of infection from this source could be important in determining the first appearance of blight each year.

Overwintering hosts may occur also in Australia, for blight has been collected from the Australian species, *S. simile* Muell., growing in the Dunedin Botanic Gardens by Dr. G. T. S. Baylis of the University of Otago (Brien, R. M., personal communication).

C. M. DRIVER

Crop Research Division,
Dept. of Scientific and Industrial Research,
Christchurch, New Zealand.

[1] Brien, R. M., and Dingley, Joan M., *N.Z. J. Sci. Tech.*, A, **37**, 27 (1955).
[2] Baylis, G. T. S., *Trans. Roy. Soc. N.Z.*, **82**, 639 (1954).
[3] Black, W., Mastenbroek, C., Mills, W. R., and Peterson, L. C., *Euphytica*, **2**, 173 (1953).
[4] Hirst, J. M., *Plant Path.*, **4**, 2, 44 (1955).
[5] Van der Zaag, D. E., Dissertation, Wageningen (1956).

Water Absorption by Submerged Leaves

DIXON[1,2] and van der Paauw[3,4] have both recorded the uptake of water by the cut ends of submerged shoots of land plants ; but there is divergence in their findings concerning the factors which affect the rate of absorption. Dixon found that factors which favoured rapid photosynthesis caused an increased rate of absorption. Van der Paauw found that in illuminated shoots the rate of water uptake was reduced to zero or that water was even exuded from the cut end, but darkness favoured absorption. Other workers[5] were unable to confirm Dixon's early results.

Recent work in this laboratory, on single cut leaves of *Bignonia grandiflora*, indicates that the pre-treatment of the material may have an important bearing on its subsequent experimental behaviour. In our experiments the leaves were severed under water and the cut ends were always supplied with water. They were then held in a saturated atmosphere and subjected to various periods of light and darkness. After this treatment they were immediately submerged in aerated, distilled water and strongly illuminated. Uptake of water by the cut ends was measured by means of a sensitive potometer.

In one experiment the leaves were stored in the dark for 15 hr. and absorption was not observed during a subsequent period of 9 hr. under conditions of complete submergence and strong illumination. Similarly, absorption was not observed when the above pre-treatment was followed by 12 hr. illumination and then by 3 hr. in the dark again.

Absorption did occur, however, when the leaves were stored for 15 hr. in the dark and then illuminated for a further 12 hr. The total uptake of one leaf during a period of 330 min. was 29·5 mm.^{3} and when the experiment was concluded absorption was still occurring at a rate of 2·4 mm.^{3} per hour. Under these conditions the magnitude of the force causing the water to enter is considerable. A single leaf raised a column of mercury to a height of 49 mm. during a period of 490 min.

Other experiments have been performed to determine the effect of varying the environmental factors during the actual observation period. Leaves cut at 5.0 p.m. and stored in the dark for 15 hr., did not absorb when submerged afterwards in aerated, distilled water and strongly illuminated, but did so when the carbon dioxide concentration of the water was raised. Bubbles of gas were rapidly evolved from the leaf, and starch accumulated.

Leaves pre-treated in the dark for 15 hr. also absorbed when submerged in aerated, distilled water in the dark, but the flow was invariably reversed after about 20 min. During this time the intercellular spaces of about one-third of the leaf area became injected with water. Complete injection occurred after a maximum period of 12 hr. submersion. Injection of the spaces has never been observed in submerged, illuminated leaves.

The absorption of water by the cut ends of submerged, illuminated leaves can therefore be related to the pre-treatment in the first instance. After cutting, illumination in a saturated atmosphere after a period of darkness will cause absorption to occur when the leaf is afterwards submerged and strongly illuminated. The effect of the light pre-treatment on the water uptake disappears if followed by a 3-hr. period in the dark. Absorption does not occur under the same conditions if the pre-treatment is carried out in a dark, saturated atmosphere, but does occur if the carbon dioxide concentration of the water is raised. Under these latter conditions rapid photosynthesis occurs.

It is possible that these findings may explain in part the divergent results of the earlier workers. Further experiments are now in progress to try to elucidate the mechanism causing the absorption.

T. R. MILBURN

Dept. of Botany,
Makerere College,
Kampala,
Uganda. Aug. 8.

[1] Dixon, H. H., *Sci. Proc. Roy. Dublin Soc.*, **22**, No. 5, 55 (1938).
[2] Dixon, H. H., and Barlee, J. S., *Sci. Proc. Roy. Dublin Soc.*, **22**, No. 20, 211 (1940).
[3] Paauw, van der F., *Rec. Trav. Bot. Neerl.*, **32**. 292 (1935).
[4] Paauw, van der F., *Nature*, **166**, 231 (1950).
[5] Smith, F., Dustman, R. B., and Shull, C. A., *Bot. Gaz.*, **91**, 395 (1931).

Responses of *Cerianthus* to Stimulation

THE neuromuscular activities of the Anthozoa have been studied extensively as examples of the working of the 'elementary nervous system'[1,2]. Most of the information in this field comes from the sea anemones, the order Actinaria, sessile animals which exhibit basic patterns of slow periodic activity together with certain quick protective responses. The latter are facilitated responses in which single electrical stimuli are ineffective ; responses occur only to the second and subsequent stimuli of a series within a limited frequency-range[3].

Such studies influence our ideas about the evolution of the nervous system, and it is important, therefore, to extend them to as many groups of the Anthozoa as possible. In this connexion, the Ceriantharia are an obvious choice for investigation. They are a small and isolated order of tube-living anthozoans, found in North Atlantic and Mediterranean coastal waters. The musculature of the cerianthids differs greatly from that of other Anthozoa. It consists in the main of a thick and compact core of longitudinal muscle lying between the ectoderm and the mesoglœa. The contractions of this muscle pull the animal back into its tube by a series of sharp jerks whenever it is disturbed unduly by external stimuli.