

SCIENTIFIC RESEARCH IN THE PACIFIC AREA

Title	Authors	Date
The Effect of Small Departures from the Spherical Shape upon the Critical Size and Time Constant of a Sphere	Wilson, A. H.	March 1944
Alpha-Ray Analysis of X-Isotopes*. Part I. Apparatus	Clark, F. L. Spencer-Palmer, H. Woodward, R. N. Wilkinson, D. H.	May 1944
Tests Concerning the Reproducibility of the RaBeF ₃ Neutron Standard and its Calibration as a Source of Neutrons	Fairbrother, H.	June 1944
The Critical Size and Time Constant of a Spheroid	Kinsey, B. B. Cohen, S. G.	June 1944
The Energy Spectrum of the Neutrons from the Lithium (p,n) Reaction	Preston, P. D. Davison, B.	July 1944
Critical Radius of a Hemisphere Completely Surrounded by a Container	Wilson, A. H.	July 1944
The Effect of Anisotropic Scattering on the Multiplication in a Sphere	Feather, N.	July, 1944
Note on the Investigation of Spatial Asymmetry in Fast Neutron Fission, using a Double Ionisation Chamber and Pulse Analyser, and its Possible Bearing on the Problem of Large Capture Cross-Sections at High Energies	Broda, E.	September 1944
Iodine 131 and 133 as Fission Indicators	Feather, N.	September 1944
On a Possible Method of Investigating the Back-Scattering of α -Particles under Conditions of "50 per cent Geometry"	Feather, N.	September 1944
On the Distribution of Pulse Sizes in a Parallel-Plate Ionisation Chamber containing a Thick Layer of Hydrogen-Rich Material Irradiated with a Parallel Beam of Neutrons	Feather, N.	October 1944
On the Distribution of Pulse Sizes in a Parallel Plate Ionisation Chamber containing a Thick Layer of Hydrogen-Rich Material Irradiated with Neutrons (II): Effect of Oblique Incidence	Smales, A. A.	November 1944
A Rapid Colorimetric Method for the Determination of T in Solutions of $T\text{O}_2\text{F}_2 + \text{HF}$, by means of Hydrogen Peroxide†	Feather, N.	c. January 1945
Chance Coincidences between Non-Random Sequences, with particular reference to Experiments using a Cyclotron Source	Peiser, H. S. Alcock, T. C. Broda, E. Wright, P. K.	March 1945
X-Ray Powder Patterns of some X Metal‡ Compounds	Wilkinson, D. H.	April 1945
Upper Limits of the Fission Cross-Sections of Lead and Bismuth for Li-D Neutrons	Wilkinson, D. H.	May 1945
The Range/Energy Relation for α -Particles of 0.5-3 MeV. in Ethylene and Polythene	Livesey, D. L. Wilkinson, D. H.	May 1945
A Photographic Plate Study of Neutrons from the D-D Reaction	Kynch, G. J.	c. June 1945
Differential Diffusion Through a Capillary (Part I. Mathematical)	Broda, E. Feather, N.	June 1945
The Assignment of the Slow-Neutron-Produced Activities of Thallium and the Dual Disintegration of Radium E	Broda, E. Wright, P. K.	July 1945
Preparation of a Strong Thin Polonium Source and Preliminary Experiments on the Yield of (α,n) Reactions	Kynch, G. J.	c. August 1945
Differential Diffusion through a Capillary, Part II	Allen, K. W.	August 1946
Measurement of a Flux of Fast Neutrons with a Counting Pressure - Ionization Chamber	Broda, E.	August 1946
The Application of the Photographic Plate to the Quantitative Determination of Activities by Track Counts	British Non-Ferrous Metals Research Association	October 1946
The Permeability of Metals to Argon and Helium		

* Uranium isotopes.

† T = uranium.

‡ Uranium.

THE *Proceedings* of the Pacific Science Conference of the National Research Council, held at Washington, D.C., June 6-8, 1946, and now published as Bulletin No. 114 of the National Research Council (Washington, D.C.: National Academy of Sciences), includes reports of the opening addresses and of the various sessions, the specific and general recommendations of the Conference, the proposed organisation of the Pacific Science Survey and the recommendations relating to international co-operation.

The objectives of the Conference were to form an effective organisation of American men of science interested in the Pacific, to encourage and assist scientific research and activities in that area, and to further international co-operation along these lines. These objectives were detailed more specifically by Dr. Douglas L. Oliver at the opening session, and the permanent organisation which the Conference recommended the National Research Council should establish under some such name as the Pacific Science Survey contemplates six divisions, for anthropological sciences (including human geography), earth sciences, oceanography and meteorology, plant sciences, public health and medicine, and zoological sciences, respectively, each represented by a committee within the appropriate division of the National Research Council, the chairmen of these committees, with three others, constituting the Pacific Science Board. A co-ordinated programme of scientific research for the Pacific Islands, under American or foreign administration, has been formulated, and recommendations are detailed in the report under each of the divisional heads given above.

The pamphlet also includes a number of general recommendations regarding the release of materials and scientific information, the conservation of flora and fauna, and the use of insecticides, herbicides, etc., which might disturb the biological balance, the interchange of information on the physiology, biochemistry and biophysics of plants of importance in the Pacific area; and the establishment of base stations for scientific research in Hawaii, Guam and the Galapagos Islands, as well as floating stations, advance base stations for both marine and terrestrial research on various types of islands and at the extremes of environmental conditions and liaison stations in the Solomon Islands, Australian and Dutch New Guinea, French Oceania, Indonesia, the Philippines and the Galapagos. A survey of the state of our knowledge in the various fields of science in the Pacific, including a bibliography of the basic contributions, and documentation centres at Washington and Honolulu are also recommended.

Specific recommendations pertaining to international co-operation relate to the establishment of visitors' facilities at the principal centres, collaboration with interested institutions and individuals, American and foreign, in the preparation of a series of regional Floras, and encouragement of field-work in areas for which the data are inadequate. The establishment by the Government of the Netherland Indies of a scientific research station at Hollandia, Dutch New Guinea, is also recommended. Other matters discussed are the formation of international committees for the correlation and standardization of nomenclature and methods of measurement,

extension of the survey of the Algæ and algal resources of Philippine and Indonesian waters to cover the Pacific, and the establishment of a scientific centre in the Philippines, supported by private funds.

FREE-PISTON COMPRESSOR-ENGINES

THE paper by H. O. Farmer on "Free-Piston Compressor-Engines", read before the Institution of Mechanical Engineers on December 6, must have been for many their first introduction to the subject, as this type of engine has received little publicity and has only just reached the production stage.

The free-piston compressor-engine, in its production form, is a reciprocating air compressor driven by a reciprocating two-stroke compression-ignition (or Diesel) engine. The outstanding feature is that neither the engine nor the compressor has the conventional rotating crankshaft; instead, the engine and compressor cylinders are arranged in line and the pistons are coupled directly. A normal engine has a flywheel which supplies the energy for the compression stroke; but in the free-piston engine, which has no flywheel, energy is supplied by the compressed air remaining in the compressor cylinder clearance space. This action is assisted in most free-piston engines by a separate 'cushion' cylinder with a closed end.

In order to improve the balance, there is usually a piston at each end of the engine cylinder, one being coupled directly to the compressor piston and the other to the 'cushion' piston; these two moving systems are coupled by a light linkage so that their displacements are equal and opposite. The underside of the compressor piston is used to pump scavenging air for the engine cylinder. This arrangement has all the very attractive features of the opposed-piston, two-stroke, supercharged, compression-ignition engine without the complication and expense of the connecting rods and rotating parts associated with conventional designs.

The amount of fuel injected is varied automatically by a governor so as to keep the output air pressure constant; the effect of varying the air demand being to change the stroke of the plant (the stroke is not fixed as in a normal plant). The frequency of the cycles remains nearly constant, and is 1,000 cycles per minute in one case quoted in the paper.

Starting is accomplished by bringing the engine pistons together suddenly. In small engines this is done by a spring, previously compressed manually through a handle and gearing; in larger engines a charge of compressed air is admitted to the 'cushion' cylinder. Another interesting detail is the method of driving rotating accessories such as the cooling fan and the water pump; the main reciprocating parts drive a plunger-type oil pump; this oil then drives a gear-type oil motor which provides the small power required.

A possibility which is being actively investigated is the use of a free-piston compressor-engine, instead of the usual rotary air compressor, in conjunction with a gas turbine for power purposes. The whole of the air pumped by the compressor cylinder is fed to the engine cylinder for scavenging and supercharging, and the hot exhaust gas, at comparatively

high pressure, passes through a gas turbine. It is claimed that the very high overall efficiency of 41 per cent is obtainable.

Free-piston compressor-engines were largely developed by Pescara, who started work on them in France in 1922. In Great Britain their development was encouraged by the Services; the first engines were ordered for the Navy and later ones for the Army.

TREPLOCYTES AND TREPLOCYTOSIS

DR. LIEBMAN'S monograph, "On Treplocytes and Treplocytosis; a Study on the Role of Leucocytes in Nutrition and Growth" (*Growth*, 10, 291; 1946), concerns a neglected field of invertebrate hæmatology, and combines a comprehensive review of the literature with a record of his own extensive studies. Attention is focused on leucocytic elements that contain inclusion bodies (granules, spherules and pigment), but which, according to the evidence, have no phagocytic function. The author advances a well-substantiated view that the inclusion bodies are elaborated inside these cells, which he calls 'treplocytes', and that they are discharged and utilized as nutrient material in regions of increased metabolic activity. Hence the concept of treplocytosis, which is thought to be the main function of these cells, as opposed to phagocytosis, which, in the author's opinion, may well be the main task of hyaline 'lymphoidocytes'. On the comparative side, a parallel is drawn between the treplocytes of invertebrates and the mast cells of vertebrates.

The attitude of the author is characterized by a justified reluctance to apply, without reservation, the teleological line of thought imposed by mammalian 'defence' physiology and, consequently, a caution in attributing phagocytic properties to elements which do not seem to possess any.

Of particular interest are the author's current studies in Tunicates, and especially his observations made in Sipunculids and Polychætes, where some blood cells reveal intermediate characteristics between leucocytes with inclusions and erythrocytes. A more detailed account of this work may well prove of great value for comparative hæmatology.

FORTHCOMING EVENTS

Monday, March 31

PALÆONTOGRAPHICAL SOCIETY (in the Geological Survey Museum, Exhibition Road, London, S.W.7), at 11 a.m.—Centenary Meeting; Prof. H. L. Hawkins, F.R.S.: Commemorative address: at 2.30 p.m.—Mr. C. P. Chatwin: "The Story of Fossils".

INSTITUTION OF ELECTRICAL ENGINEERS (at Savoy Place, Victoria Embankment, London, W.C.2), at 5.30 p.m.—Discussion on "Developments in Fractional Horse-Power Motors" (to be opened by Mr. A. N. D. Kerr).

Tuesday, April 1

SHEFFIELD METALLURGICAL ASSOCIATION (at 198 West Street, Sheffield), at 7 p.m.—A representative of the Mond Nickel Co., Ltd.: "Isothermal Transformations".

TELEVISION SOCIETY (at the Institution of Electrical Engineers, Savoy Place, Victoria Embankment, London, W.C.2).—Annual General Meeting.

Wednesday, April 2

INSTITUTE OF FUEL, NORTH-WESTERN SECTION (at the Engineers' Club, Albert Square, Manchester), at 2 p.m.—Annual General Meeting.