Fungi improving our lives

Once you take a long look at fungi you discover that their forms, their functions and their distribution are widely varied and their significance for our planet and us is massive.

On a minor front, some of them must be held responsible for pathological conditions such as aspergillosis and candidiasis. On the other side of the picture, they can be used to manufacture antibiotics for the control of infections. On a more general view they can be used to provide foodstuffs, and in the processes of brewing and baking.

However, a rather different aspect of these plants is examined by Simon Hadlington in the May issue of *Chemistry World*. He points out that fungi play a subtle and diverse role in the cycling of elements on the earth's surface. Not only do they decompose animal and vegetable matter to recycle carbon and nitrogen; they interact intimately with minerals and recycle inorganic components such as metals, phosphorus and sulphur. They break down the surfaces of rocks and buildings and sometimes serve to clean up contamination produced by human industry, an important function that we could well use far more effectively than we do at present.

Fungi can carry out chemical weathering of mineral substances by excreting metabolites such as hydrogen ions, carbon dioxide and organic acids, which attack surfaces and cause pitting, etching and dispersal of mineral grains. Although inorganic rock substrates do not necessarily favour fungal growth, various residues within cracks and fissures, notably decaying plants and animals and their products, act as nutrient sources of which fungi can take advantage.

Fungi can flourish on limestone, soapstone, marble, sandstone, granite and even quartz, although they much prefer alkaline rocks than acid ones. They do not disdain harsh environments such as deserts. They attack aluminosilicates and silicates with organic acids and complexing agents, the producers of organic acids being paramount. Oxalic, citric, formic, tartaric and acetic acids play an important role in the process.

Fungal activity can reduce metal compounds to their elemental form; silver, selenium and tellurium can be produced. On the other hand, carboxylic acids produced by fungi can form stable complexes with many metals in rocky formations. Biomethylation can release volatile derivatives into the atmosphere. Oxalates are important intermediates. Some fungi associate with plant roots, and can thereby clean up soil contaminated with metals by way of mycorrhiza. To overlook these useful functions is to underrate the value of the fungus community as a means of improving our living circumstances. We should give more thought to the phenomenon.

Universities cut back on chemistry teaching

It is disturbing to learn of rumours that universities have been trimming their provision for teaching chemistry. The rumours have prompted the Royal Society of Chemistry to take action to preserve this essential part of the academic curriculum.

Apparently university authorities are arguing that the study of chemistry is too expensive to maintain because of the cost of laboratories and scientific equipment, and that scarce resources would be better spent on the arts and humanities, the so-called "soft subjects", where special facilities are not required. A spokesman for the RSC has described the move as a series of short-term policies on the part of some university vice-chancellors.

As well as being short-term, the idea is decidedly shortsighted, since it would soon have adverse effects on the national health and wealth. The recent news that Swansea University plans to close its chemistry department has been greeted by vigorous opposition. Although the university eventually agreed to retain its research and postgraduate activities, it proposes to withdraw its facilities for undergraduate chemistry teaching. Money saved by closing the chemistry department will be channelled into engineering, medicine, business and physics and partly diverted to the humanities, media studies and computing.

According to the education minister, Charles Clarke, closures have not resulted from falling numbers of chemistry students enrolling, as was previously reported. The Government and the RSC now claim to be supporting chemistry and the chemical sciences. The minister offered assurances that officially chemistry was regarded as of crucial importance. The RSC has asked the Government for more investment, since university chemistry departments throughout the country require some £25m a year to being them in line with life sciences departments.

Diet and sloth may displace tobacco as main cause of avoidable death

A recent report by scientists at the US Centers for Disease Control and Prevention in Atlanta has concluded that there is a distinct possibility that a combination of physical sloth and a faulty diet will shortly displace tobacco as the main cause of avoidable death in the US. This prospect is reviewed in the 7 May issue of *Science*.

A previous report estimated that 435,000 deaths in the US in 2000 were attributed to the consumption of tobacco in some form or other, but another 400,000 were attributable to poor diet and physical inactivity. Other causes of death listed ever the same period included consumption of alcohol or illicit drugs, microbial or toxic agents, motor accidents and firearm misuse, none associated with a comparable fatality rate. Comparison with the 1990 rates showed that tobacco and faulty diet were outstanding in their increased effects.

Some critics have argued, writes Eliot Marshall in *Science*, that the evidence on the role of tobacco is thoroughly tested, whereas that relating to diet and exercise is relatively weak. Figures for obesity risk are claimed to have been based on studies of a younger population than has been used for smoking studies and, if spread over an entire nation, may overstate the significance of obesity dangers compared with smoking hazards. There have also been criticisms that deaths attributable to insufficient nutrition have been added to those for obesity problems.

In general, however, the statisticians engaged in the latest surveys seem to be in agreement that the methods employed to reach the estimates have been sound in their design, and that it must be accepted that faulty diet and lack of physical exercise is almost as serious a challenge to society as is the tobacco habit.