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REVIEW OF THE INDO-PACIFIC PIPEFISH GENUS *STIGMATOPORA* (SYNGNATHIDAE)

C. E. DAWSON

Gulf Coast Research Laboratory Museum, Ocean Springs, Mississippi USA

SUMMARY

The syngnathine (tail-pouch) genus *Stigmatopora* (type-species: *Syngnathus argus* Richardson) is rediagnosed and compared to other pipefishes with confluent superior trunk and tail ridges. Descriptions, illustrations, key, synonymies and data on variation and distribution are given for the three recognized species: *S. argus* (Australia), *S. nigra* (Australia and New Zealand), *S. macropterygia* (New Zealand and Auckland Is.).

INTRODUCTION

In continuation of review studies of Indo-Pacific pipefishes, I here treat the syngnathine (tail-pouch) genus *Stigmatopora* Kaup. References to species of the genus are not uncommon in regional literature but most consist of inadequate descriptions, inclusion in keys and species lists or more detailed treatments of a few specimens from restricted localities. As a result, the nomenclature is in part confused, descriptions and diagnoses are often inadequate, identification is difficult, distribution is uncertain and little information on intraspecific variation is available. This report, based on the majority of known museum holdings, clarifies some of these problems and provides a basis for future detailed studies on the biology and ecology of these subtropical-temperate pipefishes.

METHODS AND MATERIALS

Distal portions of the tail are often lost in specimens of *Stigmatopora* and frequencies of tail rings are not employed here for species identification. For the same reason, total length (TL) measurements are often of uncertain accuracy and proportional data are here referred to measurements (mm) of head length (HL). Coloration may be sexually dimorphic and may also exhibit considerable individual variation within and between samples of the same species. Present colour descriptions are therefore based on the most characteristic or more frequently encountered markings of specimens preserved in alcohol. Some meristic data (Tables 2-5) have been grouped to simplify presentation and these may not agree exactly with counts given in diagnoses and descriptions. As employed here, the term "venter" refers to the ventral surface. Measurements in Materials Examined sections are approximate and, except in the case of type material, loss of distal tail rings or other damage is not indicated. Lengths of damaged types are approximations of the present overall length. Other methods and definitions of counts and measurements follow Dawson (1977).

Abbreviations for repositories of examined material follow: AMS — Australian Museum, Sydney; BMNH — British Museum (Natural History); GCRL — Gulf Coast Research Laboratory Museum; MCZ — Museum of Comparative Zoology, Harvard Univ., MNHN — Muséum National d'Histoire Naturelle, Paris; NMNZ — National

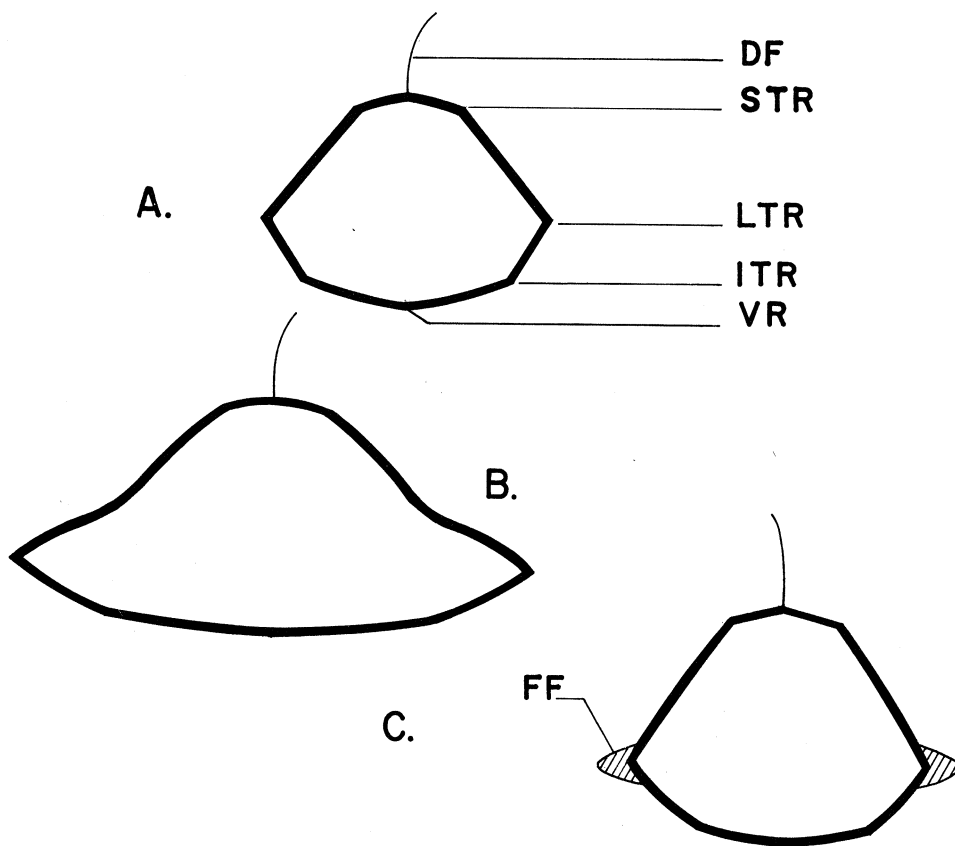


Fig. 1. Semidiagrammatic delineations of body cross-sections at 5th preanal ring in mature females of *Stigmatopora argus* (A), *S. nigra* (B) and *S. macropterygia* (C). DF — dorsal fin, STR — superior trunk ridge, LTR — lateral trunk ridge, ITR — inferior trunk ridge, VR — median ventral ridge, FF — fleshy fold on lateral trunk ridge.

Museum of New Zealand, Wellington; NMV — National Museum of Victoria, Melbourne; QM — Queensland Museum, Brisbane; QVM — Queen Victoria Museum and Art Gallery, Launceston; SAM — South Australian Museum, Adelaide; WAM — Western Australian Museum, Perth.

Stigmatopora Kaup

Stigmatopora Kaup, 1853:233 (type-species: *Syngnathus argus* Richardson, by monotypy).

Stigmatophora. Kaup, 1856:52 (emended spelling).

Stigmataphora. Castelnau, 1872a:201 (misspelling).

Pipettella (not of Haeckel, 1887) Whitley, 1951:62 (as subgenus of *Stigmatopora*: type-species: *Stigmatopora nigra*, by original designation).

Nigracus Whitley, 1953:135 (gen. nov.; replacement name for *Pipettella*, preoccupied).

Stigmatophota. Kähnsbauer, 1978:316 (misspelling).

DIAGNOSIS: Superior trunk and tail ridges continuous, not arched dorsad below dorsal-fin base; lateral trunk ridge, with or without a fleshy marginal fold (Fig. 1), ends without deflection between penultimate trunk ring and 35th tail ring; lateral tail ridge absent; inferior trunk and tail ridges continuous, the former largely located on ventral portion of trunk (Fig. 1); dorsum of trunk flat to slightly convex between superior ridges; venter of trunk flat to slightly V-shaped, without a prominent median ridge; trunk dorsoventrally compressed and expanded laterad, strikingly so in some adult females; tail slender, distally attenuated or thread-like but not coiled ventrad in preservative. Snout long and slender; median dorsal snout ridge low, entire, typically fails to reach interorbital, usually ends just before vertical through nares; preorbital moderately broad, the nares well removed from anterior rim of orbit; interorbital broad, flat to slightly concave; posterior supraorbital and median dorsal head ridges low to obsolete; supraopercular ridges absent; opercle with or within a complete or incomplete longitudinal ridge, elsewhere ornamented with fine radiating striae; gill opening located above middle or posterior third of opercle, not above posterodorsal angle; pectoral-fin base protruding a little laterad, with or without a single longitudinal ridge; principal body ridges low, slightly indented between rings, the margins essentially entire; scutella small, poorly defined, oval and without longitudinal keels; head and body without spines, denticulations or dermal flaps. Dorsal-fin origin on trunk, the fin base not distinctly elevated; pectoral fins broadly rounded; anal fin present; caudal fin absent in larvae and adults. Head length ca. 5.9-7.5 in TL, snout length ca. 1.4-1.7 in HL, snout depth ca. 8-32 in snout length, length of dorsal-fin base 0.5-1.0 in HL, trunk rings 16-23, tail rings ca. 67-92, total subdorsal rings ca. 15-26, dorsal-fin rays 36-75, pectoral-fin rays 11-19, anal-fin rays typically 4. Brood pouch under anterior portion of tail; pouch plates absent or vestigial; pouch eggs not in a continuous gelatinous matrix, deposited in membranous compartments lining dorsum of pouch and protected by well-developed pouch folds which meet or nearly meet on ventral midline. Without bony plate-like inclusions in gill membranes (Dawson, 1978) or odontoid processes in jaws (Dawson and Fritzsche, 1975). Maximum length at least 356 mm; three species; marine and estuarine. Endemic to Australia, New Zealand and Auckland Is.

COMPARISONS: Among the 22 nominal genera of pipefishes with confluent superior trunk and tail ridges, only *Stigmatopora*, *Syngnathoides* Bleeker 1851 and *Runcinatus* Whitley 1929 share the following character combination: confluent inferior ridges, dorsal-fin origin on trunk, absence of caudal fin, presence of pectoral fins in adults and lateral trunk ridge ending without ventral deflection. *Stigmatopora* and *Syngnathoides* are superficially similar in that they share the elongate snout and a dorsoventrally compressed trunk (in adults) but they differ in a number of primary characters. *Stigmatopora* lacks the distally coiled prehensile tail found in preserved representatives of both *Syngnathoides* and *Runcinatus* and further lacks the dermal flaps found in *Syngnathoides* and the spiny or denticulate body of *Runcinatus*. The lateral trunk ridge is essentially straight and the male brood organ is under the tail in *Stigmatopora*, whereas the ridge is angled dorsad and the brood organ is under the trunk in *Syngnathoides*. Eggs are deposited within a well-developed protective pouch under the anterior part of the tail in males of *Stigmatopora*, whereas eggs are deposited in unprotected membranous compartments under the tail in *Runcinatus*.

REMARKS: Most authors have employed Kaup's (1856) unjustified emendation "*Stigmatophora*", but the correct original spelling from Kaup (1853) is *Stigmatopora*. Whitley (1951) proposed the name *Pipettella* for a new subgenus of *Stigmatopora*,

differentiated solely on the basis of the relatively short snout and relatively great sexual dimorphism of the type-species, *S. nigra*. He later (1953) elevated this nominal taxon to generic rank, without pertinent comment, and introduced *Nigracus* as a replacement name for the preoccupied *Pipettella*. Present studies fail to indicate separate treatment for *Stigmatopora nigra*.

The distal termination of the lateral ridge is often obscured by the pouch folds in brooding males (especially in *argus*) and, although otherwise reasonably distinct, this character is best seen in partially dried specimens.

Pouch folds meet on the ventral midline in some brooding males but they fail to meet in others and portions of the developing eggs may be exposed. One species (*argus*) usually has a very thin and narrow, dorsally directed, membrane along the dorsal edge of the free margins of the pouch folds. This evidently led Herald (1959) to conclude that pouch closure was the inverted type in *Stigmatopora*. Examination of a number of brooding males of each species indicates that closure agrees most closely with the semi type of Herald (1959). Brood-pouch eggs are usually deposited in a single layer and well-developed larvae are often found within the pouch of preserved males.

KEY TO THE SPECIES OF *STIGMATOPORA*

1. Dorsal-fin origin on 5th-7th, usually (79%*) on 6th trunk ring; lateral trunk ridge ends on or near anal ring; often with narrow dark bilateral stripes on underside of head *nigra*

Dorsal-fin origin on 9th-13th trunk ring; lateral trunk ridge ends near or beyond vertical from rear of dorsal-fin base; without dark stripes on underside of head 2

2. Total subdorsal rings 14.75-22.75; dorsal-fin rays 37-64; lateral trunk ridge reaches 8th-20th, usually (97%*) 8th-18th, tail ring; dorsum of trunk often with numerous pale or dark spots *argus*

Total subdorsal rings 23.0-26.25; dorsal-fin rays 63-74; lateral trunk ridge reaches 22nd-35th, usually (89%*) 24th-32nd, tail ring; when present, spots on dorsum restricted to bilateral pairs between trunk rings *macropterygia*

*Percent of specimens examined.

***Stigmatopora argus* (Richardson)**

Figs. 2-5

Syngnathus argus Richardson, 1840:29 [orig. descr.; ocellated pipefish; "exact habitat" unknown (probably Tasmania)]; Richardson, 1844:183, pl. 7, fig. 2 (descr.); Zietz, 1908:298 (listed, SA).

Stigmatopora argus. Kaup, 1853:233 (n. comb.; New Guinea, Tas.); Bleeker, 1859:15 (compiled); Mellen, 1919:134, fig. (prehensile tail; among *Zostera*); Jordan, 1919:254 (compiled); McCulloch, 1921:37, fig. 96a (in key; common in sea grass; to 7 in.); Waite and Hale, 1912:308, fig. 48 (in key; synonym.; descr.; sexually dimorphic coloration; distr.); Lord, 1923:64 (listed, Tas.); Lord and Scott, 1924:40 (spotted pipefish; to 250 mm; common, Tas.); McCulloch, 1929:93 (synonym.; distr.); Scott, 1939:139, 142 (in key; Tas.); Whitley, 1948:14 (listed, WA); Whitley, 1951:62 (compared with *S. nigra*); Whitley and Allan, 1958:61, fig. 13 (very common; S Qld. to WA, Tas.); Scott 1960:88 (synonym., in part; comparisons; Tas.);

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Scott, 1961:61 (in key, Tas.); Scott, 1963:19, fig. 7 (descr.; notes on eggs and brood pouch); Whitley 1964:38 (compiled); Scott, 1970:35 (compared with "*Ichthyocampus*" *cristatus*); Scott, 1977:123 (note on opercular ridge); Hutchins, 1979:93 (listed, Rottneest I.); Dawson, 1980a:287 (ref.).

Solegnathus argus. Bleeker, 1855:3, 4, 17 (nomen nudum; as sr. synonym of *Syngnathus argus* Richardson; Tas.).

Stigmatophora Argus. Kaup, 1856:53 (emended spelling; descr.; New Guinea, Tas.); Castelnau, 1872:243 (listed, SA); Castelnau, 1873:77 (descr., Vic.); Castelnau, 1879:355 (listed, NSW).

Stigmatophora argus. Steindachner, 1866:52 (Port Jackson); Duméril, 1870:583 (characters; New Guinea, Tas.); Günther, 1870:190 (descr., distr.); Bleeker, 1878:49 (compiled, New Guinea); Castelnau, 1879:362 (compiled; New Guinea); Klunzinger, 1879:326, 420 (synon.; to 12 cm; Port Phillip and Port Darwin); Macleay, 1882:297 (descr.; Port Phillip, Port Jackson); Tenison-Woods, 1882:23 (listed, NSW); Johnston, 1883:134 (common, Tas.); Johnston, 1890:37 (compiled); Lucas, 1890:39 (listed, Vic.); Lucas, 1891:14 (descr. copied); Duncker, 1907:660 (ref.); Duncker, 1909:239 (synon.; descr.; notes on eggs and brood pouch; distr., in part); Duncker, 1912:234 (ref.); McCulloch, 1914:30 (compared with *S. nigra*); Duncker, 1915:103 (synon.; descr.; distr.); Fowler, 1922:444 (notes "Fiji" specimen, probably from Austr.); Weber and de Beaufort, 1922:97 (synon.; descr.; distr.); Fowler, 1928:112 (ref.; diag.; distr., in part); Bertin and Estéve, 1950:50 (as sr. synonym of *S. unicolor*); Kähnsbauer, 1950:272 (counts; descr.; distr., in part); Munro, 1958a:90, fig. 622 (descr.; distr.); Munro, 1958b:141 (ref. New Guinea); Fowler, 1959:144 (descr.); Marshall, 1964:120 (in key; distr.); Taylor, 1964:113 (compiled); Munro, 1967:152, 154, fig. 247 (descr., estuarine; New Guinea); Scott et al., 1974:123, fig. (in key; descr.; to 25 cm; all Austr. states); Shiino, 1976:109 (ocellated pipefish); Carcasson, 1977:77 (descr.; estuaries; distr., in part); Chubb et al., 1979:18 (lower Swan-Avon estuary, WA); Glover, 1979:147, 150, fig. 7 (in vegetation; Kangaroo I.); Scott, 1979:115 (data on Tasmanian sp.); Scott, 1980:106 (listed, Tas.).

Stigmatophora olivacea Castelnau, 1872:244 [orig. descr.; St. Vincents Gulf (SA)]; Castelnau, 1873:77 (emended descr.).

Gastrotokeus gracilis Klunzinger, 1872:44 [orig. descr.; Port Phillip (Vic.)]; Lucas, 1890:39 (compiled).

Stigmatophora olivacea. Macleay, 1882:298 (descr. compiled); Ogilby, 1912:36 (notes spec. from SA).

Stigmatophora depressiuscula Macleay, 1882:299 [orig. descr.; King George's Sound (WA)]; Stanbury, 1969:206 (holotype as Macleay Mus. No. F280).

Stigmatophora gracilis Macleay, 1882:299 (orig. descr.; Tas.); Johnston, 1883:134 (compiled); Johnston, 1890:37 (compiled); Whitley, 1955:119 (incorrectly, as jr. synonym of *S. longirostris*).

Stigmatophora argus var. *brevicauda* (sic) Lucas, 1891:14 (orig. descr.; Geelong Inner, Vic.).

Stigmatophora nigra (not of Kaup). Fowler, 1907:426 (misident.; Fiji).

Stigmatophota (sic) *argus*. Kähnsbauer, 1978:316 (descr.; type locality incorrect, as Papua.)

DIAGNOSIS: Dorsal-fin origin on 9th-13th trunk ring; lateral trunk ridge reaches 8th-20th tail ring; pectoral-fin rays usually (97%) 14-18; without dark bilateral stripes on underside of head; often with spots or ocelli on dorsum of trunk.

DESCRIPTION: Trunk rings 16-23; tail rings 78-91 (7 counts); dorsal-fin rays 37-64; pectoral-fin rays 13-18; dorsal-fin origin on 9th-13th (usually 10th-12th) trunk ring; subdorsal rings 11.5-6.25 + 7.0-12.25 = 14.75-22.75; lateral trunk ridge reaches 8th-20th (\bar{x} = 12.6) tail ring; see Tables 1-5 for additional counts. Proportional data based on 27 specimens 14.0-39.2 (\bar{x} = 26.7) mm HL follow: snout length in HL 1.4-1.6 (1.5), snout depth in snout length 11.9-31.6 (17.7), length of dorsal-fin base in HL 0.6-1.0 (0.8), anal ring depth in HL 7.5-13.4 (9.5), trunk depth in HL 6.3-12.2 (8.8), pectoral-fin length in HL 7.7-13.4 (10.7), length of pectoral-fin base in pectoral-fin length 0.9-1.6 (1.2).

Opercular ridge straight or angled a little dorsad, complete in young, often incomplete or vestigial in subadults and adults; trunk depth of adults 1.3-1.9 (\bar{x} = 1.6) in trunk breadth, the ratio not strongly sexually dimorphic; adult females occasionally with an expanded fleshy marginal fold on lateral trunk ridge.

COLORATION: Snout, opercles and much of dorsum of head mainly dusky brown, sometimes blotched with pale; dorsum and upper parts of sides of trunk and anterior tail rings tan to brown, with or without narrow dark or pale bars between rings or with dark or pale spots; remainder of dorsum and sides of tail mainly brownish, usually with narrow dark brown edging on principal ridges; venter of head pale to brownish, without narrow dark bilateral stripes on posterior part of snout, suborbitals and opercles; venter of trunk and tail (except pouch folds) pale to tan, plain or with narrow dark bars between rings on trunk and anterior third of tail; pouch folds plain or spotted faintly with pale but most commonly striped (Fig. 4) in mature males; fin-rays narrowly edged with brown.

Preserved coloration is highly variable but two common patterns (spotted and unspotted) occur in subadults and adults of both sexes. Spotted fish are most common in collections, but both forms and a variety of intergrades may occur in a single sample. Spots may be simple or faintly ocellate, they are brown to near black or occasionally pale (Figs. 3-4) and they occur in 2-8 regular or irregular transverse rows. Spots may completely ornament the dorsal surface from the nape to the anterior part of the tail or they may be reduced to a single row on either side of the dorsal-fin base.

COMPARISONS: *Stigmatopora argus* is best distinguished from its sympatric congener, *S. nigra*, by the longer lateral trunk ridge (reaches 8th-20th tail ring versus 1st tail ring in *nigra*), by the more posterior dorsal-fin origin (on 9th-13th trunk ring versus 5th-7th in *nigra*) and by the absence of dark ventral stripes on the head (usually present in *nigra*). Mature females do not develop the exceptionally broad trunk common to mature females of *S. nigra* (Fig. 8), the spotted dorsal surface and striped brood pouch frequently found in *S. argus* do not occur in *S. nigra* and *S. argus* reaches a greater size (ca. 255 mm TL against ca. 162 mm in *nigra*). In addition, average frequencies of dorsal and pectoral-fin rays are higher in *S. argus* (respectively, 48.0 and 15.4 versus 39.0 and 13.0 in *nigra*), subdorsal trunk rings average 8.6 versus 11.9 in *S. nigra* and the brood pouch is longer (14-24 rings versus 12-16 in *nigra*).

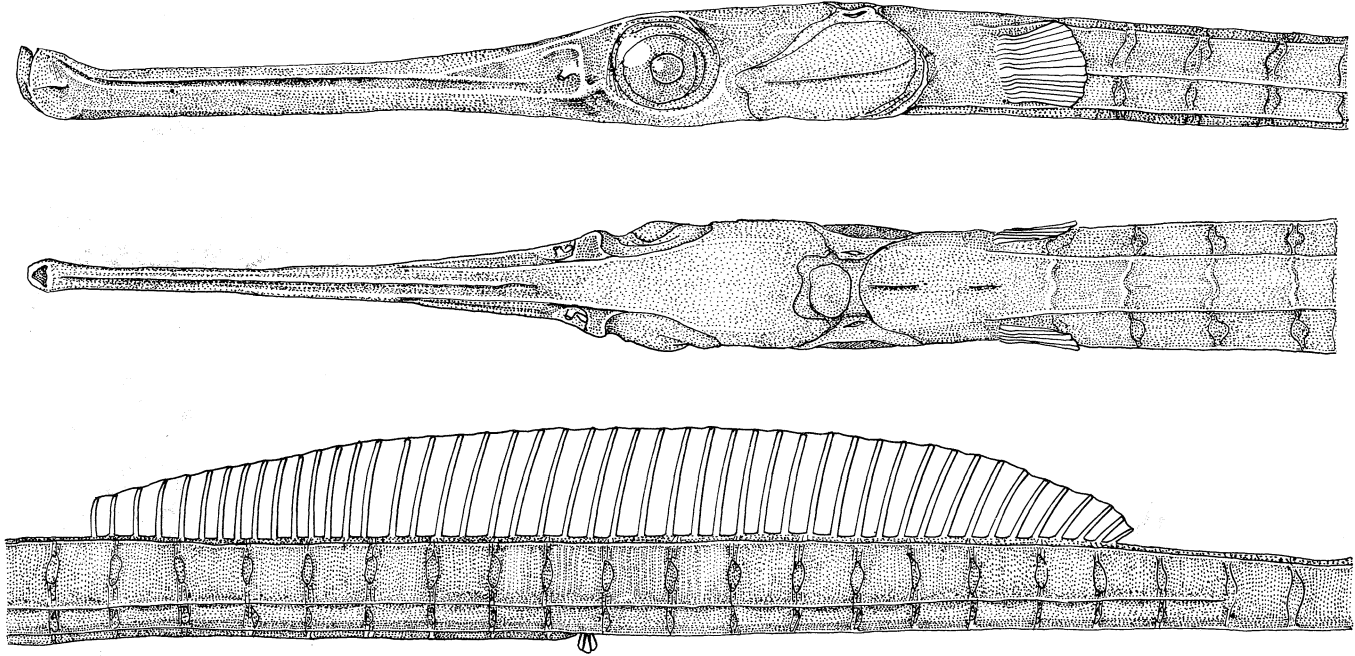


Fig. 2. *Stigmatopora argus*. Lateral and dorsal aspects of head and anterior trunk rings, together with section of body illustrating ridge configuration and dorsal and anal fins. From 114 mm TL adult female (GCRL 16376).

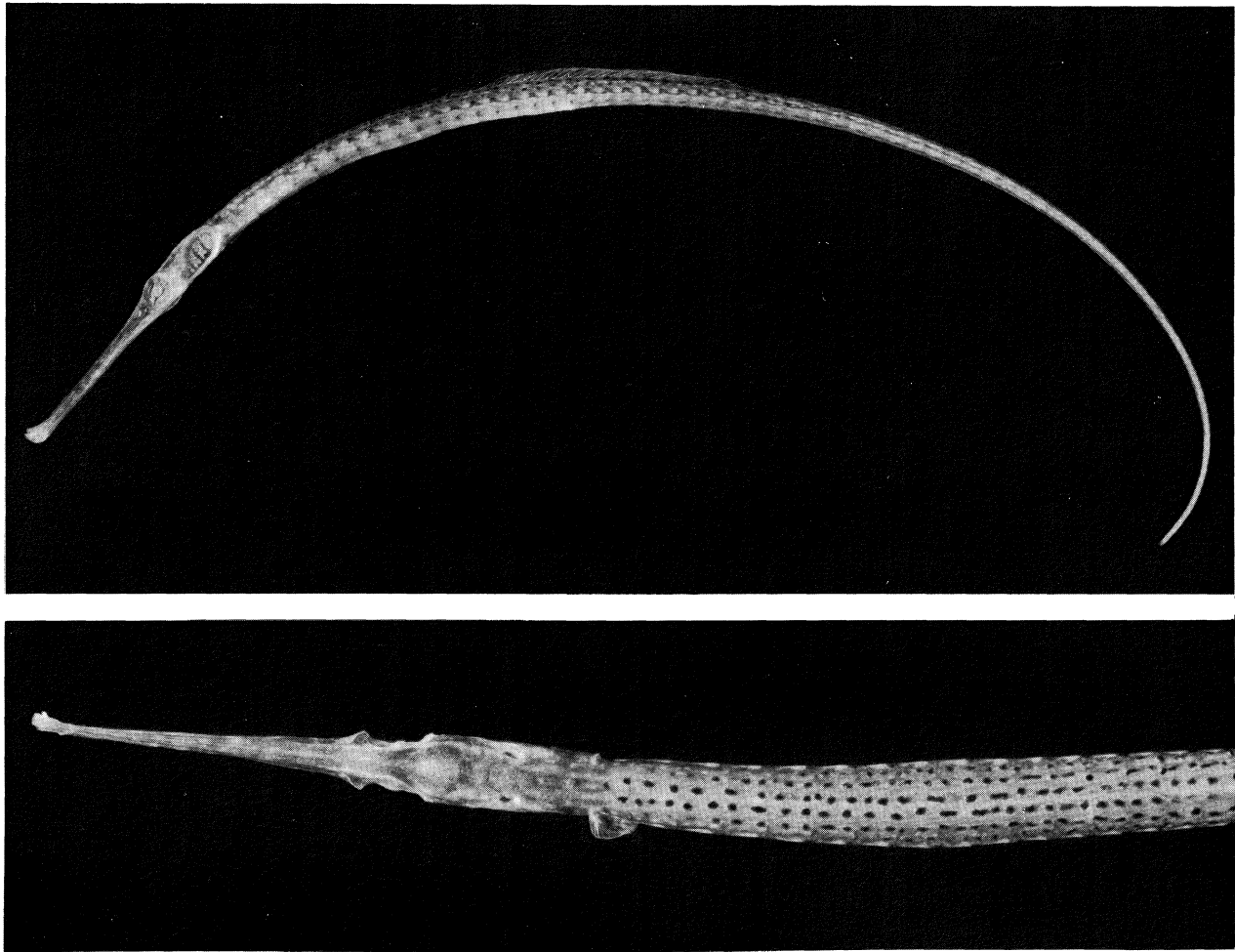


Fig. 3. *Stigmatopora argus* GCRL 16376 (adult female, ca. 103 mm TL). Top — Lateral aspect, some distal tail rings lost. Bottom — Dorsal aspect of head and anterior portion of trunk.

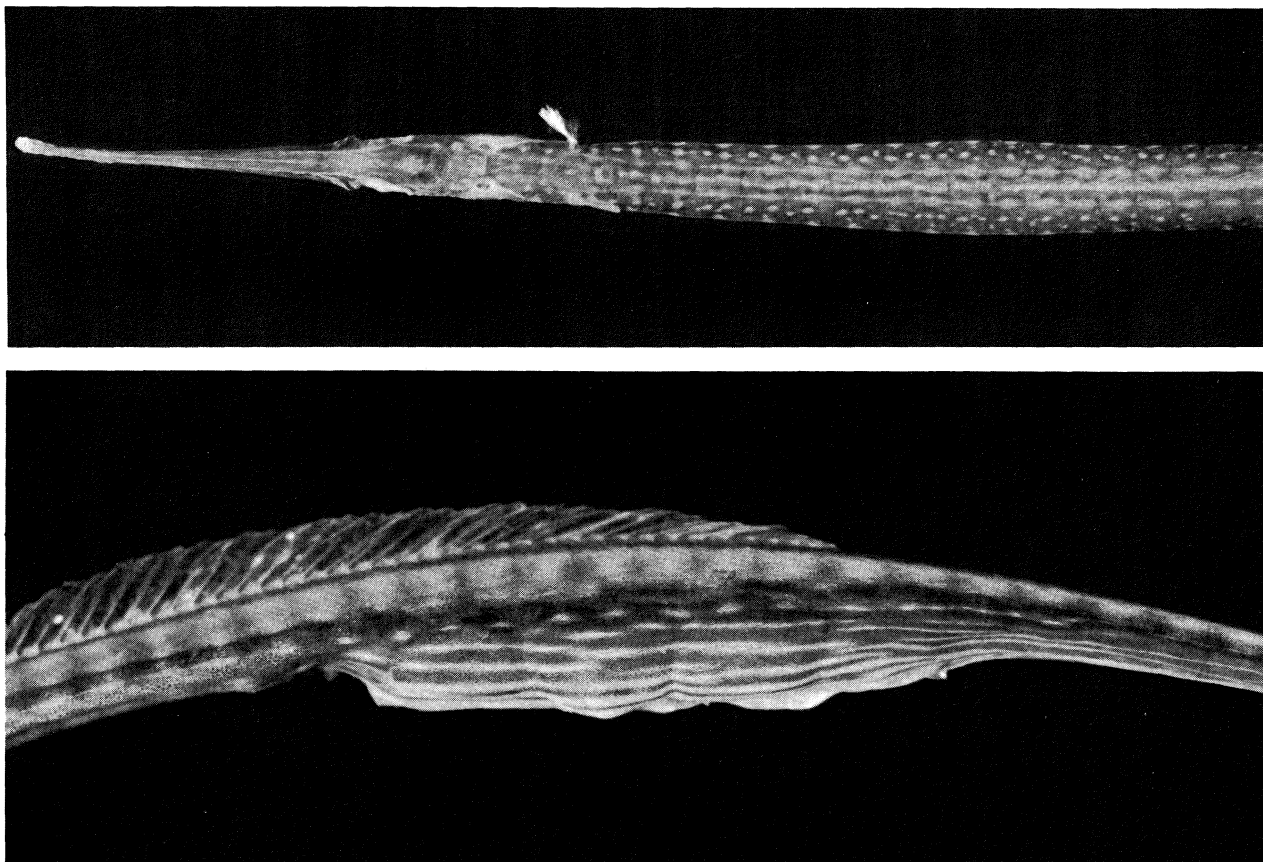


Fig. 4. *Stigmatopora argus*. Top — Dorsal aspect of head and anterior portion of trunk of 149 mm TL adult male (GCRL 16376). Bottom — Lateral aspect of section of body of 94.5 mm TL brooding male illustrating striped pattern on pouch folds.

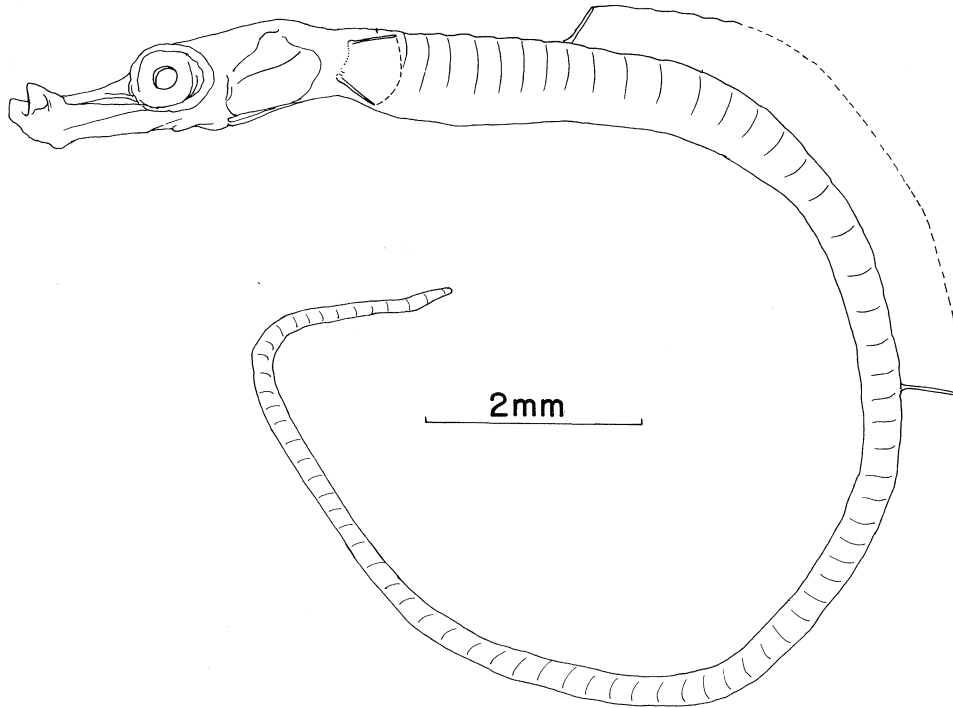


Fig. 5. Partially straightened 20.4 mm TL pouch larva of *Stigmatopora argus* (GCRL 16306).

Compared to its New Zealand congener, *S. argus* has a shorter lateral trunk ridge (crosses an average of 12.6 tail rings versus 28.1 in *macropterygia*), fewer subdorsal rings (14.75-22.75 versus 23.25-26.5) and fewer dorsal-fin rays (37-64 versus 63-74). The spotted coloration and striped brood pouch occurring in many adult *S. argus* do not occur in *S. macropterygia* and adult females of the latter usually have well-developed fleshy folds on the lateral ridge (uncommon in *argus*). Finally, *S. argus* is a smaller form which fails to approach the maximum observed length of *S. macropterygia* (ca. 350 mm TL). Shared characters, such as the relatively long lateral trunk ridge, the more common occurrence of the fleshy lateral ridge fold and the low trunk depth in breadth ratio of adult females, suggest that these species are more closely related than either is to *S. nigra*.

TYPES: The holotype of *Syngnathus argus* Richardson (BMNH 1855.9.19.1392) is a female (ca. 192 mm) which now lacks the anal fin as well as the tips of both the snout and the tail and has a damaged dorsal fin. Dark spots persist on the trunk and the lateral trunk ridge reaches to or near the 15th tail ring and bears a marginal fold (see Tables 1-5 for other data). I count 53 rather than the described 48 dorsal-fin rays, but the specimen otherwise agrees with Richardson's (1844) description in all important features.

Castelnau (1872b) diagnosed *Stigmatophora olivacea* as lacking a longitudinal opercular ridge and having the vent below the middle of the dorsal-fin, 19 body rings, 13 pouch rings and olive coloration. The emended diagnosis (Castelnau, 1873) stated

that there were about 84 tail rings and 45 dorsal-fin rays, that there were 18 pectoral-fin rays, that the brood pouch was orange, that the total length was nine inches (228.6 mm). Neither diagnosis suggests that Castelnau had more than a single male specimen of *S. olivacea*. The Paris collection now contains a damaged male specimen (MNHN A.738) catalogued as "*Stigmatophora olivacea*, Adelaide, Castelnau." The snout and tail are broken, the distal extremity of the tail is missing and the estimated length of the extant portion is about 220 mm. There are 19 trunk rings, 75 remaining tail rings, 45 dorsal-fin rays, 17 pectoral-fin rays, 8.5 + 7.75 subdorsal rings, eggs are present through 11 of 18 pouch-rings and coloration is plain except for faint indications of stripes on the pouch folds. The present count of 18 pouch-rings is greater than that given for the holotype but the count of 11 egg-bearing pouch rings more closely agrees with Castelnau's pouch-ring count of 13. This specimen closely approaches Castelnau's description in respect to size, counts and coloration and I consider it the presumptive holotype of *Stigmatophora Olivacea*.

The holotype of *Stigmatophora unicolor* Castelnau 1875 (MNHN A.737), a species formerly referred to the synonymy of *Stigmatopora argus*, is actually a specimen of *Syngnathoides biaculeatus* (Bloch).

The holotype of *Stigmatophora depressiuscula* (AMS I.16289-001) is a male of indeterminable length which now lacks much of the head and tail and all fins are damaged. The specimen has 19 trunk rings and about 8 + 10 subdorsal rings.

I have been unable to locate the types of *Gastrotokeus gracilis* Klunzinger, *Stigmatophora gracilis* Macleay or *Stigmatophora argus* var. *brevicaudata* Lucas.

REMARKS: The free dorsal edge of each pouch fold bears a thin, dorsally directed, narrow membrane and the ventral edge bears a wider, largely adnate, out-turned membranous fold. The brood pouch extends below the anterior 14-24 tail rings in 27 examined males; the smallest male with evidence of pouch development is about 95.5 mm TL. Among 12 brooding fish (ca. 112-230 mm TL) the pouch extends below 15-20 rings and eggs are deposited in 2-4 transverse rows through the 10-19 anterior pouch-rings. The 112 mm fish contained a total of 15 eggs through 11 of 18 pouch rings while the 230 mm specimen had 41 eggs through 16 of 20 pouch rings. The pouches of examined males were never completely filled with eggs, and membranous egg compartments were never developed through the entire pouch length. Maximum egg diameter was 1.8 mm in a 140 mm TL male and pouch larvae (Fig. 5) measured ca. 20.4 mm TL in one fish (ca. 133 mm TL) from South Australia. Study material includes brooding males taken in Jan., Mar., Apr. and July-Oct.

The holotype and ten other adult females (ca. 122.5-159 mm TL) had narrow to moderately broad fleshy folds on the lateral trunk ridges.

GEOGRAPHIC VARIATION: Material examined fail to show significant geographic variation in proportional values or coloration but such variation is indicated for a number of meristic features (Tables 1-5). Additional data are required for adequate analysis, but fish from Tasmania and Western Australia have somewhat higher counts of trunk rings, pectoral and dorsal fin rays and subdorsal trunk rings than those from other areas. Tasmanian fish have the highest frequencies of total subdorsal rings. Four badly damaged large fish (SAM F.3609), reportedly collected "off Cape Douglas, SA," have counts (omitted from Tables) which agree with the Tasmanian population. Other South Australian fish closely approach samples from Victoria and New South Wales in most meristic values and these atypical specimens may well be of Tasmanian origin. Present clinal variation in meristic values is replicated to a greater or lesser degree in

several other species of pipefishes which range along southern Australian coasts from Queensland to Western Australia.

Although detailed information on depth and method of capture is lacking for many samples, present materials suggest that the largest specimens of *S. argus* occur in Tasmania and Western Australia. At least 12 of the 28 fish examined from these areas ranged from 200-225 mm TL. Excepting the questionable specimens in SAM F.3609 (one at least 227 mm), none of the hundred fish examined from South Australia, Victoria and New South Wales exceeded 195 mm TL. Furthermore, Tasmanian and Western Australian adults seem to have somewhat better development of the opercular ridge than adults from other areas.

DISTRIBUTION: A number of literature records from Australia and other localities are probably erroneous. All records from New Guinea are evidently based on Kaup (1856) and those from Darwin are based on Klunzinger (1879) but these have not been confirmed by subsequent collections. Fowler's Fiji records (1907 (as *nigra*), 1922, 1959) were doubtless based on mislabelled Australian specimens, and Carcasson's (1977) references to Indonesia and Melanesia cannot be substantiated here. I have been unable to verify Munro's (1958a) record from S. Queensland and Duncker's (1909) record from Barrow I. (ca. 20°46'S, 115°24'E) is questionable.

Based on examined material, *S. argus* is presently known from the southern half of Australia, ranging (Fig. 6) from the Hawkesbury River, New South Wales (ca. 33°30'S, 151°10'E) to Rottnest I. and Shark Bay, Western Australia (ca. 25°25'S, 113°35'E), including Tasmania. The species occurs among vegetation (*Zostera* sp., etc.) in shallow bays and estuaries and is also found in offshore waters. Maximum recorded capture depth is 8 m and a specimen (100 mm TL) has been taken (with *nigra*) among floating *Sargassum* sp. off Rottnest I. Although presently unknown from New Zealand, *S. argus* should be expected in protected waters, since *S. nigra*, formerly thought restricted to Australia, has recently been reported from this region (Dawson, 1980a).

MATERIAL EXAMINED: 130 specimens (excluding pouch larvae), 66-254 mm TL, including holotype.

HOLOTYPE: BMNH 1855.9.19.1392 (192 mm, damaged female), "exact habitat unknown", "presented . . . by the surgeon of a convict ship", probably Tasmania.

OTHER MATERIAL: AUSTRALIA, New South Wales: AMS I.17034-002 (2, 122.5-175.5), AMS I.19938-007 (1, 154.5), AMS I.20021-001 (3, 145-160.5), AMS I.20040-004 (4, 133-157), AMS I.20044-006 (3, 138-151), GCRL 15521 (2, 115-129), GCRL 16370 (2, 128-139.5), GCRL 16374 (4, 86-130), GCRL 16375 (6, 95-114), GCRL 16376 (9, 98-149), NMV 54336-41 (6, 166-196), QM I.441 (7, 138-185). Victoria: AMS I.19785-006 (1, 152.5), MCZ 52361 (1, 115), NMV A.608 (4, 95-132), NMV A.609 (1, 66), NMV A.610 (1, 126), NMV A.611 (1, 130), NMV A.612 (1, 114), NMV A.613 (1, 100), NMV A.614 (3, 120-130), NMV A.615 (1, 97), NMV A.616 (1, 114), NMV A.617 (1, 97.5), NMV A.618 (1, 88), NMV A.619 (2, 92-120), NMV A.620 (1, 126), NMV A.621 (2, 136-157), NMV A.622 (3, 98-106), NMV A.623 (2, 114-116), NMV A.671 (6, 112-133.5). South Australia: AMS I.20179-016 (6, 80-165), AMS I.20180-020 (2, 103.5-190), MNHN A.738 (ca. 220, damaged male, presumptive holotype of *Stigmatophora olivacea*), QM I.9828 (2, damaged), SAM F.3588 (1, 90), SAM F.3632 (1, 108), SAM F.4136 (8, 105-159), SAM F.3609 (4, damaged). Tasmania: BMNH 1860.11.29.58-59 (2, 168-177), BMNH 1872.9.9.9-10 (2, 172.5-178), GCRL 14764 (1, 165), QVM 1974/5/37 (1, 181), QVM 1978/5/89 (3, 195-254.5). Western Australia: AMS I.16289-001 (damaged male holotype of *S. depressiuscula*), BMNH 1935.9.14.5 (1, 150.5), GCRL 16461 (1, 99), NMV A.607 (1, 225), WAM P.25258-014

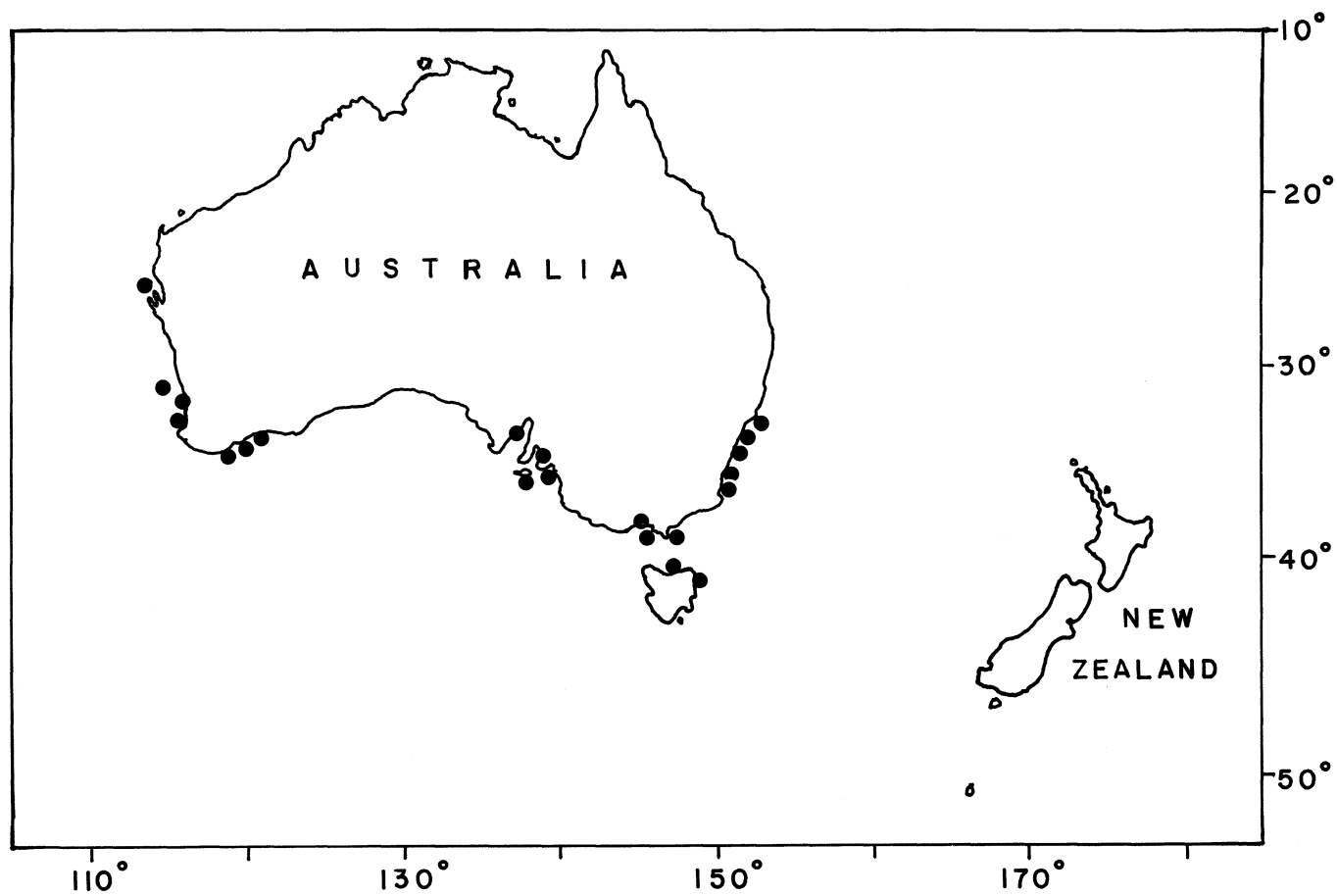


Fig. 6. Distribution of *Stigmatopora argus* based on material examined. Each symbol indicates approximate locality of one or more collections.

(3, 147-168.5), WAM P.25259-002 (4, 217-250), WAM P.25752-004 (1, 195.5), WAM P.26466-001 (2, 221-243).

Stigmatopora nigra Kaup
Figs. 7, 8

Stigmatopora niger Kaup, 1853:233 (nomen nudum).

Stigmatopora nigra Kaup, 1856:53 (orig. descr.; Tas.); Duméril, 1870:583 (descr.); Günther, 1870:190 (descr.); Castelnau, 1875:48 (Adelaide); Castelnau, 1879:355, 360 (Port Jackson; Austr., endemic); Macleay, 1882:297 (descr.; Port Jackson, Port Phillip); Tenison-Woods, 1882:23 (compiled); Johnston, 1883:134 (Tamar, Tas.); Johnston, 1890:37 (compiled); Lucas, 1890:39 (compiled); Schreiner and Miranda Ribeiro, 1903:87 (listed); Ogilby, 1912:36 (Qld.); McCulloch, 1914:29, figs. 1-3 (sexual dimorphism; comparisons; Tas.); Duncker, 1915:103 (descr.; SA, Tas.); Whitley, 1927:4 (listed, Fiji); Fowler, 1931:323 (listed, Fiji); Bertin and Estéve, 1950:49 (syntype listed as holotype); Munro, 1958a:90, fig. 623 (descr.; distr.); Scott, 1961:60 (in key; Tas.); Marshall, 1964:120, pl. 28 (in key; descr.; distr.); Breder and Rosen, 1966:294 (ref.); Marshall, 1966:177, pl. 28, fig. 129 a-c (colour note; S. Qld.); Scott et al., 1974:123, figs. (in key; descr.; distr.); Shiino, 1976:109 (compiled); Glover, 1979:150 (Kangaroo I.); Scott, 1980:106 (listed, Tas.).

Stigmatopora nigra. Castelnau, 1872:201 (misspelling; descr.; Melbourne).

Stigmatopora boops. Castelnau, 1872:203 (nomen nudum; Melbourne).

Syngnathus pelagicus (not of Linnaeus). Zietz, 1908:298 (misident.; SA).

?*Stigmatopora nigra*. Duncker, 1909:239 (counts; Vic., Tas.)

Stigmatopora nigra. McCulloch, 1921:37, fig. 966 (compiled; NSW); Waite and Hale, 1921:311, fig. 49 (descr.; distr.); Lord, 1923:64 (listed, Tas.); Lord and Scott, 1924:40 (fairly common; Tas.); McCulloch and Whitley, 1925:137 (compiled); Lord, 1927:13 (listed, Tas.); McCulloch, 1929:93 (compiled); Scott, 1939:139, 142 (in key); Whitley, 1951:62 (type-species of *Pipettella* subgen. nov.); Whitley, 1953:135 (type-species of *Nigracus* gen. nov.); Scott, 1960:88 (nomenclatural notes); Scott, 1966:93 (note on anomalous opercular ridges); Scott, 1970:35 (compared with "*Ichthyocampus*" *cristatus*); Lenanton, 1974:8, 14 (compiled; WA); Scott, 1977:123 (ref. to operc. ridge); Dawson, 1980a:288, fig. 6 (diagnosis, New Zealand).

Nigracus nigra. Whitley, 1953:135 (n. comb.; type-species of *Nigracus* gen. nov.); Whitley and Allan, 1958:61, fig. (compiled); Whitley, 1964:38 (compiled).

DIAGNOSIS: Dorsal-fin origin on 5th-7th trunk ring; lateral trunk ridge not continued past 2nd tail ring; pectoral-fin rays usually (95%) 11-14; usually with dark bilateral stripes on underside of head; without well-defined spots or ocelli on dorsum of trunk.

DESCRIPTION: Trunk rings 16-19; tail rings 67-79 (10 counts); dorsal-fin rays 35-47; pectoral-fin rays 11-16; dorsal-fin origin on 5th-7th (usually 6th) trunk ring; subdorsal rings 13.5-10.5 + 4.25-8.75 = 15.75-20.75; lateral trunk ridge usually ends on anal ring or 1st tail ring; see Tables 1-5 for additional counts. Proportional data based on 26 specimens 9.9-20.3 (\bar{x} = 14.5) mm HL follow: snout length in HL 1.5-1.8 (1.7), snout depth in snout length 7.5-18.7 (10.2), length of dorsal-fin base in HL 0.5-0.8 (0.6), anal ring depth in HL 6.9-13.0 (9.2), trunk depth in HL 4.6-11.0 (7.8), pectoral-fin length in HL 6.4-8.4 (7.2), length of pectoral-fin base in pectoral-fin length 1.3-2.3 (1.7).

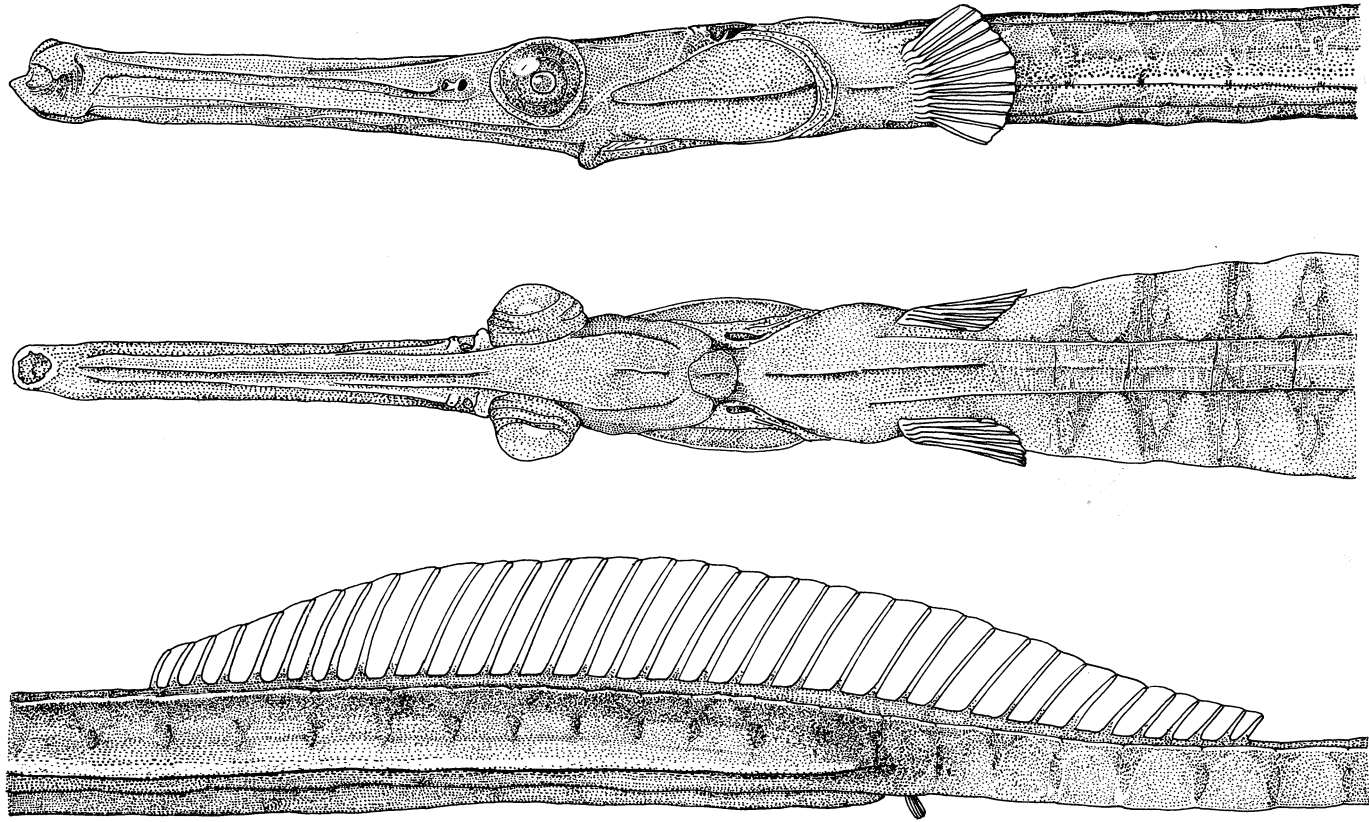


Fig. 7. *Stigmatopora nigra*. Lateral and dorsal aspects of head and anterior trunk rings, together with section of body illustrating ridge configuration and dorsal and anal fins. From 98.5 mm TL adult female (GCRL 16369).

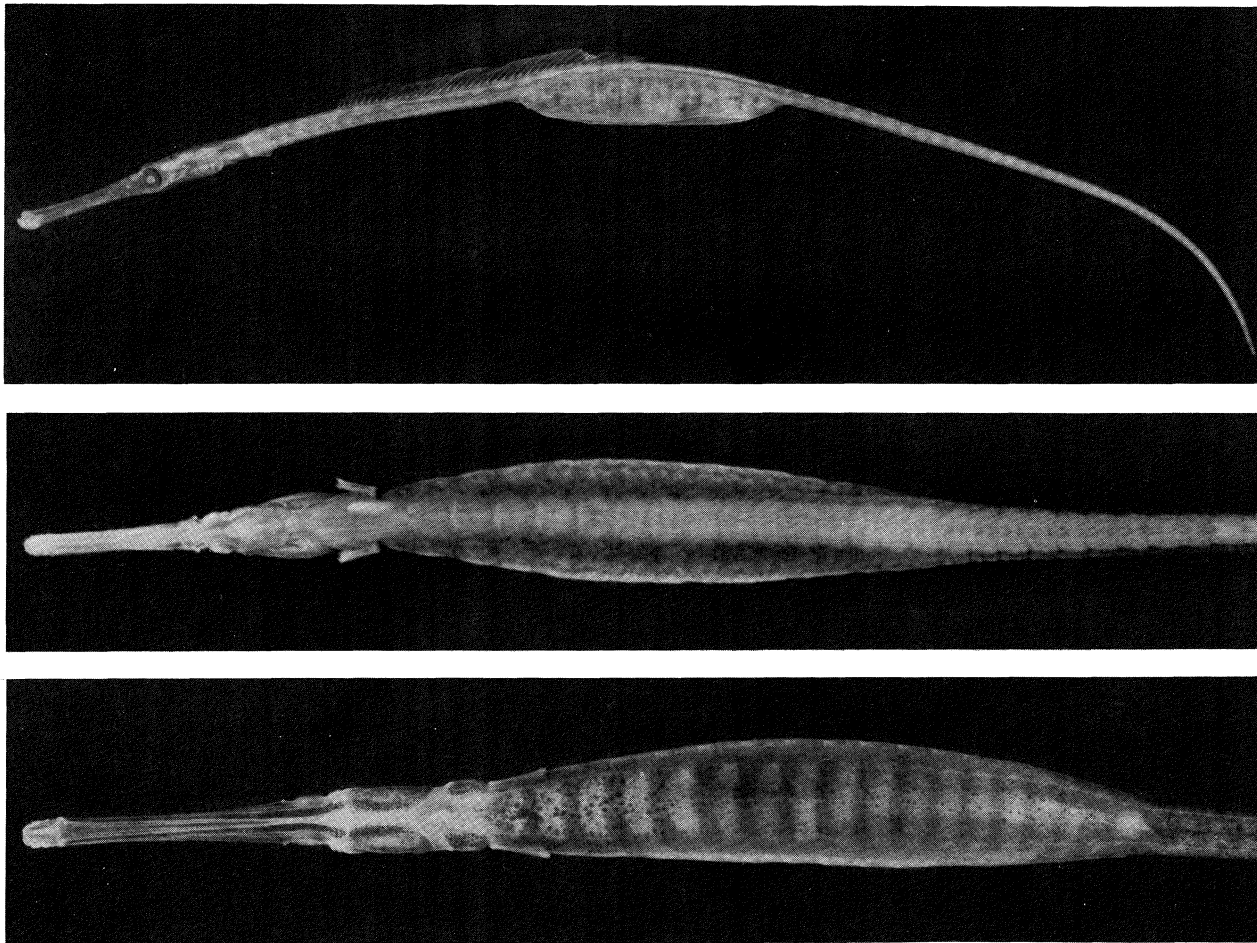


Fig. 8. *Stigmatopora nigra*. Top — Lateral aspect of 68 mm TL brooding male (GCRL 16372). Middle — Dorsal aspect of head and anterior portion of body of 138.5 mm TL adult female (NMNZ 7964). Bottom — Ventral aspect of head and anterior portion of body of 99.5 mm TL adult female (NMV A.673).

Opercular ridge usually rather prominent, complete or nearly complete in young and adults. Trunk depth in breadth ratio clearly sexually dimorphic in adults, averages 1.4 in males and 2.2 in females; adult females seldom with marginal fleshy fold on lateral trunk ridge.

COLORATION: Ground colour gray to dark brown in adults, pale in pelagic juveniles; adults with dorsum and sides of head brownish, sometimes blotched with pale; venter of head brown in front, with a pale medium area behind vertical through anterior rim of orbit and with narrow dark bilateral stripes crossing suborbital and lower part of opercle (Fig. 8); dorsum of trunk plain or blotched with brown, usually lighter than upper half of sides; lateral trunk ridge usually pale in mature females; ventral surface of trunk pale to dark brown, usually with indications of dark bars between rings; brood-pouch folds often with pale margins, otherwise plain brown or with a few irregular minute flecks of pale or dark brown; remainder of tail plain, irregularly blotched or with indications of narrow bands of pale and brown; fin rays usually edged or flecked with brown.

COMPARISONS: Compared to its New Zealand congener, *S. nigra* has fewer trunk rings (modally 17 against 21 in *macropterygia*), a more anterior dorsal-fin origin (on 5th-7th trunk ring versus 8th-10th), lower counts of subdorsal tail rings and total subdorsal rings (respectively, 4.5-9.0 and 15.75-21.0 versus 10.5-13.5 and 23.25-26.25) and a shorter lateral trunk ridge (ends near anal ring in *nigra*, on 25th-32nd tail ring in *macropterygia*). Adult females have a broadly expanded trunk (moderately so in *macropterygia*) and typically lack of fleshy fold on the lateral trunk ridge (typically present in *macropterygia*). Furthermore, maximum observed length of *S. nigra* (ca. 162 mm) is much less than that of *S. macropterygia* (ca. 350 mm).

For other comparisons see this section under *S. argus*.

TYPES: Kaup's (1856) two syntypes of *S. nigra*, then located in the Paris collection, included at least one adult male but lengths were not indicated. Later, Duméril (1870) noted that the Paris collection included only a 110 mm female specimen of *S. nigra*, and Bertin and Estéve (1950) listed a specimen of this length and sex as the holotype of *S. nigra* (MNHN 6055). Recent examination shows MNHN 6055 to contain a single male of this species which lacks part of the tail and measures about 84 mm TL. This fish has 17 trunk rings, about 21 tail rings, about 40 dorsal-fin rays, 13 pectoral-fin rays, 11.25 + 5.25 subdorsal rings and 14 pouch rings. These values agree with or approximate those given by Kaup and this specimen is here treated as a presumptive syntype of *S. nigra*. The female specimen mentioned by Duméril (1870) and Bertin and Estéve (1950) cannot be located in the Paris collection and its fate is unknown.

Bertin and Estéve (1950) listed 10 specimens (50-60 mm) as paratypes of *Stigmatophora boops* Castelnau (MNHN A.1435). These have recently been shown (Dawson, 1980b) to be syntypes of *Urocampus carinirostris* Castelnau.

REMARKS: The outer dorsal edges of the pouch folds lack the narrow dorsally directed membranes found in *S. argus*. The free margins of the pouch are sometimes simple but they usually bear a narrow ventrally or laterally directed fold. The brood-pouch extends below the anterior 12-16 tail rings in 19 males examined. The length range of 12 brooding fish was 68-108 mm TL with the smallest male having evidence of pouch development measuring ca. 57 mm TL. Eggs are in 1-4 transverse rows with the inner rows often irregular or incomplete. One male (80 mm) had a total of 20 eggs through 9 of 12 pouch rings, while another (77.5 mm) had 41 early embryos through 11 of 14 rings and a third (68 mm) had 14 late larvae (ca. 8.8 mm) within a 15

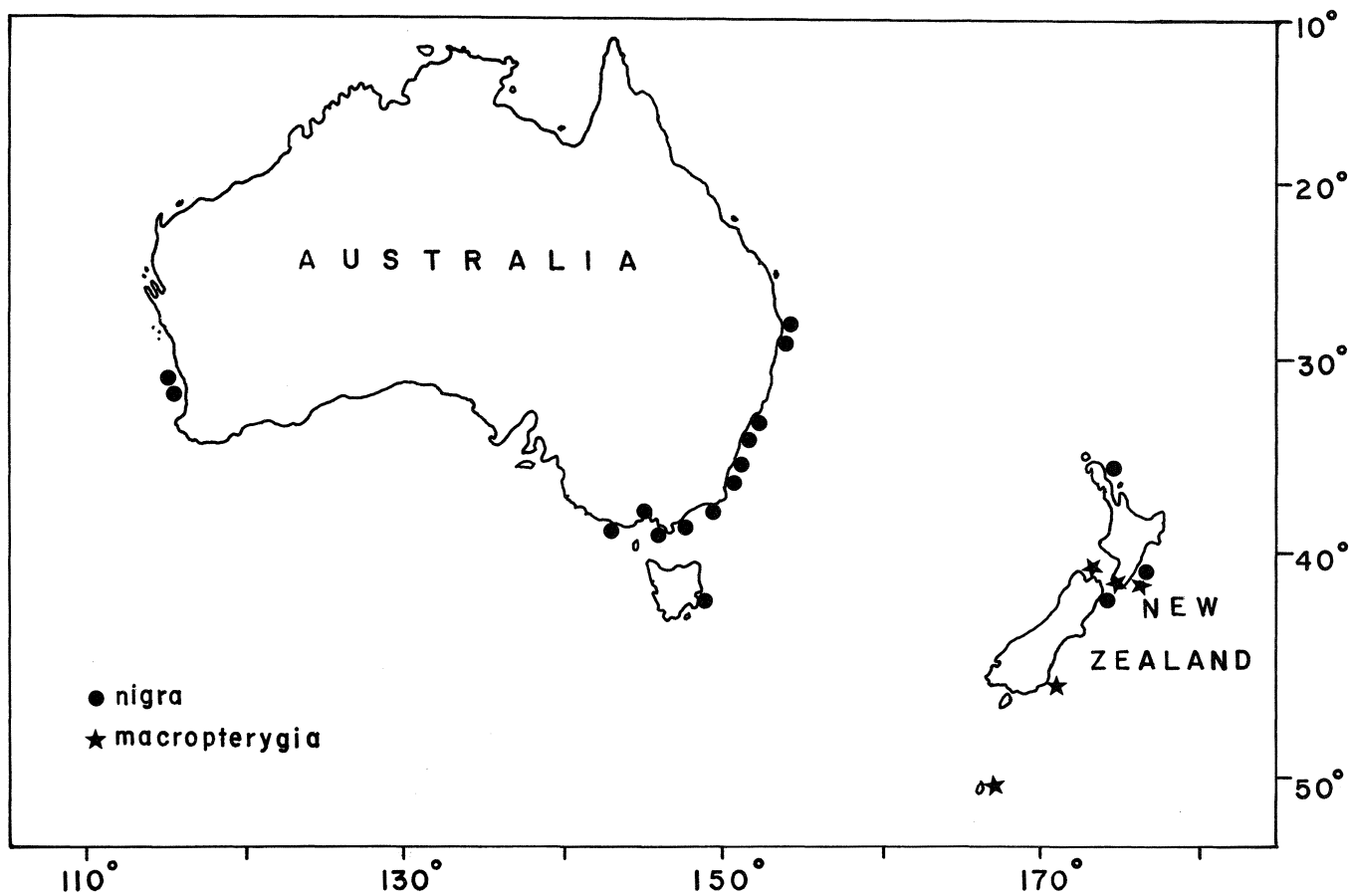


Fig. 9. Distribution of *Stigmatopora nigra* and *S. macropterygia* based on material examined. Each symbol indicates approximate locality of one or more collections.

ring pouch. Brooding Australian fish were taken during Feb., Apr.-June and Aug.-Oct. The smallest examined female with a clearly expanded trunk was ca. 69 mm TL. A fleshy marginal fold was clearly evident on the lateral ridge of only one adult female.

The bilateral dark stripes on the underside of the head may be faint or obscured by an exceptionally dark ground colour but some indication of their presence persists in most well-preserved material.

GEOGRAPHIC VARIATION: I fail to find evidence of geographic variation in coloration of proportional features, and meristic data (Tables 1-5) show few major differences between compared Australian populations. Still, trunk ring counts average a little higher in material from Victoria, counts of pectoral-fin rays are a little lower in the Tasmanian sample, while counts of dorsal-fin rays are lower in Queensland and Western Australia and highest in Tasmania. Additional study is required to determine the validity of these apparent differences.

Compared to the Australian population, New Zealand material has higher counts of subdorsal trunk rings and total subdorsal rings (respectively, 6.75-9.0 and 18.75-21.0 versus 4.5-7.5 and 15.75-19.5). The New Zealand fish agree with Tasmanian specimens in the relatively high counts of dorsal-fin rays, with Western Australian samples in the lower counts of pectoral-fin rays and have a tendency toward higher trunk ring counts than the majority of Australian specimens.

DISTRIBUTION: Whitley's (1927) reference to Fiji was based on Fowler's (1907) misidentification of mislabelled specimens of *S. argus*; Fowler's (1931) record is from Whitley (1927).

Stigmatopora nigra is presently known (Fig. 9) from the vicinity of Tangalooma Pt., S. Queensland (ca. 27°12'S, 153°22'E) south and west to the offings of Rottneest I., Western Australia (ca. 32°02'S, 115°36'E), from Tasmania and from New Zealand. The species frequents shallow bays and estuaries (among vegetation) as well as offshore waters where specimens are recorded from trawl and dredge collections to a maximum depth of 35 m. Juveniles and adults (35-67 mm TL) have been collected from floating *Sargassum* sp. off Rottneest I.

MATERIAL EXAMINED: 97 specimens (excluding pouch larvae), 35-162 mm TL, including one presumptive syntype.

PRESUMPTIVE SYNTYPE: MNHN 6055 (84 mm, damaged male), Tasmania, M. Verreaux.

OTHER MATERIAL: AUSTRALIA, Queensland: QM I.7751 (1, 75), QM I.1608 (1, 100), QM I.11273 (1, 63), QM I.13400 (3, 73-85). New South Wales: AMS I.16498-006 (1, 102.5), AMS I.17817-001 (1, 109), AMS I.17895-002 (6, 67-100), AMS I.19933-001 (2, 63-74.5), AMS I.19948-002 (1, 83), AMS I.20044-001 (2, 90-91), AMS I.20049-010 (9, 67-128), GCRL 16369 (5, 72.5-101), GCRL 16372 (3, 37.5-75). Victoria: AMS I. 19782-001 (2, 94.5-101), NMV A.550 (1, 113), NMV A.598 (1, 69), NMV A.599 (1, 162), NMV A.600 (1, 80), NMV A.601 (2, 59-72.5), NMV A.602 (1, 57), NMV A.603 (1, 80), NMV A.673 (8, 78-106). Tasmania: GCRL 15522 (5, 80-114). Western Australia: GCRL 16460 (15, 35-67), NMV A.604 (2, 70-80), WAM P.25343-002 (1, 116), WAM P.25344-009 (3, 83.5-107), WAM P.25346-013 (3, 74-91), WAM P.25804-002 (5, 97-113). NEW ZEALAND, North I.: NMNZ 1261 (2, 89-140.5), NMNZ 7963 (1, 92.5), NMNZ 7964 (1, 138.5). South I.: GCRL 16313 (1, 94.5), NMNZ 1077 (3, 75.5-88).

Stigmatopora macropterygia Duméril

Figs. 10, 11

Stigmatopora macropterygia Duméril, 1870:583 (orig. descr.; Oceania); Duncker, 1915:104 (descr.; New Zealand); Fowler, 1928:112 (ref.); Bertin and Estéve, 1950:50 (holotype listed).

Stigmatopora longirostris Hutton, 1872:68 (orig. descr.; Wellington Harbour); Gill, 1893:122 (compiled); Hutton, 1904:52 (compiled); Phillips, 1927:11 (compiled); Whitley, 1955:119 (listed as snr synonym of *S. gracilis*); Heath and Moreland, 1967:16, fig. (ref.); Morton and Miller, 1968:199, fig. (among tidal algae).

Stigmatopora longirostris. Waite, 1907:14 (compiled); Whitley, 1968:35 (compiled); Russell, 1969:108 (among intertidal algae).

Stigmatopora macropterygia. Dawson, 1980a:288, fig. 7 (diagnosis, comparisons).

DIAGNOSIS: Dorsal-fin origin on 8th-10th trunk ring; lateral trunk ridge reaches 22nd-35th tail ring; pectoral-fin rays usually (96%) 16-19; without stripes on underside of head; dorsum of trunk with or without bilateral dark spots between rings.

DESCRIPTION: Trunk rings 21-22; tail rings 85-92 (7 counts); dorsal-fin rays 63-74; pectoral-fin rays 15-19; dorsal-fin origin on 8th-10th trunk ring; subdorsal rings 13.5-11.5 + 10.5-13.75 = 23.0-26.25; lateral trunk ridge reaches 22nd-35th (\bar{x} = 28.1) tail ring; see Tables 1-5 for additional counts. Proportional data based on 26 specimens 13.4-52.8 (\bar{x} = 36.6) mm HL follow: snout length in HL 1.4-1.6 (1.5), snout depth in snout length 10.4-28.3 (17.3), length of dorsal-fin base in HL 0.5-0.7 (0.6), anal ring depth in HL 6.6-14.9 (9.1), trunk depth in HL 6.2-10.0 (7.8), pectoral-fin length in HL 7.9-12.9 (9.4), length of pectoral-fin base in pectoral-fin length 1.0-1.7 (1.3).

Opercular ridge low, complete in juveniles (82 mm TL), sometimes incomplete in adults; trunk depth of adults 1.2-1.7 (1.3) in trunk breadth, the ratio not strongly sexually dimorphic. Females (larger than 216 mm) usually with a fleshy marginal fold on the lateral ridge, fold widest (to ca. 3 mm) on tail and posterior part of trunk.

COLORATION: Subadults and adults gray to dark brown, the venter usually lighter than sides and dorsum; often without distinctive markings but some specimens have bilateral dark spots on the superior ridges between some or most trunk rings, whereas others retain traces of faint bands on the trunk; brood-pouch folds without distinctive markings; marginal fold on lateral ridge of adult females often plain, sometimes narrowly edged or scalloped with black; fin rays usually edged with brown. Juveniles (ca. 80-115 mm TL) pale, with irregular scattering of microchromatophores and hyaline fins.

TYPES: Duméril reported 68 dorsal-fin rays and 13 + 13 subdorsal rings in the damaged holotype of *S. macropterygia*. This juvenile or female specimen (MNHN 6054) is now in two pieces (estimated combined length ca. 170 mm) and in very poor state of preservation. The dorsal fin originates on the 8th trunk ring and I count 65 dorsal-fin rays and 11 + 13.25 subdorsal rings.

The original description of *S. longirostris* was based on at least one adult male and at least one "young." The species was described as common, reaching a length of 14 inches (355.6 mm) and having 21 + 71 rings and 66-67 dorsal-fin rays. A juvenile or young female and an adult female (BMHN 74.4.26.8) labelled "Wellington, received

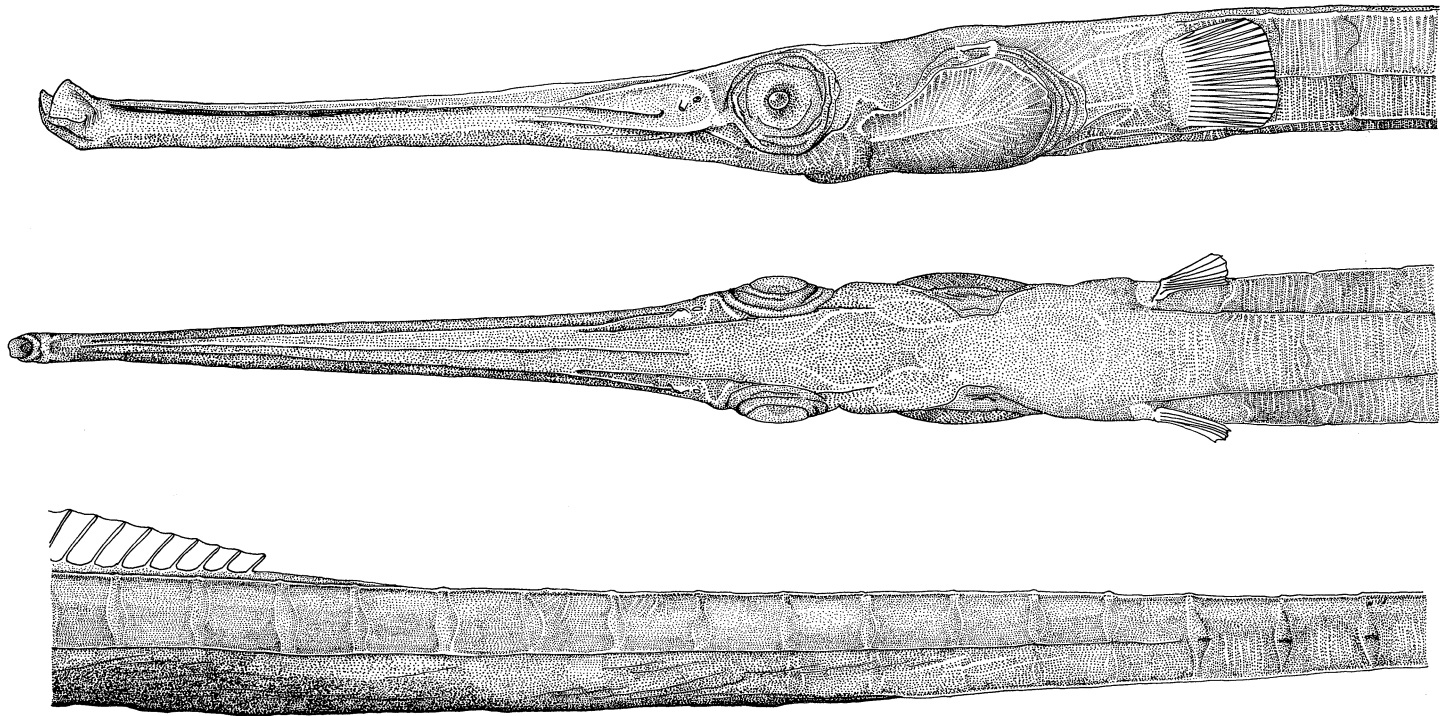


Fig. 10. *Stigmatopora macropterygia*. Lateral and dorsal aspects of head and anterior trunk rings, together with section of body illustrating ridge configuration and posterior portion of dorsal fin. From 255 mm TL adult male (GCRL 15083).

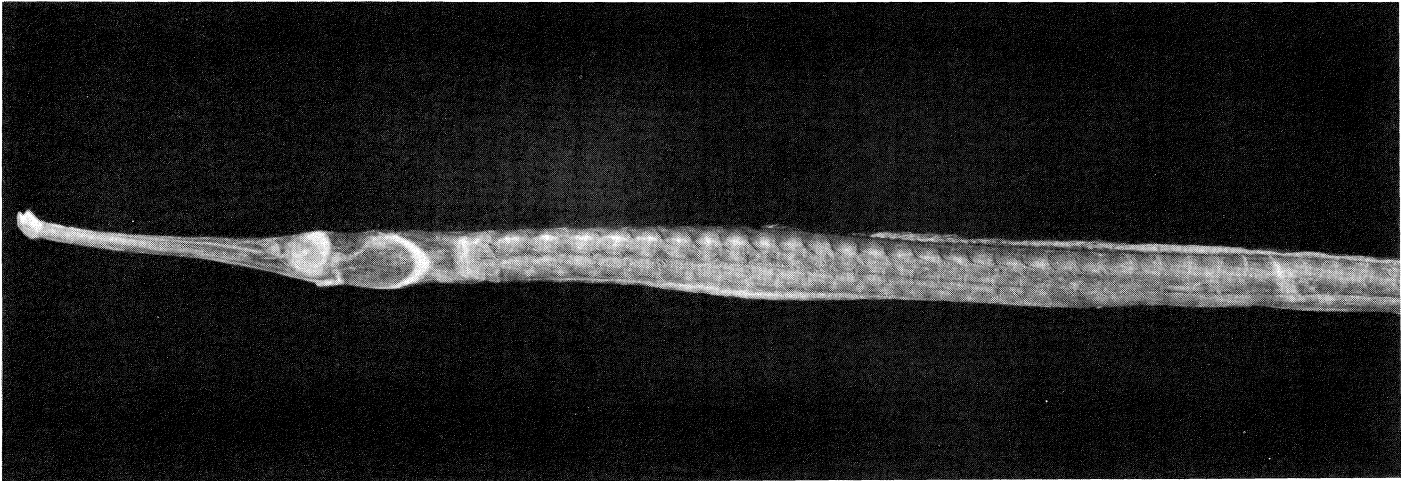


Fig. 11. *Stigmatopora macropterygia*. Lateral aspect of head and anterior portion of body of 255 mm TL adult male (GCRL 15083).

INDO-PACIFIC PIPEFISH GENUS *STIGMATOPORA* (SYNGNATHIDAE) 597

from the New Zealand Institute, Wellington," are considered presumptive syntypes. Both lack distal portions of the tail, and have 21-22 trunk rings and 67-69 dorsal-fin rays. The adult retains paired dark spots on the dorsum as noted in the original description. The fate of the male syntype(s) is unknown.

REMARKS: Part of the tail was missing in each of the seven adult males examined. Margins of pouch folds appeared to be simple with the brood-pouch developed below 21-24 anterior tail rings. Eggs were not present but embryos and pouch larvae (ca. 20.2 mm) were retained in three fish. One specimen had at least five transverse rows of membranous egg compartments and about 32 compartments in the outer right row. Data are not available on brooding season.

GEOGRAPHIC VARIATION: Available material shows no evidence of geographic variation.

DISTRIBUTION: This species is known only from New Zealand and the Auckland Is. (Fig. 9). Present material includes New Zealand specimens collected from Otago Harbour (South Island) to Castel Point (North Island). Most seem to have been collected near wharves or piling; maximum recorded depth is 7.3 m.

MATERIAL EXAMINED: 37 specimens (excluding pouch larvae), 82-349.5 mm TL, including holotype.

HOLOTYPE: MNHN 6054 (damaged juvenile or female), Oceania, Arnoux.

OTHER MATERIAL: NEW ZEALAND: BMNH 74.4.26.8 (2, 127-279.5, presumptive syntypes of *Stigmatophora longirostris*), BMNH 1886.11.18.104 (1, 190), GCRL 15083 (2, 255-257), GCRL 16310 (1, 339.5), GCRL 16311 (1, 282), GCRL 16330 (1, 82), NMNZ 291 (1, 117), NMNZ 519 (1, 278), NMNZ 688 (1, 293.5), NMNZ 743 (1, 254), NMNZ 850 (2, 199-203), NMNZ 1197 (1, 349.5), NMNZ 1240 (2, 188.5-229.5), NMNZ 1265 (1, 159.5), NMNZ 1615 (1, 290.5), NMNZ 1700 (1, 240), NMNZ 1762 (1, 259.5), NMNZ 2097 (2, 228-287), NMNZ 2177 (1, 100.5), NMNZ 2312 (1, 311), NMNZ 2544 (1, 261.5), NMNZ 2715 (1, 332), NMNZ 2716 (3, 132-244.5), NMNZ 3190 (1, 256), NMNZ 3276 (2, 216-235), NMNZ 4203 (1, 296), NMNZ 7972 (1, 272). AUCKLAND IS.: NMNZ 3325 (1, 107).

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TABLE 1. Frequency distributions of trunk rings, site of dorsal-fin origin and pectoral-fin rays in species of *Stigmatopora*. Except where indicated, data are not available for primary types.

Species	Locale	Trunk rings						Dorsal-fin origin on trunk ring						Pectoral-fin rays															
		16	17	18	19	20	21	22	23	5	6	7	8	9	10	11	12	13	11	12	13	14	15	16	17	18	19		
<i>nigra</i>																													
Australia																													
	Qld.		5								5										1			1					
	NSW	3	21	3					4	12											1	27	10						
	Vic.	3	8	8					1	12	3										4	8	9	3	1				
	Tas.		4*	2						4	1									3	1	2*							
	WA	1	10						3	9													2						
New Zealand																													
			3	5	1						2									5	8	3							
<i>argus</i>																													
Australia																													
	NSW		4	24	13	1								7	24	1					2	15	15	9	9				
	Vic.	1	5	8	15	3								1	9	20	2				1	4	16	7					
	SA	2	6	2	4	3	3							3	5	2					1		14	14	1	2			
	Tas.				3	7*								1	3	5*							4*	7	3				
	WA				1	4	3	4	2						1	3	7	2					7	10	2				
<i>macropterygia</i>																													
New Zealand																													
							21	12						1*	1	5								2	26	18	5	1	

*Primary type

TABLE 2. Frequency distributions of dorsal-fin rays in species of *Stigmatopora*. Except where indicated, data are not available for primary types.

Species	Locale	Dorsal-fin rays												
		36	39	42	45	48	51	54	57	60	63	66	69	72
<i>nigra</i>														
Australia														
	Qld.	11	4											
	NSW	4	18	7										
	Vic.	3	11	1										
	Tas.			2	3									
	WA	10	1											
New Zealand														
				4	3	2								
<i>argus</i>														
Australia														
	NSW			1	17	16	5	2						
	Vic.	1	1	5	8	6		1						
	SA		1	6	2	5	2							
	Tas.						1	1*	4	2				
	WA					3	6	1	2					
<i>macropterygia</i>														
New Zealand														
										2	15*	6	7	1

*Primary type.

 TABLE 3. Frequency distributions of subdorsal trunk rings in species of *Stigmatopora*.

Species	Locale	Subdorsal trunk rings										
		13.5	12.75	12.0	11.25	10.5	9.75	9.0	8.25	7.5	6.75	6.0
<i>nigra</i>												
Australia												
	Qld.			1	4							
	NSW			5	11	9	2					
	Vic.			2	6	8						
	Tas.				1	5*						
	WA				4	7						
New Zealand												
		1	3			5						
<i>argus</i>												
Australia												
	NSW						2	8	19	10	2	
	Vic.						1	5	13	6	1	1
	SA						1	4	8	2	1	
	Tas.							3	5*	1	1	
	WA				1	6	4	2	1			
<i>macropterygia</i>												
New Zealand												
		5	12	16	1*							

*Primary type.

TABLE 4. Frequency distributions of subdorsal tail rings in species of *Stigmatopora*.

Species	Subdorsal tail rings												
Locale	4.5	5.25	6.0	6.75	7.5	8.25	9.0	9.75	10.5	11.25	12.0	12.75	13.5
<i>nigra</i>													
Australia													
Qld.		3	1	1									
NSW		5	12	9	1								
Vic.		3	9	4									
Tas.		2*	2	2									
WA	2	5	4										
New Zealand				1	4	3	1						
<i>argus</i>													
Australia													
NSW					3	11	11	15	1				
Vic.					2	10	9	6					
SA				1	3	4	2	5	1				
Tas.						1*		2	1	3	3		
WA				1	4	5	3	1					
<i>macropterygia</i>													
New Zealand									1	7	12	11	3*

*Primary type.

TABLE 5. Frequency distributions of total subdorsal rings in species of *Stigmatopora*.

Species	Locale	Total subdorsal rings															
		15.0	15.75	16.5	17.25	18.0	18.75	19.5	20.25	21.0	21.75	22.5	23.25	24.0	24.75	25.5	26.25
<i>nigra</i>																	
Australia																	
	Qld.				2	2	1										
	NSW			2	6	12	5	2									
	Vic.			3	4	6	3										
	Tas.			2*	2	1	1										
	WA		1	4	3	3											
	New Zealand						3	2	3	1							
<i>argus</i>																	
Australia																	
	NSW		5	8	11	11	6										
	Vic.	3	4	5	7	6	2										
	SA	2	6		1		7										
	Tas.						1*	3	4	1	1						
	WA				2	6	6										
<i>macropterygia</i>																	
	New Zealand											7	6*	9	7	5	

*Primary type.