J. mar. biol. Ass. U.K. (1973) 53, 465–467
Printed in Great Britain

ABSTRACTS OF MEMOIRS

RECORDING WORK DONE IN THE PLYMOUTH LABORATORY

CLARKE, M. R., 1972. New technique for the study of sperm-whale migration. *Nature, London*, **238**, 405–406.

Knowledge of sperm-whale migration between the Antarctic and subtropical waters rests upon return of marks or external infestation by the Antarctic *Cocconeis* and *Cyamus*. Marking is expensive and has only resulted in one return showing a northward migration. External infestation can only show northward movement and is influenced by the freshness of the whale. In most regions sperm whales feed on cephalopods whose beaks are not digested but are retained in the stomach and vomited periodically. Studies on the flesh and beaks have made it possible to distinguish between the beaks of cold-water Antarctic cephalopods and those from warm waters off Africa and Australia. Stomachs of some whales caught off Durban include beaks of Antarctic squid. In females and small male whales (< 35 ft) Antarctic beaks contributed 1·3 % or less of all beaks collected. In 60 % of larger males (> 37 ft) Antarctic species contributed 9–85 % of all beaks. Sight records show that female whales occur south to 40° S and the very small numbers of Antarctic cephalopod beaks in females' stomachs suggest that the northern limit of distribution of these cephalopods is close to the subtropical convergence. Those whales with more than 80 % Antarctic beaks must have eaten very little during their 600-mile journey from 40° S to Durban probably taking 5–8 days. Similar evidence suggests sperm whales do not normally migrate from west to east round South Africa. Extension of the method to other areas requires a detailed knowledge of cephalopod distribution which should come from further studies. M.R.C.

DENTON, E. J., GILPIN-BROWN, J. B. & WRIGHT, P. G., 1972. The angular distribution of the light produced by some mesopelagic fish in relation to their camouflage. *Proceedings of the Royal Society of London* (B), **182**, 145–58.

The angular distributions of luminescent light produced by two oceanic fish, *Argyropelecus affinis* and *Chauliodus sloani*, were measured in two vertical planes, one containing the antero-posterior axis of the fish and the other at right angles to this axis. These distributions of light were of the kind required to match, over a wide range of angles of viewing, the external daylight field in the ocean. These observations give strong support to the hypothesis that the function of many photophores is to give camouflage.

DILLY, P. N. & MESSENGER, J. B., 1972. The branchial gland: a site of haemocyanin synthesis in *Octopus*. *Zeitschrift für Zellforschung und mikroskopische Anatomie*, **132**, 193–201.

The branchial glands of cephalopods are essential to life. Electron-microscope observations have produced evidence that in *Octopus* they are the site of haemocyanin formation. The glands are profusely vascularized and have no ducts. They contain secretory cells that are arranged in numerous acinar groups surrounding the capillaries. Electron microscopy shows that the gland cells contain masses of endoplasmic reticulum surrounding the nucleus. The rest of the cytoplasm consists of pale granular areas that contain large (1 μm) vacuoles that may be empty or contain granules. The granular endoplastic reticulum is highly organized in large parallel arrays. The gaps between the ER membranes are filled with granular material similar in appearance to that found in the pale areas of the cell cytoplasm. Some granular material is membrane bound and some lies within the cavity of the reticulum. These granules are roughly spherical about 25 nm in diameter. They have a dense periphery surrounding a central clear core. They are identical in size and appearance with haemocyanin granules found in *Octopus* blood vessels. It is suggested that the

haemocyanin granules are made in the endoplasmic reticulum, are then released and encapsulated in the vacuoles. Then the vacuoles will ultimately release them into the capillaries and hence into the circulation.

GIBBS, P. E., 1972. Polychaete annelids from the Cook Islands. *Journal of Zoology, London*, **168**, 199–220.

A systematic account of a collection of polychaetes from the Cook Islands, central Pacific, is given together with ecological and zoogeographical notes. New species of the genera *Ceratonereis*, *Perinereis*, *Scolelepis* and *Myriochele* are described.

GILPIN-BROWN, J. B., 1972. Buoyancy mechanisms of cephalopods in relation to pressure. *Symposia of the Society for Experimental Biology*, **26**, 251–259.

Two of the buoyancy mechanisms found in the cephalopods are described, the first concerned with certain body fluids, the second with the well-known chambered shells. In the first case, neutral buoyancy is achieved by means of liquid-filled buoyancy chambers. In the Cranchidae this consists of a single chamber (the much enlarged coelom) but in some other families the buoyant liquid is contained in very many small vacuoles situated mainly in the mantle and arms. In the second case neutral buoyancy is brought about by the buoyant shell. The buoyancy of the shell is determined by the proportion of liquid and gas the chambers contain. Liquid is exchanged with the tissues of the animal through the siphuncle, a specially permeable region of the shell covered by an active epithelium which can pump liquid out of the shell. Since the pressure of gas within the chambers is always less than atmospheric the whole mechanical pressure of the sea has to be borne by the shell structure and gas pressure plays no part in holding liquid out of the shell.

PINGREE, R. D., 1972. Mixing in the deep stratified ocean. *Deep-Sea Research*, **19**, 549–61.

Mixing along neutral surfaces produces the small-scale structures in the deep ocean. New surfaces are defined for use on T, S curves for deep-water spreading of Mediterranean Water in the N.E. Atlantic.

ROBERTS, B. L. & RUSSELL, I. J., 1972. The activity of lateral-line efferent neurones in stationary and swimming dogfish. *Journal of Experimental Biology*, **57**, 435–48.

The lateral-line sense organs of fishes, as well as being supplied by sensory nerves, are innervated by nerve fibres which originate in the brain and which are of unknown function. The activity of these nerve fibres was followed by recording from filaments of cranial nerve X in decerebrate dogfish (*Scyliorhinus*). The efferent nerves were not spontaneously active but became active in response to tactile stimulation, vestibular stimulation and noxious chemical stimulation. In contrast, natural stimulation of the lateral-line system (water jets) did not reflexly evoke discharges from the efferent fibres. The successful stimuli were those which were followed by movements of the fish. Vigorous body movements, involving the white musculature, were accompanied by vigorous efferent nerve activity while rhythmical swimming movements were associated with rhythmical bursts of low-frequency efferent nerve activity. It was concluded that the efferent neurones do not contribute to a feedback regulatory system. The close correlation which was found between body movement and efferent nerve activity suggested that the system operates in a protective manner to prevent the lateral-line organ from being over-stimulated during vigorous body movement.

B.L.R.

RUSSELL, I. J. & ROBERTS, B. L., 1972. Inhibition of spontaneous lateral-line activity by efferent nerve stimulation. *Journal of Experimental Biology*, **57**, 77–82.

The efferent nerves innervating the body lateral-line organs in the dogfish *Scyliorhinus* were stimulated electrically while the spontaneous activity of the lateral-line organs was recorded from sensory nerve fibres. Significant changes in the spontaneous impulse frequency could be produced when the efferent nerves were stimulated by trains of pulses at a frequency between 20 and 100 sec^{-1}, but lower frequencies had no visible effect. The sensory activity decreased or was totally inhibited during the stimulus period and for 150–200 msec following it. The inhibitory effect was very variable and declined during repetitive stimulation. B.L.R.

SOUTHWARD, A. J. & SOUTHWARD, E. C., 1972. Observations on the role of dissolved organic compounds in the nutrition of benthic invertebrates. III. Uptake in relation to organic content of the habitat. *Sarsia*, **50**, 29–45.

Experimental evidence shows that many soft-bodied marine invertebrates accumulate amino acids, glucose, and fatty acids from dilute solutions by direct uptake through the epidermis. Comparison with what is known of the occurrence of these compounds in marine deposits suggests that some bottom-living animals could take up enough to meet all their metabolic needs as calculated from oxygen consumption. The species with significant rates of uptake include some polychaet worms and small unitentaculate pogonophores.

Pogonophores seem capable of obtaining useful quantities of amino acids and glucose from concentrations less than 10^{-5} moles/l; for the same uptake polychaetes require concentrations of the order of 10^{-5} to 10^{-4} moles/l, whereas tapeworms living in the rich environment of the digestive tract of vertebrates function best at levels around 10^{-3} moles/l. These concentrations may possibly indicate the levels of dissolved substances in the normal habitat, and illustrate the degree of adaptation of the uptake mechanism.

It is not yet possible to draw any definite conclusions about the nutritive value of epidermal uptake in animals which possess a functioning alimentary canal, though in some forms it could be of more than supplementary use. In pogonophores, which have no internal digestive system, it is reasonable to suppose that the small species examined so far can and do exist on the total absorbable organic matter in the habitat.