the St Kilda house mouse, *Mus musculus muralis*, only disappeared about 1932. The three feral species listed in the booklet are the ferret, *Mustela putorius furo*, goat, *Capra*, and sheep, *Ovis*. The musk rat, *Ondatra zibethicus*, now extinct, was feral between 1927 and 1937, and the notorious coypu, *Myocastor coypus*, has been feral since about 1940. The American mink, *Mustela vison*, occasionally escaped from about 1930, and has been truly feral since about 1950.

The white whale or beluga, *Delphinapterus leucas*, and the porpoise, *Phocoena phocoena*, are vagrants, but the killer whale or grampus, *Orcinus orca*, is a regular inhabitant of British waters. And in case it should approach on a dark night it is as well to know that *O. orca* is conspicuously black and white (or yellow) with broad, not pointed, flippers and with teeth which are oval in cross-section with a greater axis up to two inches long.

BOTANY

Retarded Ferns

from our Botany Correspondent

ETHANOL can now be added to the list of factors which retard the development of one of the stages of the life cycle of the fern. D. L. Smith and P. M. Robinson have found that in *Polypodium vulgare* the change from filamentous growth to the two-dimensional growth that leads to the familiar heart shaped gametophyte is inhibited by certain fungi, particularly *Fusarium oxysporum* which has a high content of ethanol (*New Phytologist*, **68**, 113; 1969).

The haploid spores of *Polypodium*, produced by the diploid sporophyte generation, usually germinate to form a filament of cells, the protonema, with an apical cell which later divides longitudinally as well as transversally to produce the small gametophyte generation. Smith and Robinson noticed that cultures of gametophytes of *P. vulgare* developed abnormally in the presence of a contaminating fungus. Because this fungus could not be induced to sporulate it could not be identified, but the effects of three other fungi on gametophyte development were tested.

Fusarium oxysporum added to spore cultures of *P. vulgare* before germination prolonged the filamentous phase of growth of the gametophyte. When a colony of *F. oxysporum* was added to the gametophyte culture after transition to two-dimensional growth, there was a reversion to filamentous growth followed later by a return to two-dimensional growth. *Geotrichum candidum* and *Aspergillus niger* also affected gametophyte morphology, but to a much smaller degree.

From the point of view of development, the effects of *F. oxysporum* on the transition from one type of growth to another were obviously the most interesting. Gas chromatography of culture filtrates showed ethanol and acetaldehyde to be the principal volatile substances present after addition of the fungus. The effects of ethanol and acetaldehyde on gametophyte development were therefore tested.

Both reagents inhibited two-dimensional growth, which began when the concentration of ethanol in the culture medium decreased to less than 40 p.p.m. Growth was stunted by acetaldehyde even after the reagent was no longer detectable in the medium. Changes in the concentration of ethanol, however, clearly correlated with the changes in gametophyte morphology, leading to the conclusion that ethanol promotes the growth of the filamentous phase and inhibits the transition to the two-dimensional phase. Smith and Robinson also achieved a return to filamentous growth by adding ethanol to a gametophyte culture after the transition.

As well as ethanol, factors known to inhibit the transition to two-dimensional growth include low light intensity, red or far red light, and purine, pyrimidine and amino-acid analogues. The effects of ethanol—to reduce cell division and increase cell length—are compatible with the idea that there is a direct relationship between the rate of cell division and the transition to two-dimensional growth, for in that case anything that reduces the rate of cell division would inhibit the transition.

With their results in mind, Smith and Robinson suggest two mechanisms that might be involved in the control of development of fern gametophytes. First, the transition could depend on a specific factor accumulating to a threshold level, perhaps under the control of the phytochrome system. Or second, the relative activities of fermentative and oxidative pathways in the gametophyte cells might be correlated with or directly influence the transition.

MEDICAL BIOCHEMISTRY

Tests for Malnutrition

from our Medical Biochemistry Correspondent

MALNUTRITION is probably one of the most important causes of morbidity and mortality in the world, particularly in children. At present no accepted biochemical test can indicate the severity and likely outcome of the disease or distinguish kwashiorkor (specific protein deficiency) from the deficiency condition known as marasmus.

Several groups have claimed that biochemical tests are of value in protein-calorie malnutrition, but at last a group in Ibadan has compared several of these tests on the same group of children (*Lancet*, i, 392; 1969). They measured total protein, serum albumin, the hydroxyproline index, the ratio of non-essential to essential amino-acids, cholesterol esters, bilirubin, transaminases and transferrin in children with clinical signs of protein-calorie malnutrition, and in a control group of children attending the outpatient clinic with no clinical evidence of malnutrition. Blood samples for the estimations were taken when the children first attended the clinic and fortnightly for ten weeks after the first attendance.

Children with kwashiorkor were classified as severe, moderate and mild according to the clinical signs of disease. Transferrin concentration seemed to give the most reliable measure of the severity of the disease. In the severe group, twenty out of twenty-three had transferrin concentrations of less than 0·45 mg/100 ml.; half the moderate group were below this level, as were eleven of the thirty-nine in the mild group. Eight children who died very rapidly all had severely depressed hydroxyproline indices and six out of the eight had severely depressed transferrin concentrations. Results of the other tests showed that many children with kwashiorkor had low total protein and serum albumin, but none of the other tests was as reliable as