of the value of 40*l.* per annum, tenable at the college for three years. Certain of these scholarships are reserved for women, while others will be awarded in the subjects of the London arts degree. The governors of the college have extended the work by introducing a course in languages and literary subjects. Students taking this course will study under recognised teachers, and be internal students of the University of London. As a consequence of this development, the governors have decided that the college shall, in future, be known as the East London College.

PROBATE has been granted of the will of Mr. John Innes, of Merton, Surrey, who died on August 8, 1904, leaving the sum of about 200,000*l.* for public and charitable purposes. Among other bequests he left his house, the Manor Farm, Merton, and two acres of ground, "to establish thereon a school of horticulture or such other technical or industrial institution as the law will allow, to give technical instruction in the principles of the science and art of horticulture and the necessary physical and mental training incidental thereto; to erect suitable buildings and furnish them, and to provide workshops, tools, plant, scientific apparatus, libraries, reading-rooms, lecture and drill halls, a swimming bath, and gymnasium. If this may not be legally carried out, then to establish in these buildings a public museum for the exhibition of collections of paintings and similar works of art, objects of natural history, or of mechanical or philosophic inventions, and to lay out land for a park."

MR. S. HERBERT COX has been appointed to the professorship of mining at the Royal School of Mines, South Kensington, vacant by the death of Sir Clement Le Neve Foster. In view of the changes in organisation that may be found desirable in the Royal College of Science and the Royal School of Mines after the completion of the investigations now in progress by the departmental committee, the appointment has been made a temporary one. Mr. Cox is an Associate of the Royal School of Mines. After experience as assistant geologist and inspector of mines in New Zealand, he was appointed instructor in geology, mineralogy, and mines in Sydney Technical College; concurrently with his tenure of this office he was employed to give technical lectures at various mining camps in New South Wales, and practised as a mining engineer. Since 1900 he has been entirely engaged in private practice, and has had experience of mining in England, France, Spain, Egypt, the United States, and Canada. Mr. Cox was president of the Institution of Mining and Metallurgy in 1899–1900.

THE *London University Gazette* (August 9) publishes the following announcement referring to the endowment of a chair of protozoology:—"The senate had before them a communication from the Secretary of State for the Colonies, offering the university the sum of 700*l.* a year for five years for the purpose of instituting a chair of protozoology. Of this sum, 200*l.* a year was stated to be a contribution from the Rhodes trustees, and 500*l.* a year to represent a moiety of a grant originally made from the tropical diseases research fund (established under the auspices of the Colonial Office) to the Royal Society for the promotion of research work, and by the Royal Society surrendered for the purpose of endowing the chair. Having considered reports upon this offer from the academic council, and from the board of advanced medical studies and the boards of studies in botany and zoology, the

senate decided to accept the offer, to devote the whole of the 700*l*. a year as salary to the professor, and to set aside a further sum of 200*l*. a year to defray the cost of assistants and laboratory expenses in connection with the chair."

A DAY higher commercial department is to be opened at the end of September next in connection with the City of London College. The object of this department is to provide a higher education for those who have already had an ordinary secondary education. Hitherto there has been some basis for the charge that higher education has not generally induced students to regard business sympathetically, nor has it exhibited a commercial career attractively. Those engaged in higher education have seldom attempted to show that the study of science, language, and of other subjects is, or can be, related to the conduct of commerce, and that a commercial man will understand his business better if he starts with a groundwork of knowledge which has been deliberately exhibited to him in its relation to the conduct of ordinary business. Those responsible for the new scheme at the City of London College believe that, other things being equal, a youth who has been trained to see the principles which lie behind the facts of commerce, to know how far nature has been controlled by commerce, and commerce by nature; to know the commercial methods of his own and other nations and the reasons for their existence, will make a better business man than one who has had no such training. They believe that there is a mass of experience a judicious selection from which, if assimilated, will save an English youth on his actual entry to commercial life from errors and waste of time. The experiment will be watched with great interest by all who are interested in the various sides of higher education.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 8.—"The Morphology of the Ungulate Placenta, particularly the Development of that Organ in the Sheep, and Notes upon the Placenta of the Elephant and Hyrax." By R. **Assheton.** Communicated by A. Sedgwick, F.R.S.

The formation of the placenta of the Ungulata vera is founded on a system of foldings of the subzonal membrane (or of the trophoblast only), which fit into corresponding grooves in the walls of the uterus, without thickening of the trophoblast layer of the blastocyst, and without destruction of maternal epithelium or other tissue (Sus). Certain parts of the crests of the ridges are produced by local amplification into true villi, into which the splanchnopleure of the allantois subsequently extends (Equus, Bos, &c.).

For this type of placentation, which is caused fundamentally by the folding of the trophoblast, the term plicate is used (placenta plicata), and to this type of placentation it is suggested that the Cetacea, Sirenia, and Proboscidea conform, as well as the Ungulata vera, and possibly the Edentata and Prosimia.

The term placenta cumulata is used for the type of placentation in which the placenta is formed by the heaping up or thickening of the trophoblast layer, among the cells of which accumulation extravasated maternal blood circulates. Destruction of the maternal epithelium probably always occurs. To this type belong the Rodentia, Insectivora, the Hyracoidea, Primates, and Chiroptera. The Carnivora are perhaps intermediate, but, according to Strahl's account, they would be distinctly plicate, while, according to the account of other authors, they are slightly cumulate.

The morphological position of the sheep's placenta, a full account of the development of which is given in the paper, is at that end of the series of plicate forms which closely approximates to the cumulate type.

The placentation of the Ungulata shows that that order is more closely connected with the Proboscidea, and the Sirenia and Carnivora, than with other groups of mammals, whilst the placentation of the Hyracoidea suggests no connection at all with those groups, but is of the cumulate type, and resembles more closely the form found in certain of the Insectivora.

EDINBURGH.

Royal Society, July 10.—Dr. R. H. Traquair in the chair.—On the bathymetry, deposits, and temperature of the south-western Pacific: Sir John **Murray**, K.C.B. The region discussed lay to the east and south-east of Australia. Seven of the soundings were in depths exceeding 4000 fathoms and three in depths exceeding 5000 fathoms. Interesting comparisons were made between the bathymetric charts and the temperature charts, and information was also derived from the study of more than 1000 samples of deposits. Globigerina ooze covered about 48 per cent., and red clay about 44 per cent. of the bottom, the remaining 8 per cent. being covered by other deposits. The percentage of carbonate of lime was low in very deep water and in shallow water near islands not bordered by coral reefs. In moderately deep water and in shallow water where the deposit was coral mud, the percentage of carbonate of lime was high. The evidence seemed to point to a continent in the making rather than to a sunken continent.—The varying form of the stomach in man and the anthropoid ape: Prof. D. J. **Cunningham.** The paper was a detailed discussion of the anatomy of the stomach, its changes of form and position at various stages of digestion, the functions of the different parts, and the movements by which digestion was carried out.—The evaporation of musk and other substances: John **Aitken.** The question was as to the nature of the exhalation or emanation which produced the characteristic odour; was it solid or vapour? The test applied was the cloud-producing power in a region saturated with water vapour and suddenly cooled. Experiment showed that when the air was purified of dust particles, but full of musk emanations and water vapour, a sudden cooling produced no cloud. Therefore the emanation must itself be vapour and not solid. The same result was obtained with many other substances, such as spices, chemicals, herbs, and flowers, not one of them giving off solid particles. Evidence was adduced that the dusts of these substances affected the branch of the fifth nerve which serves the nostrils, while the olfactory nerve was sensitive to matter in the gaseous form.

July 17.—Lord McLaren in the chair.—On some points in the geometry of reflecting telescopes with graphical solutions: Dr. James **Hunter.** The real problem in the construction of an efficient reflecting telescope is to find the best size of small mirror and the best position for it, so that the maximum of light and of definition is gained. This the paper discussed in detail, and gave a simple graphical construction by which the required data could be obtained to an approximation sufficient for practical purposes.—Some general principles of absorption spectrophotometry, and a new instrument: James R. **Milne.** The necessary conditions for the photometric comparison of two patches of light, of which one is produced by a ray passing through an absorbing medium, were fulfilled as follows:—(1) By use of a small hole instead of a slit in the collimator a strictly parallel beam of light was secured. (2) By use of a naked flat acetylene flame, the beam was obtained of equal intensity across a normal section, a condition unrealisable by electric arc or lime-light unless heavily screened. (3) By means of a double image prism replacing the ordinary eye-piece of the spectrophotometer telescope it was found possible (*a*) to bring the two patches of light presented to the eye accurately edge to edge, (*b*) to have these patches of some width, namely, that of the telescope objective, (*c*) to secure the coplanarity of the two "faces" of rays which proceed from each point of the edge common to the two patches. The instrument constructed on these lines could also be used as a spectrometer or as a spectropolarimeter for measuring optical rotations.—Note on some generally accepted views regarding vision: Dr. W. **Peddie.** The note referred to some observations on the effect of fatigue in the eye in relation to its power of judging of colour.—On the opacity of aluminium foil to the ions from a flame: George A. **Carse.** The experiments were made in the Cavendish Laboratory, and showed that the aluminium foil was quite opaque to the ions, a result not in agreement with results described by Lebon.—On deep sea-water waves: Lord **Kelvin.** This was a continuation of a paper read last January. By use of Lord Rayleigh's method of