

belief that this part of the brain is in some sense the 'organ' of voluntary movement. This inference cannot, however, be sustained. Nor can the cortical sensory projection areas be accepted as the 'seat' of sensory experience. We appreciate to-day that neither elementary sensations nor elementary movements are appropriate units for the analysis of behaviour and that we should concern ourselves rather with higher-order products of cerebral organization.

The attempt to investigate integrated behaviour patterns by physiological techniques is then considered. It is pointed out that as a number of primitive behaviour patterns concerned with the control of appetite, sleep and the simpler aspects of emotional expression appear to be organized at the diencephalic level, it would seem appropriate to speak of these behaviour patterns as having a measure of localization. Mention is made of the value of techniques of stimulation through implanted electrodes in the unrestrained, conscious animal in extending our knowledge of the functions of these deeper regions of the brain.

The effects of ablation of the brain cortex on the learning and retention of habits in mammals is then discussed. Following the work of Lashley, it is widely believed that habits have no very precise localization and are affected by the extent rather than the locus of a cerebral lesion. But it is important to bear in mind that Lashley himself did not reject the concept of localization. Further, more recent work, especially with primates, has given evidence of the differential localization of a considerable number of acquired behaviour patterns.

The problem of inter-hemispheric relations in learning and performance is briefly considered, with special reference to the work of Prof. R. S. Sperry. This leads on to some discussion of asymmetry of cerebral hemisphere function in man and the problem of cerebral dominance.

In conclusion, it is pointed out that cerebral localization is not so much a matter of delimiting 'centres', each with its own intrinsic 'function', as of specifying integrative foci in systems which may well comprise large areas of the brain and their inter-connexions. In spite of some recent assertions to the contrary, it is contended that examination of the defects resulting from injury to the brain, whether in animals or man, does in fact throw light on the cerebral bases of normal behaviour. It may even turn out that the ideas of Gall, for all their *naïveté*, will, in the long run, prove more relevant to our understanding of brain function than cybernetic models of the kind now in vogue.

THE TROPICAL BOTANIST

BOTANY is a vast subject, growing unwieldy. It stretches from the physical and chemical workings of plant-protoplasm through the grosser structure of cells and tissues to the vegetation which they make. It is concerned with the most important and one of the most abstruse problems of life, namely, photosynthesis. It involves the classification of one of the most complicated sets of entities, namely, the half-million or more living plants which make up the vegetation of sea and land. It comprises the problems of their distribution, their origin and evolutionary connexions, their economic and cultural value to man, and the interpretation of fossil remains. It began as a science about the middle of its range when Linnaeus introduced the system of biological names. It spread with the excitement of the microscope and the voyages of discovery. It spreads with the ultra-microscope, the techniques of modern physics and chemistry, the progress of genetics and ecology, and the accumulation of collections of the world flora, both past and present. It leans on the other sciences, borrows from them, contributes to them and, yet, lacks its own mastery. Its

extremes are now so far apart that they cannot be satisfactorily housed, financed, or understood in the same department. The older aspects of classification, plant-structure, life-histories, distribution, ecology, and natural history are referred to, sometimes with contumely, as classical botany. Its younger aspect, which links the minute workings of the plant with physics and chemistry, is being woven into the new science of cell or molecular or microbiology. The study of vegetation takes classical botany into the country. The study of micro-structure builds the new laboratories in the city.

Mr. E. J. H. Corner, in his presidential address to Section K (Botany), is concerned with the future of classical botany. It has ramified, and prospers now in many small fields. It is full of specialists. It has lost most of its applications to the sciences of agriculture, horticulture, forestry, fisheries and medicine. It is impoverished and avoids its main issues. It lacks the integration of a spontaneous science. It seems ripe for overthrow by the rising molecular biology.

This would be disastrous. It would destroy that which should unify our understanding and appreciation of all plants. It would destroy it before it has found its proper footing. Classical botany has still to familiarize itself with the majority of living plants, and this majority, which it has neglected in the tropics, is now in danger of extermination. Classical botany is needed by the applied and lucrative sciences, and the alternative of leaving them to foster the fragments which they require would be as unsatisfactory a surrender.

In order to survive, classical botany must be re-organized. First, it must face and accept the challenge to its stereotyped thought given by A. H. Church in Oxford in 1919. For a generation this outstanding issue has been evaded, but "the beginnings of botany" are in the sea, whence it must be re-developed. Secondly, classical botany must concern itself with the plants, the processes and the results of plant-industries. There is more money in bananas than in buttercups, in mushrooms than in mosses, in seaweeds than in pond-scums, in timber than in taxonomy. Thirdly, it must re-cast its morphology, ecology and classification from the tropical point of view. The neglect of this exuberance has caused the stagnation of the study of the land-flora.

The progress of tropical botany cannot be relegated to the slow rise of pure biology in the tropics themselves at the hands of their own biologists. The tropical countries are being industrialized, their leading students are being made industry-minded, and their floras, which are the richest heritage of plant-life, are being wiped out. Tropical botany must be sponsored from the seats of classical botany in the temperate countries, particularly by the interchange of university personnel. Probably no other natural science needs to develop so much the counter-stream of students to the tropics.

The tragedy of universal deforestation, so often short-sighted and purely for exploitation, brings home to the botanical traveller the fact that his science has no control over its natural resources. Botanists have for too long been content with the crumbs dropped by others from the lavishness of Nature's table. The feast is coming to an end, and botanists must take their stand in the conservation of what remains. They must assert themselves in this administration of world-affairs. Their classical science has the ingredients of leadership for human benefit.

THE BENEFICENT FOREST

THE aim of Prof. H. M. Steven's presidential address to Section K* (Forestry) is to consider what benefits woodlands can bestow, both in general and with special reference to the Highlands of Scotland and similar upland areas in Britain.