degree, but with multidimensional variations. A wide new field for investigation is thus disclosed, the working of which may yield valuable results for the whole theory of colour vision.

## Education and the Modern Study of Plants

THE subject of Prof. E. J. Salisbury's presidential address to Section K (Botany) is the modern study of plants in relation to education. There are several misconceptions with respect both to the contacts and to the contents of botanical science. Despite the vastly enlarged content of botanical knowledge since it was regarded as a harmless and elegant occupation for the female sex, the general conception of botany has remained much what it was then. The high value of botany as an educational subject and indeed its absolute necessity in any system of real cultural development is an aspect that botanists have failed to present and emphasize. This is partly the outcome of the growing obtrusion of the more technological aspects in this as in other subjects ; a trend which is making itself felt further and further back in the student's training, at the expense of general education and culture. Here, as elsewhere, too much attention is paid to the acquisition of mere information, too little to the principles which are involved.

Our educational methods are too often divided in their allegiance between the provision of a liberal culture that will make for the greatest happiness of the individual in terms of mental contentment and an abiding resource in later life, and the technical equipment of the student for the earning of his daily bread. This emphasis on erudition has been perhaps encouraged by the universities through the fact that a sufficiently broad basis of scientific knowledge is not insisted upon before specialization begins, and that in the appointment to academic posts too little attention is given to capacity as teachers.

The merits of botany from the cultural point of view are many. It provides perhaps the best medium for training in accurate observation, it is the foundation of a vast extent of human activity and the basis of a large and essential part of every human environment. Its very extent, however, as indicated by enumeration of its diverse branches of taxonomy, morphology, anatomy, cytology, mycology, palæobotany and plant geography, on the descriptive side, and the experimental aspects of ecology, physiology, bacteriology and genetics, indicate the breadth of the botanical field, whilst the applied aspects of agriculture, horticulture, pomology, sylviculture and plant pathology show the great contribution that botany can make to the well-being of the human race as well as to the enrichment of the mind. This diversity tends towards detachment of interests and specialization which should be accompanied by greater co-ordination. The accumulation of data in these varied directions of inquiry will only fulfil its purpose if the many threads are continually woven into a single fabric of knowledge.

Herein lies the particular cultural value of the synthetic approach which we term ecology. The study of the plant in relation to its environment not only brings together almost every aspect of plant study but also has a direct bearing upon many practical problems such as land utilization, the conservation of water supplies, or the selection and care of national parks.

## The Informative Content of Education

MR. H. G. WELLS, in his presidential address to Section L (Education), directs attention to an aspect of educational science that has received perhaps a disproportionately small amount of attention in educational literature, the question of information. He leaves the physical and mental training of our modern populations aside, he contributes nothing to the discussion of language teaching, mathematics, the cultivation of literary appreciation, music, drawing and æsthetic training generally, and he concentrates upon the question of what a modern human being should know in order to play the part of a citizen, happily and adequately. What sort of *fact system* should be and can be established in a normal human mind under the conditions existing in a contemporary civilized community ?

Few people realize the restrictions set to the accumulation of knowledge by the exigencies of the time-table and the school-leaving age. When due allowance has been made for the other elements in educational work it is questionable whether we can allot more than six hours a week to imparting real knowledge (real, that is, as distinguished from methods of expression, etc.), or, assuming ten 40-week years, rather less than two thousand four hundred hours altogether in the school period of life. A vast amount of miscellaneous knowledge is, of course, picked up by talking, reading, observation and so forth outside the formal school scheme and we learn facts in vast variety to our