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# Sphaeromatid isopod (Crustacea: Peracarida) assemblages in an algae-sponge association at North Stradbroke Island, southeastern Queensland

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## ABSTRACT

The endofauna of the green algae *Cladophoropsis vaucheriaeformis* (Aresch.) Papenf. was examined. This algae is associated with sponge tissue and has a tough, spongy thallus morphology. Twenty thalli were sampled in shallow waters of 1–9 m near Amity Point, North Stradbroke Island, Queensland, of which five samples were found to be inhabited by large numbers of sphaeromatid isopods belonging to the species *Oxinasphaera lobivia*, Bruce 1997. This is the first time assemblages of the isopod *O. lobivia* are reported in association with the algal-sponge association *Cladophoropsis vaucheriaeformis*. □ symbiosis, algae, sponge, Crustacea, Peracarida, Isopoda, Queensland, Australia

The green algal genus *Cladophoropsis* is widely distributed in warm-temperate and tropical waters of the Atlantic, Indian and Pacific Oceans. The genus was created by Børgesen (1905) and a recent revision resulted in the recognition of 6 morpho-species, although recognising that generic relationships with other taxa in the Siphonocladales require further attention (Leliaert & Coppejans 2006). *Cladophoropsis vaucheriaeformis* (Aresch.) Papenf. is an unusual member of the genus because of its association with sponge tissue. This sponge association results in a tough, spongy thallus morphology and an atypical branching pattern. *Cladophoropsis vaucheriaeformis* generally grows epilithically, occasionally on calcified seaweeds in the mid-intertidal to shallow subtidal down to 1 m (Leliaert & Coppejans 2006). At Amity Point, North Stradbroke Island, Queensland, *Cladophoropsis vaucheriaeformis* is found on most stones in the sandy bay.

Isopods are well known as parasites of both fishes and crustaceans (e.g. see Rhode 2005),

but other forms of opportunistic or obligate symbioses are relatively rare. Examples include the cirrolanid *Cartetolana integra* (Miers, 1884) (Bruce 1986) which inhabits the anal cavity of tropical crinoids, *Neocirrolana hermitensis* (Boone, 1918), another cirrolanid, lives in association with hermit crabs (Bruce 1994), and the corallanid *Argathona rostrata* Bruce, 1982, which inhabits sponges. Species of Sphaeromatidae are not frequently known as symbionts or associates of other biota. Within the family Sphaeromatidae the monotypic *Xynosphaera* Bruce, 1994, has morphological adaptations for a symbiotic association with alcyonaceans; *X. colemani* Bruce, 1994, burrows into the host although the exact trophic relationship is not known. Sphaeromatid association with sponges are more widely reported, notably the species *Paracerceis sculpta* (Holmes, 1904) (see Shuster 1992; Shuster & Sassaman 1997) while *Cassidias* sp. has been reported from gorgonian corals (Bruce 1999). In contrast to these sparse records of isopod-sponge

association, the Indo-West Pacific genus *Oxinasphaera* Bruce, 1997, is known to have numerous species associated with sponges or which have been directly collected from or in association with sponges, 'sponges' being the most commonly recorded habitat for species of the genus. In most cases the identity of the host sponges is not known, and therefore the level of host specificity or degree of host preference remains unknown.

#### MATERIAL AND METHODS

In February 2005, during the Moreton Bay Marine Biodiversity workshop, 20 thalli of *Cladophoropsis vaucheriaeformis* were sampled at Amity Point via snorkelling. The pieces were cut off at the base with a knife and each algal piece placed in a fine-mesh (0.30 mm) bag.

In the laboratory the volume of each sample was determined by water replacement in a measuring cylinder. The associated epifauna was collected and identified to OTU and to species where possible. The fauna found living within the anastomosing network of the *Cladophoropsis* thalli was revealed by carefully slicing the algae under a stereomicroscope; the isopods were directly removed, counted and identified.

#### RESULTS

Five of the twenty pieces of *Cladophoropsis vaucheriaeformis* contained sphaeromatid isopods, all belonging to the species *Oxinasphaera lobivia*. The volume of the *Cladophoropsis* ranged from 85–410 ml, the number of sphaeromatids, not directly related to the volume of the alga, ranged from 15–506 individuals. A total of 811 specimens of *Oxinasphaera lobivia* were found in

the five algal pieces, see Table 1. Males, females and juveniles of *Oxinasphaera lobivia* were found within the tissue mass of *Cladophoropsis*. The average host volume per individual sphaeromatid varied from 0.8 ml to 13.3 ml, with an average of one sphaeromatid per 1.4 ml algal tissue.

The 15 pieces of *Cladophoropsis vaucheriaeformis* not containing sphaeromatids were not inhabited by any other macro-invertebrates. Occasional Tanaidacea and Amphipoda were found externally on the algae-sponge association, but not inside. The volume of the 'empty' *Cladophoropsis* samples varied from 10–350 ml. Overall the epifauna of the *Cladophoropsis* hosting sphaeromatids and those without inhabitants was very similar.

#### DISCUSSION

*Oxinasphaera lobivia* Bruce, 1997, is a known associate of sponges, although sponge identity has not been recorded (Bruce 1997). *O. lobivia* is here reported in association with the algal-sponge association of *Cladophoropsis vaucheriaeformis* for the first time. We believe *O. lobivia* is primarily using the algae-sponge association as a refugium, not as a direct food source. Even though we have not conducted stomach content analysis, the host tissue did not seem to be affected by its inhabitants. At least while slicing the algae pieces, no apparent difference in structure was obvious between *Cladophoropsis* hosting sphaeromatids and those without inhabitants.

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**TABLE 1.** Number of *Oxinasphaera lobivia* per sample of *Cladophoropsis vaucheriaeformis* at Amity Point, North Stradbroke Island, Moreton Bay.

Sample	Feb 05	Lat/Long	Depth (m)	<i>C. vaucheriaeformis</i> (ml)	<i>O. lobivia</i> no. of specs
A8-04	14	27°23.9'S 153°26.2'E	5–10	150 ml	80
A9-12	15	27°24.25'S 153°26.22'E	4–9	85 ml	106
A9-13	15	27°24.9'S 153°26.22'E	4–9	410 ml	506
A20-03	20	27°23.9'S 153°26.2'E	0.5	200ml	15
A20-09	20	27°23.9'S 153°26.2'E	0.5	260 ml	104

workshop, to those participants who joined the first author on the under-water fieldwork and to all the participants who contributed to make this workshop an enjoyable and successful time. Thanks are also due to Julie Phillips (Eco Algae Research, Brisbane) for the identification of the algae, and Wendy Nelson (NIWA) for suggestions on an earlier draft of the ms. This work was supported by NIWA international travel funds to A.-N. Lörz. Co-funding to both authors was from the New Zealand Foundation for Research, Science and Technology (FRST) CO1X0502.

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