advantages to science, both agricultural and to a less extent general, which would result, but because we believe such a course to be the only one which will lead to enduring popularity, or yield gains to agriculture commensurate with the outlay. We are confident, that, if Dr. Sturtevant will make it his avowed aim to do as much real scientific work as possible, the state will receive a far larger return for its outlay, and that within no long time it will acknowledge such to be the case; while the beneficial effects of such a course, in promoting an appreciation of and respect for true science among the people, would not be its least recommendation.

Agricultural experimentation is attracting increasing attention; and it seems important that a clear idea should be reached by those concerned in it of its proper aims and methods; and this can be attained in no better way than by a free criticism, on the part of all concerned, of methods and ideas which seem to them false or unwise.

HERRICK'S TYPES OF ANIMAL LIFE.

Types of animal life, selected for laboratory use in inland districts. By C. L. Herrick. Part i., *Arthropoda.* Minneapolis, 1883. 33 p., 7 pl. 8°.

The author says in the preface, that the notes which this work contains are only a small part of the material collected some years ago for a 'Laboratory assistant for western students, arranged upon quite a different plan.' During the delay in completing the proposed work, the great need of it has been in a measure supplied by recent works; but as these treat chiefly of marine forms, or such as require dissection, he has 'thought best to place at the disposal of students and teachers in summer science classes' his notes on such types as can be studied, while living, under the microscope. The types selected are the larva of Corethra, Canthocamptus, and Gammarus, which are described, without directions to the student, or explanations of methods of work.

A text-book of this kind ought to be clearly written, and accurate, a model for the student; but Mr. Herrick's work is far from this, and no better than we might expect to find the rough notes of the student in a 'summer science class.' The description of the heart of Chironomus, on p. 7, is throughout almost or quite unintelligible, and ends with the statement that 'the last chamber is closed behind, and has the ostia quite a distance beyond.' On p. 25 we have the opening of the green or antennal gland of Gammarus described as 'an auditory or other sensory organ;' and on plate 8, an antennula, or first antenna, figured, for comparison, as the 'second antennae of prawn, with auditory sac and secondary flagellum.' The Copepoda are Mr. Herrick's specialty, and so we naturally turn to the chapter on Canthocamptus for better work: but in the first paragraph we are told that the Copepoda are divided into three sections,—Gnathostoma, having 'the mouth-organs in the form of jaws;' while 'the other sections, Poecilostoma and Siphonostoma, have the mouth-parts more or less modified for piercing or sucking.' The student may search long and unsuccessfully to discover what the 'Poecilostoma' may be. In this chapter, also, we naturally look for some account of the 'heterogenesis' of which Mr. Herrick has written elsewhere, and find the following:—

"The young of Canthocamptus become fully developed sexually before they assume their final form; and it is not unusual to find females bearing egg-sacs which are not only much smaller than the parent, but with considerable differences in the various organs. This sort of heterogenesis is not uncommon among lower crustacea, for the mother may differ much from the young till after they have themselves produced young."

Grammatical, verbal, and typographical errors so abound that it is needless to point them out. The illustrations, engraved by the author himself, are for the most part far from accurate, and very rude.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Photographing the solar corona without an eclipse.— Dr. Huggins has continued his experiments on this subject during the past season. He has made use of a fine seven-and-a-quarter-inch speculum by the late Mr. Lassell (loaned for the purpose by Miss Lassell). Three inches and a quarter of the central portion only are employed, the light being received a little obliquely, so as to throw the image to one side, as in the Herschellian telescope, thus avoiding a second reflection. The absorbent screens of potassic permanganate, or blue pot-glass, have been dispensed with, and an emulsion, prepared specially

for the purpose by Capt. Abney, and containing only chloride of silver, has been generally used for the sensitive plate. This film is said to be sensitive only to rays between h and H, or at least to be only slightly affected by rays of either higher or lower refrangibility. Between April 2 and Sept. 4, fifty plates have been exposed on fifteen different days; and all of them are said to show a more or less distinct coronal appearance around the sun.

The plates have been put into the hands of Mr. Wesley, the celebrated engraver, who made the magnificent plates of Mr. Ranyard's Eclipse volume; and he has prepared for each day a drawing of what he could make out on all the plates taken on that day. "This was desirable," as Dr. Huggins says, "because, whenever sufficient duration of sunshine permitted, photographs were taken on silver-bromide films as well as on silver-chloride plates: some photographs were taken with the sun screened off by a brass disk (close to the plate), others without it: also photographs were taken with the sun in different portions of the field. As a rule, Mr. Wesley has introduced into his drawings only those coronal features which were common to all the plates taken on that day."

Four drawings were presented, each of them showing incontestibly details belonging to the lower portion of the corona. The paper was presented to the British association. — (*Brit. journ. phot.*, 1883, 575.) C. A. Y. [380

Saturn. — Dr. William Meyer of Geneva gives the results of a large series of measures of Saturn and his rings. The measures agree very well with those taken in 1880. He also determined the position of the belt in the southern hemisphere of the planet. Encke's division was observed several times, and its position seemed to be nearer the exterior edge on the left than it was on the right ansa. On one occasion the ball seemed of a grayish-blue tint, while the ring was glittering white in color. — (*Astr. nachr.*, 2,517.) M. McN. [381

MATHEMATICS.

Equations of equilibrium. — M. Appell remarks that the analogies between the equations of equilibrium of a flexible and inextensible thread, and the equations of motion of a point, have long been noted, but that no one has put these equations of equilibrium into their canonical form, which would permit the application of Jacobi's principles. M. Appell considers first the case of a free thread acted on by forces possessing a potential, and transforms the equations of equilibrium into forms analogous to those giving the motion of a point. He next introduces the notion of generalized co-ordinates, q_1, q_2, q_3, replacing x, y, and z. The transformations made here are quite similar to those given by Jacobi, in his *Vorlesungen über dynamik*. The author finally studies the position of equilibrium of a thread acted upon by the same forces as before, but constrained to lie upon a given surface. — (*Comptes rendus*, March 12.) T. C. [382

Parallel surfaces. — Mr. Craig gives expressions for the ratio between the corresponding elements of area on a given surface and its parallel. The relations between corresponding elements of length, and the relation connecting the measures of curvature on both surfaces, are also derived. The area of the parallel to the ellipsoid is obtained as the sum of the areas of the given ellipsoid, a certain derived ellipsoid, and a sphere whose radius is the modulus of the parallel surface. — (*Journ. für math.*, 1883.) T. C. [383

ENGINEERING.

Simple and compound engines on short routes. — Mr. Boulvin has determined a series of formulas expressing the relations between size of vessel, weights carried, and distances traversed, and the weights of the simple and the compound engine, and finds, that, for short routes, the best form of engine is the single cylinder rather than the compound. He finds that for lines from twenty to sixty miles in length, as those from Dover to Calais and from Ostend to Dover, a gain of a knot an hour may be obtained by the use of the simple engine instead of the compound, in consequence of the saving in weight of machinery. On long routes the economy is on the side of the compound engine, in consequence of the saving in weight of fuel. The later practice of English constructors has been in accordance with this result, and with the principles involved in the work of Mr. Boulvin. He constructs curves showing the equations graphically, and illustrates their use by examples. — (*Ann. trav. publ.*, xli.) R. H. T. [384

Transportation by steamers on the Rhone. — Mr. F. Moreaux has investigated the conditions of transportation by steam on the Rhone and other fast-running and shallow rivers, and has incidentally developed a new formula for the resistance of vessels, which he applies in his study of the best methods of transporting merchandise.

He takes an expression of the form

$$R = K_1 S' + K_2 \times \frac{l'}{p} \times S'',$$

in which R is the resistance, K_1 and K_2 are numerical coefficients, S' and S'' are the areas of the middle body and of the tapered ends of the vessel: l and p are the length and the breadth of these ends. The values of the coefficients vary, according to stated conditions, from 0.10 to 0.22 for K_1, and from 0.48 to above 2 for K_2. They can only be used, evidently, in cases in which these conditions are definitely known. Where used as by Mr. Moreaux, however, they give very satisfactory results. The formula is applied to a river-navigation, now conducted largely with steamers about 135 metres long, 7 wide, 1 metre in draught, with 8 square metres area of immersed midship section, 1,100 square metres area of wetted surface, and 900 tons displacement. Their engines are of 1,150-horse power, and their speed is about $4\frac{1}{2}$ metres per second. The current is, in places, nearly 4 metres. Mr. Moreaux concludes that the best system for such river-transportation is that in which is used what he calls the '*Bateau mixte a ancres*,' which is fitted as a towboat, but which is also supplied with anchors of peculiar form and of great holding-power, by which the tug may be held at the head of a rapid, and then, by hauling in a tow-line attached to the tow, bring the latter through into still water. Two

such boats sometimes act alternately, the one hauling, while the other is getting a new position ahead. The advantages thus secured are, that the propelling craft is not detained at either end of the line of transportation; that transshipment and the breaking of bulk are avoided; that the rapids are surmounted with comparative ease; that canal-boats are thus transportable from river to canal, and the reverse, making long trips through river and canal, and thus saving expense of repeated handling of merchandise. This system is proposed for use between Arles and Lyons. The author proposes the connection of Arles and Marseilles by a canal, and the continuation of this system through the waterway thus formed. — (*Mém. soc. ing. civ.*, April.) R. H. T. [385

AGRICULTURE.

Hill-culture of potatoes. — Experiments by Wollny having led to the conclusion that hill-culture was superfluous, or even injurious, on light soils, Schleh has made experiments with potatoes which in general have corroborated Wollny's conclusion. — (*Biedermann's centr.-blatt.*, xii. 483.) H. P. A. [386

Proteine of maize-ensilage. — Stutzer finds, that, in the preparation of ensilage from maize, the proteine is largely broken up into products which are not precipitated by copper hydrate, and which are probably of inferior nutritive value. Jordan has made the same observation in experiments at the Pennsylvania state college. — (*Ibid.*, xii. 497.) H. P. A. [387

Nitrification in the soil. — Nitrification is dependent on the presence of oxygen, and Schlösing has shown that a diminution of the amount of oxygen present decreases the rapidity of the change. Such a diminution of the amount of oxygen in the soil is effected by the presence of organic matter, which unites with it, forming carbonic acid, and thus acts, as Déhérain and Maguenne point out, to moderate the rapidity of nitrification, and so to prevent a loss of nitrates in the drainage-water. The same authors explain in this way the greater richness in nitrogen of untilled land, and claim that the presence of organic matter is necessary in order that the soil shall gain nitrogen from natural sources. — (*Ibid.*, xii. 506.) H. P. A. [388

MINERALOGY.

Albite. — Des Cloizeaux gives the results of the optical examination of a large number of specimens of albite. Although this mineral is the most constant of all the felspars in its chemical composition, its variations in optical properties are great, and dependent upon the homogeneity of the material, the number and arrangement of the twin lamellae, and, without doubt, upon the circumstances of temperature and pressure at which the crystals were formed. The following are the properties of the purest and most transparent crystals, which may be regarded as normal: the plane of the optic axes is normal to a surface truncating the acute edge between oP and $\infty \breve{P} \infty$, and making an angle of 101°–102° with the base; the acute bisectrix is always positive, and nearly normal to the edge oP and $\infty \breve{P} \infty$; the axial angle for red in oil is about 80°–85°, ordinary dispersion $\rho < v$; the obtuse bisectrix is always negative; the axial angle for red in oil is about 104°–106°, ordinary dispersion $\rho > v$; basal sections give for the angle of extinction 2°–4° on either side of the plane of twinning; on the brachypinnacoidal section the angle of extinction is nearly 20°. The results of the examination of thirty-four different varieties of albite are given, many of them accompanied by chemical analyses. — (*Bull. soc. min.*, vi. 89.) S. L. P. [389

METEOROLOGY.

Meteorology in China. — Dr. Doberck of the Hong Kong observatory proposes to study the climatology of the region, to determine the magnetic conditions, and to investigate the magnetic attraction of various mountains and hills in the vicinity. It is probable that he will endeavor to arrange for the receipt of regular reports from neighboring observatories with the object of making weather forecasts. — (*Nature*, Sept. 27.) W. U. [390

Hygrometer studies. — A good hygrometer which can be used in place of the wet- and dry-bulb thermometers, and be equally convenient, but more accurate in cold weather, is one of the needs of practical meteorology. Comparative observations of the psychrometer and the improved hair hygrometer, as manufactured by Höttinger, have been made at Breslau by Dr. Galle since 1880. As a result, he states, that if the saturation-point is determined at intervals of from eight to fourteen days, and the instrument carefully cleaned when necessary, the relative humidity can be obtained with as great accuracy as with the psychrometer, and in winter with greater accuracy. Unfortunately, there still remains in the instrument the liability to unexpected changes in the saturation-point, and in the working of the mechanism; so that a psychrometer must be at hand for the purpose of comparison. — (*Preuss. stat.*, lxxi.; *Ergeb. met. beob. königl. met. inst.*, 1882.) W. U. [391

GEOGRAPHY.

(*Asia.*)

Investigations in Thibet. — At the suggestion of Gen. Walker, geodesist-in-chief to the survey of India, an interesting exploration is about to be undertaken by one of the pundits attached to the survey. This pundit was a companion of the famous Nain Singh, and succeeded, in the midst of a thousand obstacles in the eastern part of Thibet, in recording and preserving his itineraries, and obtaining many latitude observations. Thanks to his researches, an area three times as extensive as France can be to a certain extent corrected, and mapped with tolerable accuracy. The great Thibetan problem as to the relations of the Dzang-bo River are probably settled by his work, from which it would appear that this belongs to the head waters of the Brahmaputra rather than (as formerly supposed) to the Irawadi River. — (*Bull. soc. géogr. Mars.*, June.) W. H. D. [392

(*Africa.*)

Sociology of the Kabyles. — M. Sabatier, who has long been a resident of Algeria, and served as a judicial officer among the Kabyles, gives the following details as to their civil and social organization. These people, sharply distinguished from the Arabs, are of the Berber race, and number about three hundred thousand.

The villages are associated in governmental groups of not more than twenty settlements each. Such a group is termed a kabila. The supreme chief, or magistrate, of the kabila, is the amin. There is always another chief called ukil, charged with defending the rights of the minority of the electors. In each kabila the karuba, of forty or fifty male adults, forms an electoral body. The right to vote, or the attainment of individual majority, is decided in a singular manner. A thread is measured off, which, when doubled, shall exactly encircle the neck. This thread, made single, is then passed from the occipital base of the head over the cranium ; and, when the other end reaches only to the chin, the development of the head is supposed to be complete, and the individual politically mature. This ordinarily happens about the age of fourteen. Each karuba has a distinct jemmáha, a sort of municipal council, presided over by a tamen. The tamens, all together, form the general council of the kabila, which, with the ukil and amin, forms the administration. The rights of minorities in each karuba are carefully guarded. The minority is called the saf, and may elect a chief, who serves one day to redress grievances, after which he retires to his private station. They have no prisons. The grand council may banish a criminal, destroy his house, burn his clothing, or order him, as a last resort, to be stoned to death. The council directs all municipal matters. If hostilities break out between two villages, and blood is shed, neighboring villages generally intervene by proclaiming anaya. This anaya is an invitation to cease hostilities, which the combatants dare not disregard. Were it disregarded, it would be considered an extreme insult to the safs of the peace-making villages, which all other village safs would be bound in honor to avenge.

The family organization of the Kabyles is unique. There is, in fact, no family, in our sense of the word. Such as there is, is terminable conditionally. A Kabyle who desires a wife says to her father and brother, 'You must sell me this girl.' The price is debated, and an agreement made before witnesses. Fifteen to forty dollars is the usual range. The money paid, he gives a dress to the bride, and all is done. The wife may be sent back without explanation, and the price reclaimed from her family.

If the wife quarrels with her husband, she may call upon a third person to proclaim anaya between them. The husband may then not only reclaim his payment to her family, but set on her head a price, often exorbitant, which any other lover must pay into his hands before he can take her to wife. The woman is then said to be 'retired from circulation.'

Children, if boys, are held in honor, representing one more vote and one more gun; girls must shift as best they may; at least half the Kabyle women live by gathering sweet acorns.

Kabyle law regulates the disposition of property. If a peddler possesses a field which he cannot use on account of the demands of his business upon his time, the law obliges him to plant it with olives. The property in such matters is wonderfully divided up: one man may own the fifth part of a field; another, a fifth of the crop of olives, or a third of the crop of figs; still another, the third branch of the fifth olive-tree, or that branch which points to the east.

In Kabylia the discoverer of a spring of water, even if situated in the field belonging to another person, owns the water from it. This tends to encourage the search for water, the most important element in that arid region. The Kabyles are excellent agriculturalists. If there is a spot of earth in a chasm, a Kabyle will descend by a rope and cultivate it. They are extremely industrious, and work in concert. In the Kabyle country, land suitable for cultivation is worth eighty dollars an acre, while in the Arab districts it does not average four dollars in value per acre, — a difference illustrating the respective characters of the two races. The question of ousting the Kabyles from the land they cultivate, to make room for French colonists, is being discussed in France: so it would seem that the Americans are not the only people capable of robbing the aborigines. — (*Rev. géogr.*, June, 1883.) W. H. D. [393

BOTANY.

Columbines. — Grant Allen (*North-American review*, September) traces several of the steps by which the typical ranunculaceous flower has been modified to form that of Aquilegia and the other more highly specialized genera. The more important are the elongation of the petal, which "is just the petal of the buttercup, with the tiny depression or hollow of the nectary prolonged backward into a tubular spur," as a protection against small, thieving insects; and the reduction in the number of carpels, without a corresponding lessening of the ovules, which insures a more certain fecundation of the latter. The fact that A. canadensis is even more perfectly adapted to pollination by humming-birds than by bees, seems, however, to have escaped him. Though more greatly modified, the hooked spur of European columbines is in no wise more perfectly adapted to the end it is to serve than the straight spur of American species. In his zeal for demonstrating the correlation of highly specialized forms and colors in entomophilous flowers, the writer is also led to ignore such species as the common European Aconitum lycoctonum, which, with the structure of its immediate relatives, has the much less specialized yellow color of those lying lower in the scale.

Dr. Gray (*Bot. gazette*, September) calls attention to the longest columbine (A. longissima), a species from northern Mexico, with spurs four inches or more in length, and clearly adapted to profit by the visits of some long-tongued hawk-moth like Amphonyx antaeus, which occurs in the south-west, and has been found by Mr. Henshaw to have a proboscis cer-

tainly five inches and three-quarters long. It should be stated that all of our American columbines that have been studied, whether fertilized by bees, moths, or birds, are strongly protandrous, like the European species. — W. T. [394

Symbiosis. — Dr. Sedgwick gives a well-written synopsis of the results of the more important recent studies concerning the occurrence of chlorophyll in animals, and its significance. These seem to show that the so-called 'animal chlorophyll' has no actual existence, being in every case (possibly excepting Hydra and Spongilla) connected with a vegetable structure living in the tissues of the animal. This association of plant and animal, in the mutual benefits derived, is held to be somewhat different from the so-called parasitism known in lichens; but it is hard to see in what important respect the two cases differ. — (*Pop. sc. monthly*, Oct.) W. T. [395

ZOÖLOGY.

Coelenterates.

The anatomy and histology of Porpita. — A diffused nervous system, made up of a plexus of scattered ganglion-cells connected with each other by nerve-fibres, and similar to that described in the Medusae and Actiniae by the Hertwigs, and in the Hydroids by Jickeli, Lendenfeld, and others, has been described by Chun in Velella. Conn and Beyer have independently discovered the same structures in Porpita; although they express some doubt whether they are really nerve-cells, rather than some form of connective-tissue corpuscle without any nervous function. They incline, however, to the belief that the close resemblance which they bear to cells which have been found in the Medusae and Actiniae justifies us in regarding them as a very primitive nervous system.

The cells in question are, in Porpita, ectodermal; and sections show that they lie actually in the ectoderm-cells, outside the supporting layer and the layer of muscles. They are always found in connection with the muscles, and they are most abundant where the muscular system is most developed. They are bipolar, tripolar, or multipolar; and their processes could be traced to a considerable distance. Their distribution is as follows: they lie wholly in the ectoderm; and their fibres, after running for a considerable distance beneath the outer ectoderm-cells and immediately upon the muscle-layer, finally penetrate this layer, and are lost. The whole of the upper surface of the animal is supplied with them, somewhat sparsely toward the centre, but much more abundantly towards the edge, and especially in the velum. The under surface of the velum has also a rich supply, and the tentacles also contain great numbers; but towards the centre of the lower surface of the disk they gradually disappear, and none could be found upon the nutritive zooids. They are everywhere few in number, as compared with the ectoderm-cells, and they are very irregularly distributed. There is nothing like a central nervous system, and no union of the cells into a nerve-ring could be made out. Conn and Beyer also describe a number of so-called 'sensory organs,' which are placed in pockets, or pouches, around the edge of the velum. Each of these is filled with large and highly modified ectoderm-cells, which the authors regard as sense-cells. They have no connection with the ganglion-cells. — (*Stud. biol. lab. Johns Hopk. univ.*, ii. 433.) W. K. B. [396

Mollusks.

Visual organs of Solen. — Dr. Benjamin Sharp had been led to believe that Solen ensis and S. vagina, the common razor-shells, are possessed of visual organs, by observing that a number of these animals which were exposed in a large basin for sale in Naples retracted their siphons when his hand cast a shadow over them. Repeating the experiment at the zoölogical station, he became convinced that the retraction was due to the shadow, and not to a slight jar which might have been the cause. Upon examining the siphon, he found as many as fifty fine blackish-brown lines or grooves between and at the base of the short tentacular processes of the external edge. When a vertical section of these pigmented grooves is made, the cells of which they are composed are found to be very different from the ordinary epithelial cells of the surrounding tissue. The pigment-cells are from one-third to one-half longer than the latter, and consist of three distinct parts. The upper ninth or tenth part of each cell is perfectly transparent, and is not at all affected by the coloring-matter used in making the preparation; the second part is deeply pigmented and opaque, and forms about one-half the cell; while the remainder consists of a clear mass, which takes a slight tinge when colored. This portion contains a well-defined nucleus filled with granular matter, and is probably the most active part of the cell. These retinal cells, if so they may be called, resemble those of the very primitive eye of Patella. The value to the Solen of an organ which would enable it to detect the shadow of approaching objects as it lies embedded in the sand, with the end of the siphon protruding, must be evident; and the structure of the cells described bear sufficient relation to those of the eyes in Patella, Fissurella, and Haliotis, to make it highly probable that they constitute true primitive visual organs. — (*Acad. nat. sc. Philad.; meeting* Nov. 6.) [397

Organization of chitons. — A second part of Dr. Béla Haller's valuable investigations of the chitons of the Adriatic has appeared. It is illustrated with three double plates; and the species which have served his purposes are Chiton siculus and C. laevis. This part is devoted especially to the finer structure of the buccal muscles, of the parts surrounding the mouth and below the radula, and the minute structure of the branchia. He confirms the conclusion of Dall in 1879, — that the separate branchial tufts correspond each to a distinct branchia, instead of to the old cyclobranchiate theory, — and adds very materially to our knowledge in each of the above-mentioned directions. The author wisely refrains from much theorizing, as no group of equal rank exhibits more polymorphism than this, and no general rules can be

laid down with confidence from the examination of two species. — (*Mittheil. zool. inst. Wien*, v. heft 1.) W. H. D. [398

Crustaceans.

Trilobites from the Hamilton rocks of Pennsylvania. — Professor Angelo Heilprin has found in a small collection of invertebrate fossils obtained from the Hamilton rocks of the vicinity of Dingman's Ferry, Pike county, Penn., a complete specimen and several tail-pieces of Phacops bufo, and several well-preserved fragments of Homalonotus Dekayi. The determination of these species is of peculiar interest, inasmuch as it had been asserted that no trace of trilobites could be discovered in the rocks of this series. — (*Acad. nat. sc. Philad.; meeting* Oct. 30.) [399

VERTEBRATES.

Origin of fat in cases of acute fat-formation. — The chief part of this paper by Lebedeff is taken up with a discussion of the origin of the fat formed or deposited in the liver in phosphorus-poisoning. The author criticises at length the different theories of the origin of fat, under both physiological and pathological conditions. He does not admit the generally accepted theory of Voit, that the fats of the body form one of the products of the destruction of proteids, and gives some calculations showing the insufficiency of such an hypothesis to account for the amount of fat found in the liver and other organs after poisoning by phosphorus. His own view is, that, under normal conditions, the animal fat is derived directly from that taken into the body as food, while, in pathological cases, — fatty infiltration of the liver, for instance, — the fat originates from that already stored up in the body. The change in the chemical composition of the blood, produced by phosphorus, causes the fat in the subcutaneous connective tissue to pass into the blood, whence it cannot be removed on account of the diminished supply of oxygen, which is one of the results of phosphorus-poisoning, and therefore accumulates in the liver. Lebedeff has shown in a former paper, that when a dog is starved until all fat has disappeared from its tissues, and is then fed on foreign fats — linseed-oil, for example — and some proteids, there is a large accumulation of the strange fat in the body. Similar experiments were again made, with the addition that the animal was afterwards poisoned with phosphorus. Chemical analysis of the fat of the liver in such cases showed that it also, like the subcutaneous fat, contained a large proportion of the foreign fat. This fat could not have resulted from the destruction of proteids of the body, but must have been derived from fat already stored up in the body before poisoning, especially the subcutaneous fat. Lebedeff also made chemical analyses of the fats contained in the milk of the cow, woman, and rabbit, and compared them with the fats of other parts of the body. He finds that the 'fat of milk has no analogue in the body,' and consequently is not derived directly from these fats. He does not believe, however, that this fat results from proteid metamorphosis. The increase in the fat of milk, that takes place after feeding with meats, is owing, he thinks, to the fact that the albuminous material taken serves to emulsify the fats, and thus insures an easier passage from the blood. He comes to the conclusion that the fat of milk is directly influenced by the nature of the fat taken as food, and gives the results of some experiments demonstrating this fact. With regard to the origin of the milk-fat, his statements are not very satisfactory. It is derived directly, in the first place, from the fat of the mammary glands, with which it agrees in composition. This, in turn, is formed, he thinks, from the fats taken as food, or, in the case of starvation, from the fats stored up in the body. — (*Pflüger's archiv*, xxxi. 6.) W. H. H. [400

Mammals.

Vaso-dilators of the lower limb. — In previous papers, Dartre and Morat have shown that the view which was generally held of the distribution of the vaso-motor nerves — that the vaso-constrictors take their course through the sympathetic, the vaso-dilators through the cerebro-spinal nerves — is not true for the cervical sympathetic. They succeeded in demonstrating in it the presence of vaso-dilator nerves for the cheek, lips, etc. In the present paper they give the results of similar investigations upon the lower segments of the sympathetic, and the vaso-motors of the lower limbs. In order to estimate the vaso-motor effects, two methods were used. A manometer, or sphygmoscope, was connected with the femoral artery below the origin of the profunda; and, at the same time, the color-changes in the skin of the toes were noticed. Young dogs with little or no pigment on the feet were used. They first investigated the effect of stimulation of the peripheral end of the divided sciatic. In all cases the manometer showed a rise of arterial pressure, indicating that vaso-constriction had taken place; but, together with this general vaso-constriction of the blood-vessels, it was found, in some cases, that the balls of the toes were congested, showing local vaso-dilatation. If, instead of the sciatic, the abdominal sympathetic was divided at the level of the fourth lumbar ganglion, and the peripheral end stimulated, the same result was reached, — a general constriction of the arteries, together with a local dilatation of the skin of the toes. The latter phenomenon, as in the first experiment, was not constant. When the sympathetic was stimulated still higher, just below the diaphragm, the manometer gave a rise of pressure; but the dilatation of the vessels of the toes was more evident, and occurred in all cases. The interpretation they give to their experiments is, that vaso-dilator as well as vaso-constrictor fibres run in the sympathetic to the lower limbs; the vaso-constrictors predominate: hence the general rise of blood-pressure in the limb. The fact that the vaso-dilator effects are always obtained when the lower part of the thoracic sympathetic is stimulated, while in stimulation of the lumbar sympathetic and the sciatic this phenomenon is very inconstant, means, they think, that the vaso-dilators terminate, in part at least, in the

ganglia of the lumbar sympathetic, and exercise their influence on the blood-vessels by means of these ganglia, and not through the hypothetical peripheral ganglia of Goltz. Facts of the same general import have been given before by the authors, with regard to the last cervical and first thoracic ganglia. — (*Arch. de physiol.*, 549, 1883.) W. H. H. [401

Sexual variation of Rhytina. — Drs. Stejneger and Dybowski have given in two different journals a preliminary account of their joint discovery of a remarkable variation, supposed to be sexual, occurring in the skull of the arctic sea-cow. Their conclusions are based upon an examination of five adult male and three adult female skulls. The male skulls have the zygomatic arches both absolutely and relatively wider than the female skulls. The whole central portion of the former, also, is wider than that of the latter. In the female the vertical ramus of the mandible is longer than in the male, and the posterior angles are much nearer together. It appears that these differences have long been recognized by the Eskimo. — (*Proc. U. S. nat. mus.*, v. 79; *Proc. zoöl. soc. Lond.*, 1883, 72.) F. W. T. [402

ANTHROPOLOGY.

The death of King M'tesa. — Col. J. A. Grant, once the guest of this renowned king of Uganda, gives credit to the report of his death, published in the daily papers of the 13th of July. Some years ago the king was suffering with a malady which the missionaries believed would terminate fatally unless an operation was performed. The king was dissuaded from this; though the Africans, as a rule, operate upon one another without fear. When Speke and Grant visited him in 1862, he was a minor, the lineal descendant of a line of thirty-five kings, which accounts for the 'blue blood' and vanity which certainly ran in the veins of M'tesa. Col. Grant alludes to the princes of Uganda, whom Stanley saw in chains, as following a custom by no means irksome, to which M'tesa himself had submitted previously to his election. The vigor with which he administered his government, and his courtesies to travellers, have given him a world-wide reputation. He raised his subjects above the ordinary scale of Africans by making them observe while travelling. He fearlessly adopted the Mahometan, and afterwards the Christian religion, by listening to the Mollahs and Christian travellers who entered his country; his previous belief having been in one supreme being and in charms. To M'tesa is greatly due the discovery of the sources of the Nile; for it was he who gave us the route from the Victoria Nyanza to Egypt, and the knowledge that we have of the people, and the flora and fauna, of equatorial Africa. The army and navy of this king is said to have numbered 125,000 soldiers. His government was carried on by daily durbars, where several hundred chiefs of districts assembled with their followers to hear the eloquence of the prime-minister and members of the government. — (*Proc. geogr. soc. Lond.*, Aug.) J. W. P. [403

The tribes of the Cunéné, S. W. Africa. — The earl of Mayo, having spent the best part of a year in Mossamedes and its vicinity, gives us the benefit of his experience. Not much new information is conveyed about Portuguese rule; but a very interesting account is given of a colony of Boers, at Humpata, who, with their wives, children, and cattle, had trekked from Pretoria in the Transvaal, and reached his place after seven years' wandering. The negro tribes encountered were: 1. The Mundombes, holding the region from Mossamedes to Capangombe, at the foot of the Sierra de Chella. They have a language of their own, and belong to the Bantu family. They are large cattle-keepers, and are the native porters who carry travellers' luggage as far as the top of the Sierra de Chella. 2. The Munhanecas and Quipongos, tribes who inhabit the country around Humpata, Huella, and three days eastward. They are of the Bantu stock, cultivate the soil, and are armed with poisoned arrows, assegais, and knobkerries. 3. The Chibiquas, who live on the west slope of the Sierra de Chella, north of the Cunéné River. They belong to the Damara race, intermixed with Ovampos, whose language they speak. They capture the elephant by prodding the hind-feet so as to sever the muscles. The animal, thus brought to a standstill, is despatched with assegais. 4. The North Ovampos, who speak a dialect of the Damara language, and cultivate each an hereditary farm, having no communal farming, as the Hahé and Huilla natives. — (*Proc. geogr. soc. Lond.*, Aug.) J. W. P. [404

The Lolos of central China. — There is one indigenous tribe or people, now completely enveloped by a Chinese population, which has successfully resisted the wave of Chinese encroachment. They are termed 'Lolo' by the Chinese, 'Lo-see' and 'Ngo-see' in their own dialect. They inhabit a mountainous region on the Yangtsze, between 27° and 29° north. They make incursions into Chinese territory for blackmail and ransom, which they call 'rent,' and hold in slavery the Chinese then captured. We have the word of Marco Polo that "they are a tall and very handsome people, though in complexion brown rather than white, and are good soldiers." They never intermarry with the Chinese, even the Chinese female captives being given to the male captives as wives. Mr. Baber, who has closely studied these people, seeks to identify them with the *Colomon* of Marco Polo, and in the course of his argument makes some interesting statements respecting their burial-customs. They possess the art of writing; and Major-Gen. Mesny, of the Imperial Chinese army, some years ago obtained a thick folio manuscript from a tribe near Chenning, in Kuei-chou (25° north, 105° 40′ west). The work is bound in goat-skin with the hair on, and is written in the ordinary Lolo script, with illustrations of a crude and primitive nature, depicting human figures, animals, and plants. Mr. Baber pays a just tribute to Baron v. Richthofen and Col. Yule, in stating his conclusions respecting the Lolos. — (*Proc. geogr. soc. Lond.*, Aug.) J. W. P. [405

Ethnology of Timor. — In a letter addressed to Sir Joseph Hooker, in 1880, Mr. H. O. Forbes wrote

from Sumatra, offering, if some assistance could be forwarded him, to attempt an expedition to Timor-laut. The British association granted the needed funds, and the trip was made. This island must not be confounded with Timor, lying to the south-west. A large collection of crania and culture-objects was made, and a vocabulary of several hundred words compiled. Among their customs described are their methods of dressing the hair, the clothing and ornamentation of the body, their agriculture, meals, fishing, armor, marriage, care of children, mourning, inheritance, oaths, government, slavery, physical characteristics, intellectual and moral qualities, pastimes, music, and calendars. Commenting on the paper, Prof. Flower stated, that, of the twelve crania, eight were brachycephalic, and of decidedly Malay type; one was dolichocephalic, prognathous, and with large teeth, indicating Papuan or Melanesian affinities; and the other three were more or less intermediate. Nearly all showed signs of artificial flattening of the occipital region.

Mr. Keane remarked that Mr. Forbes confirmed the prevalent opinion regarding the extremely complex nature of the ethnical relations throughout the whole of Malaysia and Polynesia. In Timor-laut, Papuan, Malayan, and even Polynesian tribes had here become intermingled in diverse proportions; the result being a distinctly mixed race, such as was everywhere in this region often designated by the inconvenient term of 'Alfuro.' Timor-laut, however, seemed to present the peculiarity that the various elements had not here become so completely amalgamated as in most of the neighboring islands. Hence the remarkable phenomenon of frizzly and lank hair, brown and black complexion, very tall and very short stature, dolichocephalous and brachycephalous heads, etc., all still found side by side in the same village community. The resemblance in so many of the crania to those of the brown Polynesian race of Samoa, Tahiti, Hawaii, etc., was very striking; so that Timor-laut must have been one of the last islands occupied by this race in Malaysia during its eastward migration to the remote archipelagoes of the Pacific. — (*Journ. anthrop. inst.*, xiii. 8.) J. W. P. [406

The Mavia tribe of negroes. — Cape Delgado is on the east coast of Africa, about 11° south. Mr. H. O'Neill, H.M. consul, has made a journey inland from this point into the country of the Mavias, or Mahibas, whose existence was first pointed out by Livingstone, and who have baffled the efforts of succeeding travellers to penetrate their country. Mr. Joseph Thomson and Mr. Chauncey Maples both testify to their exclusiveness. A description of one village will serve for all. A circular belt sixty to eighty feet wide was thickly planted with trees and underbrush. At two or three points a narrow path was left for entrance, and guarded by double or triple gates. The gate is a framework of two strong uprights, deeply embedded in the ground, and strengthened by two horizontal bars about five feet apart. Two other movable horizontal bars fit, one end in a hole, the other in a niche in the uprights. A number of smaller uprights have holes burnt through both their ends, by which they are threaded upon the two horizontal bars until the framework is completely closed, when the ends are thrust into the holes and niches, and the whole strengthened by beams placed against it on the inside. The gates are carefully closed at sunset. Forty or fifty huts are built in the space, and goats and poultry take the place of the Irishman's pig in each shanty. This tribe wear immense lip rings or studs, which give to them a hideous profile. They show a great respect for the dead, and carefully tend the graves of any of their chiefs or head men. On some of these are raised mounds of clay, enclosed with a low ridge. This again had a raised framework upon it, roofed in with thatch, and the corner posts ornamented with small streamers of cloth. Mr. O'Neill appends a vocabulary of about a hundred words. — (*Proc. geogr. soc. Lond.*, July.) J. W. P. [407

EARLY INSTITUTIONS.

French and English law. — Some time ago the Institute of France proposed as a subject for competitive writing a comparison of the French and English systems of law in their history and development. An extensive work (5 vols. 8°) was forthwith produced by M. Glasson. It was accepted and 'crowned' by the academy. It is entitled *Histoire du droit et des institutions politiques, civiles, et judiciaires de l'Angleterre, comparés au droit et aux institutions de la France, depuis leur origine jusqu'à nos jours.* The book is being reviewed, and is much praised. The student who finds Reeves' History of the English law obsolete and tiresome will be glad to have a substitute for it. The writer takes up different subjects,—'the king,' 'parliament,' 'property,' etc., — and treats them separately. The sequence of events, and their relationship with one another, are by this method lost sight of to a certain extent. The method has its advantages, however; and a subject so comprehensive could hardly be treated, we should think, in any other way. It is quite impossible to bring history, with its innumerable beginnings and endings, or issues, into one continuous narrative. French history begins with the meeting of the Germans and the Romans. French institutions are, to begin with, partly German, partly Roman. English institutions are, however, almost purely German down to the period of the Norman conquest. It is in England, therefore, that we trace the development of German institutions, rather than in France. The monarchy, for example, was in France framed upon the Roman model; while in England the Teutonic model was adhered to. While we have an absolute monarchy in France, we have a very limited monarchy in England, — a democratic republic, with a monarchical head, so to speak. Feudalism is described as the result of German and Roman influences. It established itself in France, and was taken from France into England. The English were verging towards feudalism, to be sure. There was a good deal of feudalism in England before the conquest. The custom of commendation was not unknown, but it was not associated with the holding of benefices. The hold-

ing of *boc-land* under the *trinoda necessitas* resembled the holding of a benefice in later times; but the holders of *boc-land* were not vassals of a lord. Their services were due to the state rather than to the king. The king was not the universal landlord until after the conquest, when the Norman lawyers persisted in describing proprietorship as a tenancy. At the same time a great deal of proprietorship was converted into tenancy. The position of the isolated proprietor was unsafe; and proprietors very generally converted their inheritances into tenures, under the overlordship of the king or some other great lord. M. Glasson describes the various forms of tenure which existed under the feudal system, and the condition of the tenants. A large part of the work is devoted to legal procedure and judicial organization. — (*Edinburgh rev.*, July, 1883.) D. W. R. [408

NOTES AND NEWS.

THE death of Dr. John L. LeConte at his home in Philadelphia on Thursday of last week, at the age of fifty-eight, removes one who has long been the leader, *facile princeps*, of American entomologists. With his death, the younger men are completely separated from the former generation of workers in this field, and they will lose a friend and teacher to whom they constantly looked. Dr. LeConte was as highly honored abroad as at home, and has been an active investigator for nearly forty years. His death occurred during the session of the National academy, of which he was a member, but was not known in New Haven until its close. We shall give in a future number an account of his services to science.

— President Arthur, in carrying out an act passed by Congress, has invited the various countries to send representatives to an International conference at Washington, the date of which is not yet fixed, to establish a common prime meridian. The governments of Austria, Norway, and Sweden, have declined; but the latter two approve of the object. Spain is favorable, but has deferred its reply. Belgium is uncertain, but Denmark and Portugal have accepted the invitation conditionally. Switzerland, Venezuela, Mexico, Turkey, Greece, China, Japan, Hawaii, Hayti, Liberia, Holland, Canada, Guatemala, Roumania, Nicaragua, and Honduras have accepted. Replies are expected from Italy, Great Britain, Russia, France, Chili, Brazil, and Germany.

— Mr. Edward Atkinson has prepared a plan for a textile laboratory and museum in Boston. He thinks that a hundred thousand dollars would be ample for the construction of a proper building, and its equipment, which should be an adjunct of the Massachusetts institute of technology. The purpose is to afford special training for young men intending to pursue textile manufacture. The first two years' course of instruction in the institute is suited as a basis for the future special study of textile manufactures; and it is in the next two years of the curriculum that special training should be followed. The first two years would ground the student in modern languages and mathematics, in mechanical drawing, in general geology and chemistry, as well as in the practical work of the physical and chemical laboratories, and will thus prepare him for entering upon the special course of textile industry. The professional studies would include geology, botany, mechanical engineering, building and architecture, mechanics, textile design in all branches, industrial chemistry, history, and political economy.

— Professor Balfour Stewart and Mr. W. L. Carpenter discussed, before the British Association for the advancement of science, the supposed sun-spot inequalities of short period. Putting aside for the time the question of true or nearly apparent periodicity, they exhibited certain results obtained by application of a method of detecting unknown inequalities in a mass of observations. Thirty-six years' observations of sun-spots were divided into three series of twelve years each. Two apparent sun-spot inequalities of about twenty-six days came out very prominently, appearing for each of the twelve years in the same phase, and to very nearly the same extent.

— A design for a new high-level bridge at Newcastle-on-Tyne has been prepared by W. G. Laws, city engineer. It shows a clear span of six hundred feet, and a clear headway above high water of eighty-two feet. The bridge will be of steel, and the cost of superstructure, foundations, and approaches, is estimated at two hundred and fifty thousand pounds.

— Sir J. Whitworth & Co. have lately completed and tested a 9-inch (23 centimetres) gun for the Brazilian government. The peculiar feature of this system is the hexagonal section of the bore of the gun. The material is compressed cast steel, which is superior to other steels in its combined ductility and tenacity, and in its perfect soundness. This gun, on trial, threw a shell of the weight of 300 pounds (136 kilograms) 7,876 yards (over 7,000 metres), and drove a steel shell weighing 400 pounds (181 kilograms) through a wrought-iron plate 18 inches (48 centimetres) in thickness; and its backing broke up a cast-iron plate supporting it, and finally buried itself in the earth. Such results are not attainable, so far as experience has yet indicated, by any other system of ordnance.

— An electric tram-car was recently tried in Paris very successfully. It was driven a distance of thirty miles in about three hours without accident or detention. The current was supplied by Faure accumulators placed under the seats, and driving a Siemens dynamo under the floor at the rate of twelve hundred revolutions per minute. The car-wheels turn sixty times to twelve thousand revolutions of the dynamo. The speed attained was five and a half to nine miles an hour, according to the gradient.

— In a paper before the British association, Professor Boyd Dawkins remarked that the classification of the tertiary rocks, sketched out some fifty years ago, and since then altered in no important degree, is out of harmony with our present knowledge, and the definitions of the series of events which took place in it has been greatly modified by the process of discovery in various parts of the world. The terms 'eocene,' 'miocene,' and 'pliocene' no longer express the