peculiar histological structure of the hepatic ducts is noted and it is also said that the intestine is the chief absorptive organ. The auricle and the ventricle are free from endothelial lining and it is said that the heart muscles are bathed in blood. The excretory and nervous systems are normally disposed. The ovotestis is recorded to generate sperms first and then the female cells.

The Investigation of the Cleavages in Granites.—In connection with his work on the Bavarian forest granites J. F. Bell (*Eco. Geology*, **31,** No. 3) has suggested an interesting line of work on the interrelationship of fabric and cleavage in granites. From a long time, cleavage has been attributed to such causes as various factors influencing the consolidation of the liquid magma, pressure, arrangement of minerals like felspar and quartz, etc. By following the petrofabric analyses of Sander and Schmidt by using an universal stage, Bell has now concluded that the arrangement of the biotite mica is mainly responsible for the development of joints and cleavages. He has further shown that by this method of investigation, the crushing strength of the granites can also be estimated.

SCIENCE NOTES.

Weight of a Drop as a Function of the Diameter and Material of an Orifice.—Mr. D. L. Das, Lecturer in Physics, Cotton College, Gauhati, writes:

The weight of a drop for an orifice is found to be very nearly the same, when the period of dropping is about ten seconds or more (A. Adler, *Science Abstracts*, Dec. 1935, No. 4896). Experiments were conducted with eight orifices,—four of brass and four of iron—the period of dropping being about 15 seconds. Short uniform tubes of different internal diameters were taken and each tube was bevelled from outside, to a circular knife edge, at one end. Water was allowed to pass from a reservoir through a fine capillary tube and then drop from the orifice, horizontally held. The period of dropping was adjusted by changing the height between the orifice and the constant level of water in the reservoir. The results obtained are given in the table below :—

Orifice material	Orifice diameter (in cms.)	Temperature of water (in °C.)	Period of dropping (in sec.)	Average mass per drop (in gms.)	*Drop mass* / orifice diameter
Brass	0·680	25·7	15·2	0·0966	0·1421
,,	0·620	25·8	15·7	0·0871	0·1405
,,	0·552	25·9	14·9	0·0785	0·1422
,,	0·431	25·9	15·6	0·0654	0·1517
Iron	0·640	25·9	15·3	0·0940	0·1469
,,	0·602	25·8	15·2	0·0879	0·1460
,,	0·492	25·7	14·8	0·0747	0·1518
,,	0·410	25·6	15·0	0·0650	0·1585

The sixth column of the table shows that the ratio of the mass of a drop to the orifice diameter in the case of either material is not a constant, but it slowly decreases and then increases as the diameter decreases within the range of the orifice diameters used. If the masses of drops be plotted against the corresponding orifice diameters in a graph, two separate but nearly parallel curves will be obtained for iron and brass orifices respectively. From the graph it can be shown that if two orifices are used one of brass and the other of iron but both of the same diameter the mass of a drop from an iron orifice is about 1·04 times greater than that from a brass one, for the same rate of dropping and at the same temperature. Thus from a measure of the weight of drop, a relative idea of the surface tensions for different materials can be obtained; the surface tension between iron and water is about 1·04 times that between water and brass.

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Birthday Honours.—The names of the following men of science have been included in the list of the recipients of Birthday Honours :—*Knighthood*: Major-General C. A. Sprawson, Director-General, Indian Medical Service. *C.I.E.*: Dr. F. J. F. Shaw, Director, Imperial Institute of Agricultural Research; *O. B. E.*: Ghulam Yazdani, Director of Archæology, Hyderabad, Deccan; *M.B.E.*: Mr. S. Rajagopal Nayudu Garu, Ag. Chemical Examiner, Madras; *Rai Bahadur*: Mr. B. M. Das, Superintendent, Bengal Tanning Institute; Mr. T. N. Banerji, Professor of Medicine, Medical College, Patna; Mr. S. N. Mukarji, Reader in Mathematics, Delhi University; *Rao Bahadur*: Mr. S. Ramakrishnan; Avl., Professor of Bacteriology, Medical College, Madras; Mr. K. N. Dikshit, Deputy Director of Archæology; *Rao Sahib*: Mr. D. V. Bal, Agricultural Chemist, C. P.; Mr. K. I. Thadani, Botanist, Sind Agricultural Station, Sakrand.

* * *

A Terracotta Toy-Cart in the Indian Museum.—At the ordinary meeting of the Royal Asiatic Society, held on the 6th July, Mr. N. G. Majumdar exhibited a terracotta toy-cart. This unique specimen has been in the Museum for many years. Its findspot is unknown. The cart has six passengers represented in relief including two women, who are all in festive mood and enjoying themselves. The party is engaged in eating and music, as may be seen from a tray containing eatables, a *tabla* and a harp. A similar example of a toy-cart has recently been discovered at Kosam in Allahabad District, and it is very likely that this one also came from the same place. On artistic grounds it may be placed in the Sunga period (about 150 B.C.).

At the same meeting of the Society, Mr. S. K. Chatterji exhibited a set of old Oriya Playing Cards, made of cloth stiffened with a ground made of gum. They are circular in shape and are 2½" in diameter. Mr. N. Barwell communicated a paper entitled "Influence of Oriental *Motifs* upon book-bindings in Europe from the 15th to the 18th century".

Maulavi Muhammad Sanuwar Bakht was ballotted for as an ordinary member.

Excavations at Nalanda.—Among the new buildings which have been exposed at Nalanda is a monastery where about 200 metal images and an image with bronze head and agate body have been found. According to Dr. K. P. Jayaswal, President of the Managing Committee, Patna Museum, this monastery was evidently inhabited by monk-artists, as materials for fashioning images have been found in the rooms. Some of the images are of great artistic value.

The system of disposal of the dead in the ancient university has been brought to light by recent excavations. The dead were cremated in a straight row and the ashes were left undisturbed. Many of the smaller *stupas* which were formerly regarded as merely ornamental, had proved to be relic memorials where bones and hair of the deceased saints were placed under double sealings, which in their turn were preserved in clay caskets.

The finds recovered from the excavations at Rajgir in the Maniyar Matha area, specially the terra-cotta with various spouts which are at present housed in the Nalanda Museum, are, according to Dr. Jayaswal, of exceptional importance and such antiquities have so far not been reported anywhere in the world. The Nalanda museum which will soon be extended, will be one of the most important museums of the world, when all the exhibits excavated are arranged and housed properly.

* * *

De Havilland Arch of Seringapatam.—This famous swinging arch, one of the chief attractions of the tourists and a marvel of bridge engineering which was a protected monument, collapsed on 2nd July. The Director of Archaeology in Mysore, who visited the scene, considers the restoration of the arch impossible. The Government are considering how best to preserve the remains.

The Arch was built 125 years ago by De Havilland, a French Engineer, attached to the Seringapatam garrison during Tippu Sultan's reign. De Havilland was asked to build a bridge across the Cauvery to facilitate the march of troops and civilian population. Before launching on the scheme to project a bridge without piers and columns, he undertook to construct a specimen bridge in the island. The result was a brick arch with a span of 112 feet, greater than any attempted at that time. This monument of his skill, which withstood all weathers for over a century and a quarter, has been lost for ever.

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The Woodhouse Memorial Prize for 1935 has been awarded to Dr. Mohammad Aziz, D.Sc. (Agric.), of the Wheat Breeding Sub-Station and Rust Research Laboratory, Simla, for his essay on "Problem of Wheat Rusts in India".

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The Sir Vincent Massey Scholarship for the year 1936–37 has been awarded to Mr. R. C. Lacy, M.Sc. of the Allahabad University for study and research in Plant Pathology.

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Dr. S. K. Banerji officiates as Director-General of Observatories *vice* Dr. C. W. B. Normand, granted leave for three months and two days with effect from July 11 or date of availing.

Dr. C. S. Fox will officiate as Director of Geological Survey of India *vice* Dr. A. M. Heron, granted four months leave from India with effect from July 30.

* * *

Problems of Broadcasting in India.—*The Indian Listener* (June 22) has published a very timely article dealing with the principal problems confronting the development of broadcasting in India. It is an appeal addressed to scientists all over India to co-operate with the Research Department of the Broadcasting Service in determining the nature of the major factors.

To make a success of Broadcasting in India, where an enormous area has to be covered with a dependable signal which will be sufficiently higher than the interfering atmospherics, several technical problems demand close investigation. Both scientific and lay opinion agree that *atmospherics* constitute the first problem. The data available on this point are very incomplete and little work seems to have been done on the distribution of atmospherics on the frequency spectrum. What is wanted is a series of observations of the absolute strength of atmospheric noise at different frquencies. Diurnal and seasonal variations have also to be observed and data tabulated before we can predict with any degree of certainty the probable service area of a station or decide upon the optimum band of frequencies. In order to be able to co-ordinate the results obtained, it is advisable to employ similar methods at all the observing stations. It is suggested that measurements be made immediately after 7–0, 10–0, 13–0, 16–0, 19–0, and 22–0 hours and in each case observations be recorded of the field strength of atmospheric disturbances alone in microvolts per meter, the values being interpreted over 5-minute period on each spot frequency. The variations should be recorded on the complete spectrum between 150 and 20,000 kilohertz.

The collection of data on atmospheric disturbances will be helpful in ascertaining suitable frequencies for transmission. Short-wave experimental transmissions will be made from Delhi, as soon as funds become available for erection of a transmitter, at a number of frequencies, and the results observed. In this connection it is hoped to obtain the help of the listening public as well as the scientific world. The former will be requested to submit reception reports, while scientific workers at different distances from Delhi will be requested to make field strength observations. In this way it will be possible to obtain extensive correlatory curves which will be helpful in founding a short-wave service.

As the suitability of high frequencies for local broadcasting has yet to be proved, the medium frequency band is at present the main vehicle for the diffusion of broadcast programmes. One of the chief difficulties in the drawing up of a suitable scheme of development in this line is the paucity of data on earth conductivity. Since ground-ray attenuation is a function of both frequency and ground conductivity, it is necessary to have reliable data on soil characteristics, over varying types of terrain. It is very desirable, therefore, to have a series of measurements taken at different parts of India over ground ranging from granite and gneiss formations to the pastoral

deltaic areas. This work will be undertaken by the Research Department but co-operation from outside will be very helpful.

* * *

Expeditions to Himalayas.—A Japanese expedition to negotiate the Mount Nandakot in the Himalayas is expected to start the ascent from Spetember 1. This expedition is supported and financed by the Rikkyo (Missionery University) and *Nichi* an influencial daily of Tokyo. This is considered to be of the nature of a trial for a projected expedition to Mount Everest. The party consists of eight members five of whom are graduates. Their previous experiences comprise the conquests of Mount Aliga in Switzerland and Alberta Peak in Canada.

Another expedition to Mount Nanda Devi, consisting of four Americans and four Englishmen planned by the Harward Mountaineering Club and the British America Himalayan Expedition, has already started making preliminary arrangements. Their base camp will be established at a height of 14,000 feet, and the actual ascent from the camp will start either by the end of August or the beginning of September. The expeditionists, all of whom possess considerable mountaineering experience, are equipped with light wind-proof clothing, shoes suitable for deep snow climbing and dried provisions, and they hope to reach the summit of Nanda Devi before the 20th September.

* * *

International Conference on Timber Utilisation, London.—The Second International Congress, organised by the Comité International du Bois', Department for Timber Utilisation in conjunction with its member organisation, the Timber Development Association, Ltd., was held in London from 31st March to 3rd April. 21 countries were represented at the Conference, which was inaugurated by the Earl of Dunmore. Three public sessions were held: (1) Forestry and Timber Utilisation, (2) Timber Research and Timber Utilisation, and (3) The Utilisation of wood waste.

The intimate collaboration in all matters concerning the wide utilisation of timber has already shown very satisfactory results. The various papers read at the Conference served to emphasise the similarity of problems concerning timber in various countries. A main Committee was appointed to receive the reports on the activities of various national organisations for timber utilisation.

It was resolved in principle (1) to continue and intensify international collaboration, (2) to arrange international inquiries, and (3) to organise international competitions. It was considered that all countries represented at the Conference should participate in one pavilion at the World Exhibition to be held in Paris in 1937.

The delegates visited the Prince Risborough Forest Products Research Laboratory, the well-equipped centre of English timber research.

* * *

Inventive Activities in India.—The annual report of the Patent Office reveals a decrease of about 25 per cent. in the number of applications for patents originating from India as compared with those for the year 1934.

While a decrease was noticed in the patents connected with electrical industry, those concerning chemical industry show a marked increase. The subjects investigated cover a wide range such as synthetic resins, drugs, wetting agents for textile processing, investigations on sterols, the manufacture of sulphuric acid by contact process and manufacture of salts by base-exchange reactions. There was a notable increase in patents for surgical and medical appliances. Applications for patents concerning inventions in rail and road transport and aeronautics constituted ten per cent. of the total. Steady progress was maintained with respect to inventions relating to agriculture and allied industries. A number of applications relating to guttapercha and India rubber was received. In the field of glass manufacture, the investigations were mainly directed towards the production of non-shatterable safety glasses. glass suitable for use as a protective coating or glaze upon the interior surface of sodium lamp bulbs where the glass is exposed to highly heated sodium vapour, and the manufacture of certain kinds of boro-silicate glass which are moisture resistant and highly inert to hot sodium vapour and also more transparent than glasses hitherto used for the purpose.

* * *

An Indian System of Physical Culture.—Maharaja Balasahib Pant Pratinidhi, Ruler of Aundh State, a keen follower, an ardent advocate and enthusiastic propagandist of *Surya Namaskar*, an ancient system of Physical Culture adopted for individuals and groups and suitable for all ages and both the sexes, is now touring in Europe to popularise this system. The Ruler of Aundh has made the system compulsory in all the schools of his State and having satisfied himself with the results obtained, he is now advocating the system not only to the peoples of India but also to those outside. The system affords excellent movement to the three vital parts of the body—the abdomen, the chest and the spinal cord. By reviving this excellent system and spreading it, the Maharja has done a lasting service to the cause of Physical Culture. He is the author of a book dealing with the system, originally written in English but now available in many Indian languages.

* * *

The Imperial Institute of Sugar Technology.—The Imperial Institute, which is housed in the Harcourt Butler Technological Institute, was formally brought into being on the 1st July. Mr. R. C. Srivastava, Sugar Technologist in the Imperial Council of Agricultural Research, is the first Director of the Institute. The Teaching and Research Staff consists of about 20 members including three Professors of Sugar Technology, Sugar Engineering and Sugar Chemistry, each assisted by an Assistant Professor, Research Physical Chemist and Biochemist.

The Central Government's contribution to the Institute will be about Rs. 14 lakhs spread over a period of 5 years, which with grants of Rs. 25 lakhs made to the Imperial Council of Agricultural Research for the promotion of sugar research, brings the total Government contribution to Rs. 39 lakhs.

At the recent conference held at Simla to review the progress of sugar research, it was decided to recommend the continuation of the two schemes which have reached the end of their five-year periods, *viz.*, the Deccan Sugarcane Research

Station at Padegoan where considerable work on sugarcane physiology has been carried out, and the scheme dealing with sugarcane diseases carried out at the Imperial Institute of Agricultural Research at Pusa.

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Imperial Council of Agricultural Research.—Sir John Russel, Director of the Rothamsted Experimental Station, and Dr. N. C. Wright have been appointed to conduct the scientific survey of the working of the Imperial Council of Agricultural Research since its inception. Mr. Sethi, Rice and Sugarcane Expert at Shahajahanpur and Prof. Agarwal, of the Lahore Veterinary College, have been appointed as Indian Secretary and Adviser respectively to the Experts, who, it is understood, will arrive in India in November. Their headquarters will be Delhi but will visit a number of research stations in several provinces during their six months' stay in India.

* * *

Properties and Applications of "Everdur".—An alloy of copper, silicon and manganese, whose remarkable properties have procured for it a wide application during the past 10 years, is now available as a British product, following the acquisition by I. C. I. Metals, Ltd., of the manufacturing and selling rights in the United Kingdom. The material is now produced in the form of plate, sheet, strip, tape, rod and wire over a wide range of sizes and tempers to suit individual requirements as well as in ingots for casting. Properties, applications and methods of working are fully described in an illustrated booklet recently issued by the company.

"Everdur" is the first commercial application of copper containing substantial amounts of silicon, and marks a decided advance in the metallurgy of copper alloys in that it combines the tensile strength of medium and low carbon steel with the non-rusting and corrosion-resisting properties of copper. The wide range of its potential applications may be judged from such other desirable properties as a high fatigue limit and good machinability, and from the fact that it is non-magnetic, easy to cast or to work hot or cold, and readily weldable by all commonly used methods. These properties should make possible the replacement of steel with "Everdur" in many applications involving corrosive conditions.—(*Chemical Age*, 1936, **34**, *Metal. Sect.*, p. 56.)

* * *

A Review of the Physiology and Biochemistry of the Sulphur Bacteria.—(His Majesty's Stationery Office. Price 9*d*. net., post free 10*d*.) The importance of sulphur in inorganic nature has long been known but the recognition of the biological significance of sulphur came later. There is, in fact, "a sulphur cycle" which is an expression of the manner in which sulphur passes from inorganic to organic nature and *vice versa*. This circulation is largely due to the sulphur bacteria whose activities are dealt with in this review where reference is made to their economic importance and to the problems concerning them that remain to be solved. One of the major problems is to utilise them commercially, for, up to the present, it is their harmful rather than their beneficial effects that have attracted attention.

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Survey of the Biochemical Activities of the Acetic Acid Bacteria.—(His Majesty's Stationery Office. Price 1s. net, post free 1*s*. 1*d*.) It is just 100 years since the conversion of wine into vinegar or acetic acid was definitely declared to be caused by living organisms which at first were thought to be of one species. Later work has shown that there are many species of the acetic acid bacteria, and in recent years a serious attempt has been made commercially to utilise their powers other than in the vinegar industry.

This survey gives a comprehensive account of the nature and variety of the chemical transformations which this group of bacteria are able to effect. Suggestions are made for their application to the production of certain compounds which are difficult to obtain by ordinary chemical methods and for the investigation of problems of potential utility.

* * *

Announcement

Paris International Exhibition, 1937.—An International Exhibition with the support of the French Government will be held in Paris in April, 1937.

The exhibition will be divided into fourteen sections which will again be sub-divided into 75 sub-sections. The subjects to which the different sections will be devoted are: Expression of thought—Literary, musical and artistic, including the scientific discoveries in their applications; social questions including co-operation, hygiene, organisation of intellectual and manual labour; arts and crafts including higher education; artistic and technical diffusion including radiophony, television and cinematography; urbanism including town-building, horticulture and arboriculture; graphic and plastic arts; building industry; interior decoration and furniture; work of art including jewellery, morocco leather work, scientific and musical instruments, books and reviews printing; apparel including dress materials and perfumery; transport and tourism including hotels and travelling requisites; congress, processions and sports; publicity including shop windows and display articles.

Further particulars can be obtained from: Monsieur le Commissaire Général de l 'Exposition Internationale, Paris 1937, Grand Palais, Porte C, *Paris*.

* * *

World Congress of Pre-Historic and Proto-Historic Science.—The second session of the Congress will be held in Oslo on August 3 to 9 this year, in accordance with the decision taken at the first session in London in 1932. The Norwegian Committee of Honour and the Organising Committee announce that they invite all pre-historians and other persons interested, to attend the Congress. Acceptance of this invitation should be sent to Bureau de Congress, Universities Oldskassamling, Oslo. The Organising Committee is putting on agenda several of the more important problems which are occupying the attention of Scandinavian archæologists and which are of international interest. These include excavations of sites dating from the Stone Age of Finmark which set many problems of general interest; rock carvings of the Arctic group to which the most modern research methods have been applied of late years; the remains of farms of the Migration period; the decorative art of the Migration period and finally the textile art of the Viking. Special exhibitions have

been arranged so that members may gain first-hand experience of the subject. Excursions have been arranged to the old Vestfold during the Congress and to Stavenger, Bergen or Trondheim, after the close of the Congress.

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The League of Nations will award the Darling Prize of 1,000 Swiss francs this year for the best work in the pathology, etiology and prophylaxis of malaria. Works which have been published within the last five years as well as unpublished work may be submitted.

* * *

Indian Science Congress, 1937.—The 24th Annual Meeting of the Indian Science Congress will be held in Hyderabad (Deccan) from January 2 to 8, 1937. His Exalted Highness the Nizam of Hyderabad has consented to be the Patron of the meeting. Rao Bahadur T. S. Venkataraman of Coimbatore will be the President.

Papers submitted for reading at the session of the Congress can only be submitted by Ordinary and Full Session Members or through Ordinary Members. No papers are admissible for reading at the session by any one who has not been enrolled as a member by September 15, 1936.

Papers for the Congress should be forwarded together with three copies of an abstract to the President of the Section concerned not later than 15th September 1936. Abstracts are to be typewritten and must not exceed 200 words.

Dr. H. Hyder Ali Khan, Principal, Medical College, Osmania University, and Dr. Muzafferuddin Qureshi, Head of the Department of Chemistry, Osmania University, Hyderabad have been appointed Local Secretaries.

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We acknowledge with thanks the receipt of the following :—

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"Journal of Agricultural Research," Vol. 51, Nos. 5–7.

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"The Philippine Agriculturist," Vol. XXV, No. 1, June 1936.

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"The Biochemical Journal," Vol. 30, No. 5, May 1936.

"Journal of the Institute of Brewing," Vol. XLII, No. 6, June 1936.

"Chemical Age," Vol. XXXIV, Nos. 882–885.

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"Experiment Station Record," Vol. 74, Nos. 4 and 5, April–May 1936.

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"Indian Forest Records," Vol. I, No. 3 (Silviculture—The Distribution of Sesquioxides, Silica and Organic Matter in Forest Soil, etc.).

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"Genetics," Vol. 21, Nos. 1 and 2, Jan. and March 1936.

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"Monthly Statistics of Production of Certain Selected Industries of India (Department of Commercial Intelligence and Statistics), No. 12 of 1935–36, March 1936."

"Indian Trade Journal," Vol. CXXI, Nos. 1563–1566; Vol. CXXII, No. 1567.

Irrigation Research Institute, Punjab, Vol. II, No. 11; No. 12; Vol. V, Nos. 4 and 5.

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No. 34.—"An Investigation of the Durability of Molding Sands". No. 36—"The Cause and Prevention of Steam Turbine Blade Deposits."

"The Calcutta Medical Journal," Vol. 30, No. 12, June 1936.

"Mathematics Student," Vol. III, No. 4, Dec. 1935.

"Review of Applied Mycology," Vol. 15, No. 5, May 1936.

"The Cambridge Bulletin," Vol. LXXVIII, June 1936.

"Memoirs of the India Meteorological Department," Vol. XXVI, Part V.—Soundings of Temperature and Humidity in the Field of a Tropical Cyclone and a Discussion of its Structure, by K. R. Ramanathan.

Imperial Bureau of Plant Genetics (for Crops other than Herbage):—"Plant Breedings Abstract, Supplement II.—Summary of Report received from Stations in the British Empire," 1932–35, April 1936.

"London Shellac Research Bureau (controlled by the Indian Lac Cess Committee, India), Technical Paper," No. 8.—"Darkening of Lac Solutions and the effect of Oxalic acid thereon," by Lal C. Verman, May 1936.

Do. No. 7.—"Fundamental Physical Properties of Lac, Part III. Electrical Properties" by Lal C. Verman, May 1936.

"Bulletin No. 2 of Indian Industrial Research—A Survey of the Indian Glass Industry," by E. Dixon.

"Nature," Vol. 137, Nos. 3473–3476.

"Journal of Nutrition," Vol. 11, No. 5.

"Indian Journal of Physics and Proceedings of the Indian Association for the Cultivation of Science," Vol. X (XIX), Part III.

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"Scientific American," Vol. 154, No. 6, June 1936.

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"Mitteilungen über Neuerscheinungen und Fortsetzungen, 1936," Nummer 3, (Juni), (Messrs. Verlag von Gustav Fischer in Jena).