A PRELIMINARY REPORT ON THE DIURNAL RHYTHM IN THE LOCOMOTOR ACTIVITY OF PILL-MILLIPEDE, ARTHROSPAERA DALYI (POCOCK)

BY AL. PAULPANDIAN*

(University of Madras, Madurai Centre, Madurai-2, S. India)

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The phenomenon of 24-hour periodicity in animals and plants is well known. Reviews by Welsh (1938), Park (1940) and Calhoun (1944), Harker (1958) and Cloudsley-Thompson (1961) give detailed information about physiological and behavioural rhythmicity in the animal kingdom.

Park, Lockett and Myers (1931) have studied the activity of the millipede, Polydesmus serratus and found the endogenous nature of locomotor activity which showed the peak of activity at night and inactiveness during the day. They showed that activity increases with increasing relative humidity and decreasing temperature; and decreases with decreasing relative humidity and increasing temperature. Park (1935) has shown in Spirobolus marginatus a persistent locomotor rhythm lasting for periods up to 18 days which is not associated with feeding or hunger periods. Cloudsley-Thompson (1951) has reported an exogenous rhythm primarily responding to light and darkness in the British millipedes, Blaniulus and Paradesmus. He has also shown in his aktograph studies on Ophistreptus and Oxydesmus an endogenous diurnal rhythm independent of fluctuating light and temperature and persisting up to 19 days.

The present paper is a preliminary report on the persistent endogenous diurnal rhythm in the locomotor activity of pill-millipede, Arthrosphaera dalyi (Pocock).

MATERIAL AND METHODS

The pill-millipedes, Arthrosphaera dalyi (Pocock), were collected from Pazhamudir Solai area of Alagarcoil hills which is about 12 miles from Madurai. They were reared in a glass terrarium, the base of which was...
filled with damp humus. Once in three days spraying water on the surface of the humus helped it to regain the loss of dampness. The temperature inside the terrarium was 27° C. ± 1° C. throughout the period of investigation.

The locomotor activity was recorded with an aktograph consisting of an animal chamber and a mechanical recording system. The animal chamber was a rectangular plastic box with perforations to allow free passage of air. One end of the chamber was suspended in a rigid support and the other end was connected to a palmer lever. Suitable weight was added in the recording arm to counterbalance the weight of activity chamber. When the animal moved from one end to the other, the chamber tipped on one side which actuated the lever which in turn recorded the movement on a smoked kymograph drum. To keep the animal chamber moist throughout the experimental period a wet filter-paper was placed at the bottom of the chamber. A cord piercing through the filter-paper and the bottom of the chamber irrigated the filter-paper from the water kept in a finger bowl placed 5 cm. below the activity chamber. This ensured not only a constant moist surface but a constant relative humidity. The activity chamber and the water container were placed in an outer chamber where the temperature was maintained at 27° ± 0.1° C. with a thermostat.

A 60-Watts incandescent lamp placed 50 cm. above the terrarium served as a light source for treating the animals to constant light condition. A similar lamp was placed 50 cm. above the experimental chamber to record the activity in continuous light condition. For treating the animals to constant darkness the terrarium was made light-tight by covering it with black paper. In the same way the experimental chamber was also made light-tight. The terrarium and experimental chamber were exposed to the normal light condition for natural light experiments.

A quantitative picture of the activity was obtained by measuring the number of tilts recorded in the paper.

**RESULTS**

Figure 1 shows the Kymograph tracing of the locomotor activity of pill-millipede *A. dalyi* kept in constant darkness.

Pill-millipedes conditioned to natural light in the laboratory show the diurnal rhythm of activity which is persistent beyond ten days. The activity phase sets in between 4 and 5 p.m. in the evening (Fig. 2). Two peaks of