CENTENARIES

Wallace, William (1768–1843)

WILLIAM WALLACE, a British mathematician, was born of a leather-manufacturer, 23 September 1768. Having served, as a boy, in a book-bindery and then in a printing office, he learned mathematics and classics by his own industry. In 1794 he became a mathematics teacher in Perth Academy and began contributing to the *Transactions of the Royal Society of Edinburgh*. His work attracted the notice of John Playfair who secured him a teaching post in the Royal Military College in 1803. In 1819 he succeeded to the professorship at Edinburgh.

Wallace was mainly responsible for the erection of the observatory at the Carlaton Hills and of a monument to Napier, the inventor of logarithms. He invented the eidograph and the chorograph.

Wallace died at Edinburgh, 28th April 1843.

Cartwright, Edmund (1743–1823)

EDMUND CARTWRIGHT, the inventor of the power loom, was born at Marnham, 24 April 1743. He entered Oxford at 14 and was enabled by a special act to take his degree before the prescribed age and was made a Fellow of Magdalen in 1764 and in 1779 he became rector of a provincial town.

In 1784, Cartwright paid a holiday visit to the spinning mills at Cromford. Soon after his return home, he constructed a power loom and took patent in 1785. In 1787, he set up a factory of his own at Doncaster to work with his power loom.

In 1782 Cartwright invented a wool-combing machine. It saved labour so much that some 15,000 wool-combers appealed to the Parliament for protection.

On the petition of fifty prominent Manchester firms, the Parliament granted him a sum of £10,000 in recognition of the services rendered by him to the nation by the invention of the power-loom.

Cartwright died at Hastings, 30 October 1823.

University Library,
Madras, S. R. RANGANATHAN.
December 4, 1943.

SCIENCE NOTES AND NEWS

Preventive Methods for the Remission of Malaria.—The discovery that a deficiency in biotin, nature's most powerful vitamin, greatly increases the susceptibility to malaria and that an adequate amount of the vitamin will increase resistance to the infection, was reported this week in *Science*. Experiments on chickens and ducks, which led to the findings, are described by Dr. William Trager of the Princeton Station of the Rockefeller Institute for Medical Research.

The discovery clears up for the first time the long-standing mystery of why some individuals are more susceptible to malaria than others, and marks one of the very few instances in which a specific vitamin has been found to increase resistance to a specific disease—in this case, one that inflicts several hundred million people throughout the world. Thus there is opened for us a new avenue of approach for the prevention of malaria which promises to be of considerable value to our armed forces in lands where malaria is prevalent. Biotin is found in large amounts in egg yolks, liver, milk and, to a lesser degree, in a number of other foods.

Chickens and ducks, made biotin-deficient by being kept on an egg-white diet for two or three weeks, were subsequently inoculated with large doses of malaria parasites. They showed their peak in parasite numbers to be 50 to 100 per cent. higher than those shown by control animals, while among the biotin-deficient animals, the parasite numbers persisted at a high level several days longer and more animals died of malarial infection than among the controls.

"Certainly the results would indicate that biotin which is a substance of known chemical nature helps determine the degree of resistance of the host to an infection with malarial parasites. The results are also of interest since they provide an example, in addition to the very few thus far discovered, of specific relations between nutritional deficiency and susceptibility to an infectious disease."

A Cure for Many Diseases.—An article in the current issue of the *Lancet* by Professor and Mrs. Florey of Oxford, describing the first extensive trial of a new drug, Penicillin, may well prove to be a landmark in medical history, writes the medical correspondent of the *News Chronicle*.

Not only is Penicillin many hundred times more potent than the Sulphonamide drugs, like M and B 693, and Sulphathiazole, but it has also cured infections such as meningitis, staphylococcal and septicæmia in which the Sulphonamide drugs had proved useless.

In one remarkable instance an airman, who had such severe blood poisoning from staphylococci that his lungs were full of abscesses, made complete recovery.

A local application of Penicillin to the infected wounds has also proved most effective.

The drug is still quite unobtainable by the public. A tedious and lengthy process is necessary to make only very small quantities. It is to be hoped that further researches may result in larger supplies being produced synthetically and that no effort will be spared to make the benefits of this drug available to everyone.

The Use of Silica Gel as a Substitute for Agar in Culture Media: by C. G. Anderson and J. C. Macsween.—In view of the importance of the subject-matter, we reproduce below, in full, an extract from the *Journal of Pathology and Bacteriology*, Vol. 54, No. 4, October 1942:—

The use of silica gel to replace agar in media for the isolation of auto-trophic bacteria was introduced by Kuhne (1890) and developed by Winogradsky (1891) and Omelianski (1899). It has occasionally been recommended for more general use, for example, by Munch (1936), Wahl (1938), Clauberg (1941) and Sterges (1942). Usually rather elaborate dialysis procedures have been employed for removing excess of salts and for introducing the nutrient materials. The difficulty of sterilisation has been mentioned frequently. Autoclaving and steaming result in disruption of the gel unless special precautions as to composition, pH and other conditions are taken.

When it became desirable to grow *Bact. dycenteriæ* Shiga on a solid medium for the production of toxin without contamination by agar products the following method was adopted.

Commercial water glass (sodium silicate) is diluted with water to a specific gravity of 1·3. One volume of the solution is mixed with nine volumes of nutrient broth (or other appropriate medium) and 25 ml. of 0·04 per cent. bromothymol blue indicator added per litre. The solution is sterilised by filtration through Ford SB pads in a Seitz filter as soon as possible after mixing. A delay of even an hour or two considerably slows down the filtration, while standing for two to three days results in gel formation. The filtered broth-silicate mixture is filled into sterile containers, using a burette with a hooded jet. The pH of the medium is then adjusted by the addition of 8N or 4N phosphoric acid under sterile conditions. The strong acid is used for large volumes of medium, for example, 100 ml. in a Roux bottle, and 4N acid for small quantities for slopes or pouring plates. Gel formation occurs between pH 5 and 9, but considerably more rapidly on the alkaline side. The optimum appears to be about pH 7·2 (a very pale blue-green colour of the bromothymol blue), but it can be varied to suit the requirements of the organism under investigation. To bring the broth-silicate mixture to pH 7·2 requires a volume of 8N phosphoric acid approximately one-tenth that of the broth. Gel formation at this pH takes about two minutes, allowing ample time for sloping tubes or pouring plates. It is advisable to incubate plates or Roux bottles for 24 hours in an inverted position before use, in order to allow complete extrusion of fluid from the gel by syneresis. If this is not done the inoculum may be washed off or a spreading growth result. The extruded fluid can be removed in a sterile manner if desired, although it is not really necessary. This preliminary incubation also serves as a check on sterility.

The medium has been found to support the growth of the ordinary pathogens and saprophytes as effectively as an agar medium. Morphologically the organisms appear normal. In the case of Shiga's bacillus, toxin is produced, cn autolysis, in as good yield as from organisms grown on ordinary media.

Kerst Induction Electron Accelerator or Betatron.—One of the major discoveries in the field of X-rays in recent years is the successful development of an induction electron accelerator or betatron. In a paper appearing in *Physical Review*, 1941, 60, 47, Prof. Donald W. Kerst of the University of Illinois has described the principle and the constructional details of this new physical apparatus. It works on the same principle as the cyclotron. The electron-generatcr which is a doughnut-shaped glass vessel, is placed between two circular pole pieces of an A.C. electro-magnet. The electron beam emerging from the hot filament is accelerated during repeated revolutions in the magnetic field. At the end of the cycle, the high-speed electrons fall on a target giving rise to X-radiations. The velocity attained by the electrons is said to be the highest ever attained, being only 3/100 per cent. less than that of light. Prof. Kerst's first model had an output of nearly two million volts. In the treatment of malignant growth in human body, these high-voltage X-rays emerging from the electron tube have maximum effect about 1½" below the surface of the body and could, therefore, be used for such treatment without causing injury to the skin. C. S. V.

Gramicidin.—Within the last few years a number of bactericidal substances produced by soil bacteria have been investigated. Of these, certain substances, extracted by alcohol from gram-positive organisms, and especially gramicidin isolated by Dubos and his co-workers (Dubos, R. J., and Hotchkiss, R. D., *J. Exp. Med.*, 1941, 73, 629) appear to be the most important. These investigators found that extracts from cultures of certain soil bacteria and from similar organisms present in sewage, manure and cheese, could inhibit the growth of gram-pcsitive organisms. The most important constituent of such cultures, gramicidin, is apparently a substance with remarkable properties. It is a polypeptide soluble in lipoid solvents, but insoluble in water, so that it has to be administered in suspensions. Unlike penicillin and the sulphonamides, its action is bactericidal rather than bacteriostatic. Against

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1. Clauberg, K. W., *Zbl. Bakt., Abt. I, Orig.*, 1941, **147**, 75. 2. Kuhne, W., *Z. Biol.*, 1890, **27**, 172. 3. Munch, H., *Arch. Hyg. Bakt.* **117**, 129. 4. Omelianski, V., *Zbl. Bakt., Abt. II*, 1899, **5**, 537. 5. Sterges, A. J., *J. Bact.*, 1942, **42**, 317. 6. Wahl, R., *Compt. rend. Soc. biol.*, 1938, **128**, 854. 7. Winogradsky, S., *Ann. Inst. Pasteur*, 1891, **5**, 92.

certain organisms it produces its effect in quite high dilutions. This is observed when the experiment is carried out *in vitro* and is also seen in the living animal, especially when the organism used for inoculation is the pneumococcus. Unfortunately the toxicity of gramicidin injected into animals is comparatively high, and it is doubtful whether it is suitable for general administration. It may possibly be of value for local application, and good results have been reported in the treatment of mastitis in cows, following the injection into the udder of suspension of gramicidin.

Much further work will be done on chemotherapeutic substances produced by various kinds of bacteria, and it seems quite possible that discoveries of great therapeutic value may ultimately result from these investigations.

(Robson, J. M., *Chem. Products*, 1942, 6, 15.)

The U.S.S.R. in War-time.—The broadsheet *Soviet Planning in War-Time*, issued by P.E.P. (Political and Economic Planning) gives a useful objective account of the ways in which the Russian economy has advanced from one mobilised for war in 1941 to a battle economy, and of the general background of this economy. The machinery of Soviet planning functions through three main stages: first, a comprehensive survey of existing resources; secondly, the formulation of a plan, which is simply the laying down of a series of output programmes which must be carefully dovetailed into each other so that they are consistent; and, thirdly, a mechanism for checking their progress and for providing the elasticity necessary for periodic adjustments. This machinery was evolved over a considerable period of time, and the broadsheet gives a brief account of the purposes and achievements of the three Five-Year Plans. It was only during the second Five-Year Plan that the consumption of foodstuffs and living standards generally rose to any appreciable extent, but an important aspect of that period was the development, partly for strategic reasons, of industrial and raw material resources east of the Urals. Both the first and the second Five-Year Plans between them largely achieved their objectives of the creation of modern large-scale industry and a mechanised agriculture as the basis of raising living standards to a higher level and for national self-sufficiency in war-time.

The third Five-Year Plan provided for further increases in the output of industry and agriculture, but its most striking feature was the huge increase in the resources devoted to defence. Moreover, the whole organization of Russian economic life, with its machinery for central planning and its high degree of military preparedness, makes for a greater degree of continuity between peace and war economies than in any other country except Germany. Owing to the absence of excess capacity, the war sector from the outset had to be expanded at the expense of the peace sector of the economy. The producers' goods industries were, so far as possible, adapted to war production and the output of these industries was reduced. Agriculture was seriously affected by labour shortage due to mobilization, which was only in part made up by urban workers and spare-time labour. Excess purchasing power seems to have been skimmed chiefly by increased subscription to State loans. To effect the heavy losses in production resulting from Nazi occupation of European Russia, great efforts, apart from the evacuation of industrial plant and rolling stock, have been made to increase the absolute absorptive capacity of the Ural and Asiatic regions. New sources of raw materials are being exploited, new power stations established, new coal pits sunk, and new oil-wells drilled. New plantations of rubber-bearing plants, of sugar beet, etc., have been developed, and new substitutes and methods are being employed for the manufacture of sugar and soap. In all this, scientific workers have played a great part, as well as in the simplification and rationalization of many technical processes.

—(*Nature*, 1943, **151**, 50.)

MAGNETIC NOTES

Magnetic conditions during March 1943 were almost as in the previous month. There were 8 *quiet* days, 20 days of *slight* disturbance and 3 of *moderate* disturbance as against 12 quiet days, 15 days of slight, 3 of moderate and 1 of great disturbance during the same month last year.

The quietest day during March 1943 was the 15th, while the 29th was the day of largest disturbance.

The individual days were classified as shown below:—

Quiet Days	Disturbed days	
	Slight	Moderate
9, 10, 13, 15, 18, 25, 26, 28.	1, 3-8, 11, 12, 14, 17, 19-24, 27, 30, 31.	2, 16, 29.

One moderate storm of short duration with a gradual commencement was recorded in March 1943, while two magnetic storms, one of moderate and one of great intensity were recorded during the same month last year.

The mean character figure for the month of March 1943 was 0·84 as against 0·74 for March 1942.

M. V. Sivaramakrisiinan.

SEISMOLOGICAL NOTES

Among the earthquake shocks recorded by the seismographs in the Colaba Observatory, Bombay, during the month of March 1943, there were six of slight and three of moderate intensities. The details for those shocks are given in the following table:—

Date	Intensity of shock	Time of origin I.S.T.	Epicentral distance from Bombay	Remarks
		H. M.	(Miles)	
7	Moderate	09 32	5300	Epicentral region near Aleutian Islands.
9	Moderate	16 19	7870	Epicentral region near New Zealand (?)
10	Slight	14 45	7850	...
14	Slight	18 29	4490	..
14	Slight	19 13	4490	..
15	Slight.	08 55	7140	..
15	Slight	11 18	4670	.
22	Moderate	03 06	5500	..
27	Slight	00 08	7910	..

ANNOUNCEMENT

University of Travancore.—*The Subramonya Karayalar Lecturership*: Applications are invited for the award of the Subramonya Karayalar Lecturership under the University.

The subject of the Lecture shall relate to some scientific problem of economic value.

The Lecturer selected will have to deliver at Trivandrum a course of not less than four lectures relating to some scientific problem of economic value within the course of two years from the date of this notification.

The Lecturer will be paid an honorarium of Rs. 400 only. A grant not exceeding Rs. 100 may be made by the Syndicate towards incidental expenses in connection with the lectures, if necessary.

Applications must reach the Registrar, University Buildings, Trivandrum, on or before the 1*st July* 1943.

Imperial Dairy Research Institute.—The Imperial Dairy Research Institute, Bangalore, has been authorised by the Government of India to entertain Honorary Research Workers, who are graduates of Indian and European Universities and who are desirous of carrying out research work at the Institute. Such candidates as are suitable and well qualified for dealing with a problem within the purview of the work and activities of the Institute will be selected. The number of workers to be admitted will be limited to two at present and their period of research work will not ordinarily exceed one year. The workers will be exempt from payment of any fees for the period of the research work; but they will have to make their own arrangements for board and lodging.

We acknowledge with thanks the receipt of the following:—

"Journal of the Royal Society of Arts," Vol. 91, No. 4628.

"Biological Reviews," Vol. 18, No. 1.

"Agricultural Gazette of New South Wales," Vol. 54, Pt. 1.

"Biochemical Journal," Vol. 34, No. 12; and Vol. 36, Nos. 7-12.

"Journal of the Indian Chemical Society," Vol. 20, No. 1.

"Indian Farming," Vol. 3, No. 12; and Vol. 4, No. 1.

"Indian Forester," Vol. 69, No. 4.

"Genetics," Vol. 28, No. 1.

"Bulletin of the Indian Central Jute Committee," Vol. 5, No. 12.

"Transactions of the Mining, Geological and Metallurgical Institute of India," Vol. 38, Pt. 2.

"Indian Medical Gazette," Vol. 78, No. 3.

"The Review of Applied Mycology," Vol. 21, Nos. 11 and 12.

"Bulletin of the American Meteorological Society," Vol. 23, No. 8.

"Nature," Vol. 150, No. 3815; and Vol. 151, Nos. 3818 and 3819.

"American Museum of Natural History," Vol. 50, No. 3; and Vol. 51, No. 1.

"Canadian Journal of Research," Vol. 20, Nos. 10 and 11.

"Science," Vol. 96, No. 2504.

"Science and Culture," Vol. 8, No. 10.

"Sky," Vol. 2, No. 3.

"Indian Trade Journal," Vol. 148, Nos. 1912-18; and Vol. 149, Nos. 1919-20.

BOOKS

The Life of Sir J. J. Thomson. By Lord Rayleigh. (Cambridge University Press, London), 1942. Pp. x + 299. Price 18*sh.*

Switchgear Practice. By Arthur Arnold. (Chapman & Hall, London), 1942. Pp. iv + 238. Price 22*sh.*

Electric Power System Control, Vol. XI. By H. P. Young. (Chapman & Hall, London), 1942. Pp. xii + 319. Price 25*sh.*

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