Marine Engineers in New York. Whatever may be the decision of the U.S.A. authorities as to the surface speed necessary, the author of this paper is firmly convinced of the relatively greater importance of the submerged qualities for this type of boat, and believes that battery capacity and submerged radius of action and speed should not be unduly sacrificed either in the interests of durability or first cost.

OUR ASTRONOMICAL COLUMN.

A NEW COMET.—According to a telegram received on December 5 from Prof. Strömgren, Copenhagen, a message from the Cape to the Astronomer Royal announces that a new comet was observed by Taylor on December 2 in a position "three minutes preceding sixteen minutes south of δ Orionis." It is stated to be moving slowly north, but no indication is given of its magnitude.

THE SOLAR ROTATION.—The detailed account of a valuable spectrographic determination of the latitude variation in velocity of the sun's rotation is presented by Mr. J. B. Hubrecht in a memoir forming part i. of vol. iii. of the Annals of the Solar Physics Observatory, Cambridge (see also Monthly Notices, R.A.S., No. 8). Four series of spectrograms were secured during the first fortnight of June, 1911, with the McClean solar instruments. Each series contained the material—forty-eight plates—from which velocity differences have been derived for pairs of plates taken in positions separated by 90° at intervals of 15° around the sun's limb. The region studied was λ 4300–λ 4400, under a dispersion in fourth order such that 1 Å.U. = 1·13 mm. Attention may be directed to a point regarding the manipulation of the Zeiss comparator; the settings were made by simply pushing the slide, and the readings were taken to 0·0001 mm., with an average probable error per displacement of only 0·0004 mm.

The results obtained indicate that the velocities probably vary regularly according to wave-length, diminishing towards the red, due to some physical cause residing in the sun itself. The distribution of the velocities appears to be consistent with the requirements of Emden's theory of the constitution of the sun.

GALACTIC CO-ORDINATES.—The progress made of recent years in stellar astronomy has directed increasing attention to the employment of a natural system of co-ordinates in place of those based on the arbitrary, ever-changing geo-solar planes of reference. The fundamental plane of reference is obviously determined by the Milky Way, but there remains to be fixed the point of departure in longitude. Unfortunately, from analogy with the standard system choice of this initial point has fallen on the ascending node of the galaxy. Mr. R. T. A. Innes, in advocating the general introduction of secular co-ordinates, pointed out the great economy of effort they afford in connection with the study of the planetary motions, and proposes to fix the zero of galactic longitude by the apex of the sun's way, thus entirely eliminating the effect of precession. In Circular No. 29 of the Union Observatory, Mr. Innes supplies a convenient table for the conversion of equatorial into galactic co-ordinates. The table is calculated on the basis of Newcomb's position of the pole of the galaxy (α 191·1°, δ + 26·8°, and Campbell's determination of the solar apex (α 270·0, δ + 30·0°), and contains the galactic equivalents of every 5° of declination and twenty minutes of right ascension, also galactic parallactic angles for converting north pole position angles into corresponding position angles referred to the north galactic pole.

A MARTIAN CALENDAR.—In Report on Mars, No. 10, Prof. William H. Pickering gives what should prove a convenient calendar for the use of observers of the planet Mars. The Martian year is divided into 669 calendar days of 24h. 38m. 42·04s. each, the planet's sidereal day (*i.e.* time period of rotation) being 1m. 19·39s. shorter. Fifty-six days are allotted to the first nine "months," and one day less to each of the other three. The "week" of seven days is thus retained as a unit. The year commences at vernal equinox, Martian date, March 1 = terrestrial date, March 20. The same report also contains some remarks on the possibility of observing gemination of canals during the coming opposition, and concludes with a discussion of colouring of the markings.

THE CENTENARY OF THE SOCIÉTÉ HELVETIQUE DES SCIENCES NATURELLES.

THE centenary of the Swiss Natural Science Society was celebrated on September 12–15. The meeting was a great success, and was marked by two touching ceremonies: the placing of a laurel crown before the monument of Henri Albert Gosse, the gifted apothecary of Geneva, who with Pastor Wyttenbach, of Berne, originated this great national society, and the inauguration of a monument to the Swiss naturalist Forel at Morges. Both these monuments consist of fine erratic blocks, with the head of the naturalist carved in the form of a medallion. One stands in the shady garden surrounding the University of Geneva; the other has been placed in one of the most exquisite spots on the banks of Lake Leman. But it is not in these grand stones that we must seek the record of the fame of those they commemorate. It is in the living society which has carried out the ideals and continued the work of its founders—a society of which Forel formed until three years ago a prominent member—that the glory of these simple lovers of Nature and of their country is to be found.

The primary idea in founding the society was patriotic; a secondary one, dependent on the success of the undertaking, was that the society would be visited by *savants* from all countries, and that it might prove itself a source of light the rays of which should spread over the whole scientific world. Both these ideas have been realised in the hundred years that have passed, but it is interesting that the centenary should fall at a moment when the former only could have any prominence.

There were no official delegates from foreign countries, and practically all the participators were Swiss. The author of the present account was the only member of the English scientific world at the meeting, but she and Prof. W. H. Young, whose absence in America alone prevented his giving personally the communication presented in his name, are accepted by the Genevese scientific circle as almost, if not quite, of them.

In these circumstances, and in view of certain superficial elements of discord between the French and German Swiss, which the war has brought under the eye of the public, the occasion was made one for a manifestation of patriotic feeling. The President of the Confederation was present, and gave a memorable and eloquent address to the society after the official banquet at the Parc des Eaux Vives, lately become the property of the town of Geneva. President Motta is a native of Italian Switzerland, a fact

of no small importance at the present crisis. Switzerland, one and indivisible, her children diverse in speech and modes of thought, only the more efficient for that diversity, were mirrored in that patriotic confraternity of science, inaugurated by a citizen of Romance Geneva and one of Allemannic Berne. Among the names, too, of the great Swiss naturalists, French and German as they sound, Swiss as they are—Agassiz, de Candolle, Vogt, Forel, Escher, Merian, Studer—whom President Motta cited as written in golden letters in the great book of European science, he placed one more, that of Luigi Lavizzari, not only as worthy of as high a place, but more especially for having devoted his life to the description of the natural beauties of that corner of earth which the president called "his own," which unites on a small surface, eternal snow and plains rich in corn, sombre pines and sweet olive-trees, the severe shadows of the north, and the brilliant lights of southern landscapes.

"How," the president exclaimed, "can one be Swiss without loving Nature? It is the sense of the infinite and the insatiable thirst for perfection and for truth which confer on man, with his royal littleness—the idea is Pascal's—his true greatness. How can one love Nature without loving Science, whose aim is disinterested research, and whose condition of existence is intellectual liberty? And how can we love Nature and Science without being attached to the soil of our country with all the fibres of our heart?

"Certainly the country is not only the soil on which the people dwell; it is more than that; it is composed of the patrimony of the past and the aspirations of the future; it is formed by the holiness of customs and the spirit of institutions; it is the physical and moral tradition which binds the dead to the living and the living to those that shall be born; but the soil remains an essential part of the country. And when this soil itself represents a little world, when it offers to its children the most touching and the most picturesque sights, grace and sublimity side by side, oh! then the soil is sacred. It becomes the source of the sanest thoughts and the purest emotions. It explains in some sort our history and why Switzerland cannot be other than a democracy, that is to say, a popular government aspiring always to more liberty, more justice, and more fraternity; to defend it, to defend this soil, each of us in the hour of danger would be ready, if need were, to sacrifice his blood and his life.

"No," he continued, "none of us will ever admit in our midst the struggles and the competition of races. The present hour, which has given birth in all the belligerent countries to proofs of self-sacrifice and devotion, arousing on our part cries of admiration and of pity, brings out that which is murky, sad, and almost inhuman in these struggles and antagonisms.

"Switzerland will remain for ever a fraternal republic. No one has ever demanded that the differences of race, language, and education should disappear. The ideal of a State like ours is not uniformity; we know that our State would lose a capital part of its force and its value if it ceased to exhibit that variety of tendencies, languages, and methods of education; but variety means emulation and not contrast. . . . To set the Latins against the Germans, as irreconcilable enemies, would be not only a bad deed, contrary to the moral and political constitution of the country, but also an attack on Christianity and civilisation."

In concluding, the president referred in moving words to the work of the Red Cross, and to its founder, the Swiss Henri Dunant. "What more appropriate wish," he cried, "can I formulate for the Swiss Natural History Society than that it should, in the second century of its existence, become the Red Cross of Science, to bind up and to heal the most distressing of ulcers and the most mortal of wounds, those which torment souls and part spirits?"

In spite of the war, which in Switzerland, as elsewhere, has affected scientific productivity, a valuable series of communications was presented to the society. The programme was as follows:—

(1) *Mathematics.*—L. G. Du Pasquier, On systems of complex numbers; G. Polya, Is a series of powers in general capable of analytic continuation?; M. Plancherel, On the convergence of a remarkable class of definite integrals, involving an arbitrary function; W. H. Young, On integration with respect to a function of bounded variation; G. Chisholm Young, On curves without tangents; D. Mirimanoff, On the tile theorem; L. Crelier, On a theorem in kinematic geometry; R. de Saussure, The geometry of *feuillets côtés*; G. Cailler, Analytical discussion of the same. (A *feuillet côté* is a geometrical form consisting of a point, a straight line through it, and a plane through that, all being weighted, or "côté," with an additional number. The theory has much analogy with the theory of screws, but has two more degrees of freedom.) H. Berliner, A new analytic geometry; Gonseth, Two generalisations of a theorem of Poncelet.

(2) *Physics.*—L. de la Rive, On the movement of the ether relative to the earth; A. Hagenbach and W. Rickenbacher, Comparison of the thickness of soap films when measured optically and electrically; E. Guillaume, On Maxwell's law of repartition; C. E. Guye and C. Levanchy, Experimental verification of the formula of Lorentz-Einstein for cathodic rays of high velocity; A. Schidlof, Recent researches into the charge of the electron and Avogadro's number; A. Tcherniawsky and Z. Popoff, The flow of mercury along tinned wires; S. Ratnowsky, The constants of entropy for gases and the theory of rigid bodies; A. Piccard and A. Cherbuliez, A new method of studying paramagnetic salts in very dilute solution; J. de Kowalski, On the radiation of an oscillating electric spark; A. Gockel, On rays which pierce through the atmosphere; J. Andrade, An exact balance for the measurement of horizontal force.

(3) *Geology and Geophysics.*—A. Brun, The action of steam on eruptive rocks at a high temperature; L. Rollier, On the Mesozoic palæography of Switzerland; M. Lugeon, Some new facts in the geology of the Dent de Morcles; R. Billwiller, The chief types of great deposits in Switzerland; A. de Quervain, Report of the Commission of glaciers in Zurich (1915), and the work done in the seismological department of the Swiss Meteorological Institute; J. Maurer, On the repetition of the sun-spot periods in the observations of the Northern Lights made in Switzerland since 1540; A. Heim, On the relation of variations of gravity to the geological structure of Switzerland; P. Girardin, The changes of the limit of perpetual snow in Savoy and the Alps in historic times; L. Collet, The subterranean outlet of the Seewlisee (Uri); A. Buxtorf, The geology of the Grenchenberg Tunnel; B. G. Escher, Stones with furrows and rills.

(4) *Chemistry.*—E. Noelting and F. Steimle, The preparation of compounds with closed chains; E. Noelting and E. Kempf, On the properties of trianisylcarbinol for dyeing; L Reutter, A contribution to the chemistry of the physiological powder of juniper; A. Werner, On compounds containing at the same time asymmetric carbon atoms and an asymmetric cobalt atom; F. Fichter, Electrochemical re-

duction and oxidisation of organic compounds of arsenic; S. Reich, Nitration of phenylpropiolic acid; P. Dutoit, On the mechanism of the formation of certain precipitates; E. Briner, On the formation and the decomposition of the metallic carbures; O. Kaiser, On the hydrocarbons in coal; M. Duboux, On a differential calorimeter; G de Montmollin and O. Billeter, The action of cyanide of benzine-sulphonyle on sulphuretted compounds; A. Pictet and T. Q. Chou, Direct formation of alkaloids starting with albumines; L. Pelet, On the theory of dyeing.

(5) *Botany*.—A. Ernst, Researches into *Chara crinata*; C. Schroter, Recent researches in botanic geography in North America; P. Jaccard, On the distribution of medullar rays in the conifers; B. P. G. Hochreutiner, On certain new species of Malvaceæ; G. Senn, The distribution of chromotophores in marine algæ; E. Kelhofer, Wooded and cultivated parts of the Jura near Schaffhausen; M. Rikli, The flora of Crete; A. Trondle, On the permeability of the tip of the root; M. Jäggli, The delta of the Maggia and its vegetation; J. Briquet, The vegetable parts of the Cruciferæ sempervivoides.

(6) *Zoology*.—Dr. Thomas, A critical study of mountain sickness; P. Revilliod, Preliminary note on the osteology of the fossil Chiropteræ in Tertiary beds; J. Roux, The family of the Atyidæ; E. A. Göldi, Comparative development in the sexual reproduction of plants and animals; A. Oswald, On the action of the glands of internal secretion on the circulation; A. Burdet, The birds of the island of Texel, Holland; O. E. Imhof, The molluscs of our Alpine lakes; H. Blanc, Contribution to the anatomy of *Chlamydophorus truncatus*; L. Ascher, (*a*) The factors determining the internal secretion of the glandula suprarenales, (*b*) the innervation of the liver; (*c*) the acoustic properties of the canales semi-circulares; A. Lipschütz, The importance of physiology in the study of development; E. Yung, The effects of inanition on the cell; A. Gandolfi, Observations on the distribution of *Daphnia hyalina* in the Lake Leman; E. André, The balantidium of the amphibians.

(7) *Entomology*.—C. Emery, History of an experimental society of amazon ants; J. L. Reverdin, Revision of the palæoarctic species Hesperia; E. A. Göldi, New discoveries in the origin of sex, the determination of sex, and the proportion of the sexes in insect states, particularly in the cases of the honey-bee and the neotropic ants; F. Ris, Census of the Swiss Plecoptera by F. J. Pictet in 1841 and nowadays; O. Schneider-Orelli, On the biology of *Phylloxera vastatrix*; F. Brocher, The circulation of the blood in the wings of the Dyticidæ; C. Ferrière, The utilisation of insects which eat other insects; H. Faes, On the value of the powder of pyrethra obtained from indigenous plants for insecticide purposes; A. Pictet, Hereditary and individual reactions in insects.

(8) *Anthropology and Ethnography*.—Dr. Lardy, The grotto of Cotanchere; H. Lagotala, Study of a hundred Genevese femurs; Dr. Montandon, The instruments of music in the ethnographic museum at Geneva; R. Montandon, The handling of stones at the Moustierian station of Rebières; Prof. Schlaginhaufen, The Neolithic lake-dwellings of Egolzwil; E. Matthias, The influence of physical exercise on growth; A. Schultz, New projective measurements of the skull; H. Hoessly, Craniological investigations among the east Eskimos, after the Greenland expedition of 1912; A. Cartier, The chief discoveries at the Magdalenian station of Veyrier; E. Pittard, Castration and the morphological modifications which it causes in man.

On September 13 and 15 lectures were given to the assembled society in the Aula of the University. Prof. Emile Yung, the eminent Genevan zoologist, gave an interesting account of the first century of the society, and laid before the meeting the *Livre du centenaire*. The venerable geologist, Prof. Albert Heim, the friend of Forel, spoke on fresh light in the investigation of the Jura Mountains; Prof. P. L. Mercanton, of Lausanne, reported on forty years' mensuration of the Rhone glacier; Dr. Fritz Sarasin, of Basel, the well-known traveller and archæologist, gave a lecture, with lantern-slides, on an archipelago in the Pacific Ocean—the Loyalty Isles; and Dr. E. Rübel, of Zürich, spoke of the international botano-geographic expedition to North America, also with magic lantern. But the most remarkable was the opening discourse of the president, Prof. Amé Pictet, of Geneva. It dealt with molecular structure and its influence on life and death. What, he asks, is it that renders matter living? And, again, what is it that renders some matter injurious and some harmless or beneficial? To study these profound questions, Prof. Pictet turns to the vegetable world, as more fundamental in the scale of life than the more dependent animal realm. It is the plants, indeed, that are able to perform the synthesis of organic substances on which all life seems to depend. In the vegetable world it is the group of poisons known as the alkaloids which have yielded up their secret to Prof. Pictet's patient study. His theory is that it is to the molecular constitution that we must look. It has been shown that all the organic compounds known belong to two types of molecular structure: (1) open chains, and (2) closed chains. These two classes of compounds are separated by a great gulf; but it is not impassable The passage from the open to the closed chain can be effected with comparative ease by means of chemical reactions, but the reverse process is difficult. The closed chain is a very stable molecular form, and this it is which Prof. Pictet connects with death. Life is, roughly speaking, the passage of all open chains to the closed form. Such closed chains may be, and indeed must be, formed from time to time in the organism, and constitute the life in death, from which the animal tries to free itself by excretion. The plant cannot do this, but it protects itself internally from these dangerous products. Such are the essential oils, turpentines, and camphors, which constitute so many of our perfumes; such, again, are the caoutchoucs and tannins, the vegetable colouring matters, and the deadly poisons hidden in various plants These, Prof. Pictet tells us, are products of denutrition; they are like our so-much-talked-of uric acid. We find them, not in the living cell, but packed away in dead cells, and often wrapped round with protecting covers to prevent them from harming the living plant. Thus, he concluded, the serpent who bites his own tail, which was the symbol of eternity with the ancients, deserves to become for the modern biochemist the symbol of death.

GRACE CHISHOLM YOUNG.

THE CONCH SHELL OF INDIA.[1]

THE conch or chank shell (*Turbinella pyrum*) is so intimately connected with the religious and social life of the people of India that the monograph on the subject prepared by Mr. J. Hornell, Superintendent of Pearl and Chank Fisheries to the Government of Madras, is welcome. He has gained in the course of his official duties a knowledge of the industry in Madras, and he was recently deputed by

[1] Madras Fisheries Bureau. Bulletin No. 7. "The Sacred Chank of India: A Monograph of the Indian Conch (*Turbinella pyrum*)." By J. Hornell. Pp. viii+181+18 plates. (Madras: Government Press, 1914.) Price 3s.