

concentrate proteins is wasteful, especially as the high value of leaf proteins is now established and new methods of isolating and storing them are becoming available. The development of these conventional methods of increasing production may well satisfy human needs for many years.

However, other points of view are now becoming prominent. It is evident that the current methods of agriculture are open to criticism on three theoretical grounds: they absorb only a very small part of the incident sun's energy—usually less than 0.1 per cent; they are subject to all the vagaries of uncontrollable climatic variation; and finally, the yields compare unfavourably with those of modern industrial processes. For these three reasons an unconventional approach to the problems of food production has frequently been suggested, and the possibility of controlled employment of micro-organisms in a photosynthetic unit has been canvassed. A discussion of the use of an alga like *Chlorella* in this connexion reveals the practical difficulties that are involved, though real advances in the future are likely from the use of this type of organism.

What is really being envisaged is the development of controllable systems in which the organism acts as an enzyme complex, such that both rate of reaction and type of product can be strictly determined. The problem is whether a sufficiently high rate of photosynthesis can be maintained to give the very large increase in yields which would be industrially desirable in such a system. Botanists would emphasize the unrealized possibilities for synthesis existing in such autotrophic systems. They will also realize the greatly increased knowledge of cellular organization which must be acquired before such methods become possible.

THE TEACHER IN THE TWENTIETH CENTURY

MR. RONALD GOULD in his presidential address to Section L (Education) remarks that the quality of teachers will always be one of the determinants of the quality of succeeding generations. The characteristics of a teacher of high quality are technical competence; a knowledge of the subject to be taught; the power to communicate knowledge; a broad educational background; and personality (that combination of personal characteristics, difficult to define but easily recognized, which enables him to stimulate and encourage his pupils individually and collectively).

Three conditions, however, must be satisfied if the qualities of the teaching profession are to be improved. First, teachers must realize the need for continuing their education. The training college course should be extended to three years. More adequate attention could then be paid to the theory and practice of education, and higher educational standards achieved. Further, every serving teacher should look to his own education, working out his own philosophy, striving to achieve that maturity of mind which would enable him to sift the wheat from the chaff in current educational thinking and practice. This could be done by organizing more refresher courses, the extension of exchanges with American and Dominion teachers, and the release of experienced teachers from school, for six months or a year, for the purpose of undertaking worthwhile educational investigation. Above

all, teachers should read widely and keep abreast of modern thought.

Second, teachers must be assured of considerable freedom in their professional work. Freedom from the fear of arbitrary dismissal is essential: so are civic freedom, freedom from compulsory duties not concerned with the work of the school, and academic freedom. After long and hard struggles, teachers have now attained security of tenure. Civic freedom is not a freedom established by law but has been conceded by local authorities because of constant pressure from teachers. This freedom, however, is still threatened. Freedom from compulsory extraneous duties has but recently been established, since only a short time ago teachers were sometimes appointed to county schools not on the basis of their qualifications as teachers, but because they were prepared to be choir masters, Sunday school superintendents, parish clerks, or to assume some other responsibility in the district. Academic freedom is of enormous importance. Within the limits imposed by law, public opinion and the broad consensus of professional opinion, the teacher should be free to choose both the content of his curriculum and the methods to be used. All these freedoms have been acquired in the past fifty years.

The third condition necessary to establish real quality in the teaching profession is that all concerned with the education system—teachers, local authorities, the Government and parents—should regard themselves as a partnership. There is now real partnership, in spite of some misunderstandings and conflicts as to the speed of advance or the means to be adopted, for all these parties are conscious that they serve the child. This is, however, a recent conception. In the eighteenth century, there were three basic ideas about the provision of popular education: it was a charity, it was a voluntary and not a State effort, and it was under ecclesiastical auspices. Such conditions made partnership with teachers impossible. There was little change even after the establishment of School Boards in 1870. From 1902, however, relationships between the teachers and H.M. inspectors, and between teachers and local authorities, slowly improved. Under the Education Act, 1944, administrative power in education was divided among the Minister of Education, 146 local authorities, hundreds of divisional executives, thousands of managerial and governing bodies and a quarter of a million teachers. Such a dispersal of power was politically sound. Successive Ministers, to their credit, have willingly shared with others powers legally their own, and the establishment of many advisory committees by the Minister is evidence of the voluntary sharing of power and the desire for a real partnership. Parent-teacher co-operation, too, has shown marked improvement.

The future, however, holds some dangerous possibilities—the possible reform of local government and in 1956 the review of the education grant formula. Neither of those should be allowed to affect adversely the freedom of the teacher and existing partnerships.

AGRICULTURE: THE INDUSTRY AND THE SCIENCE

THE art and practice of agriculture advanced very little during the two thousand years prior to 1900, the principal change being the evolution of