

SCIENCE NOTES AND NEWS

The Complete Solution of the Plateau Problem.—J. Douglas who was the first to have given a complete solution of the Plateau Problem of the existence of the minimal surface with a single contour has now published his partially proved and announced results concerning a very profound generalisation of the problem (*Annals of Math.*, 1939, 40, 205-98). The generalisation consists in proving the existence of the minimal surface bounded by any number of curves  $\Gamma_1, \Gamma_2, \dots, \Gamma_n$  and which is of prescribed genus (deficiency or the 1st Betti number  $r$ ). Courant has also proved the same but has not completely published his proof.

Douglas starts with the well-known conformal representation of the minimal surface due to Weierstrass, i.e., to find  $n$  harmonic functions

$$x_i = R [F_i (u + iv)], \text{ where } \sum_1^n F_i'^2 = 0$$

on a domain of Riemann's surface with the same topological structure in such a way that the  $n$  boundary curves of the domain are transformed into the given contours in space. (The deficiency of the Riemann's surface is easily seen to be  $r + k - 1$ .) Klein's introduction of a symmetric Riemann's surface is of help here. It is a Riemann's surface with an involution  $T$  on itself so that pairs of corresponding points correspond to antipodal points on the minimal surface and the boundary curves correspond identically to themselves by means of the involution. The contours in space have to satisfy certain conditions besides being Jordan curves but may cross one another and they may be oriented in any desired way. It may also happen that a single minimal surface may not exist at all, i.e., the solution obtained gives a number of distinct minimal surfaces whose total boundaries are equal to the set  $(\Gamma)$ .

One of the artifices employed by the author consists in employing the Dirichlet integral

$$D(X) = \iint_R (E + G) du dv = \iint \left[ \left( \frac{\partial x_i}{\partial u} \right)^2 + \left( \frac{\partial x_i}{\partial v} \right)^2 \right] du dv$$

instead of the usual surface integral

$$I(X) = \iint \sqrt{EG - F^2} du dv$$

which is more difficult to deal with. On account of the identity

$$\frac{1}{2}(E + G) - \sqrt{EG - F^2} = \frac{1}{2}(E^{1/2} - G^{1/2})^2$$

$$+ \frac{1}{2} \left[ \sqrt{E^{1/2}G^{1/2} + F} - \sqrt{E^{1/2}G^{1/2} - F} \right]^2$$

which proves immediately the fact that

$$D(X) \geq I(X),$$

he has proved that the two minimal problems are identical.

The next transformation which is difficult consists in transforming these integrals to line integrals along the contours by finding and employing the Green's function for the domain

on the Riemann's surface. Douglas brilliantly extends certain simple identities of the theory of elliptic and  $\theta$ -functions of one variable to identities in the theory of multiple  $\theta$ -functions (by means of these and the  $\rho$ -abelian integrals of the first kind on the Riemann-surface the Green's function is expressed) and the functions corresponding to the Weierstrassian functions and makes use of them in an interesting way. The advantage of this transformation is this. The Dirichlet-Functional (the area functional is more easy) is more difficult to deal with than the functional formed by the line integrals. He shows that the latter functional is lower semi-continuous and that the total set of all surfaces bounding the contours (omitting certain improper ones) forms a compact set. Hence the existence of the minimal surface follows immediately.

These are only the bare outlines of the proof. The problem is extremely complicated and it is really a pleasure to see that this famous problem of the latter half of the previous century is solved with extreme generality. Almost all types of surfaces (with any topological structure) can be experimentally constructed by means of soap films.

K. V. I.

The Mesotron.—The probable existence of a new type of particle intermediate in mass between the electron and proton has been suggested by Anderson and Neddermeyer (1937) as constituting the hard component of cosmic radiation. Remarkably enough such particles were postulated by Yukawa (1935) to explain the exchange forces between proton and neutron without introducing the neutrinos as would be necessary on the  $\beta$ -decay theory. It has further been shown by Frölich, Heitler and Kemmer that the heavy electron theory can also be made consistent with the observed magnetic moments of neutron and proton. This intermediate particle has been designated by various workers by different names as heavy electron, yukon, barytron, and mesotron or meson. This last name appears to be the one favoured by most physicists. In the short interval of two years, there has been a very large number of papers written on the mesotron, and it appears to play a very important part in cosmic ray theory. A most important suggestion is that of Euler and Heisenberg that a mesotron can disintegrate into an electron and a neutrino, the heavy mass of the mesotron appearing in its offspring as great kinetic energy. This assumption explains the observation of cosmic ray workers that the hard component is much more reduced in intensity in passing through air than through an equivalent amount of dense lead, as has been shown by Rossi, Blackett and others. Heitler has also shown that the nuclear proton-proton force can be explained by assuring a neutral heavy particle (or *neutretto*), and a new evidence for such a particle has recently been given by F. R. Shonka (*Phys. Rev.*, 1939, 5, No. 1, p. 24) which, however, requires confirmation. Bhabha has pointed out (*Nature*, Feb. 18, 1939,

p. 276) that the theory of the mesotron introduces a fundamental length, and connects this theory with Dirac's recent work on the point electron. The mesotron promises to play a very important part in nuclear theory, and provides ample material for theoretical speculation, adding as it does, a new type of particle intermediate between the light and heavy particles.

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**A New Type of Nuclear Reactions.**—A new and important type of nuclear reaction has been reported by Hahn, Meitner and Strassman of the bombardment of uranium by deuterium neutrons, and the resulting disintegration leading to the production of a barium isotope ( $Z = 56$ ). This has been confirmed by workers at Columbia University, Carnegie Institute at Washington, and John Hopkins University. Such a reaction would be inexplicable on the older nuclear theories, but appears to be a brilliant confirmation of Bohr's recent theory of nuclear processes as being really double transitions with the formation of a compound nucleus as an intermediate stage. This theory explains very simply the resonance phenomena of nuclear physics, and it has been suggested that the above nuclear reaction of disintegration of uranium by neutrons is such a phenomenon. On Bohr's liquid drop model the disintegration into a Ba-nucleus is exactly like the fission of a liquid drop into two. Further work with thorium is being continued in the same direction.

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**A New Stable Isotope.**—Another gap in the list of stable isotopes has been filled by the work of Joliot and Zlotowski who report (*J. de Phys.*, T. 1938, 9, No. 10, p. 403) the formation of a stable isotope of helium ( $\text{He}^3$ ) of mass five formed by the collision of  $\text{He}^4$  and deuterons. Fuller data regarding the binding energy of this nucleus would add considerably to the theoretical development of the lighter nuclei.

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**The Differential Analyser.**—This instrument giving a mechanical method for integrating differential equations which are not exactly integrable was devised about eight years ago by Dr. Vannevar Bush of the Massachusetts Institute of Technology. The superiority of this method over all other approximate methods has now been definitely established and the instrument is very widely used in electrical Engineering problems as shown recently by Hartree and Nuttal (*J. Inst. Elec. Eng.*, No. 503). It can also be used with great advantage in calculations with cosmic ray data (see for e.g., Lemaitre and Vallarta, *Phys. Rev.*, 1936, 50, 493; and A. Hunter, *ibid.*, Jan. 1939, 55, No. 1, p. 15). It might perhaps also be mentioned here that Dr. Bush, who has recently devised a new instrument called the "Cinema Integrator", has been appointed President of the Massachusetts Institution.

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**Non-Stoichiometric Oxides.**—Until the end of 1933, it was assumed that the complex oxides can be properly formulated in terms

of the simpler members of the series, e.g.,  $\text{Cr}_2\text{O}_3$ , was formulated as  $3\text{CrO}_2$ ,  $\text{Cr}_2\text{O}_3$ , and  $\text{Pb}_2\text{O}_3$ , as  $2\text{PbO}$ ,  $\text{PbO}_2$ . In 1934, Klemm and Hass (*Zeit. Anorg. Chem.*, 219, 82) showed from paramagnetic studies that nickel oxide can never exist as  $\text{NiO}_{1.000}$ . A similar departure from the law of constant proportions appears to be shown by cupric and ferrous oxides, and by ferrous sulphide. It would thus seem likely that the oxides of metals of variable valency are not exactly stoichiometric compounds, and may also vary slightly in composition between well-defined limits. A. Cameron, E. H. Harhard, and A. King (*J.C.S.*, 1939, p. 55) have studied a large number of oxides of chromium, and find that chromic anhydride decomposes in two stages with the formation of two non-stoichiometric oxide ranges  $\text{CrO}_{2.6}$ - $\text{CrO}_{2.2}$  and  $\text{CrO}_{1.7}$ - $\text{CrO}_{1.4}$ . Many of the "oxides" reported in the literature hitherto have been shown to be in one or other of these stability ranges.

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**The Mould Fungi of India.**—Because of their role in decomposing unwanted organic matter and their use in alcoholic and cellulose fermentations, in the preparation of food products, vinegar and other organic acids, the mould fungi affect us very closely. A study of some of these organisms made by Chaudhuri *et al* (*Proc. Ind. Acad. Sci.*, 1938, 8, 79-99) is, therefore, a step in the right direction. The papers are designated "Molds of the Punjab" but information on all the known Indian *Aspergilli* and *Penicillia* is given in the two papers so far published. Of the thirty-one species of *Aspergilli* recorded by Chaudhuri, *Aspergillus polychromous* De Mello is not accepted as a species by Thom and Church (*The Aspergilli*, p. 137), while *A. sachari* Chaudhuri and *A. humicola* Chaudhuri and Sachar are not considered as deserving of separate specific rank by Blochwitz (*Ann. Myc.*, 1935, 33, 240). Blochwitz thinks that the former may be *A. quercinus* and the latter, *A. flavus*, from the given descriptions. The identification of one isolate as *A. calyptratus* is also doubted, which, he thinks, may be *A. fumigatus*. Blochwitz complains that in spite of repeated requests, he was unable to obtain cultures of *Aspergilli* described by Chaudhuri and a similar complaint is made by Thom and Church regarding De Mello's species. The mould fungi are the most difficult to identify. Cultures of moulds, especially of new species, should invariably be deposited in a central place both for the use of specialists for the confirmation of determinations and the industrial chemists who can harness them into some use.

M. B.

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**Nephridia in the Indian Leech, *Hirudinaria*.**—Our knowledge of the excretory and associated organs of *Hirudinaria* is brought up to date by the extensive observations of M. L. Bhatia on the nephridia and "funnels" of the Indian leech (*Quart. Journ. Micros. Sci.*, 1938, 81, Pt. I, Dec. 1938). Though *Hirudinaria* resembles the European leech *Hirudo* which is described in numerous text-books on Zoology, the true detailed structure and interpretation

of the functions of the various organs are not known conclusively. There are 17 pairs of nephridia in *Hirudinaria*, each consisting of the initial, the apical, the inner and the main lobes, and the vesicle and its duct. The cells of the different lobes form intracellular canals forming a network through the nephridium. The vesicle is a non-contractile bag; it is formed as an epidermal ingrowth during development and later acquires a connection with the nephridium proper. Remarkable ciliated structures called "funnels" occur in association with the nephridium in all the segments except the first six. These have no connexion with the nephridium in the adult, but in the embryo the funnel is a solid mass of cells continuous with the nephridium. The "funnel" is not a degenerate structure as was supposed by many previous workers. Its structure really reveals a large number of smaller funnels opening into a central reservoir. The reservoir is the seat of the manufacture of corpuscles which are thrown out through the funnels into the surrounding perinephrostomial sinus.

**Hyderabad Geological Survey.** The latest number of the *Journal*, Hyderabad Geological Survey (Vol. III, Pt. 2), which has been just published, contains six reports embodying the work done by the several officers of the Survey during the last year. Messrs. L. S. Krishna Murthi and H. S. Krishna Murthi contribute a Note on the Test Bore-holes for the investigation of brine along the Sarjapur Nullah, Raichur District—a locality where a large number of salt works are already in existence producing a considerable percentage of good edible salt, and which also affords quick and easy transporting facilities, being situated on the main road to Raichur. Dealing with another aspect of economic geology in the State, is the paper by the late Capt. L. Munn and Dr. C. Mahadevan, regarding the possibility of making Portland Cement in the vicinity of the proposed dam site across the Krishna in Nalgonda District, Wazirabad limestone area, and at Macherla, Guruzala Taluk, Guntur District. There is also a valuable Note on the Marble deposits near Yellandu in Warangal District, by Mr. Syed Kazim and Dr. C. Mahadevan, in which the authors have given an account of the white, yellow and grey marbles seen about four miles north of Yellandu and have also gone into the question of whether suitable quality of marble is available to be worked, and if so, what would be the quantity available in the area where quarrying operations are under contemplation.

Among the other papers published in the *Journal*, may be mentioned (i) Notes on Deccan trap in parts of Gulbarga and Osmanabad Districts, by Dr. C. Mahadevan and Mr. L. S. Krishna Murthi, and (ii) Correlation of some acid members with the auriferous quartz veins in association with Dharwar formations in the western portion of the Raichur Doab, by Mr. S. K. Mukherjee.

The contents of the *Journal* constitute an impressive record of the varied activities of the Hyderabad State Geological Survey Depart-

ment, and the general get-up of the publication is quite good.

**Metal-Mining Enterprise** which formed the subject of the Warrington Smyth Memorial Lecture, delivered sometime back, by Professor S. J. Truscott, at the Royal School of Mines, London, has been published as a booklet ("Metal-Mining Enterprise" by S. J. Truscott, Warrington Smyth Memorial Lecture, 1938, Macmillan & Company, London, 1938, pp. 38. Price 1sh.). The theme of the lecture forms, mainly, a brief review of the progressive use which man has made of the metals from the early times to the present day.

The lecturer states that the bright colours of the metals, like the glittering yellow of the pellets of alluvial gold and the bright red of heavy native copper, caught the attention of the early man who, discovering some of the physical properties of these metals, used them for his needs; gold as an ornament, and copper for his implements. Later, he seems to have realised that copper when heated was more pliable than the cold metal as found in nature, and on melting, different pieces of copper could be welded together to any required mass. A knowledge of these properties of the metal led to its wide use at this early period which may be called the Copper Age. In regions where some flintstone was associated with copper, an accidental mixture of the former along with molten copper led to the chance discovery of the useful alloy, which we now know as Bronze. The alloy being found better than copper, was then largely used during the period, known as Bronze Age, which came to an end some 4,000 years back. Some time after, about 3,000-4,000 years ago, the production of iron from its ores was discovered, and this gave rise to the Iron Age which has become eventually the present Steel Age. Silver and lead are also stated to have been in use during the ancient periods.

Though all these metals were used by the early man and their practical use was extended for different purposes by the succeeding generations, yet the art of metallurgy developed rather slowly till the end of the nineteenth century, since when the progress has been rapid. After this introductory account of the progressive use of metals, the lecturer gives some statistical figures showing the rate of increase of production of the several metals, within the past one hundred years, including nickel and aluminium which have come into general use within this present century. The progress of civilization has created greater need for the metals, and the demand for them is at present much greater than that for consumable goods, like vegetable and animal products; and the lecturer thinks that this demand for metals will continue to increase though at a slower rate.

The lecturer then proceeds to a consideration of the price of metals in relation to their cost of production, demand, international control of markets, etc., Metal-mining enterprise is a risky and speculative venture, and the real worth of any metalliferous deposit depends

upon several fluctuating factors. A metalliferous deposit which may be regarded as practically useless at one time, may attain a considerable importance at another. Huge mechanical appliances for breaking and handling large masses of ore bodies, and improved methods of ore concentration by flotation have brought down the cost of operation considerably in large-scale metal-mining enterprises. The extensive use and the wider application of some metals in modern industries have given an added impetus for their large-scale mining and utilisation. Of such, aluminium and magnesium may be mentioned. The lecturer surmises that in days to come suitable methods may be devised to extract economically aluminium from the common clay, and magnesium, from the largely available deposits of dolomites, when even these common materials may become of considerable value. Similarly many other metals like beryllium, platinum, etc., which are so very rare and difficult to get now may be produced in larger quantities considerably cheaper.

The lecturer has dealt with his subject in a masterly way and those who desire some general information on the present status of metal-mining as a financial enterprise will find the book to be of absorbing interest.

B. RAMA RAO.

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**Grasses of Assam.**—A list of the known grasses of Assam is given in a publication just brought out by the Forest Research Institute, Dehra Dun, in its *Indian Forest Records*, New Series (Botany).

The importance of the study of grass has been recognised in many parts of the world. Unfortunately, India has lagged behind. The present work, therefore, in which details are given of the grass resources of Assam and a number of grasses new to science are described, marks an important advance in the study of the subject.

Assam, with its tropical temperature, its abundant rainfall and its copious supply of underground water, presents all the essentials of a forest climate as understood by ecologists. The climax vegetation of the Province is, therefore, taken to be a tall forest of evergreen trees.

From very early days, however, a large portion of the Assam plains has been covered by a savannah of tall coarse grasses, which are not relished by cattle; but cattle will eat them in default of anything else. The young leaves and stems, which are sent up by the underground rhizome at the close of the annual fires, are acceptable and are greedily eaten by cattle. Hence the practice of herdsmen is to fire the savannah as early as possible in order to induce the appearance of the tender shoots.

The tall grasses are broken down and each new shoot is browsed off as soon as it appears. Palatable grasses may appear if the locality is favourably placed but they are selectively grazed and are soon eliminated.

At the same time, important changes are taking place in the upper layers of the soil. They are impacted by the hooves of the cattle and the soil becomes drier owing to the removal of the heavy vegetation. The stage is now

set for the appearance of deep-rooted perennials which make no far-reaching demands upon the factors of the habitat, and perennials which possess special adaptations which enable them to survive in the face of heavy grazing. Unless new arrivals are adapted to withstand continual browsing they cannot survive, because any erect grass is immediately eaten to the ground.

Therefore the elements required by a plant which has any expectations of survival in closely-grazed pasture are that it must be (1) protected in some way that enables it to use its green parts for photosynthesis, (2) a species which possess an efficient means for the dispersal of its seeds and (3) able to adapt itself to very diverse edaphic conditions.

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**Atmospheric Electricity.**—A scientific note of the Indian Meteorological Department (Vol. VII, No. 79) by Mr. S. M. Mukherji discusses the results of atmospheric electric observations made at the Colaba Observatory during the period July 1935 to August 1936.

It has long been known that in fair weather, the earth's surface has a charge of negative electricity and that near the ground, the electric potential increases with height at the rate of about 100 volts per metre.

The presence in air of electrified particles or ions causes a small conductivity. The positive ions move towards the side of decreasing potential and *vice versa* causing an "air-earth current".

These quantities are never steady but change with meteorological conditions. During the cold season in Bombay, for example, the potential gradient is very large in the early mornings but decreases in the afternoons. The conductivity changes are in the opposite direction. These changes depend mainly on the presence of haze or fog in the atmosphere.

Of the few systematic observations of these quantities made in India, the earliest observations were those taken at Simla by Simpson in 1910.

In 1930 a small room in the northeast corner of the grounds of the Colaba Observatory, Bombay, was set apart for atmospheric electric observations. For measurements of potential gradient, a radium spiral collector was installed, projecting outside the room through a hole in the western wall at a height of 170 cm. above the ground. Normally the distance between the radium spiral and the wall was kept at 40 cm. but this was altered suitably if any abnormalities in potential gradient were expected. It was clear at the very outset that there were two types of variation of the potential gradient, one characteristic of the southwest monsoon and the other of the dry monsoons. In 1936, therefore, the observations of potential gradient were supplemented by those of atmospheric electric conductivity. From the potential gradient and the conductivity it is possible to calculate in a simple manner the small electric current that flows from the atmosphere to the earth or *vice versa*.

The mean monthly potential gradient has been found by Mr. Mukherji to be maximum in mid-winter and minimum in May. The

conductivity varies roughly inversely to the potential gradient.

The average value of the potential gradient at Bombay was 150 volts metre and conductivity  $2.5 \times 10^{-4}$  electrostatic units and of air-earth current  $3.9 \times 10^{-3}$  electrostatic units or  $2.0 \times 10^{-10}$  amperes per square centimetre of the earth's surface.

**Toxic Gases in Industry.** The Department of Scientific and Industrial Research has issued two further leaflets in the series describing standard methods for the detection of poisonous gases produced in industrial processes. These deal with sulphur dioxide and benzene vapour respectively. (Leaflets Nos. 3 and 4, H. M. Stationery Office, London.)

A concentration by volume of one part of sulphur dioxide in 2,000 is dangerous for even short exposure, and one part in 100,000 is the maximum concentration allowable for several hours' exposure. The standard method developed for the detection of this gas depends on drawing a sample of the atmosphere by a hand-pump through test paper treated with starch and potassium iodide to which potassium iodide has been added. The test-paper becomes stained a brownish colour and the concentration is determined by comparing the stains with a standard colour chart supplied with the leaflet. Concentrations down to one part in 250,000 can be estimated by making not more than ten strokes with the hand-pump. Complete instructions for carrying out the test are given in the leaflet.

In high concentrations benzene vapour acts as a narcotic (acute poisoning). In low concentrations over a prolonged period, it affects the blood and the blood-forming organs of the body (chronic poisoning). Individual susceptibility is well recognized, women and young persons being particularly liable to suffer from chronic poisoning.

Analyses of air in factories where poisoning has occurred give values ranging from 1 in 200 to 1 in 500 parts of benzene.

The chemical test recommended in the leaflet is capable of detecting concentrations down to 1 part in 10,000. The test involves the absorption of benzene vapour in concentrated sulphuric acid containing a trace of formaldehyde. An orange brown colour is produced, even traces of benzene being sufficient for this result. The test is carried out by drawing a sample of the atmosphere under test through a tube containing the reagent by means of a hand-pump of definite capacity, and determining the number of strokes required to produce a certain standard depth of colour. From the number of strokes of the pump required to produce the standard colour, the concentration of benzene vapour present is obtained by reference to the table given in the detailed instructions in the leaflet.

**Fibre from Willow Bark.** The latest *Bulletin* of the Indian Central Jute Committee (No. II, February 1939), gives some details regarding a German patent for breaking up willow bark. "Tannic acid is first extracted from the peeled bark by means of water, after which the

bark is boiled for several hours at a pressure of 1 to 3 atmospheres in a 3 to 4 per cent. solution of caustic soda or sodium sulphate. It is then treated with a mixture of about 1 part sulphurous acid, 3 parts hydrochloric acid, and 10 parts water. The fibre produced in this way is specially well adapted for mixing with flax, wool and jute leading to the production of a fabric with new and valuable properties."

**Unification of Pharmacopœia.** The potential value of the creation of a limited international pharmacopœia has long been realised by medical men and is frequently brought home to the individual patient by the difficulty he experiences in getting his prescriptions made up when abroad. The same problem exists with regard to the treatment of ships' crews calling at different ports and the replenishment of ships' medical chests.

From the academic point of view, the existing variations in the strengths and composition of medicinal preparations in different national pharmacopœia add an unnecessary complication to the investigation of the comparative results in drug therapy of the same disease in different countries, and further tend to prevent the adoption of new methods of treatment by a country, even where these have proved valuable elsewhere.

Apart from the view of the practitioner, consideration must also be given to the manufacturer who, from one country, is supplying large quantities of drugs to the international market. The varying standards as to strength and particularly as to purity at present existing make it essential for a producer, either to limit his sales to his own country, or to manufacture a special preparation of the same drug for each country to which he is exporting.

The field of possible unification of pharmacopœia had already been explored by an International Conference, meeting at Brussels in 1923, the outcome being a Convention creating an International Secretariat, under the Belgian Government. In addition, the International Pharmaceutical Federation had worked along similar lines. A further step forward was taken in 1937, when, after agreement with the Belgian Government and in *liaison* with the International Pharmaceutical Federation, the Health Organisation set up a Technical Commission of Pharmacopœial Experts. This Commission met in Geneva during 1938 and prepared a programme of studies, including the selection of suitable drugs for examination.

The Commission further considered and adopted standard forms of monograph for use in preparing the drafts, and decided to prepare general descriptions of reagents and analytical procedures and statements of other general principles for the unification of monographs. The preparation of a report on maximum doses and on the possibility of defining average doses was entrusted to two members of the Commission.

Finally, the members agreed to prepare a number of draft monographs on various drugs, sixty of which have already been received. The monographs will be subsequently considered at a meeting of the Commission in May

1939, when the final form will be discussed and approved, and will then be forwarded to the Permanent Secretariat in Brussels for circulation amongst the signatory countries of the Agreement, with a view to their ultimate adoption and final incorporation into a limited international pharmacopœia.—(*Chronicle of the Health Organisation*, League of Nations, February 1, 1939.)

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**League of Nations.**—The latest Bulletin of the Health Organisation of the League of Nations (Vol. VII, No. 5), contains information concerning the activities of the Organisation from August to October 1938, and is specially devoted to the question of biological standardisation.

This number reproduces an important report on the meeting of the serologists of the Permanent Commission on Biological Standardisation held at Paris in October 1938. The report is accompanied by a number of annexes relating to tetanus antitoxin, anti-snake venom serum and gas gangrene anti-toxins. The volume also contains studies on the international standard of vitamin B, and the Report on the Third International Conference on the Standardisation of Hormones, held at Geneva in August 1938.

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At a Symposium on Food and Drug Adulteration held under the joint auspices of the Association of Technologists, Mysore, and the Institute of Chemistry of Great Britain & Ireland (Indian Section), under the presidency of Sastravaidyapravina Dr. S. Subba Rao, B.A., M.B.B.S., M.R.C.S., Senior Surgeon with the Government of Mysore (Retd.), on Sunday, the 12th March 1939, in the Mayo Hall, C. & M. Station, Bangalore, the following resolution moved from the Chair, and seconded by Dr. L. R. Govardhan, Health Officer, C. & M. Station Municipality, was adopted:

"This meeting of the Association of Technologists, Mysore, the Institute of Chemistry of Great Britain and Ireland (Indian Section) and other scientists and public health authorities is of opinion, that in view of the widespread prevalence of adulteration of foods and drugs in this country, and the absence of effective methods of controlling it, immediate steps should be taken by the governments and public bodies concerned, to (1) introduce suitable standards for the various foods and drugs; (2) introduce suitable legislation to secure more effective control; and (3) appoint public analysts and devise other effective machinery for the detection and prevention of adulteration.

It is suggested that a committee may be appointed to go into the question in Mysore State and representatives may be included from the Association of Technologists and the Institute of Chemistry".

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**Indian Zoological Society.**—The inaugural meeting of the Indian Zoological Society was held on Saturday, the 7th January 1939, at 3 P.M. in the Zoological Laboratory of the Government College, Lahore. Dr. B. L. Bhatia presided.

The President read out some of the letters received from the members of the Organisation Committee. He reported that 82 zoologists had joined the Society as Foundation Fellows in response to the circular letter issued by him.

Dr. Bhatia then placed before the meeting the draft constitution of the Society which had been prepared by the Organising Committee and this was accepted with a few amendments.

The following Office-bearers were elected:—**PRESIDENT:** Dr. B. Prashad (*Calcutta*); **VICE-PRESIDENT:** K. B. Mohd. Afzal Hussain (*Lahore*); **SECRETARY:** Dr. H. K. Mookerjee (*Calcutta*); and **BUSINESS MANAGER OF THE JOURNAL:** Dr. B. L. Bhatia (*Lahore*).

Fifteen names were then duly proposed and seconded for election as Ordinary Members of the Council, and the following seven were elected by ballot:—Prof. R. Gopala Aiyar (*Madras*), Prof. B. K. Das (*Hyderabad*), Prof. A. B. Misra (*Benares*), Prof. C. R. Narayan Rao (*Bangalore*), Dr. Hamid Khan (*Ljallpur*), Mr. Inayat Ali Khan (*Aligarh*), and Mr. Guran Lal Arora (*Lahore*).

Lahore was selected as the Headquarter of the Society.

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**Society of Biological Chemists, India.**—The Ninth Annual General Meeting of the Society of Biological Chemists, India, was held at 2-30 P.M., on Saturday, 7th January, in the University Hall, Lahore. In the unavoidable absence of the President Sir U. N. Brahmachari, Dr. S. S. Aiyar took the Chair.

The annual report and accounts of the Society were presented by the Secretaries and adopted.

The following were elected Office-bearers for the year 1939:—

**President:** Sir Upendramath Brahmachari; **Vice-Presidents:** Dr. G. J. Fowler, Rao Bahadur B. Viswa Nath, Lt.-Col. S. L. Bhatia and Mr. R. C. Srivastava; **Hon. Secretaries:** Dr. C. N. Acharya and Mr. B. H. Iyer.

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**Benares Hindu University.**—Mr. S. Ram Mohan Rao, M.Sc., who carried on researches for four years under Professor A. B. Misra on the *Coccidæ* has been awarded the D.Sc. degree by the Benares Hindu University on the recommendations of Prof. R. Newstead, F.R.S., of the Liverpool University and Mr. F. Laing of the British Museum (Natural History Section) in London.

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Dr. A. B. Misra, Professor of Zoology in the Benares Hindu University, was elected President of Section 3(A), dealing with Insect Morphology, Physiology and Embriology at the VII International Entomological Congress recently held in Berlin.

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Dr. C. G. Pandit, Director, King Institute, Guindy, has been awarded the Minto Medal for the year 1938 in recognition of his work on virus diseases. The Medal, which is of the value of Rs. 500, is awarded annually for "distinguished work in tropical medicine by an Indian".

**Third All-India Obstetric and Gynaecological Congress.**—The third All-India Obstetric and Gynaecological Congress will be held in Calcutta during December 1939. The exact date will be notified at a later date. The chief subjects selected for discussion are:

- (1) Functional Uterine Hemorrhage;
- (2) Anemia of Pregnancy; and
- (3) Maternity and Child Welfare.

Further informations can be obtained from the Secretary, Bengal Obstetric and Gynaecological Society, Calcutta Medical Club House, 91-B, Chittaranjan Avenue, Calcutta.

**Lady Tata Memorial Trust.** Applications are invited for five scientific scholarships of the value of Rs. 150 each for the year 1939-40.

The scholarships are open to men and women and will be tenable for a period of twelve months commencing from the 1st July 1939. Any or all the scholarships may be extended for a further period of twelve months within the discretion of the Trustees. All old scholars who desire renewal should re-apply.

Applicants, who must be of Indian nationality, must be Graduates in Medicine or Science of a recognised University. They must undertake to work whole-time and will be debarred from private practice. In the duration of the period of his scholarship or award, the recipient of the benefit shall devote himself to the work before him to the entire satisfaction of the Trustees, who reserve the right to withdraw payment on the recommendation of the Advisory Committee.

The subject of scientific investigation which they may select must have a bearing directly or indirectly on the alleviation of human suffering by disease.

Applications must be forwarded through the Director of a recognised Research Institute or Laboratory where the candidate proposes to work, and must be accompanied by a letter from the Director stating that he has critically examined the details of the proposed research, that he approves of the general plan and that he is willing, as far as possible, to guide and direct the investigation and give laboratory facilities.

Applications must give (a) a short resume on the subject indicating present state of knowledge and (b) details of the proposed research, indicating (i) the methods intended to be employed, (ii) previous experience in the use of these methods and (iii) the experiments to be carried out.

Applications, which must be typed, must give full particulars in the order indicated above and must be addressed to the Secretary, The Lady Tata Memorial Trust, "Bombay House," Bruce Street, Fort, Bombay, so as to reach him not later than 7th April 1939.

**Government of India: Industrial Research Council.**—The Government of India offer the following prizes for the papers dealing with researches of industrial importance:

1st Prize of	Rs. 1,000
2 Prizes of	.. 500 each
2 " "	.. 250 "
3 " "	.. 150 "

Particulars of the terms of the competition and entry forms may be obtained free of cost

on application to the Director, Industrial Research Bureau, Imperial Secretariat, New Delhi. Entries will be accepted only on the official forms provided.

Papers must be submitted not later than the 1st June 1939.

**Deutsche Akademie.** On the occasion of its tenth jubilee year the Indian Institute of the "Deutsche Akademie" in connection with the study group "Das Ahnenerbe" has selected in October 1938 the following subject for a competition: "*Symbols in India, their meaning, historical development and present position.*"

This competition is open only to Indian scholars who have already graduated and completed their study.

All papers must be submitted on or before the first of April 1940.

The first prize is a scholarship for one year in a German university town including the cost for the journey from India to Germany and back.

The second prize is a scholarship for one year in a German university town but exclusive of the costs of the journey.

The third prize is a scholarship in a German university town for half a year and exclusive of the costs of the journey.

The winner of the first prize will receive a monthly stipend of RM. 300 during his stay in Germany. The winners of the second and third prize will receive a monthly stipend of RM. 200 each.

All winners will receive in addition the journal of the "Deutsche Akademie" and one of the journals of the study group "Das Ahnenerbe" according to their own choice free for three years.

The India Institute of the "Deutsche Akademie" acquires the right to print and publish any of the prize winning papers. The printed papers will bear a notice showing them to be the prize winners in the competition of the India Institute of the "Deutsche Akademie" and of the study group "Das Ahnenerbe".

Papers which have not been awarded a prize will be returned. The Committee however can not undertake any responsibility with regard to the reading and returning of any paper that may be submitted to them.

**International Centre for the Identification of Salmonellae.** In pursuance of the recommendation adopted by the International Association of Microbiology, an International Centre for the identification of Salmonella Strains has been set up, thanks to a grant from the Commonwealth Fund, at the State Serum Institute, Copenhagen, under the direction of Dr. F. Kauffmann. With a view to facilitating the serological identification of Salmonellae in all countries, this centre is willing to distribute the necessary immune sera and standard cultures free of charge, and to study any aberrant strains sent to it. It also proposes to stimulate the establishment, in every country, of national centres equipped for the identification of Salmonella strains, which would thus be in a position to meet the requests for agglutinating sera made by scientific workers in the country concerned.

## ACADEMIES AND SOCIETIES

## Indian Academy of Sciences:

February 1939. SECTION A.—(Miss) S. PANKAJAM: *On Symmetric Functions of  $m$  Symmetric Functions in a Boolean Algebra*. G. ABDULLA AND LAL BAHADUR: *On a Problem of Arrangements*. S. CHOWLA: *A New Solution of the 10-21 Problem*. A. E. BRODSKII, A. M. SACK AND L. V. KORTCHAGIN: *The Raman Spectra of liquid solutions*.—The aditivity of the Raman Spectra in mixtures of  $AsCl_3$ ,  $SbCl_3$ , and  $PCl_3$ , with different solvents, has been investigated. N. M. PHILLIP: *Adiabatic and Isothermal Compressibilities of liquids*.—The adiabatic compressibility, variation of specific volume with temperature, and specific heat at constant pressure have been measured for 24 liquids after careful purification. The data have been applied to the data on light-scattering, and good agreement found. P. B. RAMA MURTY AND T. R. SESHADRI: *Chemical composition of Vitis quadrangularis (Wall.)*.—The plant contains a high percentage of mineral matter, and Vitamin C. As a source of carotene it occupies a middle place. B. R. VENKATARAMAN: *On the inverses of a circle with respect to a tetrad of fixed circles and their orthogonal tetrad*. S. RANGASWAMI, P. SURYAPRAKASA ROW AND T. R. SESHADRI: *Pigments of Cotton Flowers, Part VI.—Methylation of Herbacetin*. B. R. SETH: *Potential solutions near an angular point*. K. S. K. IYENGAR: *On a problem related to the Cauchy-Maclaurin Integral Test*. S. S. BHATNAGAR, P. L. KAPUR AND A. HUSSAIN: *Studies in the properties of Bivalent Metal Oleates, Part I*.—A study of physical properties such as solubility, molecular complexity, viscosity, surface tension, etc., shows that whereas zinc oleate may be regarded as a gel, magnesium oleate behaves more like a colloidal electrolyte. A. NARASINGA RAO: *Studies in Turbine Geometry, III—The non-oriented line element in two-dimensional mobius geometry*.

February 1939. SECTION B.—RAMA NAGINA SINGH: *The Myxophyceæ of the United Provinces, India, IV*—deals with some of Myxophyceæ that have not been recorded from the U.P. JAGJIWAN SINGH: *A Contribution to our knowledge of the Indian Soil Actinomycetes*.—The actinomycetes do not show any marked seasonal variation in population. V. PURI: *Studies in the order parietales, II*.—A Contribution to the Morphology of *Garcinia livingstonii* T. Anders. M. C. CHERIAN AND MOHAMED BASHEER: *Tetrastichus sokolowskii Kurdj*

(Family Eulophidæ)—A Larval Parasite of *Plutella maculipennis* in South India.—The habits and life-history of the parasite are described. H. S. RAO: *Cuticular studies of Magnoliales*.—The Magnoliales have not been directly derived from Bennettitales, and synthetic types combining the characters of the Cycadales, the other haplocheile gymnosperms and the angiosperms are to be found in this small group.

## Indian Association for the Cultivation of Science (Proceedings):

December 1938.—A. C. BANERJI AND P. L. BHATNAGAR: *On the Intensity of Ionisation in the Earth's Atmosphere*. A. BALANKESWARA RAO: *The Spectrum of Argon IV*. L. SIBAIYA: *On the excitation of Chladni Figures*. S. K. BANERJI: *On the Interchange of Electricity between solids, liquids and gases in mechanical actions*. MOHINIMOHAN GHOSH: *Dynamics of the pianoforte string and the hammer, Part II*. S. K. MITRA, J. N. DHAR AND S. P. GHOSH: *The lower ionosphere*.

## Indian Chemical Society:

November 1938.—S. S. BHATNAGAR, P. L. KAPUR AND MAHBUB SHAH HASHMI: *Phototropy and photochemical isomerism from the magnetic Standpoint*. N. R. DHAR AND S. K. MUKERJI: *Denitrification in sunlight and its retardation, Part IV*. W. V. SUNDARA RAO, P. V. KRISHNAMURTI AND G. GOPALA RAO, *Mechanism of the Micro-biological oxidation of ammonia. Part I—Formation of intermediate products*. JAMIAT V. LAKHANI AND RUSTOM P. DAROGA: *The determination of the parachors of inorganic salts in solutions. Part III—The parachors of some salts of magnesium, strontium and barium, and the atomic parachor of the above elements and radium*. R. CHATTERJEE: *Oxalenediamidoxime. Part I—Estimation of nickel*. S. C. GANGULY: *On the estimation of fumaric and maleic acids*. BALWANT SINGH: *Note on oxidation of ferrous iron with potassium iodate*.

## Meteorological Office Colloquium, Poona:

February 3, 1939.—N. K. SUR: *Lange's Radio Meteorograph*. February 14, 1939.—K. R. RAMANATHAN: *The Earth's Magnetism and the Upper Atmosphere*.

## Fourthcoming Event

April 7-8, 1939.—A convention of Technologists and a Symposium on MATERIALS OF CONSTRUCTION FOR THE CHEMICAL INDUSTRY will be held at Bhadravati under the joint auspices of the Association of Technologists, Mysore and

the Technical Association, Bhadravati. The convention will be opened by Rajasevaprakashta A. V. Ramanathan, Chairman, Mysore Iron and Steel Works. Sir C. V. Raman, kt., F.R.S., N.L., will preside over the Symposium.