spacing and bolting; but at the time when the observations were made, it is thought that all potential bolters had, in fact, bolted. With shallots grown at three inter-row distances (8, 12 and 16 in.) and four inter-plant distances (3, 6, 9 and 12 in.) the number of flower heads produced per plant was influenced by the spacing, the figures being 0·70, 0·89 and 1·09 for the 8, 12 and 16 in. rows, and 0·72, 0·90, 0·95 and 0·99 for the 3, 6, 9 and 12 in. inter-plant distances. None of the results obtained contradicts the thesis that wide spacing increases the incidence or accelerates the occurrence of bolting.

We do not, however, interpret these results as being determined by direct competition for light; but incline to the view that wider spacing allows of more rapid growth, so that with the shallots more flower heads will have emerged before, probably, lengthening days suppress further emergence, while in the root crops, on any date when bolting is progressing a greater proportion of the potential bolters will have actually bolted on the widely spaced than on the closely spaced plots. This effect will not be evident if at the time of the observation all potential bolters have, in fact, bolted, as with the Altrincham carrots in 1948.

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[1] *Nature*, **164**, 496 (1949).

Zinc and Plant Respiration

Dufrenoy and Reed[1], in their study of coacervation in hypoplastic cells, demonstrated some important correlations with the respiratory activities in vacuoles, and they also suggested that a similar correlation between dwarfed shoots and coacervation was shown as the result of zinc deficiency in apricots and walnuts[2]. However, the effect of zinc on the respiration of plants has not hitherto been described. It is possible to determine the relationship between zinc and respiration by direct measurements of oxygen uptake and carbon dioxide evolution by the normal and zinc-deficient plants.

Oxygen uptake and carbon dioxide evolution by zinc-deficient and normal tomato leaf sections suspended in phosphate buffer, *p*H 5·0, temperature 30° C.

Plant	Length of stem (cm.)	Gas exchange in μl./200 mgm. leaf/hr.					
		First hour			Second hour		
		O_2	CO_2	R.Q.	O_2	CO_2	R.Q.
Control	11·5	80·8	113·6	1·41	75·2	100·4	1·33
−Zn	9·8	92·8	121·4	1·31	78·1	101·9	1·30
Control	28·5	81·5	109·2	1·34	87·0	119·2	1·36
−Zn	10·4	88·4	89·9	1·01	89·1	89·9	1·00
Control	35·0	86·3	95·1	1·10	76·3	85·8	1·12
−Zn	10·5	92·0	99·3	1·07	82·5	90·2	1·09

Tomato plants, *Lycopersicon esculentum* Mill. variety John Baer, were used as experimental material. The methods of culturing the plants have been described in a previous paper[3]. Gas-exchange measurements were made in Warburg's respirometer. Oxygen uptake was measured in vessels having concentrated potassium hydroxide in the central well, while the difference between oxygen uptake and carbon dioxide evolution was measured in a second vessel without potassium hydroxide in the usual way. The experiments were carried out at 30° C. Tomato leaves of normal and zinc-deficient plants were cut into pieces about 2–4 mm.[2] in area; 200-mgm. samples were weighed out for each vessel, which contained 2 ml. of phosphate buffer of *p*H 5·0.

No significant difference in the rate of oxygen consumption and carbon dioxide evolution between the normal and zinc-deficient plants has been demonstrated. The high respiratory quotient was obtained in the early stage of growth; this is presumably due to the high organic acid content in the young plants. The results (see table) show that the rate of respiration of the zinc-deficient plants was slightly higher than that of the control: this is because the calculation is based on the fresh weight. I have already demonstrated that the zinc-deficient plant has a lower water content[4]. From the results described above, it is concluded that zinc plays no direct part in the respiratory system of the higher plants.

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[1] Dufrenoy, J., and Reed, H. S., *Plant Physiol.*, **21**, 416 (1946).
[2] Reed, H. S., and Dufrenoy, J., *Amer. J. Bot.*, **29**, 544 (1942).
[3] Tsui, C., *Amer. J. Bot.*, **35**, 172 (1948).
[4] Tsui, C., *Amer. J. Bot.*, **35**, 309 (1948).

Occurrence of the Spiny Dog-fish *Oxynotus centrina* in South African Waters

A specimen, 22 in. in length, of *Oxynotus centrina* (Linn.) was recently trawled in 60 fathoms off the west coast of the Cape Peninsula. It is the first record of this genus in South African waters.

Although some elements of the fauna of the deep water off the Cape Peninsula show resemblances to the southern Australian fauna, there is no question of this specimen belonging to the species *bruniensis* (Ogilby). It has all the characters of the Mediterranean species[1], except the colour, which is black instead of brownish.

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[1] See Norman, *Proc. Zool. Soc.*, 77 (1932).

Unicellular Algæ in Association with Invertebrates

The presence of unicellular algæ in association with a large number of invertebrate animals is well known. It occurs among members of the Protozoa, Porifera, Cœlenterata, Ctenophora, Turbellaria, Rotifera, Gastropoda and Lamellibranchiata (Yonge[1]). To this list must now be added the Brachiopoda, for I have found that in *Lingula*, growing in 0–1 fathom off Trincomalee, zooxanthellæ are abundantly present within the cells of the digestive glands. Here then is another animal digesting intracellularly and harbouring a unicellular green alga within its tissues. It is hoped to publish a fuller account of this elsewhere.

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[1] Yonge, C. M., *Nature*, **134**, 12 (1934).