ABSTRACTS OF MEMOIRS

RECORDING WORK AT THE PLYMOUTH LABORATORY

BRYAN, G. W., 1976. Heavy metal contamination in the sea. In *Marine Pollution* (ed. R. Johnston), pp. 185–302. London: Academic Press.

The first part of this review describes the sources of metal input to the oceans and the fate of metals in sea water and sediments. Following this there are sections on the absorption, storage and loss of metals by marine and estuarine organisms and on the toxicity of metals. The final part of the review deals with the effects of metals on organisms in the field, organisms as indicators of metal contamination and the influence of metals from marine sources on man.

CLARKE, M. R., 1977. Beaks, nets and numbers. *Symposia of the Zoological Society of London*, No. 38, 89–126.

Comparisons are made between collections of cephalopod beaks obtained from the stomachs of a variety of predators, including sperm whales, porpoises, seals, sharks, tuna and birds, and collections of cephalopods obtained with several kinds of nets.

Over 140000 lower beaks from the stomachs of sperm whales from various regions, and more than 4000 specimens from nets form the main basis for comparisons, together with selected published work. Comparisons are made between the family compositions of various samples from different regions, and the coverage is often sufficient to distinguish between regional effects and differences due to type of sampler.

In the North Atlantic, nets with small mouths take a large proportion of cranchiids while nets with large mouths catch a large proportion of enoploteuthids. Sperm whales, on the other hand, generally take a far bigger proportion of histioteuthids and octopoteuthids, families that are relatively rare in net samples; near-surface lining in temperate and tropical regions in the North Atlantic yields very little but ommastrephids, which is also true of midwater photography.

The relative numerical importance of families in the diet of the sperm whale in different regions is assessed. Because sperm whales are so large and numerous they must play an important part in their trophic level. Cephalopods form a considerable part of the food of the sperm whale so that they too must be very important in the ecology of the oceans. The relationship, by weight, of cephalopod families in the sperm whale diet is assessed for various regions sampled by the author and other workers. A rough estimate of the total weight of cephalopods eaten by sperm whales each year is over 100 million tons, but is likely to have been twice as much in the years before 1946.

The possible significance of the increase in the number of species caught by opening–closing nets between 60 and 11° N in the North Atlantic is discussed.

GILPIN-BROWN, J. B., 1977. The squid and its giant nerve fibre. *Symposia of the Zoological Society of London*, No. 38, 233–241.

An explanation of the importance of the squid's giant nerve fibre to the squid, and to man. A transcript of the commentary of a 16 mm film of the same title which was made for the Symposium, it gives a brief account of Professor Young's investigations of the giant nerve fibres of squid in the 1930s and describes some of the techniques that different scientists have developed subsequently for their study. Although obviously incomplete without the accompanying film, the usefulness of the transcript has been increased by the inclusion of additional references.

HARRIS, R. P., BERDUGO, V., O'HARA, S. C. M. & CORNER, E. D. S., 1977. Accumulation of ^{14}-C-1-naphthalene by an oceanic and an estuarine copepod during long-term exposure to low-level concentrations. *Marine Biology*, **42**, 187–195.

Accumulation of the bi-cyclic aromatic hydrocarbon ^{14}-C-1-naphthalene in adult female *Calanus helgolandicus* Claus and adult female *Eurytemora affinis* Poppe in sea-water concentrations of hydrocarbon ranging from 0·2 to 992 μg/l was studied during exposure periods of up to 15 days as part of an investigation of the possible effects on marine zooplankton of persistent exposure to low levels of petroleum hydrocarbons. With both species the body levels of radioactivity increased rapidly during the first few days of the exposure period, but after exposure for 7–8 days to sea water containing 50 μg hydrocarbon/l an equilibrium condition was approached; in some experiments where *E. affinis* was exposed to 1·0 and 10 μg hydrocarbon/l for 15 days there was no further increase in body levels of radioactivity after 7–8 days. Using a low concentration of hydrocarbon (1 μg/l), the quantity of radioactivity accumulated after 10 days was found to be nearly fifty times greater in the smaller species, *E. affinis*, than in *C. helgolandicus*, when expressed in terms of body weight. After they had been exposed to the hydrocarbon for several days the copepods contained a considerable proportion of radioactivity that was no longer identifiable as naphthalene and was presumably present as metabolites. Radioactivity accumulated in the copepods after several days was rapidly lost after they were transferred to uncontaminated sea water; e.g. *C. helgolandicus* lost nearly 90 % of its body level of radioactivity in 24 h. Thereafter the rate of loss was greatly reduced, and 5 % of the original body level of radioactivity still remained in the copepods at the end of 11 days. Experiments on the breakdown of naphthalene added at low concentrations to sea-water samples containing natural microbial populations indicated degradation rates of 0·1–0·2 μg/l/24 h in oceanic water, and 2·6 μg/l/24 h in inshore water samples. The results are discussed in terms of the possible transfer of hydrocarbon to a higher trophic level in areas subjected to constant low-level inputs of petroleum hydrocarbons.

MEVES, H. & PICHON, Y., 1977. The effect of internal and external 4-aminopyridine on the potassium currents in intracellularly perfused squid giant axons. *Journal of Physiology*, **268**, 511–532.

1. The effect of 4-aminopyridine (4-AP) on the K outward and inward currents in perfused giant axons of *Loligo forbesi* has been studied with the voltage-clamp technique.

2. Small internal or external 4-AP concentrations (10–100 μM) considerably delay the rise of the K outward current. Repetitive pulsing with a pulse interval of 0·1–5 sec leads to a faster rise of the K current; in 10 μM 4-AP a small effect is visible even with a pulse interval of 60 sec.

3. The phenomenon has been studied quantitatively by using a prepulse of varying height and duration, followed after 5 sec by a constant test pulse. The effect of changing the holding potential has been investigated.

4. The effect of repetitive pulsing disappears in higher 4-AP concentrations; 1–10 mM 4-AP markedly reduce the size of the K outward current; the blocking effect is less pronounced for large depolarizing pulses than for small.

5. In K-rich sea water 4-AP reduces both the K outward current and the K inward current; the blocking effect on the K outward current is smaller than in K-free sea water.

6. The K outward current in fibres treated with 10 μM 4-AP and immersed in K-rich sea water is increased and accelerated by repetitive depolarizing pulses. The effect of repetitive pulsing is not dependent on the size of the K outward current (which can be increased by removing K inactivation).

7. The effect of repetitive pulsing and the voltage dependence of the 4-AP block can be explained by the hypothesis that 4-AP molecules are displaced from their blocking sites during the pulse and slowly rebound afterwards. Removal of the 4-AP block by a depolarizing pulse seems to be a direct effect of the potential during the pulse and not related to K current.