

SHORT NOTE

Field Observations of Colony Movement and Division of the Ascidian *Didemnum molle*

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ABSTRACT: A group of colonies of the ascidian *Didemnum molle* Herdman was photographed approximately daily in the field for 12 d. Of the 16 colonies present on Day 1, many divided until there were 35 colonies on Day 12. Even colonies that did not divide often moved several cm during the observations. This is the first evidence for short-term movements by didemnid colonies under field conditions.

Migration over the substrate has been reported in adults of several ascidians of both colonial and solitary species, including *Botrylloides leachi* (White, 1877), *Ciona intestinalis* (Valle, 1900, 1901), and at least 6 different species of didemnids (Valle, 1900a, b; Carlisle, 1961; Birkeland et al., 1981; Thinh, personal communication). Didemnids commonly contain symbiotic prochlorophytes (Lewin, 1975; Birkeland et al., 1981; Thinh, personal communication) proposed that colonies may move so as to provide optimum sunlight for this symbiont.

The present note reports that colonies of *Didemnum molle* Herdman migrate over the substrate and divide under field conditions. In addition, a possible interaction between *D. molle* colonies and other benthic invertebrates is described.

This study was carried out at Calatagan, Batangas, Philippines (13° 53' N lat., 120° 39' E long.) for the 12 d period from July 22 to August 2, 1980. A large coral-head at a depth of 3 to 4 m, depending on tidal fluctuations, was marked with a buoy, and clusters of adult *Didemnum molle* colonies were chosen for observation. Photographic records were made at various intervals throughout the 12 d period using a Nikonos III camera with close-up lens (+2 diopter), flash, and framer to insure consistent size and angle of photographed area.

Photographs from Day 1 and Day 12 were superimposed with reference to stationary landmarks on a nearby coral to show the net changes in movement over time (Fig. 1). Next, external changes in morphol-

ogy and behaviour of dividing colonies are presented through a pictorial sequence covering 4 consecutive days (Days 9–12) of colony movement (Fig. 2).

Observation of *Didemnum molle* colonies over 12 d revealed movement of colonies on the order of a few cm. Change in position of colonies between Days 1 and 12 is indicated diagrammatically in Fig. 1. The colonies not only migrated, but some also divided. On the first day, there were 16 colonies, and on the 12th day there were 35 colonies; the almost daily photographic record left no doubt that all 35 came from the original 16. The number of cloacal apertures in all the colonies studied increased from 43 on the first day to 52 on the 12th day. A few of the colonies divided more than once during the 12 d observation, with as many as 4 colonies resulting from an original one. Total area of substrate covered by the ascidians was not markedly changed over the 12 d period.

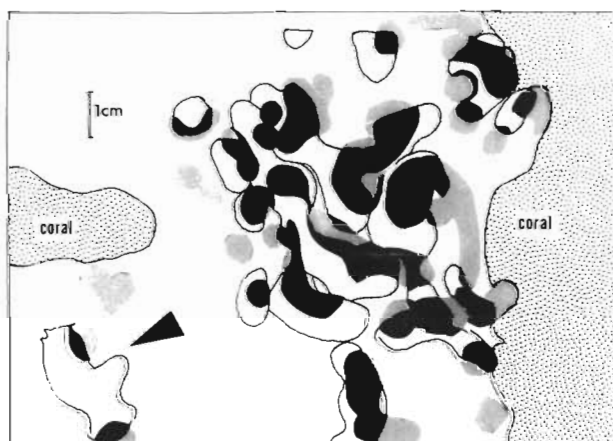


Fig. 1. *Didemnum molle*. Diagrammatic surface view of colonies on Day 1 (white areas) superimposed on surface view of colonies on Day 12 (finely stippled areas); areas of overlap are black. Coarse stippling indicates position of coral colonies (*Porites* sp.)

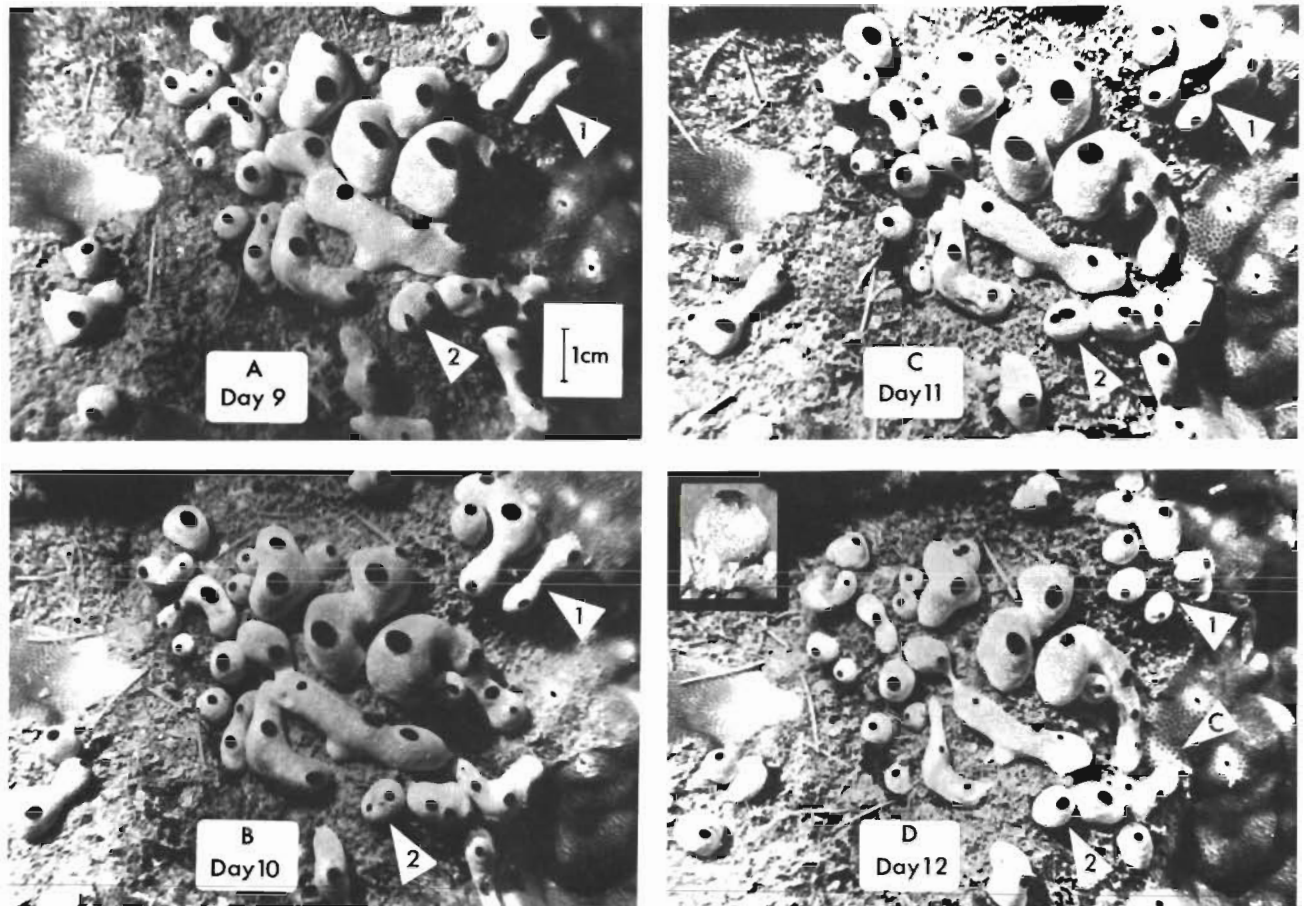


Fig. 2. *Didemnum molle*. Colony 1 with cleavage plane passing between adjacent cloacal aperture during Days 9 through 12 (A-D). Colony 2 shows a pair of apertures merging into one during Days 9 through 12. Arrow C indicates discoloration of periphery of a colony of *Porites* sp., indicating possible competition between ascidian and coral. Inset shows projections of test material which may be involved in movement and/or attachment of *D. molle*. Scale line on Fig. 2 A also applies to Figs. 2 B-D

In all colonies which did divide, the cleavage plane passed between 2 adjacent cloacal apertures as elongation proceeded. In some colonies small projections (Fig. 2 D, inset) were visible anchoring the ascidian to the substrate. Carlisle (1961) reported that Valle also believed *Diplosoma* sp. colonies used their ampullae to guide migration.

Presence of multiple atrial apertures alone did not necessarily indicate imminent division. For example, openings to cloacal cavities sometimes moved toward one another through the test until they merged (Fig. 2, Arrow 2). Carlisle (1961) reported a similar type of rapid reorganization of zooids in *Diplosoma* sp. Upon attachment to the substrate, individuals migrated through the test until their siphons burst through in the proper orientation. Here, through coordinated activity between zooids, entire large atrial cavities moved through test material until merging. The present study did not include sectioning of colonies to follow movements of the individual zooids.

The relatively rapid movement of *Didemnum molle*

colonies which accompanies division appears to be beneficial to their spaceholding ability. Increased numbers of colonies from division, in combination with motility could insure acquisition of more substrate area, in time, without giving up territory along the interface with a coral competitor.

In general, new colonies moved in the direction of acquiring space not occupied by coral (*Porites* sp.). With an increased number of separate colonies, the tunicate maintained an almost continuous interface with the coral. In Fig. 2 D, discoloration of *Porites* sp. may indicate competitive interaction between ascidian and coral.

Other observations of movement of large didemnids in the field have been reported by Carlisle (1961) in *Diplosoma* sp. and Birkeland et al. (1981) in *Trididemnum solidum*. These encrusting forms moved over long periods of time by growth and regression, competing with and overgrowing coelenterates which Birkeland states are 'apparently defenseless against overgrowth by ascidians'. During the short (12 d) observation

period of the present study, versus 2 year or 4 month studies respectively, *Didemnum molle* did not overgrow the *Porites* sp. colony; however, from discolored portions of coral along the interface, as well as maintenance of position, it appeared that smaller didemnids may also compete successfully against scleractinians.

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