roots and wilting is more than fortuitous cannot be said. Neither can we say whether the wilting which occurs is indicative of an internal water deficit sufficiently serious to restrict growth. It is noteworthy that one of the varieties concerned ('Cheltenham Green Top') is a popular variety among commercial growers and hence is presumably at least not markedly inferior to other varieties in its cropping capacity.

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1 "Agricultural Botany", London (1910).

A Technique for Studying Infection of *Dracunculus* in *Cyclops*

THE study of the relative infectivity of *Dracunculus* larvæ in various species of *Cyclops* which we undertook at the Department of Parasitology in the University College, Ibadan, involved the examination of thousands of *Cyclops*. Ordinarily there are two ways of identifying infected *Cyclops*: to examine them alive, which could be done if one is dealing with a few specimens; or, when large numbers have to be dealt with, to stain them in bulk and then examine them, one by one, later.

A live infected *Cyclops* in a drop of water on a slide is easily recognized with the low power of the microscope because of the vigorous lashing movement of the *Dracunculus* larvæ (it is rare to find only one larva in an infected *Cyclops*) inside the body cavity. It is necessary to immobilize the *Cyclops* temporarily by some means to stop it darting about on the slide. The substance used for this purpose must be such as will have no effect on the larvæ inside, for if these, too, are immobilized their identification will be difficult, especially in the breeding season when the body cavity of the *Cyclops* is generally filled with large coloured dense cells which will later give rise to eggs or spermatophores.

A few drops of 10 per cent alcohol added to about a dozen *Cyclops* in 2 c.c. of water in a watch-glass generally produce the required effect in two minutes and keep them in that state for about five minutes while the *Cyclops* are examined individually under the microscope. One has to make sure of the exact quantity of narcotizing material used, since if this is too weak the *Cyclops* do not stay immobilized long enough, while, if too strong, they will be permanently adversely affected later, on their return into the culture jar.

The method of staining works well if, after fixing the *Cyclops*, they are kept in a jar of 5 per cent caustic potash for 24 hours before staining. If this is not done, the staining will fail to show up the larvæ because the overlying muscle bands in the cephalothorax of the *Cyclops*, taking up the stain better than the larvæ underneath, will obscure them.

Both methods involve individual examination of the *Cyclops*, so that, apart from being very tedious, they are not suitable when numbers running into thousands are to be dealt with in a short time.

Recently, while working on the effects of low temperature on infected *Cyclops*, it was observed that the chill-coma temperature of *Cyclops* was 10° C. while that of *Dracunculus* larvæ was 7·5° C. (Details of this work are reported elsewhere.) Thus at any temperature between 7·5° and 10° C. the *Cyclops* are effectively immobilized while the contained larvæ are active and moving about, and, as such, are spotted without any difficulty. This, therefore, provides a method of rapidly counting the number of infected *Cyclops* in a dish containing more than a hundred. All that is necessary is to put into this dish sufficient crushed ice to cool the water to, say, 8° or 9° C., while a count is made with a binocular microscope, or, if desired, a separation into infected and uninfected groups is effected. *Cyclops* treated in this way suffer nothing and can undergo the same treatment several times without any apparent harm.

If it is not necessary to keep the *Cyclops* alive after the count is made, a more convenient way is to put them in a refrigerator for 24 hours. A few minutes after returning them to room temperature the larvæ will be seen to be moving about vigorously in the infected *Cyclops*, while any of the latter that have not already been killed by the cold can only resume normal activity after several hours.

The advantages of using the differential chill-coma temperature method in studying *Dracunculus* infection in *Cyclops* are four-fold, namely: (1) it enables one to deal with more than a hundred *Cyclops* in a dish at once instead of examining them one by one on a slide; (2) it eliminates the risk of under- or over-narcotizing the *Cyclops*, as often happens when 10 per cent alcohol or some other narcotic is used; (3) when the temperature is merely reduced to about 8° C., the *Cyclops* can be returned to the culture jar without any ill-effects after a count is made; (4) the process is very easy to carry out.

A similar technique may be applicable in the study of other parasitological problems.

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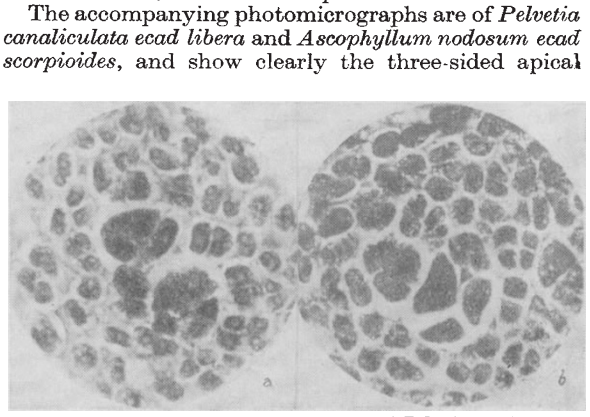
Apical Cell of Salt Marsh Fucoids

I HAVE been studying the anatomy of the British salt marsh fucoids under the direction of Prof. V. J. Chapman. While Prof. Chapman was at Manchester in 1946, Prof. I. Manton, as a matter of interest, examined the apical cell of *Fucus vesiculosus ecad volubilis* and found that it was in the three-sided juvenile state. On this basis, Prof. Chapman in his book "An Introduction to the Study of the Algæ" surmised that the three-sided juvenile condition of the apical cell may be common to all marsh forms of the fucoids, and this has proved to be correct.

The accompanying photomicrographs are of *Pelvetia canaliculata ecad libera* and *Ascophyllum nodosum ecad scorpioides*, and show clearly the three-sided apical



Transverse section of apical cell (× 200): (*a*) *Pelvetia canaliculata ecad libera*; (*b*) *Ascophyllum nodosum ecad scorpioides*