

**Pisces, Pleuronectiformes: Flatfishes from the waters
around New Caledonia. Six species of the bothid genera
Tosarhombus and *Parabothus***

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ABSTRACT

Six species of the two related bothid genera *Tosarhombus* and *Parabothus* from the Coral Sea are described and keys to species are provided: *T. neocaledonicus* Amaoka & Rivaton, 1991, *T. longimanus* sp. nov., *T. brevis* sp. nov., *P. filipes* sp. nov., *P. kiensis* (Tanaka, 1918) and *P. coarctatus* (Gilbert, 1905). *T. longimanus* is characterized by having uniserial teeth on upper jaw, a pectoral fin on the ocular side longer than the head in males, 62 - 71 scales in the lateral line and a light brown

AMAOKA, K., MIHARA, E. & J. RIVATON, 1997. — Pisces, Pleuronectiformes: Flatfishes from the waters around New Caledonia. Six species of bothid genera *Tosarhombus* and *Parabothus*. In: SÉRET, B. (ed.), Résultats des Campagnes MUSORSTOM, Volume 17. *Mém. Mus. natn. Hist. nat.*, 174 : 143-172. Paris ISBN 2-85653-500-3.

body. *T. brevis* is characterized by having a deeper body, a shorter pectoral fin on the ocular side in males and smaller mouth. *P. filipes* is distinguished from known congeners of the genus by the greatly elongated pelvic fin in males and the small number of scales in the lateral line. *P. kiensis* and *P. coarctatus* represent first records from the Coral Sea.

RÉSUMÉ

Pisces, Pleuronectiformes : Poissons plats des eaux de la Nouvelle-Calédonie. Six espèces de Bothidae des genres *Tosarhombus* et *Parabothus*.

Six espèces de deux genres apparentés de la famille des Bothidae de la mer du Corail sont ici comparées et décrites : *Tosarhombus neocaledonicus* Amaoka & Rivaton, 1991 ; *T. longimanus* sp. nov. et *T. brevis* sp. nov. ; *Parabothus filipes* sp. nov., *P. kiensis* (Tanaka, 1918) et *P. coarctatus* (Gilbert, 1905). *Tosarhombus longimanus* se caractérise par des dents unisériées sur la mâchoire supérieure, la pectorale de côté oculé plus longue que la tête chez les mâles, 62-71 écailles sur la ligne latérale et une coloration marron clair. *T. brevis* se distingue par un corps plus haut, une pectorale plus courte sur le côté oculé chez les mâles et une bouche plus petite. *Parabothus filipes* se démarque de tous ses congénères par une nageoire pelvienne très allongée chez les mâles et un petit nombre d'écailles sur la ligne latérale. *P. kiensis* et *P. coarctatus* sont deux espèces nouvellement signalées de la Mer du Corail.

INTRODUCTION

Members of the bothid genera *Tosarhombus* and *Parabothus* are closely related to each other, widely distributed in Indo-Pacific region, and usually found at more than 200 m deep. The genus *Tosarhombus* characterized by an ovate body, a wide interorbital space, a strong rostral spine in males and white blotches along anterior head margin, includes four species (AMAOKA & RIVATON, 1991). *T. neocaledonicus* Amaoka & Rivaton, 1991 is the only species of this genus known from the Coral Sea.

The bothid genus *Parabothus* is distinguishable by the elliptical body, the narrow interorbital space, the absence of rostral spine (rarely a blunt knob) in males and the absence of white blotches along the head margin. It contains seven valid species. However, no species are known from the Coral Sea.

We have examined a large collection of flatfishes from waters around New Caledonia, captured during the recent ORSTOM cruises. In that collection, we have found three *Tosarhombus* species including two new species and three *Parabothus* species including one new species. Also *P. kiensis* and *P. coarctatus* are recorded for the first time from these waters. Descriptions of the six species belonging to these genera are given with synonymies and keys.

Specimens are deposited in Muséum national d'Histoire naturelle (MNHN), Paris, and Laboratory of Marine Zoology, Faculty of Fisheries, Hokkaido University (HUMZ). Specimens were fixed in 10% formalin and preserved in 75% ethanol. Abbreviations for institutions follow LEVITON *et al.* (1985).

Methods of measurements and terminology follow AMAOKA, MIHARA & RIVATON (1993). Abbreviations of the meristic and proportional characters are as given in Table 1.

SYSTEMATIC ACCOUNT

Famille BOTHIDAE

Genus *TOSARHOMBUS* Amaoka, 1969

Tosarhombus Amaoka, 1969: 64 (type species: *Tosarhombus octoculatus* Amaoka, 1969, by original designation).

DIAGNOSIS. — Body ovate or elliptical. Tip of isthmus below posterior margin of lower eye. A strong rostral spine on snout in males, feebly developed or absent in females. Interorbital space concave, becoming wider with increasing body size, wider in males than in females. Dentition nearly similar on both sides of jaw. Scales ctenoid with short or elongate ctenii on ocular side. Lateral line developed only on ocular side. Pelvic fin on ocular side originating at tip of isthmus; base of ocular side fin longer than on blind side. Some white blotches along head margin. Body on blind side without markings. Three infraorbital bones on blind side. Four caudal plates (i.e., parhypural, two hypurals, and hypural + epural) without subdivisions.

REMARKS. — This genus closely resembles *Parabothus*, *Engyprosopon*, *Crossorhombus*, and *Bothus*, but it differs from *Parabothus* in having some white blotches along anterior margin of head, and wider interorbital width and deeper body depth when compared with same body size and same sex. It also differs from other three genera in having the isthmus tip extending to below the posterior margin of lower eye (middle or anterior half of lower eye) (see AMAOKA & RIVATON, 1990).

TABLE 1. — Abbreviations of the counts and proportional measurements.

D	Number of dorsal fin rays	TL	Total length
A	Number of anal fin rays	SL	Standard length
P1	Number of pectoral fin rays	HL	Head length
P2	Number of pelvic fin rays	BD	Body depth
C	Number of caudal fin rays	SNL	Snout length
	(as upper unbranched rays + branched rays + lower unbranched rays)	UED	Upper eye diameter
		LED	Lower eye diameter
LLS	Number of scales in lateral line	IW	Interorbital width
GR	Number of gill rakers on first arch	UJL	Upper jaw length
	(as upper limb + lower limb)	LJL	Lower jaw length
V	Number of vertebrae	DCP	Depth of caudal peduncle
	(as abdominal vertebrae + caudal vertebrae)	P1L	Pectoral fin length
		P2L	Pelvic fin length
SD	Standard deviation	P2B	Pelvic fin base length
O	Ocular side	LDFR	Length of longest dorsal fin ray
B	Blind side	LAFR	Length of longest anal fin ray
M	Male(s)	MCFR	Length of mid-caudal fin ray
F	Female(s)	LLCW	Lateral line curve width
Y	Young(s)		

KEY TO NEW CALEDONIAN SPECIES OF *TOSARHOMBUS*

- 1 Scales more than 80 in lateral line; usually five or six white blotches along head margin in mature specimens *T. neocaledonicus*
- 1' Less than 71 scales in lateral line; less than five white blotches along head margin 2
- 2 Mouth large, upper jaw length on ocular side, 2.44-2.75 in head length; pectoral fin on ocular side greatly elongated, longer than head in males (much shorter than head in females); body shallow (when compared with specimen of about same size), its depth 2.14-2.47 in SL (Fig. 7); interorbital width wide in either sexes (Fig. 5) *T. longimanus* sp. nov.

- 2' Mouth small, upper jaw length on ocular side 2.78-3.06 head length; pectoral fin on ocular side less than head in both sexes; body deep (when compared with specimen of about same size), its depth 1.92-2.35 in SL (Fig. 7); interorbital width narrow in both sexes (Fig. 5)*T. brevis* sp. nov.

Tosarhombus neocaledonicus Amaoka & Rivaton, 1991

Tables 2-3

Tosarhombus neocaledonicus Amaoka & Rivaton, 1991: 461, fig. 12-13.

Bothus sp.: RICHER DE FORGES & PIANET, 1984: annexe 2.

Tosarhombus sp. nov.: RIVATON, 1989: 155 (in part).

MATERIAL EXAMINED. — 30 specimens (7 males, 22 females and 1 young).

Chesterfield and Bellona Plateaus. CHALCAL 1: stn CP 10, 20°00.20'S, 158°46.60'E, 225 m, beam trawl, R. V. "Coriolis", 22 July 1984: holotype, male 166.5 mm (MNHN 1988-686); 1 paratype, female 109.0 mm (MNHN 1988-687, part); 2 paratypes, females 105.3-143.0 mm (HUMZ 114940, 114942); 3 females 84.2-122.3 mm (MNHN 1991-452, part). — Stn CP 17, 22°34.70'S, 159°15.30'E (Nova Bank), 295 m, beam trawl, 28 July 1984: 1 paratype, female 173.2 mm (MNHN 1988-687, part).

CORAIL 2: stn 131, 19°25.49'S, 158°37.96'E, 217 m, beam trawl, R. V. "Vauban", 29 July 1988: 1 paratype, male 183.1 mm (HUMZ 114938); 1 female 133.1 mm (MNHN 1991-451, part). — Stn 142, 19°36.16'S, 158°26.79'E, 193 m, beam trawl, 30 July 1988: 1 paratype, female 140.8 mm (HUMZ 114939); 1 female 145.8 mm (MNHN 1991-451, part); 1 young 74.6 mm (HUMZ 129466). — Stn 162, 19°46.24'S, 158°25.67'E, 203 m, beam trawl, 1st August 1988: 2 paratypes, females 115.5-140.8 mm (HUMZ 114941, 119270); 1 male 132.1 mm (MNHN 1991-452).

MUSORSTOM 5: stn CP 253, 25°08.70'S, 159°55.26'E (Capel Bank), 295 m, beam trawl, R. V. "Coriolis", 7 October 1986: 1 male 154.4 mm (MNHN 1994-320). — Stn CP 254, 25°10.07'S, 159°53.07'E (Capel Bank), 280-290 m, beam trawl, 7 October 1986: 1 female 133.0 mm (MNHN 1994-319). — Stn CP 259, 25°31.64'S, 159°44.47'E (Capel Bank), 285 m, beam trawl, 8 October 1986: 1 male 140.4 mm (MNHN 1994-323). — Stn CP 267, 25°23.60'S, 159°47.20'E (Capel Bank), 285 m, beam trawl, 8 October 1986: 1 male 137.7 mm (MNHN 1994-324). — Stn CP 268, 24°44.70'S, 159°39.20'E (Capel Bank), 280-290 m, beam trawl, 9 October 1986: 1 male 172.2 mm (HUMZ 129469); 1 female 148.7 mm (MNHN 1994-326). — Stn CP 276, 24°48.90'S, 159°40.90'E (Capel Bank), 269-258 m, beam trawl, 9 October 1986: 2 females, 122.9-132.9 mm (MNHN 1994-321, 322); 1 male and 1 female 131.1-153.1 mm (HUMZ 129467, 129468). — Stn CP 318, 22°26.51'S, 159°21.36'E, 330 m, beam trawl, 13 October 1986: 3 females 157.8-163.0 mm (NMHN 1994-327, 328, 329). — Stn CP 319, 22°24.40'S, 159°16.50'E, 320-325 m, beam trawl, 13 October 1986: 1 female 164.7 mm (MNHN 1994-325).

DIAGNOSIS. — More than 80 scales in lateral line; pectoral fin on ocular side of males, longer than head, 0.5-0.8 in head length; teeth on upper jaw uniserial; body on ocular side light brown.

DESCRIPTION. — Counts and proportional measurements as percent of SL are shown in Tables 2 and 3. For description, coloration, and sexual dimorphism see AMAOKA & RIVATON (1991).

DISTRIBUTION. — Known only from the Chesterfield Plateau, the Nova Bank, and the Capel Bank, west of New Caledonia, at depths of 169-325 m.

REMARKS. — This species resembles *Tosarhombus longimanus* sp. nov., but differs from it as shown in the remarks of the latter.

TABLE 2. — Frequency distribution of eight meristic characters of *Tosarhombus neocaledonicus* Amaoka & Rivaton, 1991. Parenthesis for pectoral fin are used to distinguish ocular (without) from blind (with) side.

Dorsal fin rays										Anal fin rays												
101	102	103	104	105	106	107	108	109	110	81	82	83	84	85	86	87						
2	3	7	9	1	4	1	1	0	2	1	6	8	9	4	1	1						
Pectoral fin rays				Caudal fin rays			Vertebrae															
11	12	13	14	2+12+2	3+11+3	2+13+2	10+31	10+32														
0(15)	0(15)	13(0)	17(0)	2	2	26	3	24														
Scales in lateral line										Gill rakers												
81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	0+7	0+8	0+9					
		1	0	2	0	3	5	5	4	6	1	1	1	0	0	1	7	14	9			

TABLE 3. — Ranges of variation and averages (in parentheses) of proportional measurements expressed as % of SL and meristic counts for three New Caledonian species of *Tosarhombus*.

Number	<i>T. longimanus</i>		<i>T. brevis</i>		<i>T. neocaledonicus</i>
	Holotype	Paratypes	Holotype	Paratypes	Type series & others
SL (mm)	Male 125.0	4M + 12F 65.2-139.7	Male 133.4	2M+5F+3young 48.7-121.1	7M+22F+1young 74.6-183.1
HL	26.9	25.2-27.5 (26.3)	25.3	25.6-27.9 (26.6)	24.5-28.5 (26.1)
BD	43.6	40.5-46.7 (43.0)	52.1	42.5-51.6 (48.8)	42.6-50.9 (45.1)
SNL	5.6	5.2-5.9 (5.4)	5.2	4.7-5.9 (5.3)	4.4-5.7 (5.1)
UED	7.3	6.0-8.4 (7.2)	7.1	7.1-9.9 (8.4)	5.9-8.4 (6.9)
LED	7.1	6.2-8.2 (7.1)	7.3	7.0-10.1 (8.4)	6.0-8.3 (6.9)
IW (M)	9.0	5.9-9.5 (8.3)	7.3	3.9-7.5 (6.2)	8.7-12.0 (10.8)
IW (F)		2.8-6.6 (5.1)		0.8-3.7 (2.1)	3.2-8.0 (6.4)
UJL (O)	10.3	9.4-10.6 (9.9)	8.5	8.6-9.7 (9.1)	8.3-9.7 (9.0)
UJL (B)	10.3	9.7-10.9 (10.1)	8.6	8.8-9.7 (9.1)	8.3-10.4 (9.3)
LJL (O)	12.6	11.5-13.4 (12.4)	10.7	10.7-12.7 (11.9)	10.3-12.6 (11.4)
LJL (B)	13.6	12.6-14.3 (13.5)	12.0	12.2-14.0 (13.0)	11.3-13.7 (12.5)
DCP	9.8	9.0-10.6 (9.5)	10.9	9.7-10.4 (10.2)	8.8-10.1 (9.4)
P1L (O, M)	52.8	32.1-51.5 (45.5)	24.1	20.1-22.2 (22.1)	39.3-52.6 (46.0)
P1L (O, F)		16.9-21.6 (19.9)		16.4-19.1 (18.1)	16.1-26.7 (19.9)
P1L (B)	9.7	8.7-10.6 (9.8)	10.6	8.9-10.6 (9.8)	9.9-12.7 (11.0)
P2L (O)	9.8	9.1-11.2 (10.3)	11.6	11.1-12.9 (11.7)	10.4-14.2 (12.5)
P2L (B)	9.5	8.4-10.4 (9.4)	10.0	9.8-10.6 (10.2)	8.3-11.3 (9.8)
P2B (O)	7.8	7.2-8.7 (8.0)	7.6	7.4-8.2 (7.8)	7.7-9.6 (8.6)
P2B (B)	4.3	3.5-4.7 (4.3)	4.3	4.0-4.6 (4.3)	4.0-4.9 (4.4)
LDFR	13.4	11.0-15.0 (13.0)	12.4	12.9-14.6 (13.5)	9.9-13.0 (11.8)
LAFR	13.5	12.2-15.6 (13.6)	12.8	13.0-15.4 (13.9)	10.6-13.0 (11.9)
MCFR	20.6	18.2-21.3 (19.9)	20.2	19.1-23.6 (21.3)	18.3-22.7 (20.0)
LLCW	16.8	13.5-17.4 (15.6)	16.4	13.7-16.8 (15.1)	13.7-17.9 (15.9)

TABLE 3 (Continued). — Meristic counts for three New Caledonian species of *Tosarhombus*.

	<i>T. longimanus</i>		<i>T. brevis</i>		<i>T. neocaledonicus</i>
	Holotype	Paratypes	Holotype	Paratypes	Type series & others
Number	Male	4M + 12F	Male	2M+5F+3young	7M+22F+1young
SL (mm)	125.0	65.2-139.7	133.4	48.7-121.1	74.6-183.1
D	98	95-102 (98.4)	102	97-104 (100.6)	101-110 (104.3)
A	77	75-81 (78.2)	81	77-83 (80.0)	81-87 (83.5)
P1 (O)	13	12-13 (12.8)	13	12-14 (12.6)	13-14 (13.6)
P1 (B)	10	9-10 (9.8)	11	9-11 (10.5)	11-12 (11.5)
LLS	63	62-71 (64.9)	71	64-71 (67.3)	81-95 (87.4)
GR	0+8	0+6-9 (0+7.6)	0+7	0-1+7-9 (0.1+7.6)	0+7-9 (0+8.1)
V	10+30	10+30-31 (10+30.2)	10+32	10+30-32 (10+31.0)	10+31-32 (10+31.9)

Tosarhombus longimanus sp. nov.

Figs 1-7; Tables 3-4

MATERIAL EXAMINED. — 17 specimens (5 males and 12 females).

Chesterfield and Bellona Plateaus. MUSORSTOM 5: stn CP 351, 19°33.10'S, 158°36.90'E, 290-310 m, beam trawl, R. V. "Coriolis", 17 October 1986: holotype, male 125.0 mm (MNHN 1994-334). — Stn DW 350, 19°34.00'S, 158°35.30'E, 280 m, beam trawl, 17 October 1986: 1 paratype, male 98.2 mm (MNHN 1994-342). — Stn CP 351, 19°33.10'S, 158°36.90'E, 290-310 m, beam trawl, 17 October 1986: 7 paratypes, females 69.3-125.0 mm (MNHN 1994-335 to 341); 1 paratype, male 122.9 mm (HUMZ 129473).

CHALCAL 1: stn CP 5, 19°29.10'S, 158°37.63'E, 290 m, beam trawl, R. V. "Coriolis", 6 July 1984: 3 paratypes, 1 male and 2 females 65.2-139.7 mm (MNHN 1994-330 to 332). — Stn CP 10, 20°00.20'S, 158°46.60'E, 225 m, beam trawl, 22 July 1984: 1 paratype, female 66.6 mm (HUMZ 129470).

CORAIL 2: stn 130, 19°27.41'S, 158°34.00'E, 217 m, beam trawl, R. V. "Vauban", 29 July 1988: 3 paratypes, 1 female 135.9 mm (MNHN 1994-333); 1 male and 1 female 125.1-131.5 mm (HUMZ 129471, 129472).

DIAGNOSIS. — Upper jaw length on ocular side 2.44-2.75 in head length; teeth on upper jaw uniserial; pectoral fin on ocular side much longer than head in males; 62-71 scales in lateral line; body depth 2.14-2.47 in SL (Fig. 7).

DESCRIPTION. — Data for holotype are given first, followed in parentheses by ranges for paratypes and averages including holotype for proportional data. Counts and proportional measurements as percent of SL are shown in Tables 3 and 4. Head length 3.72 in SL (3.64-3.96, 3.80); body depth 2.29 (2.14-2.47, 2.33). Snout length 4.80 in head length (4.55-5.11, 4.83); upper eye diameter 3.69 (3.24-4.38, 3.67); lower eye diameter 3.78 (3.30-4.23, 3.72); interorbital width 2.97 (2.71-4.41, 3.22) in males, (3.81-9.94, 5.78) in females; upper jaw length 2.60 (2.44-2.75, 2.65) on ocular side, 2.60 (2.45-2.74, 2.61) on blind side; lower jaw length 2.14 (2.02-2.24, 2.12) on ocular side, 1.98 (1.87-2.04, 1.95) on blind side; depth of caudal peduncle 2.73 (2.51-2.98, 2.79); pectoral fin length 0.51 (0.50-0.81, 0.61) on ocular side in males, (1.24-1.54, 1.34) in females, 2.78 (2.47-3.05, 2.69) on blind side; pelvic fin length 2.75 (2.37-2.93, 2.56) on ocular side, 2.82 (2.61-3.07, 2.80) on blind side; pelvic fin base length 3.43 (2.99-3.60, 3.30) on ocular side, 6.22 (5.45-7.44, 6.21) on blind side; length of longest dorsal fin ray 2.01 (1.78-2.29, 2.03), length of longest anal fin ray 1.99 (1.71-2.17, 1.95); length of middle caudal fin ray 1.30 (1.23-1.47, 1.32); curved length of lateral line 1.60 (1.53-1.98, 1.69).

Body ovate, deepest point slightly in front of middle part of body, its depth about 1.5-1.9 times of head length; dorsal and ventral contours gently arched. Caudal peduncle deep, its depth about 21-25 % of body depth. Head

large; upper profile with a large notch in front of upper margin of lower eye, steep in males, less so in females and young (Figs 2-3). Slightly protruding snout, 66-89 % of upper eye diameter. A strong rostral spine in males, poorly developed or absent in females and young (Fig. 3). Eyes small, upper eye diameter 62-82 % of upper jaw length on ocular side; lower eye in advance of upper. An orbital spine anterior to upper eye in males, absent in females and young. Interorbital region concave, becoming wider with increasing body size, wider in males than in females and young (Figs 2, 3, 5). Nostrils on ocular side anterior to upper margin of lower eye; anterior nostril tubular with posterior flap; nostrils on blind side small, below origin of dorsal fin, similar in shape to those on ocular side. Mouth large, oblique; maxilla extending almost vertical to middle part of lower eye; anterior tips of both jaws nearly on same vertical line when mouth closed. A small ventral knob at mandibular symphysis. Teeth on upper jaw sharp, uniserial, becoming larger and more widely spaced anteriorly, some anterior canine-like teeth. Lower jaw teeth uniserial, nearly similar to anterior teeth of upper jaw in terms of size and spacing. Gill rakers on first arch slender, not serrate, absent on upper limb. Scales on ocular side large, with long ctenii (Fig. 4A), snout, both jaws and pectoral fin naked; cycloid scales on blind side. Lateral line curved above pectoral fin on ocular side, absent on blind side. Dorsal fin origin on blind side, anterior to upper margin of lower eye. Anal fin origin slightly anterior to vertical of posterior margin of head. Pectoral fin on ocular side longer than head in males, much shorter than head in females (Figs 2, 3, 6), but longer than fin on blind side. Pelvic fins with 6 rays; base on ocular side longer than that on blind side, approximately fourth ray on ocular side opposite to first ray on blind side. Tip of isthmus below posterior margin of lower eye. All fin rays simple except for caudal fin rays. Caudal fin rays branched except for two upper- and lowermost rays. Vent on blind side, immediately above first anal fin ray. Urogenital papilla on opposite side of vent.

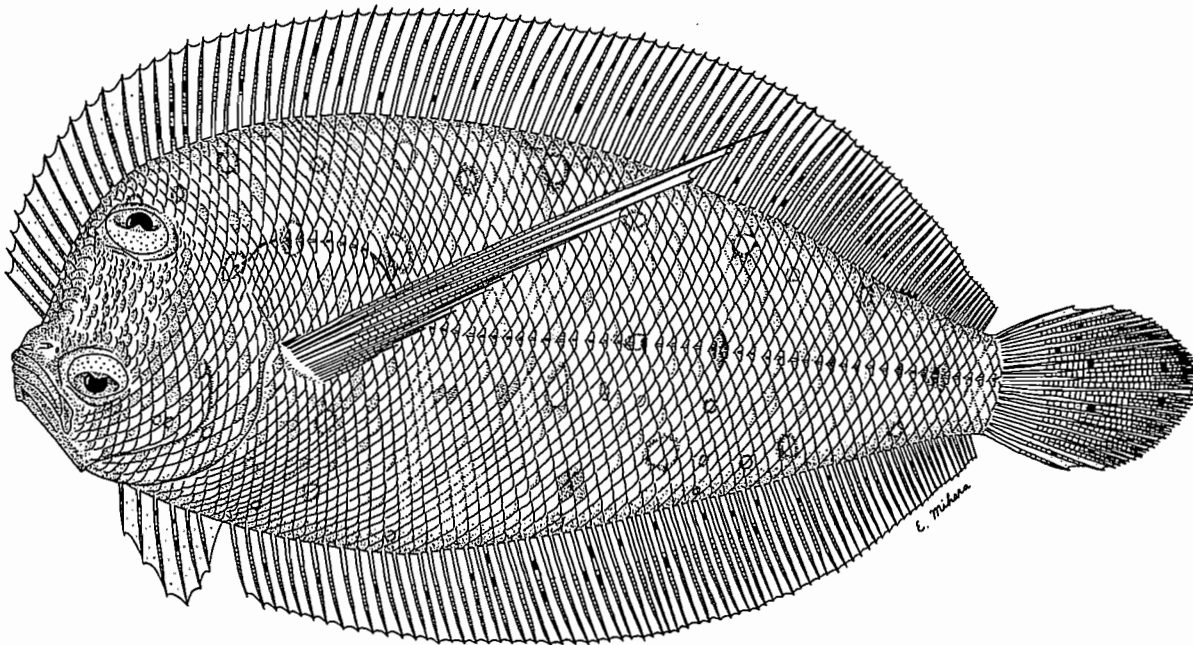


FIG. 1. — *Tosarhombus longimanus* sp. nov., holotype, male, 125.0 mm, from Chesterfield Plateau, west of New Caledonia (MNHN 1994-334).

Coloration (in alcohol). Body color on ocular side light brown; anterior margin of head darkened; a series of three to five white blotches along head margin in front of interorbital space and upper eye; an diffused dark blotch at junction of straight and curved parts of lateral line, a few obscure dark blotches on straight portion of lateral line; many indistinct whitish markings on entire body, some with dark rings. Blind side pale yellowish white. Dorsal and anal fins with a series of dark spots; pelvic fin with scattered small dark spots.

Sexual dimorphism. This species shows sexual dimorphism in the presence or absence of rostral and orbital spines (Fig. 3), the interorbital width (Figs 2, 3, 4), the length of pectoral fin on ocular side (Figs 2, 3, 6), and the curvature of anterior dorsal profile (Figs 2-3).

DISTRIBUTION. — The specimens were collected from the Chesterfield Plateau, at depths of 217-310 m.

ETYMOLOGY. — Named for the prolonged pectoral fin on the ocular side in males.

REMARKS. — *T. longimanus* sp. nov. most closely resembles two New Caledonian species, *T. neocaledonicus* and *T. brevis* sp. nov. in having uniserial upper jaw teeth and light brown body on the ocular side, but differs from the former species in having the lower number of scales in the lateral line, and rather low numbers of dorsal fin ray, pectoral fin rays, anal fin rays and vertebrae, and longer upper jaw (Table 3), and from the latter species as shown in the remarks of *T. brevis*.

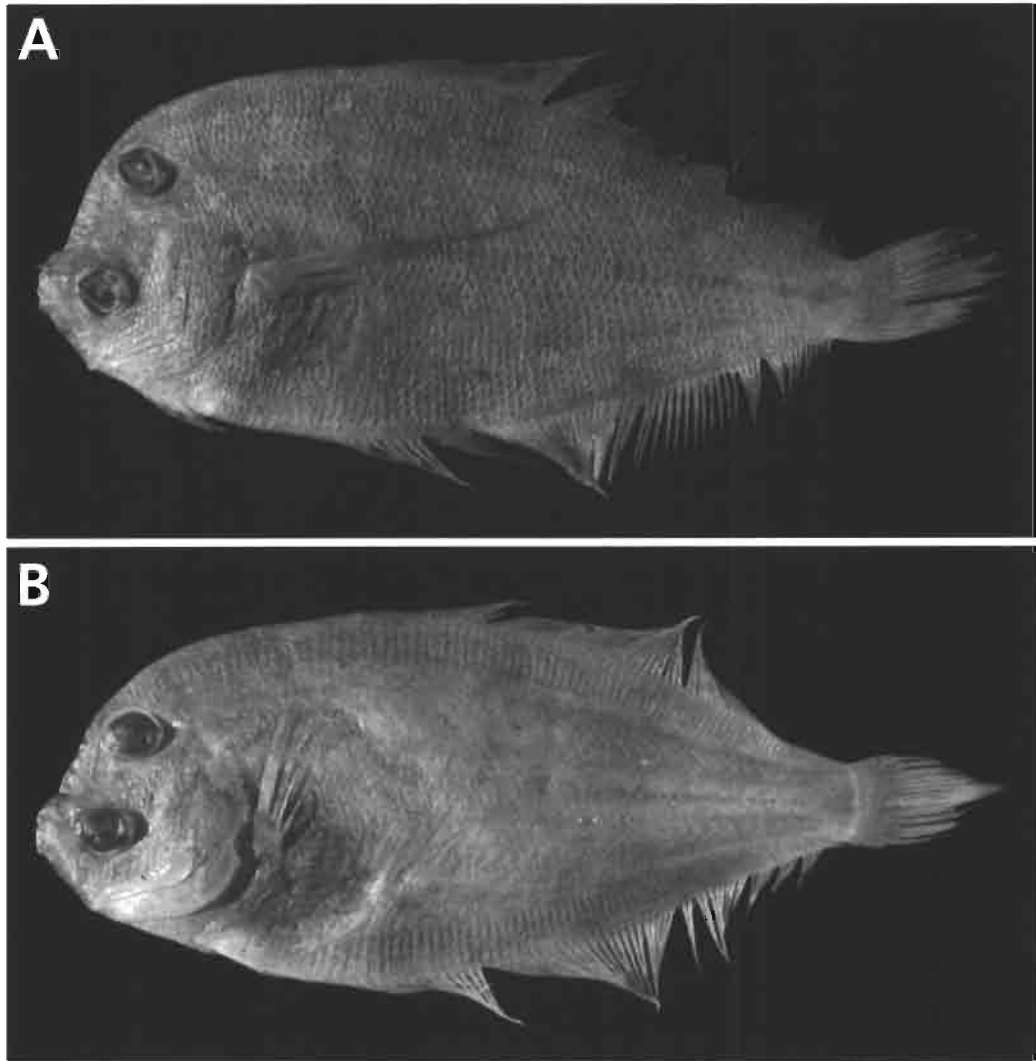
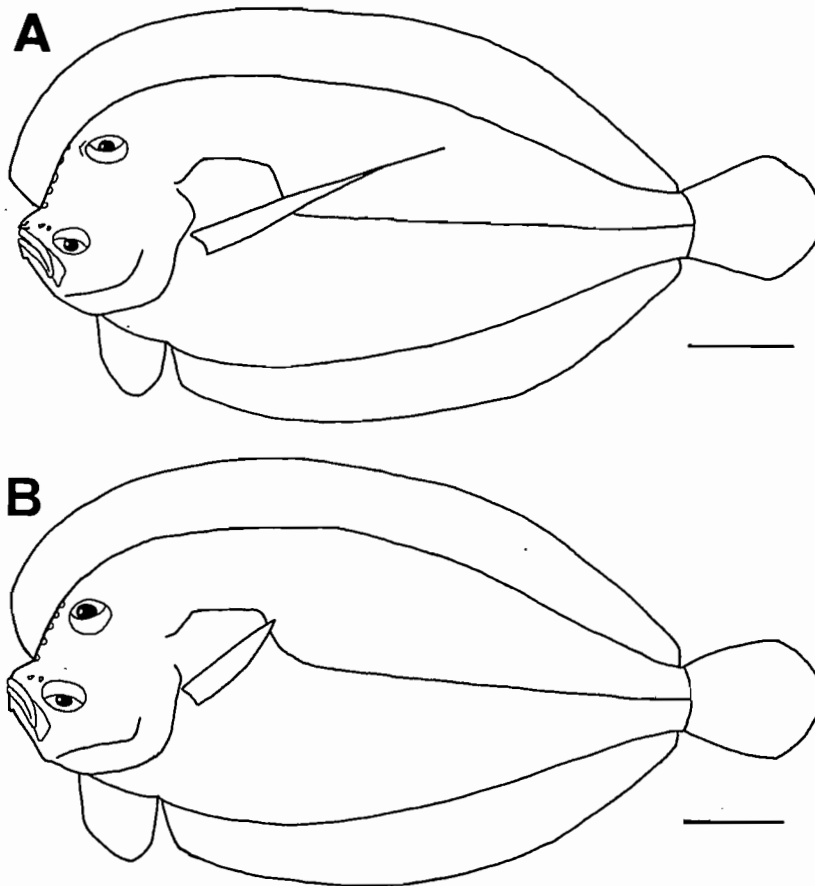


FIG. 2. — *Tosarhombus longimanus* sp. nov. — **A**: holotype, male, 125.0 mm, from Chesterfield Plateau, west of New Caledonia (MNHN 1994-334). — **B**: paratype, female, 131.5 mm, from Chesterfield Plateau, west of New Caledonia (HUMZ 129472).

TABLE 4. — Frequency distribution of eight meristic characters of *Tosarhombus longimanus* sp. nov. Counts for holotype included in boldfaced numbers.

Dorsal fin rays										Anal fin rays					
95	96	97	98	99	100	101	102	75	76	77	78	79	80	81	
1	4	0	4	2	3	2	1	1	1	4	5	2	2	2	
Pectoral fin rays					Caudal fin rays										
9	10	11	12	13	2+12+2	2+13+2									
0(4)	0(12)	0(0)	3(0)	14 (0)	1	16									
Scales in lateral line										Gill rakers			Vertebrae		
62	63	64	65	66	67	68	69	70	71	0+6	0+7	0+8	0+9	10+30	10+31
1	3	6	3	1	0	1	1	0	1	1	7	6	3	13	4

FIG. 3. — Diagrammatic illustration of body parts showing sexual dimorphism in male (A) and female (B) in *Tosarhombus longimanus* sp. nov. Scale bars 20 mm.

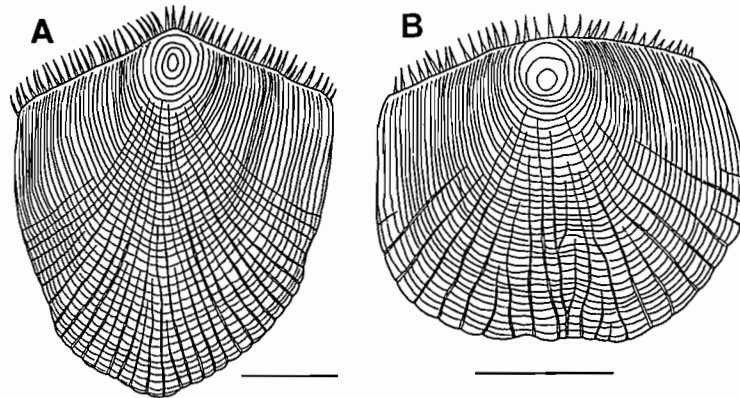


FIG. 4. — Scales from ocular side. — A: *Tosarhombus longimanus* sp. nov., paratype, 139.7 mm (MNHN 1994-331). — B: *T. brevis* sp. nov., paratype, 115.0 mm (HUMZ 129475). Scale bars 1 mm.

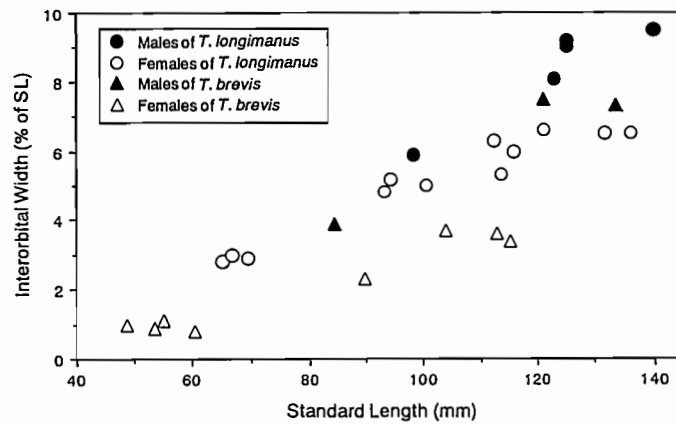


FIG. 5. — Relationships between SL and interorbital width in percent of SL in two species of *Tosarhombus*.

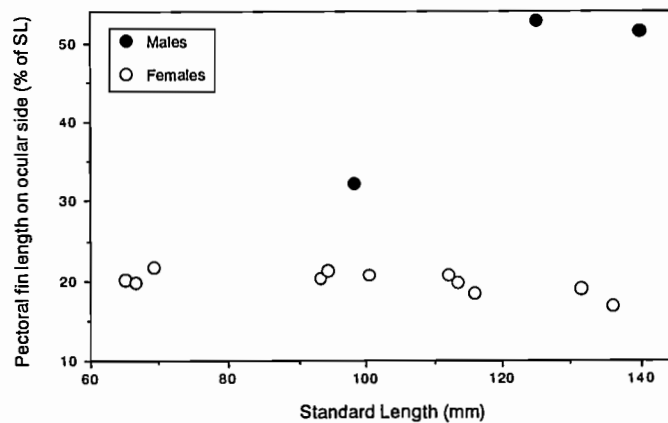


FIG. 6. — Relationships between SL and pectoral fin length on ocular side in percent of SL in *Tosarhombus longimanus* sp. nov.

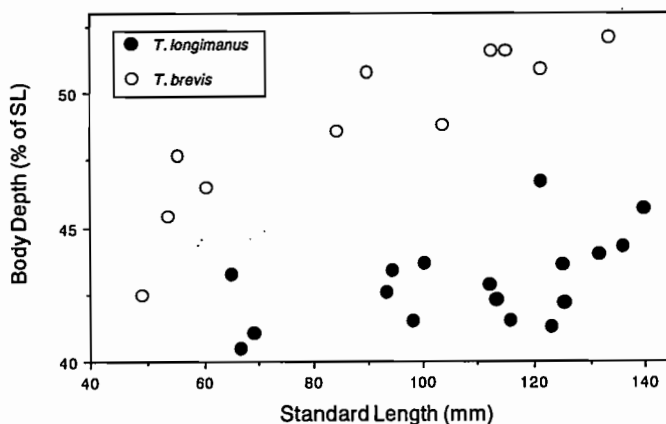


FIG. 7. — Relationships between SL and body depth in percent of SL in two species of *Tosarhombus*.

Tosarhombus brevis sp. nov.

Figs 4-5, 7-10; Tables 3, 5

MATERIAL EXAMINED. — 11 specimens (3 males, 5 females and 3 young).

New Caledonia. MUSORSTOM 4: stn CC 173, 19°02.50'S, 163°18.80'E, 250-290 m, shrimp trawl, R. V. "Coriolis", 29 September 1985: holotype, male 133.4 mm (MNHN 1994-347). — Stn CP 154, 19°02.60'S, 163°17.80'E, 275 m, beam trawl, 14 September 1985: 1 paratype, male 121.1 mm (MNHN 1994-77). — Stn CC 173, 19°02.50'S, 168°18.80'E, 250-290 m, shrimp trawl, 29 September 1985: 1 paratype, female 112.5 mm (MNHN 1994-348).

BIOCAL: stn CP 110, 22°12.38'S, 167°06.43'E, 275-320 m, beam trawl, R. V. "Jean Charcot", 9 September 1985: 1 paratype, male 84.2 mm (MNHN 1994-349).

Loyalty Islands MUSORSTOM 6: stn CP 445, 20°54.29'S, 167°17.16'E (Lifou Island), 261 m, beam trawl, R. V. "Alis", 19 February 1989: 2 paratypes, 1 female 103.7 mm (HUMZ 129474) and 1 female 89.7 mm (MNHN 1994-343). — Stn CP 455, 21°00.65'S, 167°26.08'E, 260 m, beam trawl, 20 February 1989: 5 paratypes, 1 female and 2 young, 48.7-60.4 mm (MNHN 1994-344 to 346); 1 female and 1 young, 53.5-115.0 mm (HUMZ 129475, 129476).

DIAGNOSIS. — Short upper jaw on ocular side, 2.78-3.06 in head length; teeth on upper jaw uniserial; body deep, its depth 1.92-2.35 in SL (Fig. 7); interorbital width narrow (Fig. 5); scales in the lateral line 64-71; pectoral fin on ocular side scarcely prolonged in either sexes, shorter than head length.

DESCRIPTION. — Data for holotype are given first, followed in parentheses by ranges for paratypes and averages including holotype for proportional data. Counts and proportional measurements as percent of SL are shown in Tables 3 and 5. Head length 3.96 in SL (3.58-3.91, 3.77); body depth 1.92 (1.94-2.35, 2.06). Snout length 4.81 in head length (4.70-5.64, 5.03); upper eye diameter 3.55 (2.77-3.60, 3.20); lower eye diameter 3.44 (2.71-3.65, 3.18); interorbital width 3.47 (3.41-7.12, 4.67) in males, (7.16-31.80, 18.15) in females; upper jaw length 2.98 (2.78-3.06, 2.92) on ocular side, 2.93 (2.69-3.00, 2.91) on blind side; lower jaw length 2.36 (2.07-2.38, 2.23) on ocular side, 2.11 (1.99-2.16, 2.05) on blind side; depth of caudal peduncle 2.32 (2.50-2.83, 2.62); pectoral fin length 1.05 (1.15-1.39, 1.20) on ocular side in males, (1.37-1.61, 1.48) in females, 2.39 (2.44-3.00, 2.72) on blind side; pelvic fin length 2.17 (2.11-2.42, 2.27) on ocular side, 2.51 (2.48-2.71, 2.61) on blind side; pelvic fin base length 3.30 (3.27-3.59, 3.41) on ocular side, 5.81 (5.88-6.65, 6.18) on blind side; length of longest dorsal fin ray 2.03 (1.81-2.11, 1.96), length of longest anal fin ray 1.97 (1.77-2.09, 1.92); length of middle caudal fin ray 1.25 (1.16-1.42, 1.25); curved length of lateral line 1.54 (1.53-1.95, 1.77).

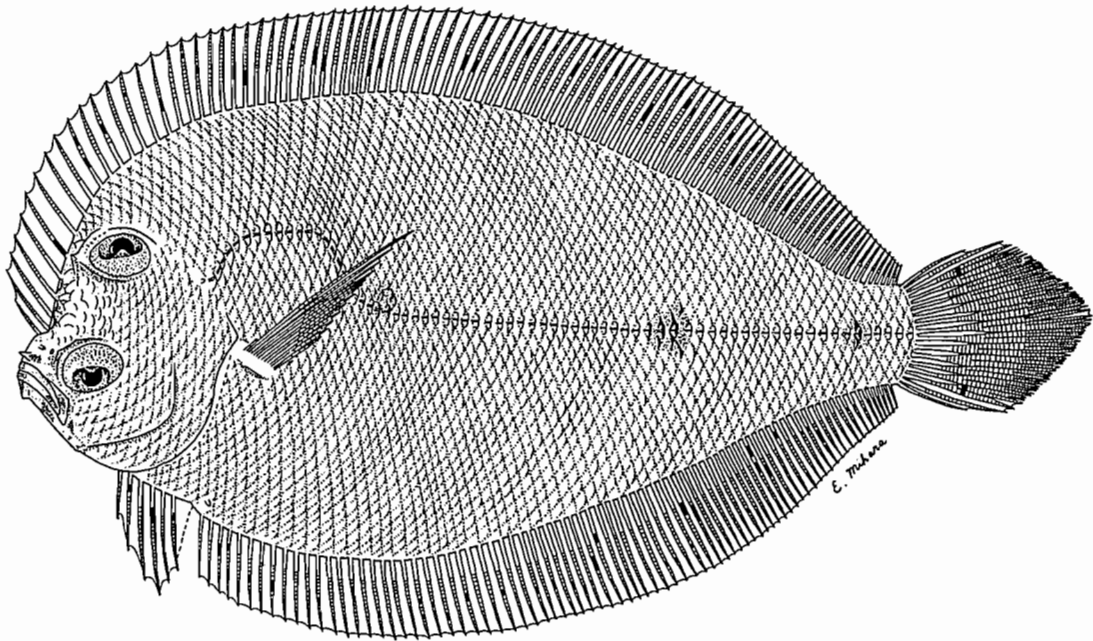


FIG. 8. — *Tosarhombus brevis* sp. nov., holotype, male, 133.4 mm, from New Caledonia (MNHN 1994-347).

Body deeply ovate, deepest point slightly in front of middle part of body, depth 1.56-2.06 times of head length; dorsal and ventral contours gently arched. Caudal peduncle deep, its depth about 19-24 % of body depth. Head large; upper profile with a large notch in front of upper margin of lower eye, steep in males, not so in females and young (Figs 9, 10). Slightly protruding snout 50-74 % of upper eye diameter. A strong rostral spine in males, absent or feeble in females and young (Fig. 10). Eyes large, upper eye diameter 84-102 % of upper jaw length on ocular side; lower eye in advance of upper. A strong orbital spine anterior to upper eye in males, absent in females and young (Fig. 10). Interorbital region concave, becoming wider with increasing body size, wider in males than in females and young (Figs 5, 9, 10). Nostrils on ocular side anterior to upper margin of lower eye; anterior nostril tubular with posterior flap; nostrils on blind side small, below origin of dorsal fin, similar in shape to ocular side ones. Mouth large, oblique; maxilla extending to below anterior 1/3 part of lower eye; anterior tips of both jaws nearly on same vertical line when mouth closed. Small ventral knob at symphysis and posteroventral corner of mandible. Teeth on upper jaw sharp, uniserial, becoming larger and more widely spaced anteriorly with some anterior canine-like teeth. Lower jaw teeth uniserial, nearly similar to anterior teeth of upper jaw in terms of size and spacing. Gill rakers on first arch slender, not serrate, absent on upper limb. Scales on ocular side large, with rather short ctenii (Fig. 4B); snout, both jaws and pectoral fin on ocular side naked; cycloid scales on blind side. Lateral line curved above pectoral fin on ocular side, absent on blind side. Dorsal fin origin on blind side, on horizontal line through upper margin of lower eye. Anal fin origin below posterior margin of head. Pectoral fin on ocular side slightly prolonged in males, less so in females and young (Figs 9, 10), second ray longest, longer than blind side fin. Pelvic fins with 6 rays, base on ocular side longer than blind side base, third or fourth rays on ocular side opposite to first ray on blind side. Tip of isthmus below posterior margin of lower eye. All fin rays simple except caudal fin rays. Caudal fin rays branched except for two upper- and lowermost rays. Vent opens on blind side, immediately above first anal fin ray. Urogenital papilla on opposite side of vent.

Coloration (in alcohol). Body color on ocular side light brown; a series of three or four indistinct white blotches along head margin in front of interorbital space and upper eye in larger specimens, absent in young; not delimited dark blotch at junction of straight and curved parts of lateral line, two dark blotches on straight portion of lateral line. Blind side pale yellowish white. Dorsal and anal fins with a series of dark spots; pelvic fin with scattered small dark spots.

Sexual dimorphism. This species shows sexual dimorphism in the presence or absence of rostral and orbital spines (Fig. 10), interorbital width (Figs 5, 10), the length of the pectoral fin on the ocular side (Fig. 10), and the curvature of the anterior dorsal profile (Figs 9, 10).

DISTRIBUTION. — The specimens were collected from the Lifou Island, northern and southern waters of New Caledonia, at depths of 250-320 m.

ETYMOLOGY. — Named for its stocky body (from latin *brevis* meaning short).

REMARKS. — This new species most closely resembles *T. longimanus* sp. nov. in having uniserial upper jaw teeth, light brown body on the ocular side and small numbers of meristic counts (Table 3), but differs from the latter in having a deeper body (Fig. 7) and a narrower interorbital region in either sexes (Fig. 5), a shorter upper jaw on the ocular side (2.78-3.06 in head length vs 2.44-2.75 in *T. longimanus*), a shorter pectoral fin on the ocular side in males, a rather longer pelvic fin on the ocular side, and rather large number of vertebrae (Table 3).

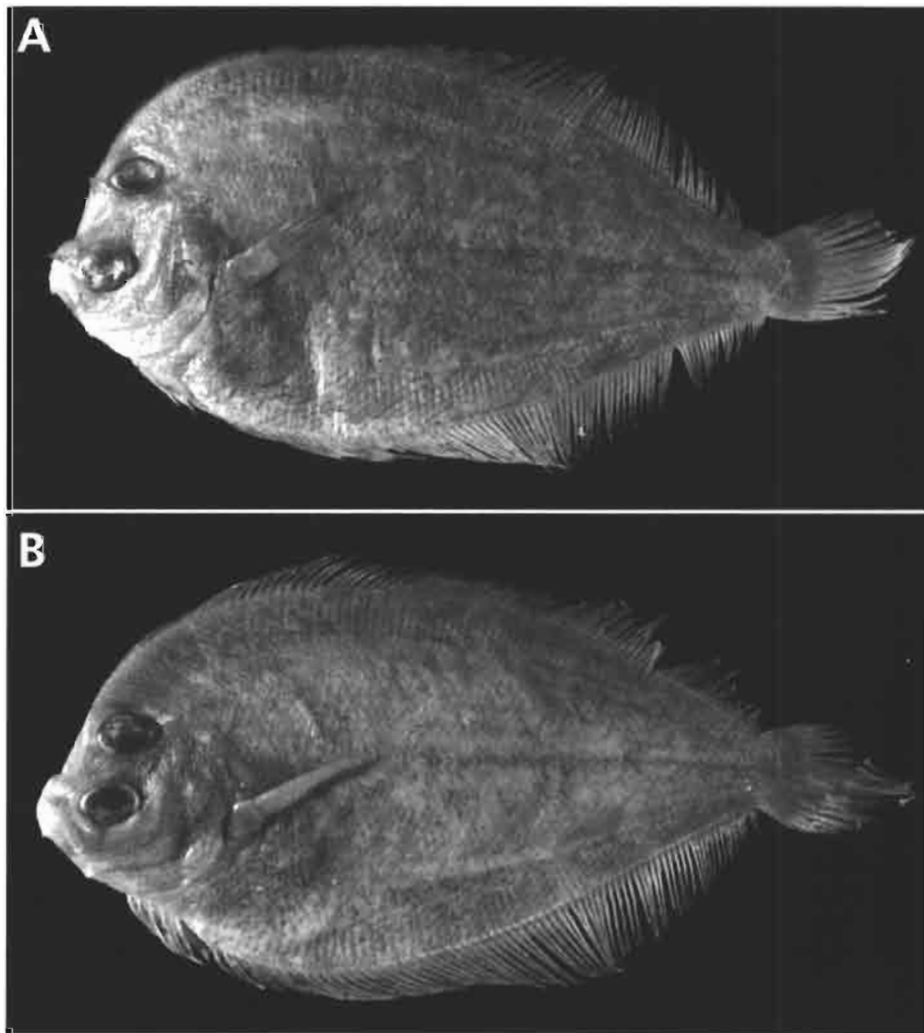
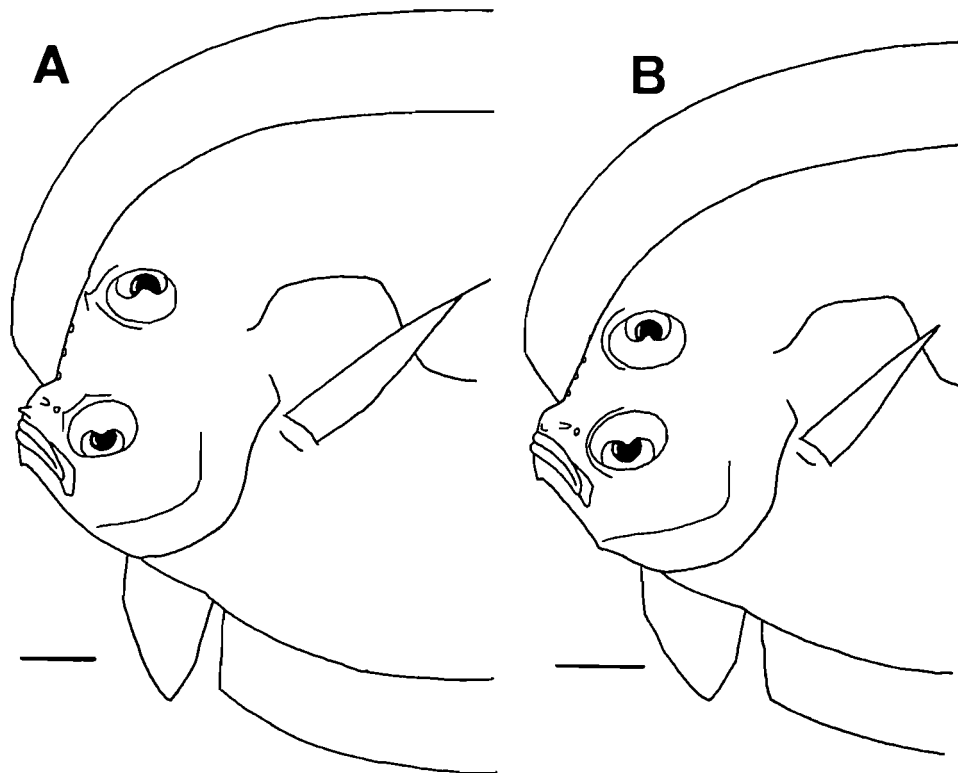


FIG. 9. — *Tosarhombus brevis* sp. nov. — A: holotype, male, 133.4 mm, from New Caledonia (MNHN 1994-347).
— B: paratype, female, 112.5 mm, from New Caledonia (MNHN 1994-348).

TABLE 5. — Frequency distribution of eight meristic characters of *Tosarhombus brevis* sp. nov. Counts for holotype included in boldfaced numbers.

Dorsal fin rays								Anal fin rays							
97	98	99	100	101	102	103	104	77	78	79	80	81	82	83	
1	0	2	2	2	3	0	1	2	0	3	2	1	1	2	
Pectoral fin rays						Caudal fin rays									
9	10	11	12	13	14	2+13+2	2+14+2								
0(1)	0(4)	0(6)	5(0)	5(0)	1(0)	10	1								
Scales in lateral line								Gill rakers			Vertebrae				
64	65	66	67	68	69	70	71	1+7	0+7	0+8	0+9	10+30	10+31	10+32	
3	1	0	0	2	2	0	2	1	4	5	1	1	9	1	

FIG. 10. — Diagrammatic illustration of body parts showing sexual dimorphism in male (A) and female (B) in *Tosarhombus brevis* sp. nov. Scale bars indicate 10 mm.

Genus *PARABOTHUS* Norman, 1931

Parabothus Norman, 1931: 600 (type species: *Arnoglossus polylepis* Alcock, 1889, by original designation).

DIAGNOSIS. — Body elliptical. Tip of isthmus below posterior margin of lower eye. Blunt rostral knob rarely found only in males, barely obvious or absent in females. Interorbital space narrowly concave, becoming wider with increasing size, wider in males than in females. Dentition about equally developed on both sides of jaw. Scales on ocular side with short or moderate ctenii or cycloid. Lateral line developed only on ocular side. Pelvic fin on ocular side originating at tip of isthmus; base on ocular side longer than blind side base. Three infraorbital bones on blind side. Four caudal plates (i.e., parhypural, two hypurals, and hypural + epural) without subdivisions.

REMARKS. — This genus closely resembles *Tosarhombus*, *Arnoglossus* and *Psettina* in having an elliptical body and caudal plates lacking subdivisions. However, it differs from *Tosarhombus* in having a narrower interorbital region, shallower body and head margin of uniform color (some white blotches along head margin in the latter), and from *Arnoglossus* and *Psettina* in having wider interorbital region and sexual dimorphism observed in the interorbital width. *Arnoglossus* and *Psettina* have a bony ridge and less often, a narrow concave area between the eyes. Also no sexual dimorphism is found in the interorbital width in these two genera. In addition, *Parabothus* is easily distinguishable from *Psettina* in having cycloid or ctenoid scales with short spinules. *Psettina* has ctenoid scales with elongate spinules. NORMAN (1934) and AMAOKA (1969) have indicated that the genus *Parabothus* lacks a rostral spine. This character eliminated from the generic definition because *P. amaokai* Parin, 1983, *P. taiwanensis* Amaoka & Shen, 1994 and *P. filipes* sp. nov. have a blunt rostral knob at least in males.

COMPARATIVE MATERIAL. — *P. chlorospilus*: USNM uncat., 3 males and 5 females 69.1-180.8 mm, 21°09.7'N, 157°29.8'W, Hawaii, 177-183 m, 7 April 1968. — USNM uncat., 5 males and 5 females 71.0-182.8 mm, 21°09.6'N, 157°24.6'W, Hawaii, 181-188 m, 5 May 1968. — USNM uncat., 2 males 137.4-154.5 mm, 20°57.1'N, 156°47.1'W, Hawaii, 205-214 m, 14 November 1967.

P. coarctatus: FAKU 33342-33362, 13 males and 8 females 100.2-224.8 mm, Mimase, Kochi Pref., 15 December 1959.

P. malhensis: HUMZ 72351, 1 male 177.5 mm, 11°10'S, 60°08'E, Saya de Malha Bank, 191 m, 31 August 1977. — HUMZ 74000, 74001-74010, 74206, 74211, 3 males, 9 females and 1 young, 103.0-165.0 mm, 11°03'S, 61°15'E, Saya de Malha Bank, 254 m, 31 August 1977.

P. kiensis: FAKU 33298, 33299, 33301-33303, 33306-33311, 33313-33341, 33822, 24 males and 18 females 104.7-192.6 mm SL, Mimase, Kochi Pref., 15 December 1959.

P. amaokai: HUMZ 110064, paratype, 1 female 191.1 mm, 25°41.2'S, 85°24.1'W, 22 November 1983.

Psettina profunda: ZMA 109-393, syntype, 1 male 87.5 mm, Timor Sea (9°0.3'S, 126°24.5'E), 112 m, 20 January 1900. — ZMA 109-394, syntype, 1 female, 69.4 mm, Madura Sea (7°2.6'S, 115°23.6'E), 100 m, 15 March 1899.

KEY TO NEW CALEDONIAN SPECIES OF *PARABOTHUS*

- 1 Gill rakers serrate (Fig. 13C); pelvic fin of ocular side greatly elongated in males, its length much more than half of head in male specimens of more than 50 mm SL; a few irregular dark bands in front of both eyes and interorbital region in mature specimens; a ventral rostral knob near snout tip in males; lateral line scales-56-66; dorsal fin rays 90-96; anal fin rays 69-75 *P. filipes* sp. nov.
- 1' Gill rakers not serrate; pelvic fins not elongated in both sexes, its length much less than half of head; three white bands below upper eye in mature specimens; rostral knob absent; lateral line scales 80-99; dorsal fin rays 104-119; anal fin rays 83-98 2

- 2 Caudal fin with dark pigment near middle of rays; no conspicuous blotches on straight portion of lateral line; a few dark spots along each of dorsal and ventral margins on ocular side of body; interorbital region wide in large specimens (Fig. 16)*P. kiensis*
- 2' Caudal fin without particular markings; three not delimited dark blotches on lateral line; many dark spots and rings irregularly scattered on ocular side of body; interorbital region narrow (Fig. 18)*P. coarctatus*

Parabothus filipes sp. nov.

Figs 11-15; Tables 6-8

MATERIAL EXAMINED. — 31 specimens (15 males and 16 females).

Chesterfield and Bellona Plateaus. CHALCAL 1: stn CP 17, 22°34.70'S, 159°15.30'E (Nova Bank), 300 m, beam trawl, R. V. "Coriolis", 28 July 1984: holotype, male 79.9 mm (MNHN 1994-360). — Stn CP 17, 22°34.70'S, 159°15.30'E (Nova Bank), 300 m, beam trawl, 28 July 1984: 29 paratypes, 11 males and 13 females 40.5-80.3 mm (MNHN 1994-350 to 374); 3 males and 2 females 62.0-88.0 mm (HUMZ 129479 to 129483). — Stn CH 2, 22°34.41'S, 159°17.39'E (Nova Bank), 330 m, otter trawl (fishes), 28 July 1984: 1 paratype, female 73.5 mm (HUMZ 129478).

DIAGNOSIS. — Pelvic fin on ocular side greatly elongated in males, about 0.8-1.5 in head length in male specimens of more than 50 mm SL (Fig. 15); gill rakers long and serrated; a few irregular dark bands in front of both eyes and interorbital region; a poorly developed rostral spine near snout tip above maxilla in males; scales in lateral line 56-66; dorsal fin rays 90-96; anal fin rays 69-75.

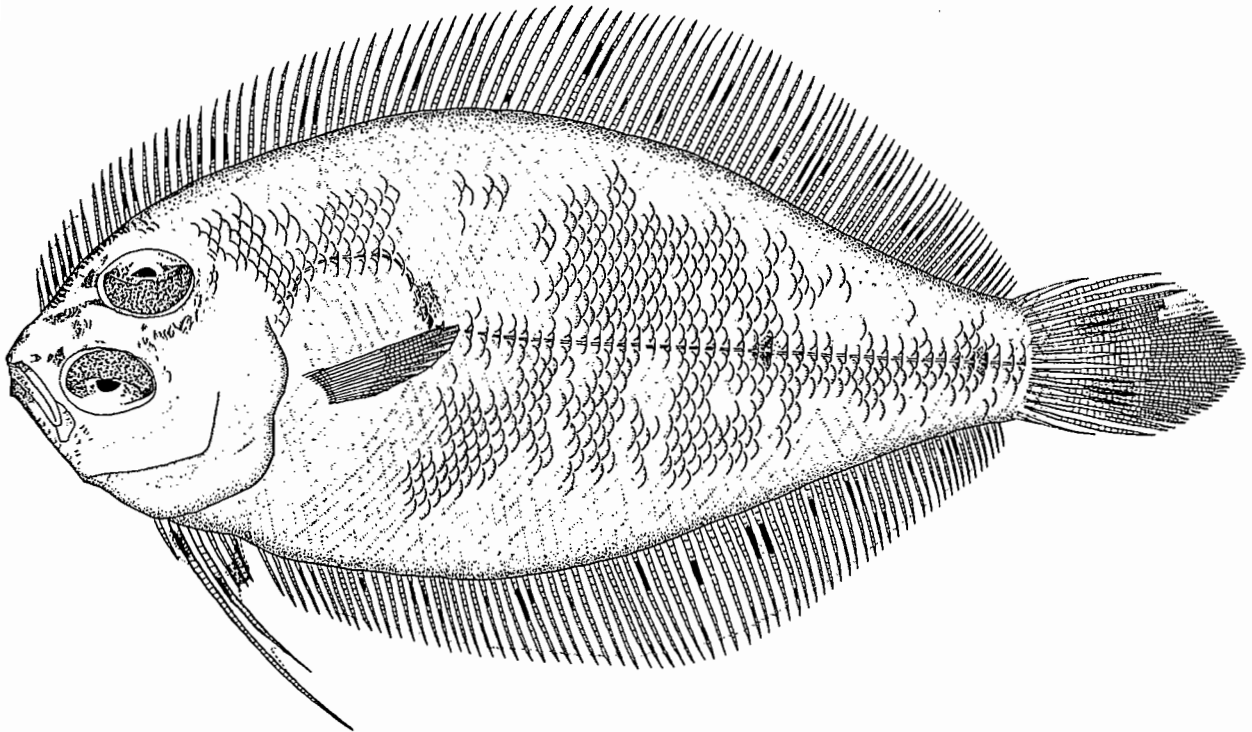
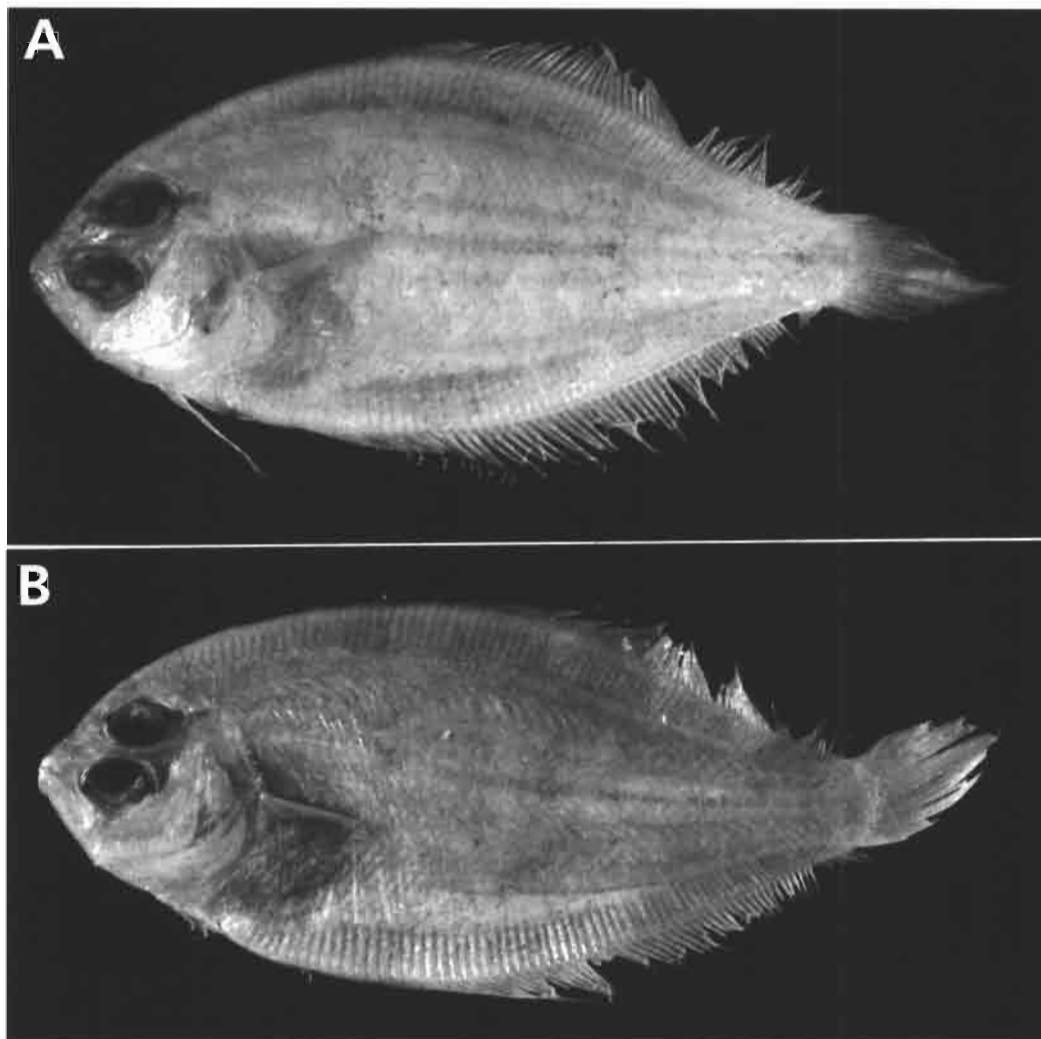


FIG. 11. — *Parabothus filipes* sp. nov., holotype, male, 79.9 mm, from Nova Bank, west of New Caledonia (MNHN 1994-360).

TABLE 6. — Frequency distribution of eight meristic characters of *Parabothus filipes* sp. nov. Counts for holotype included in boldfaced numbers.

Dorsal fin rays							Anal fin rays							Vertebrae		
90	91	92	93	94	95	96	69	70	71	72	73	74	75	10+29	10+30	10+31
2	4	6	6	7	5	1	2	1	3	5	8	9	3	3	23	5
Pectoral fin rays							Caudal fin rays									
7	8	9	10	11	12	13	2+13+2	3+11+3	2+12+3	3+12+2						
0(1)	0(19)	0(9)	1(1)	1(0)	19(0)	10(0)	11	13	3	4						
Scales in lateral line											Gill rakers					
56	57	58	59	60	61	62	63	64	65	66	0+7	0+8	0+9	0+10		
2	0	2	6	7	4	6	1	1	0	1	3	15	12	1		

FIG. 12. — *Parabothus filipes* sp. nov. — A: holotype, male, 79.9 mm, from Nova Bank, west of New Caledonia (MNHN 1994-360). — B: paratype, female, 73.4 mm, from Nova Bank, west of New Caledonia (MNHN 1994-369).

DESCRIPTION. — Data for holotype are given first, followed in parentheses by ranges for the paratypes and averages including holotype for proportional data. Counts and proportional measurements as percent of SL are shown in Tables 6 and 7. Head length 3.57 in SL (3.47-3.91, 3.67); body depth 2.21 (2.15-2.56, 2.30). Snout length 5.74 in head length (4.65-5.89, 5.23); upper eye diameter 2.99 (2.82-3.40, 3.02); lower eye diameter 3.15 (2.86-3.46, 3.08); interorbital width 9.74 (9.19-37.33, 14.53) in males, (21.56-35.67, 28.27) in females; upper jaw length 2.80 (2.47-2.85, 2.64) on ocular side, 2.73 (2.47-2.80, 2.61) on blind side; lower jaw length 2.13 (1.95-2.25, 2.07) on ocular side, 1.98 (1.80-2.05, 1.92) on blind side; depth of caudal peduncle 2.55 (2.26-2.84, 2.60); pectoral fin length 1.68 (1.60-1.81, 1.71) on ocular side, 2.60 (2.53-3.61, 2.95) on blind side; pelvic fin length 1.01 (0.78-3.61, 1.40) on ocular side in males, (2.73-3.30, 3.03) in females, 2.95 (2.82-3.48, 3.07) on blind side; pelvic fin base length 3.67 (3.06-4.22, 3.67) on ocular side, 8.30 (7.48-10.00, 8.55) on blind side; length of longest dorsal fin ray 2.41 (2.18-2.48, 2.36); length of longest anal fin ray 2.24 (2.05-2.32, 2.23); length of middle caudal fin ray 1.25 (1.20-1.37, 1.27); curved length of lateral line 2.11 (1.72-2.25, 1.95).

TABLE 7. — Proportional measurements as % of SL in *Parabothus filipes* sp. nov. Averages include measurements from holotype.

Character	Holotype	Paratypes	Average	SD
SL (mm)	79.9	40.5-88.0	64.1	12.2
HL	28.0	25.6-28.8	27.3	0.8
BD	45.3	39.1-46.5	43.6	1.6
SNL	4.9	4.5-6.0	5.2	0.3
UED	9.4	8.4-9.8	9.0	0.4
LED	8.9	8.1-9.8	8.9	0.4
IW (M)	2.9	0.7-3.0	2.2	0.7
IW (F)		0.7-1.2	1.0	0.2
UJL (O)	10.0	9.5-11.2	10.4	0.4
UJL (B)	10.3	9.7-11.5	10.5	0.4
LJL (O)	13.1	12.3-13.8	13.2	0.4
LJL (B)	14.1	13.4-15.2	14.2	0.4
DCP	11.0	9.5-11.3	10.5	0.5
P1L (O)	16.6	15.1-17.0	16.0	0.5
P1L (B)	10.8	7.6-10.8	9.3	0.8
P2L (O, M)	27.7	7.6-35.7	24.0	7.4
P2L (O, F)		8.2-9.7	9.0	0.4
P2L (B)	9.5	7.7-9.7	8.9	0.5
P2B (O)	7.6	6.8-9.1	7.5	0.4
P2B (B)	3.4	2.7-3.5	3.2	0.2
LDFR	11.6	11.0-12.3	11.6	0.4
LAFR	12.5	11.4-13.0	12.3	0.4
MCFR	22.4	19.7-23.4	21.5	0.8
LLCW	13.3	12.5-15.7	14.0	0.7

Body elongated and elliptical, deepest point near middle of body, its depth 1.43-1.74 times of head length; the dorsal and ventral contours gently arched. Caudal peduncle deep, its depth 22.0-27.8 % of body depth. Head slightly longer than 1/4 of SL; upper profile with very slight concavity in front of lower margin of upper eye. Snout blunt, its length 51.4-71.0 % of upper eye diameter. Feeble, obtuse rostral spine near snout tip above maxilla in males, directed downward, absent in females (Figs 12, 13A-B). Eyes large, upper eye diameter 78.8-95.0 % of

upper jaw length on ocular side, lower eye in advance of upper. Interorbital region shallowly concave, becoming wider with increasing body size, wider in males than in females (Figs 12, 13A-B, 14). Nostrils on ocular side anterior to upper margin of lower eye; anterior nostril tubular with posterior flap; nostrils on blind side small, below origin of dorsal fin, similar in shape to those on ocular side. Mouth large, oblique; maxilla extending beyond anterior margin of lower eye; anterior tip of both jaws nearly on same vertical line when mouth closed. A small ventral knob at mandibular symphysis. Dentition almost equally developed on both jaws; teeth on upper jaw sharp, uniserial, closely spaced laterally, becoming larger and more widely spaced anteriorly, some anterior canine like teeth; lower jaw teeth uniserial, nearly similar to anterior teeth of upper jaw in size and spacing. Gill rakers on first arch long, posterior margins serrated (Fig. 13C), none on upper limb. Scales large, with short ctenii on ocular side (Fig. 13D); snout, middle part of interorbital region and anterior parts of both jaws naked; cycloid scales on blind side. Lateral line curved anteriorly on ocular side, absent on blind side. Dorsal fin origin on blind side, on horizontal line through lower margin of upper eye. Anal fin origin below posterior margin of head. Pectoral fin on ocular side not elongated in both sexes, its length 1.50-2.03 times as long as that on blind side. Pelvic fin on ocular side originating at tip of isthmus; second and third rays greatly elongated in males, the second ray longest, becoming longer with increasing body size in males, longer in males than in females (Figs 12, 13A-B, 15); fourth ray on ocular side opposite to first ray on blind side. Tip of isthmus below posterior margin of lower eye. All fin rays simple except for caudal fin rays. Caudal fin with rounded margin; all rays branched except for two or three upper- and lowermost rays. Posterior basipterygial process well projecting between pelvic fins. Vent opens on blind side, immediately anterior to first anal fin ray. Urogenital papilla on opposite side of vent.

Coloration (in alcohol). Body color on both sides pale brown; snout margin, anterior parts of both jaws, and dorsal margin of head stained with dark, a few irregular dark bands in front of orbital region in larger specimens (Fig. 13AB); an obscure dark spot at junction of straight and curved parts of lateral line, one spot on middle of straight and another on near caudal-fin base. Caudal fin with a pair of not well delimited dark blotches in middle; dorsal and anal fins with a series of dark spots of variable size; pelvic fin with two dark spots, one on fin membrane between first and second rays and another between fourth and sixth rays (Fig. 11).

Sexual dimorphism. *Parabothus filipes* sp. nov. shows sexual dimorphism in the presence or absence of rostral spine, the interorbital width and length of the pelvic fin on ocular side (Figs 12, 13AB, 14, 15).

DISTRIBUTION. — The specimens were collected from the Nova Bank, the Coral Sea, at depths of 300-330 m.

ETYMOLOGY. — Named for the elongated pelvic fin on the ocular side in males, which is one of diagnostic character of this species.

REMARKS. — The present species is closely related to species of the genus *Parabothus*: elongated elliptical body; clearly concave and narrow interorbital space (a bony ridge in the young), broader in males than in females; mouth moderate, the length of maxilla 2.5-2.9 in head length; ctenii on scales not elongated; 4 caudal plates without subdivisions (NORMAN, 1934; AMAOKA, 1969; AMAOKA & SHEN, 1993). There are eight valid species in the genus *Parabothus*: *P. coarctatus* (Gilbert, 1905), *P. kiensis* (Tanaka, 1918), *P. polylepis* (Alcock, 1889), *P. chlorospilus* (Gilbert, 1905), *P. malhensis* (Regan, 1908), *P. budkeri* (Chabanaud, 1942), *P. amaokai* Parin, 1983 and *P. taiwanensis* Amaoka & Shen, 1993, except for *P. thackwrayi* Smith, 1967 that is shown to be a larva of *Laeops pectoralis* (Bonde, 1922) (HENSLEY, 1986).

P. filipes sp. nov. is easily separable from other known congeners in having an elongated pelvic fin on the ocular side in males, a low number of scales in the lateral line (Table 8), gill rakers with serrate margins, and a few irregular dark bands in front of both eyes and interorbital region in mature specimens. *P. taiwanensis* has a low number of scales on the lateral line (61-62), but it is clearly separable from the latter by the presence of uniserial upper jaw teeth (biserial in *P. taiwanensis*), feebly ctenoid scales on the ocular side (scales with long ctenii), gill rakers with serrated margins (gill rakers with smooth margins), and lower numbers of dorsal and anal fin rays (Table 8). *P. malhensis* has gill rakers that are similar to the ones found in *P. filipes*. However, *P. malhensis* has cycloid scales on both sides of the body and high numbers of the meristic counts, while *P. filipes* has ctenoid scales on the ocular side and lower meristic counts (Table 8). On the other hand, this species superficially resembles *Psettina profunda* (Weber, 1913) from Java, Madura Sea and Timor Sea, in the narrow concave interorbital space

and the elongated pelvic fin in males, and also in the numbers of dorsal fin rays (94-95 in the latter), anal fin rays (73-75), and scales in the lateral line (57-59), but differs from the latter in the following characters: serrated gill rakers, somewhat broader interorbital space, moderate length of ctenii of scales and uniserial tooth row in both jaws (biserial in upper jaw anteriorly).

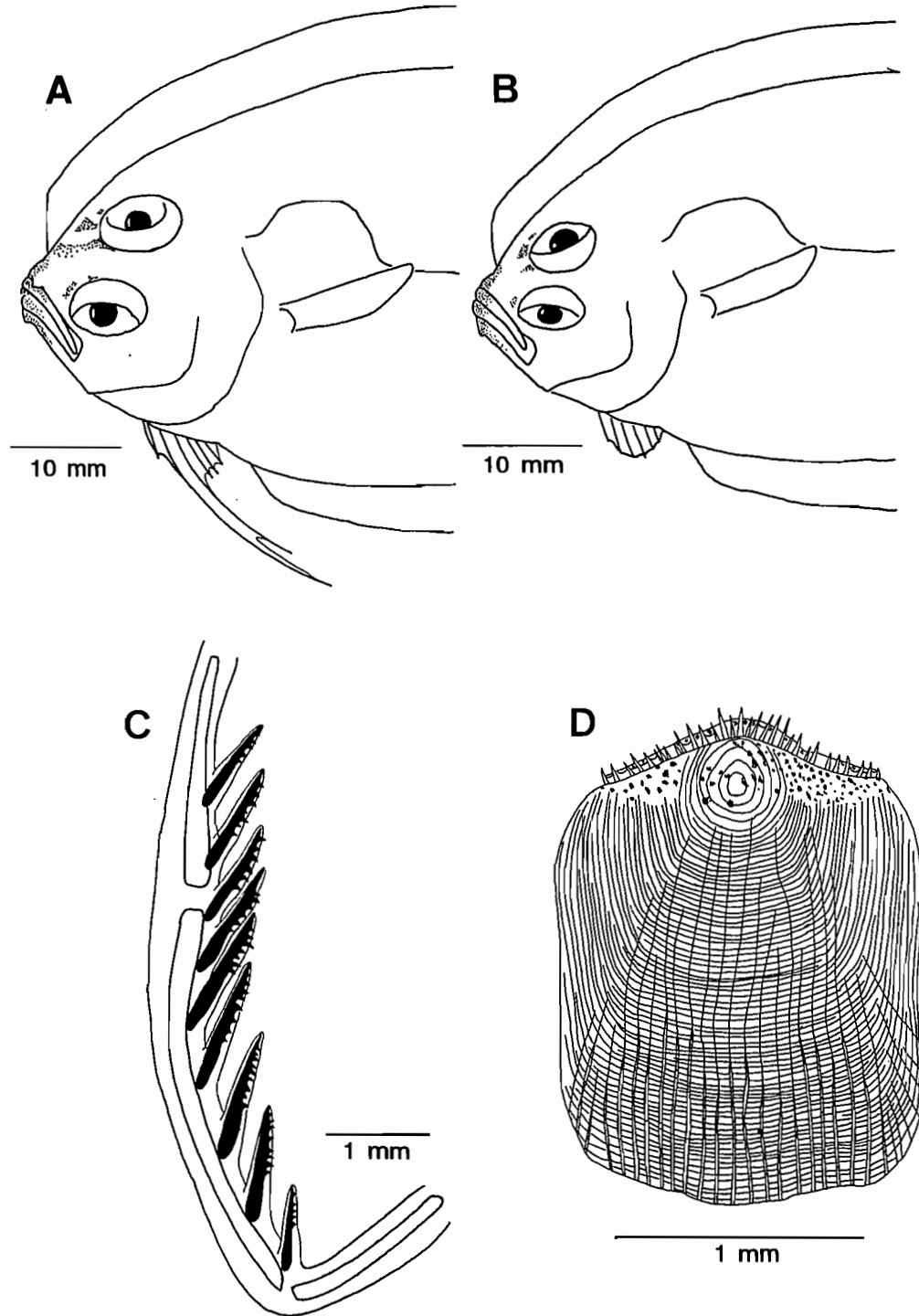


FIG. 13. — Body parts showing sexual dimorphism in male (A) and female (B), and first gill arch (C) and a scale (D) from ocular side in *Parabothus filipes* sp. nov., paratype, 74.1 mm (HUMZ 129482).

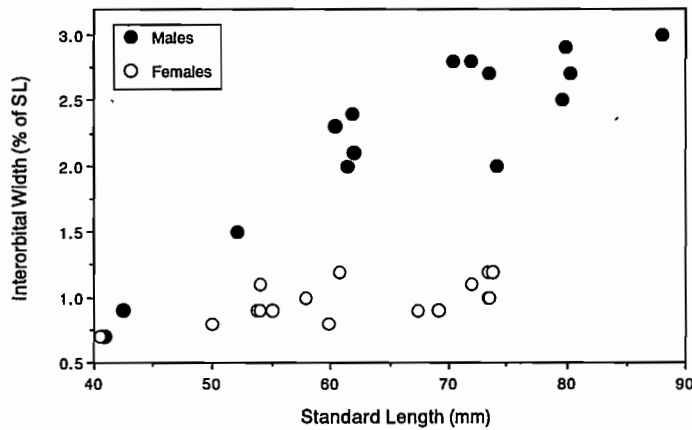


FIG. 14. — Relationships between SL and interorbital width in percent of SL in *Parabothus filipes* sp. nov.

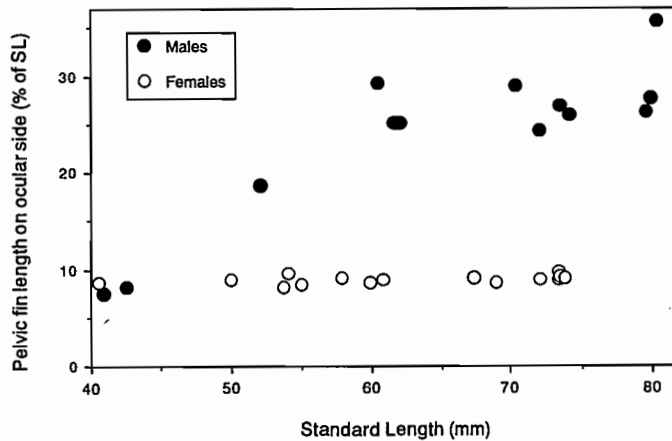


FIG. 15. — Relationships between SL and pelvic fin length on ocular side in percent of SL in *Parabothus filipes* sp. nov.

Parabothus kiensis (Tanaka, 1918)

Figs 16-17; Tables 8-10

Platophrys kiensis Tanaka, 1918: 225.

Platophrys kiensis: — UI, 1929: 272, fig. 102. — KAMOHARA, 1934: 301.

Parabothus kiensis: OKADA & MATSUBARA, 1938: 423. — KAMOHARA, 1950: 241. — MATSUBARA, 1955: 1261. — KAMOHARA, 1958: 62. — OCHIAI & AMAOKA 1963: 133. — KAMOHARA, 1964: 82. — AMAOKA, 1969: 125, fig. 33-35. — AMAOKA, 1984: 384, pl. 312-H. — NAKABO, 1993: 1168.

MATERIAL EXAMINED. — 7 specimens (3 males and 4 females).

New Caledonia BIOCAL: stn CP 110, 22°13.31'S, 167°09.93'E, 275-320 m, beam trawl, R. V. "Jean Charcot", 9 September 1985: 1 male 96.5 mm (MNHN 1994-375).

MUSORSTOM 4: stn CP 172, 19°01.20'S, 163°16.00'E, 275-330 m, beam trawl, R. V. "Vauban", 17 September 1985: 1 male and 2 females 72.0-81.0 mm (MNHN 1994-377, 378, 379); 1 female 87.7 mm (HUMZ 129484). — Stn CP 192, 18°59.30'S, 163°25.00'E, 320 m, beam trawl, 19 September 1985: 1 female 98.3 mm (MNHN 1994-376); 1 male 170.5 mm (HUMZ 129485).

DIAGNOSIS. — Caudal fin stained with dark pigments on middle rays; no distinct blotches on lateral line; 80-88 scales in lateral line; gill rakers without serration.

DESCRIPTION. — Ranges for proportional data are given first, followed by averages. Counts and proportional measurements as percent of SL are shown in Tables 9 and 10. Head length 3.65-3.89, 3.80 in SL; body depth 2.44-2.82, 2.69. Snout length 4.54-5.27, 4.78 in head length; upper eye diameter 2.75-3.44, 3.03; lower eye diameter 2.79-3.16, 3.08; interorbital width 4.89-37.80, 22.80 in males, 33.00-41.60, 36.56 in females; upper jaw length 2.67-2.92, 2.76 on ocular side, 2.59-2.66, 2.63 on blind side; lower jaw length 1.96-2.07, 2.03 on ocular side, 1.86-1.93, 1.90 on blind side; depth of caudal peduncle 2.68-3.02, 2.89; pectoral fin length 1.68-1.89, 1.82 on ocular side, 2.95-4.00, 3.66 on blind side; pelvic fin length 3.15-3.52, 3.31 on ocular side, 3.15-3.58, 3.28 on blind side; pelvic fin base length 3.44-3.96, 3.69 on ocular side, 6.10-7.04, 6.48 on blind side; length of longest dorsal fin ray 2.10-2.30, 2.25; length of longest anal fin ray 1.91-2.24, 2.12; length of middle caudal fin ray 1.34-1.50, 1.41; curved length of lateral line 1.81-2.07, 1.91.

Body elongated and elliptical, deepest point at about middle of body, its depth 1.34-1.59 times as long as head length; dorsal and ventral contours gently arched. Caudal peduncle deep, its depth 23.5-26.3 % of body depth. Head large, upper profile with a concavity in front of lower margin of upper eye. Snout blunt, and long, its length 58.5-75.8 % of upper eye diameter. Rostral or orbital spines absent. Eyes large; upper eye diameter 77.6-101.5 % of upper jaw length on ocular side, lower eye in advance of upper eye. Interorbital region shallowly concave, becoming wider proportionally with increasing body size, wider in males than in females. Nostrils on ocular side anterior to upper margin of lower eye; anterior nostril tubular with posterior flap; nostrils on blind side small, below origin of dorsal fin, similar in shape to those on ocular side. Mouth large, oblique; maxilla extending beyond anterior margin of lower eye; anterior tips of both jaws nearly on a same vertical line when mouth closed. A small ventral knob at mandibular symphysis. Dentition about equally developed on both jaws; teeth on upper jaw sharp, uniserial, becoming larger and more widely spaced anteriorly, few anterior canine-like teeth; lower jaw teeth uniserial, almost similar to anterior teeth of upper jaw in terms of size and spacing. Gill rakers on first arch long or moderate in size, not serrate, absent on upper limb. Scales on ocular side ctenoid with moderate ctenii (Fig. 17). No scales on snout, marginal portions of both eyes, anterior parts of both jaws and basal part of pectoral fins; cycloid scales on blind side. Lateral line curved above pectoral fin on ocular side; absent on blind side. Dorsal fin origin on blind side, on horizontal line through upper margin of lower eye. Anal fin origin below posterior margin of head. Pectoral fin on ocular side not elongated in both sexes, its length 1.76-2.12 times as long as that on blind side. Pelvic fin on ocular side originating at slightly posterior to tip of isthmus, shorter than head length; third ray on ocular side nearly opposite to first ray on blind side. Tip of isthmus usually more posterior than vertical line through posterior margin of lower eye. All fin rays except for caudal fin rays, simple. Caudal fin rays branched except for two upper- and lowermost rays. Vent opens on blind side, immediately anterior to first anal fin rays. Urogenital papilla on opposite side of vent.

Coloration (in alcohol). Body color on ocular side light brown; three white bands below upper eye in larger specimens; anterior band running from anterior margin of upper eye, middle one from anterior 1/5 of upper eye downward to anterior margin of lower eye and posterior one from posterior 1/5 of upper eye downward to posterior 1/4 of lower eye; a diffused dark blotch above junction of straight and curved parts of lateral line; a few dark spots along each of dorsal and ventral margins of body. Blind side pale yellowish white except for light brown margin of body. Dorsal and anal fins with a series of dark spots; caudal fin stained with dark on middle rays; pelvic fin with a dark spot.

Sexual dimorphism. This species shows sexual dimorphism only in the interorbital width.

DISTRIBUTION. — Southern Japan and the Coral Sea, at depths of 275-330 m.

TABLE 8. — Comparison of proportional measurements and meristic counts for ten *Parabothus* species. — N: NORMAN (1934); A: AMAOKA (1969); A & I: AMAOKA & MAMURA (1990); C: CHABANAUD (1942); P: PARIN (1942); A & S: AMAOKA & SHEN (in press); OR: original.

	No.	SL (mm)	P2L (O, in HL)	D	A	LLS	V	GR	Sources
<i>P. filipes</i>	31	40.5-88.0	0.78-3.61 (M) 2.73-3.30 (F)	90-96	69-75	56-66	10+29-31	0+7-10	OR
<i>P. polylepis</i>	2	80-130	-	83	63-66	82-85	-	?+8-9	N
<i>P. chlorospilus</i>	22	69.1-182.8	2.85-3.27	103-113	84-94	83-90	10+30-32	0+9-10	OR + N
<i>P. coarctatus</i>	21	100.2-224.8	2.73-3.23	106-117	87-95	90-96	10+32-33	0+8-10	A
	7	50.9-180.8	2.68-3.24	113-118	95-98	88-99	9-10+32-35	0+8-11	OR
<i>P. malhensis</i>	14	102.2-166.2	3.58-4.90	111-114	90-93	93-98	10+35-37	0+9-11	A & I
<i>P. kiensis</i>	40	105.8-202.9	2.44-3.76	104-113	83-90	80-86	10+31-32	0+7-10	A
	7	72.0-170.5	3.15-3.52	113-119	90-95	85-88	10+32-33	0+8-9	OR
<i>P. budkeri</i>	3	52-122	-	82-83	59-62	78-80	-	-	C
<i>P. amaokai</i>	2	110-191.1	2.45-3.4	103-105	87-89	70-75	10+30	0+15	OR + P
<i>P. taiwanensis</i>	5	80.4-148.5	2.56-2.93	100-107	78-84	61-62	10+28-29	0+8	A & S

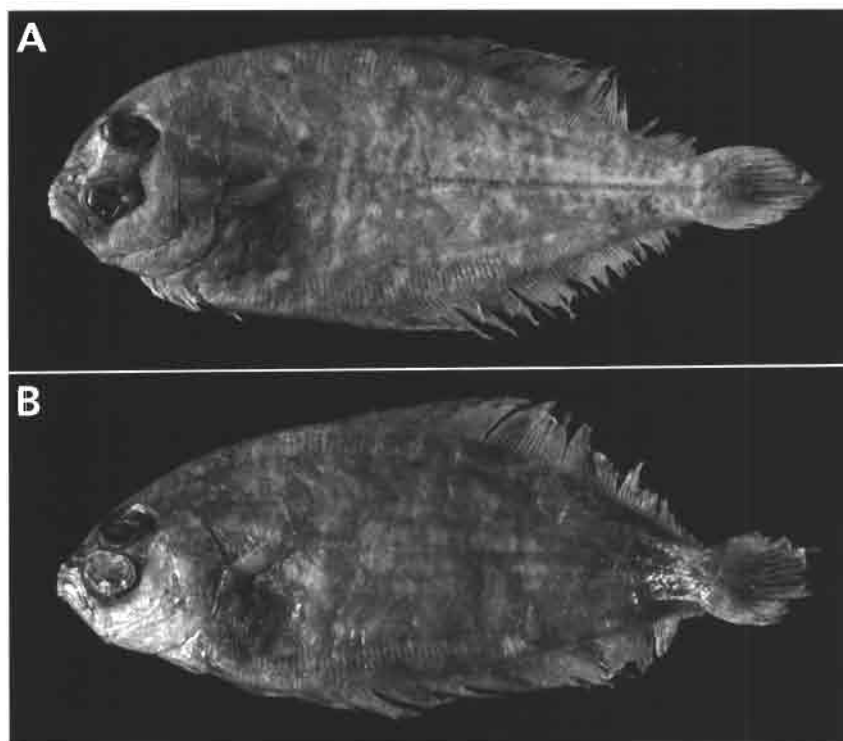


FIG. 16. — *Parabothus kiensis* (Tanaka, 1918). — **A**: male, 170.5 mm, from New Caledonia (HUMZ 129485). — **B**: female, 87.7 mm, from New Caledonia (HUMZ 129484).

REMARKS. — Specimens from Coral Sea were compared with Japanese specimens. They have more or less larger numbers of dorsal and anal fin rays and scales in lateral line, somewhat short ctenii on scales (Fig. 17), and a wide interorbital space in the largest specimen (when compared with specimen of about same size). These differences do not seem to be meaningful in delimiting species for the following reasons: the three meristic counts and the length of ctenii of scales have geographical variations in other some species of Bothidae and the interorbital width is quite variable in large specimens. This species has been previously known only from southern Japan. This is the first record for the Coral Sea.

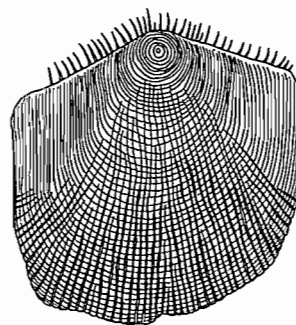


FIG. 17. — A scale from ocular side in *Parabothus kiensis* (Tanaka, 1918) (HUMZ 129485). Scale bar 1 mm.

TABLE 9. — Frequency distribution of eight meristic characters of *Parabothus kiensis* (Tanaka, 1918).

Dorsal fin rays							Anal fin rays						
113	114	115	116	117	118	119	90	91	92	93	94	95	
1	1	1	0	2	1	1	1	1	0	1	3	1	
Pectoral fin rays					Caudal fin rays								
10	11	12	13	14	2+13+2								
0(1)	0(6)	0(0)	5(0)	2(0)	7								
Scales in lateral line				Gill rakers		Vertebrae							
85	86	87	88	0+8	0+9	10+32	10+33						
1	4	1	1	5	2	6	1						

Parabothus coarctatus (Gilbert, 1905)

Fig. 18; Tables 8, 11-12

Platophrys coarctatus Gilbert, 1905: 686, fig. 267.

Platophrys coarctatus: JORDAN & JORDAN, 1922: 24. — FOWLER, 1928: 92.

Rhomboidichthys coarctatus: GÜNTHER, 1909: 343.

Arnoglossus violaceus Franz, 1910: 61, pl. 7, fig. 56. — JORDAN, TANAKA & SNYDER, 1913: 315. — KAMOHARA, 1931: 542; 1938: 57; 1950: 239.

Parabothus coarctatus: NORMAN, 1931: 601; 1934: 243, fig. 185. — KAMOHARA, 1935: 21; 1950: 241; 1958: 62; 1964: 82. — OKADA & MATSUBARA, 1938: 423. — FOWLER, 1949: 61. — MATSUBARA, 1955: 1261. — AMAOKA, 1969: 121, figs 31-32; 1982: 296, 406, fig. 219; 1984: 348, pl. 321-F,G. — IWAI, 1976: 150, fig. M.Pat-24. — BORETS, 1983: 3. — FOROSHCHUK, 1991: 154. — NAKABO, 1993: 1168.

Parabothus (?) *violaceus*: NORMAN, 1931: 601.

Parabothus violaceus: NORMAN, 1934: 242, fig. 184. — OKADA & MATSUBARA, 1938: 423. — MATSUBARA, 1955: 1261. — KAMOHARA, 1958: 62; 1964: 82.

TABLE 10. — Proportional measurements as % of SL in *Parabothus kiensis* (Tanaka, 1918).

Character	Ranges (n = 7)	Average	SD
SL (mm)	72.0-170.5	96.94	34.1
HL	25.7-27.4	26.3	0.5
BD	35.4-40.9	37.3	1.8
SNL	5.2-5.7	5.5	0.2
UED	7.5-9.6	8.7	0.6
LED	7.2-9.4	8.6	0.7
IW (m)	0.7-5.3	2.3	2.1
IW (f)	0.6-0.8	0.7	0.1
UJL (O)	9.4-9.7	9.5	0.1
UJL (B)	9.8-10.3	10.0	0.2
LJL (O)	12.6-13.5	13.0	0.3
LJL (B)	13.4-14.2	13.9	0.3
DCP	8.8-9.6	9.1	0.3
P1L (O)	13.6-15.4	14.4	0.5
P1L (B)	6.4-8.7	7.3	0.8
P2L (O)	7.5-8.3	8.0	0.3
P2L (B)	7.4-8.3	8.0	0.3
P2B (O)	6.8-7.6	7.1	0.3
P2B (B)	3.8-4.3	4.1	0.2
LDFR	11.2-12.2	11.6	0.4
LAFR	11.7-13.6	12.4	0.6
MCFR	18.2-19.4	18.7	0.5
LLCW	13.2-14.5	13.8	0.4

MATERIAL EXAMINED. — 7 specimens (7 females).

New Caledonia. LAGON: stn 1153, 18°58.4'S, 163°23.0'E, 330-335 m, beam trawl, R. V. "Vauban", 29 October 1989: 1 female 174.8 mm (HUMZ 129486).

Norfolk Ridge. CHALCAL 2: stn CH 4, 24°44.31'S, 168°09.94'E, 253 m, otter trawl (fishes), R. V. "Coriolis", 27 October 1986: 1 female 174.8 mm (MNHN 1994-383). — Stn CP 19, 24°42.85'S, 168°09.73'E, 271 m, beam trawl, 27 October 1986: 1 female 180.8 mm (MNHN 1994-380). — Stn CP 20, 24°44.60'S, 168°09.30'E, 230-300 m, beam trawl, 27 October 1986: 1 female 164.0 mm (MNHN 1994-382). — Stn CC 1, 24°54.96'S, 168°21.91'E, 500-580 m, shrimp trawl, 28 October 1986: 1 female 167.7 mm (MNHN 1994-381).

SMIB 4: stn DW 44, 24°46.00'S, 168°08.02'E (South of Isle des Pins), 300 m, Waren dredge, R. V. "Alis", 8 March 1989: 1 female 50.9 mm (MNHN 1994-384).

Isle of Matthew. VOLSMAR: stn DW 7, 22°26.00'S, 171°44.10'E, 400 m, Waren dredge, 1 June 1989: 1 female 59.5 mm (HUMZ 129487).

DIAGNOSIS. — Small scales on ocular side with moderate ctenii; rostral and orbital knobs absent; gill rakers not serrated; three diffused dark blotches on lateral line; interorbital region narrow.

DESCRIPTION. — Ranges for proportional data are given first, followed by averages. Counts and proportional measurements as percent of SL are shown in Tables 11 and 12. Head length 3.69-4.12, 3.88 in SL; body depth 2.38-2.89, 2.55. Snout length 4.11-4.76, 4.35 in head length; upper eye diameter 2.94-3.81, 3.51; lower eye diameter 3.00-3.81, 3.53; interorbital width 12.47-31.80, 20.24 in females; upper jaw length 2.61-2.82, 2.70 on ocular side, 2.52-2.76, 2.59 on blind side; lower jaw length 1.90-2.01, 1.95 on ocular side, 1.82-1.88, 1.84 on blind side; depth of caudal peduncle 2.53-3.12, 2.81; pectoral fin length 1.64-1.87, 1.74 on ocular side, 2.68-3.79, 3.05

on blind side; pelvic fin length 2.68-3.24, 2.96 on ocular side, 2.93-3.37, 3.12 on blind side; pelvic fin base length 3.39-4.42, 3.79 on ocular side, 5.76-7.95, 6.45 on blind side; length of longest dorsal fin ray 2.00-2.13, 2.08; length of longest anal fin ray 1.92-2.06, 1.99; length of middle caudal fin ray 1.34-1.46, 1.40; curved length of lateral line 1.55-1.97, 1.74.

Body elongated and elliptical, deepest point at about middle of body, its depth 1.30-1.67 times as long as head length. Caudal peduncle deep, its depth 22.4-24.8 % of body depth. Head large, upper profile with a concavity in front of lower margin of upper eye. Snout blunt and long, its length 64.4-89.0 % of upper eye diameter. Rostral or orbital knob absent. Eyes small; upper eye diameter 69.8-91.8 % of upper jaw length on ocular side, lower eye in advance of the upper. Interorbital region shallowly concave, becoming wider proportionally with increasing body size, wider in males than in females. Mouth large, oblique; maxilla extending beyond anterior margin of lower eye; anterior tips of both jaws nearly on same vertical line when mouth closed. A small ventral knob at mandibular symphysis. Teeth on upper jaw sharp, uniserial, becoming larger and more widely spaced anteriorly, some anterior canine-like teeth; lower jaw teeth uniserial, nearly similar to anterior teeth of upper jaw in size and space. Gill rakers on first arch long or moderate in size, not serrate, absent on upper limb. Scales on ocular side small, ctenoid with moderate ctenii, no scales on snout, middle part of interorbital region, anterior parts of both jaws, and basal part of pectoral fins; cycloid scales on blind side. Pectoral fin on ocular side not elongated in both sexes, its length 1.61-2.02 times as long as that on blind side. Pelvic fin on ocular side originating at slightly posterior to tip of isthmus, shorter than head length; third ray on ocular side nearly opposite to first ray on blind side. Tip of isthmus usually below posterior margin of lower eye. Caudal fin rays branched except for two upper- and lowermost rays.



FIG. 18. — *Parabothus coarctatus* (Gilbert, 1905), female, 167.7 mm, from Norfolk Ridge, south of New Caledonia (MNHN 1994-381).

Coloration (in alcohol). Body color on ocular side dark brown; three white bands below upper eye in larger specimens; a pair of obscure dark blotches at junction of straight and curved parts of lateral line, one blotch at middle and posterior portions of straight part of lateral line; dark rings arranged along dorsal and ventral margins of body; many darker spots and rings irregularly scattered on body. Blind side pale yellowish white except for light brown margin of body. Dorsal and anal fins with a series of dark spots; pelvic fin with a dark spot.

Sexual dimorphism. *Parabothus coarctatus* shows sexual dimorphism in only the interorbital width.

DISTRIBUTION. — Hawaiian Islands, Japan and the Coral Sea, at depths of 253-580 m.

REMARKS. — This species has been known from the Hawaiian Islands and southern Japan. This is the first record of this species from the Coral Sea.

TABLE 11. — Frequency distribution of eight meristic characters of *Parabothus coarctatus* (Gilbert, 1905).

Dorsal fin rays						Anal fin rays									
113	114	115	116	117	118	95	96	97	98						
1	0	0	0	2	4	1	2	1	3						
Pectoral fin rays				Caudal fin rays		Vertebrae									
11	12	13	14	2+13+2	9+35	10+32	10+33	10+34							
0(5)	0(2)	6(0)	1(0)	7	1	1	1	4							
Scales in lateral line											Gill rakers				
88	89	90	91	92	93	94	95	96	97	98	99	0+8	0+9	0+10	0+11
2	0	0	0	1	1	1	1	0	0	0	1	1	2	3	1

TABLE 12. — Proportional measurements as % of SL in *Parabothus coarctatus* (Gilbert, 1905).

Character	Range (n = 7)	Average	SD
SL (mm)	50.9-180.8	134.7	55.5
HL	24.3-27.1	25.8	1.0
BD	34.6-42.1	39.4	2.6
SNL	5.7-6.1	5.9	0.1
UED	6.6-9.1	7.4	1.0
LED	6.6-8.9	7.4	0.8
IW (F)	0.8-2.1	1.4	0.4
UJL (O)	9.1-10.3	9.6	0.4
UJL (B)	9.5- 10.6	10.0	0.4
LJL (O)	12.5-13.9	13.2	0.4
LJL (B)	13.1-14.5	14.0	0.5
DCP	8.6-9.6	9.2	0.4
P1L (O)	14.0-16.2	15.0	0.8
P1L (B)	7.1-9.3	8.5	0.7
P2L (O)	8.1-9.2	8.7	0.4
P2L (B)	7.9-8.6	8.3	0.3
P2B (O)	6.1-7.3	6.8	0.4
P2B (B)	3.4-4.5	4.0	0.3
LDFR	11.9-12.7	12.2	0.3
LAFR	12.1-13.6	12.7	0.5
MCFR	17.3-20.0	18.5	1.0
LLCW	13.8-16.0	14.9	0.8

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REFERENCES

- ALCOCK, A., 1889. — List of Pleuronectidae from the Bay of Bengal. *J. Asiat. Soc. Bengal*, **58**(2): 279-295.
- AMAOKA, K., 1969. — Studies on the sinistral flounders found in the waters around Japan, Taxonomy, anatomy and phylogeny. *J. Shimonoseki Univ. Fish.*, **18**(2): 65-340.
- AMAOKA, K., 1982. — Bothidae. In: OKAMURA, O., AMAOKA, K. & F. MTANI (eds), *Fishes of the Kyushu-Palau Ridge and Tosa Bay*. Japan Fisheries Resource Conservation Association, Tokyo, pp. 296-299, 405-408.
- AMAOKA, K., 1984. — Bothidae. In: MASUDA, H., AMAOKA, K., ARAGA, C., UYENO, T. & T. YOSHINO (eds), *The fishes of the Japanese Archipelago*. Tokai Univ. Press, Tokyo, pp. 331-340.
- AMAOKA, K. & H. IMAMURA, 1990. — Two new and one rare species of bothid flounders from Saya de Malha Bank, Indian Ocean (Teleostei: Pleuronectiformes). *Copeia*, **4**: 1011-1019.
- AMAOKA, K., MIHARA, E. & J. RIVATON, 1993. — Pisces Pleuronectiformes: Flatfishes from the waters around New Caledonia. A revision of the genus *Engyprosopon*. In: CROSNIER, A. (ed.), *Résultats des Campagnes MUSORSTOM*, Volume 11. *Mém. Mus. natn. Hist. nat. (A)*, **158**: 377-426.
- AMAOKA, K. & J. RIVATON, 1991. — Pisces Pleuronectiformes: A review of the genus *Tosarhombus* (Bothidae) with description of two new species from Saya de Malha Bank (Indian Ocean) and the Chesterfield Islands (Coral Sea). In: CROSNIER, A. (ed.), *Résultats des Campagnes MUSORSTOM*, Volume 8. *Mém. Mus. natn. Hist. nat. (A)*, **151**: 449-466.
- AMAOKA, K. & S.-C. SHEN, 1993. — A new bothid flatfish *Parabothus taiwanensis* collected from Taiwan (Pleuronectiformes: Bothidae). *Bull. Mar. Sci.*, **53**(3): 1042-1047.
- BONDE, C. VON., 1922. — The Heterosomata (flat fishes) collected by the S. S. "Pickle". *Rep. Fish. Mar. Biol. Surv. Un. S. Afr.*, **2**(1921), Spec. Rept., 1: 1-29.
- BORETS, L. A., 1983. — A new species of flounder, *Microstomus shuntovi* sp. n. (Pleuronectidae), and two rare flounder species (Bothidae) from seamounts of the Northwestern and Hawaiian Ridges. *J. Ichthyol.*, **23**(5): 1-6.
- CHABANAUD, P., 1942. — Notules ichthyologiques. XVI. Remarques critiques concernant l'iconographie de deux Cynoglossidés d'Indo-Chine. *Bull. Mus. Natn. Hist. Nat., Paris*, Ser. 2, **14**: 395-402.
- FOROSHCHUK, V. P., 1991. — [Fauna of Pleuronectiformes from the Saya-de-Malha Bank in the Indian Ocean.] In: GRECHINA, A. S., et al. (eds), *Biological resources of the world ocean thalassobathyal: collected papers*. VNIRO, Moscow, pp. 144-167 (In Japanese).
- FOWLER, H. W., 1928. — The fishes of Oceania. *Mem. Bernice P. Bishop Mus.*, **10**: i-iii+1-540.
- FOWLER, H. W., 1949. — The fishes of Oceania. Supplement 3. *Mem. Bernice P. Bishop Mus.*, **12**(2): 35-186.
- FRANZ, V., 1910. — Die japonische Knochenfische der Sammlungen Haberer und Doflein. In: *Beiträge zur Naturgeschichte Ostasiens. Abh. K. Bayer. Akad. Wiss.*, **4**, Suppl., Bd. 1: 1-135.
- GILBERT, C. H., 1905. — The aquatic resources of the Hawaiian Islands. Section II. The deep-sea fishes. *Bull. U. S. Fish. Comm. for 1903*, **23**(2): i-xi+575-713.
- GÜNTHER, A., 1909. — Andrew Garrett's Fische der Südsee III. *J. Mus. Godeffroy*, **6**: i-iv+261-515.

- HENSLEY, D. A., 1986. — Bothidae. In: SMITH, M. M. & P. C. HEEMSTRA (eds), *Smith's sea fishes*. Springer Verlag, Berlin, West Germany, pp. 854-863.
- IWAI, T., 1976. — [Bothidae]. In: Far Seas Fisheries Research Laboratory (ed.), *Colored illustrations of bottomfishes collected by Japanese trawlers*. Vol. II. Japan Deep Sea Trawlers Association, Tokyo, p. 150. (In Japanese).
- JORDAN, D. S. & E. K. JORDAN, 1922. — A list of the fishes of Hawaii, with notes and descriptions of new species. *Mem. Carnegie Mus.*, **10**(1): 1-92.
- JORDAN, D. S., TANAKA, S. & J.O. SNYDER, 1913. — A catalogue of the fishes of Japan. *J. Coll. Sci., Imp. Univ. Tokyo*, **33**(1): 1-497.
- KAMOHARA, T., 1931. — [Supplementary notes on the fishes collected in the vicinity of Kochi-shi (I)]. *Zool. Mag.*, **43**(514): 533-544. (In Japanese).
- KAMOHARA, T., 1934. — [Supplementary notes on the fishes in the vicinity of Kochi-shi (VI)]. *Zool. Mag.*, **46**(549): 299-303. (In Japanese).
- KAMOHARA, T., 1935. — [Supplementary notes on the fishes collected in the vicinity of Kochi-shi (VIII)]. *Zool. Mag.*, **48**(1): 17-21. (In Japanese).
- KAMOHARA, T., 1938. — *On the offshore bottom-fishes of Province Tosa, Shikoku, Japan*. Maruzen, Tokyo, 86 pp.
- KAMOHARA, T., 1950. — [Description of the fishes from the Provinces of Tosa and Kishu, Japan]. Kochi Insatsu, Kochi, 4+288+46+26 pp. (In Japanese).
- KAMOHARA, T., 1958. — A catalogue of fishes of Kochi Prefecture (Province Tosa), *Japan. Rep. Usa Mar. Biol. St.*, **5**(1): 1-76.
- KAMOHARA, T., 1964. — Revised catalogue of fishes of Kochi Prefecture, Japan. *Rep. Usa Mar. Biol. St.*, **11**(1): 1-99.
- LEVITON, A. E., GIBBS, Jr., R. H., HEAL, E. & C. E. DAWSON, 1985. — Standards in herpetology and ichthyology : Part I. Standard symbolic codes for institutional resource collections in herpetology and ichthyology. *Copeia*, 1985(3): 802-832.
- MATSUBARA, K., 1955. — [Fish morphology and hierarchy]. Part II, Ishizaki Shoten, Tokyo, v+816 pp. (In Japanese).
- NAKABO, T., 1993. — [Bothidae]. In: NAKABO, T. (ed.), *Fishes of Japan with pictorial keys to the species*. Tokai Univ. Press, Tokyo, pp. 1166-1174. (In Japanese).
- NORMAN, J. R., 1931. — Notes on flatfishes (Heterosomata). III. Collection from China, Japan, and the Hawaiian Islands. *Ann. Mag. Nat. Hist.*, **(10)** 8: 597-604.
- NORMAN, J. R., 1934. — *A systematic monograph of the flatfishes (Heterosomata). 1. Psettodidae, Bothidae, Pleuronectidae*. Brit. Mus., London, 459 pp.
- OKADA, Y. & K. MATSUBARA, 1938. — [Keys to the fishes and fish-like animals of Japan, including Kurile Islands, southern Sakhalin, Bonin Islands, Ryukyu Islands, Korea and Formosa]. Sansendo, Tokyo and Osaka, 1+584 pp. (In Japanese).
- PARIN, N. V., 1983. — [Two new species of bothid flounders (Bothidae, Pleuronectiformes) from the Nazca Submarine Ridge]. *Bull. Moskovskogo Obshch. Ispyt. Prirody*, **88**(4): 90-96. (In Russian with English summary).
- REGAN, C. T., 1908. — Report on the marine fishes collected by Mr. J. Stanley Gardiner in the Indian Ocean. *Trans. Linn. Soc. London, Zool.*, Second Ser., **12**(3): 217-225.
- RICHER DE FORGES, B. & R. PIANET, 1984. — Résultats préliminaires de la campagne CHALCAL à bord du N. O. « Coriolis » (12-13 juillet 1984). *Rap. Missions, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar.*, **32**: 1-34.
- RIVATON, J., 1989. — Premières observations sur la faune ichtyologique des îles Chesterfield (Mer du Corail). *Cybiurn*, **13**(2): 139-164.
- RIVATON, J. & B. RICHER DE FORGES, 1990. — Poissons récoltés par dragages dans le lagon de Nouvelle-Calédonie. *Rap. sci. et techn.*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **55**: 1-101.
- SMITH, J. L. B., 1967. — Two flatfishes new to South and East Africa. *J. nat. Hist.*, **4**: 457-464.
- TANAKA, S., 1918. — [Twelve new fishes found in the waters around Japan]. *Zool. Mag.*, **30**(356): 223-227. (In Japanese).
- UI, N., 1929. — [Fishes of Kisyu, Wakayama Prefecture]. Takahashi Nan-ekisha, Osaka, 284+45pp. (In Japanese).
- WEBER, M., 1913. — Die Fische der Siboga Expedition. *Siboga Rept.*, Leiden, **57**: i-xii + 1-710.



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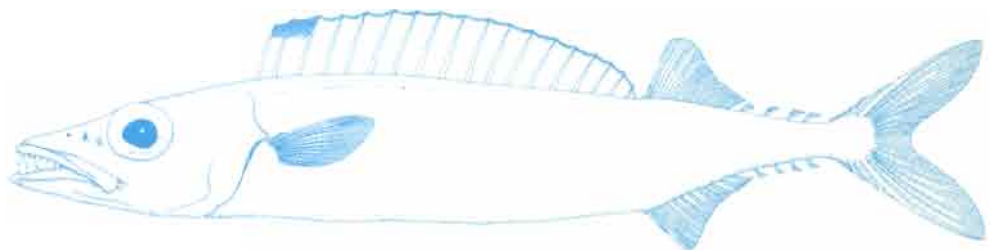
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Ce volume des Résultats des Campagnes MUSORSTOM traitant des poissons de profondeur de Nouvelle-Calédonie est dédié à Pierre FOURMANOIR, océanographe biologiste de l'ORSTOM de 1950 à 1984. Il a effectué toute sa carrière dans la région indo-pacifique (Madagascar, Ile de la Réunion, Comores, Vietnam, Philippines, Nouvelle-Calédonie, Vanuatu).

Durant son séjour malgache, Pierre FOURMANOIR a étudié les poissons d'intérêt économique et dressé un inventaire ichtyologique des Comores. A cette époque, le premier coelacanthe venait d'être découvert. Il participa alors aux recherches du second spécimen et partagea la déception française... Mais le professeur J. L. B. SMITH (descripteur du premier coelacanthe) lui conserva toute son amitié puisqu'il le considérait comme son « fils ichtyologique » (dixit Margaret M. SMITH).

En Nouvelle-Calédonie où il séjourna plus de 13 ans, Pierre FOURMANOIR s'est intéressé naturellement aux poissons coralliens. L'ensemble de ses travaux sur l'ichtyofaune corallienne constitue un apport important à l'ichtyologie du Pacifique Sud. C'est à son initiative que des pêches expérimentales profondes ont été effectuées, notamment sur les pentes externes récifales de Nouvelle-Calédonie, des Iles Loyauté et du Vanuatu. En effet, il a toujours eu le souci, dans ses travaux de faunistique, de rechercher de nouvelles espèces économiques.



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