PDF - POLYPIDE MORPHOLOGY AND FEEDING BEHAVIOR IN MARINE ECTOPROCTS - researchcub.infoObservations onliving colonies of 56 species of marine bryozoans from Florida and Panama haveshown that these organisms possess a variety of morphological and behavioraladaptations related to feeding activities. In the species studied meanlophophore diameter varies from 187 to 1,012 fivn, mouth size from 15 to 91ium, and tentacle number from 8 to 31. Polypide morphology, particularlyintrovert length and lophophore symmetry, also varies from species to species,and this variation is linked to behavioral strategy. With respect to individualpolypide behavior species can range from passive filterers (e.g. Crisiaelongala), to tentacle feeders (e.g. Pasylhea lulipifera), to cage-captors(e.g. Bugiila neriiina), to particle jugglers (e.g. Siindanelta sibogae).Colony-wide patterns of morphology and behavior also reflect various methods ofdealing with water currents. These range from weakly integrated patternscharacterized by separation and a high degree of functional independence ofindividual polypides to highly integrated patterns in which both skeletal morphologyand polypide orientation serve to enhance and/or channel feeding currents.Similar strategies have evolved in all three orders of marine bryozoans,apparently in response to the common problem of changing the characteristics ofwater flow in the immediate vicinity of the colony so that food particles maybe extracted. Behavior is not a word one commonly associates with colonialmarine organisms, particularly those as sessile and apparently inactive asectoprocts. Seeing the calcified crusts or seaweed-like festoons of theircolonies among the rocks of breakwaters or on the undersurfaces of platycorals, it is hard to imagine writing of any of them as, “remarkable among anactive tribe for the vivacity of its movements,” or, “A colony in full health andvigor affords a rare display of delicate structure, vivacious movement andgraceful form” (Hincks, 1880). Yet to 19th century naturalists, enchanted bythe newly discovered miniature world of the tide-pool, the ectoprocts wereindeed active creatures. In most species feeding activities of individualzooids are limited to movements of the polypide: protrusion, retraction,expansion and bending of the lophophore, and associated actions of the ciliatedtentacles. The basic features of the anatomy of the ectoproct polypide wereunderstood by the early 19th century. Farre (1837) was able to make detailedand accurate observations on the structure of the polypide in several species,noting size and activity of the tentacles, distribution of cilia and “bristles,”the form of various portions of the gut, the fate of food particles and theaction of swallowing. Hincks (1880) included in his survey of the Britishmarine Polyzoa much information indicating his understanding of individualmorphology and behavior, including the presence of sensory cells on thetentacles, though most of this information is buried in species descriptions.Yet the comparative aspects of polypide morphology have not received attention,and, indeed, examination of later 19th and 20th century literature shows agradual loss of information on polypide structure and function. Although the19th century knowledge of individual (polypide) behavior was never codified, itis apparent from species descriptions and illustrations (Grant, 1827; Lister, 1834;Farre, 1837; Hincks, 1880, and BULLETIN OF MARINE SCIENCE, VOL. 28, NO. 1, 1978Others) that individual behavior has been observed. Even the process of feedingwas studied (Grant, 1827; Farre, 1837; Hincks, 1880),

and, while the languagein which it was described is overly metaphorical for present-day scientifictastes, the observations themselves are generally correct. These authors notedboth that the current generated by the cilia of the tentacles acts to “create avery maelstrom in the water, which sweeps the passing animalcule or thefloating food particle toward the central mouth” (Hincks, 1880, p. xiv), andthat the tentacles themselves might play an important role in feeding: “Thetentacula are exquisitely sensible, and we frequently observe them eithersingly or all at once, striking in their extremities to the centre of thebell-shaped cavity, when any minute floating body comes in contact with them”(Grant, 1827, p. 114). While individual polypide behavior was understood bythose early workers, the phenomena of colony-wide patterns in feeding behaviordo not seem to have been discovered until much more recently. Banta, McKinney,and Zimmer (1974) showed the presence of excurrent chimneys, based on polypidemorphology and orientation in Membranipora membranácea and speculated on thepossible function of monticules and other skeletal modifications in fossil andliving ectoprocts in providing effective water circulation throughout colonies.In reviewing the feeding biology of marine ectoprocts (Winston, in press) Ibecame aware of the limited knowledge, the controversies, and thepossibilities, regarding polypide morphology and feeding behavior in theseanimals. The research reported here was started in order to learn (1) therange and variation of morphology possible in the gymnolaemate polypide, withspecific reference to variation in lophophore shape, and in the positioning ofpossible sensory structures, (2) what different types of behavior patterns werepossible for individual polypides and for colonies, and (3) in what ways thesebehavior patterns could be related to parameters of morphology, ecology andtaxonomy. This paper covers qualitative observations on morphology andbehavior. The quantitative relationships between them will be explored in afuture publication (Winston, in prep.). MATERIALS AND METHODS Ectoprocts werecollected in various subtropical and tropical habitats; in Florida, fromestuarine grassbeds, fouling panels, breakwaters, and intertidal beachrockledges, in Panama, from coral reef and intertidal and subtidal rocky areas. Noattempt was made to collect all the ectoprocts from any one habitat, rather theemphasis was on collecting as many different kinds of colonies and as manyrepresentatives of the different groups, cheilostomes, cyclostomes, andctenostomes, as possible. Animals were taken to the laboratory where they wereobserved and measured in seawater under the dissecting microscope. Mostobservations were made as soon as possible after collection, as the behavior ofmany species changes markedly within a few hours after being collected. Somespecies could be kept in aquaria without harm, and these were maintained andfed with Dunal¡ella or Isochrysis. Because there was so little informationavailable on the ways in which polypides behave, the first few weeks of theproject were spent in making detailed obsei-vations on a variety of species inorder to learn what behavioral characters occurred and how they could becombined in a data sheet that could be used with other species. Table 1summarizes the characteristics for each of 56 species of marine ectoprocts fromFlorida and Panama studied.

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