has been measured using radio echo sounding. The rate of accumulation of the ice is shown by the annual layering where it is visible, and lower down in the ice—100–300 metres deep—measurements of the ratio of oxygen-18 to oxygen-16 can be used. It has been found that the thickest ice is not necessarily where the rate of accumulation has been fastest; ice flows away from some areas. Temperature also seems to have little effect on the thickness of the ice sheets.

This sort of information about the physical properties of the ice, combined with geological evidence, is being used to build up a picture of the dimensions, flow and climate of the Pleistocene ice sheets. Calculations from the known rates of accumulation indicate that it would take 10,000–15,000 years for the ice to expand from its present extent to that of the greatest glaciation of the Ice Age. Recession back to the present situation would probably take 5,000–10,000 years. The expansion of the ice sheets seems to have occurred largely by spreading from cores of existing ice.

Dr R. G. West, of the Botany School at the University of Cambridge, talked about the biological consequences of glaciation. During each of the three major glaciations of the Pleistocene, ice covered much of the British Isles; at its greatest extent only a belt of land south of where London is now was left uncovered. Before the first cold period, the British flora, in common with that of the rest of Europe, contained many species which are now characteristic of eastern Asia and North America, such as *Tsuga*, *Sequoia* and *Metasequoia*. These became extinct in Britain with the coming of the cold, after which there was a tundra-like flora, rich in low growing species and containing combinations of plants which are not known now. These flourished on the fresh soil which was made available by freezing and thawing processes, without competition from trees, and in a diversity of habitats.

The animals, because of their way of life, suffered more than the plants, and there is a great difference between the situation now and that before glaciation. Deer, elephants and rhinoceroses soon became extinct. Only the insects seem to have escaped as lightly as the plants with comparatively few extinctions during glaciation.

Free Fatty Acids and Heart Deaths

from our Medical Biochemistry Correspondent

THE blockage of the blood supply to a portion of any tissue, usually as a result of thrombosis in the blood vessel, cuts off the oxygen supply to the tissue. Unless the oxygen supply is rapidly restored, the tissue cells will die, thus creating an area of infarction. When this occurs in the heart it may prove fatal, but patients can make good recoveries. It is not easy, however, to predict the likely outcome in individual cases of myocardial infarction.

A report now published suggests that there is a connexion between high concentrations of free (unesterified) fatty acids in the serum immediately after acute myocardial infarction and the development of disorders in the heart rhythm and death. Oliver, Kurien and Greenwood (*Lancet*, i, 710; 1968) measured the free fatty acid concentrations in the serum of 200 patients within the first 48 hours after an acute myocardial infarction. A blood sample was taken as soon as possible after admission to hospital, and later blood samples were taken each morning so that they were comparable with the fasting blood concentrations of a series of controls. 100 control male subjects had a mean free fatty acid concentration in the serum of 521 ± 129 micro equivalent per litre, and there was no evidence of any variation with age or sex. The highest free fatty acid concentrations were found within four to eight hours of the start of the attack, and almost invariably the highest concentration in each patient was in the first blood sample taken. When the patients were divided into four groups according to the highest free fatty acid concentration recorded in the serum, there was a clear correlation between early and late deaths and the increase in concentration of free fatty acids. There was also a clear connexion between the presence of a high free fatty acid concentration in the serum and the development of abnormalities in the heart beat (arrhythmias).

There was no correlation between the free fatty acid concentration and clinical state of the patient on admission, except that shock was more frequent in patients with very high concentrations. The free fatty acid and blood glucose concentrations were not significantly correlated except in patients with shock, and there was no correlation between free fatty acid concentrations and serum creatine kinase or aspartate aminotransferase concentrations. The increased enzyme concentrations are presumed to come from leakage of enzymes from dead tissue and therefore reflect the amount of tissue damage, but there was no correlation between enzyme concentrations and the development of arrhythmias.

The authors suggest that the free fatty acid increase in serum may be a sign of the presence of excess catecholamines, particularly noradrenaline. These compounds are known to stimulate the hydrolysis of lipids, and excess catecholamine could affect the function of the heart and incidentally increase the free fatty acids in the serum. The same authors alternatively suggest that the heart tissue uses the fatty acid as respiratory substrate. Fatty acids require more oxygen for respiration than the equivalent carbohydrate substrate, and this additional requirement in a tissue already suffering from lack of oxygen might cause further damage. Much further work is necessary before the reason for the connexion between serum free fatty acids and heart arrhythmias and deaths is established, but this test seems to distinguish a group of patients who require the most careful attention after acute myocardial infarction.

Ordered Transcription

from our Microbiology Correspondent

THE latest contributions from H. O. Halvorson's group at Madison, on the differentiation of bacterial endospores, are concerned with the timing of enzyme syntheses during the sequence of events leading to vegetative growth, that is, during the period known as outgrowth. Earlier work had shown that the dormant spore almost completely lacks *m*RNA, so protein synthesis during outgrowth is dependent on new transcriptions. Considerable evidence has accumulated to suggest that a sequential synthesis of proteins occurs at this time. Furthermore, as *m*RNA has a short half-life, these ordered syntheses may mirror an ordered transcription of the genome. Steinberg and Halvorson