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This Week's Citation Classic

Newell R. The role of detritus in the nutrition of two marine deposit feeders, the prosobranch *Hydrobia ulvae* and the bivalve *Macoma balthica*. *Proc. Zool. Soc. London* **144**:25-45, 1965.
[Dept. Zoology, Westfield Coll., Univ. London, England]

Experimental studies suggest that organic debris is initially colonised by microorganisms which utilise the detrital carbon as an energy source. Ingestion by deposit-feeders allows utilisation of the microbial protein, the voided material then becoming available for further cycles of microbial recolonisation and ingestion by consumers. [The *SCI*® indicates that this paper has been cited in over 220 publications since 1965.]

R.C. Newell
Institute for Marine Environmental Research
Plymouth PL1 3DH
England

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"One of the features of estuaries which had interested me for several years was that the food resources for the dense communities of deposit-feeders consist primarily of faecal material which has already been exploited by consumer organisms and which might therefore be assumed to have little further nutritive value. I decided to work on this problem at Westfield College (University of London) and found that natural detritus had an unexpectedly high nitrogen content and represented a protein resource for exploitation by deposit-feeding animals. During passage through the gut, the microbial protein was removed from the detritus so that the voided faeces were low in nitrogen. Following incubation in seawater, however, the faeces were recolonised by heterotrophic microorganisms which fixed nitrogen and utilised the detrital carbon as a substrate. The detritus thus became available again as a nitrogen-rich food resource for deposit-feeding organisms. I inferred that this cycle could be repeated several times until microbial activity had oxidised all the carbon in the original organic debris.

"Recent developments for direct estimation of absorption efficiency, microbial biomass, and routine CHN-analysis make the experimental techniques I used seem embarrassingly crude. Perhaps such work is more fairly judged by the prevailing attitudes and techniques available in the early 1960s; certainly many scientists had evidently been thinking along similar lines to myself. There followed a spate of research on the role of microorganisms in detrital systems which has continued to the present, and which accounts for the frequent citation of my early paper.

"I returned to working on detrital systems in 1978 and, partly because of the original work I carried out on detritus utilisation, I was fortunate enough to be awarded a senior research fellowship of the Royal Society, an appointment which I hold at present. As a result of this more recent work, we now know not only the carbon, but also the nitrogen, requirements of at least some consumer organisms[1] and can thus for the first time match the available supply of carbon and nitrogen quantitatively to the requirements of the consumer community.[2-4] What has emerged is a more complex picture than I was able to infer from my rather simplistic study of *Hydrobia* and *Macoma*. Several detritus-feeders can absorb a significant proportion of their carbon requirements from the detrital supply itself,[3,5] but the microbial component constitutes a major source of protein to the consumers.[4,6] The essential significance of microorganisms as a protein resource for larger consumers thus appears to be confirmed quantitatively for at least some communities."

1. **Hawkins A J S.** *Metabolic strategy in the marine mussel*, Mytilus edulis *L.* PhD thesis. Exeter, UK: University of Exeter, 1983.
2. **Newell R C & Field J G.** The contribution of bacteria and detritus to carbon and nitrogen flow in a benthic community. *Mar. Biol. Lett.* **4**:23-36, 1983.
3. **Selderer L J, Newell R C & Cook P A.** Quantitative significance of style enzymes from two marine mussels (*Choromytilus meridionalis* Krauss and *Perna perna* Linnaeus) in relation to diet. *Mar. Biol. Lett.* **3**:257-71, 1982.
4. **Selderer L J, Davis C L, Robb F T & Newell R C.** Utilisation of bacteria as a nitrogen resource by the kelp-bed mussel *Choromytilus meridionalis* Krauss. *Mar. Ecol.—Progr. Ser.* In press, 1983.
5. **Stuart V, Field J G & Newell R C.** Evidence for the absorption of kelp detritus by the ribbed mussel, *Aulacomya ater* (Molina) using a new ^{15}Cr-labelled microsphere technique. *Mar. Ecol.—Progr. Ser.* **9**:263-71, 1982.
6. **Newell R C & Field J G.** Relative flux of carbon and nitrogen in a kelp-dominated system. *Mar. Biol. Lett.* **4**:249-57, 1983.