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VARIATIONS IN THE MEIOFAUNA OF *CORALLINA OFFICINALIS* L. WITH WAVE EXPOSURE[1]

By

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ABSTRACT

The meiofauna of *Corallina officinalis* has been studied at three localities with different exposure south of Bergen, Norway. A distinct distribution pattern is shown for some species, and this is discussed with reference to the wave exposure.

The meiofauna of *Corallina officinalis* L. has been studied at three localities south of Bergen, Norway (Fig. 1). Locality 1 is situated in Raunefjorden. It has almost no wave exposure and considerable quantities of sediment accumulate there. Locality 2, in Fanafjorden, is more exposed; waves can comes traight in through Korsfjorden from the ocean and the surf can be very heavy on stormy days. Locality 3 is situated on a small island on the open coast and there is nothing offshore to lessen the force of the waves.

C. officinalis occurs at different levels and in different algal communities at the three localities (Fig. 2). At locality 1 the samples were taken at 0.6 m, at locality 2 at 0 m and 2.5 m, and at locality 3 at 0 m and 5 m.

The samples were obtained by skin-diving. Small tufts of *Corallina* were enclosed in a plastic bag and then detached from the rock.

At 0 m at localities 2 and 3 *C. officinalis* grows very compactly (maybe as a result of the wave-exposure). The structure is reinforced by small *Modiolus modiolus* L. and *Musculus discors* L. ranging from less than one to about 12 mm. This compactness reduces the interstitial space where animals can move and thus affects the composition of the fauna; it also gives protection against fast-moving water and desiccation.

The occurrence of some species is shown in Fig. 3. The first four species in the table were distinctly more common at the most exposed locality, and the amphipod, *Parajassa pelagica* (LEACH), was only found there. The last five species seem to prefer quiet water, while the three in the middle do not seem to be much affected by variations in exposure. Most notable is the occurrence of large numbers of some species at locality 3. In particular the amphipod, *Parajassa pelagica*, and the isopods, *Idotea pelagica* LEACH and *Jaera praehirsuta* FORSMAN, were very common.

The amphipods, *P. pelagica*, *Ampithoe rubricata* (MONTAGU), and *Corophium bonelli* (MILNE-EDWARDS), live in tubes and probably seldom leave them if they

[1] Contribution from the Biological Station, Espegrend, Blomsterdalen, Norway.

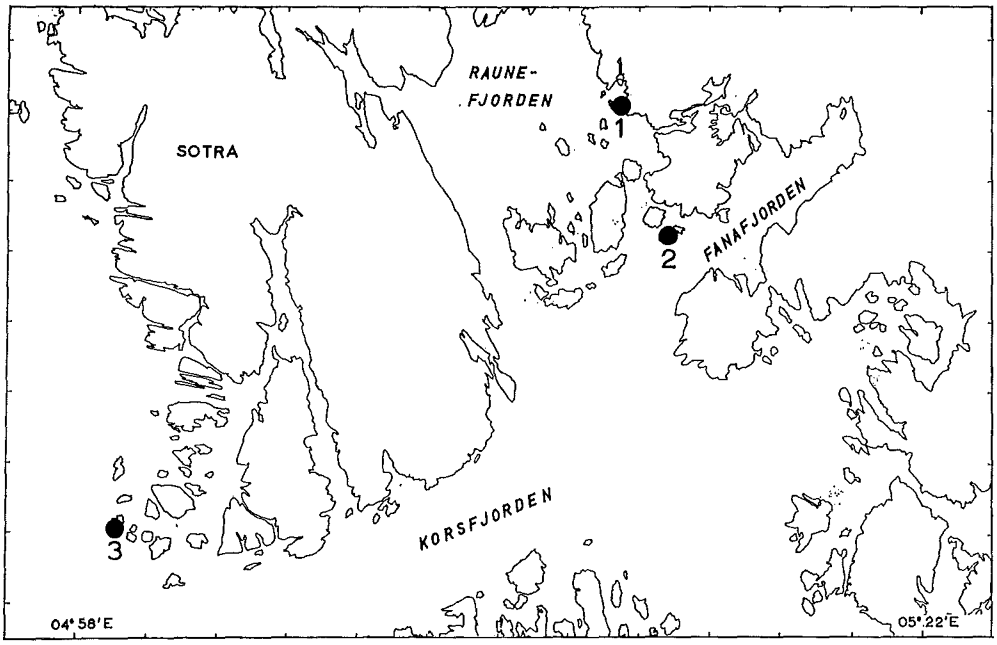

Fig. 1. Map of the area near the Biological Station, Espegrend, showing the three sampling localities.

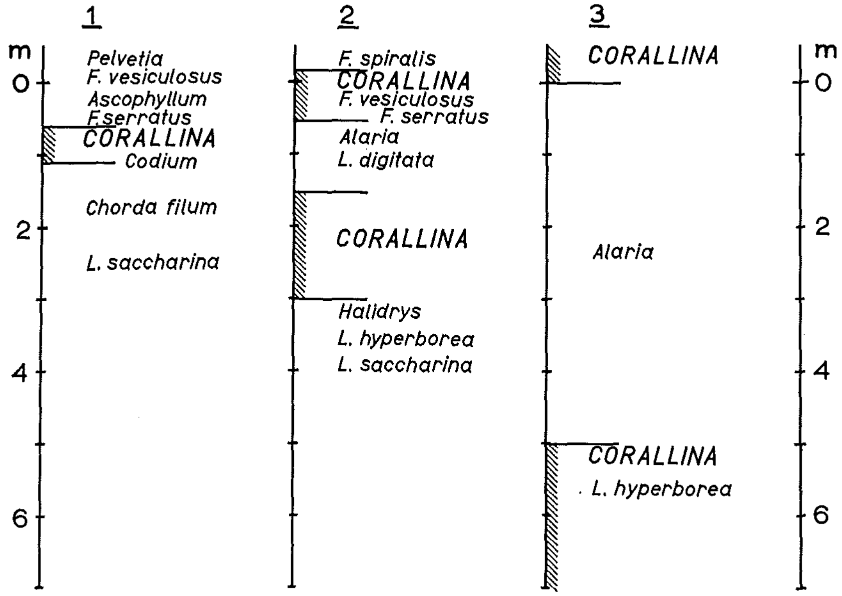

Fig. 2. The vertical distribution of *Corallina officinalis* (shaded) and of other large algae occurring in the same area.

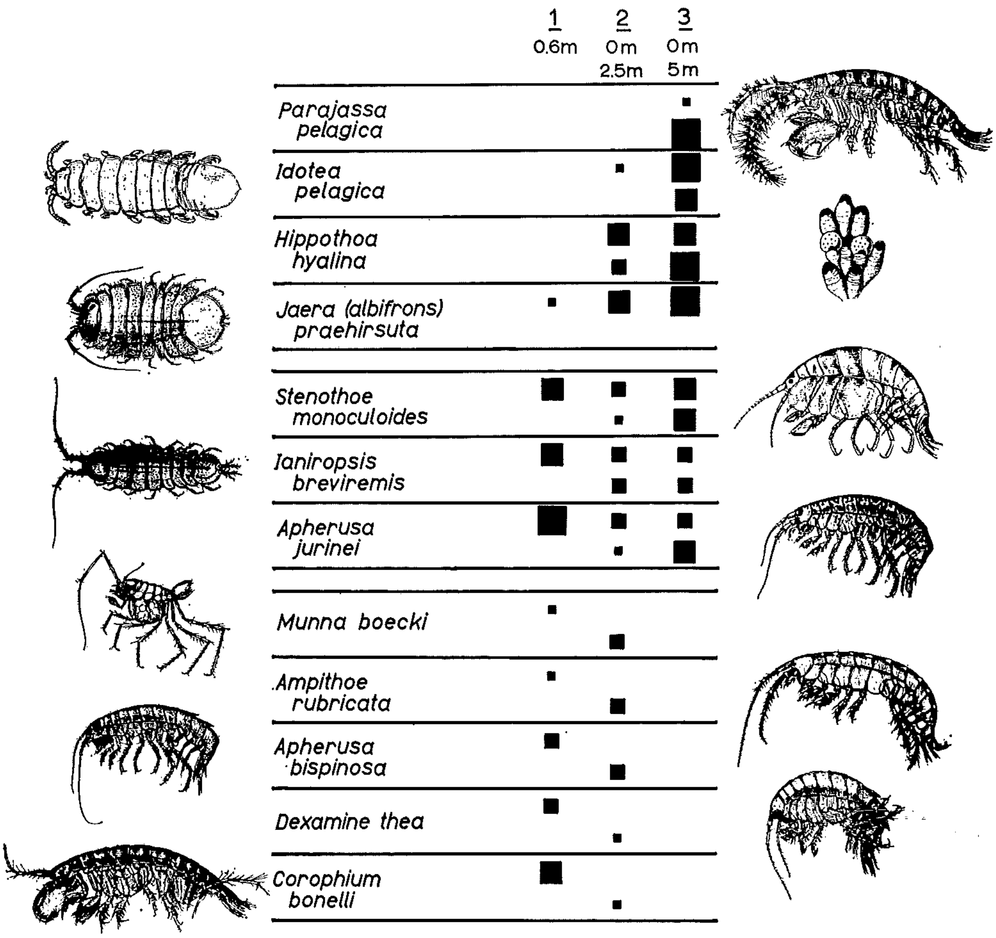

Fig. 3. The occurrence of some species. The black squares represent, from the smallest to the largest, 1—5, 6—25, 26—100, and >100 specimens per 20 ml 'drip-free' algae. The amount of *H. hyalina* has only been estimated subjectively; the numbers of individuals represented by a square of given size are much larger for this species than for the others. The number of samples obtained from each site varies from 1 to 7 and the black squares represent mean values. Drawings from SARS (1895, 1899) and MARCUS (1940).

get enough food. I have found *A. rubricata* and *C. bonelli* only at localities 1 and 2, at the latter only at 2.5 m.

C. bonelli is a suspension feeder (ENEQUIST 1950) and its tube is built of mud. A mud-tube is unlikely to stand much exposure, so that this species is unable to live at locality 3.

A. rubricata is known to feed on algal fragments which drift within reach of its tube, but it also eats living algae and it may turn carnivorous (SKUTCH 1926).

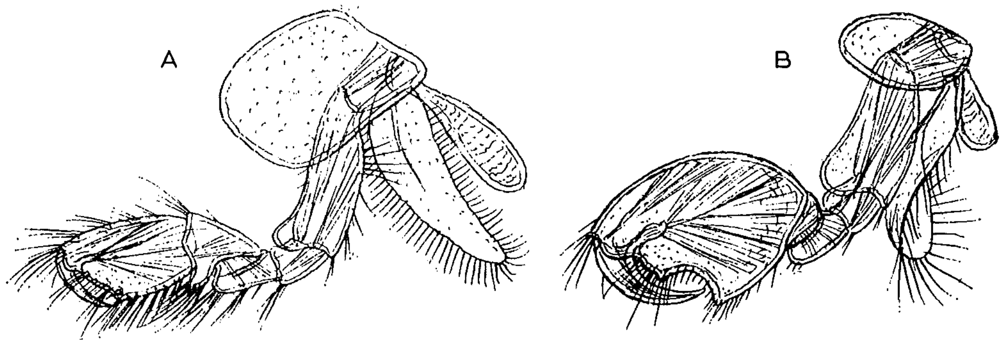

Fig. 4. Second gnathopods of *Ampithoe rubricata* ♀ (A) and *Parajassa pelagica* ♀ (B). Drawings from SARS (1895).

The tube is built from algal fragments, living algae, and excrement, kept together with 'amphipod silk' secreted by special glands on the pereiopods (SKUTCH 1926).

The tube of *P. pelagica* is very similar to that of *A. rubricata*. *P. pelagica* has been observed in petri-dishes to grasp pieces of algae and everything else that is brought within reach of its tube. It may feed, therefore, in the same way as *A. rubricata*, but it is possible that it is also a suspension-feeder. Its very setose antennae seem ideal for filtering and it cleans them often by pulling them through the half-closed claw of the first gnathopod, but I have not been able to see if anything is carried to the mouth.

SKUTCH (1926) described how females of *A. rubricata* expelled their offspring very soon after they emerged from the brood-pouch, whereupon the young ones started building their own tubes. If this is a usual practice, it may explain the difference in occurrence of *A. rubricata* and *P. pelagica*. The very strong wave action at locality 3 practically every day in the year probably makes it difficult for young *A. rubricata* to start building a tube of their own. If they are not able to cling to the algae, they will be carried away and prevented from building a tube. The young specimens of *P. pelagica* on the other hand, have much larger second gnathopods, the proportional difference being similar to that between the adult females (Fig. 4). I have seen these two species, when out of their tubes, clinging to branches of *C. officinalis* with their gnathopods (Fig. 5). It is quite possible that *A. rubricata* does not occur among *C. officinalis* at locality 3 because the young ones (and perhaps also larger animals) are not able to cling to *Corallina* because of the wave-exposure, and therefore cannot build tubes there. It must be pointed out, though, that I have not examined other algae and it is not impossible that *A. rubricata* occurs at locality 3 on algae with thinner thalli, which are easier to grasp with smaller gnathopods — and perhaps also give a better hold for the other legs.

Of the other amphipods shown in Fig. 3, *Stenothoe monoculoides* (SP. BATE) and

Fig. 5. *Parajassa pelagica* using one of its second gnathopods to cling to a branch of *Corallina officinalis*. (Photographed in a petri-dish; electronic flash.)

Apherusa jurinei (MILNE-EDWARDS) occur at all three localities. Both have strong legs and are well adapted to cling to the algae. They are also good swimmers.

Apherusa bispinosa (SP. BATE) is confined to the least exposed sites, locality 1 and at 2.5 m at locality 2. It is not as strongly built as *A. jurinei*; the body and the legs are both much more slender.

Dexamine thea BOECK is probably a detritus feeder. ENEQUIST (1950) noted that *Dexamine spinosa* (MONTAGU) ate detritus mixed with carmine. Apart from size, *D. thea* is very similar both in the structure of the mouth-parts and in general morphology so it is likely that this is also a detritus feeder. *D. thea* also has relatively long legs and is not found at the most exposed sites.

The morphology of the four isopods, *Idotea pelagica*, *Jaera praehirsuta*, *Ianiropsis breviremis* G. O. SARS, and *Munna boecki* KRÖYER, reflects to some extent the exposure to which they are subject. *I. pelagica*, which occurs in large numbers at the most exposed locality, is compact and very strongly built. The legs are short and thick, and the terminal claws large and strong, making the species well adapted to cling to algae.

J. albifrons and *I. breviremis* occur at all three localities. Their legs are longer and thinner and look less strong than those of *I. pelagica*. The terminal claws are also smaller.

M. boecki was found only at the least exposed sites. It has very long legs and antennae, which might well get tangled in fast-moving water.

By far the most common bryozoan was *Hippothoa hyalina* (L.), which occurred in very large numbers at a depth of 5 m at locality 3. At locality 1 no Bryozoa were found, probably because sediment prevented settlement of the larvae. MATURO (1959) considered silt a major factor in preventing the establishment of bryozoans.

SUMMARY

Wave exposure affects the form of growth and the zonation of *Corallina officinalis*. It also affects the composition of the fauna, indirectly probably through its effect on *C. officinalis* and directly through the effect of water motion on the species themselves; only those species able to stay in their habitat even in very strong surf occur under conditions of strong exposure. The result of this seems to be that the species found in the most exposed locality are characterized by shorter legs and stronger terminal claws than those found only in the less exposed localities. In the case of tube-living amphipods a strong tube is necessary for survival. Lack of wave exposure can result in an accumulation of sediment which prevents the settling of Bryozoa.

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