THURSDAY, MAY 14, 1908.

A CONTRIBUTION TO THE HISTORY OF MEDICINE.

The History of the Study of Medicine in the British Isles. By Dr. Norman Moore. The Fitz-Patrick Lectures for 1905–6, delivered before the Royal College of Physicians of London. Pp. viii+202. (Oxford: Clarendon Press, 1908.) Price 10*s.* 6*d.* net.

THERE are two ways in which a scientific subject may be taught—the logical method, which describes the facts, and follows the course of reasoned demonstration; and the historical method, which follows the progress of knowledge by which facts are accumulated long before their logical sequence has been ascertained. The geometry of Euclid follows the former course, as do most of the exact sciences. The history of navigation follows the historical method, and so does the history of medicine.

Complete histories of medicine are few and far between, and, with the exception of the unfinished treatise of Dr. Freind, have not dealt with more than fragments of the subject. Medical biographies, like Dr. Payne's "Life of Sydenham," or the excellent biographical articles dealing with physicians in the "Dictionary of National Biography," begun by Leslie Stephen, and happily completed by Sidney Lee, furnish an example to all professions, but to write the history of a science demands a knowledge of the successive labours by which each in turn contributed his stone to the great edifice.

Dr. Caius, president of the College of Physicians of London in 1555, Sir Hans Sloane, president in 1719, beside Dr. Hamey in 1640, and Dr. Freind in 1725, had each of them attempted a history of medicine.

After mentioning the names of some, chiefly Royal physicians of our Norman kings, Dr. Moore gives a comparatively full account of John Mirfeld, the author of a treatise on medicine which he called the "Breviarium Bartholomei"; he lived in the Convent of St. Bartholomew, in Smithfield, a separate foundation from that of St. Bartholomew, though both were founded by Rahere.

Among other "cases," Mirfeld records that of hydrocephalus in a girl, who was tapped by a cautery on two occasions, and with final success.

Another patient of Mirfeld was a Canon, who was thrown from his horse and taken up without sense or motion; the patient's head was shaved, rubbed with oil of roses in warm vinegar, bound up with bandages, and covered over all with a lamb's skin. Strict abstinence from food was enforced until the fourth day, when for the first time he spoke, and was able to swallow; on the sixth day he was given some chicken broth, followed by laxative pills. Mirfeld afterwards recommended the patient to eat brains of kids and fowls, with the object of supplying the injuries of the patient's brain.

Beside the "Breviarium," which is based on the famous "Regimen Sanitatis Salerni," Mirfeld compiled a "Florarium Bartholomei," which was discovered among the MSS. of the British Museum. Mr. Gilson, the discoverer of this MS., lent it to Dr. Norman Moore, who has given us four columns of the text, which can be deciphered with comparative ease by the help of a magnifying glass. Yet another fragmentary MS. by Mirfeld was discovered in the library of Lambeth Palace, which is inscribed with the name of Archbishop Sancroft. Among the more modern medical works which Mirfeld mentions were translations of "Rhazes' Serapion" and of "Avicenna." He knew something of Horace, Ovid and Virgil, of Boethius, of the Vulgate, and of the commentaries of Augustin, Anselm, and Thomas Aquinas.

Dr. Moore, in his second lecture, deals with the education of London physicians in the century of Harvey and Sydenham. Thomas Linacre, the first president of the college, was a learned man who had studied Greek under Demetrius Chalcondylas, a refugee from the Turkish invasion. He will always be revered as the founder of the Royal College of Physicians. Like Mirfeld and the earlier physicians, he was a scholar first and a physician afterwards, and like Mirfeld he took holy orders. He wrote a Latin grammar, and belonged to that little group of learned men who adorned the golden time of Henry VIII.'s youth. Erasmus was a welcome addition to the English scholars, Sir Thomas More and Dean Colet, the founder of St. Paul's School. The young king was himself a scholar and a musician in that happy *Decennium Neronis*.

All these scholars were accomplished Grecians. Edward Wotton, who was president of the college in 1541, was a learned man, and also a natural historian. He describes three kinds of thrushes, the missel-thrush, *Turdus viscivorus*, the song-thrush, *Turdus musicus*, and the red-wing, *Turdus iliacus*.

Another learned physician, Caius, who took up the study of natural history, wrote a book on the breeds of dogs in England, and a most valuable monograph on the sweating sickness. He also founded at Cambridge the college called after his name, which has always been connected with the study of medicine. A greater genius than any except Harvey himself was Wm. Gilbert (1540–1603), the author of the first treatise on the magnet, published in 1600, the year in which he was elected president of the College of Physicians; it has lately been re-published in a fine edition by Prof. Silvanus Thompson in 1902.

Dr. Moore wisely passes the two greatest names in medicine with a bow, for the life and works of Harvey and Sydenham have been repeatedly and adequately dealt with. Dr. Payne's admirable volume on Sydenham, and several recent Harveian orations, render full justice to each. Another early fellow of the college was a French physician, Theodore de Mayerne (1573–1655), an accomplished chemist, to whom we owe "Lotio Nigra."

Glisson is chiefly known by his work on the "Anatomy of the Liver," but to him is due the first recognition of what he called irritability as a property of

living tissues of which muscular contractility is only one manifestation. We must not forget the connection of the College of Physicians with what is now called "The Pharmacopœia," and thereby with the growing study of chemistry.

The eminence of Sir Thomas Brown was literary rather than scientific, but his "Religio Medici" confers undying lustre on perhaps the greatest prose writer of the seventeenth century. His son, Dr. Edward Brown, was educated at Trinity College, Cambridge, and in 1644 he petitioned for his degree, and was duly admitted by a Grace when Dr. Francis Glisson was regius professor of physiology.

On one of his visits to London, Edward Brown studied the anatomy of a hare and a skeleton of a monkey, and a few weeks later dissected a hedgehog and a badger; on this occasion he saw in the King's zoological collection several outlandish (*i.e.*, foreign) deer, a sheep from Guinea, a white raven, and a stork which had broken his leg and used a wooden substitute with dexterity.

Edward Brown remained with his father at Norwich, studying anatomy, botany, and chemistry; in 1664 he left Norwich for London and Dover, and thence to Paris, where he lived in a room in the Rue Zacharie for seven francs a month; here he attended lectures on surgery, hernia and fevers, and studied in the "Hotel Dieu" and "La Charité," as so many English physicians have done since, and still do if they are wise. On leaving Paris he went to Montpellier, then famous as a school of medicine.

He next visited Rome, thence travelled to Venice and Padua; and returned to Montpellier and Paris where he caught small-pox. After his recovery he returned home, but in 1668 he visited Holland devoting himself to its libraries, museums, and universities. Thence he travelled to Vienna and Greece, and returned by Styria and Hungary to England; his last journey was to Cologne. He was president of the College of Physicians in 1704, and died in 1708.

Sydenham was comparatively uninfluenced by the progress of anatomy and science, and this, as Dr. Payne has shown, was probably due to his brothers and possibly himself having enlisted in the Commonwealth Army.

It is remarkable how very few "cases" of disease are described by Sydenham or his predecessors; the explanations of the symptoms, which were mostly mistaken, leave little room for observation of facts. We must admit that in the latter part of the seventeenth century, as in the first half of the nineteenth century, the most fruitful progress in clinical medicine was in Paris, not in London.

Dr. Moore was the first to direct attention to the accurate clinical account of the symptoms during life, and to read between the lines by the light of our present knowledge, that in all likelihood the death of Henry Prince of Wales, which changed the course of English, and perhaps of European, history, was due to enteric fever, as shown by the symptoms during life and by the examination after death.

The medical memoir on his father, James I., was accurate and interesting, but it is difficult to make out more than that he suffered from gout, while that on Ann of Denmark is illustrated by a letter from herself to Mayerne.

Thomas Willis, the author of "The Anatomy of the Brain," published in 1664, accomplished his great anatomical work at Oxford, where he filled the chair of natural philosophy.

Richard Morton published in 1689 his treatise on consumption under the title "Phthisiologia." It has the great merit of being no mere speculation, but *variis historiis illustratum*. He discusses causes of phthisis, which he regards as sometimes a nervous disease. Other cases he ascribes to hæmorrhage, others to excessive lactation or to dysentery.

Another section treats of wasting due to diabetes with polyuria. He gives the names and addresses of many of his patients, but uses the decent obscurity of a learned language. Other cases of diabetes he ascribes to salivation, others to dropsy.

The eighteenth century was, on the whole, inferior to the seventeenth in England. The leading physicians were Radcliffe, the founder of the museum which bears his name at Oxford; and Arbuthnot, the first of the many physicians who earned perpetual fame by their services to great men of letters. They were followed by Mead, who was also repaid by the gratitude of Pope; Freind, who began the "History of Medicine" too early to be of much value, but who gave occasion for extorting from Walpole the prescription which cured his gout, and also secured Freind's pardon. Sir Samuel Garth was more literary than medical. Mead and Freind were good writers, but did not attain to the level of Arbuthnot.

In the latter half of the eighteenth century, Heberden was the leading physician in London after he had lectured on medicine in Cambridge, where notes of his lectures were taken by Dr. Erasmus Darwin in 1752. He died in 1801, having lived nearly ninety years, and his admirable commentaries were only published after his death by his second son. This was the most original and valuable treatise an English physician had then made; as Dr. Moore remarks, the method of examining a patient in the time of Heberden scarcely differed from that of Galen in the reign of Marcus Aurelius, the chief exception being counting the pulse. Percussion and auscultation, the ophthalmoscope, the laryngoscope, and electrical reactions were all invented in the nineteenth century.

In the eighteenth century, Sir Hans Sloane, the eminent botanist as well as physician and traveller, was president of the College of Physicians, 1719 to 1735. An Irishman by birth, he studied medicine at Paris and Montpellier, and took his degree in the University of Orange; on his return to England he lived for a time with Sydenham, and practised as a physician in London, but in 1687 he accompanied the Duke of Albemarle to Jamaica, where he studied the natural history of that island.

His first volume appeared in 1707. He was deservedly elected president of the College of Physicians and of the Royal Society.

Dr. Moore's book is a most interesting and scholarly contribution to the history of medicine.

THE CALIFORNIA EARTHQUAKE.

The California Earthquake of 1906. Edited by David Starr Jordan. Pp. xv+371; illustrated. (San Francisco: A. M. Robertson, 1907.)

THIS is a collection of nine well-written essays, which, as might be expected, more or less overlap in their subject-matter. The first of these, by the editor, deals almost entirely with the Great Fault or Rift, the sudden yielding along which caused the earthquake. The strongest motion was felt where the fault enters the sea, near to which hotels and houses were thrown into the water. A fact that there was some disturbance in the sea suggests that a portion of the origin was beneath the same. At one place a train was overturned. We read that persons in an undisturbed district looking towards one that was shaken may have seen rows of trees and rows of bushes filing past them. The earthquake, we learn, was not connected with eruptions in the Aleutian Islands. The author gives us lists of Californian earthquakes, the more destructive of which apparently have had a period of thirty to forty years. He is inclined to ridicule electrical theories as a cause of earthquakes, and in referring to the destruction which took place in town and country, he quotes from the book of Isaiah, which declares that "men shall be plagued by their own inventions."

The second essay is by Prof. Branner. It deals with the geology of the earthquake. He chiefly describes the Great Fault, which split both trees and houses. Prof. Derleth confines his remarks to the effect of the earthquake upon structures. Destructivity is marked along a belt 300 miles in length and fifty miles in breadth. Apparently there was an attempt to tell outsiders that San Francisco had only been visited by a fire, but Prof. Derleth thinks it will do San Francisco and California more good if it is admitted that there really was an earthquake. Santa Rosa, like San Francisco, had fire simultaneously with the earthquake. Varieties of buildings in San Francisco are described in a variety of terms. Some were honest, some dishonest; some were fire-traps, others fire-proof without but not fire-proof within. Destruction varied according to the nature of the ground on which buildings were placed. The failure of water-pipes and sewers is described in great detail. In short, this essay is a treatise on building, for which thirty-nine rules are given. With most of these we quite agree, but not with all. Rule 4 refers to brick chimneys, which, we are told, should be built of weak lime mortar. Built in this way, when the earthquake comes they will crumble and fall as individual bricks, but if built with rich cement they will fall *en bloc*, and crush through the roof. We admire what Prof. Derleth has done off his own bat, which, taken altogether, is certainly good, but we cannot help suggesting that he might with advantage have consulted the results which have been arrived at with regard to construction in countries other than his own.

Mr. G. K. Gilbert, of the U.S. Geological Survey, also describes the Great Fault, seventy-five miles from which the shock was observed by nearly all persons awake, but at 200 miles it was perceived by only a few. Mr. S. Taber, of the Stanford University, estimates the area of greatest damage as being a little more than 200 miles in length and forty miles in width. The intensity of the shock was greatest along the line of faulting, and the initial movement was parallel to the same.

Dr. F. Omori, of the Imperial University of Japan, gives us interesting notes with regard to several points not touched upon by other writers. He tells us that in San Francisco the greatest number of monuments were overturned towards the east; the ascertained number of persons killed in San Francisco was 300, while the total number of persons killed in the earthquake area was probably not more than 1000; the double amplitude of motion in San Francisco was about 4 inches, and the period was about 1 second. For twenty or thirty years, Central California may seismically be regarded as a very safe place.

The last article is a personal narration by Mary Austin. It is not intended to be scientific, but it contains sufficient epigram, pathos, and humour to make it well worth reading. The first words are, "there are some fortunes harder to bear once they are done with, than while they are doing." Later we read, "It is perfectly safe to believe anything anyone tells you of personal adventure; the inventive faculty does not exist which can outdo actuality." Speaking of intelligence that reads God behind seismic disturbance, the writer says that the actual damage done by God to San Francisco was small beside the damage that resides in man's contrivances. Man made things carry the elements of their own destruction.

J. MILNE.

ELECTRIC RAILWAYS.

Electric Railways Theoretically and Practically Treated. Vol. ii., Engineering Preliminaries and Direct-current Substations. By Sydney W. Ashe. Pp. vi+282. (New York: D. Van Nostrand Co.; London: A. Constable and Co., Ltd., 1907.) Price 10*s.* 6*d.* net.

THIS is essentially a book for experts, and especially American experts. The English engineer may find here and there in the book some information that will be useful, but he must be an expert to understand it. On the title-page we read that this is "Volume Two," and that it deals with "Engineering Preliminaries and Direct-current Substations." By preliminaries the author means statistics as to the relations between the number of inhabitants in a town and their requirements in the way of travelling facilities.

The amount of statistical material brought together in the first few pages is very large, but as it refers exclusively to American towns it is almost useless to the European expert. The condition of the public roads, the scarcity of cabs, the hustling tendency of the business man, and the general tendency to ride rather than walk, all make for a greater development of travel facilities by tramway than on this side of the Atlantic, so that the figures given by the author

would have to be used with great caution in estimating tramway requirements in Europe. Fortunately there is no need to use American figures at all, since sufficient data are available from European experience. A curve on p. 14 is interesting as showing that with the expansion of towns the mileage of electric lines per 1000 inhabitants goes down, and the yearly number of journeys made by each inhabitant goes up. The figures are not directly applicable to European towns, but the tendency shown by these curves is the same in Europe. Towns of about 40,000 inhabitants show the greatest mileage, namely 0·76 per 1000 inhabitants, but only 110 journeys per inhabitant yearly, whilst towns of one million inhabitants and above have on the average only half a mile of line per 1000, but each inhabitant uses the cars on an average 230 times a year.

It is not clear from the author's figures whether they refer to what we should term tramways or whether they include railways also; the latter is probable, for tables giving mileage, equipment, cost, and earning of electrified main lines are mixed up with the other statistics. The next three chapters are devoted to what the author calls "Electrical Features," and deal with motor capacity and running diagrams. Various methods for getting out these curves are given, namely, Armstrong's, Storer's, and Hutchinson's methods, the latter at some length. The treatment is by no means lucid, formulæ and coefficients being introduced without explanation. Unless the reader is a thorough expert in this subject (when he needs no further instruction from the author) he will make nothing of these chapters.

Altogether the author's mathematics is not characterised by exactitude. Thus, on a later page, when he treats of converters, following (with due acknowledgment) Mr. Hay's method for the determination of the output, we find him calling a line like the following

$$\tfrac{1}{4}I_d^2+\tfrac{1}{2}I_a^2-\tfrac{1}{2}I_a\int_0^{\pi}\cos 2\left(\alpha-\frac{\pi}{n}\right)\pm I_dI_a\int_0^{\pi}\sin\left(\alpha-\frac{\pi}{n}\right)$$

an equation, without saying what it is equal to, and omitting the differential $d\alpha$. It will also be noticed that the third term should contain either the product of two currents or the square of a current, so that the expression is also wrong in the matter of dimension. A reader having Mr. Hay's book at hand will perhaps be able to find his way through the author's mathematics, but without such aid he had better skip the part on p. 195.

The author seems to pin his faith to the system, almost universal in America, of transmitting by three-phase current and converting into continuous current by means of rotary converters in substations. Motor generators, direct working, or the use of boosting batteries are not even mentioned. The important matter of heating of transformers and means of cooling is dealt with in less than two pages of general remarks, but to make up for this we get plenty of catalogue pictures of plant installed by the two leading American companies. Chapter ix., treating of insulating oils, is instructive. On p. 234 a curve is given showing the enormous influence on the insulating property of the oil of even slight traces of moisture, and the specification given on p. 239 should prove useful. GISBERT KAPP.

OUR BOOK SHELF.

(1) *Algebraic Equations.* By G. B. Mathews, F.R.S. Pp. viii+64. (2) *The Theory of Optical Instruments.* By E. T. Whittaker. Pp. viii+72. (Cambridge Mathematical Tracts, Nos. 6 and 7. (Cambridge: The University Press, 1907.) Price 2*s.* 6*d.* each net.

(1) THE solution of a given equation is a problem which has attracted the attention of many of the greatest mathematicians. In this tract we have a short summary of the results arrived at. The solution depends on the properties of a certain permutation-group called the Galoisian group; if this group is soluble, the equation is solvable by radicals. Interesting types of soluble groups are cyclical, Abelian, and metacyclic groups. To each of the corresponding equations is devoted a chapter in which are explained the application of cyclical groups to cyclotomy, the dependence of Abelian on cyclical equations, and Kronecker's solution of the metacyclic equation. Prof. Mathews's masterly epitome of the subject is not very easy reading, and he assumes some knowledge of Tschirnhausen's transformation, the theory of permutation-groups, &c. The student will probably have to prepare himself for the study of this tract by reading some more elementary treatise on the same subject (*e.g.* Dickson's "Algebraic Equations"), and some book on groups, such as Burnside's.

(2) Dr. Whittaker does not follow Prof. Mathews in writing for the advanced mathematician, but appeals in the first place to those students of physics to whom mathematics is interesting chiefly for its applications. The professed object is to give "a simple theoretical account of those defects of performance of optical instruments to which the names of coma, curvature of field, astigmatism, distortion, secondary spectrum, want of resolving power, &c., are given." Limitations of space necessitate in places proofs which, though clear, are rather too concise; but except for this the beginner will find the tract fairly straightforward reading. The author has succeeded in producing a book which will prove remarkably interesting, not only to the user of optical instruments, but also to any student of mathematics. The leading principles and results are very attractively presented, and can be readily grasped without plodding through every detail of the somewhat laborious approximations which the subject at times requires. H. H.

Detection of the Common Food Adulterants. By E. M. Bruce. Pp. vii+84. (London: A. Constable and Co., Ltd., 1907.) Price 5*s.* net.

THE United States used popularly to be looked upon as *par excellence* the land of wooden nutmegs and similar examples of perverted manufacturing ingenuity. Perhaps, therefore, it is fitting that what our author calls "the great pure food reform" should find especial favour there. Be that as it may, there has undoubtedly arisen in the States a quickening of interest in the matter of food adulteration; wherefore Mr. Bruce speaks of health officers, food inspectors, chemistry teachers, and even students being constantly called upon to test the purity of various foods—at whose instance is not quite clear. He proposes to help them and others in this task, which he says

"usually involves nothing more than making simple qualitative tests for adulterants," by bringing together in one small book the best and simplest qualitative methods of detecting all the common sophistications of foodstuffs.

As a collection of recipes the work is good; in other respects it commands but qualified admiration. For the glorified cookery-book in chemical literature we have no great liking, and this compendium of "tests" is little more. The numerous pitfalls which beset the unwary are rarely indicated in the directions given; and the reasons for the various operations are left for the operator to discover for himself. Now this is well enough if the person using the book is already a master of his craft, knowing the pitfalls and how to avoid them, cognisant of the why and wherefore of his procedure, and only employing the work as a convenient collection of notes wherewith to refresh his memory when applying the various processes. But in the hands of the unpractised person, whether student or "inspector," it is quite another matter. Differences of conditions, apparently slight, may lead him wholly astray. It would be well enough for the enthusiastic student or teacher to test his breakfast bacon for borax, or his morning milk for added water, provided he does it merely for his private information; only in that case it would not benefit the pure-food movement much. But if he is going to lodge a serious complaint on the strength of his discoveries, it would be well, also, first to have those discoveries confirmed by a practised analyst. Otherwise there may arise unpleasant references to the law of libel.

The experiments are well selected and tersely described. As a compendium of some of the best qualitative tests for ordinary food-adulterants the book will be useful, especially to the man who already knows how to apply the processes. C. S.

Altitude Tables. Computed for Intervals of Four Minutes between the Parallels of Latitude 0° and 30°, and Parallels of Declination 0° and 24°. Designed for the Determination of the Position Line at all Hour Angles without Logarithmic Computation. By Frederick Ball. Pp. xxxiii+245. (London: J. D. Potter, 1907.) Price 15*s.* net.

SINCE the notice of the first part of this work appeared in NATURE of February 20, the companion volume for latitudes 0° to 30° has been published, making these tables complete between the parallels of 60° N. and 60° S. By their means the navigator can with facility and rapidity determine his position by the observation of any heavenly body the declination of which does not exceed 24°, and, as the latitude and declination are interchangeable in the tables, they are consequently available for all stars up to 60° in declination between 24° N. and 24° S.

This valuable contribution to scientific navigation will be appreciated by all navigators who employ the "New Navigation"—Captain Marcq St. Hilaire's method—as a practical and direct help in saving the tedious computation of the altitude required in the problem. The tables will undoubtedly tend to popularise that excellent method, which has hitherto been neglected by so many navigators, mainly on account of the lengthy calculations entailed, and more especially when it is realised that their practical utility equals their mathematical exactness.

The introduction to each volume fully explains the various uses of the tables, so that no difficulty need be experienced when employing them. The book is of a handy size and well bound, with clear type well arranged and spaced, so that the navigator with but little light and limited time will find a pleasure in using it. MIREMONT.

Logarithmic and Other Tables for Schools. By Frank Castle. Pp. 36. (London: Macmillan and Co., Ltd., 1908.) Price 6*d.*

THE introduction of more practical methods in the teaching of mathematics in schools has led to an increasing demand for inexpensive tables of logarithms, values of trigonometric functions, and other data which pupils are now encouraged to use at quite an early stage of their mathematical work. Mr. Castle has compiled a series of four-figure tables which will meet every need of mathematical classes in schools, and be of great service in school laboratories. The tables include logarithms and antilogarithms, natural and logarithmic sines, cosines and tangents, degrees to radians and radians to circular functions, hyperbolic logarithms, powers, roots and reciprocals, and exponential and hyperbolic functions. The type is clear and the style attractive, and these qualities, combined with the wide scope and low price, should ensure a wide popularity for the tables.

Praise of a Simple Life. Edited by E. A. Baker. Pp. x+258. (London: George Routledge and Sons, Ltd., n.d.) Price 2*s.* 6*d.* net.

MR. BAKER has compiled a collection of extracts on the theme of a life according to nature from classical writers to the end of the eighteenth century. These utterances are arranged in four sections, which the editor calls respectively the antique world, the dawn of a new age, the age of expansion, and the age of reason. More than four-score authors are drawn upon, so that the reader is provided with a diversity of points of view. The volume is dainty, will go into the pocket, and should be a favourite with readers of poetic temperament.

LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. *No notice is taken of anonymous communications.]*

On the Radio-activity of Potassium and other Alkali Metals.

IN the course of some experiments made by them on the radio-activity of a series of salts which had hitherto been considered inactive, Messrs. Campbell and Wood (Proc. Camb. Phil. Soc., vol. xiv., part i., p. 15, 1907) found that potassium salts exhibited a radio-activity greater than that of any other substance previously examined which did not contain any of the so-called radio-active elements.

In seeking for the source of this activity, these experimenters found it impossible to separate out any active impurity from the salts examined, and they were led by the results of their investigation, which included measurements on the activities of a limited number of the compounds of potassium, to conclude that the activity originated with the potassium itself, and was an atomic property of that metal.

In a later paper (Proc. Camb. Phil. Soc., vol. xiv., part ii., 1907) Campbell described some additional experiments dealing with the character of the radiation emitted by the potassium salts, and in concluding expressed the opinion that the radiation consisted of β rays possessing an average velocity less than that of the β rays of uranium.

During the last few months the writer, in collaboration with Mr. W. T. Kennedy, has made, in the Physical Laboratory at Toronto, a close examination of the radio-activity of a large number of potassium and other salts, and while the results of this examination confirm the discovery of Campbell and Wood that potassium salts generally possess an exceptionally high activity and emit a radiation possessing considerable penetrating power, they

do not support the conclusion that the activity of these salts is a *normal* atomic property of potassium, and that it is always directly proportional to the amount of that metal present in the salt.

In measuring and comparing the activities of the different salts, these were spread in turn in thin regular layers on a shallow tray, which was placed on the bottom of an ionising chamber 40 cm. long, 26 cm. wide, and 28 cm. deep. The saturation currents through the air in this chamber were measured with a sensitive quadrant electrometer, and were taken as measures of the activities of the different salts. Experiment showed that the saturation current increased with the thickness of the salt layer up to between 2 mm. and 3 mm., and for greater thicknesses remained constant.

The investigation included the examination of some thirty specimens of potassium salts, and thirteen samples of the salts of the other alkali metals. As a result of this examination it was found :—

(1) That samples of a selected potassium salt obtained from different sources exhibited widely differing degrees of activity. Two chlorides of potassium, for example, were found to differ by more than 40 per cent. in their activities, and two of hydroxides by an almost equal amount. In the case of cyanide of potassium, the variation in activity was especially marked, as two samples of this salt exhibited activities which were approximately only 5 per cent. and 20 per cent. respectively of that shown by a number of other samples of the same composition. A sample of potassium sulphite, too, was found to possess an extremely small activity.

With the majority of the salts, however, the variations were not so marked, but the differences observed, even when due allowance was made for the varying densities and states of division of the salts, were so extensive and of such magnitude as practically to preclude the view that the activity of potassium and its salts was connected with a *normal* atomic property of the metal.

(2) That while metallic sodium and several sodium salts did not exhibit the slightest trace of activity, some samples of sodium chloride, obtained in the form of rock salt, showed an activity comparable with that exhibited by a number of the potassium salts. This result, taken in conjunction with the low value obtained by Elster and Geitel in their measurements on the conductivity of air in a salt mine, would indicate that very probably some active impurity was present in the samples of rock salt examined.

(3) That with the exception of ammonium chloride, which exhibited a feeble activity, none of the lithium and ammonium salts examined showed the slightest trace of radio-activity; that a sample of rubidium alum was found on examination to exhibit an extremely small activity, and that a sample of cæsium chloride exhibited one which was only just measurable. J. C. MCLENNAN.

University of Toronto, April 15.

Chemical Analyses of Water from Dew Ponds.

I HAVE been interested in the reviews of books and articles which have appeared in NATURE from time to time on the subject of dew ponds; and it occurred to me that the chemical analysis of the water of these ponds would help to settle the question of the origin of the water. This is a method used to some extent by sanitary authorities. I have had the opportunity of obtaining some specimens of water from different districts, and the specimens have been analysed by Mr. Claude Saville Grace, one of the students at this institute.

The first specimen (*a*) came from a dew pond on the southward down to the north of Ramsbury, Wiltshire. The pond is on the flat upland near the 693-feet mark on the 1-inch Ordnance map south of Aldbourne. The formation is chalk, so that analysis would immediately settle the point as to whether the water had come through the chalk or had been condensed from the air. The other two specimens, (*b*), (*c*), come from St. Boniface Down, north of Ventnor, Isle of Wight. The pond (*b*) is near the 787-feet mark, almost at the highest point of the down; the second pond (*c*) is on the neck between St. Boniface and Shanklin Downs. The downs are chalk masses lying on Greensand rock. I have added the analysis of the St. Boniface spring water, a spring on the south side of the down facing Ventnor, about 450 feet above sea-level. It is locally known as a wishing well, and its chemical peculiarity is that it contains sulphuretted hydrogen in small quantity. It undoubtedly comes out of the chalk, and the sulphuretted hydrogen is due to the decomposition of pyrites which occurs in masses in the chalk.

	$CaCO_3$ parts per 100,000	Cl parts per 100,000	
(*a*) Ramsbury pond	3·6	0·75	... inland
(*b*) St. Boniface pond	4·3	3·5	... near sea
(*c*) Shanklin pond	7·7	3·4	... ,,
(*d*) St. Boniface Wishing Well.	23·9	7·3	... traces H_2S

The quantities of $CaCO_3$ indicate to me that the waters are, in the cases (*a*), (*b*), (*c*), condensed waters which have been lying in the pond sufficiently long to take up a little $CaCO_3$. The ponds near the sea show increased chlorine, probably from salt spray blown up from the sea. The sulphuretted hydrogen shows the origin of the wishing-well water in the deep chalk.

To me there is very little doubt that all three ponds are simply water butts in which rain water is stored. Inspection of the ponds shows that they have much larger catchment areas than simply the water area, and the area is generally more than nine times that of the pond. We have to remember that for circular ponds and catchment areas of radii 1 and 3 respectively a rainfall of 20 inches would mean a depth of 180 inches (15 feet) when collected into the pond area, so we can easily understand the presence of water all the year round under these conditions.

It is interesting to note that a fresh-water pond is easily distinguished from the hard-water pond by the waterweed growing in the former. I have noticed the same carex in all the fresh-water ponds. SIDNEY SKINNER.

South-Western Polytechnic Institute, May 8.

The Reflection of Distant Lights on the Clouds.

I DO not know whether observations have ever been made to determine how far the reflection of distant lights on the clouds may be seen. It may possibly, however, be of some interest to know that the lights of London may at times be seen in this way at a distance of at least fifty miles. At 11 p.m. on April 30 the reflections of the lights of several neighbouring towns were unusually bright as seen from here. The altitude of the Portsmouth glare was about 10°; the distance of the centre of Portsmouth is about 12·5 miles; the cloud height was therefore about 2·2 miles. Over Hindhead and Blackdown a bright band of light was visible. Circumstances prevented me from measuring its altitude, but I estimated it as one or two degrees. Now London lies exactly in this direction, and fifty miles would bring one to the well-lighted area of south London. If the cloud height were uniform, the altitude of the reflection at this distance should have been a little more than 2°. The only other large town in the same direction is Guildford; the altitude of its glare should have been 5°. I do not think I could have made so large an error in estimating the altitude, but apart from this the Guildford glare would not stretch along the horizon for more than 2°, while the observed band of light stretched for at least 10°, and possibly more, for trees bounded the view to the west and the downs to the east.

CHARLES J. P. CAVE.

Ditcham Park, Petersfield, May 9.

Jupiter's Eighth Satellite.

THE discovery at Greenwich Observatory of Jupiter's eighth satellite, its great distance from the planet, and its retrograde motion, have excited the interest of the astronomical world.

Until more extended observations have led to a more certain knowledge of the orbit, speculation is premature. But it is impossible to resist the conjecture that there is a bare possibility that the object is really the long lost Lexell's comet, which in 1770 was describing an elliptic orbit with an eccentricity of 0·7858, with a periodic time

of 5½ years, in a plane inclined 1° 34′ to the ecliptic; the next return of which it was impossible to observe from the earth's position; which about 1779, August 23, approached Jupiter within 0·01 of the earth's mean distance from the sun; and which has not been again observed.

At that distance Jupiter's attraction exceeds that of the sun in the proportion of at least 200 to 1, and the distance from one of the satellites may have been very small. In this way it is not altogether impossible that the comet may have been diverted into an elliptic orbit round Jupiter, and a retrograde motion round the planet would be as likely as a direct motion to ensue. The intervention of a satellite is essential, and this, combined with the observed large angular distance from Jupiter in one part of its orbit, implies a large eccentricity. Should further observations reveal a moderate eccentricity, the impossibility of identity between this satellite and Lexell's comet will be proved.

The Athenæum, May 6. GEORGE FORBES.

The Corrosion of Iron and Steel.

IN a letter to NATURE of April 16, Dr. Frank Clowes states his belief that pure lead will dissolve to a slight extent in perfectly pure water "as iron did in the experiments made by Whitney and repeated by the American investigators, when they brought iron into contact with water under conditions similar to those which I had secured."

The American investigators here referred to are W. H. Walker, Cederholm, and Bent, who have recently studied the process of the rusting of iron (Journ. Amer. Chem. Soc., 1907, xxix., p. 1251), and agree with Whitney in regarding the whole subject as an electrochemical one.

With reference to the behaviour of lead in contact with water, I have nothing to say, for although the study of the corrosion of metals has been pursued by me for several months, my observations have not as yet been extended to lead. I wish to point out, however, that if this metal does dissolve to an appreciable extent in water as Dr. Clowes suggests, then the analogy adopted by this gentleman is open to criticism. I have made a very careful study of the process of the rusting of iron, and my results point conclusively to the fact that it is primarily the result of acid attack. These results will, I hope, shortly appear in print; it is unnecessary, therefore, to enter into any detail here. Nevertheless, one or two general remarks may prove of interest.

Walker and his co-workers found that if water in which iron has been boiled is concentrated to a few drops, the presence of iron can be detected by chemical means. It is clear that if the concentration of the iron in solution can be increased by the evaporation of the water, as these authors say, the same result should be obtained by protracted boiling of the water and iron, keeping the volume of the former constant by using a reflux condenser.

My experiments show, however, that such is not the case. The presence of traces of iron discovered by Walker, Cederholm, and Bent is not, therefore, to be ascribed to the action of pure water alone, but to that of traces of dissolved carbon dioxide.

In a very interesting series of investigations, Leduc (*Comptes rendus*, 1906, cxlii., p. 149) has recently shown that all the dissolved air cannot be expelled from water by the mere process of boiling. He further calculates that at least 1 c.c. of gas remains in a litre of water even after thorough boiling. Since carbon dioxide is not only much more soluble than oxygen and nitrogen, but also combines with the water to form carbonic acid, it is not unreasonable to suppose that a considerable percentage of this residual gas is carbon dioxide. This will effect the solution of a trace of iron. Although this quantity may be too minute to detect at once by chemical means, its concentration can be greatly increased by evaporating to small bulk, when the characteristic reactions for iron may be obtained. On the other hand, protracted boiling with reflux condenser cannot increase the concentration of the iron, since the amount of carbon dioxide remains the same. The extreme difficulty of removing all traces of this gas from water is not generally realised by chemists, and the precautions adopted by Walker and his co-workers were not sufficiently refined—hence their results. A single molecule of carbonic acid is sufficient, theoretically, to cause the corrosion of iron (see my remarks, NATURE, September 27, 1906), and I have shown that in practice a very few molecules are operative.

There can be no reasonable doubt, therefore, that the electrolytic theory is wholly inadequate.

In a letter to NATURE of October 11, 1906, Mr. Richardson asks if the rusting of iron is not caused by bacterial agency. As no reply has been given, it may not be out of place to deal with the question here. The suggestion is not new. Schorler, Beythien, Adler, Raumer, and others have directed attention to a bacterium, *Gallionella ferruginea*, which obtains its life energy by oxidising ferrous carbonate or organic ferrous salts with the precipitation of rust. But no organism has been found capable of feeding on metallic iron. Indeed, if one such were found, it would have to effect the solution of the iron by some presumably acid secretion, and this brings us back to the acid theory of rusting.

J. NEWTON FRIEND.

Fault Lines in the Atlantic.

IN Prof. J. Milne's discourse at the Royal Institution which appeared in NATURE of April 23 is given an interesting map on p. 593 showing the folds and probable direction of fault lines in the Atlantic. In that map is shown the mid-Atlantic "rise" extending to about 40° S. The map, however, would have been more interesting had Prof. Milne included in it the recent bathymetrical researches of the *Scotia*, which were described in a preliminary paper in the *Scottish Geographical Magazine* in August, 1905. Here it is shown that the Scottish expedition sounded out this "rise" for a thousand miles further south than Prof. Milne has marked it, and also that that "rise" has probable connection with another running in a more or less E.N.E. and W.S.W. direction from the south of South America through South Georgia and the Sandwich Group, and also from Graham Land, Antarctica, through the South Orkneys and the Sandwich Group, thence passing eastward through Bouvet Island to Madagascar and the east coast of Africa. The extension of the mid-Atlantic "rise" continues the reflection of the South American continent, and again the transverse "rise" reflects the hypothetical and known portions of the coast-line of Antarctica. WM. S. BRUCE.

The Pollination of the Olive.

As Knuth's great work on flower pollination, compiled from all available sources, says nothing whatever about the olive, I recently asked Prof. J. E. Coit, of Arizona, to look out for insects upon the flowers. He carefully examined many olive trees in flower at Tucson, and did not find a single insect at the flowers, with the exception of a thrips (apparently *Euthrips occidentalis*, Pergande), which occurred in great numbers. He kindly sent me some twigs with the Euthrips upon them, and I was able to observe that these insects were profusely dusted with pollen. No bees were seen at all. Prof. Coit adds:—"Olive pollen is formed and shed in such enormous quantities that I think the wind among the branches is the chief agent in pollination. If you jar a large branch of olive while it is in full bloom, a perfect cloud of *green* pollen will be seen to float away on the breeze."

Arizona, however, is not the original home of the olive, and the purpose of this note is to suggest that those who have an opportunity to see the plant in bloom in Mediterranean and other countries should make some observations.

T. D. A. COCKERELL.

University of Colorado, May 2.

The Coloration of Birds' Eggs.

I SHOULD be very grateful if anyone could tell me whether there is anything known with regard to the egg-colour of birds. Is there here, by any chance, a field for investigation which may throw light upon the so-called Mendelian phenomena? Or is there yet any explanation of how the egg becomes coloured, or why?

66 Hallam Street, W. R. L. LESLIE.

THE CRUISES OF THE "VALHALLA."[1]

IN taking with him as collector on the *Valhalla* a young naturalist and presenting the specimens obtained to the British Museum, Lord Crawford has set an excellent example to all yacht-owners who, from considerations of health (as in his Lordship's own case) or pleasure, enjoy the opportunity of cruising leisurely among islands of which the natural history is still imperfectly known. Not only does the systematic collecting of natural history specimens add largely, if undertaken in an appreciative spirit, to the interest and pleasure of such a cruise, but it may, as in the present instance, add very appreciably to zoological knowledge. For during two of the *Valhalla's* cruises, described in the present volume, no fewer than eleven birds were obtained, which in the opinion of the British Museum experts are entitled to rank as new species.

In obtaining the services of Mr. Nicoll as naturalist, the owner of the *Valhalla* may be considered to have been specially fortunate, as the book before us is evidently the work of an acute observer, who knows what to look for, and how to describe in readable language what he has seen. The selection appears indeed to have been fortunate in more ways than one, for the training and experience acquired during the three cruises doubtless aided Mr. Nicoll in obtaining his present post at the Giza Zoological Gardens, where he has every prospect of a successful career.

The first and longest voyage, during which no fewer than 38,000 miles were covered, consisted of the circumnavigation of the African continent, to which, however, a wide berth was given on the west side, where the vessel touched the Brazilian coast at Bahia. The second cruise was to the West Indies and back, during which the ornithology of the Caiman Islands was worked as fully as circumstances permitted; while the third and last was a voyage round the world, in the course of which the yacht touched at quite a number of interesting islands, including the Comoros, Seychelles, Aldabra, and Tristan da Cunha. It was this voyage that afforded by far the great majority of the new birds; while it is also the one which has acquired a historical celebrity on account of the sight of the "sea-serpent" off the Brazilian coast. Since reference has been made to this incident on a previous occasion in NATURE, it will be unnecessary to make special comment in this place, except to mention that Mr. Nicoll now expresses, apparently for the first time, his belief that the creature was a mammal.

At Punta Arenas the author was asked 50*l.* for a small fragment of the skin of the now well-known ground-sloth of the cavern of Ultima Esperanza—an offer which gives him the opportunity of stating that the creature is almost certainly extinct, as otherwise specimens would have been killed and offered for sale by the natives. If we have to abandon all hope of seeing a live ground-sloth, it is satisfactory to learn that the giant tortoises of Aldabra are still to the fore. On Aldabra itself there are only a few remaining, which the party was unable to visit, but in the Seychelles a number are now kept in a walled enclosure at Government House. While some were of huge size, others were but recently hatched; and it seems that these reptiles breed freely in captivity, and that all the islands of the group have tortoise-farms.

Another noteworthy event of the third voyage was a visit to Marie Louise Bay, in Praslin Island, Seychelles, for the purpose of inspecting the famous "coco-de-mer" trees, which grow in a small valley above the bay, and are found in a wild state nowhere else in the world. The author was informed that the huge nuts take many years to mature; while practical experience convinced him that even when they reach that stage their contents are insipid, and far inferior to the ordinary cocoanut.

"Coco de Mer" Trees, Praslin Island, Seychelles. From "Three Voyages of a Naturalist."

Did space permit, reference might be made to many other interesting passages in Mr. Nicoll's volume, which, although containing little that is absolutely new, may be commended as a well-written narrative of the experiences of an eager naturalist in remote islands.

R. L.

[1] "Three Voyages of a Naturalist; being an Account of many little-known Islands in Three Oceans visited by the *Valhalla*, R.Y.S." By M. J. Nicoll. Introduction by Right Hon. the Earl of Crawford. Pp. xxvi+246; illustrated. (London: Witherby and Co., 1908.) Price 7*s.* 6*d.* net.

ALBERT DE LAPPARENT.

GEOLOGISTS throughout the world will be grieved to hear that one of the best known and most illustrious of their number, M. de Lapparent, has passed away after a brief illness. It seems but yesterday since, with so notable a company of his fellow-countrymen, he attended the centenary celebrations of the Geological Society here, apparently in the fulness of health, and with still many years of vigorous life before him. Lately, however, he had not been well, and for a time his condition had even given cause for some anxiety. But the danger seemed to have passed off, and his friends hoped soon to welcome him back to his place at the Academy of Sciences in Paris. But a rapid change for the worse supervened, and he died in the early part of last week at the age of sixty-seven years.

The loss sustained not only by geology, but by science at large, through the death of so accomplished a writer cannot at once be fully appreciated. It was not so much by the extent of his contributions to original research as by the philosophical discussion of all contemporary investigation regarding the history of the earth that he gained the commanding position which he held for so many years. His well-known essay on the Pays de Bray, published in 1879, proved what he could have achieved had he devoted himself to field-work. His "Traité de Géologie," which first appeared in 1881, showed the full bent of his genius by its luminous presentation of every department of the science, its admirably logical arrangement, and its characteristic elegance and clearness of style. The first edition formed a single volume, but in the course of a quarter of a century it was continually augmented and enriched, until, when the fifth edition was issued two years ago, it formed three volumes, with an aggregate of more than 2000 pages. This noble treatise will remain as its author's best monument. It has taken its place as an indispensable book of reference and suggestive guidance to every student of modern geology, and it will in future years be consulted as an ample exposition of the condition of the science at the beginning of the twentieth century.

The later editions of the "Traité," among many improvements and additions which the author's wide range of reading enabled him to make, have especially been marked by the numerous maps introduced into the text in illustration of the geographical features of different regions in successive geological periods. Following up the brilliant outlines of Neumayr and the generalisations of Suess, M. de Lapparent embodied in definite charts what he conceived to have been the distribution of land and sea throughout the ages of the earth's history. No one can peruse these restorations without a sense of the enormous amount of research which they involved in the published geological literature of every part of the globe. Although they could only be tentative, for the data obtainable are often meagre and not always trustworthy, yet as sketches of what may have been the geography of the earth's surface in the remote past they are replete with interest and suggestiveness. The author's other minor text-books on geology, mineralogy and physical geography, distinguished, as they are, by the same lucidity of arrangement and elegance of expression, have been of the greatest service in furthering the progress of these branches of science in the general advance of education.

There was something eminently attractive in de Lapparent. His gentle and kindly manner drew men of all nationalities to him. His charm as a speaker led to his being continually called upon to address an assembled company. The well-modulated voice, the felicitous choice of words, and the flashes of humour made his speeches delightful to listen to. Under a playfulness of conversation he would from time to time reveal the depths of his serious nature. He was an eminently religious man, and sacrificed not a little in life for the sake of his convictions. No temptation could induce him to abandon the Institut Catholique, where from its foundation he continued to be one of its pillars of strength. So widely recognised were his personal qualities as well as his scientific distinction and his literary accomplishments, that on the death of Berthelot last year the Académie des Sciences could find no more fitting successor as secrétaire perpétuel than Albert de Lapparent. By his death the cause of science has been deprived of one of its most strenuous and successful advocates, and those who were privileged with his friendship have to mourn one whose memory they will never cease to cherish. A. G.

M. ALBERT LANCASTER.

M. LANCASTER, whose death was announced recently, was connected with the Royal Observatory of Belgium for so many years that it is impossible, as it would be undesirable, to disconnect his career from that of the institution he served so well. He saw the observatory grow in extent and reputation under several directors, from Quetelet to Lecointe, and gave loyal and devoted service to each. The site shifted from Brussels to Uccle, where a new and modern observatory replaced the modest building that long did duty, but M. Lancaster remained true to its fortunes. With the change of building and with the enlargement of its usefulness, M. Lancaster had to adapt himself to new conditions, but throughout the continual onward development, his energy and industry contributed not a little to the maintenance of the prestige of the observatory with which he was so long connected.

In three distinct ways M. Lancaster deserved well of science and his countrymen. In his capacity of librarian to the observatory, he appreciated the rapid extension of astronomical literature, and early recognised the desirability of making known to all what had been accomplished by individual effort, and of placing at the disposition of those who were engaged in a particular inquiry the results achieved by others similarly engaged. He took steps to give practical effect to this view, and not only did he publish several useful time-saving compilations, but he was led to the collection and arrangement of a vast mass of information, which in collaboration with the late director, M. Houzeau, was issued as an astronomical bibliography. Later and more complete compilations have necessarily superseded these early efforts, but Houzeau and Lancaster were the first to make any serious attempt to bridge the interval that separated the work of Lalande in 1802 from that of modern times.

Again, by the encouragement and assistance he gave to amateurs, M. Lancaster did much to create an interest in meteorology and astronomy throughout Belgium. He founded and edited the popular review, *Ciel et Terre*, which made the study of physics and astronomy attractive to the many, and fostered the true spirit of scientific inquiry. He gave to this periodical, which first appeared in 1880, the closest attention, wrote many articles for its pages, and by his enthusiasm made it not only a vehicle for the diffusion of information, but the means of encouraging a vast amount of amateur work in very varied directions.

Lastly, since 1898, he became director of the Meteorological Department of the Royal Observatory, and the successive volumes that have appeared bear-

ing upon the climatology of Belgium testify to his skill and energy. He was well qualified for this position because meteorology had for him many attractions. As early as 1876 he tried to give greater uniformity to the method of meteorological observing by publishing a code of instructions for observers, and throughout an active life he exhibited a keen interest in this branch of physics. His rain-chart of Belgium is a specimen of what he could accomplish by ingenuity and painstaking industry.

If M. Lancaster's services were not brilliant, they were persistent and practical. He admirably filled the position in which he was placed, and by his comparatively early death at the age of fifty-nine years the observatory has lost a capable and devoted servant. In his lifetime his scientific ardour was adequately acknowledged. He was a member of many learned societies at home and abroad, and in addition to being Chevalier de l'Ordre de Léopold, he was decorated with the Ordre de la Couronne du Congo, La Croix civique de 1re Classe, and la Croix commémorative du Règne de S. M. Léopold II.

NOTES.

THREE years ago the late Sir Michael Foster described in these columns (vol. lxxi., p. 443) the foundation by Prof. A. Mosso of the Col d'Olen Laboratory, at an altitude of 3000 metres on the southern slopes of Monte Rosa. On that occasion it was pointed out that the financial condition of the laboratory left much to be desired, and the hope was expressed that Prof. Mosso would secure ere long the necessary additional funds required. We are glad to learn, from a pamphlet descriptive of recent work at the laboratory, that the income of the institution has improved greatly, the subscriptions now reaching 117,504 francs, being very near the 120,000 francs originally considered necessary. It has been decided that the affairs of the laboratory shall be administered by a committee consisting of the professors of physiology, botany, and hygiene in the University of Turin, with the president and treasurer of the Italian Alpine Club. Prof. A. Mosso is the president, and Prof. O. Mattirolo the secretary. As was mentioned last week, two places in the laboratory are reserved to England, on the nomination of the Royal Society. Applications for a place should be made in the first instance to the Royal Society.

WE regret to see the announcement of the death, in his eighty-fourth year, of Prof. K. Möbius, professor of zoology in the University of Berlin.

ON Thursday next, May 21, Dr. Alexander Scott will deliver the first of a course of three lectures at the Royal Institution on "The Chemistry of Photography."

PROF. A. LAWRENCE ROTCH, the founder and director of Blue Hill Meteorological Observatory, Massachusetts, U.S.A., has been elected an honorary member of the Royal Meteorological Society.

A REUTER message from Athens announces that the German Emperor has presented Prof. Dörnfeld, head of the German Archæological Institute there, with a sum of 5000 marks (250*l.*) for the purpose of starting excavations on the site of the ancient Pylos.

AT the meeting of the National Academy of Science held in Washington on April 23, the following foreign associates were elected:—Prof. Svante A. Arrhenius, Stockholm; Prof. J. Larmor, Sec.R.S., Cambridge; Dr. Ivan P. Pavlov, St. Petersburg; Prof. Hugo R. van Seeliger, Munich; and Prof. T. Barrois, Lille.

THE death is announced of Dr. Hermann Wedding, professor of metallurgy at the Berlin School of Mines. He was an honorary member of the Iron and Steel Institute, and in 1896 received the Bessemer gold medal of that society. He translated Dr. Percy's works on metallurgy into German, and was the author of a large number of important metallurgical treatises.

THE Paris correspondent of the *Times* states that, within a year, in virtue of a contract with a French firm, Spain is to be provided with wireless telegraphy stations. The Canaries and the Balearics are to receive, respectively, seven and two stations, which will keep them constantly in touch with the fifteen stations of the Peninsular coast. It is anticipated that radio-telegraphic communications will shortly be arranged between Pernambuco and Tenerife. In that case the Spanish stations will form a link between Europe and South America.

IN the Journal of the Franklin Institute (vol. clxv., No. 4) Dr. Persifor Frazer traces the history of the Franklin Institute from its foundation in 1824 to the present time, giving portraits of the eminent men who have helped in the development of the society. A subscription of 50,000 dollars, given to the building fund by Mrs. Anna W. Walker in memory of her father, has assured the institute a new lease of life under greatly improved conditions.

THE death is announced of Mr. Caleb Barlow, chief preparator of fossils in the British Museum (Natural History). Mr. Barlow entered the British Museum as a mason in 1874, and gradually acquired remarkable skill in the preparation and restoration of fossil skeletons. He was especially successful in mounting imperfect specimens and modelling missing parts to complete them. Much of his unofficial time was devoted to other institutions, and examples of his skilful work are to be found in many museums.

THE *Comptes rendus* of the Paris Academy of Sciences for May 4 contains a communication, by M. Alfred Angot, with respect to the application of wireless telegraphy to the forecasting of the weather. The communication is practically amplifying the note by M. Bigourdan, to which reference was made in NATURE of May 7, and gives a *résumé* of the present situation. It is mentioned that for the last year the Meteorological Office has received each day wireless messages from several ships, the information being regularly published in the Daily Weather Report. M. Angot states that this information adds somewhat to our knowledge of the state of the atmosphere over the Atlantic. He directs attention to the report of Dr. Shaw on this subject to the International Meteorological Committee at Paris in September, 1907. It is pointed out that the obstacle to the extension of the use of wireless messages for weather forecasting is one purely of finance, and the necessary expense precludes the English and French weather offices from taking full advantage of the opportunity afforded.

"THE Daylight Saving Bill," which passed its second reading in the House of Commons on March 26, and is now before a committee of the House, proposes that early on the morning of each of the first four Sundays in April all the public clocks shall be set forward twenty minutes and be set back twenty minutes on each of the first four Sunday mornings in September. Cape Town has been cited as an example to show how easily the origin of public time can be changed. But Sir David Gill shows, in a letter in Tuesday's *Times*, that even to change the origin of time once for all requires careful preparation, and that to

make changes in the manner proposed by the Bill must lead to confusion. Instead of adopting this method of making use of daylight hours, Sir David Gill suggests a change in our national habits and customs, such as was advocated in an article in NATURE of February 20 (vol. lxvii., p. 372). He points out that if, for example, the Bank of England could be persuaded to open business at 9 a.m. instead of 10 a.m. from April 1 to the end of September, no doubt all other banks and offices would follow suit, and if employers of labour would open their works an hour earlier in the spring and summer months the objects of the Bill would be in great part gained without difficulty or confusion.

THE news of the death on May 10 of the Rev. Father Eugene Lafont, S.J., C.I.E., has been recently notified from India, and will be received by his numerous friends with great regret. He died in Darjiling, the hill station of Bengal, to which place he went some little time ago. His age was seventy-one years, and he lived almost continuously in Bengal, with perhaps one visit to Europe, for about forty-three years. Father Lafont will long be remembered in Bengal for his distinguished scientific attainments and for the enthusiastic zeal with which he fostered the study of practical science by every means in his power among Indian and Eurasian students. He was, however, an educationist rather than an original thinker or original worker, but he did yeoman service for science in Bengal. For many years he was professor of physical science at St. Xavier's College, in Calcutta, and afterwards he became rector of the same institution. This college is one which makes provision for the education of the domiciled European and Eurasian population of Calcutta and Lower Bengal, and in this way Father Lafont secured great influence among these classes. The college is also popular with native Indian gentlemen, and by his influence with Rajahs and other men of note Lafont was able to obtain several endowments for the purchase of scientific apparatus. This college possesses an excellent supply of most costly lecture apparatus, especially of the kind necessary for popular lecture demonstration, in which way that college is better equipped than any other in India. Indeed, in addition to his sterling qualities as an educationist, Father Lafont was a born popular scientific lecturer, and had a peculiar facility for putting dry facts in a popular way and an equal facility for making his lectures interesting by excellent experimental illustrations. For more than thirty years he was a prominent fellow of the Calcutta University, both under its former and its present constitution, and he held a number of prominent honorary posts under it, while his influence is to be found in many of the science courses of study as at present arranged. He was always held in the greatest respect and esteem by all his fellow-workers, and was most popular with all Indian gentlemen. It was to a considerable extent owing to his cooperation and influence that the late Dr. Mahendra Lal Sarkar, C.I.E., was able to start, some thirty years ago, a society called the "Indian Association for the Cultivation of Science" in Calcutta, an association which is still doing very useful work in diffusing scientific knowledge among various classes of Indian gentlemen. Father Lafont was for many years an active supporter of this society, and was one of its honorary lecturers, and later on became its vice-president. His name will thus be long kept in mind as that of one of the pioneers of scientific education in Bengal, and his death is hence a great loss, especially at this time, when strenuous efforts are being made to put education in Bengal on a satisfactory basis.

WE have to acknowledge the receipt of the ninth fasciculus of the "Fauna of New England," now in course of publication in Occasional Papers of the Boston Society of Natural History. It is devoted to a list of the spiders (Araneida), which has been drawn up by Elizabeth B. Bryant, and comprises 399 definitely recognised species, together with about a dozen others which are at present unrecognised.

WE are indebted to the author, Dr. E. Balducci, for a copy of a paper entitled "Morfologia dello Sterno degli Uccelli," published by C. and G. Spighi, of Prato, at the price of five lira. It is illustrated by a large number of figures of the sternum in a numerous series of nocturnal and diurnal birds of prey. After discussing the bearing of the characters of this part of the skeleton on the relationship of the Striges to the Accipitres, the author points out that not only can the different species of these two groups be recognised by means of the sternum, but that there are also recognisable sexual features in the sterna of individual species.

IN the February issue of the Proceedings of the Philadelphia Academy, Mr. F. W. True discusses the fossil cetacean beak from Charles County on which Cope founded the genus and species *Rhabdosteus latiradix*, together with certain other fragmentary beaks and teeth which have been assigned to the same form. In Mr. True's opinion, it is probable that while the teeth belong to the widely spread genus Schizodelphis, the type beak is generically distinct. Of the other two beaks, one apparently indicates a dolphin allied to the Amazonian Inia, while the third may be provisionally assigned to the extinct genus Priscodelphinus.

PROTECTIVE colouring in South African birds forms the subject of an article by Mr. A. Haagner in the April issue of the Journal of the South African Ornithologists' Union. One of the most remarkable instances of such protective resemblances is furnished by the rufous-cheeked nightjar. Noticing what appeared to be a strange protuberance on a bough, the author on one occasion ascended a tree to ascertain its real nature, when he was astonished to see a nightjar fly off. "The bird had been sitting lengthways on the bough, flattened up against it, and the assimilative nature of its plumage was most marked, the mottled grey-brown and rufous colouring harmonising with the bark of the tree on which the nightjar sat."

To the first number for the current year of the *Bulletin de la Classe des Sciences* of the Académie Royale de Belgique, Comte Goblet d'Alviella contributes a memoir on the excavations at Court-Saint-Etienne, in the valley of the Orne, one of the richest prehistoric cemeteries in Belgium. The remains discovered consist of articles in bronze and iron, with numerous examples of pottery. Of bronze, the most remarkable article is either a portion of a sword-belt or of a horse bridle. In some of the mortuary jars the bones of children have been discovered, pointing either to the burial of infants with their dead mothers or to a sacrifice intended to ensure the fertility of the crops. The cemetery appears to be of the well-known Hallstadt period, and the researches of Comte d'Alviella are of much interest in relation to the extension of the bronze and iron culture from the south into northern Europe.

IN the fourth part of vol. xvii. of the Proceedings of the Royal Physical Society, Edinburgh, Prof. D. C. M'Intosh discusses variation in the lobster, both in respect of the relative sizes of males and females, the relative numerical proportions of the two sexes, and in regard to the number and arrangement of the genital apertures in

the male. In respect to the first point, measurements show that the female is shorter than her partner, while she also seems to be more slenderly built. The relative numbers of the two sexes cannot yet be definitely determined; it is true that more males than females are captured, but this may be due to their larger dimensions, which prevent them from escaping through the meshes of the nets, and may also lead to a smaller number being rejected as unsaleable on account of inferior size. Finally, it is demonstrated that the occurrence of additional genital apertures is by no means uncommon.

THE March number of *Biometrika* contains two papers dealing with the inheritance, in two separate instances, of split hand and foot deformities in man, the so-called "lobster-claw," in which Messrs. Lewis and Embleton show that the deformity is inherited and varies in degree, although not in kind. The nature of the deformity is illustrated in a series of radiographic plates. The authors discuss the application of Mendelism to their results, and conclude that, despite the apparent segregation, the transmission is not governed by Mendelian laws. In an addendum Dr. Lewis cites cases in which hypophalangia or brachydactylia has been transmitted through normal individuals, so that the basis for the Mendelian application fails. "It may be," he urges, "and very probably is the case, that Mendelism applies to certain hereditary human deformities; but the conclusions which are being drawn, or implied, conclusions having a serious sociological aspect, are at present ahead of the facts at our disposal." In the family discussed by Mr. Pearson, there was no instance of transmission through a normal individual, but the Mendelian ratios do not fit. This case is illustrated by plates bringing out the variability of the deformity.

AMONG several articles of more than usual interest in the February number of the *American Naturalist*, attention may be directed to one on the law of geminate species, by Dr. D. S. Jordan, of Stanford University. Starting with the axiom that in any region the nearest representative of a given species is to be found, not in the same region or in a remote region, but in a neighbouring district separated from the first by a barrier of some kind or other, the author points out that this law rests on the fact that the minor differences separating species and races of animals are due to some form of segregation or isolation. On account of the presence of some obstacle or barrier, the members of one group are prevented from breeding with those of another minor group or with the bulk of the species, and as a result local peculiarities arise, which eventually develop into distinct races or species. On the other hand, where a number of individuals of a species are simultaneously modified in the same way by similar conditions of food or climate, they show no permanence in heredity, and should have no permanent place in taxonomy. This is exemplified by Mr. Beebe's researches into the effects of moist air in inducing dusky colours in birds, which demonstrate the impermanence of the groups or subspecies characterised by dark shades of colour developed in regions of heavy rainfall. These words, it may be added, should be well weighed by those taxonomists who name local forms characterised by the development of either unusually pale (in desert districts) or unusually dark (in moist forest regions) colouring. The fishes on the two sides of the Isthmus of Panama, which have been separated since the late Miocene or early Pliocene, afford excellent examples of geminate (twin, or representative) species, or perhaps, as we might in many cases better say, races.

IN a letter to NATURE of October 3, 1907, Mr. Ainley Walker asked for definite evidence bearing upon the widespread belief in many countries that the stings of bees act both protectively and as a cure for rheumatism. Dr. J. Newton Friend, North Terrace, Mildenhall, Suffolk, sends us an account of a case which has just come under his personal knowledge. Two or three years ago a country schoolmaster in Norfolk, who suffered very severely from rheumatism in the back, deliberately exposed his arms to the stings of bees, and was stung all over the arms. By the time, however, that his arms were well again, his rheumatism had completely disappeared. The gentleman who took these heroic measures is now close on fifty years of age. Dr. Friend suggests the addition of the following two questions to those given by Mr. Walker:—(1) What is the approximate age of the person supposed to have been cured? (2) In what part of the body was the rheumatism manifested, where was the person stung, and for how long was the cure effective?

MR. T. E. D. INNES has compiled a list of Indian jungle products used as food by the natives during periods of famine, that has been issued as an appendix to the February number of the *Indian Forester*. Some of the fruits, although lacking flavour, are eaten raw, others are parched, or, as in the case of *Ficus glomerata*, *Shorea robusta*, &c., the fruits are ground into flour and baked into cakes. Several climbers yield roots that are parched or boiled, and vegetables are provided by the leaves of *Vicia hirsuta*, *Chenopodium album*, *Chlorophytum tuberosum*, and others.

THE sixth number of the botanical section of the *Philippine Journal of Science*, concluding the section for the year 1907, is devoted to short notes and to the third portion of the index to Philippine botanical literature compiled by Mr. E. D. Merrill. Mr. Merrill also contributes a first addendum to his identifications of the species described in Blanco's "Flora de Filipinas," and a few additions to the species recorded for the islands. Species of Pteridanthus and Petræovitex are new to science, and provide first records for the genus in the Philippines. Dr. E. B. Copeland is responsible for a revision of the fern genus Tectaria; many of the species are transferred from the subgroup Sagenia of the genus Nephrodium.

A NOTE on the flora of Prince Charles Foreland, Spitsbergen, by Mr. R. N. R. Brown, published in the Transactions of the Botanical Society of Edinburgh (vol. xxiii.), refers to collections made by Dr. W. S. Bruce. The number of species totals fifty-five, or rather more than a quarter of the number recorded for the whole archipelago. The character of the flora is evident from the observation that *Saxifraga oppositifolia* is probably the commonest plant on the island and covers large areas; other species of Saxifraga are *Hirculus*, *aizoides*, *caespitosa* and *nivalis*; the species of Ranunculus and Draba are also interesting. The flora is European, and shows an entire absence of an American element.

MR. G. H. SHULL records some additions to the list of plants that conform to Mendelian principles in the February issue of the *Botanical Gazette*. The first instance cited is that of a branched specimen of the so-called "Russian" sunflower; experiments made in crossing branched and unbranched plants indicated that branching is a dominant character. Other examples were provided by plants of *Lychnis dioica* and *Verbascum Blattaria*. In the former case purple and white flowers provided reciprocal characters when according to expectation white proved to be recessive. For Verbascum, yellow colour in the flowers was found to

be dominant over white, this being contrary to the experience with Polemonium and Matthiola; it is noted that in Verbascum the yellow is a sap-colour, whereas in the other two plants it is a plastid-colour.

THE new identifications, "Decades Kewenses, XVII.," that are published in the *Kew Bulletin* (No. 3) are almost entirely Malayan plants named by Sir George King, F.R.S., and Mr. J. Gamble; species are added to the genera Clerodendron, Premna, Vitex, and Petræovitex of the order Verbenaceæ. Colonel Prain forms a new genus allied to Cymaria (order Labiatæ) on the Malayan plant, *Acrymia ajugiflora*. To the same number Mr. T. W. Brown communicates an article on banana cultivation in Egypt, where the Chinese or Canary banana provides the commercially important variety. A synopsis of the New Zealand species of Rhodophyllis, by Mr. A. D. Cotton, is concerned with corrections of diagnoses by Harvey and J. Agardh; a new species is proposed, and the recently formed *Rhodophyllis chathamensis* is withdrawn. The seventh list of additions to the wild fauna and flora of the gardens includes Coleoptera, ants, scale insects, and a few plants. Mr. R. A. Rolfe contributes an article to show that there is considerable doubt as to the localities of some of Cuming's Philippine plants.

AT the meeting of the Vienna Academy of Sciences of April 2, Prof. J. Hann presented a paper entitled "The Daily Variation of Wind-force on the Mountain Peaks of South India in their Relation to the Daily Oscillation of Air-pressure." The author calculated the daily range of wind-force on the Dodabetta peak (lat. 11° 32′ N.), and at the Kodaikanal Solar Observatory (lat. 10° 40′ N.), for separate months, and found that from October to May, during the period of the north-east monsoon, the maximum wind-force occurred between 9h. and 10h. a.m., but that in June, with the advent of the south-west monsoon, it suddenly jumped backwards to 4h.–1h. a.m., while at the recurrence of the north-east monsoon in October it again jumped forward to 9h.–10h. a.m. After much laborious investigation Prof. Hann traced the cause of the shift of epoch to the double daily oscillation of the barometer, which affects the east and west wind in a different manner, as the author fully explains in the paper.

THE *Scottish Geographical Magazine* for April contains a very interesting article on the climate of the British Isles by Mr. A. Watt, secretary to the Scottish Meteorological Society. The average distribution of temperature in midwinter and in midsummer is shown with great clearness by two maps drawn by Dr. Buchan, and reproduced from Bartholomew's "Atlas of Meteorology"; the trend of the isotherms plainly exhibits the ameliorating influence of the sea on the climate. The least difference between winter and summer is in the south-west of Ireland, where the isotherms shift by only 14°, and the greatest in the east central district of England and near London, where the isotherms shift by 25°. The author points out that the prevalence of warm south-westerly winds is the controlling factor of our climate; the Gulf Stream, to which the mildness of our winters is commonly attributed, has but little direct influence, though it may have an indirect effect by probably producing the low-pressure area off Iceland, which, together with the area of high pressure near the Azores, is the cause of our south-westerly winds. The average rainfall is exhibited by a map specially drawn by Dr. Mill from his unique collection of records. The author mentions several interesting facts tending to show that there is no evidence that our climate has changed, although it has been subject to considerable oscillations.

THE paper on electric supply prospects and changes as affected by metallic filament lamps and electric heating, by Messrs. Handcock and Dykes, read before the Institution of Electrical Engineers recently, gave rise to a very important discussion, which occupied two meetings. The metallic filament lamp has been welcomed on all sides as a solution of the problem of cheap electric lighting to compete with incandescent gas among small consumers, and there is no doubt that it has done, and will do, a great deal towards bringing the cost of lighting by electricity within the means of the smaller consumer. At the same time, central station engineers are faced with the problem that, owing to the small consumption of the metallic filament lamp, the output of the central station is very greatly reduced, thus entailing a very large increase in consumers to make up the loss incurred. Granted that this increase can be obtained, owing to the facilities that the metallic filament lamp offers, a two-fold difficulty still remains to be surmounted—(*a*) the cost of installing the wiring in small houses, and (*b*) the cost of the house-service connection. The first falls on the consumer, whether he installs it at his own cost or on the "free wiring system," the latter on the supply company. The present systems of wiring employed in this country have been made as good, as solid, and as safe as is possible, and consequently the expense is great. On the Continent the course followed is the reverse. Perhaps the system employed is not quite so secure from possible danger as is desirable, but surely some happy mean may be found. Surface wiring with a high-grade flexible would be infinitely cheaper than our present methods, and if central station engineers would agree to this or some cheaper method than that now employed, the wiring contractors would be pleased to avail themselves of the permission. At present the contractor is handicapped by the cost of the installation being too great for the prospective consumer, and consequently the central station loses also.

IN connection with the letter from Dr. J. W. Evans on the amount of helium in the earth's atmosphere which appeared in NATURE of April 9 (vol. lxxvii., p. 535), Prof. J. Hann has sent us the following table given by him in the *Meteorologische Zeitschrift* for March, 1903:—

Percentage composition by volume of the atmosphere at different altitudes and probable temperatures.

Altitude	0 km.	10	20	50	100 km.
Temperature ...	10° C.	−18°·5	−38°·5	−60°	−80° C.
Nitrogen	78·03	81·20	84·34	79·17	0·099
Oxygen	20·99	18·10	15·19	7·03	0·0
Argon	0·94	0·56	0·31	0·03	0·0
Carbonic acid ...	0·03	0·015	0·006	0·0	0·0
Hydrogen	0·01	0·035	0·147	13·64	99·45
Neon	0·0015	0·002	0·004	0·0	0·0
Helium	0·00015	0·0	0·002	0·126	0·453
Krypton	0·00010	0·0	0·0	0·0	0·0
Total pressure...	760 mm.	199·2	42·2	0·32	0·0223

DR. LULL'S memoir on the evolution of the elephant, referred to in NATURE of March 26 (vol. lxxvii., p. 494), appeared, not in the March number of the *American Naturalist* as stated, but in the March number of the *American Journal of Science*.

LIEUT.-COLONEL SEDGWICK writes to say that in the notice of his book, "Man and his Future," which appeared in last week's issue of NATURE (p. 5), the date of his paper on the "Form of the Atom" should have been given as 1892, and not 1902, as stated at the end of the review.

A SECOND edition of Mr. Richard Semon's "Die Mneme als erhaltendes Prinzip im Wechsel des organischen Geschehens" has been published in Leipzig by Mr.

Wilhelm Engelmann, and copies may be obtained in this country from Messrs. Williams and Norgate. The first edition was reviewed at some length in NATURE of February 8, 1906 (vol. lxxiii., p. 338), and reference may be made to that notice for a description of the characteristics of the work.

MESSRS. CHAPMAN AND HALL, LTD., have published a second edition of Dr. F. H. Getman's "Laboratory Exercises in Physical Chemistry." The first edition was reviewed in the issue of NATURE for July 28, 1904 (vol. lxx., p. 296). A chapter on thermostats has been inserted in the new edition, and the chapters treating of electromotive force, solubility, and chemical dynamics have been extended. The measurement of radio-activity has been dealt with briefly, and some other modifications made.

THE *Physical Review* for February contains an article by Mr. F. L. Bishop on the heats of dilution of certain aqueous solutions he has measured recently at the Massachusetts Institute of Technology. He finds that if concentration be represented by the ordinate, and the heat absorbed when a solution containing one gram-molecule of a dissolved salt is diluted down to the concentration in question be represented by the abscissa of a curve, the curve is a straight line for the nitrates of potassium, sodium, and barium, and approximates to two straight lines intersecting at a concentration of about 1·2 gram-molecules per litre in the case of potassium chloride. The break in this curve the author puts down to some chemical change taking place in the solution.

WE have received from the Charles Urban Trading Company, Ltd., 89–91 Wardour Street, London, W., a copy of their latest catalogue, entitled "Urbanora, the World's Educator." The list, which runs to 252 pages, deals with scientific and educational subjects treated in such a way as to be suitable for exhibition by the bioscope and microkinematograph. Films are available which depict various forms of animal life, bacteriological and other microscopic forms, and typical natural phenomena. The catalogue provides detailed information as to the subjects of science which can now be illustrated in such a way as to bring vividly before students essential facts. The actual steps in the life-histories of lowly organisms, the sequence of events in the study of the habits of plants and animals in their natural surroundings, and the reproduction of the details in typical operations to assist the teaching of operative surgery may be mentioned as examples of the way in which the kinematograph is now being utilised for educational purposes.

OUR ASTRONOMICAL COLUMN.

THE D_3 (HELIUM) ABSORPTION LINE IN THE NORMAL SOLAR SPECTRUM.—An important statement by Mr. J. Evershed, concerning the presence of the dark helium, D_3, line in the solar spectra photographed by Mr. Nagaraja, appears in No. 396 (p. 212, May) of the *Observatory*. Readers of these columns will remember that various observers have criticised copies of Mr. Nagaraja's photographs, and have arrived at the conclusion that the dark line shown thereon is probably not the absorption line (D_3) of helium. But Mr. Evershed has carefully measured this dark line shown on a number of plates, and the results of his measures lead him to the belief that the line is really the helium absorption line. Micrometer measures on the actual photograph from which the copies were taken (May 4, 1907) give 5876·15 and 5876·17 as the wave-lengths of the bright line at the limb and of the dark line respectively, whilst from six determinations of each of a series of photographs obtained during 1907 Mr. Evershed obtains the mean values 5875·96 and 5875·97 respectively. The coincidence is indeed very close, and the mean value is in good accordance with the values obtained by Prof. Rowland and Prof. Hale. Mr. Evershed suggests that the prolongation of the dark line across the umbral areas, a phenomenon which proved a difficulty with the visual observers who criticised the results, may be due to the unsteadiness of the image on the spectrograph slit during a long exposure.

THE LIGHT-CURVE OF δ CEPHEI.—Between June, 1906, and September, 1907, Mr. Joel Stebbins, of the Illinois University Observatory, made a large number of observations of δ Cephei with a polarising photometer attached to the 12-inch refractor. Seventy-four observations, each consisting of ninety-six settings, were made, giving a total of 7104 settings, and every precaution was taken to make each observation perfectly independent and free from systematic errors; a sixth magnitude companion at a distance of 41″ was the only comparison star employed, but there is no evidence to show that all the variation exhibited is not due to the well-known variable. The light-curve obtained from the observations shows secondary fluctuations with maxima at 4·6 and 0·4 days. A maximum occurred on 1906, July 3·29 (=J.D. 2417395·29) and a minimum on July 1·87 (=J.D. 2417393·87), G.M.T.; the range of magnitude is shown to be 0·76 (*Astrophysical Journal*, vol. xxvii., No. 3, p. 188, April).

THE MASSES OF α CARINÆ AND α PAVONIS.—In a recent note in these columns (No. 2005, p. 520, April 2) we directed attention to a communication from Mr. Gore to the *Observatory* in which the writer, basing his conclusions on spectroscopic observations made at the Lick Observatory, showed that the binaries α Carinæ and α Pavonis should have very small masses. From a letter now published in the same journal (No. 396, p. 215, May), from Mr. H. C. Plummer, it appears that Mr. Gore's deductions were based on a slight misapprehension as to the data given in the Lick publication, and his results are therefore erroneous. Mr. Plummer's correction shows that it is quite impossible to justify the inference that the systems of these two stars are necessarily of very small mass.

THE NEW TOWER TELESCOPE OF THE MOUNT WILSON SOLAR OBSERVATORY.—No. 3, vol. xxvii., of the *Astrophysical Journal* (p. 204, April) contains an interesting description, by Prof. Hale, of the tower telescope recently erected at the Mount Wilson Observatory. We gave a brief description of the instrument proposed in our issue of February 28, 1907 (p. 424, No. 1948), and for fuller details must refer our readers to Prof. Hale's illustrated description of the actual instrument. The advantages expected to be obtained by this form of telescope mounting have been fully realised, and only one or two minor modifications, *e.g.* the reduction of the thickness (12 inches) of the mirrors employed, will have to be made. Among the illustrations reproduced in Prof. Hale's paper there is an excellent photograph of a sun-spot spectrum, on the scale of Rowland's map, which shows with remarkable clearness the "widened lines" in the D_3 region.

FURTHER OBSERVATIONS OF JUPITER'S EIGHTH SATELLITE.—In No. 4246 of the *Astronomische Nachrichten* (p. 367, May 1) Sir W. H. M. Christie gives the positions of the newly discovered eighth satellite of Jupiter. The plates from which these positions were deduced were obtained on March 31 and April 3 with the 30-inch reflector, and the position of the satellite referred to three or four faint comparison stars. The positions of the latter were then determined, with reference to some thirty A.G. Catalogue stars, on a plate taken with the 13-inch astrographic refractor.

OBSERVATIONS OF PERSEIDS IN 1907.—The results of the observations of the Perseids, made by three sets of observers connected with the Kasan Observatory during the nights of August 11, 12, and 13, 1907, are given by Herr W. Milowanov in No. 4246 of the *Astronomische Nachrichten* (p. 353, May 1). The paths of 201 Perseids were recorded, and the general radiant was found to be $\alpha = 43°{\cdot}8$, $\delta = +54°{\cdot}0$ (1905·0). The real paths of some forty meteors were computed, the mean heights at the beginning and end of their visible traces being 127 km. and 86 km. respectively.

THE EXTINCTION OF MALTA FEVER.[1]

THE subject of this evening's discourse is the extinction of Malta fever, and I propose to bring before you in this paper the various steps in the investigation of this disease which led up to the discovery of its mode of spread, and so to its prevention and extinction.

HISTORICAL.

This fever has been studied in various ways for the last quarter of a century, but it was not until 1904 that the Government, alarmed by the great wastage in man caused by it, took the matter up seriously, and asked the Royal Society to undertake a thorough investigation of the disease. This the Royal Society agreed to do, and early in the summer of the same year sent out to Malta a small Commission for this purpose; and it is principally the result of the work of the Commission which I have the honour of bringing before you this evening.

It seems a pity that this research was not undertaken twenty years earlier, as during this time some 14,000 or 15,000 sailors and soldiers have suffered from the disease. It is to be hoped that the result of this work will bring home to the Government the great good to be gained by introducing scientific methods of research into the study of disease in the Army. This, strange as it may seem, has not yet come home to Government departments. If an application was made to the Treasury to-morrow for, say, 100*l.* for such scientific purposes, the answer would be that it was not the function of the Royal Army Medical Corps to engage in scientific research, but that their duty was to attend to the sick soldiers. This waiting until a man is sick is fatal. It ought to be our chief duty to anticipate and prevent sickness.

Before I leave the subject of the Commission, I may remark that its work went on for three years before the successful result was attained.

But now to return to Malta fever.

DESCRIPTION OF MALTA FEVER.

At the outset it will be necessary to give a short description of this fever, in order that you may know what we are dealing with.

Malta fever is no trivial complaint, but is a severe and dangerous disease, which lasts a long time, and is accompanied by a good deal of pain. To give you an idea of the long duration of this fever, I may tell you that our soldiers remain under treatment in hospital with it on an average for 120 days, and it is by no means uncommon for a patient to suffer almost continually from it for two or even more years.

During the whole course of his illness the patient is apt to suffer from severe rheumatic pains in the joints, and neuralgia in various nerves, and this, combined with the long-continued fever, brings about a condition of extreme emaciation and weakness, from which recovery is slow.

In order to show you to what a degree of emaciation a few weeks of this fever may bring a man, I will take the liberty of throwing on the screen a photograph of a soldier who has been suffering from it for a few weeks. (Here a picture of a man extremely thin and evidently very ill was thrown on the screen.)

On admission to hospital this man was a robust and muscular soldier, and now see what a few weeks have brought him to.

INCIDENCE OF MALTA FEVER IN THE GARRISON.

Next I would direct your attention to the number of cases of this fever which occur among our sailors and soldiers in Malta, in order to impress upon you the importance of this disease to the State. Among our soldiers, who number about 7000, there have been on an average 312 admissions to hospital every year from Malta fever alone, and among the sailors about the same number. This means that 624 soldiers and sailors have been treated in hospital 120 days each, which makes about 75,000 days of illness per annum.

To illustrate this I throw on the screen a diagram (Fig. 1).

Now I have said enough to show you that we are dealing with a severe and important form of disease.

STUDY OF MALTA FEVER FROM THE EPIDEMIOLOGICAL POINT OF VIEW.

Before we begin the experimental investigation of this fever, it is well that we should know as much as possible about it from a general point of view. For example, in what parts of the world is it found; under what conditions of climate; whether any connection can be made out between it and the temperature or rainfall; whether age or sex render a person more liable; whether occupation or social position has any bearing on it; whether a difference in sanitary conditions has any effect, as, for example, do people living in small villages without any proper system of water supply suffer more than those living in towns supplied with pure water and a modern drainage system?

Now it is clearly impossible for me to go into all these points with the time at my disposal, but I would like to

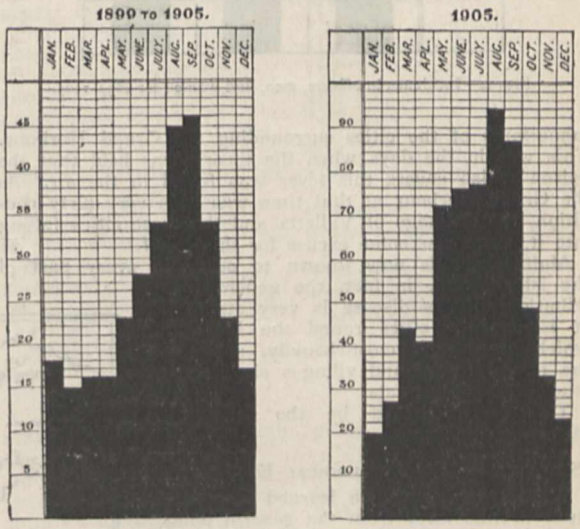


FIG. 1.—Charts of incidence in 1899–1905, and 1905.

bring before you a few facts which bear on the problem we have before us.

Geographical Distribution.—For example, it is interesting to know that Malta fever is not confined to Malta, but occurs in most parts of the world.

Climatic Conditions.—Then again in regard to the effect of climate. Malta is extremely hot and dusty in the summer, and correspondingly cold and wet in winter. But, although the number of cases of Malta fever do show an increase in summer, yet it is a disease which is prevalent all the year round, one-third as many cases occurring in the coldest and rainiest months as in the hottest and dustiest.

Another fact of importance is that if we study the occurrence of Malta fever in individual years we are struck by its irregularity, a number of cases appearing in December or February or other of the cold and rainy months.

Social Position.—Another curious fact in regard to this disease is that the better the social position of a person the more risk is there of catching this fever. Officers and their wives and children, living in large, airy, and clean houses, suffer more frequently than the men in their more crowded barrack-rooms. In fact, the chance of a naval or military officer taking this fever was more than three times as great as in the case of the men.

[1] Discourse delivered at the Royal Institution on Friday, January 24, by Colonel David Bruce, C.B., F.R.S.

This is shown on this diagram (Fig. 2).

Distribution of Malta Fever among the Civil Population.—Another important fact is the distribution of Malta fever among the civil population. Until recently it was supposed by many of us that it was restricted to the

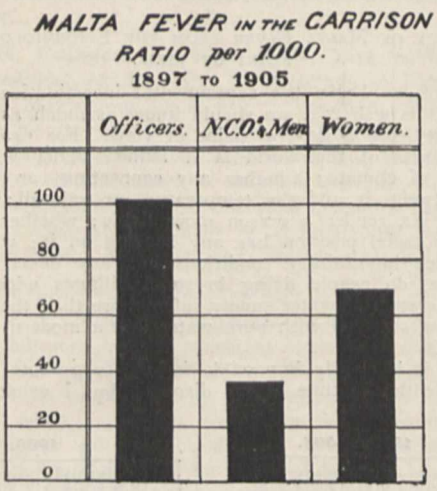


FIG. 2.—Incidence in officers, men, and women for 1897-1905.

inhabitants of the cities surrounding the Grand Harbour. This was in the days when the theory was held that the poison which causes this fever was found in the air. As the Grand Harbour at that time was in a very dirty condition, the drainage of Valletta and the three cities falling into it, there was some excuse for this belief.

Malta fever is now known to occur in every part of the island, and, in fact, the general distribution of this disease is very striking. It is not the cities round the Harbour which are struck most heavily, some of the inland towns and villages showing a much higher fever-rate.

This is illustrated by the following diagram (Fig. 3).

SUMMARY OF EPIDEMIOLOGICAL EVIDENCE.

What, then, have we learned from the study of this fever from the general point of view?

We have found that Malta fever depends on no local conditions, as it occurs in many parts of the world. It cannot have any great dependence on climatic conditions, as it occurs in the cool and rainy months almost as frequently as in the hot, dusty, and rainless.

Poverty and insanitary surroundings do not predispose; in fact, the well-to-do classes have been shown to be more liable to take the fever than the poor. It has no connection with water supply or systems of drainage, as it breaks out as frequently in the smallest country villages as in the large cities.

What, then, is the cause of this fever?

STUDY OF MALTA FEVER BY THE EXPERIMENTAL METHOD.

Discovery of the Parasite.—Let us approach this problem from the experimental side. The first step to be taken is to discover if any parasite or micro-organism is associated with this fever. To do this we examine the blood and the tissues of the various organs, both microscopically and by means of cultivation, on suitable media, to find out if anything can be seen or grown. In this way, as long ago as 1887, it was discovered by an army medical officer that a minute organism, to which the name of *Micrococcus melitensis* was given, is the cause of this disease.

Description of the Micrococcus melitensis.—There is not much to be said about this micro-organism, except that it is very minute, only becoming visible under a magnification of 1000 diameters. It is round or oval in shape, and non-motile. It is found in every case of Malta fever, and if injected under the skin of monkeys gives rise in them to a fever similar to that in man.

CHARACTERISTICS OF THE *Micrococcus melitensis*.

Behaviour outside the Body.—Now, having found the micro-organism, it is necessary to study its characteristics.

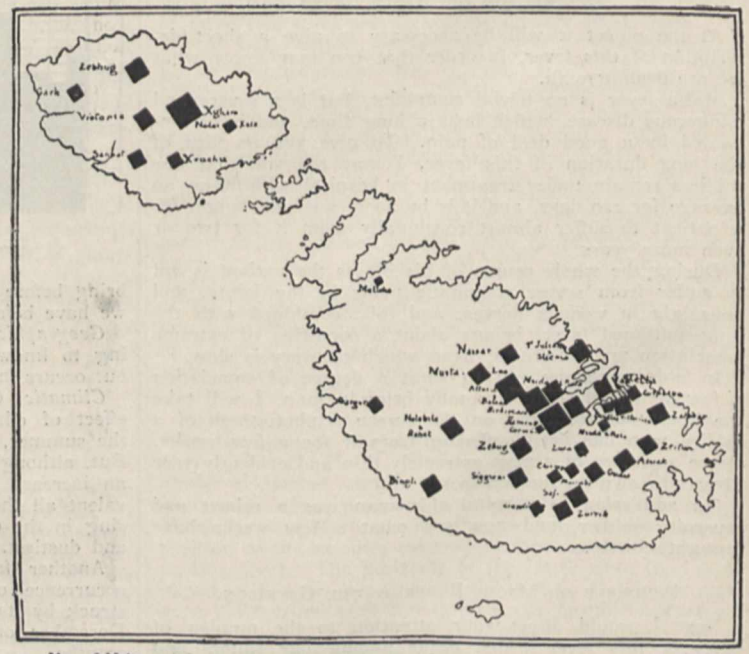
It is found to survive outside the body for some time. For example, it can retain its vitality and virulence in a dry condition in dust or on clothing for at least two or three months. It can also live in a moist condition; in water—tap-water or sea-water—for a somewhat shorter period.

The important thing to be noted is that it does not increase outside the body; it merely survives for some time and then dies off, and, if exposed to direct sunlight, it disappears in a few hours.

Many attempts were made to discover it outside the body under natural conditions. As the generally accepted theory was that it was conveyed in air, naturally the air of fever wards or of places where cases had occurred was examined with great care. It was also looked for in the dust of suspected places and in the water of the Harbour, but with no success. It is evidently what is known as a facultative parasite, or one which depends on a host for its existence.

Thus, then, the first important step in our discovery of a means of preventing Malta fever has been taken. We now know the cause of the disease, and can look with some chance of success for the source whence man obtains it.

The next steps are to find out how this micrococcus leaves and how it gains entrance to the body.



Map of Malta and Gozo, showing the Distribution of Malta Fever in the various Towns and Villages of the two Islands

FIG. 3.—Incidence in civil population.

HOW DOES THE *Micrococcus melitensis* LEAVE THE BODY?

In regard to the first of these, it is conceivable that it might leave the body by way of the expired air, in the saliva, in mucus from the lungs, as in consumption, in the secretion of the skin, as in scarlet fever, in the renal

secretion, or by way of the intestinal tract. Or it might leave the body by way of the blood, by the agency of mosquitoes or other biting flies.

Many experiments were made along all these lines, and finally it was decided that this micro-organism leaves the body principally in the renal secretion, and in the blood taken out of the body by blood-sucking insects.

The result, therefore, of this experimental work was to give rise to the belief that the disease was either conveyed from the sick to the healthy by contact, by inhalation of infected dust, or, lastly, by the agency of mosquitoes.

How does the *Micrococcus melitensis* gain Entrance to the Body?

The investigation of these various modes of infection was therefore undertaken.

By Contact.—Let me first consider infection by contact. Experiments were made by placing monkeys, one affected by Malta fever, the other healthy, in more or less intimate contact, and it was found that if the monkeys lived together in the same cage infection did take place. If, on the other hand, the monkeys were kept in the same cage, but separated by a wire screen, so that, although they could touch each other, contamination of the healthy monkey's food by the sick monkey could not take place, then infection did not take place.

In regard to this question of conveyance by contact, there is one argument against it which has always seemed to me unanswerable, and that is that thousands of cases of Malta fever have been invalided home to England, and treated in our naval and military hospitals, without, as far as I am aware, a single case of the fever arising among the patients, orderlies, or nursing sisters.

It was therefore concluded that contact with Malta fever patients, or the handling of infected clothing or discharges, is not the mode of infection.

Then the question of infection by contaminated dust was taken up.

By Dust contaminated by the Micrococcus melitensis.—For some time it was considered probable that this would prove to be the common method of infection. The fact that the micrococcus withstands drying for a long time, the dusty nature of Malta, and the probability that gross contamination of the surface of the soil takes place by infective discharges, rendered this view likely.

Experiments were made to put the theory to the test. Dust was artificially contaminated with micrococci and blown about a room in which monkeys were confined, or blown into their nostrils or throat. Several of these experiments were successful. It was therefore proved that dust *artificially* contamined with *Micrococcus melitensis* could give rise to the disease.

This, however, was no proof that this mode of infection occurs in Nature. The artificially-contaminated dust contained myriads of micrococci. Under natural conditions they could seldom be numerous, and the powerful Maltese sunlight would tend to kill them off rapidly. The dust blown about by the wind must also dilute the micrococci to an enormous extent, so that it is only possible to conceive of a micrococcus here and there in a vast quantity of dust. Experiments were therefore made with dust naturally contaminated, in order more closely to resemble natural conditions. Dust contaminated in this way, and also that collected from suspicious places, and blown about the cages, sprinkled on food, or injected under the skin, always gave negative results.

The conclusion was therefore again come to that conveyance of the infective germ by means of contaminated dust could only rarely, if ever, give rise to the disease.

By Mosquitoes or other Biting Insects.—As already mentioned, the theory had been strongly advanced that Malta fever, like yellow fever or plague, might be conveyed by blood-sucking insects. The fact that the micrococci are frequently found in the peripheral blood gave some colour to the belief. This point was therefore fully investigated, and numerous experiments made with the different species of mosquitoes found in Malta, and also with other blood-sucking insects.

The results, again, were all negative, and it was therefore decided that Malta fever is not conveyed by contact, by contaminated dust, or by mosquitoes.

What, then, could be the mode of spread?

By Way of the Alimentary Canal.—It had long been known that the smallest quantity of the micrococci introduced under the skin or applied to a scratch would give rise to the disease in man or monkeys, but some work by previous observers had led us to believe that infection did not take place by way of the mouth in food or drink. They had fed monkeys on milk contaminated by the micrococci, and stated that in no case had infection taken place. This observation kept the Commission at first from making feeding experiments. As infection, however, did not appear to take place by contact, by the inhalation of infected dust, or by mosquitoes, it was clearly necessary to repeat these feeding experiments.

Malta Fever

Species of animal	Mode of infection. M. = *M. melitensis*	Probable time which elapsed before infection took place in days	Result. + Infection - No infection
Monkey 39	Feeding on potato containing M.	30	+
,, 40	Do. do.	31	+
,, 66	Accidental feeding ..	..	+
,, 72	Milk + M.; stomach tube	.	+
,, 113	Dust + Mediterranean fever urine. Dried		-
,, 114	Do. do.	..	-
,, 119	Dust + Mediterranean fever urine. Moist	.	+
,, 124	Potato + M. from spleen	..	+
,, 125	Do. do.	..	+
,, 126	Potato + M. from urine	..	+
,, 127	Do. do.	..	+
,, 2	Milk + M.	..	+
,, 4	Do.	..	+
,, 5	Do.	..	+
,, 99	Do.	..	+
,, 6	Culture	..	+
,, 7	Do.	..	+
,, 8	Do.	..	+
,, 9	Do.	..	+
,, 19	Do.	18	+
,, 19c	Do.	32	+[1]
Kid 9	Milk	..	-
,, 19a	Mother's milk ..	..	-
Goat 12	Culture from milk ..	..	+
,, 13	Mediterranean fever urine and dust	..	+
,, 14	Do. do.	..	+
,, 4	Milk + culture ..	..	+

FIG. 4.—Feeding experiments.

Feeding Experiments.

Here is a table showing the result of some of these feeding experiments, and you see it is abundantly proved that Malta fever can be conveyed to healthy animals by way of the alimentary canal. Even a single drink of a fluid containing few micrococci almost certainly gives rise to the disease (Fig. 4).

From the results, then, of all these experiments it seemed most probable that the micrococcus gained an entrance to the body by way of the alimentary canal, and therefore by some infected food or drink.

FIG. 5.—Milking goat.

This led to an examination of food-stuffs, and among these the milk of the goat is one of the most important.

Infection by Means of Goats' Milk.

The goat is very much in evidence in Malta, and supplies practically all the milk used. There is, I believe, one goat to every ten of the population, so that, as there

are 200,000 inhabitants, there must be 20,000 goats. Flocks of them wander about the streets from morning until night, and are milked as required at the customers' doors (Fig. 5).

It must be confessed there seemed little hope that an examination of these animals would yield any result. The goats appeared perfectly healthy, and they have the reputation of being little susceptible to disease of any kind.

To put the matter to the test several goats were inoculated with the micrococcus, and the result watched. There was no rise of temperature, no sign of ill-health in any way, but in a week or two the blood was found to be capable of agglutinating the specific micro-organism.

This raised our suspicions, and a small herd of apparently healthy goats was then procured and their blood examined to see if they were all healthy. Several of them were found to react naturally to the agglutination test, and this led to the examination and the discovery of the *Micrococcus melitensis* in their blood, urine, and milk.

Micrococci in Goats' Milk.

Some thousands of goats in Malta were then examined, and the astounding discovery was made that 50 per cent. of the goats responded to the agglutination test, and that

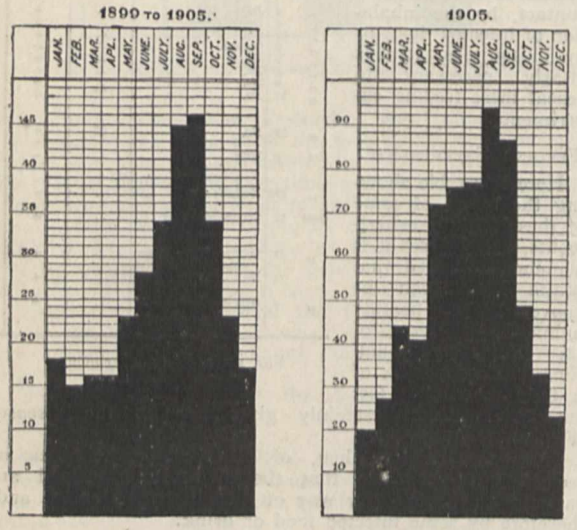


FIG. 6.—Charts of incidence among the soldiers in 1899–1905, and 1905.

actually 10 per cent. of them were secreting and excreting the micrococci in their milk.

Monkeys fed on milk from an affected goat, even for one day, almost invariably took the disease.

s.s. *Joshua Nicholson.*

At this time, curiously enough, an important experiment on the drinking of goats' milk by man took place accidentally. Shortly, the story is as follows:—In 1905 the s.s. *Joshua Nicholson* shipped sixty-five goats at Malta for export to America. The milk was drunk in large quantities by the captain and the crew, with the result that practically everyone who drank the milk was struck down by Malta fever.

Sixty of the goats (five having died) on arrival in America were examined, and thirty-two found to give the agglutination reaction, while the *Micrococcus melitensis* was isolated from the milk of several of them. This epidemic of Malta fever on board the s.s. *Joshua Nicholson* therefore clinched the fact that the goats of Malta act as a reservoir of the virus of Malta fever, and that man is infected by drinking the milk of these animals.

Epidemiological Features.

Here, then, at last was discovered a mode of infection which explains the curious features of Malta fever—the irregular seasonal prevalence, the number of cases which occur during the winter months, when there are no mosquitoes and little dust. It is true there are more cases in summer than in winter, but this may be explained by the fact that more milk is used at that time of the year for fruit, in ice-creams, &c. It also explains the fact that officers are more liable than the men, as the former consume more milk than the latter. It also explains the liability of hospital patients, milk entering so largely into a hospital dietary.

Result of Measures Directed against the Use of Goats' Milk.

As soon as goats' milk was discovered to be the source of infection, preventive measures were begun. The result is very striking, as is shown in the charts thrown on the screen, which give the number of cases of Malta fever among the soldiers in the garrison before and after the preventive measures came into action.

Here is a chart of the incidence of Malta fever among the soldiers each month before the preventive measures were put into force (Fig. 6).

And here is another showing the incidence of this fever

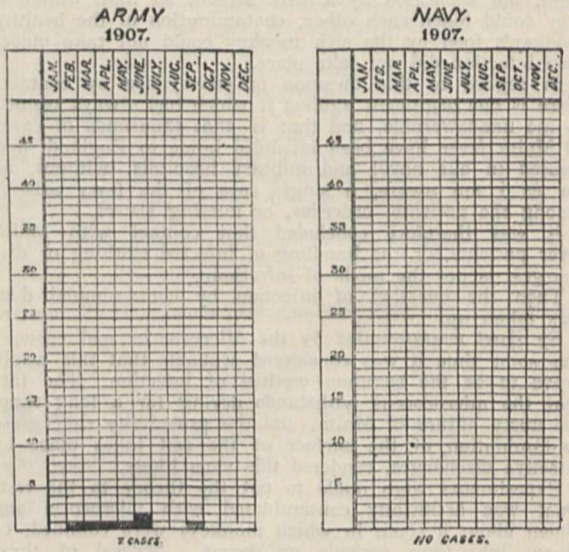


FIG. 7.—Charts of incidence among the soldiers and sailors, 1907.

among the soldiers and sailors in Malta since goats' milk has been banished from their dietary (Fig. 7).

With this chart, which shows the practical extinction of Malta fever, my discourse comes to a close.

RUSSIAN TRANSLITERATION.

THE system of transliteration from Russian generally adopted in British libraries and scientific bibliographies is that first published in NATURE on February 27, 1890. It was the result of consultation by a committee of which the secretaries were Prof. Miers and the writer. This system was intended to satisfy the need for some uniform practice, and it was based on the principle that no system of transliteration from Russian would be suitable for bibliographic work unless every word may be re-transliterated into the original Russian spelling, so that it may be found in a dictionary. It was accordingly necessary that each Russian character should have one constant equivalent, and that the equivalents should be so arranged that the same combination of letters should not result from different Russian characters. It was also considered advisable to use accents as little as possible. Phonetic considerations and elegance in appearance were regarded as unimportant in comparison with the main requirements of certainty in re-transliteration.

The Imperial Academy of Sciences of St. Petersburg has recently adopted a system from the transcription of proper names into Russian. The symbols adopted by the Imperial Academy of Sciences are as follows:—

а	б	в	г	д	е[2])	ё[5])	ж	з	и[3])	і	й	к	л	м	н
a	b	v	g	d	e, je	ë	ž	z	i, ji	i	j	k	l	m	n
о	п	р	с	т	у	ф	х	ц	ч	ш	щ	ъ	ы	ь[4])	ѣ[2])
o	p	r	s	t	u	f	ch	c		š	šč	—	y	ĭ	ě, jě
э	ю[1])		я[1])	ѳ	ѵ										
e	ju, ĭu,		ja, ĭa	f	i										

The table of Russian and Latin characters is accompanied by the following notes:—

(1) The liquid vowels и and ю beginning a syllable or preceded by ъ or ь (which, in the last case, are omitted from the transcription) are transcribed by "ja" and "ju"; if preceded by a consonant these vowels are transcribed by "ia" and "iu," if they form a syllable with the preceding consonant.

(2) The liquid vowel "e" and the vowel ѣ preceded by ь or ъ (which in this case are omitted in the transcription) are transcribed by "je" and "jě"; if preceded by a consonant these vowels are transcribed by "e" and "ě." But the liquid vowel "e" beginning a prope name is transcribed by a simple "e." Thus Egorov (pronounced Yegorov) begins with the liquid "e."

(3) The letter и preceeded by ь is transcribed by "ji" (the liquid "i").

(4) The letter ь at the end of a word or before a consonant is transcribed by "ĭ."

(5) The letter "e," when it is pronounced "jo," is represented, as in Russian, by "ë," but only when the author writes his name in that way.

(6) The names of foreign authors who have written in Russian are re-transcribed according to this system when the original orthography of these names is unknown; when it is known, the transcription of the Russian form of the name can be given in a note.

The British system also proposed to use the original form of any Russianised proper name in preference to re-transliterating them.

The Russian Academy's system does not attempt to secure the precision in re-transliteration which was the main object of the British system; for the letter "f" stands for either ѳ or ф; "u" stands for "y" or occurs in combination with "j" (which is itself the transliteration of й) for ю; "i" may be the transliteration of any one of four letters, и, і, ь, or ѵ, as well as in combination with "u" and "a" from ю or я. The English "e" is the equivalent of either "e," ѣ, or э. Five Russian letters have alternative transliterations. Phonetically, the Russian system has some advantage over the British, although in this respect it is in some ways less satisfactory. The Russian system, however, is proposed only for proper names, for which a less rigid system is perhaps necessary than for general scientific and bibliographic work.

J. W. GREGORY.

DYEING QUALITIES OF NATURAL AND SYNTHETIC INDIGO.

THE annual report, written by Mr. Cyril Bergtheil, of the Indigo Research Station of the Bihar Planters' Association for the year 1907–8 has just been issued; it contains an interesting statement with regard to the value of "synthetic" indigo as a dye-stuff compared with natural indigo. From last year's experiments (see NATURE, vol. lxxv., p. 614) it was concluded that "synthetic" indigo gives poorer results under practical conditions than those obtained with the natural dye, the latter imparting a richness of shade or "bloom" which was unobtainable with the synthetic material. It has since been ascertained that the synthetic indigo supplied for the tests was "brand E" of the Badische Anilin- und Soda-Fabrik, which contains some 25 per cent. of lime; the presence of this high proportion of alkali would of itself account for the bad results obtained in the hydrosulphite vat. Experiments will now be made using the material which the Badische company itself recommends for the hydrosulphite vat.

The rest of the report deals with the results obtained in experiments made to ascertain the best conditions to be observed during the growth of the indigo plant, and in the extraction of the dye subsequently. Good results have been obtained by the use of sulphuric acid as a means of facilitating the germination of the seed of the Java plant, as recommended in a previous report (NATURE, vol. lxxv., p. 497), but care must be observed in ensuring that the acid used is of correct strength. A number of interesting experiments made to ascertain the effect of manuring on the production of indican in the plant are also reported. It would appear that the proportion of indican in the plant is independent of, or is actually decreased by, manurial treatment; in fact, the production of indican appears to be a starvation phenomenon, the proportion of the dye being increased by the absence of moisture and by adverse climatic conditions. On the other hand, the fertility of the land must not be allowed to drop too much, otherwise the growth of the plant as a whole is interfered with, and the return of the dye per acre is affected. New fungoid diseases, and an insect pest producing ravages on indigo plants, are also dealt with in the report.

MAY METEORS.

MAY, like June, cannot be said to be prolific of meteoric showers or to offer special inducements to observers. There are, of course, the May Aquarids, due during the first week of the month in the morning hours. There is also a pretty rich shower of Coronids between about May 11 and 18, but they are not often seen in marked prominence; and I believe there is a special shower at the close of May from the N.W. region of Pegasus, at about 334°+28°, which deserves more attention. I found the position of this radiant on reducing a number of meteors recorded by the Italian Meteoric Association in 1870, and very satisfactorily confirmed the showers in 1886 May 29 to June 4, the exact positions being 330°+28° and 333°+27° respectively.

There is a well-marked radiant of slow meteors from this point in July and August, but it has been seldom noticed at the close of May and early days of June. This year moonlight will not interfere with observation, and it would be interesting to watch the eastern sky in the mornings of May 29 to June 4 for the purpose of further investigating these η Pegasids. They are of the Perseid type, being swift and streaking meteors, and I think the stream may prove of some importance among the spring showers, though very little is known of it.

Any observations conducted for the purpose of re-detecting the system may also be found useful in giving us a fuller insight into the other meteoric displays of the same period.

W. F. DENNING.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—Twenty students matriculated this term, bringing the total number for the year up to 1162. This is an advance of seventy-nine on the numbers for last year, and of ninety-seven on the numbers for 1906 to the present date. The increase in the number of advanced students over that of last year is *ten*.

It is proposed to confer the degree of Master of Arts, *honoris causa*, upon Mr. A. Henry, reader in forestry.

Mr. F. Darwin, F.R.S., has been nominated the representative of the University at a meeting convened by the Linnean Society of London to be held in July in celebration of the fiftieth anniversary of the reading of the joint essay by Charles Darwin and Alfred Russel Wallace "On the Tendency of Species to form Varieties; and on the Perpetuation of Varieties and Species by Natural Means of Selection."

The general board has reported on the proposed readership in metallurgy which the University will be enabled to establish by the munificence of the Goldsmiths' Com-

pany, which has presented 10,000*l.* for the purpose of founding and endowing a readership in metallurgy. The board is of opinion that the generous offer of the Goldsmiths' Company should be accepted, that a readership in metallurgy should be established, that the readership should be associated with the name of the company, and that among the principal duties of the reader should be that of research and other work in the precious metals and of instruction in the theory and practice of assaying. The board is of opinion, further, that the stipend attached to the readership should be 300*l.* a year, or such larger or smaller sum as the capital may produce. The board has consulted the professor of chemistry, and finds he is of opinion that there is suitable and sufficient accommodation in the present chemical laboratory to enable the reader to carry out the special duties of his office, but if the metallurgy of the commoner metals is to be studied accommodation will have to be provided on another site more suitable for the purpose.

LONDON.—Sir Arthur Rücker, principal of the University, was unfortunately absent through illness on Presentation Day, May 6, and was therefore unable to deliver his valedictory address. The principal's report, read by the secretary to the Senate, showed continued progress. Matriculation candidates were 7356 in 1907–8, compared with 7112 in 1906–7 and 7036 in 1905–6; of the 7356, however, only 3277 were admitted to the University. Eighty-five graduates of other universities and others similarly qualified have taken advantage of Statutes 113 and 129, and are now studying in London as internal students with the view of taking a higher degree of the University of London. Gifts amounting to 24,667*l.* had been received by the University during the past year. In concluding his report, the principal said:—"For three-quarters of a century all efforts for the establishment of university education in London were spasmodic, disconnected, and sometimes even avowedly antagonistic. Eight years of an attempt to substitute for this condition of chaos a common policy and such common government as may be compatible with the free play of individual effort have justified those who supported and carried the great reform which took effect in the autumn of 1900." The presentees included eleven Doctors of Science (eight in science, one in engineering, and two in economics), thirty-three Doctors of Medicine and eight Masters of Surgery, one Doctor of Literature, and one Doctor of Divinity.

The University exhibit at the Franco-British Exhibition promises to be very interesting and comprehensive. It will consist mainly of photographs, publications, and charts. An exhibit representing medical education in London, and another illustrating the social and athletic life of the students, have been specially organised. One of the most valuable exhibits is a collection of publications by teachers of the University and their students in the year 1907; a special catalogue of this collection is to be published. The University will publish a special handbook containing a catalogue of the University exhibit. The medical schools have prepared a large and fully illustrated handbook on medical education in London, and the students' representative council has published a students' handbook dealing especially with the social and athletic life of the student. Copies of all these publications will be available for visitors to the exhibition.

Admission is free to the following lectures addressed to advanced students of the University and others interested in the subject of the lectures:—Eight Mercers' Company lectures on "Recent Advances in Physiology," Prof. E. H. Starling, F.R.S.; four lectures (under the Chadwick benefaction) on "The Engineering Aspect of Recent Advances in connection with Sewering," W. D. Scott-Moncrieff; eight lectures on "Cholesterol and Lecithin: from the Chemical and Physiological Standpoints," J. A. Gardner; three lectures on "The Early Development of Mammalia," Prof. J. P. Hill; eight lectures on "Fossil Ferns and Allied Seed Plants," Dr. D. H. Scott, F.R.S.; three lectures on "The Thames and its Tributaries," Prof. H. G. Seeley, F.R.S.; and four lectures on "Recent Advances in the Determination of Minerals by Optical Methods," Dr. J. W. Evans. Particulars as to the lectures can be obtained from the academic registrar of the University.

OXFORD.—The following is the text of the speech delivered by Prof. Love in presenting Prof. W. James for the degree of D.Sc., *honoris causa*, on May 12:—

Adest Willelmus James, in Academia Harvardensi Professor emeritus, novi rerum ordinis in Psychologia inventor. Qui vir, quo magis eam scientiam promoveret quæ mentis humanæ agitationes, cogitationis memoriæque rationem, sentiendi, percipiendi modos complectitur, nulla fere disciplina non institutus est. Neque enim solum acuto, ut philosophus, ingenio, sed usu et scientia, ut medicus, peritia etiam experimentis parta, ut physiologus, præstabat. Accessit, quod caput est, mira quædam divinandi facultas. Quæ renuntiat suis oculis assecutus est, vir non legendo sed intuendo doctus: idem admirabili dicendi genere inventa explicat. Mox a psychologia ad philosophiam conversus fecit ut hæc studia in omni orbis terrarum parte revivescerent. His quidem diebus apud nos de philosophia luculenter contionatus magno iuniorum seniorumque conventu Academiam nostram maxime delectavit.

THE Court of Glasgow University has decided to establish a lectureship in geography at the University.

THE King has consented to visit Leeds in July, accompanied by the Queen, for the purpose of opening the new university buildings.

VISCOUNT MORLEY OF BLACKBURN has been elected Chancellor of the University of Manchester in succession to the late Duke of Devonshire.

ARMSTRONG COLLEGE, Newcastle, has accepted with thanks an offer from Lord Barnard to place the sum of 1000*l.* in trust for the benefit of the agriculture department of the college.

THE public bequests announced under the will of the late Mr. T. Webb include:—University College, London, 5000*l.*, to be used and applied, so far as is practicable, for the purposes of physical research; University College of South Wales and Monmouthshire, 5000*l.*, also to be applied, so far as is practicable, for the purposes of physical research.

AT a meeting of the Bristol City Council, held on May 5, a resolution was passed in favour of the proposal "to establish a university for Bristol and the west of England, and agreeing to give financial assistance to such university in the event of a charter for its establishment being obtained, provided arrangements as to the constitution of the university satisfactory to the council have been made."

IN the House of Lords on Tuesday, Lord Stanley of Alderley moved the second reading of a Bill the main object of which was to make thirteen the minimum age at which a child can be exempted from the obligation to attend school. The second reading was rejected, not because any argument against the Bill could be put forward from the point of the physical and mental welfare of the nation, but because, to use the words of Lord Tweedmouth, "a sudden change in the law would cause a very considerable amount of inconvenience, especially to the agricultural interest, to the cotton interest, and to some extent to the woollen interest." So the healthy development of the body and mind of the child has to be sacrificed to these various interests. Meanwhile, the Education Bill for Scotland, read a second time in the House of Commons on May 5, makes fourteen the normal age of leaving the primary school. Evidently, we have to look to the north for advance in educational standards.

PROF. AINSWORTH DAVIS has been appointed principal of the Royal Agricultural College, Cirencester. The college was founded in 1845, and has hitherto been conducted without the least aid from Government or local authorities. It has been decided, however, to re-constitute the college, making it a public institution with a representative governing body, in association with the county councils of Gloucestershire and the adjoining counties. In addition to providing courses for pupils proposing to become farmers or manage estates, it is proposed to hold vacation courses for village schoolmasters desiring to become qualified to teach rural subjects. Forty acres of land are attached to the college, and, in addition, the students have access to a farm, arable and pasture, of more than 450 acres. Great attention is directed to

forestry, and the professor and students have the advantage of a forest nursery located in Earl Bathurst's park, a portion of which he placed at the disposal of the college for this purpose.

THE Board of Education has published (Cd. 4037) the Regulations for English Secondary Schools for the year beginning August 1 next. The regulations are in main substance the same as those of last year. Owing to difficulties which have arisen during the past year in the interpretation of the regulations referring to the provision of free places in secondary schools, these rules have been further defined. It is made clear that boys and girls applying for such free places may be required to pass an entrance test of attainments and proficiency, having due regard to the age of the applicants, the subjects in which they have been receiving instruction, and the standard of attainments and proficiency required for the admission of fee-paying pupils. Pupils who enter the school as bursars or pupil teachers must not be counted in estimating the number of free places provided. In examinations held for the selection of boys and girls to occupy free places, importance is to be attached to the report of the candidate's own teachers, and the masters or mistresses of the secondary school are to be associated with teachers familiar with elementary-school conditions in conducting the examination. The regulations make provision, too, for greater elasticity in the way of adapting the instruction to the requirements of the pupil, though precautions are taken to see that this privilege is used with proper moderation. To meet the difficulty of providing secondary education in rural areas and less populous urban or semi-urban districts, the Board is prepared next year to recognise secondary schools with fifteen instead of sixteen as the normal leaving age, but this concession is only made where a consideration of local circumstances shows that it will be of distinct educational advantage to the district, and that a longer school-life is not under actual conditions possible.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, June 27, 1907.—"On the Polymorphic Changes of Ammonium Nitrate." By U. **Behn.** Communicated by Prof. A. Schuster, F.R.S.

The main results of the research may be summarised as follows:—

(*a*) From the dilatometric and crystallographic work no definite information is forthcoming which affords any precise proof as to a difference in properties of the two tetragonal modifications of ammonium nitrate.

(*b*) The argument derived from the investigation of the thermal properties tells, so far as it goes, against the identity of the two tetragonal modifications, but it cannot be considered as decisive.

January 30, 1908.—"The Refractive Index and Dispersion of Light in Argon and Helium." By W. **Burton.** Communicated by Prof. J. J. Thomson, F.R.S.

The initial object of this research was to find the dispersion of light in the monatomic gases argon and helium, but as it was necessary to know the absolute value of the refractive index with considerable accuracy, determinations of the refractive index were made.

The results for argon and helium are tabulated below, and, for comparison, Mascart's values for hydrogen are also given.

Refractive index, reduced to 0° C. and 760 mm. pressure for D_1 line.

Argon	1·0002837
Helium	1·00003500
Hydrogen (Mascart)	1·0001387

Dispersion:—In equation

$$n-1=a\left(1+\frac{b}{\lambda^2}\right), \text{ or } n=A+\frac{B}{\lambda^2},$$

	b	a	A	B
Argon ...	$5{\cdot}6\times10^{-11}$	0·0002792	1·0002792	$1{\cdot}6\times10^{-15}$
Helium...	$2{\cdot}2\times10^{-11}$	0·00003478	1·00003478	$7{\cdot}5\times10^{-16}$
Hydrogen (Mascart)	$4{\cdot}3\times10^{-11}$	0·0001376	1·0001376	$5{\cdot}9\times10^{-15}$

It may be noted that the values of a/b for these substances are approximately in the ratio 3 : 1 : 2.

February 13.—"The Effect of Hydrogen on the Discharge of Negative Electricity from Hot Platinum." By Prof. H. A. **Wilson,** F.R.S.

The view taken in this paper is that the effect of the hydrogen on the leak is due to its presence in the surface layer of the platinum. To explain this it is supposed that the hydrogen atoms in the layer are positively charged, so that they diminish the charge per unit area in the electrical double layer covering the surface of the platinum. The hydrogen appears to dissolve in the platinum at first, but at high pressures in time forms a stable combination with the platinum, having a very small dissociation pressure. Before this compound has been formed, the leak is proportional to a power of the pressure of the hydrogen.

February 20.—"On the Dispersion of Gaseous Mercury, Sulphur, Phosphorus, and Helium." By C. **Cuthbertson** and E. Parr **Metcalfe.** Communicated by Prof. F. T. Trouton, F.R.S.

In continuation of previous work on the refractive indices of certain elements in the gaseous state, the authors have measured the dispersion of the elements named above within the limits of the visible spectrum.

The results obtained may be summarised as follows:—

Mercury ... ... $\mu-1=0{\cdot}001755\left(1+\frac{2{\cdot}265}{\lambda^2 10^{10}}\right)$.

Sulphur ... ... $\mu-1=0{\cdot}001046\left(1+\frac{2{\cdot}125}{\lambda^2 10^{10}}\right)$.

Phosphorus... ... $\mu-1=0{\cdot}001162\left(1+\frac{1{\cdot}53}{\lambda^2 10^{10}}\right)$.

Helium ... ... $\mu-1=0{\cdot}0000347\left(1+\frac{2{\cdot}4}{\lambda^2 10^{11}}\right)$.

The dispersion of mercury is about four times that of air.

The index of sulphur for infinite waves is, within 2 per cent., four times that of oxygen. Its dispersion is, not so exactly, four times that of oxygen.

The index of phosphorus, for infinite waves, is exactly four times that of nitrogen. Its dispersion is almost exactly twice that of nitrogen.

The index of helium is, within 1·6 per cent., one-eighth of the best existing value for the index of argon. Its dispersion is about three-sevenths that of air.

March 5.—"On the Electrical Resistance of Moving Matter." By Prof. F. T. **Trouton,** F.R.S., and A. O. **Rankine.**

The question of relative motion between the earth and the neighbouring ether has been under discussion for many years. It has, from time to time, been the subject of important investigations, but these have all resulted negatively. The experiment described in the present paper is not different from them in this respect, yielding, as it does, no definite information on the main point. Indirectly, the aim was to measure the direction and magnitude of ether-drift, the actual method having been to attempt to demonstrate the existence of the Fitzgerald-Lorentz shrinkage, which has been supposed to mask the effect in the direct experiments of Michelson and Morley, and of Trouton and Noble.

The results lead the authors to conclude:—

(1) The total electrical resistance of a wire is not altered by an amount exceeding 5×10^{-10} of the whole amount by any change of its position relative to its motion through space.

(2) On the assumption that the Fitzgerald-Lorentz shrinkage is a real effect, the specific resistance of a material is dependent upon the direction of flow of the current, being greater to a current flowing parallel to the velocity of the material through space than to a current in a perpendicular direction. The magnitude of this change of specific resistance is shown by the experiments to be certainly within 2 per cent. of being sufficient to compensate the change of length.

March 12.—"Bacteria as Agents in the Oxidation of Amorphous Carbon." By Prof. M. C. **Potter.** Communicated by Prof. J. B. Farmer, F.R.S.

Under conditions of exposure to the air, a slow oxidation

of amorphous carbon takes place through the agency of bacteria. This has been conclusively established by experiments upon such carbonaceous substances as charcoal, lamp-black, coal, and peat.

When these substances are subjected to bacterial action carbonic acid is given off, as estimated volumetrically by absorption in baryta solution and titration with standard oxalic and hydrochloric acids.

The amount of CO_2 given off increases in proportion to the rise of temperature, and ceases to be evolved at a supra-vital temperature. There is no evolution of CO_2 under perfectly dry conditions such as preclude the possibility of bacterial life.

A distinct rise of temperature occurs through the action of bacteria. The heat generated was determined by measurement, with a galvanometer, of the electromotive force produced by the difference of temperature between two thermo-elements, one placed in a sterile and the other in an inoculated flask.

The evolution of CO_2 and the accompanying rise of temperature does not take place when carbonaceous substances are preserved from the intrusion of micro-organisms.

The heat generated by microbial activity is an influence to be taken into account in connection with the oxidation and spontaneous combustion of coal; it may be a dangerous motive force acting upon explosive gases.

The oxidising action of bacteria must be largely responsible for the disintegration of coal and the high percentage of depreciation which it undergoes in store.

Coal and peat, like other organic matter, are liable to decomposition as soon as conditions are presented suitable for the life of aërobic organisms. The carbon is then once more liberated in the form of CO_2 to play its *rôle* in the life-cycle. It is thus conceivable that the vast supplies of carbon locked up in the world's coalfields may become available for plant nutrition without the intervention of direct combustion.

"The Origin and Destiny of Cholesterol in the Animal Organism," parts i. and ii. By C. **Dorée** and J. A. **Gardner.** Communicated by Dr. A. D. Waller, F.R.S.

These two papers throw some further light on the interesting question of the part played by cholesterol in the economy. The authors made, first, a very thorough and careful examination of the excretion of cholesterol by the dog. The animal was fed for periods varying between fourteen and thirty days on diets the cholesterol content of which varied greatly. The output of cholesterol in the fæces was in every case found to be a function of the food taken. Thus in seventeen days on horseflesh one gram of cholesterol was recovered, in thirty-one days on oatmeal and water 0·1 gram only. On a diet of raw brain, which is rich in cholesterol, a very interesting result was observed. In fourteen days the output amounted to 17 grams, and it consisted entirely of coprosterol, the dihydrocholesterol normally present in human fæces. In every experiment the cholesterol actually found was very much less than the quantity that should have been poured into the intestine with the bile.

In the excrement of grass-fed animals the main cholesterol product is the so-called hippocoprosterol, which is shown to be an alcohol, $C_{27}H_{54}O$, melting at 79° C. But far from being, as previously supposed, reduced from cholesterol in the intestine of the animal, it is merely a constituent of the grass taken as food. This was finally and clearly proved by feeding a rabbit on grass from which the chortosterol (as the authors propose to re-name it) had been removed by extraction with ether. The body could no longer be obtained from the fæces. No trace of cholesterol was found in the excrement of the herbivora examined, and it thus appears probable that the cholesterol of their bile is actually absorbed in the intestine—a point at present under investigation.

April 2.—"The Antagonistic Action of Calcium upon the Inhibitory Effect of Magnesium." By S. J. **Meltzer** and J. **Auer.** Communicated by Prof. E. H. Starling, F.R.S.

In a series of recent studies which the authors have carried out upon the relations of the effects of calcium to magnesium, many facts came to light which demonstrate unmistakably that calcium is the most available agent to neutralise inhibitory effects of magnesium. The following experiment is an instance:—

By subcutaneous injections of a magnesium salt (for instance, Epsom salt—about 7 c.c. of a 25 per cent. solution per kilogram), rabbits are brought to a profound state of anæthesia and paralysis. The slow and shallow respirations indicate the approaching danger. Now 6 c.c. or 8 c.c. of an M/6 or an M/8 solution of a calcium salt are given through the ear vein. Within a few seconds the respiration becomes quicker and deeper, and within one minute the animal turns over, sits up, and appears normal.

Here calcium not only did not add an inhibitory effect, but completely neutralised the profound inhibitory effect of magnesium. The companionship of calcium and magnesium within the body means, at least in many instances, not a concerted action of similar effects, but rather a resultant effect of antagonistic actions.

Royal Microscopical Society, April 15.—Mr. Conrad Beck, vice-president, in the chair.—Dendritic growths of oxide of copper on paper: J. **Strachan.** The results verified previous investigations, showing that these dendrites originated in minute particles of copper, their branching being due to the direction of the fibres in the paper.—Nature's protection of insect life: F. **Enock.** The slides were taken by the Sanger-Shepherd three-colour process, and Mr. Enock described the method he employed in their production.

Geological Society, April 15.—Dr. J. J. Harris Teall, F.R.S., vice-president, in the chair.—The geological structure of the St. David's area (Pembrokeshire): J. F. N. **Green.** The Cambrian rocks were first traced and found to be faulted greatly. The faults have been followed into the volcanic tuffs (Pebidian), and the succession determined and pieced together. In this way the Pebidian has been subdivided into fourteen horizons, with a total visible thickness of more than 3000 feet. The subdivisions are classified into four series, the lower two of which are composed of trachytic pebbles in a chloritic matrix, and separated by a schistose quartz-felspar-porphyry sill. The third series is composed of rhyolite and hälleflinta fragments in a silicified matrix, and the topmost of highly sheared schistose beds. The tuffs appear to be mainly detrital. An unconformity between the Pebidian and the Cambrian is demonstrated. The schistose sill has been traced into the porphyritic margin of the St. David's granophyre (Dimetian), and it is inferred that the granophyre is a laccolitic intrusion in the Pebidian. The boundaries between the granophyre and the Cambrian are prolongations of faults proved in the latter, except at one point in the well-known Porthclais district. A trench opened here exposed basal Cambrian rocks resting upon a denuded surface of the granophyre, which is therefore of pre-Cambrian, but of post-Pebidian age. The relationships of the basic igneous rocks west of St. David's are discussed, and they are all described as post-Cambrian intrusions.—Notes on the geology of Burma: L. V. **Dalton.** The results are given of geological expeditions in the Irawadi Valley, carried out between 1904 and 1906, and present knowledge of the geology of Burma in general and of the Tertiary system in particular is summarised.

Zoological Society, April 28.—Dr. Henry Woodward, F.R.S., vice-president, in the chair.—A revision of the sharks of the family Orectolobidæ: C. Tate **Regan.** Twenty-one species were described, and were referred to eight genera. Attention was directed to the great differences in form, coloration, &c., among the members of the family, corresponding to differences in habits and environment.—Identification of an oligochæte worm obtained in considerable numbers from a well near Cambridge, England: F. E. **Beddard.** The author described the worm as a new species of the genus Phreatothrix, the only other species of which had been described thirty years ago from the underground waters of Prague.—The amphipod genus Trischizostoma: Mrs. E. W. **Sexton.** The memoir was based on a rich material obtained by the steamer of the Marine Biological Association in the Bay of Biscay, and by the steamer of the Irish Department of Agriculture off the west coast of Ireland.—Certain

errors respecting George the Fourth's giraffe: H. **Scherren.** The author adduced evidence to show that the time the animal lived at Windsor had been much understated, and added details as to its life in confinement, the presentation of the skin and skeleton to the museum of the society, and the notes made by R. B. Davis while painting a picture of the animal at Windsor.—Observations on the breeding-habits of a cichlid fish (*Tilapia nilotica*) made in the course of a visit last year to Lake Qurun in the Fayûm province of Egypt: C. L. **Boulenger.**—A revision of the Oriental pelobatid batrachians (genus Megalophrys): G. A. **Boulenger.**

Challenger Society, April 29.—Sir John Murray in the chair.—A series of hydrographical sections, illustrating the work of Dr. R. N. Wolfenden's yacht *Silver Belle* in 1905 off south-west Ireland and down to Gibraltar: Dr. H. N. **Dickson.** The observations allowed the extension into the Atlantic of the Gibraltar under-current of high temperature and salinity to be carefully re-studied; its effects were observed to reach to 700 or 800 fathoms, where it spreads out as a flat sheet, the high salinity of which gives it a specific gravity equal to that of the colder, fresher Atlantic water. The northward range of this water varies from year to year, and must be taken into account by the International Commission for the Study of the North Sea as a third factor in tracing the sources of Channel and North Sea water.—Practical methods for the collection and investigation of water samples and temperatures: D. J. **Matthews.**

DUBLIN.

Royal Dublin Society, March 24.—Prof. Sydney Young, F.R.S., in the chair.—Reports upon the Irish peat industries (part ii.): Prof. Hugh **Ryan.** The author begins with a description of the methods employed in Ireland for the preparation of peat fuel, and then reviews the attempts which have been made at various times to convert peat into a fuel of greater density than that ordinarily obtained by the Irish farmer. A recommendation is made for the establishing of suitable industries, such as that of glass-manufacture, at carefully selected points of the peat districts having machine-formed turf and peat-moss litter factories in connection with them. The economic importance of "generator gas" and of "mixed power gas" from peat is also considered in the paper, which concludes with a description of the "Woltereck process," employed at Carnlough, co. Antrim, for the preparation of ammonia from peat.

April 14.—Prof. Sydney Young in the chair.—The eruption of Vesuvius, 1906: Dr. H. J. **Johnston Lavis.** The author describes, from information collated and from personal observations a few days after the great outburst, the succession of events at Vesuvius in April, 1906. He points out that these events, and the manifestations since 1872, may be referred to the usual local alteration of "Strombolian" and paroxysmic "Vesuvian" stages of activity. He attributes the great outbursts of volcanic dust, accompanying the crater-forming stage, to the falling in of loose material from the crumbling cone when the lava-column has been drained down to a low level, and to its second ejection by the upbursting steam. In the cone-building stage, on the other hand, the lava-cake on the top of the magma-column, now high up in the vent, is exploded in the form of "essential" scoriæ. The courses of the lava-flows of 1906 are traced out, and their petrography and mineralogy are described. The paper was illustrated by a number of original photographs, including panoramic views showing the ash-deposits and the truncation of the cone.—The radium contents of the rocks of the St. Gothard Tunnel (preliminary note): Prof. J. **Joly.** Estimates of the radium in some typical rocks through which the tunnel was carried show a distribution of radium in accordance with the elevation of temperature which Stapff observed at the northern end of the tunnel and the lesser gradients met with at the south end. So far as the investigation has gone, the average radium content of the rocks of the central and southern sections of the tunnel is considerably below that observed by the author in the case of the Simplon rocks.

Royal Irish Academy, April 13.—Dr. F. A. Tarleton, president, in the chair.—Malignant tumours in birds, with observations on certain changes in the blood: Prof. A. E. **Mettam.** The tumours were round cell sarcomata, seen in the domestic fowl (three cases), and a true carcinoma found replacing the left lung in a thrush (*T. musicus*). Interesting changes were observed in the red blood corpuscles of the thrush. Numerous corpuscles showed profound nuclear degeneration; the nuclei were swollen, approaching the circular in outline, the chromatin network being more distinct. The protoplasm of the corpuscles showed polychromatophilia, and eventually entered into solution. The nuclear substance, now having lost its structure, remains as an irregular lump, staining especially with the acid dyes.—Spirochætes in infective sarcomata of dogs: Prof. A. E. **Mettam.** The author describes certain spirochætes, fusiform and bacillary bodies in smears obtained from the infective sarcomata developed on and in the genital organs of dogs. The number of undulations in the spirochæte is generally five, the length of the organism about 17 μ. The bacillary bodies are long or short, stiff, or, when long and attenuated, slightly undulating. They show metachromatic granules, and may have some relation to the spirochæte which they invariably accompany.—The mouth-parts of some Blattidæ, including a detailed account of the mandibles and maxillæ of *Periplaneta australasiae*, compared with those of other species of the family: J. **Mangan.** The author shows the presence of a distinct lacinia mobilis in the mandible, and gives a full description of the musculature, both of mandibles and maxillæ. He discusses the various views that have been proposed as to the homologies of the parts of a maxilla, and controverts Verhoeff's recent suggestion that the hexapodan maxillæ are primitively posterior to the labium.

April 27.—Dr. F. A. Tarleton, president, in the chair.—A new Devonian isopod from Kiltorcan, co. Kilkenny: Prof. G. H. **Carpenter** and I. **Swain.** The fossil, named *Oxyuropoda ligioides*, bears a general resemblance to an oniscoid. The first thoracic segment is closely united with the head, and appears to carry chelate limbs; the uropods are lateral, elongate, acuminate, and unjointed. This forms an interesting addition to the few Palæozoic isopods hitherto known.

PARIS.

Academy of Sciences, May 4.—M. H. Becquerel in the chair.—Formulæ relating to the minima of classes of binary, positive quadratic forms: G. **Humbert.**—The discovery of the law of falling bodies: Pierre **Duhem.** The fact that the velocity of a freely falling body increased in velocity proportionally to the time of fall was well known to Leonardo da Vinci, but it is not stated in his manuscripts whether this was his own discovery, or whether he had derived it from earlier sources. A clear definition of uniformly varying motion was given by Albert de Saxe in 1351, but his view as to the law of a falling body appears to have been erroneous, and it would seem probable that the real law was discovered by da Vinci.—Canonical hyperelliptic functions of the second species: Z. **Krygowski.**—The application of the laws of similitude to the propagation of deflagrations: M. **Jouguet.**—The comparison of continuous current series and shunt dynamos from the point of view of rapidity of starting: Paul **Girault.** Series winding gives the more rapid starting.—A new radiographic method capable of deciding whether a supposed still-born child has really lived or not: Charles **Vaillant.** With infants which have not lived no organ is visible on the radiograph. With infants which have taken a few breaths the stomach alone is visible. When the stomach is more transparent and the intestine becomes visible, the child has lived from one to fourteen hours. In the case of infants who have lived some days without food, the abdominal organs, the lungs, and the liver show on the radiograph. With infants fed during several days all the organs are clearer, and the mass of gas in the intestine allows of a much clearer image of the intestinal mass.—The ultra-violet spark spectrum of dysprosium, and on some remarkable magnetic properties of this element: G. **Urbain.** A catalogue of the spectrum lines of this element for wave-lengths between 2872 and 4221 is given. The coefficient of magnetisation of dysprosium oxide was

determined by means of the Curie and Chéneveau magnetic balance; the oxide was found to be about 12·8 times more magnetic than the oxide of iron, Fe_2O_3.—The removal of certain soluble substances from solution by precipitates: Paul **Frion.** It has been shown by Jean Perrin that contact electrification plays an important part in certain physicochemical phenomena, and he has applied this to the case of colloidal solutions. The author shows that similar considerations are capable of explaining the removal of soluble salts from solutions by precipitates.—The variation of the electromotive force of liquid chains by the polarisation of interposed diaphragms: Pierre **Girard.** The modifications in the voltage of liquid couples caused by diaphragms or membranes do not appear to be due to the variation of the mobility of the ions in the interposed medium. They appear rather to be due to phenomena of contact electrification.—The synthesis of ammonia and hydrocyanic acid: Herman C. **Wolterecк.** By the passage of air through a Dowson generator charged with wood carbon, considerable quantities of ammonia and hydrocyanic acid appear to be produced. If a mixture of air and ammonia is passed over the heated carbon (at a temperature of about 1100° C.) the yield of hydrocyanic acid is increased, and the amount of ammonia found exceeds that introduced with the air.—The estimation of the halogens in organic chloro-bromo-compounds: H. **Baubigny.** The method of combustion with sulphuric and chromic acids has been modified for the analysis of organic compounds containing both chlorine and bromine. Test analyses are given showing the exactness of the method.—A new method for the preparation of homologues of naphthalene: G. **Darzens** and H. **Ront.** An acyl derivative of naphthalene is prepared by Friedel and Crafts's method, and this reduced by hydrogen in presence of reduced nickel. The yields are quantitative, and the addition of hydrogen to the ring has not been observed.—The action of phenylmagnesium bromide upon the second methyl ester of paradimethylamido-orthobenzoylbenzoic acid: J. **Pérard.**—The formation of the cyanohydrin of benzoylacrylic acid: J. **Bougault.** The addition appears to be made at the ethylene linking, the acid formed being $C_6H_5.CO.CH_2.CH(CN).CO_2H$.—The anatomy and development of the embryo in palms, the Musaceæ, and Cannaceæ: C. L. **Gatin.**—The ecological characters of the southern region of Kabylie du Djurdjura: G. **Lapie.**—Simple schizogony in *Amoeba blattae*: L. **Mercier.**—The geology of the north and east of Corsica: E. **Maury.**—The migration towards the north of the watershed in the Lepontine Alps: Gabriel **Eisenmenger.**—The application of wireless telegraphy to weather forecasts: Alfred **Angot** (see p. 34).

DIARY OF SOCIETIES.

THURSDAY, MAY 14.

ROYAL SOCIETY, at 4.30.—Croonian Lecture: The Structure of the Central Nervous System of the Higher and Lower Animals: Prof. Gustaf Retzius, For.Mem.R.S.

ROYAL INSTITUTION, at 3.—Mendelian Heredity: W. Bateson, F.R.S.

MATHEMATICAL SOCIETY, at 5.30.—On the Invariants of the General Linear Homographic Transformation in Two Variables: Major P. A. MacMahon.—On the Order of the Group of Isomorphisms of an Abelian Group: H. Hilton.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Switch Gear Control Apparatus and Relays for Alternating-current Circuits: Dr. C. C. Garrard.

IRON AND STEEL INSTITUTE, at 10.30 a.m.—On Improvements in Plate Rolling Mills: A. Lamberton.—On the Physical Qualities of Steel in Relation to its Mechanical Treatment: J. E. York.—On a New Fatigue Test for Iron and Steel: Dr. T. E. Stanton.—On an Experimental Electric Furnace for the Smelting of Iron: Prof. B. Igewsky.

FRIDAY, MAY 15.

ROYAL INSTITUTION, at 9.—The Past and Future of Tuberculosis: H. T. Bulstrode.

IRON AND STEEL INSTITUTE, at 10.30 a.m.—On Cast Iron in the Construction of Chemical Plant: F. J. R. Carulla.—On the Application of Colour Photography to Metallography: E. F. Law.—On the Utilisation of Blast-Furnace Slag for Portland Cement: C. von Schwarz.—On the Department of Metallurgical Chemistry in the National Physical Laboratory: W. Rosenhain.—On the Pyrometric Installation of the Ordnance Factories, Woolwich: J. Wesley Lambert.

ROYAL SOCIETY OF ARTS, at 8.—The Dangers of Coal Dust and their Prevention: W. E. Garforth.

MONDAY, MAY 18.

VICTORIA INSTITUTE, at 4.30.—On the Evidence of Malay, Javanese, Arabian and Persian Admixture in the Inca or Keshna Language of Peru, amongst the Aymara, the Language of the Peasant Class: F. W. Christian.

TUESDAY, MAY 19.

ROYAL INSTITUTION, at 3.—Light: What it is which Vibrates: Prof. F. T. Trouton, F.R.S.

ROYAL STATISTICAL SOCIETY, at 5.

ROYAL ANTHROPOLOGICAL INSTITUTE, at 8.15.—The Pagan Gwari of Northern Nigeria: L. W. la Chard.

WEDNESDAY, MAY 20.

ROYAL SOCIETY OF ARTS, at 8.—Industrial Entomology: or the Economic Importance of a Study of Insect Life: F. Martin Duncan.

ROYAL METEOROLOGICAL SOCIETY, at 4.30.—Upper Air Observations in Egypt: B. F. E. Keeling.—Balloon Experiments in Barbados, November 6–8, 1907: Prof. J. P. d'Albuquerque.—Observations on the Colour of Lightning, 1903–1907: S. C. Russell.

GEOLOGICAL SOCIETY, at 8.—On some Cretaceous Fish-Remains obtained by Prof. Ennes de Souza from Ilheos, Bahia (Brazil): Dr. A. Smith Woodward, F.R.S.—On the Bala and Llandovery Rocks of Glyn Ceiriog (North Wales): Dr. T. Groom and P. Lake.

ROYAL MICROSCOPICAL SOCIETY, at 8.

THURSDAY, MAY 21.

ROYAL SOCIETY, at 4.30.—*Probable Papers:* On Some Features in the Hereditary Transmission of the Albino Character and the Black Piebald Coat in Rats: G. P. Mudge.—A Further Note on the Nutrition of the Early Embryo, with Special Reference to the Chick: E. Emrys-Roberts.—The Antagonistic Action of Calcium upon the Inhibitory Effect of Magnesium: S. J. Meltzer and J. Auer.

ROYAL INSTITUTION, at 3.—The Chemistry of Photography: Dr. Alexander Scott, F.R.S.

ROYAL SOCIETY OF ARTS, at 4.30.—The United Provinces of Agra and Oudh: Sir J. J. D. La Touche, K.C.S.I.

CHEMICAL SOCIETY, at 8.30.—Hydroaromatic Ketones, Preliminary Note: A. W. Crossley and C. Gilling.—Titani-dihydroxymaleic Acid, and the Detection of Titanium: H. J. H. Fenton.—Some Experiments on Carbon at High Temperatures and Pressures, and Apparatus Therefor: R. Threlfall.—The Sulphides and Oxy-sulphides of Silicon: I. G. Rankin and S. M. Revington.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Recent Progress in Tungsten Metallic Filament Lamps: H. Hirst.

INSTITUTION OF MINING AND METALLURGY, at 8.

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