INTROCORNIA (CRUSTACEA : ASCOTHORACIDA : PETRARCIDAE) PARASITIC IN AN AHERMATYPIC CORAL FROM SAINT PAUL ISLAND, INDIAN OCEAN

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CRUSTACÉ PARASITE
ASCOTHORACIQUES
PETRARCIDAE
SCLERACTINIAIRES AHERMATYPES
TAXONOMIE
OCÉAN INDIEN

RÉSUMÉ – Deux exemplaires de l'Ascothoracique *Introcornia australis* sp. nov., deuxième espèce connue dans ce genre, ont été découverts dans une galle interne d'une branche du Scléractiniaire *Lophelia pertusa* (L.) draguée à la profondeur de 460-510 m, au large de l'île Saint Paul dans le sud de l'Océan Indien. La nouvelle espèce est décrite et comparée avec *I. conjugans*, espèce japonaise, et des aspects de sa morphologie sont discutées. *L. pertusa* représente une nouvelle sous-famille d'hôtes pour les Ascothoraciques de la famille Petrarcidae.

PARASITIC CRUSTACEAN
ASCOTHORACIDA
PETRARCIDAE
AHERMATYPIC SCLERACTINIA
TAXONOMY
INDIAN OCEAN

ABSTRACT – Two specimens of the ascothoracidan *Introcornia australis* sp. nov., the second known species of its genus, have been found in an internal gall in a branch of the scleractinian *Lophelia pertusa* (L.) dredged from a depth of 460-510 m off Saint Paul Island in the southern Indian Ocean. The new species is described and compared with *I. conjugans*, a Japanese species, and some aspects of its morphology are discussed. *L. pertusa* represents a new subfamily of hosts for ascothoracidans of the family Petrarcidae.

INTRODUCTION

The ascothoracidan family Petrarcidae includes endoparasites of many scleractinian corals, particularly ahermatypic ones. Zibrowius & Grygier (1985) published an illustrated catalogue of this family's occurrence worldwide. *Introcornia* Grygier, the most plesiomorphic genus in the family and the only genus in the subfamily Introcorniinae, is known from one species, *I. conjugans* Grygier, that infests *Caryophyllia decapali* Yabe & Eguchi off Shikoku, Japan (Grygier, 1983). Like most petrarcids, it lives in a cavity within a gall-like enlargement of the columella and adjacent septa of a single corallite, a so-called internal gall. A second species of *Introcornia* has recently been discovered infesting another species of coral in the southern Indian Ocean, and it is described here.

TAXONOMIC SECTION

Family Petrarcidae Gruvel, 1905
Subfamily Introcorniinae Grygier, 1987 a
Genus *Introcornia* Grygier, 1983

Introcornia australis, sp. nov.

Diagnosis

Carapace lacking papillae. Mandibles with row of strong teeth and several short setae alongside; maxillules pointed, medially thickened but unarmed. A few seminal receptacles in thoracopod 2, none in thoracopod 5, at least 6 in thoracopods 3 and 4. Furcal rami with row of medial setae and many ventral setae grouped into several clusters.

Material

Holotype (Muséum National d'Histoire Naturelle, Paris, Cat. no. MNHN Ci 2045) and paratype (MNHN Ci 2046), both hermaphrodites, from same internal gall in ahermatypic coral *Lophelia pertusa* (L.), «Marion Dufresne» Cruise MD50, JASUS sta. 22 .DC108, SE of Saint Paul Island, southern Indian Ocean (18-VII-1986, 3848.8'S, 7735.7'E, 460-510 m). Parasites accidentally exposed by break in coral about 1 cm below calice edge, no external manifestation of infestation. One carapace valve removed from holotype to expose main body to view; paratype

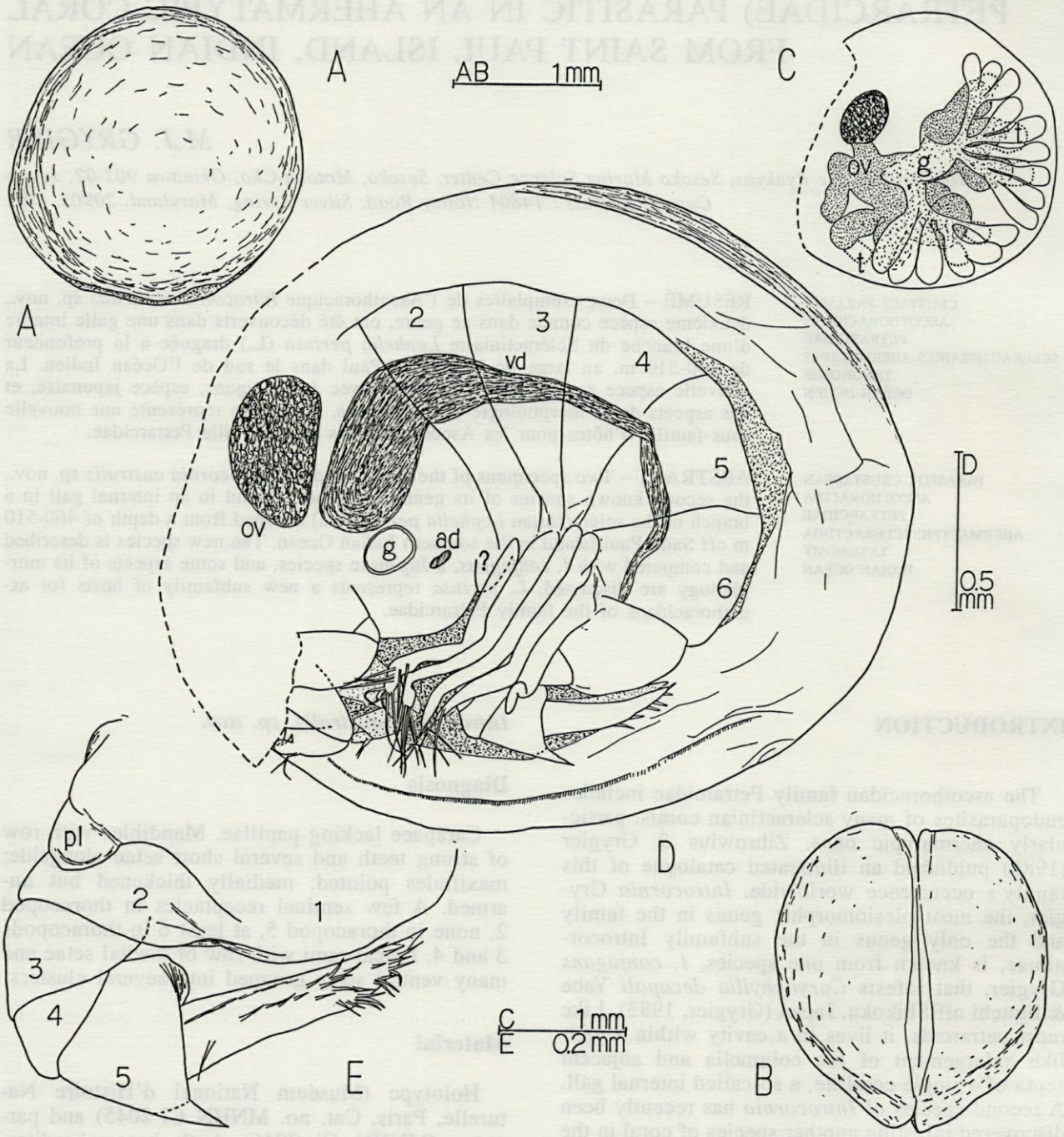

Fig. 1. – *Introcornia australis*, sp.nov. A, holotype (MNHN Ci 2045), lateral view, anterior end left; b, holotype, view slightly dorsal of anterior, showing hinge line; C, paratype (MNHN Ci 2046), internal organs of left carapace valve, anterior end left; D, paratype with left valve removed to expose body (oral cone hidden from view), thoracomeres numbered; E, abdomen of paratype, lateral view, segments numbered, left furcal ramus removed, only left penis lobe visible. Key : ad, site of adductor muscle; g, gut diverticulum; ov, ovary diverticulum; pl, penis lobe; t, presumed testes (dotted outline); vd, vas deferens filled with sperm (paired); ?, unidentified lobe.

completely dissected, primary source of data for description.

Etymology

From Latin *australis* (of the south)

Description

Carapace bivalved with faintly evident anterior hinge; basically spherical with slight anteroventral protrusion (Fig. 1A, B). Holotype 1.8 mm long and wide, 2.2 mm high; paratype 2.1 mm long and wide, 2.3 mm high. Valves hemispherical, thick, completely enclosing body but not forming brood chamber; outer surface smooth with abundant, evenly scattered pores; inner surface flattened marginally where valves appressed to each other, with submarginal ventral row of very short guard spinules (Fig. 1D) and many rows of short cuticular ctenae farther from margin (not illustrated).

Three sets of branched organs within carapace valves (Fig. 1D). About 15 hollow, oval sacs against inner cuticle of posterior halves of valves, converging in groups of 2-3 to common ducts and then to 2 main ducts; these assumed to be gut diverticula. Ovary diverticulum with several massive lobes found against outer cuticle in central part of valve. Third set of organs not clearly visible but ends of some branches extending beyond lobes of ovary; these assumed to be testes and to connect with sperm-filled vas deferens (Fig. 1D), but contents not striated, so not full of mature sperm.

Diverticulum of testis entering head between those of ovary and gut (Fig. 1D).

Body about two-thirds as long and high as carapace (Fig. 1 D). Cephalic attachment zone anterior and vertical, delimited posteriorly by adductor muscle. Head bearing antennules and oral cone, no eyes or frontal filaments. Thorax with 5 distinct segments (presumably segments 2-6, see discussion), strongly arched and forming a semicircle together with first abdominal segment; all obvious segments about equal in length but progressively less high posteriorly, so thoracomere 6 only half as tall as thoracomere 2. Five well developed pairs of thoracopods on these segments. Small lobe anterior to them in paratype (Fig. 1D) possibly representing first thoracopod, but also possibly oviduct or maxillary gland. Abdomen 5-segmented (Fig. 1E), first segment much the largest, second and fifth next largest, then trapezoidal third segment and short, triangular fourth. First segment with ventral pair of short, round penis lobes. Fifth segment with pair of simple, triangular, posteroventral telsonic spines positioned close together below furcal rami.

Antennules well developed, 5-segmented, armament limited to distal segment (Fig. 2A). First segment triangular with long base, second irregular in shape with convex posterior margin. Third segment triangular, apex deeply recessed into second segment, distal lateral margin with proximal break reminiscent of former segment boundary. Fourth segment long, tapered. Fifth segment a parallelogram with retractable claw at distal corner. Three short setae at base of claw, one on margin, one to each side. Laterally flanged claw guard arising from rear distal corner, separated from claw by retractor muscle sclerite and bearing 3 short distal setae, 1 of them on flange. Proximal sensory process a short cylinder clearly arising from rear base of claw guard on right antennule (in paratype; Fig. 2a, insert), seemingly separate from claw guard on left antennule, with aesthetasc and slightly shorter seta.Antennular musculature standard except for thin extensor muscles joining base of fifth segment to rear side of fourth (seen in one antennule only; Fig. 2A).

Oral cone consisting of labrum, medial languette, 3 pairs of mouthparts. Labrum about as long as deep, surrounding other mouthparts and with sharply angled, distal spout (Fig. 2B). Medial languette pointed, with curved anterior and straight posterior sides, reaching about halfway from mouth to tip of labrum (Fig. 2B). Mandibles and maxillules both lamellar, appressed to each other with mandibles more lateral, shorter, and narrower. Mandibles (Fig. 2C) with 2 intrinsic muscles in basal part, lateral margin with distal hairs, medial edge with 17-18 strong teeth, some of them bifid, accompanied by smaller number of short setae to one side, setae about two-thirds as long as teeth and mostly located next to gaps between them (Fig. 1C, insert). Maxillules (Fig. 2D) sharply pointed with thickened, unarmed medial edge; at least 1 intrinsic muscle, extrinsic muscles, and buccal nerve present, ganglion at end of buccal nerve in basal part of maxillule associated with field of slit-like pores in hexagons (Fig. 1D, insert). Maxillae long, tapered, separate distally, with hairy ventral flanges, blunt distal points, and narrow, cylindrical processes behind points (Fig. 2E).

Thoracopod 2 broad-based, tapered, with 4 ill-defined segments, musculature fairly standard, but weak (Fig. 2F, K). Perhaps 3 tubular seminal receptacles against lateral margin of coxal portion. About 40 plumose setae half as long as leg lining whole margin except for lateroproximal part of coxa; about 4 setae laterodistally on coxa, 6-7 medially on coxa. Thoracopods 3-6 much narrower than thoracopod 2 and with more poorly expressed segmentation, becoming even more narrower and somewhat shorter posteriorly, probably with only 2 longitudinal muscles (Fig. 2G-J). About 6-8 tubular seminal receptacles laterally in proximal half of thoracopods 3 and 4 (thoracopod 3 unclear). Thoracopod 3 with 1-2 plumose, subterminal setae, 6 finely setulate distal setae; thoracopod

Fig. 2. – *Introcornia australis*, sp. nov., dissected parts of paratype (MNHN Ci 2046). A, left antennule, lateral view, segments numbered, showing musculature (medial muscles drawn with lighter striation), inset of tip of right antennule; B, labrum, lateral view; C, mandible, with enlargement of toothed edge of other mandible : D, maxillule, with enlargement of pore field (non-detailed part within dotted circle obscured by muscle); E, maxillae, posterior view; F-J, right thoracopods 2-5, respectively, showing musculature; K, left thoracopod 2, setae omitted, showing musculature more clearly than F; L, left furcal ramus, medial view. Key : cg, claw guard; gn, ganglion; lg, medial languette; psp, proximal sensory process; sr, seminal receptacles.

4 with 4 finely setulate distal setae; thoracopod 5 with 2-3 of them, thoracopod 6 with 0-1.

Furcal rami tapered due to oblique ventral edge (Figs. 1E, 2L), 3-3.5 times longer than basal height, left one (in paratype) with very thick distal seta, 12 medial setae more or less in a row, and 15 ventral setae in 5 clusters of, respectively, 3, 4, 2, 3, and 3 setae (Fig. 2L). Right furcal ramus less clearly seen, seemingly with about 27 non-terminal setae altogether, only about 11 on ventral margin, others medial except for 1 on dorsal margin (Fig. 1E).

DISCUSSION

Morphology

The present specimens agree with the only other known species of *Introcornia*, the type-species *I. conjugans* from Japan, in carapace shape and general body organization, almost all antennular details, some mouthparts (labrum, medial languette, and maxillae), most aspects of the thoracopods, the penis, and the telsonic spines (Grygier, 1983).

The new species is a little larger than *I. conjugans*, based on the few available specimens. Its carapace is smooth rather than papillose and the gut diverticula appear to be different; in *I. conjugans* there is a single curved diverticulum with radial branches. Grygier (1983) considered the first thoracomere as very short and not distinct from the head in that species, but it is also possible that this segment is fused to the second thoracomere.

The small lateral retractor muscles of the fifth antennular segment in one antennule in *I. australis* were not seen in *I. conjugans* nor in any other ascothoracidan described up to date; a possible homologue of them occurs in some specimens, now under study, of another petrarcid genus, *Zibrowia* Grygier, from Japan. The proximal sensory process is separate from the claw guard in *I. conjugans*; its position on the rear of the claw guard in one present antennule suggests a tendancy towards paedomorphosis in *I. australis*.

The maxillules of the present species, although hairless, recall the supposed mandibles of *I. conjugans* and the mandibles are reminiscent of the supposed maxillules of that species, although the present mandibles are more coarsely toothed. It is possible that I confused these mouthparts in my description of *I. conjugans*, but I did specify that the more lateral mouthparts were the mandibles, as here.

This is the first published report of the ganglia in the bases of the maxillules and of the presumably sensory pore fields associated with them; however, such structures also occur in many other ascothoracidans whose descriptions I am now preparing.

The narrow, distal process on each maxilla in *I. conjugans* has been considered a homologue of the movable posterior claw of many other ascothoracidans (Grygier, 1983, 1987 a), but, elsewhere in the Ascothoracida, in at least one species of *Dendrogaster* Knipovich (Grygier, 1985 b) and of *Baccalaureus* Broch (Itô & Grygier, 1990), the anterior prong of the maxilla has a narrow process at its base distal to the hook or hook remnant, and perhaps it is this process that is present in both species of *Introcornia*.

The thoracopodal segmentation is more abvious in *I. conjugans*. I found no seminal receptacles in thoracopod 2 of that species, but sometimes 1 was present in thoracopod 5; a maximum of 5 seminal receptacles was seen in thoracopods 3 and 4, versus a minimum of 6 in *I. australis*.

The penis in both species is in the form of a pair of lobes. Grygier (1983) regarded this as an advanced condition relative to the usual form of the ascothoracidan penis, a biramous shaft. In fact, it may represent the plesiomorphic condition for the Ascothoracida and the entire Maxillopoda, namely a pair of genital limbs on the seventh trunk segment (Müller & Walossek, 1988). However, Grygier's (1987 b) discovery of an apparent pair of genital limb rudiments in the embryonic ascothoracid larvae of *Gongylophysema asetosum* Grygier suggests that the present penis morphology is a manifestation of paedomorphosis, although of a different kind than that exhibited by the other subfamily of the Petrarcidae (Grygier, 1985 a).

The telsonic spines seem to be farther apart in *I. conjugans*. The furcal rami of that species have a variable arrangement of setae, seen here as well, but with only 7 setae altogether on a ramus, versus nearly 30 for the new species, and none were associated with the ventral margin.

Biogeography and Host Specificity

Saint Paul Island is a long way from Japan, and this tends to confirm Grygier's (1983) prediction that *Introcornia* would eventually prove to be distributed worldwide. There are obviously still too few records to justify a claim for any particular distributional pattern, such as bipolarity, although both finds are probably from upper slope depths (depth of occurrence of *I. conjugans* estimated at 100-300 m).

Lophelia pertusa belongs to a subfamily of corals (Desmophyllinae) which has not previously been recorded as a host of petrarcid ascothoracidans (Zibrowius & Grygier, 1985); however, it does

belong to the same family, Caryophylliidae, as *Caryophyllia decapali*, the host of *I. conjugans*. Thus, there may be a family-level host specificity in this genus and subfamily of parasites. The lack in *L. pertusa* of any external sign of infestation, such as an enlargement of the columella, suggests that petrarcids may be even more widely, but cryptically, distributed as endoparasites of scleractinian corals than even the gall-based catalogue of Zibrowius & Grygier (1985) suggests.

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