

the ranks not of our science sixth forms, but of our arts sixth forms.

Over and above such theoretical considerations, the art of making things which work is one which gives great

satisfaction to the individual—a matter the importance of which increases *pari passu* with the increase of leisure—and which obviously stands to benefit society, both in the advanced and in the underdeveloped nations.

## ASPECTS OF SOIL, PLANT AND ANIMAL RELATIONSHIPS

**D**URING the past fifty years much has been learned about soil conditions in relation to both plant growth and animal health. In particular, it has been recognized that, in addition to the accepted major nutrients, trace amounts of a number of elements are essential to both plants and animals. It is this aspect of soil-plant-animal relationships which forms the main theme of Dr. A. B. Stewart's presidential address to Section M (Agriculture).

Because of variations in environmental and soil conditions as well as in crop and animal requirements, soil-plant-animal relationships are necessarily of considerable complexity. Unlike the plant, the animal may derive much of its food from sources unrelated to its immediate environment. Direct relationships between soil conditions and animal health are in consequence more difficult to establish than are corresponding relationships between soil conditions and plant growth. On the other hand, intensification of agriculture and restriction of livestock to narrower ranges of soils has undoubtedly done much to direct attention to specific mineral deficiencies. Refinements in analytical procedures, the availability for experimental purposes of radioisotopes of most of the biologically important elements, and developments in the field of enzymology have all contributed substantially to the striking advances which have been made in knowledge of the mineral, including trace-element, requirements of plants and animals. With continuing advances in these and allied fields of research, it is probable that certain of the elements at present regarded as non-essential may be found to play vital parts in plant and animal nutrition.

Following discussion of soil conditions in relation to plant growth, reference is made to the various macro- and micro-nutrient elements now known to be essential for either plant growth or animal health or both. These include carbon, hydrogen, oxygen, nitrogen, phosphorus,

potassium, calcium, magnesium, sulphur, sodium, iron, manganese, copper, zinc, boron, molybdenum, cobalt, selenium, chlorine, iodine, and possibly fluorine, bromine, barium and strontium. Others such as aluminium and silicon are beneficial to some plants under some conditions, but the possible significance in agriculture of many elements which are taken up adventitiously by plants is still uncertain.

The principal factors determining the trace-element status of soils in Britain are soil parent material, drainage conditions and degree of acidity or alkalinity. The trace-element composition of plants depends, however, not only on soil conditions but also on such other factors as genus, species or strain of plant, environmental conditions during growth and, because of seasonal variations, the stage of maturity at which the plant is gathered or consumed. In many instances the incorporation into fertilizers of an appropriate quantity of a particular element may be a simple means of remedying trace-element deficiency in soil. It is of the greatest importance, however, to remember that with trace elements the range between deficiency and excess is a narrow one, and that unnecessary application of trace elements to a soil increases the risks of possible toxicity associated with the build-up of trace elements in available form. Toxicity conditions associated with the natural occurrence in soils of excessive amounts of certain elements such as nickel, leading to crop failure, and molybdenum and selenium, affecting adversely the health of livestock, are not uncommon. In Britain, geological complexity and the transport of soil parent materials during periods of glaciation have led not only to regional but also field-to-field variations in soil contents of biologically important trace elements. Under such conditions the indiscriminate application of trace-element supplement as a general insurance measure against possible deficiency is inadvisable.

## THE SOCIOLOGY OF SECULAR RELIGIONS

**T**HE purpose of Prof. D. G. MacRae's presidential address to Section N (Sociology) is to attempt to correct a widely spread set of beliefs about modern industrial societies—beliefs which are held both by the lay public and professional sociologists. Its second intention, which is a consequence of the first, is to correct certain largely unconscious assumptions of theoretical sociology.

It is widely accepted to-day that we are living in a period of intense secularization and that modern societies, particularly industrial societies, are the furthest advanced along this road. Churches and church attendance are believed to be in decline; material and scientific values are believed to be replacing non-natural and religious values, and patterns of behaviour based either on scientific procedures or economic calculation are believed to be becoming dominant in our societies. In a word, our societies are supposed to exemplify in an extreme form the process characterized by the German sociologist Max Weber as "increasing rationalization".

It is, of course, not the intention of this address to deny the importance of scientific procedures or their increasing role in our societies. No more is it the intention to deny that organized religion in Britain has probably less grip

on the general public and less affects our social structure than was true in the past or than is true in almost any other non-Communist society (equally, as Prof. MacRae states, it is not intended that the very high rate of religious observation in the United States should be explained away). Rather, what is claimed is that we are in a period in which there is a marked rise in secular religions.

By secular religion is meant: (1) The spread and elaboration of belief-systems based on non-natural authority, usually accompanied by specific ritual systems, and usually offering individual consolations based either on ordinary technical factors or on day-to-day social relationships. (2) In the strict sense these non-secular religions usually involve the idolatry of abstract idols: nationalism and communism will both be examined from this point of view. Not all secular religions, however, carry such heavy political weight, and various forms of scientism (including sociologism) are examined—by scientism is meant the idolatry of the appearance and the mimicry of the forms of natural science and specific technologies.

In addition, it is argued that the contemporary world is pervaded by various forms of mythical thought. This