

TWO PREVIOUSLY UNREPORTED BARNACLES COMMENSAL WITH
THE GREEN SEA TURTLE, *CHELONIA MYDAS* (LINNAEUS, 1758), IN
HAWAII AND A COMPARISON OF THEIR ATTACHMENT MODES

BY

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ABSTRACT

Two species of barnacles found living in the skin of green sea turtles, *Chelonia mydas*, and not previously recorded in Hawaii are reported and their attachment mechanisms compared. These findings bring to five the total number of barnacles commensal with Hawaiian sea turtles and to 50 the number of shallow-water cirripedes known in Hawaii. Identified as *Stomatolepas elegans* and *Platylepas decorata*, both species live embedded in the soft skin of the limbs, neck, and tail of their host. *Stomatolepas elegans* is perhaps a recent arrival in Hawaii with this being the first report of it, or any member of the genus, occurring with hawksbill turtles, *Eretmochelys imbricata*. We found the barnacle embeds by penetrating the epidermis of sea turtles and then anchors in connective tissue of the dermis by way of small spikes extending from the shell. Conversely, *P. decorata* invades host tissue less deeply, lacks anchoring devices, and becomes encapsulated only by epidermis. Species diagnoses were made by light and scanning electron microscopy and by comparison with other members in each genus.

RÉSUMÉ

Deux espèces de cirripèdes vivant dans la peau des tortues vertes marines *Chelonia mydas* et inconnues jusqu'à ce jour d'Hawaii sont étudiées et leur mécanismes de fixation comparés. Ces trouvailles portent à cinq le nombre total de cirripèdes commensaux des tortues marines d'Hawaii et à 50 le nombre d'espèces de cirripèdes d'eaux peu profondes connues à Hawaii. Identifiées comme *Stomatolepas elegans* et *Platylepas decorata*, les deux espèces vivent enfoncées dans la peau molle des membres, du cou et de la queue de leur hôte. *Stomatolepas elegans* est peut-être d'arrivée récente à Hawaii, ceci étant la première mention de sa présence, comme la première mention de ce genre, vivant avec les tortues imbriquées, *Eretmochelys imbricata*. Nous avons trouvé que le cirripède s'enfonce en pénétrant dans l'épiderme des tortues de mer et s'ancre ainsi dans le tissu conjonctif du derme au moyen de petites pointes venant de la coquille. Inversement, *P. decorata* envahit le tissu-hôte moins profondément, n'a pas de système d'ancrage et s'encapsule seulement dans l'épiderme.

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Les diagnoses des espèces ont été effectuées à l'aide de la microscopie optique et de la microscopie électronique à balayage et par comparaison avec les autres membres de chaque genre.

INTRODUCTION

Forty-eight species comprise the shallow-water barnacle fauna of the Hawaiian Islands (Pilsbry, 1927; Matsuda, 1973; Eldredge & Evenhuis, 2003), including several introduced (Newman, 1986; Southward et al., 1998; Zardus & Hadfield, 2005) and epibiotic representatives (Edmondson, 1946; Gordon, 1970). Of the latter group, three are commensal with sea turtles (Balazs, 1980). These so-called "turtle barnacles" associate strictly with sea turtles and are specialized either for glueing to the shell and epidermal scales of their host or for invading the skin. Generally considered commensals rather than parasites, these barnacles filter-feed on plankton and do not take any nutrition from their hosts apart from capturing stray food released by turtles during feeding (GHB, pers. obs.). The most conspicuous turtle barnacle in Hawaii is *Chelonibia testudinaria* (Linnaeus, 1758), which cements to the carapace, plastron, and large scales of the turtle body. Perhaps more common but less obvious is *Platylepas hexastylus* (O. Fabricius, 1798), which embeds in the surface of the skin on the flippers, around the neck, and at the base of appendages. *Stephanolepas muricata* Fischer, 1886, a less commonly encountered barnacle, burrows into the flippers, penetrating to a depth of nearly 1 cm (Balazs, 1978, 1980).

Life histories of turtle barnacles are known only for *C. testudinaria* (see Zardus & Hadfield, 2004). However, they have also been documented for *C. patula* (Ranzani, 1820), a species commensal with crabs and gastropods (Crisp, 1983), and *Coronula diadema* (Linnaeus, 1767), a confamilial species commensal with whales (Nogata & Matsumura, 2006). Each of these species follows the typical barnacle developmental pattern of seven larval stages that swim freely in the plankton with the terminal stage, the cyprid, attaching to a host and undergoing metamorphosis. Despite the complexity of their life cycle, the commensal life-mode has evolved several times in thoracican barnacles (Anderson, 1994), probably as a response to predation (Foster, 1987).

Being one of the most remote archipelagos on earth, the Hawaiian Islands have a highly endemic biota, both on land and in near-shore waters (Wagner & Funk, 1995). Several barnacle species are endemic (Newman, 1986) and resident populations of the green sea turtle, *Chelonia mydas* (Linnaeus, 1758), and the less numerous hawksbill turtle, *Eretmochelys imbricata* (Linnaeus, 1766), are considered insular to some degree, because following their pelagic phase as post-hatchlings, they nest and forage only in Hawaii (Balazs, 1980). Whether these