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A POSSIBLE RELATIONSHIP BETWEEN ENTEROMORPHA
(Chlorophyta) and MELOSIRA NUMMULOIDES (Chrysophyta:
Bacillariales)

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While investigating the effect of fluoride on the green alga, Enteromorpha, healthy chains of the centric diatom, Melosira nummuloides appeared in cultures containing a small piece of Enteromorpha, nutrient medium and all concentrations of fluoride, as Na_2SiF_6 to 160 p.p.m. Both the Melosira alone and the Enteromorpha, accompanied by Melosira, were transferred into a culture medium (germ intercepting filtrate, S=30g./kg. to which 0.4 ml./l. of the plant nutrient 'Kerigrow' was added) with a normal fluoride content; after three weeks the Melosira alone was present only in short, broken chains, whereas that in the presence of Enteromorpha had formed long, healthy chains.

Further tests were made using Enteromorpha from Garelochhead, Gareloch and Cove, Loch Long. M. nummuloides was added to duplicates of each of three media,

- (i) culture medium plus Enteromorpha, subjected to ultra-violet irradiation for 1 min.,
- (ii) supernatant water from the Enteromorpha stock culture subjected to ultra-violet irradiation for 1 min., and
- (iii) culture medium plus untreated Enteromorpha.

The multiplication of Melosira cells was noted after 1 week (Table I) when none had occurred in the irradiated medium alone.

Subsequently, the percentage increase in the number of cells in 1 week was determined for Melosira grown with Enteromorpha and Enteromorpha water which were untreated, boiled and subjected to ultraviolet irradiation for 1 min. As in the previous experiments, Melosira nummuloides in the presence of untreated Enteromorpha grew well, whereas that in the untreated Enteromorpha water merely survived and 100% mortality in the remainder took place.

Despite some conflict in the last experiment, the

results obtained indicate that Enteromorpha provides some

TABLE I. The multiplication of Melosira nummuloides after 1 week in the presence of Enteromorpha and the supernatant liquid from its culture.

| TEST MEDIUM | MULTIPLICATION OF <u>MELOSIRA</u> | |
|------------------------------------|-----------------------------------|-----------|
| | Gareloch | Loch Long |
| Irradiated <u>Enteromorpha</u> (a) | ++ | + |
| | (b) | + |
| Irradiated <u>Enteromorpha</u> (a) | Nil | Nil |
| | water (b) | Nil |
| Untreated <u>Enteromorpha</u> (a) | ++ | ++ |
| | (b) | + |

factor essential to Melosira nummuloides and this acts more efficiently when the two species have some degree of contact. Such a beneficial relationship has been noted between the blue-green alga Anabaena flos-aquae and the bacterium Zoogloea (Caldwell and Caldwell, 1978), rhodophyte epiphyte and rhodophyte host (Harlin, 1973), epiphytes and sea grasses (Harlin, 1973; McRoy and Goering, 1974) and the bryozoan Membranipora membranacea inhabiting the kelp, Nereocystis leutkeana (de Burgh and Fankboner, 1978). Berglund (1969) showed that Enteromorpha linza secretions include fatty acids, amines and peptides which strongly stimulated the growth of E. linza and Enteromorpha sp. Furthermore, M. nummuloides can absorb amino acids from the surrounding medium and utilise them in chemotrophic growth (Guillard, 1963; Hellebust and Guillard, 1967; Corrigan and McLean, 1979; and McLean, Corrigan and Webster, 1981), so that a possible basis for the observed association exists, although the mechanism remains unknown.

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