

it has stressed the affective and 'orectic' aspects of mind more than the purely intellectual processes of knowing which were of chief interest to the philosopher. In this way, in describing the actual processes of thought, it has in turn corrected the over-intellectualistic approach in the older treatises on logic. The old problem of determination it short-circuits by accepting motive, choice, decision, etc., as subjects which can be studied by the methods generally applicable to the inorganic sphere.

Medicine is another parent discipline from which psychology has sprung. Here the conflict lies chiefly with the materialistic point of view, though in modern psychosomatic medicine mind and body are treated on an equal footing. A greater realization, however, of the fact that many of the ills of the mind are no more under direct voluntary control than are the disorders of the body would produce a great alleviation of shame and encourage earlier resort to psychotherapy when it might be most effective.

There is much room for a closer psychological approach to economics, where the processes of saving and spending urgently call for a study of motivation on lines which, applied to production, are proving of great value in industrial psychology. In education psychology is already well established, but the increasing penetration of the psychologist into the field of delinquency has revealed a very significant conflict with the legal and moral points of view; and the latter conflict also plays its part in the relation between psychology and ethics, where the old problem as to whether values are subjective or objective has been rendered more acute by psychological studies of the processes of moral development and moral evaluation. Somewhat similar problems have been raised by the psychological approach to aesthetics, though the conflict is perhaps still more acute as regards religion, where the psychological investigation of the religious attitude and its development has appeared to constitute a threat to theological beliefs, although, at the same time, psychology has itself corroborated the great significance of the affective factors that enter into religion. Perhaps the most urgent need for a greater adoption of the psychological point of view is in the field of politics, where existing 'social psychology' has as yet had little actual contact with grim political realities, although psychological studies of some of the mechanisms at work—for example, ambivalence, displacement of affect, projection, splitting—certainly merit more attention than they have received from those who control the destinies of people.

Finally, as regards man's use of energy, which is the main topic of this meeting of the British Association, the human direction of physical energy depends ultimately upon man's use of the energies in his own mind, and it is only psychology which can teach him the nature of these energies and the methods possible for their direction. Hence, a very grave responsibility rests on the psychologist.

MODERN TRENDS IN THE CLASSIFICATION OF PLANTS

DR. W. B. TURRILL'S presidential address to Section K (Botany) reviews briefly some reasons for the relative neglect of plant systematics in recent times, particularly in universities. Tax-

onomists have tended to be too rigid in principles and methods; the rise of other branches of botany has captured the imagination of students; the subject is not easy to teach adequately; and there has developed the vicious circle of few or no teachers and few students with a bent towards systematics. There are signs that the position is changing. Gross morphology still provides the main basis for classification of the approximately 250,000 species forming the seed-bearing flora of the world; but methods of collecting, of analysis, and of description have improved and recent monographs and floras illustrate these improvements. Still more important has been the introduction into taxonomy of data, methods, and principles from other branches of biology, which may lead from classifications based on superficial characters towards an ideal classification which shall bring together all possible knowledge of plant life. The impact of the new points of view is considered in some detail.

Anatomical structure, particularly at the family-level, is correlated to a high degree with gross morphology. The recently published work by Metcalfe and Chalk, "The Anatomy of the Dicotyledons", provides much new information. Similarly, the biochemistry of plants often provides taxonomic data from the occurrence of volatile oils, alkaloids, glycerides and other chemical products. Cytological data can throw much light on taxonomic problems, especially at about the species-level, by providing additional characters and by indicating with greater or less certainty the origin of this or that taxon. Some new problems have, however, to be faced by taxonomists as the result of cytological investigations. They have, for example to consider the treatment of polyploids within what has been considered a species unit. From ecology, taxonomists can expect help in delimiting stable units. Autoecological studies are of great importance, and experimental ecology by such studies as those of the transplant experiments at Poltern and Kew, in California, and elsewhere, have already yielded valuable new facts for classification. Genetical research must be more closely linked with taxonomic studies if both are to progress satisfactorily. Long-range experiments with *Silene*, *Centaurea*, *Ranunculus*, and species of other genera show how genetical methods combined with those of taxonomy and ecology can solve many problems of systematics. Morphogenesis and organogenesis applied to taxonomic problems emphasize the value of considering full life-histories and past developments. Plant geography has to be based on taxonomy; but the mapping of ranges and distributions reciprocally helps with taxonomic difficulties. There is a great need of further research into the past history of the flowering plants by studies of fossils. Modern statistical methods are being gradually introduced into taxonomy; but special methods must be developed for problems peculiar to classification, and the taxonomists hope that statisticians will turn their attention to some of these.

Phylogenetic facts should be considered in preparing classifications; but most often general phylogenetic hypotheses have been based on classification, not vice versa. Recent papers by Sporne and Corner raise many questions regarding primitive and advanced characters and the course of evolution in the flowering plants. Entirely new methods and principles may yet be applied to plant classification. Hayata's so-called 'dynamic system', and the use of

figure and letter symbols in place of orthodox nomenclature, at least within the species, are suggestive.

Training in taxonomy is now receiving more serious attention. The best approach is to teach the student to teach himself the practice of taxonomy, and to guide him to an understanding of the fundamental principles of classification. This double approach must be unified: principles become dogmas unless constantly applied to, and tested by, facts; merely to collect facts is to make bricks without building. Teaching in systematics must be mainly by practice, and the newer methods and outlooks considered in this address should be given prominence.

The potentialities of plant taxonomy are very great. Without classification no research is possible. Systematics is linked with all other branches of biology. Taxonomists desire to make their classifications more and more useful to all biologists. They work to serve and ask only for such recognition as they fairly deserve.

QUALITY IN AGRICULTURE

THE main theme of Prof. H. D. Kay's presidential address to Section M (Agriculture) is that the maintenance of a tolerable standard of living in Great Britain in the future will depend to an increasingly large extent on the quantity and quality of food that can be obtained from the limited home acreage. Though there is an appreciable area of poorer marginal land which, using modern methods of reclamation, could be brought into cultivation (though at considerable expense), it is clear that much more food per acre must be produced from the better land now being farmed. The average quality of British farming is far from poor; but there is still a considerable margin for improvement on most farms.

The official approach to this major problem—the important Agriculture Act of 1947 and the agricultural expansion programme of the same year—called for improved quantity and quality of products, and laid emphasis on better farm management and adequate application on the farm of the results of scientific and technological research. The agricultural expansion programme is an endeavour to meet the economic rather than the military vulnerability of Great Britain. It is a challenge, not so much to agricultural science as such, but to the science of getting existing knowledge applied as rapidly as possible to increasing the productivity of the large majority of the relatively small units of an inherently conservative industry.

The assessment of British farming quality and efficiency in terms of monetary values and profits has of recent years, in view of subsidies, other artificial fluctuations in financial returns and arbitrary changes in rates of exchange, lost much of its significance. Efficiency must now be measured in other terms. Production per acre of foodstuff of adequate quality, when compared against local or national standards of good husbandry, gives the basis for a better estimate, and one more in line with national needs, of the quality of the work of any given farmer, or group of farmers, and provides a standard for emulative effort.

Milk production is by far the most important of agricultural enterprises in Britain. At present, by whatever yardstick it is measured, production

efficiency varies very greatly from farm to farm. It is now possible to propose reasonably quantitative standards for assessment of quality in dairy farming. The average dairy farm in England and Wales, with a cow population of twelve to fourteen, should, by using modern scientific knowledge and up-to-date management methods, be able to carry double that population with no loss, but rather an increase, in yield per cow. This would allow, on such a farm, for one other competent worker as well as the farmer to be maintained and adequately paid. In an average year, such a farm could be made almost self-supporting, given the necessary fertilizers from without. In the product, good keeping quality, freedom from pathogens and high nutritional quality denote also the 'quality' dairy farmer. It is of particular importance to maintain high nutritional value of milk: payment for milk on compositional quality would assist in this desirable objective.

With the substantially increased yields of milk per cow and per acre that science has now placed within the grasp of the competent dairy farmer, the 2,000 million gallons of milk per year for the United Kingdom, which the nutritionist calls for to meet national minimum requirements for liquid milk consumption, could be produced from a very appreciably smaller acreage than is the 1,750 million gallons produced at present. A steady move in this direction, with a concentration of dairy cows into specialist herds, should progressively liberate more good-quality land both for the home-grown cereal expansion programme and for providing more and better quality beef and other animal products. Methods for improving the quantity and quality of pigs and poultry, using home-produced feeding-stuffs only, are now known, and new methods are being investigated. The possibility of producing fodder yeast in Colonial territories abroad for supplementing pig and poultry rations at home requires further consideration and large-scale experiment, which would be likely to benefit both home and Colonial economy.

In improving farming quality, one of the most important needs is to give the large and increasing number of scientifically and practically trained young agriculturists, who have, under present inflated price conditions, little or no prospect of being able either to purchase or rent a suitable holding, a real opportunity to farm for themselves. Modern farming demands to-day a high level of scientific training and practical skill in its entrants, and must become in fact, if not in name, a chartered profession for which the same careful and thorough preparation is required as for other nationally important professions. In future, some certificate of competence from a national registration authority should be required before a man (or a woman) is allowed to farm on any but a quite small scale. This principle has already been officially adopted for smallholders.

The most serious question in British agriculture to-day is how to introduce more rapidly into practice on the majority of farms the new knowledge that agricultural science has made available. Research is needed on the limiting factors which prevent the established results of agricultural research being sufficiently widely and effectively applied. The greater the extent to which, during the very near future, these recent findings of science can be applied to the general improvement of farming quality, the less hard will it go with the nation when the highly artificial and somewhat inglorious receipt of aid from abroad comes to an end.