

The Scorpionfish *Rhinopias aphanes* Eschmeyer from Australia

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Abstract Three specimens of the scorpaenid *Rhinopias aphanes* Eschmeyer from the central Great Barrier Reef Province constitute a new record for Australian waters and the first recorded collections outside New Caledonia. These specimens are described and compared with the holotype. Colouration varies among these specimens; individuals may also change colour in captivity, and according to substratum or time of day. Shedding of "skin" (cuticle) occurs at regular intervals of as short as three days.

The holotype of *Rhinopias aphanes* Eschmeyer, 1973, was collected outside the barrier reef off Noumea in 1964. It was originally identified as a specimen of *R. frondosa* (Günther) by Whitley (1964) and by Smith (1966). Eschmeyer et al. (1973) erected the species *R. aphanes* to contain this specimen. This report describes three specimens collected from Australian waters, with notes on colour variation, habitat, behaviour and "skin" shedding.

Genus *Rhinopias* Gill, 1905

Rhinopias aphanes Eschmeyer, 1973

Rhinopias frondosa (not Günther): Whitley, 1964: 9, pl. 2.

Rhinopias aphanes Eschmeyer, in Eschmeyer et al., 1973: 300~302, fig. 8.

Negative synonym: *Scorpaena frondosa* Günther, 1891: 482~483, pl. 39.

The living holotype is shown in Fourmanoir and Laboute (1976). Condé (1976) and Catala (1979) have figured both this specimen and a second example, collected in the same locality in 1973. Fourmanoir (1976) described 3 juvenile specimens of a *Rhinopias* species collected by midwater trawl near New Caledonia, and suggested these might be young *R. aphanes*. These are the only published records of this species.

Materials and methods

Specimen 1 (AMS I. 22660-001) was collected by the authors on 19. XII. 1980 on the lee side of Davies Reef, central Great Barrier Reef (18°51'S, 147°38'E), at 11 m depth. It was kept in the aquarium at the Australian Institute

of Marine Science, Queensland, until its death in November 1981. Two further specimens (both registered as collection AMS I. 22659-001, here distinguished as "larger" and "smaller") were collected by C. Wallace, D. Agostino and G. Bull in February 1981 on the lee side of Broadhurst Reef, 13 km southeast of Davies Reef, at 6~7 m depth. These specimens were kept alive at James Cook University of North Queensland, but died in August 1981. All three specimens have been deposited with the Australian Museum, Sydney (AMS).

Methods of measuring and counting follow Eschmeyer (1965, 1969). Specimens were measured with calipers following preservation.

Description

Measurements and counts. Measurements and counts are listed alongside those for the holotype in Table 1, specimen AMS I. 22660-001 is shown in Fig. 1. When measurements are compared in terms of percent standard length, the holotype and the three Australian specimens are consistent in most characters. Head length, snout length, jaw length and predorsal fin length are proportionally somewhat greater in the holotype than in the Australian specimens. The smallest example (AMS I. 22659-001, smaller) is of similar proportions to the larger specimens, except for its fins which are proportionally larger.

In scorpaenids, the number of pectoral rays which are branched increases with the size of the fish (Eschmeyer et al., 1973). This is exemplified in *R. aphanes*: the smallest specimen (AMS I. 22659-001, smaller) has no branched

pectoral rays, but specimen AMS I. 22660-001 has pectoral rays 1 through 7 branched (LHS) and 2 through 7 branched (RHS). Specimen AMS I. 22659-001 (larger) has pectoral rays 1 through 7 branched (LHS) and 1 through 8 branched (RHS), and the holotype has pectoral rays 1 or 2 through 6 branched. The smallest specimen has unbranched caudal rays, whereas the larger Australian specimens have most or all of the 13 caudal rays branched. (On specimen AMS I. 22660-001, caudal rays 2 through 13 are branched; on specimen AMS I. 22659-001 (larger), all caudal rays are branched.)

Colouration. Colouration in all specimens follows the same basic pattern. The fish are marked with irregular dark lines which enclose elongate areas or "islets" somewhat paler than the general background colouration. Specimen AMS I. 22660-001 had (when living) a yellowish-green background with brownish-black lines enclosing greyish coloured "islets". Specimen

AMS I. 22659-001 (larger) had a pale yellowish-brown background, with dark brown or black lines enclosing variegated, pale yellow "islets". Specimen AMS I. 22659-001 (smaller) had a pale brownish-grey background tinged with green, marked with black lines encircling very pale grey "islets". In formalin, specimen AMS I. 22660-001 has pale purple background and "islets" with dark grey lines, but both specimens AMS I. 22659-001 have off-white background and "islets" marked with grey lines.

All specimens have black spots on the soft dorsal fin. In the holotype this was described as a single spot between soft dorsal rays 7 to 9 (Eschmeyer et al., 1973), but in Australian specimens a distinct pair of spots occurs between soft dorsal rays 6 to 8. In living *R. aphanes* there is a white spot below the eye, which is found also in some other scorpaenids (see Condé, 1976). Other smaller white spots are present, especially in front of the pectoral fin.

Table 1. Counts and measurements for specimens of *Rhinopias aphanes*, and comparison of ranges of measurements with *R. frondosa*. (Measurements in mm; figures in parentheses, and measurements in last two columns (except total and standard lengths) are percent standard length.)

	Specimen AMS I. 22660-001	Specimen AMS I. 22659-001 (larger)	Specimen AMS I. 22659-001 (smaller)	Holotype* AMS IB7079	Range in <i>R. aphanes</i>	Range in <i>R. frondosa</i> *
Total length	208	213	79	235	79~235	—
Standard length	163	165	58	178	58~178	79.5~152
Dorsal rays	XII+9 ¹ / ₂	XII+9 ¹ / ₂	XII+9 ¹ / ₂	XII+9 ¹ / ₂	XII+9 ¹ / ₂	XII+9 ¹ / ₂
Anal rays	III+5 ¹ / ₂	III+5 ¹ / ₂	III+5 ¹ / ₂	III+5 ¹ / ₂	III+5 ¹ / ₂	III+5 ¹ / ₂
Pectoral rays	17, 17	17, 17	16, 16	16, 16	16~17	16
Head length	72.5 (44)	73.1 (44)	25.8 (44)	85.5 (48)	44~48	44~50
Body depth	73.5 (45)	68.4 (41)	24.6 (42)	82.1 (46)	41~46	44~52
Orbit diameter	10.4 (06)	10.2 (06)	5.5 (09)	13.5 (07)	06~09	08~10
Snout length	29.3 (18)	31.9 (19)	8.7 (15)	40.0 (22)	15~22	19~21
Jaw length	34.9 (21)	34.6 (21)	12.3 (21)	42.0 (24)	21~24	20~23
Predorsal fin length	56.1 (34)	57.4 (35)	18.2 (31)	74.1 (42)	31~42	35~40
Caudal fin length	48.5 (30)	50.3 (30)	21.3 (37)	52.6 (30)	30~37	32~38
Pectoral fin length	61.2 (38)	68.2 (41)	24.3 (42)	67.7 (38)	38~42	34~42
Pelvic fin length	44.6 (27)	35.7 (22)	18.2 (32)	49.3 (28)	22~32	25~30
Length 1st anal spine	15.3 (09)	13.4 (08)	6.8 (12)	16.1 (09)	08~12	07~11
Length 2nd anal spine	26.3 (16)	25.6 (16)	10.9 (19)	23.5 (13)	13~19	12~18
Length 3rd anal spine	25.6 (16)	25.1 (15)	11.2 (19)	25.1 (14)	14~19	13~19
Length 3rd dorsal spine	41.0 (25)	41.7 (25)	17.0 (29)	41.7 (23)	23~29	25~34
Length 4th dorsal spine	41.2 (25)	41.7 (25)	16.5 (28)	—	25~28	24~36
Length 11th dorsal spine	10.8 (07)	8.8 (05)	4.1 (07)	8.5 (05)	05~07	05~08
Length 12th dorsal spine	20.7 (13)	20.0 (12)	10.2 (18)	21.9 (12)	12~18	13~17

* Data extracted from Eschmeyer et al. (1973: Table 1).

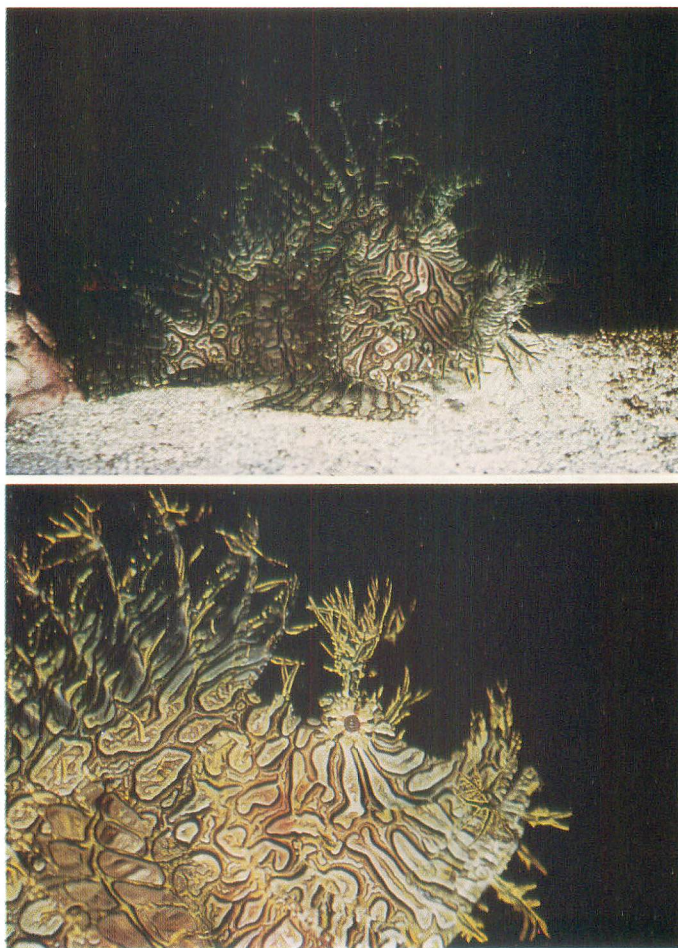


Fig. 1. Above: *Rhinopias aphanes* Eschmeyer, specimen AMS I. 22660-001, in the aquarium at the Australian Institute of Marine Science. Below: Close-up view of the same specimen.

Transparent elongate areas between the pectoral fin rays occur in a row about mid-way along the pectoral fins with, distally, a more irregular array of smaller, subcircular transparent areas. The caudal fin also has transparent sections; other fins have small, less regularly distributed transparent areas.

There is some variation in colouration. Photographs of the holotype (Condé, 1976; Fourmanoir and Laboute, 1976; Catala, 1979) show that the dark lines surrounding the "islets" are thicker and darker than in Australian specimens. Furthermore, Australian specimens had (when alive) a somewhat paler general colouration than the holotype. A further specimen, observed by the authors on 4. VII. 1977, on the

northeast side of Lizard Island ($14^{\circ}38'S$, $145^{\circ}27'E$), at 5 m depth, appeared greener than other Australian specimens. The smallest specimen also had, when living, more patches of white than other examples, notably along the base of the dorsal fin, distally on the soft dorsal fin, and on the pectoral, caudal and anal fins. However, the patterns of "islets" and dark lines are similar in all specimens, and these remain distinct in preservation.

Two of the Australian specimens became paler in colour following capture. After a few days in captivity, specimen AMS I. 22659-001 (smaller) changed from green to pale grey. After several weeks in the aquarium, the background colouration of specimen AMS I. 22660-

001, originally distinctly green, became a much lighter green. This fish also showed a rapid and reversible change in hue according to its surroundings. When placed in a bare aquarium it became paler, but darkened immediately when transferred to an aquarium containing sand and corals. In Australian specimens, the intensity of the colour of the black spots on the soft dorsal fin and the white spot on the cheek also varied. Specimens AMS I. 22660-001 and I. 22659-001 (larger) were observed to change colour at night. The greenish or yellowish colour became much lighter, almost white, and the dark lines became more prominent. Change in colouration has been reported in *R. eschmeyer* (Condé, 1977).

The second specimen of *R. aphanes* collected from New Caledonia differs from other specimens in having a distinct brown-pink colouration (Catala, 1979: figs. 142~145). This specimen appears to be a distinctly different colourmorph.

Dermal appendages. Highly ramose, antler-like projections above the eyes are present in all known specimens. These are more ramose in the larger examples (there are 40 tips on a single "antler" in specimen AMS I. 22659-001 (larger)). In Australian specimens, branched appendages are found on the maxilla (one large pair); on the upper and lower jaw and the snout; and distally on most or all of the dorsal spines, these dorsal appendages being most highly branched on the third and fourth dorsal spines. Simple, unbranched tentacles occur in a row along the lateral line and scattered sparsely over the body; between and behind the orbits; on the snout and upper and lower jaw; around the edge of the operculum; one or more pairs on the dorsal spines; and sparsely over the pectoral and caudal fins. No appendages are present on the pelvic, anal and soft dorsal fins. All appendages were, in living specimens, black or blackish, bordered by a greenish, yellowish or greyish-white colour, according to the general body colouration. Dermal appendages are very similar in the New Caledonian specimens (see Catala, 1979: figs. 141~142, 144~145). However, appendages around the jaw are more ramose in the New Caledonian examples, and the holotype has simple tentacles on the soft dorsal fin.

Distribution

The recent collections of *Rhinopias aphanes* extend the known range of this species from New Caledonia to Australia. A further specimen was observed recently at Madang, New Guinea, by Dr. P. Hutchings, at 3 m depth (R. Steene, pers. comm.). The distribution of the species appears restricted to reefs of the western Pacific.

Habitat

Australian specimens have been observed and collected from hard substrate reef areas, 30 km or more off the mainland coast. Collection localities in Australia and New Caledonia suggest a preference for clear water reef areas. The species seems to prefer lying under ledges or in small niches in the reef. Although this fish is undoubtedly rare, its excellent camouflage, cryptic behaviour (see below) and habitat have surely contributed to the lack of records.

The bathymetric range for the Great Barrier Reef is 5 m to 11 m, but New Caledonian specimens were collected at 30 m (Eschmeyer et al., 1973; Condé, 1976).

Behaviour

Behaviour was observed in Australian specimens (principally specimen AMS I. 22660-001), both in the natural habitat and in an aquarium.

Rhinopias aphanes is generally reluctant to leave the bottom, even when capturing prey. It rarely swims, usually preferring to "walk" or "hop" along with the aid of its pelvic and especially its pectoral fins (although the smallest specimen showed more swimming activity than the others). Individuals are more active at night. When resting, the fish lies on the bottom, rocking gently back and forth and from side to side. Water expelled through the branchial tubes above the opercula causes the tentacles on the first few dorsal fin rays to quiver. This behaviour enhances its camouflage, and the fish resembles algae or benthic fauna waving in the current. Specimen AMS I. 22660-001 was found next to a large crinoid of similar colouration.

Rhinopias aphanes feeds on small, active fish. Even starved individuals show interest only in prey fish which have recently been placed in the

aquarium. Once prey items have been resident in the tank for more than a few hours, *R. aphanes* shows no further interest in them as potential prey.

When a prey fish is placed in the aquarium, *R. aphanes* may move slowly or "hop" briskly towards the prey. It may immediately capture the prey, but generally stalks the prey slowly, creeping forward on its pectoral and pelvic fins. The actual capture of the prey is extremely swift. The *Rhinopias* darts forward, rapidly opens its mouth, and engulfs the prey by suction.

Shedding of "skin"

Shedding of "skin", or more correctly, cuticle, has been recorded in various fish species, including scorpaenids, by several earlier workers (see Eschmeyer et al., 1973). It has been noted in *Rhinopias* and was apparent on the holotype of *R. aphanes* (Eschmeyer et al., 1973).

Specimen AMS I. 22660-001 shed its "skin" periodically following capture, usually at intervals of one week or less, sometimes as often as three days. The process of shedding the whitish, almost transparent, tissue-like cuticle lasts only a few minutes. The *Rhinopias* exhales rapidly and vigorously, gradually inflating the covering of cuticle. Soon the entire coating is blown up, almost like a small balloon, and becomes separated from the body of the fish except at the extremities. The fish then shakes itself very vigorously and the cuticle breaks away and is flung off in many pieces.

Affinities

Rhinopias aphanes most closely resembles *R. frondosa* Günther, but the holotype of *R. aphanes* has a smaller orbit, longer snout and jaw, longer predorsal fin length, shorter caudal fin and some shorter fin spines (Eschmeyer et al., 1973). The ranges of measurements of the two species are compared in Table 1. With additional *R. aphanes* specimens, morphometric differences between these species no longer exist. However, the juvenile *R. aphanes*, specimen AMS I. 22659-001 (smaller), a much smaller specimen, has proportionally larger orbit diameter and fin lengths than adult specimens of the species. If this juvenile is omitted from the comparisons, then *R. aphanes* still differs from *R. frondosa* in orbit diameter, caudal fin length and length of

some anal and dorsal spines.

Moreover, the two species are clearly distinguished by their colouration and markings (see Eschmeyer et al., 1973; Condé, 1976, 1977). Despite some variation in colouration and dermal appendages within *R. frondosa*, its markings consist of rounded spots and blotches quite unlike the markings of *R. aphanes*. The tentacles above the eyes in *R. frondosa* are thicker and less branched than in *R. aphanes*. We agree with Eschmeyer et al. (1973) that such a change in colour pattern with growth seems unlikely, and that *R. frondosa* is not a juvenile form of *R. aphanes*. The close resemblance of the smallest *R. aphanes* specimen to adult specimens confirms this.

Rhinopias eschmeyeri Condé, 1977 closely resembles *R. aphanes* and *R. frondosa* in terms of pectoral ray counts, length of dorsal rays, and the presence of black spots on the soft dorsal fin. However, *R. eschmeyeri* has unbranched spatulate dermal appendages, and the body colour is more uniform. Masuda et al. (1975: figs. 143A~C) showed three figures of *R. frondosa* as colour variations. We believe that the third figure (Fig. 143C) more closely resembles *R. eschmeyeri* than *R. frondosa*.

Acknowledgments

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- オーストラリアから採集されたボロカサゴ属 *Rhinopias aphanes*
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カサゴ科ボロカサゴ属の *Rhinopias aphanes* が3個体、オーストラリアのグレートバリアリーフ中部で得られた。この種類は、従来ニューカレドニア産の完模式標本のみが知られていた。個体間の色彩変異が大きく、又同一個体でも、飼育環境の変化により体色が変化した。この属の他種でも知られているが、三日以内毎に、この種類でも“脱皮”が観察された。