are so abundant in this Suffolk deposit, and which are absent in Norfolk? The answer to this question is—they come from a great deposit of an earlier age, like that found in Belgium known as the Diestien or black crag; and in this we have evidence of a warmer sea, of a more Miocene-like Fauna than in any of our well-preserved East-Anglian crags—either coralline, red or Norwich. Most perfect remains of more than 20 long-snouted whales such as now live in tropical seas, of huge sharks 80 feet long, and of a great seal with huge tusks, are found in the Diestien beds freshly and sharply preserved. In our Suffolk bone-bed these same bones and remains occur much washed and water-worn. They have been washed out of Diestien beds, and are proofs to us of the former existence of Diestien strata in Suffolk. But besides these remains we find in the Suffolk bone-beds certain sandstone nodules which I have lately found strong reason to believe are bits of the old Diestien deposits indurated and water-worn. I have some here. This sandstone is even found adhering to the sharks' and whales' teeth and bones, but never to the mastodons'. But besides that, the specimens exhibited show a great number of shells perserved in that sandstone. These shells are not the shells of the red crag nor even of the coralline crag, for they occur among the water-worn nodules quite below either of these deposits. It is true all the constituents of the Suffolk bone-bed are sometimes dispersed in small numbers through the red crag, but this is what we must expect in the deposit of so destructive a sea. The most important fact about these nodules is the abundance of a black crag or Diestien shell, *Isocardia lunulata*. The shell does not occur in either red or coralline crag, but out of every forty nodules with fossils in them, you have seven specimens of Isocardia. Even *Isocardia cor* is most rare in our English crags. Only half-a-dozen specimens have been found altogether in the coralline and red crag. The presence of this shell in these nodules proves that the nodules are bits of a very different deposit, and probably of a Diestien age. When I say Diestien age, I do not mean necessarily of exact equivalence with the Belgian black crag. We know how much a few miles of distance may affect a marine Fauna, and it is most probable that the Suffolk deposits were always littoral or sub-littoral, while those of Belgium accumulated in deep water. These nodules, which I think are of great importance, are supposed by some to be of indurated coralline, or red crag—by Mr. Searles Wood, and I believe, by Sir C. Lyell; but I feel sure that a careful examination only is required to convince any one that such is not their mineral structure, and that the shells and bones they contain are those of Diestien age. The difference between the Diestien Fauna and the red and Norfolk Crag Fauna is very great. Great changes as to glaciation have gone on between the two. The coralline crag bridges over the break in part, as does the yellow Antwerp crag. The presence of derived mastodon remains in the red and Norfolk crag, and of Diestien cetacea in the red crag too, is always most deceptive, and tends to mislead the judgment as to the true character of those beds.

'On the Noted Slate Veins of Festiniog,' by Mr. S. Jenkins.

'On the Inapplicability of Fossil Plants to support the Theory of Gradual Transformation,' by Prof. Göppert.

'On the Fish-Beds of Kiltorcan, in the County of Kilkenny,' by Mr. W. H. Baily.

Section D.—BIOLOGY.

TUESDAY.

Department of Zoology and Botany.

'On the Occurrence of *Erysimum orientale* in Peculiar Circumstances at Edinburgh,' by Mr. Archer.

'On the Specific Identity of the Almond and the Peach,' by Prof. K. Koch.—The author stated that he had travelled over the mountains of the Caucasus, Armenia, some parts of Persia and Asia Minor, during four years, for the purpose of studying the origin of our fruit-trees. Although he could not assert that he had found them perfectly wild or run wild, he nevertheless had collected much interesting material. He believes that our pears and apples, cherries, most prunes, also peaches and apricots, are not natives of Europe. Only certain bad varieties of prunes have their origin from the *Prunus insititia*, the tree which grows in a wild condition in the woods of Europe. After discussing the wild stock of our cherries and pears, Dr. Koch stated that apricots do not grow wild in Oriental countries, but may, perhaps, come from China and Japan, as also the peaches. In the east of Persia, however, a peach-shrub grows, which is intermediate between the almond and the peach-trees. For some time naturalists and gardeners have asserted that there is no difference between almond and peach trees; that the latter is merely a variety in which the dry peel of the almond has become fleshy, and where at the same time the stone has acquired a rough surface. Botanists say also that the petioles of the almond-tree have at the superior end small glands, which are absent in the peach. But the nectarine, which is but a smoothed peach, exhibits these same glands. The flowers are not readily distinguishable of peach and almond. On the shores of the Rhine a double-flowered variety grows, as to which it is not certainly known whether it is peach or almond. In England and France, also, there is a plant which is well known as the peach-almond, and which is a constant variety. This plant occasionally produces a branch bearing good peaches, but, as a rule, its fruit is intermediate in character. The property of atavism seems to prove the derivation of the peach from the almond; for occasionally a sound peach-tree will produce a branch bearing almond-like fruit.

'On the Classification of the Species of Crocus,' by Prof. K. Koch.

'On the Necessity of Photographing Plants for a better Knowledge of them,' by Prof. K. Koch.

'On Sapindaceæ,' by Herr Radlkofer.

'On the Occurrence of *Lastrea rigida* in North Wales,' by Mr. G. Maw.

'On a New British Moss found last summer on Ben Lawers,' by Dr. Fraser.

'On the Possible Introduction of South European Plants in the West of Ireland,' by Prof. Hennessey.

'Notes on Two British Wasps and their Nests, illustrated by Photographs,' by Mr. John Hogg.—Mr. Hogg exhibited two admirably-photographed plates of two kinds of wasps' nests, which he had collected at Norton, in the south part of the county of Durham, from the years 1831 to 1856, both inclusive. Plate 1 represents the inner portion of the rather large nest of *Vespa arborea*, built on the under-side of a branch of the larch-tree, which he discovered in a neighbouring wood. A few years before, he captured, in the same vicinity, two neuters of a new wasp, which, being sent to Prof. Westwood and Mr. F. Smith, the latter entomologist gave the name of *arborea* to that new species, because of "its habit of constructing its nest in trees." (See *Zoologist*, p. 171, June, 1843.) The structure of the outside of that nest is strong, and rather coarse; the numerous cells were empty, owing to the lateness of the season (October) when discovered; but these are regularly distributed, and well formed. Other naturalists coincided in the great probability of that nest being the fabric of the tree-wasp, *V. arborea*. Plate 2 exhibits four very delicate and beautifully-built nests of the *V. Britannica* of Leach, or, according to other entomologists, *V. Norvegica*. They are of a grey colour, and composed of a fragile, paper-like substance, but varying in size. Affixed alongside the nests is a wasp taken out of each one respectively, and they are all of that identical species, which is small, of a dark colour, and rough with black hairs. The facial lines and marks are also the same, and quite distinct. Plate 3 shows another nest of the same social wasp, which, of a larger size, was taken this summer in a neighbouring garden. Mr. Hogg then observed upon the great use of photography in accurately illustrating natural objects, and so easily preserving the true representation of any rare plant or animal.

'Notice of Rare Fishes occurring in Norfolk and Lothingland,' by Mr. T. E. Gunn.

'Notice of a Male Octopodous Cuttle-fish,' by Mr. R. Garner.

'On the Tusks of the Walrus,' by Dr. Otto Torrell.

'On the Structure of *Coppinia arcta*,' by Prof. Allman.

'On the Study of Natural History in Schools,' by Dr. Grierson.

'On the Difficulties of Darwinism,' by the Rev. F. O. Morris.—This paper, which was one of considerable length, was read by one of the Secretaries, its author being absent. The difficulties stated by the author, and the way in which they are met by Darwinians, are fully seen in the subjoined discussion.

Mr. Wallace said that the points mentioned by the author really presented no difficulties whatever to the Darwinian theory. He asked, for instance, why female birds did not sing. Mr. Darwin had himself explained the reason; it was the same as that for which the plumage of the female bird was less beautiful than that of the male. In birds, as in all the lower animals, the female chooses the male; and it is the attractions of the latter that lead to the pairing. This applied both to the voice and the plumage. Another "difficulty" raised by the author had reference to the winged beetles of Madeira. Mr. Darwin's theory was that, as Madeira was a single island in the middle of the Atlantic, subject to violent storms of wind, insects from it once blown out to sea could not get back again. Flying insects would thus be at a disadvantage and might become extinct, while those without wings would survive. But there were some beetles in Madeira which could not get on without flying, as they would lose their means of subsistence. It was a remarkable fact, however, that such insects had longer wings than the corresponding animals in Europe, having gradually acquired increased power to enable them to battle against the wind. This Mr. Darwin illustrates by supposing the case of a ship striking against a rock near land. Persons who could swim well would get to the shore; those who could swim imperfectly would probably be drowned in the attempt, and those who could not swim at all would remain on the wreck, and have a good chance of getting ashore the next day by the boats. Thus the advantage would be to those who could swim well and those who could not swim at all, and, in like manner, to insects that could fly exceedingly well and those that could not fly at all. The author referred to the circumstance of apple-trees differing in different years in the quantity of fruit, and said that this did not depend upon the war of apple-trees with each other. Mr. Wallace said we must go back to the crab-apple for the true cause. There was a war in Nature, a struggle for existence, not only between one crab and another, but between crab-trees and every other kind of tree. All these trees produced millions of seeds every year, but not one seed in a thousand became a tree. Why did one become a tree rather than another? The slightest difference in circumstances connected with growth would affect the life or death of a particular seed. Again, the author maintained that cultivated plants and domesticated plants, when allowed to go wild, returned to the original form; and he cited as an illustration the case of the pansy. Mr. Darwin and other distinguished naturalists denied that assertion; and the author should have given proofs of it, if he desired it to be believed. With regard to the moral bearing of the question as to whether the moral and intellectual faculties could be developed by natural selection, that was a subject on which Mr. Darwin had not given an opinion. He (Mr. Wallace) did not believe that Mr. Darwin's theory would entirely explain those mental phenomena.—The Rev. H. B. Tristram said, he himself thought it best to make a compromise between the extremes of Darwinians and the religious party. He thought there was a number of shallow young men who used Darwin's name as a shibboleth, and did not really understand the matter. Mr. Darwin's theory had nothing to do with the soul, nor was there a question as to a Creator, but as to *how* the Creator had created. It was not right that the clergy should be mistrusted by men of science, and blamed by their own cloth too, when they attempted

to go into these questions.—Dr. GRIERSON complained that newspapers and other popular periodicals never presented a correct statement of the Darwinian theory, but invariably caricatured it.—Prof. ROLLESTON said he had thought this matter out for himself, and found he could still keep to the old belief in which he was brought up whilst accepting the philosophy of Darwin. He agreed with the principle laid down by Archbishop Whately, who said that, if he ever founded a sect, one of its rules should be that no man should ever attempt to prove any proposition in natural science by appealing to the Word of God. Natural science people should be left to work out their own conclusions. If they fell into errors, there were plenty of their own brethren ready enough to set them right. If a thing was true, it was true all round, and there was no truth to which it would be contradictory. No doubt, if any theory led logically to a conclusion known to be false, the premises must also be false; but it did not appear to him that Mr. Darwin's conclusions were false.

Department of Anatomy and Physiology.

'On the Seat of the Faculty of Articulate Language,' by Prof. P. BROCA.

A discussion followed, in which Dr. Jackson's paper of Monday was included. The weight of evidence adduced appeared decidedly adverse to the hypothesis of M. Broca, that the third frontal convolution of the left side is the special seat of the faculty of articulate language. That part of the brain is frequently diseased in cases of loss of speech due to cerebral causes, but it does not appear to be the only part diseased, nor is it invariably diseased in such cases.

'On the Power of Utterance in respect of its Cerebral Bearings and Causes,' by Mr. R. DUNN.

'On the Intestinal Canal and other Viscera of the Gorilla,' by Dr. CRISP.—The author came to the conclusion, after pointing out many features of a brutal character, that this ape, as regards its visceral anatomy, is far inferior to the chimpanzee and orang.

'On the Relative Weight and Form of the Eye and Colour of the Iris in Vertebrate Animals,' by Dr. CRISP.—The eyes of 600 different species of vertebrate animals filled with plaster-of-paris were exhibited for the purpose of illustration. Some of the conclusions of the author were as follows: that the giraffe, horse, eland, elk and bison had the largest eyes among terrestrial mammals, but that many smaller quadrupeds had relatively larger eyes; that brown in all vertebrates (excepting those of fishes) was the prevailing colour. A table containing the weight of the eye, the lens, humours and coats of 300 different species of animals, was appended to this paper.

'On some Points relating to the Visceral Anatomy of the Thylacinus,' by Dr. CRISP.—Dr. Crisp's object was to point out the extreme shortness of the alimentary canal (shorter relatively than that of any quadruped or bird) and the peculiar form and arrangement of the villi.

'Additional Researches on the Asymmetry of the Pleuronectidæ,' by Prof. TRAQUAIR.

WEDNESDAY.

Department of Zoology and Botany.

'On the Flora of the Isle of Skye,' by Prof. LAWSON.

'On the Geographical Distribution of *Buxbaumia Aphylla* in Great Britain,' by Prof. LAWSON.

'Notes on the Flora and Fauna of the Seychelle Group of Islands,' by Prof. E. P. WRIGHT.

'On the Geographical Distribution of the British Genera of the Sessile-Eyed Crustacea,' by Mr. C. S. BATE and Prof. WESTWOOD.

Department of Anatomy and Physiology.

'On Vitality as a Mode of Motion,' by Dr. T. DICKSON.

'On the Comparative Anatomy and Homologies of the Atlas and Axis,' by Dr. MACALISTER.

'Is the Eustachian Tube Opened or Shut in Swallowing,' by Prof. CLELAND.—Prof. Cleland pointed out that in ordinary circumstances the tube is really open, and not shut, as was taught by Mr. Toynbee. In support of this statement he mentioned that he had had the opportunity of seeing the orifice of this tube in a patient with a limited ulcer of the palate, and that he has made this patient swallow with his mouth open, and had the satisfaction of demonstrating to several pupils that the Eustachian orifice was then momentarily closed. He proceeded to take up the anatomical part of the subject, and showed that the disposition of the palatal muscles was in harmony with this observation, and such as to render Mr. Toynbee's theory untenable.

'On the Relation of the Limbs to the Segments of the Body,' by Prof. CLELAND.

'On the Anatomy of *Carinaria Mediterranea*,' by Mr. R. GARNER.

'On the Generation of White Blood Corpuscles,' by Dr. BEALE.

'On the Albuminoid Substances of the Blood Corpuscles,' by Prof. HEYNSIUS.

'On the Nomenclature of Mammalian Teeth and the Teeth of the Mole,' by Mr. E. R. LANKESTER and Mr. H. N. MOSELY.—The authors point out the arbitrary and misleading nature of the division of teeth into incisors, canines, premolars and molars, since to these terms might fairly be added sectorial, bicuspid, tricuspid, laniary; secondly, they show that maxillary and premaxillary are the only divisions admitting of homological identification, the maxillary teeth being further divided into an anterior and posterior series in most diphyodonts, by means of the fourth so-called premolar. They point out that there is no homology of upper with lower jaw teeth, and that the present rule for their identification is most arbitrary and unscientific. They show that the so-called canine of the mole is a premaxillary tooth, that animal being thus the only placental mammal with eight premaxillary or incisor teeth. They further describe a new tooth in the badger, making its dentition identical with that of the glutton; this tooth belongs to that series of "premolars" which have no milk-predecessors as described by Mr. Flower recently in the dog and pig, and very rapidly drops out of the jaw.

SECTION E.—GEOGRAPHY AND ETHNOLOGY.

TUESDAY.

'On the North-East Turkish Frontier and its Tribes,' by Mr. W. G. PALGRAVE.—The region treated of by the author was the mountainous district bordering Russian Georgia, and lying parallel to the range of the Caucasus—a journey through which he performed in the summer of 1867. The country is diversified by fertile valleys, admirably adapted for human habitation and increase. An unexpected sight met his view in these remote places—a teeming population, which had been gathered together during the last few years, and which presented signs of the formation of a new nationality. The difficulty of access to the valleys, owing to the nature of the mountain passes by which they are reached, gives them the advantages of natural fortifications, and they are well provided with all the inhabitants could require, either for successful defence or to gather forces and issue forth against an enemy. Fifty years ago this part of the world was thinly peopled, hardly exceeding the proportion of ten or fifteen inhabitants to the square mile; at the present moment it is teeming with life, consisting of immigrant Turcoman tribes, Kurds, Georgians and Circassians; some having crossed the frontier to escape from the overwhelming tyranny of Russia, and others were driven from their homes by the results of Persian anarchy. His journey commenced at Kars, accompanied by the Pasha and a numerous cavalcade of chieftains and their followers, who wished to manifest by this display their respect for a British official; his course, in a straight line, was about 140 miles, but the ground travelled over was nearly double that distance, as he diverged to the right and the left to visit the various places. The scenery throughout was most magnificent and beautiful, far surpassing anything seen in Switzerland. All the chieftains and governors in the region belong to one ruling family, which, by intermarriage with fresh arrivals, and forming an advantageous admixture of races, has continually produced men of good sense and great power in action. The intellectual and physical superiority which the men of the family display was, doubtless, due to their Georgian mothers; the chiefs having mostly married women of this race, who are still distinguished for their beauty. From every height he crossed new vistas were opened out of valleys dotted with flourishing villages full of new white houses, surrounded generally with a ring of gardens and a much wider circle of outer cultivation. One Pasha told him that in his father's time there were 15 villages; they now numbered 83—some with 20, some with 60, and some with 200 houses. He also explained whence the population came. The Turcomans, whose country has been conquered by the Russians, are discontented with the Russian Government, and are continually on the look-out for opportunities to settle elsewhere. Agents were employed to let these people know that if they would come and settle within the Turkish territory they would receive grants of land and assistance to build their houses, with the enjoyment of full civil and religious liberty. The consequence was, that every year an average of about 5,000 individuals of this character cross the frontier. The Russians are also driving out the warlike Circassians, who, under Schamyl, so long resisted their forces, and along with them a large number of entirely peaceful Circassians, by the vexatious and arbitrary arrangements to which they are exposed. These people all seek a refuge in Turkey, and are located in the Mount Ararat district. Besides these, the lands are further colonized by Kurdish tribes, driven out of their own country by the anarchical state of Persia. These people, who are herdsmen, and prefer a pastoral life, find a new home in these rich pastures. All these men of different races are not only nobles and peasants, they are soldiers, all animated by a common spirit in favour of an Asiatic nationality—a spirit which has been aroused by the sense of a common danger, and which supplies a common bond of union. The ruling family of the incipient nationality was generally known as that of the Trebizondes, from the circumstance that its founder was appointed Governor of Trebizond in the time of Mohammed the Second. Speculating upon the prospects of this new people, the author said they might remain united with the Ottoman Empire, and become an effectual barrier to the further encroachments of Russia, or they might form an independent nationality, and, as our allies and friends, help to develope the great means of communication between Europe and India by the valley of the Euphrates and Tigris, of which they hold the key.

'On the Uigurs,' by Prof. A. VÁMBÉRY.—The Uigurs are the most ancient of the Turkish tribes, and formerly inhabited a part of Chinese Tartary, which is now occupied by a mixed population of Turks, Mongols and Kalmucks. They were the first who reduced the Turkish language to writing, borrowing the characters from the Nestorian Christians, who came to their country as early as the fourth century of our era. The manuscripts of this language, written in the characters mentioned, afford, therefore, the most ancient and valuable data in investigating the history of Central Asia—nay, of the whole Turkish race. But these monuments are of great scarcity; the author believed he had collected all that had been discovered of the Uigur language. It was an interesting fact that the Uigurs had a literature, and were very fond of books, at a time when our western world was involved in ignorance and barbarism. The most valuable manuscript he had obtained bore the date of 1069, and was written in Kashgar; it treats of ethics and political subjects, and forms a kind of manual of advice to kings how to govern with justice and success. It reveals to us the social condition of this interesting people, and forms, so to say, the basis of the later regulations by which all Turks are governed. The author, having completed last year his 'Philological Researches in the Turkish of Central Asia,' was now about to publish a treatise on 'Uigur Linguistic Monuments,' which would contain more of the remains of Uigur literature than had hitherto been made known. He intended also to show that the Tartars of ancient times were not such barbarians as they now are,