doubt that the astute Moâwiya was far better qualified to guide the mighty empire. The author, however, still places himself at a point of view unfavourable to the Omaiyads. We by no means wish to imply that the frivolous Yezîd I., who had not inherited the administrative wisdom of his father, was in any respect a model prince, but it is altogether unhistorical to place him, as the author does, on a level with Nero and Caligula because he caused his troops to suppress the mad insurrection of Hosain and to chastise the hypocritical inhabitants of the holy cities. The Arabs have really no reason to be ashamed of their thoroughly national royal house, to which the great princes Moâwiya and Abd-almalik belonged; though the roots of their power did not, it is true, lie altogether in religion and consistent fidelity to the doctrines of the prophet whose successors they claimed to be. The men of powerful intelligence, in which the Mekka aristocracy was singularly rich, had for the most part opposed the prophet with all their strength, but as soon as his authority was established they placed themselves at the head of the further movement. We find Koraishites everywhere in command of armies and provinces, and the house of Omaiya, which had fought most obstinately against Mohammed, soon obtained the throne. But the religious and historical tradition was mainly in the hands of the zealous adherents of the prophet, who were hostile to the dynasty by which they were kept in the background, and favourably disposed towards pretenders, especially those of Ali's house. As soon therefore as the Omaiyads were overthrown the "learned" no longer had any motive for judging them favourably, and historians of the present day are consequently liable to be deceived by statements which have been coloured by party feeling. That our author is not entirely free from bias in judging this situation is only a fresh proof of the difficulty which even the most cultivated and intelligent inquirers find in freeing themselves from the misconceptions amongst which they have grown up.

Many other single points might be discussed, or we might dwell on the naïve style of historical criticism and interpretation of inconvenient passages, which remind us of the favourite procedures of the German rationalists of the beginning of the present century; but we have already exceeded our limits. In conclusion we would rather insist again on the pleasure with which we hail in the author a warm and sincere advocate of humane ideas. Though we cannot share his opinion that Mohammed's teaching agrees with the highest demands of humanity, it is eminently satisfactory that he should choose such a standard to test his religion by.

TH. NÖLDEKE.

Contents of the Journals.

Theologisch Tijdschrift. May.—Religion before the discovery of fire; by C. P. Tiele. [Partly a criticism of O. Caspari's *Die Urgeschichte der Menschheit*, u. s. w., a good book, which points out the right direction for future investigators, but suffers from onesidedness. The oldest form of religion must be reconstructed by abstraction from the later. We must first of all separate those parts of religion which have a relation solely to fire from those which may have belonged to an earlier period. If on historical investigation it appears that the latter are actually found among the least developed races, we may conjecture with great probability that they belonged to the primitive religion.]—Strauss and Christianity; by J. H. Scholten. [Appeared first in English in *The Theological Review*.]—Matthew Arnold; by L. W. E. Rauwenhoff. [Extracts from *Literature and Dogma*, with discriminating reflections. Was then, asks the reviewer, the revelation of Israel, even in its purest form, really so devoid of definite conceptions? Can the Bible as a whole be recommended as a "book of conduct"? Mr. Arnold's quotations are very limited in their range. The sixth chapter on "The New Testament Record" is one of the weakest in the book. What evidence is there that Jesus was absolutely free from the unsound fancies of his contemporaries? Is not Mr. Arnold unjust to the "Aryan genius" when he calls upon us to return to the religion of a nomade tribe of Semites? Imitativeness is fatal in art; is it less fatal in religion? The main point of the book (too much neglected by the English reviewers) is the separation of religion from every form of dogma, even that of a personal God. Here the reviewer joins issue with the author. On the whole Mr. Arnold, for whom the reviewer betrays much sympathy shows a strong likeness to Rousseau in his independence of conventions and advocacy of a return to "nature."]—Lagarde *On the Relation of the German State to Theology, Church, and Religion*; rev. by A. Kuenen. [A plea for "the Gospel" in opposition to "Christianity."]—Works of Finzi, De Gubernatis, Whitney, &c., noticed by Tiele; of Frankl. Grätz, Colenso, and Delitzsch, by Kuenen.

Zeitschr. für wissensch. Theologie. Vol. xvi. No. 2.—Pauline researches; by A. Hilgenfeld. [Criticises 1. Lüdemann's *Anthropologie des Apostels Paulus* (very favourably), 2. Hirsch's essay on the Epistle to the Philippians in the *Zeitschrift*, and 3. Holtzmann's *Kritik der Epheser und Kolosserbriefe*, which has entirely failed to convince the reviewer.]—Exegetical studies on the New Testament; by E. Harnsen. —Philo and the received text of the LXX; by C. Siegfried.—The ostrich in Job xxxix. 13-17; by Dr. Egli.—Epigraphic contributions to the history of the Herodian family; by E. Schürer.—Xeniola theologica; by H. Rönsch.—The letter to Diognetos; by A. Hilgenfeld. [Adverse criticism of Overbeck's view placing this letter in the age posterior to Constantine.]—Notices of books: On Dicstel's edition of Knobel's *Isaiah* (favourable), and Grätz' *Song of Songs* (adverse); by Egli. On Schrader's *Die Keilinschriften u. das A. T.*; by Siegfried. On Weiss' *Biblical Theology of the N. T.*; by A. H. On Tischendorf's (new and cheaper) edition of *Clementis Romani epistulae*; by A. H. [Cf. Lipsius in *Academy*, vol. i., p. 255 sq. In some cases Tischendorf accepts Lightfoot's view of the reading in Cod. B.; in others, and even in I. 24, he defends his own view; the commentary presents little that is new.]—Miscellaneous: Explanation of the inscription published by Schlottmann as Moabitish in the *Z. D. M. G.* xxvi. 411; by Hitzig.

New Publications.

BIBLE, The. With Commentary. Edited by Rev. F. C. Cook. Vol. III. Murray.

COLENSO, J. W. The New Bible Commentary, &c., Critically Examined. Part V. Deuteronomy. Longmans.

IRENÆUS. Works: transl. by Rev. John Keble. [Vol. 42 of Library of the Fathers.] Parker.

KEIM, Th. Celsus' wahres Wort. Aelteste Streitschrift gegen das Christenthum vom J. 178, wiederhergestellt, übers. u. erläutert. Zürich: Orell.

MOSSMAN, T. W. A history of the Catholic Church of Jesus Christ from the death of St. John to the middle of the second century. Longmans.

MÜLLER, Max. Introduction to the Science of Religion. Longmans.

ROBERTSON, J. C. History of the Christian Church. Vol. IV. (A.D. 1303-1517.) Murray.

Science.

The Expression of the Emotions in Man and Animals. By Charles Darwin. London: John Murray.

THE publication of a new work from Mr. Darwin's pen is an event of scientific as well as of public importance, and in this double aspect it becomes a task as difficult as responsible to prepare a notice of such a book. As regards the scientific questions the reviewer is placed at a disadvantage: whatever his knowledge and acquaintance with the subject may be, he may be certain that it will not suffice for the task, for Mr. Darwin has the peculiarity of opening up in each of his books new fields, where critics may perhaps find themselves impelled on less important points to controvert this or that opinion of the author, but where in general they share the position of other readers in sitting silent to learn.

If however we do not altogether refrain from discussing the new book lying before us, our main object is to give our readers an idea of the fresh fields explored by the great naturalist.

How often it has been stated that among the chief privileges of man as contrasted with the lower animals is the great gift of physiognomical expression—a gift which seemed all the more peculiarly human as it became obvious

that other animals, being destitute of the innumerable emotions of man, could not present traces of the innumerable expressions dependent on these emotions. The belief in this elementary constitution of man's nature was so great at one period that physiognomy came to be regarded as a science as important and conclusive as astrology had been in the Middle Ages; and the more hidden the actual connection between mind and body in this case, the more one pretended to intuitive knowledge about it, the more one shrank from subjecting the great achievements of which some profound physiognomists boasted to a critical examination. When we remember how Lavater spent a great part of his life in the study of physiognomy, and recall how Goethe entered into correspondence with him on the subject and sent him portraits and silhouettes, can we wonder that the great mass of the people held a belief in the most direct connection of character and mind with the expression of the face? Goethe, it is true, was not an absolute believer in the art of judging of the inside of a man by looking at his outside, for he wrote on one occasion to Lavater: "Seitdem ich keine physiognomische Praetension mehr mache, wird mein Sinn sehr scharf und lieblich, ich weiss fast in der ersten Minute wie ich mit den Leuten dran bin;" he nevertheless occupied himself in thinking over the principles of this so-called science.

Mr. Darwin himself, in the Introduction of his work, gives us a short review of what has been done in physiognomy by treatment with the scientific method. For it is not altogether nonsense—as little in fact as astronomy is nonsense, because people at one time believed in astrology. From M. Moreau, who held that the *corrugatores supercilii* from their attachment and position are fitted "à resserrer, à concentrer les principaux traits de la face, comme il convient dans toutes ces passions vraiment oppressives ou profondes, dans ces affections dont le sentiment semble porter l'organisation à revenir sur elle-même, à se contracter et à s'amoindrir, comme pour offrir moins de prise et de surface à des impressions redoutables ou importunes,"—to Messrs. Bain, and Herbert Spencer, and especially Sir Charles Bell, Mr. Darwin traces in a slight sketch the development of physiognomical investigation and philosophy.

It is not so much physiognomy, however, that constitutes the main subject of interest in the new book as the Darwinian theory which lies before us in a new guise where we would scarcely expect to meet it. Mr. Darwin has in fact fulfilled a promise given in the preface of the *Descent of Man*, of which work it forms a part and may be considered the third volume.

It is not the anatomy nor indeed can it be called the physiology of expression of which Mr. Darwin treats. His object is rather to trace its origin in the ancestors of man, and to give an exposition of the principles involved in the different modes of expression in man as well as in other animals.

Mr. Darwin is always bound to face a considerable difficulty in all that he writes. Having originated the doctrine of Natural Selection, it falls to his lot more than to anyone else to show the universal application of this principle in all forms of organic life. In truth, there is no one who has done so much to search out the hidden corners where the action of Natural Selection is to be recognised, and where this principle alone gives a satisfactory explanation of problems hitherto unsolved.

Writers in the *Revue des deux Mondes* and other journals and books may use every effort to convince their readers that the theory of descent is not Mr. Darwin's great achievement, but is due chiefly to Lamarck and others; it nevertheless remains a simple truth that Mr. Darwin's elucidation of the actual influence of Natural Selection throughout the whole organic world has been the means of overthrowing the old doctrines of separate Creation—still held by some naturalists even of high rank, and believed in by all those who cling to old traditional beliefs rather than to new scientific doctrines, for the simple reason that they believe all human knowledge to be vanity, and as a consequence prefer ignorance to inquiry.

Though Mr. Darwin not only originated the doctrine of Natural Selection as the chief principle ruling the development of the organic world, but is also its chief supporter and expounder, he nevertheless holds that Natural Selection in the strictest sense does not afford a universal explanation of all the phenomena of organic life, past, present, and future. The theory of Sexual Selection, for example, was proposed to meet the difficulty. When endeavouring to explain all the facts by Natural Selection Mr. Darwin perceived that changes in organisms occurred which were clearly not dictated by the simple action of this great principle, but by some other and minor one, which he termed the principle of Sexual Selection. The acceptance of this principle has met with considerable resistance from a good many naturalists, and even many evolutionists, who, seeing in it, we believe wrongly, an abandonment of the theory of Natural Selection, make war against their own leader. Perhaps these same gentlemen will not be entirely satisfied when they examine the three principles to which Mr. Darwin reduces all the modes of expression of emotion in man and animals. For if everything that happens is only to be tried by the test of its survival on account of its usefulness in the struggle for existence (which would bring it within the domain of Natural Selection) it may appear as if the three principles of expression do not come within the range of the discussion.

The first of these principles is that movements which are serviceable in gratifying a desire, or in relieving a sensation, if often repeated become so habitual that they are performed, whether they are of any service or not, whenever the same desire or sensation is felt even in a very slight degree.

The three principles with the many instances by which they are illustrated in Mr. Darwin's book are of interest not only as teaching physiognomy, but, as we have already indicated, in attempting to introduce the theory of Evolution into our knowledge of the functions of man and other animals. To take an example: if we consider how a person uncovers his canine teeth in expressing defiance or contempt the action would be explained by all those who are not Evolutionists by an endeavour to show the direct influence of scorn or defiance on the muscles that execute this movement. It would be difficult to find a satisfactory explanation of such uncovering of the canine teeth in a sneer. One could hardly understand why contempt or defiance is more nearly related to uncovering the canine than other teeth, why in short it has anything whatever to do with teeth. Mr. Darwin, however, on seeking out the origin of such action finds it in another function that belonged to the ancestors of man—to the lower animals, in which showing the teeth, and especially the canine teeth, denoted readiness to bite and fight. Man as a rule no longer bites his enemies, yet the uncovering of the canine teeth in a sneer is still a very usual function to express indignation, contempt, defiance, or scorn. That this should ever happen in man is only to be understood by his relationship to the lower animals, and thus a special physiognomical function of man is derived from another more or less defensive function of those animals.

A similar movement, and one only to be interpreted by similar reasoning, is the protrusion of the lips in anger and

scorn: in itself it is useless and would have no meaning, but viewed as an offspring of animal function it is clearly understood. A great number of other instances of a like kind might be quoted from Mr. Darwin's book.

Regarded from a biological point of view this book derives its chief interest from being a successful attempt to trace the origin of special functions, to introduce the theory of Evolution into the domain of physiology.

Here it seems we do meet with an element not strictly an essential constituent of the theory of Natural Selection, for as Natural Selection tends to preserve only what is useful and serviceable for the struggle of existence, movements that are not actually beneficial ought not to be retained.

The second principle is that of antithesis. The habit of voluntarily performing opposite movements under opposite impulses has become so firmly established in us by the practice of our whole lives that if certain actions have been regularly performed in accordance with the first principle under a certain frame of mind there will be a strong and involuntary tendency to perform directly opposite actions, whether these are of any use or not, under the excitement of an opposite frame of mind.

This principle points still more directly to a hidden root whence actions spring. The former leads us to look for an origin of animal action that is not to be found in direct usefulness alone, while the movements which Mr. Darwin classes under the principle of Antithesis seem, to judge by the examples and illustrations he gives, often to be quite superfluous and without the slightest direct bearing.

Lastly, the third principle is the direct action of the excited nervous system on the body independently of the will and independently to a great extent of habit. The direction which this nerve-force follows is necessarily determined by the lines of connection between the nerve-cells with each other and with various parts of the body. But the direction is likewise in a large degree influenced by habit, inasmuch as nerve-force passes readily along accustomed channels.

The origin of functions is a question as yet almost wholly untouched. The discussion of this strange subject leads us of necessity to another of an equally remarkable nature, namely, the active and passive resistance which the theory of Descent finds in more than one physiological school.

In earlier years, when physiology existed almost everywhere in, so to speak, personal union with anatomy, the dislike felt by physiologists for abstract morphology was less marked. Though physiology was always regarded as the cardinal science in relation to the great problem of life, it did not altogether disregard the aid of anatomy and morphology in working out solutions of special physiological problems. The labours of a man like Johannes Müller alone suffice to prove this, and his handbook of physiology teaches on almost every page the important influence of morphological views on physiological research. If we extend our gaze still farther back we find this striking feature of a combination of scientific physiology, anatomy, and morphology becoming more strongly apparent.

After Johannes Müller, however, and as soon as the great break happened about the theory of Vitalism, especially after the publication of Du Bois-Reymond's great work on *Thierische Electricität*, physiologists in general got rather out of the habit of carefully studying anatomical or morphological problems, while in some quarters there sprang up the idea that morphology was not so much a science as an excellent pursuit for amateurs—a more or less innocent amusement to which one might devote one's attention if one chose, but which would exercise no influence on the general march of human ideas, and through a want of method and exactness could scarcely be termed a science. Exactness came to be identified with experimental research, and physiological laboratories provided with complex apparatus and frogs, rabbits, and dogs and other animals, were considered the chief tribunal, before which life was challenged to confess its latest secrets.

There can be no question that this line of physiological research derived great advantage from the application of physics to the consideration of physiological questions. Thus the physiology of the senses and nerves attained to a wonderfully high degree of true exactness. It is perhaps due to these very results that at the time when the methods of experimental physiology were held in such respect the microscope and microscopists were a little too lightly regarded—a feeling which culminated in the dictum that a microscopical discovery scarcely lasted longer than five years. It must be admitted that at the very period of the highest development of experimental research in physiology morphology laboured under a temporary want of new ideas. The struggle against the overwhelming influence of speculation in the beginning of this century had ended in the other extreme, in an accumulation of mere facts. The want of ideas was necessarily followed by the absence of criticism, and thus morphology and zoology resembled in some respects a dictionary containing all the words necessary for the construction of a thoroughly philosophical book, but which is not the book itself.

Mr. Darwin came, and the book was written. By it morphology became burdened with important questions, the answers to which have not only a bearing on morphology itself, but extend its boundaries into fields where it touches on one of the most fundamental questions by which the human mind ever has been or can be agitated. The *Origin of Species* led to investigations concerning the origin of innumerable other things, the beginnings of which had hitherto lain in utter darkness and were believed hidden once and for ever. The theory of Evolution began to affect with its principles and methods nearly every department of human thought, but the stronghold from which it derived its methodical power was and is morphology.

Thus of a sudden the sister sciences physiology and morphology became once more of equal importance, and one might perhaps say that at present morphology has just claims to be held the greater. Such a claim however would be vain and useless, for it is impossible that physiology should any longer delay to adopt with equal energy the methods and principles of the theory of Evolution, and by so doing range itself once more close beside morphology—nay, and embrace so entirely the doctrine of Evolution that a break between physiology and morphology, such as has existed during the last twenty or thirty years, will be rendered impossible in future.

And it cannot be questioned that the new task of physiology will be to investigate the origin of functions. If it be true that all organisms now living are the descendants of former living ones, and that these former living ones possessed simpler characters, this of course will hold good equally in respect to their functions, and it becomes necessary to trace not only the change and differentiation of the organs, but also those of the functions. To do this effectually physiology must not restrict its investigations to frogs, rabbits, and dogs, but extend them over the whole animal kingdom. And in doing so it will at once find how powerful an aid morphology is, how indispensable and how ready to help its sister science, and how rich in questions which on its part it is unable to solve except by alliance with comparative physiology.

This is a powerful reason for congratulating ourselves on

the appearance of Mr. Darwin's new book. It not only gives rules and principles to physiognomy, connecting by new ties man and his mental world to animal life and its bodily constitution, but traces a new and highly important line of inquiry with respect to the origin of functions. In showing how in many cases the function of expressing emotions has its origin in other functions, he has led us to that immense and almost endless path which physiology must traverse in respect to all and every function in order to attain that point where life itself becomes but a function of matter, a part of which Spinoza determined when he said, "Cujus essentia est existentia."

Anton Dohrn.

Notes on Scientific Work.

Geology.

New Tertiary Mammals.—Prof. O. C. Marsh describes some new species and a new genus (*Colonoceras*) of mammals from the tertiaries of the Rocky Mountains, examples of which are deposited in the museum of Yale College. A study of additional specimens of *Orohippus* has led to its separation from *Anchitherium* and shows it to hold an intermediate position between that genus and *Palæotherium*. *O. agilis* possesses four functional digits in the manus. The first premolar is nearly as large as the second, and an antorbital fossa is absent. The skull is elongated and equine in its proportions. The orbit is not enclosed behind. There are three upper true molars and four premolars. The radius and ulna are separate. This species differs from *O. pumilus* in having the inner cones of the upper molars more nearly of equal size, each exhibiting a distinct basal ridge. The animal was nearly as large as a fox. The new genus *Colonoceras* differs from *Hyrachyus* and *Helaletes*, so far as they are yet known, in possessing a pair of dermal horns on the nasal bones, which are placed opposite each other. In *C. agrestis*, which was about as large as a sheep, the horns are widely divergent. *Dinoceras lucaris* has the inner posterior tubercle of the penultimate molar double; the last true molar has a tubercle in the angle of the transverse crests, and is also wanting in the second posterior tubercle. The basal ridge is continuous on the inner side of each of the three upper premolars. This as well as the foregoing species are from the Eocene of Wyoming. *Oreodon occidentalis*, which occurs in the Miocene of Oregon, resembles *O. Culbertsoni* in most of its cranial characters, but differs materially in the large auditory bulla, which is several times the size of the postglenoid process. It is smaller than *O. major* and has the frontals between the orbits more depressed and the antorbital fossa deeper. *Rhinoceros annectens* was apparently about half the bulk of *R. pacificus*, but resembles it in some of its dental characters. In the upper molars, however, the transverse crests approach each other much more nearly, while in the true molars they are united. The basal ridge is also much less developed on the inner side of the upper molars. Upper incisors are present, one of the lateral ones being much depressed and its crown very short, as in the existing *R. Javanicus*. This species is likewise from the Oregon Miocene. Another new species of this genus *R. Oregonensis*, much larger than those of the Miocene, occurs in the Pliocene deposits of Oregon. One of the specimens found is a penultimate upper molar which differs widely from the corresponding tooth of any of the known species. At the union of the transverse posterior ridge with the outer cusp there is a deep cavity, nearly circular, and enclosed by a vertical cylinder of enamel. The anterior crest also is divided, a strong branch being sent inwards and backwards from the posterior side into the main transverse valley. (*Amer. Jour. of Science*, May, 1873, 407.)

A Bird from the Rupelian Clay.—M. P. J. Van Beneden has examined (*Bulletin Acad. Roy. des Sciences*, 1873, No. 4, p. 354) the fossil remains of a bird from the Rupelian clay of the Waes country, sent to the Belgian Academy of Sciences by Dr. Van Raemdonck. They consist of a complete sternum, the greater part of the cranium with some of the face bones, fragments of lower maxillary, an entire clavicle, one complete humerus, two coracoids, two radii and ulnæ, one scapula, one tibia, a phalanx, and two tarso-metatarsals. These are all well preserved, and possess the peculiar tint of all fossils from this clay. M. Gaudry finds them to belong to an individual of the species *Anas marila*, generally known by the name of *Milouinan*, which still lives in the Arctic regions, and visits some parts of Europe during the autumn and winter months. It is the only known living representative of the birds of early tertiary times.

Discovery of a New Human Skeleton of the Palæolithic Epoch in Italy.—M. E. Rivière describes (*Comptes Rendus*, 1873, Part 16, 1027) the remains of a second fossil human skeleton from the sixth cave of Baoussé—Roussé (Grottes de Menton), Italy. The skeleton was found at a depth of nearly four metres below the floor of the cave lying extended on its back in the longitudinal direction of the cave. The deposit forming the floor is regularly stratified, and consists of charcoal, ashes, of small calcined angular stones, bones and teeth of animals, shells, and flints. Associated with the remains were numerous flint implements and a few worked in bone, as well as a number of perforated shells belonging to the genera *Nassa*, *Buccinum*, *Cypraea*, &c.; these, from their position, had evidently formed parts of a necklace and bracelets, and were interred with the body. The extreme friability of the bones did not allow of their removal in so perfect a condition as that of the first skeleton, but, in this case also, they belonged to a tall individual, the skeleton measuring nearly two metres in length. In the *débris* of the cave bones of the following animals were met with:—*Ursus spelaeus*, *Hyaena spelaea*, *Canis lupus* and *vulpes*, *Arctomys primigenia*, *Lepus cuniculus*, *Mus*, *Equus caballus*, *Sus scrofa*, *Bos primigenius*, *Cervus Canadensis*, *Elaphus corsicus* and *capreolus*, and *Capra primigenia*. Besides there were found some bones of a large eagle and some birds of passage, as well as numerous species of marine shells of the genera *Patella*, *Pectunculus*, *Mytilus*, *Pecten*, *Dentalium*, and *Trochus*.

The Geology of Mount Léberon, Vaucluse.—M. A. Gaudry contributes to the French Academy of Sciences some details of the geology of Mount Léberon. The mass of the mount consists of lower cretaceous rocks, as indicated in the geological chart of MM. Dufrénoy and Élie de Beaumont, with the middle tertiary covering its southern slope but not reaching its summit. Between Cucuron and Cabrières d'Aigues the lower tertiary consists of molasse, the lower beds of which are grey and yield very few fossils, the upper being yellow and containing principally *Janira planosulcata*, *Pecten scabriusculus* and *Ostraea Boblayei*; these appear to represent the horizon of the faluns of Bordeaux and Tourâine. At Camille-Jean, near Cabrières d'Aigues, occurs a bluish-grey sandy marl yielding several species of marine shells in good preservation, many being quite new; they belong to the highest horizon of the falunian. The beds at Cabrières enclose bands of pebbles with broken shells, indicating a beach deposit. There are moreover beds of a light-grey colour which enclose *Ostraea crassissima* in little groups of four or five individuals. The marine beds are covered with a thick layer of marly limestone which appears to have been formed in bogs; it bears *Helix Christolii*, and many other species of bog shells. The upper part passes into a reddish loam in which are embedded remains of *Hipparion*, *Rhinoceros*, *Gazelles*, &c. M. Gaudry remarks that the comparison of the mammifer remains of the upper and the marine mollusca of the lower beds tends to confirm the observations made by Darwin, Lyell, and himself in other parts of the globe, that the higher organised animals existing at a period nearer to our own are much more changed than the lower forms of an older date. MM. Fischer and Tournouër find amongst the molluscs fifteen species identical, or nearly identical, with those now living, while all the mammifers on the contrary are quite distinct from the present species, and belong to the genera *Machairodus*, *Ictitherium*, *Deinotherium*, *Hipparion*, *Acerotherium* (?), *Helladotherium*, and *Tragocerus*. Like the fauna of Pikermi in Greece, Baltavar in Hungary, and Concud in Spain, those of the red loam of Mount Léberon appear to belong to the late Miocene or tortonian epoch. M. Gaudry believes that he has been able to distinguish seventeen successive fauna in the tertiary epoch. (*Comptes Rendus*, 1873, Part 17, p. 1096.)

Physiology.

Mechanics of the Secretion of Bile.—At the meeting of the Medical Society of Vienna held on the 28th of March Professor Stricker communicated the results of an investigation undertaken in his laboratory by himself in conjunction with Dr. Röhrig with the object of determining the relation of the secretion of bile to the amount of blood contained in the abdominal viscera. This inquiry he remarked had already been taken up by Schmuljevics and Ludwig, who had observed that bile continued to be secreted when blood was injected into the excised liver. Röhrig repeated and corroborated this result, though the quantity of bile he obtained was very small. It was a question therefore whether the bile thus excreted is actually the result of the secretory activity of the liver or whether it is merely mechanically expelled from the organ in consequence of the distension of the blood-vessels. The question was decided by the injection of water or dilute solution of common salt, when it was found that no bile was secreted. In Stricker and Röhrig's experiments it was considered at the outset a matter of importance to determine whether, as Pflüger and Hering maintain, the nerve-fibres pass directly to the hepatic gland cells, in which case they would constitute the chief factors in the production of the biliary secretion, while, if these do not, the secretion must be directly dependent on the blood. As regards the rapidity with which the secretion is eliminated the means hitherto adopted for its determination have not proved very satisfactory. The introduction of a tube into the ductus choledochus is a defective method, for the pressure in the biliary ducts is very small, and a slight deviation of the tube from a horizontal position may produce considerable