ACTIVITY OF *MARPHYSAL GRAVELYI* SOUTHERN (POLYCHAETA) UNDER HETEROSMOTIC CONDITIONS

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INTRODUCTION

*Marphysa gravelyi* Southern is a common polychaete which occurs in the muddy substratum of the brackish-water regions of Madras, where salinities fluctuate over a wide range (Panikkar and Aiyar, 1937). In the laboratory under experimental conditions the worm is able to tolerate dilutions of sea-water ranging from 20–70% without any ill-effects (Krishnamoorthi, 1951). An attempt was made to see the extent to which the tissues of the animal would tolerate sea-water dilutions. Similar studies have been reported by Wells and Ledingham (1940). A knowledge of the toleration of the tissues to hypo- as well as hypertonic media, will help in understanding the importance of the constancy of an internal fluid and its regulation.

MATERIAL AND METHODS

*Marphysa gravelyi* was collected in the brackish-water regions of the Adyar estuary. The worms were washed in the medium and kept in water collected from the estuary. Survival rate was good and the worms remained in a healthy condition for over a week. The estuarine water at the time of collection was of the same strength as 30% sea-water (salinity of sea-water: 32.0%).

The preparation for recording the activity consisted of a small strip of the animal 3.2 cm. long. The head was removed and the first few anterior segments were utilised. One end of the worm was pinned on to a piece of cork and the other end was connected to an isotonic lever. The preparation was exposed to dilutions of sea-water in a glass tube of 30 ml. capacity. The movements were recorded in a kymograph drum, rotating at a very slow speed of 1.5 cm. per minute for 5–6 hours. The preparation was exposed to a constant volume of the experimental medium for a period of only 15 minutes so that the shock effects of the change in medium rather than slow acclimatisation were studied.
RESULTS

1. Effect of Hypo- and Hypertonic Media

Whole worms (Fig. 1) as well as bits of worm (Fig. 6) exhibited spontaneous activity which was maintained for long periods of time. No rhythmicity could be recognised in the activity. In normal medium there is a continuous peristalsis going on, there being rapid contractions and relaxations of the body muscles which is clear from the traces.

When the medium (30% sea-water) is replaced with 25% and 20% sea-water, there is an increase in activity which is maintained for several hours (Figs. 4 and 5). The preparation exhibits very rapid contractions of the body. There is a definite drop in the height attained indicating that the preparation is in a slightly relaxed condition. In 15% sea-water it is very vigorous to begin with but trails off at the end of a few minutes (Fig. 3). When the medium is changed and replaced with 10% sea-water, there is very little activity at first, but becomes more active at the end of a few minutes only to remain quiescent again (Fig. 2). If replaced with distilled water there is practically no activity. In all the hypotonic media below 20% the markings do not touch the base line indicating of the preparation being always in a slightly contracted condition.

The preparation, when transferred to hypertonic media of sea-water diluted to 40–45% and 50%, continued to be active (Figs. 7, 8, 9). In 60%,