

and Shoe Research Association on the modification of New Zealand fish liver oils for the production of chamois leather has yielded a process for utilizing vegetable oils in oil-tanning which, besides producing stronger leather, enables white washable gloving leather to be obtained without bleaching. Bark from *Pinus radiata* has been proved to be a possible source of tannin, and the detrimental effect of high temperatures upon pickled pelts in storage and transport has been demonstrated. The investigations by the Pottery and Ceramics Research Association indicate that for ceramic manufacture deposits of ball clays from Canterbury, Otago and Southland are equal in quality to any such deposits found elsewhere in the world.

## OCEANOGRAPHY IN THE UNITED STATES

IN 1927 the United States National Academy of Sciences appointed a Committee to consider the share of the United States in a world-wide programme of oceanographical research. Much of the Committee's report was published in book form under the title "Oceanography: Its Scope, Problems and Economic Importance", by Henry B. Bigelow (1931). One of the major outcomes of the decisions of that Committee was the building and endowment of the Oceanographic Institution at Woods Hole, and there was a general all-round increase in marine research.

In 1949 a second Committee on Oceanography was established by the National Academy. The reason for the setting up of this second body was not lack of interest in oceanography. Owing to the recognition of the practical applications of oceanography during the Second World War, marine research had, in fact, flourished; but it was chiefly government sponsored. As a result of inflation and the heavy cost of maintenance of modern research ships and equipment, private endowments were entirely inadequate, and research could only continue at its present scale with heavy government support. The Committee considered that "the healthy growth of oceanography has been hampered by the uncertainty as to how long this support may be available, and by other restrictions". It was to report on this situation that the Committee was appointed. Its report, entitled "Oceanography 1951", is now published\*.

As in the previous report, the relations of the science to biology, geology and meteorology, and certain recent notable advances, are surveyed. The advance in physical oceanography has been very striking. That this is so is largely due to the War, which has resulted in the provision of "a nucleus of 80 to 100 physical oceanographers in this country, compared with perhaps half a dozen prior to 1930. . . . More than half of the funds being expended for oceanographic investigations at the present time come from the Department of Defence".

The sea is a source of food, and it is necessary to ensure that research is also directed towards increasing the yield from the sea fisheries, as well as gaining knowledge useful in war. The annual yield of the

world's fisheries is quoted as twenty million tons, giving only one-fiftieth of the total protein consumption, yet half the world's population has a diet seriously deficient in protein. The Committee considers that "Heretofore most fishery research programmes were attempted on too small a scale. This was due to lack of appreciation of the complexity and magnitude of fishery problems, so that insufficient funds were assigned to many projects". Recently, however, there have been large-scale attacks on certain problems, such as the causes of the disappearance of the Californian sardine; the potentialities of the pelagic fisheries of the central North Pacific; and the movements of the Gulf Stream.

But the Committee considers that oceanography is not developing in a well-balanced manner and that there is almost no financial support for general marine biology. It thinks that inadequate attention is being paid to many challenging problems which do not have military significance and do not bear on specific fisheries; and it feels that, in order to ensure more freedom of research into such basic problems, greater private financial support is needed. At the same time, government support on a liberal and far-sighted basis should be continued, to provide the large-scale co-ordinated effort which the size and complexity of oceanic phenomena demand. Through the United Nations and President Truman's Point Four Programme, the United States should also encourage the development of oceanography in other countries, and especially in the southern hemisphere and western Pacific. The Committee recommends the securing of private funds for the provision of research fellowships at existing oceanographic institutions; for facilities for visiting investigators; for the provision of more permanent posts; and to supply increased funds for operating ships and for basic research in biology and chemistry.

The present total income of institutions in the United States carrying out oceanographical research is about 2,300,000 dollars, four-fifths of which is supplied by the government. It is recommended that the additional funds from private sources should be between 500,000 and 750,000 dollars. This would bring the total annual expenditure on oceanographical research into the region of one million pounds sterling by those laboratories other than the Federal and State organizations.

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## PRESERVATION OF THE LAKE DISTRICT

THE Report and News Letter for August of the Friends of the Lake District\* records a discouraging year, and refers particularly to the absence of a Joint Planning Board except in name for the Lake District National Park and to the hobbling of that authority by the failure to appoint a planning officer for the Park. The practical consequences of this position are concisely and clearly indicated, as well as the requirements for the effective functioning of any joint board. Local matters on which the Report and News Letter comment are the assurance received from the superintendent of the Eskmeals military range that the proposed night firing is, in

\* National Academy of Sciences—National Research Council. Publication 208: Oceanography 1951; a Report on the Present Status of the Science of the Sea by the Committee on Oceanography of the National Academy of Sciences. Pp. vii+36. (Washington, D.C.: National Academy of Sciences—National Research Council, 1952.)

\* Friends of the Lake District. Report and News Letter, August. Pp. 20. (14 Princes Street, Ulverston, 1952.)

fact, abnormal, and the decision given by the Minister of Fuel and Power in favour of the Electricity Board's proposal to serve farms in Martindale by overhead lines.

In Langdale no change is reported in the Electricity Board's policy of withdrawing the scheme on grounds of economy; but reference is again made to the improvement of the Hardknott from a mountain trackway with a loose rough surface into a motoring road in spite of the clear and unequivocal assurance to the contrary given in November 1946 by the chairman of the Highways Committee of the Cumberland County Council. Attention is also again directed to the general difficulty that arises because the virtual control of road-widths and traffic policy is in the hands not of the new Planning Board or even the local highway authorities, but of the Licensing Authority, a body which is detached from any interest in the preservation of the countryside. The intricate work of completing the footpath survey and official statutory map is likely to continue for another two years at least, but the review of open country in the area has been completed in the counties of Cumberland and Westmorland and in the National Park as a whole.

The Friends of the Lake District have been concerned in a preliminary review of the needs and possibilities of new footpaths on the shore of Lake Windermere, and representations have been made regarding the minimum flow in the Dash Beck water scheme for the rural district of Wigton as well as the construction of any necessary buildings. Together with the Council for the Preservation of Rural England, the Friends of the Lake District have made representations regarding the Forestry Commission's proposal to plant Low Holme Park exclusively with conifers and its effect on the footpath between Eskdale and Nether Wasdale.

## NEUROSECRETORY PATHWAYS IN THE HEAD OF CRUSTACEANS, INSECTS AND VERTEBRATES

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STUTINSKY<sup>1,2</sup> and B. Scharrer<sup>3,4</sup> have recently proved that the chrome-haematoxylin-phloxin of Gomori selectively stains the neurosecretory pathways in several of the Pterygota in identically the same way as it stains the neurosecretory tractus supraoptico-hypophyseus in vertebrates (Bargmann<sup>5</sup>, Hanström<sup>6</sup>). Thus, to the formerly known detailed similarities between the corpus cardiacum—allatum system in insects and the hypophysis in vertebrates—similarities which were originally pointed out by me in 1941<sup>7</sup>—the fact has been added that the neurosecretory tracts, which in insects connect the pars intercerebralis of the brain with the corpus cardiacum and in vertebrates the nucleus supraopticus (and the nucleus paraventricularis) of the diencephalon with the neurohypophysis, both react positively and selectively with the Gomori stain. I think it worth while also to consider whether the neurosecretory substance in insects—as seems to be the case in vertebrates (Bargmann and E. Scharrer<sup>8</sup>)—is con-

nected with the production of a hormone regulating water-balance.

In 1940<sup>9</sup> I described in some of the Apterygota two groups of cells on the surface of the protocerebrum which lie within a separate connective tissue sheath, only connected with the brain through a small aperture in their capsule. On account of their position, these groups of cells ought to be the homologues of the lateral frontal organs in crustaceans and the X-organs of these arthropods, which in 1934 were described by me as neurosecretory structures and which are transformed frontal organs. In the Apterygota these groups of cells give rise to a pair of nerves which take a characteristic course through the brain and can be traced outside it into the corpora cardiaca. In addition, I found that the cells in *Petrobius maritimus* contained secretory droplets which could be traced for a considerable distance along the axons. In higher insects these groups of cells ("the medial neurosecretory cells"), which give rise to the same nerve, are situated within the ordinary brain capsule, but otherwise show the same relations. Thus the lateral frontal organs, which in several lower crustaceans are located in the hypodermis and completely independent of the brain (though connected to it by a nerve), in other crustaceans are transformed into the X-organs, which adhere to the brain, and in the Apterygota into the groups of neurosecretory cells on the surface of the protocerebrum. In the Pterygota, finally, they have been thoroughly retraced into the brain as the medial neurosecretory cells of the pars intercerebralis, which cells, according to E. Thomsen<sup>10</sup> (cf. M. Thomsen<sup>11</sup>), must be regarded as the over-all controlling centre of the endocrine system in insects.

For comparative neurological reasons, I first assumed that a synapse may be present in the nervous pathway between the groups of neurosecretory cells and the corpora cardiaca in the Apterygota, though I did not try to verify this assumption by using special nerve-staining methods. Owing to the considerable physiological importance of the medial neurosecretory cells, which has been proved by a number of recent investigators for the Pterygota, I have now applied the chrome-haematoxylin-phloxin method of Gomori to several series of sections through the head of *Lepisma saccharina* and one series of *Petrobius maritimus* with the following result, which mainly deals with the former species.

Within the whole brain, nothing but the medial neurosecretory cell groups, their axons, and their endings within the corpora cardiaca have stained deep blue or blue-black with the haematoxylin. The plasm of the cells themselves contains conspicuous small droplets or irregularly formed larger colloidal masses of the secretory product, and small droplets are also found along the greater part of the axons. The axons are very delicate, and since the number of neurosecretory cells is very small, the axons cannot be clearly observed without an oil-immersion lens. With the aid of an oil-immersion objective, however, the thin bundle of axons could be seen standing out very sharply, stained blue-black against the phloxin-red of ordinary nervous tissue from the entry of the nerves at the surface of the brain all the way into the corpora cardiaca. Thus, there were no signs of any synapse in the neurosecretory pathway, either in *Lepisma* or in *Petrobius*; further, no such structure has been mentioned in the Pterygota by Stutinsky<sup>2</sup> or by B. Scharrer<sup>3</sup>. At the entrance of the secretory fibres into the corpora cardiaca of *Lepisma*, they