OBSERVATIONS ON THE OPISTHOBRANCH MOLLUSC AKERA BULLATA IN THE FLEET, DORSET

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Introduction

The shelled opisthobranch Akera bullata has been an abundant member of the aquatic fauna of the Fleet for 130 years or more. In their 'A History of British Mollusca, and their Shells', Forbes & Hanley (1848-53) stated that "About four miles from Portland Bridge, the mud, at high water mark is fringed with thousands of them". They are still common, with densities up to 120 per square metre (Seaward, 1978). Nonetheless, the systematic position of Akera has only recently been agreed by experts on the group. Traditionally, the family Akeridae had been placed in the opisthobranch order Bullomorpha (e.g. Thompson, 1976), by virtue of its possession of a set of bullomorph characters, such as the external shell, consisting of several whorls, albeit somewhat fragile and incapable of accommodating the soft parts during defensive retraction. Furthermore, Akera has a flattened cephalic shield with rounded wing-like antero-lateral expansions behind the eyes. The foot is dilated to form broad parapodial lobes which, when not in use for swimming, are folded over the shell dorsally.

Recently, however, Morton (1972) has revived an idea of Guiart (1901), that the akerids were more closely related to the Aplysiidae. Our own studies on the spermatozoa of these and other opisthobranch groups have provided corroboration, which, taken to its logical conclusion, means that the Akeridae must be transferred from the Bullomorpha to the Aplysiomorpha.

Taxonomic Status of Akera bullata Muller, 1776

So much for the systematic position of Akera, now to the equally vexed question of the correct naming of the British records. Taking these as a whole, the taxon can be defined as follows:

The length of the external shell may reach 41mm, swollen, fragile, glossy, up to 6 whorls, pale amber in colour; the aperture is typically about the same length as the shell or shorter. The body can reach 70mm in extended length, pale grey or brownish (very dark in the largest individuals), bearing irregular blackish mottling, often forming longitudinal streaks on the head and sprinkled with white specks overall. The cephalic disc is slightly bilobed in front and is expanded laterally to form flattened flared cephalic lobes below which are the wrinkled organs of Hancock. The eyes can be seen antero-dorsally, lying beneath paler patches of the skin. The natatory parapodial lobes mask the shell to a considerable extent, especially in larger individuals. There is no clear demarcation between the pedal sole and the parapodia. The propodium is bilabiate. The anterior lip of the shell is ensheathed by a reflexed fold of the mantle edge. Posteriorly, another lobe of the mantle projects with a short exhalant siphon. The layer of the mantle which lines the shell internally is dark in colour with pale markings which can be very uniform in any locality. Swimming is sporadic and is brought about by graceful synchronous movements of the parapodia (Morton & Holme, 1955). Specimens have been reported from areas all around the British Isles (Seaward, 1982); further records have come from Norway, Denmark, the Baltic Sea, Atlantic and Mediterranean coasts of France, Spain and the Greek Ionian Sea, to a maximal depth of 370m.

A closer study of the British material leaves little doubt that two separate subspecies are embraced within the above description of the Akera bullata aggregate. One subspecies, the variety farrani Norman, 1890 occurs in the open waters of the English Channel and elsewhere, notably in Lough Ine, Co. Cork (Ireland). It may reach 70mm in body length, swims vigorously in the adult phase, often possesses an elongated, finger-like posterior pallial lobe, and a purple gland which can expel a defensive fluid from the mantle cavity. The subspecies nana Jeffreys, 1867, found in the Fleet, is different in several significant respects. This local variety rarely exceeds 20mm in overall body-length, swims only as a juvenile, has an obtusely rounded posterior pallial lobe (very rarely produced to form a tentacle) and lacks the ability to secrete defensive purple.

Both subspecies are illustrated in Fig. 1. How far are the differences between nana and farrani truly genotypic? It might be alleged, for example, that the smaller nana simply represented the juvenile stage of farrani. To settle this point, one would normally turn to details of the buccal mass or the reproductive biology (larval strategy, egg size, sperm morphology), but in the present perplexity these have not proved to be helpful. This is because there are insufficient radular formulae available from areas outside the Fleet for a valid comparison to be made of the buccal masses. Furthermore, the eggs and the lecithotrophic larvae of the two subspecies are similar (although the spawn masses of farrani are significantly larger), and the spermatozoa are of virtually the same length (308-315μm with 55-61 gyres in nana; 325-330μm with 585-59 gyres in farrani).

Results of the Sampling Scheme

It was decided that a detailed study of the subspecies nana in the Fleet would contribute to a resolution of the problem of the status of the bullata complex and a programme of monthly sampling was initiated in November 1984. The present interim communication includes biometric data up to the end of 1985. The sampling will be continued for at least another year, and that second phase will be accompanied by histological examination of the ovotestes. Temperature and salinity continue to be monitored at the study site, the foreshore at Langton Hive Point, near the village of Langton Herring.

Figure 2 shows the temperature and salinity regime during part of the period. Salinity (measured using a refractometer) varied widely, dropping to 22 p.p.t. or lower in mid-winter, rising to 35.5 p.p.t. in the summer, as high as that in the open water of the English Channel. The temperature of the water at Langton Herring was usually higher than that of the air, but this tended to reverse in the winter months.

The biometric data (Fig. 3) show conclusively that the life cycle of Akera in the Fleet is an annual one. Each generation grows until spawn masses are produced in April-June. Spent adults died off (moribund specimens were common in the field in late April 1985 and all had died by the end of June) and were replaced by newly settled young, which dominated the samples in June and July. These juveniles had the ability to swim by parapodial contortions until they were 2 or 3 months old.

The benthic stages appear to be detritivorous; the faeces contained finely diminuted plant debris together with some animal skeletons, Polystomella for example. There is at present no evidence that Akera feeds directly upon living Zostera, either the roots or the leaves.

Conclusions

These observations reinforce the view that the Fleet population of Akera bullata nana is ecologically distinct from the larger A. bullata farrani reported elsewhere. There is no intergradation between either the morphological or the ecological data recorded for the two subspecies. Moreover, it now appears that they are different behaviourally in that swimming is characteristic of juveniles in nana but of adults in farrani. But until our sampling programme is complete, we prefer to suspend final judgement on whether the two subspecies should be elevated to full specific rank.

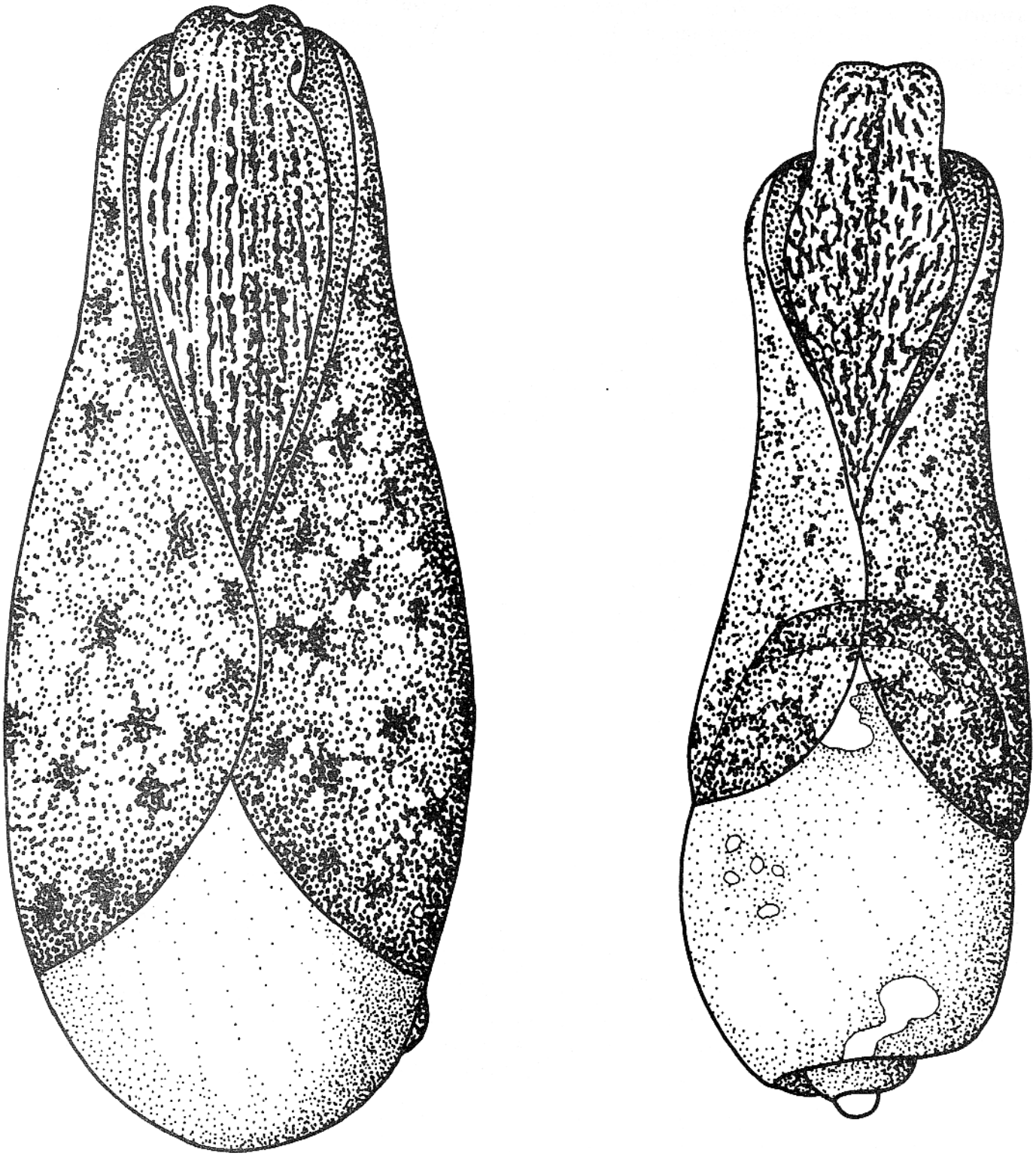

Fig. 1. Akera bullata, dorsal views of specimens from Lough Ine, Co. Cork (overall length 70 mm, subspecies farrani Norman), and from the Fleet, Dorset (overall length 16 mm, subspecies nana Jeffreys).

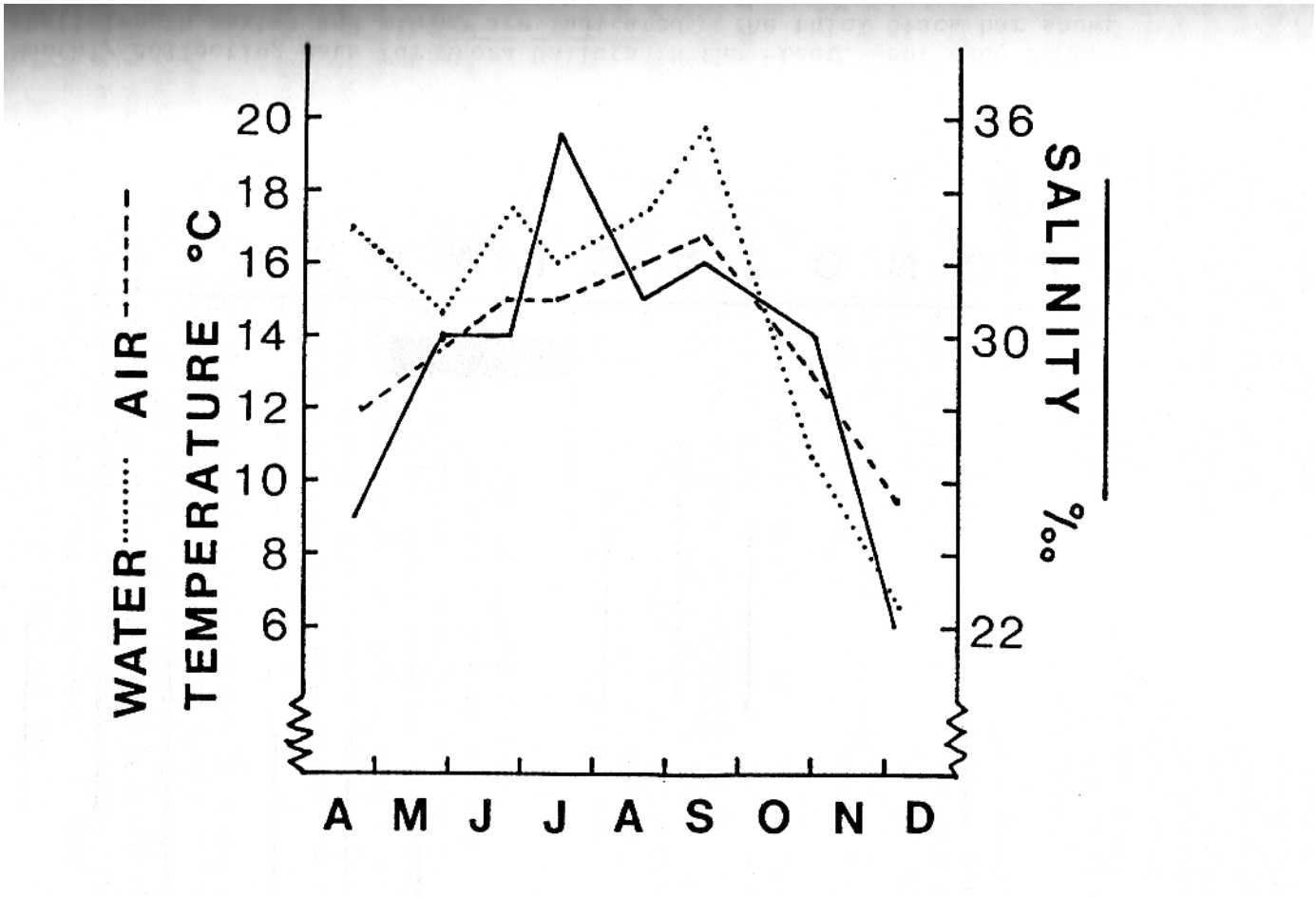

Fig. 2. Salinity and temperature measurements at Langton Herring during 1985; measurements made during approximately monthly visits.

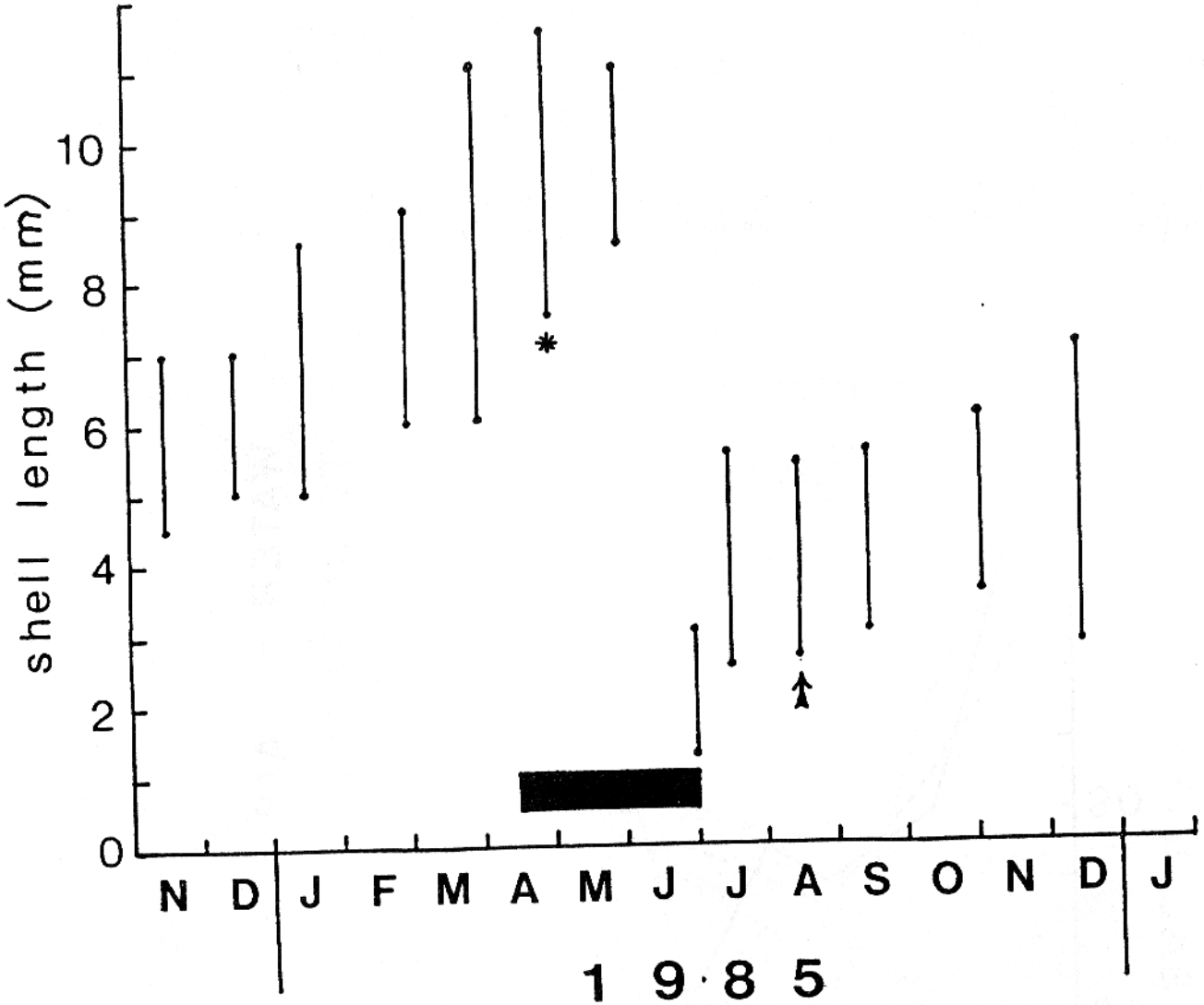

Fig. 3. Monthly collecting data for Akera bullata in the Fleet. For each sample, shell-length maxima and minima are indicated. The thick black bar shows the period when spawn was found in the field. The arrow indicates swimming behaviour; the asterisk indicates the pressence of dead and dying adults in the field.