It is suggested that virus B is no more a single entity than is virus X. It is possible that many strains of virus X may be found which do not give top necrosis on varieties like Epicure and King Edward. This conclusion, together with the findings of Bawden and Sheffield[4], indicate that there is no sound basis for giving the strains known as 'virus B' any special status within the X group. There seems to be no good reason why the reactions on a few arbitrarily chosen varieties of potato (or any other single host) should have any special significance as a basis for the classification of X strains into groups.

The value of the cross-absorption figures as a quantitative estimate of the 'common' and 'non-common' portions on the particle is very doubtful. Nevertheless, carried out with a number of strains, it may give some indication of the relative extent of antigenic relationship.

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A Protozoal Disease of South African Trawled Fish and its Routine Detection by Fluorescence

Recent investigations into the problems of (*a*) 'mealiness' of the cooked flesh of the Cape John Dory (*Zeus capensis*) and (*b*) milky spots in smoked fillets of the stockfish (*Merlucius capensis*) have revealed that the abnormalities are a consequence of heavy infections of the muscle fibre by a protozoal parasite. The parasite is identical to that described by Gilchrist[1] as *Chloromyxum thyrsites* causing the 'pap' condition of the snoek (*Thyrsites atun*). Fantham[2], however, suggested that the organism might be identical to *Chloromyxum quadratum*, Thélohans.

Gilchrist reported that 5 per cent of the snoek catch were so heavily infected as to be of no commercial value, and that microscopic examination of the flesh of twelve fish selected at random and considered perfectly healthy revealed that eight of the fish were infected.

In the John Dory, approximately 25 per cent of the catch landed are extremely emaciated, with the flesh so soft that it cannot be filleted. It is just possible to detect less severe infection at the time the fish is landed by trawlers, by the greater opacity of the infected muscle fibres, while 36–48 hours later the infection is clearly visible as milky areas embedded in the flesh.

In the stockfish there are no visible signs of infection until after the fillets have been smoked, when the infected areas appear as whitish spots embedded in the flesh. The 'milky' spots, on pressing, exude an ooze of disintegrated tissue heavily impregnated with the characteristic spores of the parasite.

The discovery that infected muscle fibres fluoresce under ultra-violet light filtered through Wood's glass has made it possible to survey in large samples of the catch, (*a*) the distribution of infection within the tissues, (*b*) the intensity of infection, and (*c*) the number of fish infected. The infection is limited to single or a few adjacent muscle fibres distributed at random throughout the flesh. Such muscle fibres fluoresce brilliantly in the stockfish, and even deeply embedded infections can be detected without difficulty. In the John Dory, the intensity of the fluorescence is not so great, but is ample to indicate even a single infected fibre in the whole fish. The fluorescence is greatly diminished in salted fish.

The extent of the infection in the trawled fish may be gauged from the following data.

Fish	No. examined	% Infected
John Dory	596	76
Stockfish	660	70

The extent of the infection may vary from a single muscle fibre to a state in the John Dory in which the fluorescing fibres permeate the whole flesh. It is difficult to imagine how such fish can move and live. It is probable that only the numerous spines with which the John Dory is protected save the heavily infected individuals from becoming easy prey to other fish. Heavy infection of the order encountered in the John Dory has not been seen in the stockfish; but there is no clear evidence to indicate whether this is due to greater resistance or to the elimination of the fish as soon as the infection reaches moderate proportions, when muscular movement might be affected.

The John Dory catch is also characterized by the preponderance of female to male in the ratio of approximately 2 : 1. The distribution of the intensities of infection in male and female fish and the proportion of infected individuals among the sexes seems to indicate that the male fish are more susceptible and that the disease progresses more rapidly in the male. There is strong presumptive evidence of considerable mortality in the John Dory from this disease. It is of considerable interest that Gilchrist suggested in 1924 that the occasional meagreness of the annual shoals of snoek visiting the Cape could probably be ascribed to this disease.

Details of this investigation will be published elsewhere.

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March 31.

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Population Studies in Fisheries Biology

G. L. Kesteven has stressed[1] the need for a dynamic approach to the study of fish populations. It has been possible recently to develop a mathematical treatment having certain features in common with that of Baronov[2], which bears this necessity in mind, and which we feel will be of value in further consideration of fisheries problems, and in particular has immediate application in the assessment of remedies for overfishing.

Russell's equation[3] expresses the dependence of the yield from a fishery on the vital coefficients of the population (natural mortality, recruitment and growth) and the rate of fishing. In its original form,