

some cases, different nuclei may give rise to separate tails; such would seem a possible explanation of Commander Sampson's observation of the comet of 1882 (Fig. 20).

J. NORMAN LOCKYER.

(To be continued.)

### THE ANNIVERSARY MEETING OF THE ROYAL SOCIETY.

THE anniversary meeting of the Royal Society was held on Friday last, St. Andrew's Day. The President read the anniversary address—a copy of which has not yet reached us—and presented the medals. Prof. Huxley received the Copley Medal, and Mr. Crookes the Davy Medal in person. Prof. Osborne Reynolds was also present to receive one of the Royal Medals. The other Royal Medal was received on behalf of Baron von Mueller by Sir Graham Berry, Agent-General for Victoria, and the Rumford Medal, which had been awarded to Prof. Tacchini, was received on his behalf by the Chevalier Catalani, the *Chargé d'Affaires* at the Italian Embassy. The Society next proceeded to elect the officers and Council for the ensuing year. The selected names we have already published.

In the evening about 175 Fellows and guests dined together at Willis's Rooms. Among the guests were eminent representatives of the English Government, of foreign nations, and of art and literature. Sir Frederick Leighton, in proposing "The Royal Society," said:—

"A great honour is done to me in intrusting to my hands the toast which I have risen to propose, for it is the toast round which the chief sympathies of those who sit at this table are centred, be they hosts or be they guests—namely, prosperity to that ancient and honoured body, the Royal Society. It is, indeed, a toast favoured in this—that no inadequacy of presentment could rob it of your warm reception, but it is one, also, which, in one sense, the individual now before you is so little fitted to propose that I could almost suspect you, Sir, of a little prompting of humour in your selection. I do not mean because the bodies with which you and I have respectively the honour to be connected are now, in Piccadilly, as they were in former days in Somerset House, next-door neighbours, and because it is not habitually to one's next-door neighbour that one looks in life for a kind word; but on this other and more cogent ground—that the subject on which you bid me speak is one in regard to which I am entirely ignorant, and that my attitude is therefore not free from ludicrous aspects in the face of a body to which grasp and accuracy of knowledge is the one thing needful, and precision of statement the first duty of man; and this, Sir, certainly not least in the day of your headship. And yet, on closer view, it is not knowledge, perhaps, that you require of the proposer of this toast so much as respectful sympathy; and that you find in me to the full. No, gentlemen, you do not demand in me knowledge beyond that of the average ignoramus who watches you in wonder as you sound with divining eyes the realms of the heavens above and of the earth beneath and of the water under the earth, and lay bare before us the very beat of the life-pulse of Nature. You demand in me, I say, rather, some sympathetic sense of your magnificent missions, some adhesion to the faith that you profess, and for these you do not look to me in vain. It happens to me, Mr. President, from time to time to have to acknowledge words of recognition of the services of the great institution to which I am bound in a like capacity with your own; and, knowing how earnestly that body is bent on the worthy discharge of an arduous task, such words are deeply grateful to me; but in every such case I see in my inner mind, behind and above the institution which I serve, the sweet and serene countenance of our divine mistress—of Art herself; and so, also, in offering this toast to the acclamation of your guests and to the acceptance of your flock, I am thinking less of the noble services of your renowned Society, less of the many names which are its high adornment at this time and our country's pride, than of your mistress beneficent and supreme, the scatterer of darkness—Science. All of us walk in the daylight of her illumination, the humblest layman can bear witness to her, and the most ignorant concerning the paths she treads may yet not unbecomingly declare his gratitude to her ministers, and express, as I now express, the hope that they and their successors may in the bond of this constituted brotherhood long continue to tend the flame and feed the increasing splendour of her sacred inextinguishable lamp."

The President of the Royal Society responded in a short speech, in which he compared the Royal Society to a wave of light moving onward through space, conveying intelligence from one portion of the universe to another far-distant portion. The molecules which it set in motion had but a brief existence, but the wave moved ever onward.

### SCIENTIFIC SERIALS.

THE *Journal of Botany* is still largely occupied with the discussion of points connected with botanical nomenclature, in which English, American, and Geneva botanists take part. The October number contains also a description of a new genus of Berberidaceæ by the Japanese botanist Tokutaro Ito.—In the November number are papers on the genus *Carex*, by Mr. L. H. Bailey; on Ferns from West Borneo, by Mr. J. G. Baker; on South Derbyshire plants, by Rev. W. R. Linton; and on the Desmids of Maine, by Mr. W. West. Mr. W. H. Beeby records the interesting fact that of the two very nearly allied species of valerian, *Valeriana Mikani* and *sambucifolia*, one is very attractive to cats, while to the other they are quite indifferent.

In the *Botanical Gazette* for September, Mr. C. Robertson completes his essay on zygomorphy and its causes, summing up the results of his observations. The remainder of the number is largely occupied by abstracts of botanical papers read at the Cleveland meeting of the American Association for the Advancement of Science.—In the October number are two important anatomical papers, by Miss Emily L. Gregory on the development of cork-wings on certain trees, and an illustrated one by Mr. W. H. Evans on the stem of Ephedra. Mr. G. Vasey contributes an interesting article on the characteristic vegetation of the North American desert.

THE number of the *Nuovo Giornale Botanico Italiano* for October 1888 is entirely occupied by reports of the papers read before the annual meeting of the Botanical Society of Italy held at Florence in September, many of which are of considerable interest.—Sig. C. Massolongo describes the germination of the spores of three new species of Sphærosporidae—*Phyllosticta Bizzozzeriana*, *P. Aristolochie* and *Phoma Orobanchie*. He maintains that the only difference between pycnidia and spermatogonia is that the sporules (stylospores) contained in the former are capable of germinating directly, while those formed in the latter (spermatia) have no such power.—Sig. A. N. Berlese adds to the very numerous fungus-parasites of the vine two new ones, *Greenaria fuliginosa*, S. et V., and *Aeschylta rufomaculans*, Berk.—Sig. G. Gasperini has investigated the nature of the organisms which bring about the fermentation of the palm-wine known to the Arabs under the name of "legibi." He finds it to be due to *Saccharomyces cerevisiae*, which is always accompanied by *Bacillus subtilis*. On the surface is also commonly found a pellicle of *Saccharomyces Mycodermis*—Prof. A. Borzi describes a new species and genus of Ascomycetes—*Eremobotrium Cymbalaria*, found on half-ripe capsules of *Linaria Cymbalaria*.—The little-known germination of the seeds of the water-lily, *Euryale ferox*, is described by Sig. G. Arcangeli, the chief peculiarity being the almost entire suppression of the elongation of the radicle.—Prof. L. Macchiati claims to have discovered an entirely new substance, which he calls *xanthophyllin*, as a constituent of the green colouring-matter of plants. It is crystallizable, and altogether distinct from xanthophyll and from the pigment of yellow petals.—Prof. A. Borzi describes the mode in which *Xerotrapsium* displays itself in some ferns—*Cetrach officinarum*, *Notochloa Marantæ*, *Asplenium Trichomanis*, and several species of *Cheilanthes*; understanding by this term the mechanical contrivances by which an organ protects itself against excessive desiccation.

### SOCIETIES AND ACADEMIES.

#### LONDON.

Royal Society, November 22.—"The Waves on a rotating Liquid Spheroid of finite Ellipticity." By G. H. Bryan, B.A. Communicated by Prof. G. H. Darwin.

The hydrodynamical problem of finding the waves or oscillations on a gravitating mass of liquid which when undisturbed is rotating as if rigid with finite angular velocity in the form of an ellipsoid or spheroid, was first successfully attacked by M. Poincaré in 1885.

Poincaré's analysis, however, did not appear to admit of any definite conclusions being formed as to the nature and frequencies of the various periodic free waves. The present paper contains an application of Poincaré's methods to the simpler case when the fluid ellipsoid is one of revolution (Maclaurin's spheroid). The solution is effected by the use of the ordinary tesseral or zonal harmonics applicable to the fluid spheroid and the auxiliary spheroid required in solving the differential equation.

Denoting by  $\kappa$  the ratio of the frequency of the free waves to twice the frequency of rotation of the liquid about its axis, the values of  $\kappa$  are the roots of a rational algebraic equation, and depend only on the eccentricity of the spheroid as well as the degree and rank of the harmonic, while the number of different free waves depends on the degree of the equation in  $\kappa$ . At any instant the height of the disturbance at any point of the surface is proportional to the corresponding surface harmonic on the spheroid multiplied by the central perpendicular on the tangent plane, and is of the same form for all waves determined by harmonics of any given degree and rank, whatever be their frequency, but the motions of the fluid particles in the interior will differ in nature in every case.

Taking first the case of zonal harmonics of the  $n$ th degree, we find that according as  $n$  is even or odd there will be  $\frac{1}{2}n$  or  $\frac{1}{2}(n+1)$ , different periodic motions of the liquid. These are essentially oscillatory in character, and symmetrical about the axis of the spheroid. Taking next the tesseral harmonics of degree  $n$  and rank  $s$ , we find that they determine  $n-s+2$  periodic small motions. These are essentially tidal waves rotating with various angular velocities about the axis of the spheroid, the angular velocities of those rotating in opposite directions being in general different.

With regard to the question of stability, the author shows that in the present problem, in which the liquid forming the spheroid is supposed perfect, the criteria are entirely different from the conditions of secular stability obtained by Poincaré for the case when the liquid possesses any amount of viscosity, which latter depend on the energy being a minimum. In fact for a disturbance initially determined by any harmonic (provided that it is symmetrical with respect to the equatorial plane, since for unsymmetrical displacements the spheroid cannot be unstable), the limits of eccentricity consistent with stability are wider for a perfect liquid spheroid than for one possessing any viscosity. If we assume that the disturbed surface initially becomes ellipsoidal, the conditions of stability found by the methods of this paper agree with those of Riemann.

Finally the methods of treating forced tides are further discussed.

The general cases of a "semi-diurnal" forced tide or of permanent deformations due to constant disturbing forces are mentioned in connection with some peculiarities they present, and the paper concludes with examples of the determination of the forced tides due to the presence of an attracting mass, first when the latter moves in any orbit about the spheroid, secondly when it rotates uniformly about the spheroid in its equatorial plane.

The effects of such a body in destroying the equilibrium of the spheroid when the forced tide coincides with one of the free tides are then considered.

**Anthropological Institute, November 13.**—Francis Galton, F.R.S., President, in the chair.—Dr. E. B. Tylor read a paper on a method of investigating the development of institutions applied to laws of marriage and descent. With the view of applying direct numerical methods to anthropology, the author had compiled schedules of the systems of marriage and descent among some 350 peoples of the world, so as to ascertain, by means of a "method of adhesions," how far each rule co-exists or not with other rules, and what have been the directions of development from one rule to another. As a first test of the results to be obtained by this means, Dr. Tylor first examined the barbaric custom which forbids the husband and his wife's parents (though on a friendly footing) to speak or look at one another, or mention one another's names. Some seventy peoples practise this or the converse custom of the wife and her husbands relatives being obliged ceremonially to "cut" one another. On classifying the marriage rules of mankind, a marked distinction is found to lie between those peoples whose custom is for the husband to reside with his wife's family and those where he removes her to his own home. It appears that the avoidance custom between the husband and the wife's family belongs preponderantly (in fourteen cases, as compared with eight computed as likely to happen by

chance) to the group of cases where the husband goes to live with the wife's family. This implies a causal connection between the customs of avoidance and residence, suggesting as a reason that the husband, being an interloper in the wife's family, must be treated as a stranger; to use an English idiom expressing the situation, he is not "recognized." Other varieties of the custom show similar preponderant adhesions. Another custom, here called *teknonymy*, or naming the parent from the child, prevails among more than thirty peoples; as an example was mentioned the name of Ra-mary, or Father of Mary, by which Moffat was generally known in Africa. This custom proves on examination to adhere closely to those of residence and avoidance, the three occurring together among eleven peoples—that is, more than six times as often as might be expected to happen by chance concurrence. Their connection finds satisfactory explanation in the accounts given of the Cree Indians of Canada, where the husband lives in his wife's house, but never speaks to his parents-in-law till his first child is born; this alters the whole situation, for though the father is not a member of the family, his child is, and so confers on him the status of "Father of So-and-so," which becomes his name, the whole being then brought to a logical conclusion by the family ceasing to cut him. These etiquettes of avoidance furnish an indication of the direction of change in social habit among mankind; there are eight peoples (for instance, the Zulus) where residence is in the husband's family, with the accompanying avoidances, but at the same time avoidance is kept up between the husband and the wife's family, indicating that at a recent period he may have habitually lived with them. The method of tracing connection between customs was next applied, with the aid of diagrams, to the two great divisions of human society, the matriarchal and the patriarchal, or, as Dr. Tylor preferred to call them, the maternal and paternal systems; and the method showed that the drift of society has been from the maternal to the paternal system. Examination was next made of the practice of wife capture, recorded among about a hundred peoples, as a hostile act, a recognized and condoned mode of marriage, or a mere formality. It appears from the tables that the rules of human conduct are amenable to classification, so as to show by strict numerical treatment their relations to one another. It is only at this point that speculative explanation must begin, guided and limited in its course by lines of fact. In the words of Prof. Bastian, the future of anthropology lies in statistical investigation. Dr. Tylor's paper showed that the institutions of man are as distinctly stratified as the earth on which he lives, succeeding one another independently of difference of race and language, by similar human nature acting through necessarily changing conditions of savage, barbaric, and civilized life.

**Royal Meteorological Society, November 21.**—Dr. W. Marquet, F.R.S., President, in the chair.—The following papers were read:—Results of an investigation of the phenomena of English thunderstorms during the years 1857-59, by Mr. G. J. Symons, F.R.S. This paper was written nearly thirty years ago; it has now been communicated to the Society at the request of the Thunderstorm Committee. The paper contains a summary, chiefly in statistical form, of some of the results of an investigation into English thunderstorms and the accidents produced by lightning during the years 1857-59. The author found that in sheet-lightning the most prevalent colour is white, then yellow, blue, and red. In forked lightning the order is nearly reversed, blue being more than twice as frequent as any other colour, then red, white, and most rarely yellow. Sheet-lightning was seen about twice as often as forked.—Notes on the meeting of the International Meteorological Committee at Zurich in September 1888, by Mr. R. H. Scott, F.R.S. The Committee recommended certain rules for the publication of data by travellers, &c., so as to insure their being useful for the advancement of sound climatological knowledge. The proposals for an international cloud nomenclature, as recommended by Mr. Abercromby and Prof. Hildebrandsson, did not commend themselves to the Committee, who suggested that the subject should be further studied. At the conclusion of the meeting the Committee was dissolved.—On a method of photographing cirrus clouds, by Dr. A. Riggenbach. The author exhibited some photographs of cirrus and other fine clouds which had been obtained by using the surface of the lake as a polarizing mirror.—Mr. A. C. Stratten exhibited some models of very large hailstones—spheres about  $2\frac{1}{2}$  inches in diameter—which fell at Montereau, about forty miles south-east of Paris, on August 15, 1888.

**Geological Society, November 21.**—W. T. Blanford, F.R.S., President, in the chair.—W. Whitaker, F.R.S., who exhibited a series of specimens from the deep boring at Streatham, made some remarks upon the results obtained.—The following communications were read:—Notes on the remains and affinities of five genera of Mesozoic reptiles, by R. Lydekker. This paper was divided into five sections. In the first the author described the dorsal vertebra of a small Dinosaur from the Cambridge Greensand, which he regarded as probably identical with the *Syngonosaurus*, Seeley. The second section described an axis vertebra from the Wealden of the Isle of Wight, which is evidently Dinosaurian, and may possibly belong to *Megalosaurus*. In the third section the femur of a small Iguanodont from the Oxford Clay, in the possession of Mr. A. R. Leeds, was described. The imperfect skeleton of a Saurapterygian from the Oxford Clay near Bedford, which formed the subject of a previous communication, was redescribed. The paper concluded with a notice of the affinities of the Crocodilian genus *Geosaurus*.—Notes on the Radiolaria of the London Clay, by W. H. Shrubsole.—Description of a new species of *Clupea* (*C. vectensis*) from Oligocene strata in the Isle of Wight, by E. T. Newton.

## PARIS.

**Academy of Sciences, November 26.**—M. Janssen in the chair.—On the difficulty of obtaining the exact latitude of the Paris Observatory, by M. Mouchez. In connection with M. Faye's recent communication on this subject, the author states that some improved instruments will soon be fitted up in the Observatoire with a view to overcoming some of the almost insurmountable difficulties attending the accurate determination of the latitude of this spot. But even so, it is feared that perfect accuracy cannot be expected, the errors of a few tenths of a second being apparently due rather to the irregularity of the astronomic refractions in the Paris atmosphere than to defective instruments and errors of observation.—On the traction of canal and river craft, by M. Maurice Lévy. It is shown that in the present state of science the mechanical method of traction by means of the telodynamic cable is preferable to any electric system. Various improvements are also described, by which the author and his associate, M. Pavie, have succeeded in surmounting the many obstacles hitherto attending the successful application of the telodynamic cable to inland navigation.—Fresh experiments on the quantitative analysis of the nitrogen present in vegetable soils, by MM. Berthelot and G. André. The researches here described have been carried out for the purpose of testing the accuracy of the analyses hitherto made by various practised chemists operating at different intervals of time and under diverse conditions. Incidentally an attempt has also been made to determine the degree of stability possessed by the nitrogen present in different soils and exposed to varying influences.—On the results of the fourth scientific expedition of the *Hirondelle*, by Prince Albert of Monaco. This expedition, like the previous, was mainly confined to the Azore waters, which were explored in all directions during the summer of the present year. Amongst the improved appliances were two detachable bagging nets with 4000 metres of steel wire, a submarine electric lamp of the newest type, a Thibaudier sounding apparatus with 8000 metres of steel wire, special boats and camping fittings for the exploration of inland waters. Besides rich marine captures in depths ranging from 20 or 30 to 2000 metres, fourteen lakelets were visited, of which thirteen had never been explored and five not yet figured on any maps.—On the application of electrolysis to the treatment of tumours, by M. Darin. Since the recent foundation of the Henry Giffard Clinical Establishment in Paris, the author has effected several remarkable cures by this process. The apparatus is of a very simple character, easily controlled, and fitted with the chloride of zinc pile of the Gaiffe system.—On the determination of the coefficients of expansion at high temperatures, by M. H. le Chatelier. A new process is described, by means of which the author hopes to overcome the great difficulty attending the exact determination of these coefficients, which, apart from their scientific interest, are of such great importance for industrial purposes. The results of some preliminary experiments are given for Bayeux porcelain, iron, steel, and nickel at temperatures ranging from 20° to 970° C.—On an astatic electrometer, by MM. R. Blondlot and P. Curie. The instrument here described is a modification of Sir W. Thomson's electrometer with quadrants, and amongst the various uses to which it is applicable is that of a wattmeter.—Influence of water-surfaces

on atmospheric polarization, and observation of two neutral points right and left of the sun, by M. J. L. Soret. Marine and lacustrine surfaces are shown to produce important perturbations on the phenomena of atmospheric polarization. Under certain conditions the curious phenomenon is also observed of two neutral points at the altitude, and to the right and left, of the sun. The polarization is then in a vertical plane between these points, and in the opposite direction beyond them.—On a new process of disinfecting the hands after surgical operations, by MM. Jules Roux and H. Reynès. The process in question is that recently introduced by M. Furbringer; but the experiments here carried out for the purpose of testing its efficacy have given unsatisfactory results in the case of microbes deposited under the finger-nails.—M. Charles Brongniart communicates a paper on Entomophthoræ and their application to the destruction of noxious insects; and M. Marcel Bertrand has a note on a new problem in the geology of the south of France, suggested by the appearance of certain Triassic marls cropping out above the Cretaceous rocks in the neighbourhood of Marseilles.

## BOOKS, PAMPHLETS, and SERIALS RECEIVED.

Lessons in Elementary Mechanics, 1st Stage: W. H. Grieve (Longmans).—A Classified List of Mr. S. W. Silver's Collection of New Zealand Birds (at the Manor House, Lercombe Regis): Sir W. L. Buller (Petherick).—The Alphabet of Economic Science, Part 1, Elements of the Theory of Value or Worth: P. H. Wicksteed (Macmillan).—The Civilization of Sweden in Heathen Times: O. Montelius, translated by Rev. F. H. Woods (Macmillan).—Review of the Planting and Agricultural Industries of Ceylon: J. Ferguson (Haddon).—Electric Bells and All about Them: S. R. Botton (Whitaker).—Thirty Thousand Years of the Earth's Past History: Major-General A. W. Drayson (Chapman and Hall).—Practical Electrical Measurement: J. Swinburne (Alabaster).—Antiseptics: A. M. Hewer (Lockwood).—Catalogue of Canadian Plants, Part 4—Endogens: J. Macoun (Montreal, Dawson).—Kirchoff's Laws and their Application: E. C. Rimington (Alabaster).—Bibliography of Astronomy for the Year 1887: W. C. Winlock (Washington).—Energy and Vision: S. P. Langley.—Archives Italiennes de Biologie, Tome x. Fasc. 3 (Turin, Loescher).—Proceedings of the Academy of Natural Sciences of Philadelphia, Part 2, 1888 (Philadelphia).—Annalen der Physik und Chemie, 1888, No. 12 (Leipzig, Barth).—Brain, Part 43 (Macmillan).—Geological Magazine, December (Trübner).

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