

Comparable groups of animals were simply replaced at their normal tidal height on their host algae after handling. The direction and distance of movement was measured to investigate any homing behaviour after 1, 2 and 4 days. Littorinids at mid shore moved further than those at the low shore and there was no difference in the distance moved by the two species. Displaced animals, however, did show a tendency to move further than the species at their normal range - and this was especially clear after 4 days. Also after 4 days all displaced animals of both species showed directional movement towards their normal "home" zones. This was developed after 2 days for both species.

The differential rates of movement between mid and low shores and also the cues for movement for these species may be the host algae. *Ascophyllum* lies flat on the substrate therefore making lateral movement relatively easy as compared to *F. serratus* which is found in clumps. Also exudates from these algae have been shown to specifically attract and repel these species of littorine (Norton & Manley, 1990) and it is possible that the winkles are using chemicals as a cue.

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## The ecology of Hong Kong Littorinids

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Thirteen species of littorinids have been recorded in Hong Kong (Reid, 1992). They belong to the genera *Peasiella*, *Littoraria*, *Nodilittorina*, *Littorina* and *Mainwaringia*, inhabiting both rocky shore and mangrove areas. These species can easily be distinguished by their shell characters, penis shapes and egg capsule structures.

Studies have been concentrated on the most abundant species of littorinids found around the rocky shores of Hong Kong which are *Nodilittorina trochoides*, *Nodilittorina radiata*, *Nodilittorina vidua* and *Peasiella roepstorffiana*. Three sites of different wave exposure, in sequence of decreasing exposure, Big Wave Bay, Cape d'Aguilar and South Bay, were selected to visit monthly.

The vertical distribution of the littorinids has been examined by belt transects. Vertical distribution is similar in all three sites, with *N. trochoides* and *N. radiata* being abundant higher up the shore than *N. vidua* and *P. roepstorffiana*. The amount of food available for the littorinids is estimated by the concentration of chlorophyll per rock surface area in order to note the relationship between the littorinid distribution and abundance and the food supply. Exclusion experiments will be set up to further investigate the relationship. The popula-

tion structures of the littorinids are investigated at the three sites by collecting about 400 individuals at each site and recording shell lengths and sex.

Egg capsules of littorinids can be obtained by separating the females in vials, with a little sea water. The egg capsule morphology varies greatly and the size never exceeds 250 microns. Veligers hatch two days after spawning and the time period needed before settlement is 46 days for *N. vidua* in a laboratory condition.

Roughness experiments will be set up in the coming months. Evidence of predation by shore birds and dogwhelks, plus density-independent mortality by rainstorm will be further studied.

A combination of these factors will help elucidate the role of these littorinids in the ecology of the upper intertidal in Hong Kong.

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## Genetic comparison of four species of *Littorina* considered before as *Littorina kurila*

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It was believed that 6 species of *Littorina* inhabit the north-western part of the Pacific ocean (Golikov & Kusakin, 1978). It has been found with a method of electrophoresis that 4 species of *Littorina* considered before as *L. kurila* occur on the Kurile Islands. There are : *L. sitkana*, *L. subrotundata*, *L. kasatka* and *L. sp.*

These species were compared electrophoretically using 17 loci coding 14 enzymes. Phenograms reflecting genetic relationships between species were produced from estimates of genetic distance (Nei, 1972) by unweighted pairgroup method. All species are easily separated on the allozyme markers of gene. Diagnostic loci are revealed. The genetic distances are : between *L. sitkana* and *L. species* 0,786, between *L. sitkana* and *L. subrotundata* 0,981, and between *L. sitkana* and *L. kasatka* - 1,660.

On the basis of obtained data it may be thought that *L. sitkana*, *L. subrotundata* and *L. sp.* are members of a common species complex. According to Reid's classification (Reid, 1990) these three species correspond to the subgenus *Neritrema*, whereas *L. kasatka* - corresponds to the subgenus *Littorina*. The genetic distance between the later and *L. sitkana* is far more than it is between *L. sitkana* and atlantic species, which are members of the same subgenus *Neritrema*.

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