

It is likely therefore that soil can exercise restraint on growing roots, and further work on artificial systems should define the effects more fully.

The Letcombe Laboratory has also turned its sophisticated hardware to the time honoured problem of the uptake of nutrients into roots. One interesting finding has been that the unreactive silica, long thought to enter roots passively, actually seems to enter by an active process similar to ion uptake. An offshoot of this work has been the production of stingless nettles, grown in a medium free of the silica which concentrates in the hairs and hardens them into stinging organs.

The radiobiological expertise at Letcombe is of course extremely useful for tackling problems of root physiology. Autoradiography of sections of root cultured in radioactive media can tell a great deal about the behaviour of various substances after uptake. The old idea that aluminium stops root development by blocking cell division has been investigated using scandium-46 (the most suitable isotope available). Autoradiographs of onion roots have shown that scandium-46 enters the cells of the meristem well in advance of cell division which would certainly be expected if it were going to block division.

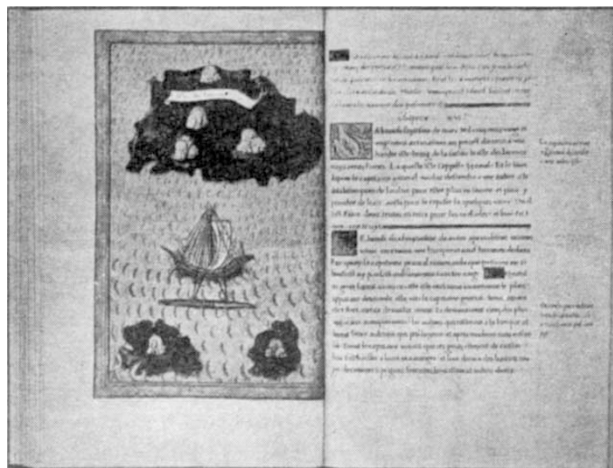
The development of a procedure for identifying soils that are deficient in copper is one of the uses that the laboratory's monitoring equipment has been put to. There are also schemes for measuring the uptake of nutrients in the field, the utilization of nitrogenous fertilizers and the distribution of roots in the soil. At the same time the environmental radioactivity department still keeps a watchful eye on the strontium-90 in milk, which continues to decline.

FACSIMILES

Magellan Translated

MAGELLAN'S first circumnavigation of the Earth has been described by Mr R. V. Skelton, retired superintendent of the Map Room of the British Museum, as "an event which inspired men's imagination as much as the launching of the first satellite did in 1957". Now, 450 years after Magellan's fleet first set sail, Yale University Press, fresh from its dubious triumph with the Vinland map, is publishing a reproduction in facsimile and a translation by Mr Skelton of a French manuscript describing the voyage.

The manuscript, attributed to Antonio Pigafetta, an Italian volunteer crew member of Magellan's fleet, is one of four surviving from the early sixteenth century and the first to have been translated into English. Two of the other manuscripts are in the Bibliothèque Nationale, Paris, and there is an Italian version in the Biblioteca Ambrosiana, Milan. The Yale manuscript has had a chequered existence. Style and quality of craftsmanship suggest that it was probably destined for someone of high social standing, and indeed the first records of its existence are in the Court of the Cardinal of Lorraine. By 1720, it was part of the library of M. Beaupré, a judge of Nancy. Eventually it was bought by a London bookseller, and then by Guglielmo Libri. In 1862, Sir Thomas Phillipps bought the manuscript for his collection in Cheltenham, where it remained until it was purchased by Messrs Robinson Brothers in 1945. In 1964, it was



A facsimile page from Pigafetta's manuscript.

bought by Mr Beinecke and presented to the Beinecke Rare Book and Manuscript Library at Yale.

Pigafetta, the author of the manuscript, came from a wealthy Venetian family, and he was about thirty years old when he set sail with Magellan in 1519. His powers of description and vivid imagination combine to give an impressive account of the three-year voyage which gave Europeans their first introduction to the people and customs of the Pacific, and the account which Pigafetta brought back did much to change man's conception of the world. In the manuscript, Pigafetta describes the mutiny of the sailors and the turning back of one of the fleet, and the hunger, thirst and illness which constantly troubled them, but perhaps the most enlightening parts of the story are those which describe the customs of the Pacific Islanders. In one encounter with these people, Magellan was killed, and in fact, of the 270 people who set sail, only eighteen survived the voyage.

The Yale publication will contain full colour illustrations and twenty-three maps, the only charts derived from originals made during the voyage. Among the illustrations will be one of the three known examples of the terrestrial globe made in 1526, which was depicted in the foreground of "The Ambassadors" by Holbein. By publishing a facsimile and translation of the manuscript, Yale is hoping to bring the manuscript within the reach of both scholars and interested lay people, but the price of £45 for the two volume edition will probably restrict the market largely to libraries.

DEMOGRAPHY

How Many Britons is Best?

THE Institute of Biology has a nose for topicality. Last year, it devoted its annual symposium to biology and ethics; this year it set its speakers to grapple with the theme of "the optimum population for Britain". The issue neatly segregated the social scientists into the hawkish camp, which saw no danger in Britain's present rate of population growth, and the biologists and politicians into the legion of doves, which believes that Britain is already overpopulated.

The symposium, which was held in London on September 25 and 26, produced a resounding democratic victory for the doves. Sir David Renton, MP,

astutely asked the audience to vote on the motion that Britain is already overpopulated and counted 131 ayes to 15 noes. The intellectual victory, however, fell to the hawks by an equally large margin. Whether the hawks are right is quite another matter.

The debate was opened by Miss Jean Thompson of the Registrar General's Office, who described the demographic history of Britain's 54 million inhabitants. The salient trend over the past century has been for completed family size to fall from six children for women who married in the 1880s to about two children for those who married in the 1930s, which is slightly below the population replacement level. The post-war recovery has brought the average family size up to 2.4 children in the 1960s. Official projections are that there will be 66 million Britons by the end of the century.

Asked whether she believed the official projections, Miss Thompson confessed to the difficulty of the question since she drew them up herself, but by and large she thought them as good as any and better than most. An interesting light on the official figures was cast by Mr A. J. Boreham of the Ministry of Technology, who, as it happens, was Miss Thompson's predecessor at the Registrar General's Office. In the preprint of his address, he stated that the population of Britain in AD 2000 would be 75 million. This, Mr Boreham explained, was the projection that he had made in his erstwhile capacity but he now accepted that Miss Thompson's figure of 66 million was correct. This sweet agreement aside, members of the audience were left in the dark as to how the population growth after 30 years could have been misjudged by a whole 11 million people, which is almost 100 per cent more than the total increase at present expected.

Although it would be unfair to extend the uncertainties of the demographer's art to other social sciences, the appearance of this 100 per cent error to some extent overcast the expertly argued case of the economists and sociologists. Mr Boreham, for example, contended that the objectives of economic policy are not likely to be affected one way or another by the size of Britain's population, at least during the next 70 years. Dr D. E. C. Eversley (University of Sussex), the star of the hawks' team, upheld Mr Boreham's thesis and argued that there is no obvious relation, in an economically developed country such as Britain, between the rate of population growth and the rate of growth of *per capita* income. Half of Britain's population is crowded into 3 per cent of the total land area, but the need to redistribute the population is a different thing from overpopulation.

There is no evidence, Dr Eversley said, that social benefits such as child allowances are an incentive to fecundity and at the same time it seems that 90 per cent of the population are practising birth control. What, then, do the advocates of population control want the government to do? It is unlikely that either setting up more family planning clinics or withholding allegedly pronatalist social benefits would have any effect. In any case, the signs are that the birth rate will drop below the replacement level within a few years and then, Dr Eversley predicted, "We shall get a new wave of pro-populationist hysteria. This will come all the more quickly if the fertility of white Britons falls more rapidly than that of the immigrants who belong to socio-economic groups which, whether

white or black, have higher fertility". Even supposing that we could decide on an optimum population, we have no means of ensuring that such a target could be reached by democratically acceptable methods.

Mr G. P. Hawthorn (University of Essex) put forward the only tangible criterion of overcrowding in Britain—the number of people to a room. The dwelling densities recorded by the Registrar General show that in 1961 about 2.6 per cent of families were living at densities of 1.5 persons per room or more, whereas in 1966 the figure was nearer 1.5 per cent. Unsatisfactory as this criterion may be, it argues against any positive relationship between population growth and overcrowding.

Mr Hawthorn disputed the favourite argument of the biologists that overcrowding in human populations, like that of animal populations, leads to psychological stresses which produce the high crime rates and suicide rates of cities. It seems just as likely that these indices are descriptive of the social classes who live in city slums rather than of population size as such.

If the theme of the hawks' argument can be summed up in a single sentence, it would be in Dr Eversley's comment that we are in any case heading for a population equilibrium and that there is nothing the government needs to do other than the steps it has already taken. To this should be added the figures adduced by Mr Hawthorn that Britain's annual excess of births over deaths could be reduced from 300,000 to 30,000 simply by eliminating unwanted births. These might be said to include the 70,000 illegitimate births, at least half of the 40,000 children born to teenage brides pregnant at marriage and some 180,000 marital pregnancies which there is reason to believe may be unintended.

The most vigorous propagandist on the doves' side was Professor Paul Ehrlich (Stanford University), whose principal argument was that the developed countries of the world would not long be allowed to consume their disproportionate share of the world's food supplies and finite mineral resources. Professor Ehrlich perhaps weakened his case by prophesying a wave of human deaths from hydrocarbon pollutants of the environment. This outcome was flatly denied by Dr Kenneth Mellanby (Monks Wood Experimental Station), who thought it unlikely that pollution would be a limiting factor in Britain's population growth.

Supporters of the overpopulation case, such as the Rt Hon. Douglas Houghton, MP, Mrs Madeleine Simms (Abortion Law Reform Association) and Lady Medawar (Family Planning Association), explicitly assumed that the British Isles are overpopulated without ever providing any evidence for their belief. (Certainly the hawks' case would have been strengthened if they had proposed criteria by which to recognize overpopulation when it occurred.) This lack of basic groundwork was not made good by Professor T. R. E. Southwood (Imperial College, London), who discussed the consequences of overpopulation among animals but neglected to prove that the analogy holds good for man. Perhaps another omission of the symposium was the question of eugenics, which is to some extent implicit in the concept of population control. Not even Professor Sir Alan Parkes (Galton Foundation), who fearlessly criticized the lamentable record of the medical profession in the history of family planning, saw fit to embark on the wider implications of population control.