

example of survival of oak-woodland, which at one time was frequently found on cliff and rock faces in Wales up to quite high altitudes. Owing to extreme steepness, many of the ledges and gulleys of the cliffs have escaped the intensive sheep grazing and human interference which has had such a great effect on almost every kind of vegetation in Britain. The reserve lies  $1\frac{1}{2}$  miles north-east of Portmadoc and covers 41 acres. It is the third reserve within the Snowdonia National Park, and has been established under a lease from Capt. S. T. A. Livingstone-Learmonth. The cliffs are composed of dolerite, which is a basic intrusive igneous rock, though basic ashes and shales also occur. The vegetation is very complex, due to the variability of the habitat and its instability. Sessile oak is characteristic with some admixture of pedunculate oak and ash. Sycamore has obtained a footing on the lower scree slopes. On the larger ledges and margins of scree such plants as marjoram and privet—both usually plants of chalk and limestone—are found; while on smaller ledges and rock faces ivy, bell heather, ling, honeysuckle, wood sage, sweet vernal grass, and composites, such as cat's ear, are prevalent, together with stunted, windswept oak. The shales have a flora which is more characteristic of acid soils and includes wavy hairgrass. Among the mosses, the rare *Hedwigia integrifolia* occurs. The crags are also the haunt of many small mammals and of birds, including the raven and peregrine falcon.

Craig Cerrig Gleisiad and Craig Cwm Du are two Old Red Sandstone crags about a mile apart and surrounded by moorland. They lie at the western end of the high glaciated ridge of the Brecon Beacons, within the Brecon Beacons National Park, between the 1,600 and 2,000 ft. contours, and about six miles south-west of Brecon. The part of the reserve now being declared is the western or Cwm Du portion, comprising 576 acres. It runs westward from the north end of Craig Cerrig Gleisiad and includes the whole of Craig Cwm Du cliffs (highest point about 1,750 ft.), the Nant Cwm Du valley and stream at their foot on the north side, and the moorland extending north and east up to and including the rock outcrops of Fan Frynych. The reserve has been established under a Nature Reserve agreement with the owner, Mr. S. E. Lewis. Negotiations are in progress to include the eastern cliffs of Craig Cerrig Gleisiad. The botanical interest is centred on rare arctic-alpine plants, notably purple saxifrage (*Saxifrage oppositifolia*), globe flower (*Trollius europaeus*), green spleenwort (*Asplenium viride*), and lesser meadow rue (*Thalictrum minus*). The two cliffs form the southernmost limit for this element in the British flora. The adjacent moorland is of a more general ecological interest, with varied upland vegetation types including much bilberry and matgrass.

In September 1956 the Nature Conservancy established the Coed Rheidol Nature Reserve covering an area of 18 acres. Two further small areas have now been added to this reserve; they lie on the western bank of the River Rheidol and link up with the small section of Dolgamfa Wood, which was included in the previous declaration, so that three-quarters of a mile of the western bank and half-a-mile of the eastern bank are now within the reserve, covering an area of 54 acres. The additional areas occupy steep rocky slopes ending in the vertical cliff of the river gorge. The rocks here consist largely of steeply inclined slabs of slate and shale, which

are unstable and consequently the nature of the ground here is extremely hazardous. The woodlands have an interesting flora particularly rich in moisture-loving and shade-loving plants including many species of mosses.

Applications for permits, which will be necessary for those who wish to collect specimens of animals or plants in the Coed Tremadoc, Craig Cerrig Gleisiad or Coed Rheidol reserves, should be made to the Conservation Officer, Nature Conservancy, Y Fron, The Crescent, Upper Bangor, Bangor, Caernarvonshire.

## CARNEGIE INSTITUTION OF WASHINGTON

### REPORT FOR 1955-56

THE Year Book 1955-56 of the Carnegie Institution of Washington includes, besides the report of the President, reports of Departments and Special Studies and of the Executive Committee and Auditors. That of the Mount Wilson and Palomar Observatories refers to the completion during the year of the National Geographic Society-Palomar Observatory Sky Survey. A survey has been made of the present state of knowledge of the abundances of the elements in stellar atmospheres, and the programme of observations of stellar magnetic fields and on the internal motions in the Orion nebula continued, while the investigation of cepheid variables and other distance variables in the Andromeda galaxy was virtually completed. An outstanding event was the explanation of the light-emission in the Crab nebula as due to electrons circulating in a magnetic field, and a theoretical study has been made of the sources of radio emission in *N.G.C.* 5128 and *N.G.C.* 1316. An improved photoelectric guide has been developed for use at the coudé focus of the 200-in. telescope and two completely new photometers designed by Baum are being made for the 60-in. and 100-in. telescopes at Mount Wilson. The Joint Committee on Large Tubes for Telescopes is attempting to extend both the effective distance in space accessible to such instruments and spectrum measurements down to much fainter objects.

The Department of Terrestrial Magnetism found definite periodicities in the occurrence of radio-noise bursts from Jupiter, which were correlated with the rotational period of the non-equatorial regions of the planet. Exploration of the continental crust was extended into Alaska and the Yukon territory, and in rock-magnetism studies—in a co-operative project with the Bernard Price Institute for Geophysical Research at Johannesburg—progress was made in ascertaining the conditions under which a primary magnetization can survive under the influence of time and natural processes. A method has been developed for using the discordant ages calculated for uranium minerals to deduce the probable history of a group of such minerals subjected to the same sequence of events. In nuclear physics the study of low-lying nuclear energy-levels by the method of Coulomb excitation continued, and further evidence has accumulated in support of the Bohr-Mottelson unified model of the nucleus. In biophysics knowledge of the characteristics of the relatively loosely held 'pools' into which small molecules are concentrated before being linked into macromolecules has

been greatly increased, some of the immediate precursors of nucleic acid have been determined, and an upper limit of three seconds established as the time required for protein synthesis, most of the work being carried out with *Escherichia coli* but some with *Torulopsis utilis*. Radioactive tracer studies were carried out with *Hydra littoralis* and carbon-14 glucose. Amino-acid tracers have been followed from a subcutaneous injection through the blood into cellular pools of free amino-acids and into the protein of new-born mice. During the year application of the membrane-filter technique to the problem of nucleic acid synthesis in *E. coli* demonstrated the formation and utilization of metabolic pools of precursors, and indicated the part played by phosphorylated intermediates. A comparatively full account of this work is given in the Departmental report, while that of the Geophysical Laboratory, which had a particularly stimulating and productive year, includes detailed accounts of the work on phase equilibria at high pressure, in which an apparatus has been constructed capable of achieving pressures of 60,000 atmospheres at about 700° C., with which studies have been made of minerals, such as might exist deep in the Earth, of the stability of hydrous iron silicates on primitive magmas, and of the age of rocks and minerals in a co-operative programme with the Department of Terrestrial Magnetism which has shown that concordant ages for potassium-40/argon-40 and rubidium-87/strontium-87 are obtained when measured on ancient minerals. Other work, which has shown that amino-acids such as glycine, sarcosine, alanine and  $\beta$ -alanine can be formed from a variety of primitive atmospheres, work on sulphide systems, which has shown that pyrite ( $\text{FeS}_2$ ) is stable below 815° C. at 5,000 bars, and work on feldspars and feldspathoids, on statistical petrology, and on the routine absolute measurement of beta radioactivity at low level from thick samples, in which a general relation was discovered between the beta-absorption coefficient and the maximum energy of the radioactivity, is also described in detail.

The Department of Plant Biology has obtained evidence suggesting an active participation of carotene in the photochemical action of chloroplasts and, by a simple method developed for recording the absorption spectra of small amounts of pigments in living leaves, an unsuspected intermediate form of chlorophyll was discovered. Further progress was made in the work on the purification and characterization of the protochlorophyll-protein complex from leaves grown in the dark, and it has been found that the frozen and dried, partly purified, proteinaceous particles can transform the protochlorophyll to chlorophyll when illuminated in the dry state just as readily as when dissolved in water. The changes of absorption in *Chlorella* induced by light have been correlated with the ability of this alga to emit light, and three different types of active spectra have been found in studies of the effectiveness of light of different wavelengths in orientating the swimming of dinoflagellates. Data for a description of the behaviour of new types of hybrid grasses are expected to be complete in the next three years, and a comparative study of fifteen apomictic lines derived from a single first-generation hybrid between *Poa ampla* from Kahlotus, Washington, and *P. pratensis* from Athabasca, Canada, indicate that a very wide range of selection is possible among the progeny of a single new, sexually reproducing hybrid. Stable apomictic derivatives from the combination *P. ampla* from the Palouse Prairie

region and *P. arida* from Nebraska have been produced for the first time.

In the Department of Genetics new experimental evidence was obtained that large, functionally intact pieces of viral nucleic acid may pass from parent to offspring phage, while genetic analyses, by the transduction method, of short regions of the chromosome complex of the bacterium *Salmonella typhimurium* have shown that mutations occurring at different sites of a single locus, although they affect one function primarily, may produce mutants differing considerably from one another in various properties. Several different controlling elements in the maize chromosome complement have been identified, and electron micrographs of salivary glands of *Drosophila* and of dividing cells of *Tradescantia* have been interpreted as indicating that the patterns of organization of their chromosomes represent a hierarchy of pairs of helically disposed chromonemata. Studies of the effect of ribonuclease, ethylenediaminetetraacetate and calcium chloride on *Drosophila* and onion roots indicate that any agent which disrupts the normal metabolism of the cell can lead to instability reflected in modification of chromosome form and behaviour. The stage of development of the salivary-gland cell in *Drosophila* at which 'blebbing' of the nuclear membrane into the cytoplasm occurs has been correlated with the assumption of a new function by the cell. A mathematical analysis of the dynamics of bacterial populations was completed.

In the Department of Embryology exploration of the chemodifferentiation of the heart-forming areas of the early chick embryo demonstrated that antimycin A acts as a specific inhibitor of heart formation, while studies on the mechanism of the spacing of blastocysts along the rabbit uterus showed that the spacing was due to the delicate interaction of two mechanisms dependent on progesterone. Studies of the nature of the fluid of the rabbit oviduct were concluded, progress is reported in the analysis of the vascular changes in the menstrual cycle in the rhesus monkey, and further investigations of the vascular patterns of the placenta indicate that maternal blood enters the intervillous space from small blood vessels, the spiral arterioles, under a head of maternal pressure. The first phase of a study of the effects of reserpine on the reproductive cycle of the rhesus monkey was completed.

## CHEMICAL RESEARCH LABORATORY REPORT FOR 1956

THE wide variety of research now in hand at the Chemical Research Laboratory is described in a report\* entitled "Chemistry Research 1956", published by H.M. Stationery Office for the Department of Scientific and Industrial Research. The investigation of corrosion problems has been continued. It includes research into the possibility of improving the efficiency of corrosion inhibitors for use in anti-freeze mixtures for engine-cooling systems, the study of the rapid pitting of boiler tubes in marine boilers, which it was found could be prevented by the addition

\* Chemistry Research 1956: The Report of the Chemistry Research Board with the Report of the Director of the Chemical Research Laboratory. Pp. vi+86. (London: H.M. Stationery Office, 1957.) 4s. net.