THE CARNEGIE INSTITUTION*

THE Year-Book No. 59 of the Carnegie Institution of Washington is again a highly informative scientific publication of current interest. It records the progress of work and the new achievements of the seven departments of the Institution for the year July 1, 1959 to June 30, 1960. Researches of a basic nature which will extend the frontiers of knowledge have always been the primary concern of the Institution. In this objective the different Departments work in co-ordination, and the subjects of study range from the tiniest particles of life on this planet to the outermost galaxies detectable in space. Life sciences play a major role in the Institution's activities. In these studies as many as five departments take part and results of significance obtained during the year have been included in the Year-Book.

Astronomical discoveries are always exciting and are taken for granted without much questioning. The Mount Wilson and Palamor Observatories have reported some spectacular observations during the year. Dr. Rudolph Minkowski (whose retirement after a long stretch of meritorious association with the Institution has been announced) photographed through the 200-inch Hale telescope the most distant astronomical object thus far discovered. It is a cluster of galaxies apparently receding from the earth at the rate of 138,000 km./sec., almost half the speed of light. It may be noted that this cluster was first located by radio astronomy methods, first at the Cavendish laboratory, England, and later at the California Institute of Technology. Accurate location by radio-receivers made possible the remarkable spectral photographs obtained by Minkowski.

During the year not only the farthest astronomical object has been photographed but the oldest cluster has been found. This is NGC 188, whose age according to Sandage of Mount Wilson is 25 billion years. The farthest and the oldest are not the only ones to go into record. A star with the strongest magnetic field so far has been found by H. W. Babcock. It is the A-type star HD 215441 whose spectrogram with the 200-inch reflector revealed Zeeman splitting corresponding to a magnetic field of 34,400 gauss (*cf.* sunspot magnetic fields of 4,000 gauss). There is no doubt that these extremes supply crucial tests for cosmological theories.

One of the major programmes in which the Geophysical laboratory, jointly with the Department of Terrestrial Magnetism, has been actively engaged in recent years is the charting of the phase equilibria of important mineral systems. The primary methods for these investigations lie in the use of high-pressure, high-temperature equipment for synthesizing and metamorphosing minerals in the laboratory. During the year Boyd and England succeeded in synthesizing diamond from graphite. The synthesized product resembled natural carbonado diamonds used for industrial purposes, and were obtained at 75,000 atmosphere and 1,500° C., in grain sizes of as much as 0·1 mm. Progress on the work with olivines has yielded some significant results. A dense spinel form of the iron olivine fayalite was obtained under pressures of 60-80 kilobars, and it was found that the transition from fayalite to spinel occurred in about the same pressure—temperature range as the inversion from graphite to diamond. These results are significant in the sense that the fayalite-spinel transition may explain the marked seismic discontinuity known to exist at a depth of about 400 km. in the earth's mantle.

In the Department of Terrestrial magnetism the investigations of the "equatorial electrojet" in the upper atmosphere above Peru which formed part of the IGY programme was completed during the year. The 60-ft. parabolic reflector whose completion has been announced is expected to be used for major contributions in the observing programme of the Department. In the Department's activities devoted to biophysics the results obtained on the dynamics of the syntheses of proteins and nucleic acids by intact living cells are fresh and striking.

The Department of Plant Biology has been chiefly concerned for several years with the study of different forms of chlorophyll that occur in living plants. The primary question around which much of the year's work has centred is whether or not the different forms of chlorophyll *a* all participate in photosynthesis, and, if so, in what manner. It was found that at least two of the forms of chlorophyll *a* function differently. The two pigment mechanism is an essential part of photosynthesis. Experiments during the year lead to the conclusion that the photophosphorylation reaction and the formation of reducing power, two well-known parts of the

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* *Carnegie Institution of Washington Year-Book No.* 59 (The Director of Publications, Carnegie Institution of Washington, 1530, P. Street, North-West, Washington, 5, D.C.), 1960. Pp. lvii+515, Price : Paper bound $ 1·00 ; Cloth bound ; $ 1·50.

photosynthetic process, are driven by separate pigments.

Dr. M. Demerec, Director of the Department of Genetics, retired from the Institution on June 30, 1960. He joined the Institution in 1923, and throughout his lifelong association with it his researches have been directed towards elucidating the structure, the function, and the mutability of genes. Further studies in this field during the year carried out with *Salmonella typhimurium* and hybrids obtained by crossing *S. typhimurium* with *Escherichia coli* have been reported.

A notable achievement in the Department of Embryology during the year is the successful visualisation of circulation in the maternal placenta by the techniques of radioangiography. The experiments were conducted on pregnant Rhesus monkeys. The technique lies in injecting into the femoral artery 15 ml. of radiopaque dye under 90 pounds pressure (the high injection pressure is an essential part of the technique), and following the course of the dye through the various arteries, and finally through the intervillous space of the placenta. The visual displaying of the circulation uses a combination of image intensifier and television system.

It is needless to mention that the Year-Books of the Carnegie Institution, Washington, containing the latest progress in the different fields of fundamental investigations undertaken by the Institution, are valuable additions to current scientific literature.

PLANNED FOREST DEVELOPMENT FOR INDIA

DR. J. A. VON MONROY, the FAO expert on forest industries, held recently an assignment in India to help design an overall plan for the integrated development of India's forests and forest industries. According to him forest resources in India, as they stand now, are not enough to meet the requirements of the country's present population of 420 million, let alone the estimated population of 600 million for 1975. India is famous for the production of valuable *slow-growing timbers*. However, present conditions demand a vast increase in the supply of wood, which can only be met by planting *fast-growing species*. Dr. von Monroy's proposal is to select about 1% of India's forest area, in the most productive parts of the country, and to plant 150,000 acres per year over the next ten years with trees which mature within 15 years. This development, coupled with intensive management arrived at raising the forest yield per acre, should double the present production of industrial wood. Dr. von Monroy's other recommendations include the development of the Himalayan coniferous forests, expanded use of low grade timber, and the use of building boards instead of solid timber.

The second phase of the programme is about the forest industries. It is estimated that for paper alone the demand will jump from the present 450,000 tons to 2·1 million tons by 1975. This can only be met by a dramatic increase in the number of pulp and paper mills, as well as fibreboard and wood particle board plants, coupled with increased use of hardwoods and adoption of modern processing techniques, such as the high-yield system. A pre-investment survey must be carried out now to determine exactly where these industries shall be located.

It is also expected that fuelwood requirements, mostly for cooking, will jump to the astounding peak of 100 million tons by 1975. A large fuelwood plantation programme has been planned, but this must be supplemented by making better use of supplies, such as popularizing more efficient simple kitchen stoves through community development projects. A very important item in India is the supply of minor forest products, such as tanning material, resin, medicinal plants and oils. Much of this demand can be met by creating small-scale cottage industries, which will, of course, greatly help rural development.—(*FAO News.*)

A CORRECTION

OUR attention has been drawn to the following statement which appeared in *Current Science*, 1956, Vol. 25, p. 283. "Dr. Ramdas began his career as a Palit Research Scholar from 1923-26 under Sir C. V. Raman and discovered the phenomenon of the 'Scattering of Light by Pure Liquid and Sound Surface'." On a reference to the original publications of the time, we find that the statement should have read: Dr. Ramdas began his career as a Palit Research Scholar from 1923-26 under Sir C. V. Raman and collaborated with Professor Raman in his fundamental researches on the scattering of light by liquid and solid surfaces. We regret the publication of the earlier erroneous report.