

**Gemfishes (Scombroidei, Gempylidae, *Rexea*)
of New Caledonia, southwest Pacific Ocean,
with description of a new species**

Clive D. ROBERTS

&

Andrew L. STEWART

Museum of New Zealand
"Te Papa Tongarewa"
P.O. Box 467, Wellington
New Zealand

ABSTRACT

Gemfishes of the genus *Rexea* from the New Caledonia Exclusive Economic Zone (EEZ) are reviewed based on fresh and preserved specimens. Three species are recognized: *Rexea antefurcata* Parin, 1989, confirming recent records (previously also recorded as *R. prometheoides*), distinguished by the presence of small scales on the caudal peduncle and extending anteriorly along the edges of the lower lateral line, lateral line branching below the 4th-5th dorsal fin spines, a long pectoral fin, and dusky colour of spinous dorsal fin membrane and (in adults) pectoral fin; *R. bengalensis* (Alcock, 1894), first record, distinguished by its small maximum size, lateral line branching below the 5th-6th dorsal fin spines, long pectoral fin, and naked body (except lateral line); and *R. alisae* sp. nov., endemic, distinguished by 3-4 dorsal finlets and 4 anal finlets, lateral line branching below the 6th to 7th dorsal fin spines, posterior extent of the upper lateral line, its naked body (except lateral line), and coloration. A key to New Caledonian gemfishes (*Rexea* spp., *Rexichthys johnpaxtoni* and *Promethichthys prometheus*) is provided.

ROBERTS, C. D. & A. L. STEWART, 1997. — Gemfishes (Scombroidei, Gempylidae, *Rexea*) of New Caledonia, southwest Pacific Ocean, with description of a new species. In: SÉRET, B. (ed.), Résultats des Campagnes MUSORSTOM, Volume 17. *Mém. Mus. natn. Hist. nat.*, **174** : 125-141, Paris ISBN 2-85653-500-3.

RÉSUMÉ

Escoliers (Scombroidei, Gempylidae, *Rexea*) de Nouvelle-Calédonie (Océan Pacifique Sud-Ouest) et description d'une nouvelle espèce.

Les escoliers du genre *Rexea* (famille des Gempylidae) capturés dans la zone économique exclusive (ZEE) de Nouvelle-Calédonie sont révisés en se basant sur des spécimens frais et fixés. Trois espèces sont reconnues. La première, *Rexea antefurcata* Parin, 1989 (précédemment identifiée comme *R. prometheoides*), est caractérisée par la présence de petites écailles sur le pédoncule caudal qui s'étendent antérieurement le long des bords de la ligne latérale inférieure, la ligne latérale qui se divise sous les 4ème à 5ème épines dorsales, une longue nageoire pectorale, les bords foncés des nageoires dorsale épineuse et pectorale. La seconde, *Rexea bengalensis* (Alcock, 1894) signalée pour la première fois dans la région, se distingue de la précédente par sa petite taille maximale, la présence de la ligne latérale qui se divise sous les 5ème à 6ème épines dorsales, une longue nageoire pectorale, et un corps sans écailles (à l'exception de celles de la ligne latérale). La troisième, *Rexea alisae* sp. nov., endémique, se distingue de la précédente par la présence de 3 à 4 pinnules dorsales et 4 anales, la ligne latérale qui se divise sous les 6ème à 7ème épines dorsales, la ligne latérale supérieure plus courte, un corps sans écailles (à l'exception de celles de la ligne latérale) et une coloration différente. Une clef de détermination intégrant *Rexea* spp., *Rexichthys johnpaxtoni* et *Promethichthys prometheus*, est proposée.

INTRODUCTION

Gempylids are swift, benthic- and mesopelagic predators found at 80-800 m depth in all oceans. Species of *Thysites* (snoek) and *Rexea* (gemfishes) may attain large sizes and, due to their local abundance, support important commercial fisheries in the waters off South Africa, Australia, New Zealand, and South America (NAKAMURA & PARIN, 1993). Although common on continental shelves and slopes, some gemfishes are characteristically found on seamounts in the open ocean.

As defined here, gemfishes comprise fishes in the genera *Rexea*, *Rexichthys* and *Promethichthys*, and are readily diagnosed in the field as gempylids possessing a prominent black blotch on the anterior two or three membranes of the spinous dorsal fin. Gemfishes together with the black snake mackerel, *Nealotus tripes* Johnson, are thought to form a monophyletic group within the family Gempylidae (COLLETTE *et al.*, 1984); characters identified as suggesting close phylogenetic relationship between these fishes include a slightly elongated body, moderate number of vertebrae, the presence of supernumerary finlets on the caudal peduncle, reduction of pelvic fins, and the presence of small fangs on the lower jaw (PARIN, 1990a). Within this group species identification is largely centred on details of lateral line configuration and extent of squamation; overlapping meristic counts coupled with an overall similarity of shape and appearance make gemfish species superficially similar and easy to misidentify. The Indo-Pacific genus *Rexea* includes six species that were revised by PARIN (1989).

ORSTOM exploratory fishing by trawl and longline on seamounts of the northern Norfolk Ridge and other offshore areas of the EEZ has captured significant numbers of gemfishes, and these have been progressively recorded as *Promethichthys prometheus* (BARRO, 1981; ANON., 1988), *Rexea prometheoides* (LABOUTE, 1989; GRANDPERRIN *et al.*, 1990; 1991) and *Rexea antefurcata* (GRANDPERRIN & LEHODEY, 1992; LEHODEY *et al.*, 1993). The main aim of this study, therefore, is to carry out a taxonomic review of these gemfishes in order to identify and diagnose the species present.

METHODS

Counts were taken using the standard methods described by HUBBS & LAGLER (1964); measurements (in a straight line from point to point with calipers) were made following those modified for gempylids by NAKAMURA *et al.* (1983). In addition, length of first dorsal fin base is measured from its origin to the origin of the second

dorsal fin, i.e. to the anterior base of the comprised spine in the fin; bony interorbital width is the bony distance across the neurocranium at mid-orbit (not quite the least bony distance); orbit length is the greatest horizontal distance between the free orbital rims; and caudal peduncle length excludes the anal finlets, i.e. is taken from the insertion of the last anal finlet to the base of the middle caudal rays. Internal characters follow NAKAMURA & PARIN (1993) and were determined from radiographs; specimens X-rayed are denoted by an asterisk in the text. Data for the holotype of *R. alisae* is given in the text description followed by data for paratypes and non-types in parentheses. Standard institutional abbreviations, following LEVITON *et al.* (1985), are used: AMS - Australian Museum, Sydney; MNHN - Muséum National d'Histoire Naturelle, Paris; NMNZ - Museum of New Zealand, Wellington (formerly the National Museum of New Zealand). Other abbreviations are: HL for "head length" and SL for "standard length".

Comparative material examined. — *Rexea brevilineata* Parin, 1989: paratypes, 2 specimens, 212-215 mm SL (AMS-I.27374-001), off Chile. — *Rexea prometheoides* (Bleeker, 1856): 6 specimens, 211-246 mm SL (AMS-I.31147-001), Western Australia; 3 specimens, 214-251 mm SL (AMS-I.31155-007)*, Western Australia. — *Promethichthys prometheus* (Cuvier, 1832): 1 specimen, 249 mm SL (AMS-I.19096-004), New South Wales, Australia. — *Rexichthys johnpaxtoni* Parin and Astakhov, 1987: holotype, 105 mm SL (AMS-I.23899-001), New South Wales, Australia; paratype, 102 mm SL (AMS-I.20444-003), Queensland, Australia.

SYSTEMATIC ACCOUNT

Family GEMPYLIDAE

REMARKS. — The scombroid family Gempylidae has long been recognized (REGAN, 1909 and subsequent authors), but its limits and monophyly remain controversial. In their phylogenetic analysis of the Scombroidei, COLLETTE *et al.* (1984: 593) diagnosed the family and recognized six monophyletic groups based on osteological characters. One of these was the "Nealotus group" composed of three genera *Nealotus*, *Promethichthys* and *Rexea*. Also using mainly osteological characters, JOHNSON (1986) carried out a phylogenetic analysis of the Scombroidei, but proposed a hypothesis which differed from that of COLLETTE *et al.* (1984). JOHNSON (1986) showed the Gempylidae of COLLETTE *et al.* to be paraphyletic and rediagnosed the Gempylidae as a monophyletic group comprising the subfamilies Gempylinae, Trichiurinae and Lepidocybiinae, however, no apomorphies were found with which to define the Gempylinae. The term "gempylids" may, therefore, include trichiurids (following JOHNSON, 1986), or exclude trichiurids (following COLLETTE *et al.*, 1984; NAKAMURA & PARIN, 1993; and others). We follow the later more widely accepted use, but recognize that the term gempylines may be more accurate and appropriate.

Genus *REXEA* Waite, 1911

Rexea Waite, 1911: 49 (feminine, type species *R. furcata* Waite = *Gempylus solandri* Cuvier by original designation).

Jordanidia Snyder, 1911: 527 (feminine, type species *J. raptoria* Snyder = *Thyrsites prometheoides* Bleeker by original designation).

REMARKS. — *Rexea* has seven species, including one described below as new, three are known from the New Caledonian EEZ. Most closely related to the monotypic genera *Promethichthys* Gill and *Rexichthys* Parin & Astakhov (PARIN, 1989).

Rexea antefurcata Parin, 1989

Long-finned gemfish, Escolier à longues ailes

Figs 1-2, Tables 1-2

Rexea antefurcata Parin, 1989: 19-21, fig. 6, original description, type locality Sala y Gomez Ridge, southeast Pacific Ocean (25°34'S; 89°12'W).

Rexea antefurcata: PARIN, 1990b: 24, listed, Nazca and Sala y Gomez ridges. — PARIN & PAXTON, 1990: fig.b, description, off east coast of Australia. — PARIN, 1991: 681, listed, Nazca and Sala y Gomez ridges. — NAKAMURA & PARIN, 1993: 44, fig. 78, description, subtropical South Pacific Ocean.

Rexea prometheoides: FOURMANOIR & RIVATON, 1979: 424, description, Ile des Pins. — RIVATON *et al.*, 1989: 39, listed, New Caledonia.

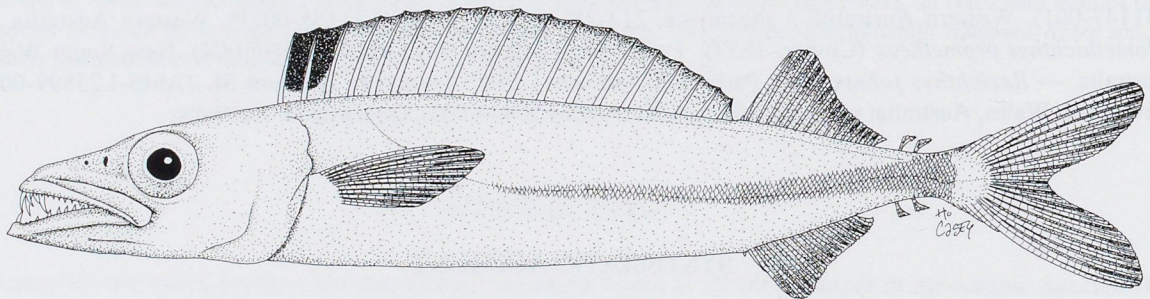


FIG. 1. — *Rexea antefurcata* Parin, 1989, NMNZ-P.29251, 272 mm SL, Stylaster seamount, off New Caledonia, a few damaged fin characters redrawn from specimen NMNZ-P.29272, 262 mm SL. Drawn by Helen Casey.

MATERIAL EXAMINED. — 43 specimens.

Chile. — Paratype, 1 specimen, 315 mm SL (AMS-I.27375-001)*, 24° 03'S, 84° 42'W, 120 m depth, R. V. "Professor Mesyatshev", 14 October 1984.

Norfolk Ridge. — 37 specimens, 128-547 mm SL.

CHALCAL 2: stn CC 3, 23°39.03'S, 167°43.11'E (Stylaster seamount), 424 m depth, otter trawl, R. V. "Coriolis", 30 October 1986: 2 specimens, 234-261 mm SL (MNHN 1995-1064)*.

BERYX 2: stn 1, 24°56.70'S, 168°21.65'E (seamount "B"), 505-585 m depth, otter trawl, R. V. "Alis", 23 October 1991: 2 specimens, 385-505 mm SL (NMNZ-P.27434)*. — Stn 3, 24° 55.15'S; 168°20.95'E (seamount "B"), otter trawl, 600-675 m depth, 24 October 1991: 1 specimen 470 mm SL (NMNZ-P.27425). — Stn 4, 24° 56.10'S, 168°22.03'E (seamount "B"), 600-700 m depth, otter trawl, 24 October 1991: 1 specimen 340 mm SL (NMNZ-P.27440)*. — stn 19, 24°55.80'S, 168°22.30'E (seamount "B"), 550-700 m depth, otter trawl, 30 October 1991: 2 specimens, 321-385 mm SL (NMNZ-P.27486)*.

BERYX 11: stn 3, 24°54.60'S, 168°21.60'E (seamount "B"), 502-610 m depth, otter trawl, R. V. "Alis", 14 October 1992: 3 specimens, 363-560 mm SL (NMNZ-P.29410)*. — Stn 4, 24° 50.75'S; 168°21.86'E (seamount "B"), 550-920 m depth, otter trawl, 14 October 1992: 1 specimen, 394 mm SL (NMNZ-P.29224)*. — Stn 6, 24°57.10'S, 168°21.30'E (seamount "B"), 505-620 m depth, otter trawl, 15 October 1992: 1 specimen, 394 mm SL (NMNZ-P.29369)*. — Stn 26, 24°45.00'S, 168°08.00'E (seamount "A"), 230-260 m depth, otter trawl, 17 October 1992: 6 specimens, 325-395 mm SL (NMNZ-P.29215)*. — Stn 28, 23°38.80'S, 167°43.00'E (Stylaster seamount), 430-490 m depth, otter trawl, 18 October 1992: 7 specimens, 272-374 mm SL (NMNZ-P.29251)*. — Stn 37, 23°38.35'S, 167°40.25'E (Stylaster seamount), 440-500 m depth, otter trawl, 19 October 1992: 3 specimens, 259-319 mm SL (NMNZ-P.29272)*.

Chesterfield and Bellona Plateaus. — MUSORSTOM 5: stn CC 365, 19°42.82'S, 158°48.00'E, 710 m depth, otter trawl, R. V. "Coriolis", 19 October 1986: 2 specimens, 128-136 mm SL (MNHN 1995-1065)*. — Stn CC 383, 19°40.85'S, 158°46.10'E, 615-600 m depth, otter trawl, 21 October 1986: 1 specimen, 315 mm SL (MNHN 1995-1066)*.

Australia. — 5 specimens, 326-408 mm SL.

1 specimen, 382 mm SL (AMS-I.29348-001)*, off Greenwell Point, New South Wales (34°53'S, 150°52'E), otter trawl, 1989. — 1 specimen, 341 mm SL (AMS-I.29379-001)*, off Greenwell Point, New South Wales (34°53'S, 150°52'E), otter trawl, 19 September 1989. — 2 specimens, 326-369 mm SL (AMS-I.29380-001)*, N.E. of Sydney, New South Wales (33°0'S,

151°0'E), otter trawl, 16 August 1989. — 1 specimen, 408 mm SL (AMS-I.30012-001)*, 50 km S.E. of Gabo Island, Victoria (37°50'S, 150°10'E), otter trawl, 450 m depth, 5 November 1989.

DIAGNOSIS. — A species of *Rexea* with the following combination of characters: second dorsal fin soft rays 15-17; two dorsal finlets and two anal finlets; two lateral lines, their point of bifurcation below interspace between 4th and 5th dorsal fin spines; small scales present on caudal peduncle and anteriorly along edge of lower lateral line; pectoral fin long, 1.7-2.2 in head length, extending past anterior part of lower lateral line; pelvic spine absent in adults; dorsal fin dark grey, distal three-quarters of anterior two interspinous membranes black; pectoral fin dusky in adults; pyloric caeca 8-9.

TABLE 1. — Frequency distributions of selected characters of *Rexea antefurcata* Parin, 1989, taken off New Caledonia, Australia (Tasman Sea) and Chile (type locality). Counts from left and right sides of same specimen given where available.

Location Data source	New Caledonia This study		Australia This study		Australia Parin (1989)	Chile Parin (1989)
Tubed scales in lateral line anterior to branch						
	Left	Right	Left	Right		
9-10	2	1	-	-	1	11
11-12	7	16	1	1	13	46
13-14	22	14	3	4	30	33
15-16	4	3	1	-	5	2
17-18	-	-	-	-	1	-
Spines in 1st dorsal fin						
18	36		5		27	43
19	1		-		1	-
Soft rays in 2nd dorsal fin						
14	4		1		-	-
15	28		3		6	9
16	5		-		20	30
17	-		-		2	4
Soft rays in anal fin						
12	4		-		1	3
13	27		3		24	30
14	6		2		3	10
Pectoral fin rays						
13	-		1		2	-
14	36		4		54	56
15	1		-		-	-

DESCRIPTION. — Frequency distributions of selected meristic characters are given in Table 1. Dorsal fin spines 18-19+1-2 (modally 18 + 2) (penultimate spine small), dorsal fin rays 15-17 (modally 15), two dorsal finlets; anal fin spines 1+1 (first spine small and separate, second larger, comprised with fin), anal fin rays 12-14 (modally 13), two anal finlets; pectoral fin rays 14-15 (modally 14, first ray simple and small); principal caudal fin rays 1+15+1,

dorsal and ventral procurrent caudal fin rays 8/8 (1-6 very small); upper jaw with 3-5 fixed and 0-3 depressible large fangs, lower jaw with 14-18 smaller compressed fangs, palatine teeth present; tubed scales in lateral line 109-115 (in four largest specimens examined); one gill raker on first arch at angle, remainder sinescent; pyloric caeca 8 (14) or 9 (7) (mode 8, n = 21); vertebrae 20+14 = 34; epineurals present on vertebrae 1 to 30; dorsal fin and anal fin pterygiophores bisegmental; the two dorsal finlet pterygiophores and the two anal finlet pterygiophores trisegmental; an elongate s-shaped bony stay posterior to last dorsal middle element and last anal middle element.

TABLE 2. — Selected measurements expressed as % standard length from specimens of *Rexea antefurcata* Parin, 1989, taken off New Caledonia, Australia (Tasman Sea) and Chile (type locality).

	New Caledonia This study n = 37	Australia This study n = 5	Chile Paratype AMS I-27375-001	Chile Parin (1989) n = 28
Standard Length (mm)	128-547	326-408	315	109-720
Head length	29.1-32.0	29.1-31.6	29.1	28.6-32.4
Snout length	11.1-12.8	11.5-12.6	11.5	11.0-12.5
Upper jaw length	13.2-15.2	13.0-14.9	13.0	13.0-14.5
Orbit length	6.9-10.6	7.0-8.5	7.0	6.0-7.0
Postorbital head length	10.0-12.6	11.1-11.9	11.1	10.7-12.8
Interorbital width	5.2-8.8	5.7-7.8	5.7	3.9-5.3
Bony interorbital width	2.9-4.8	4.1-5.0	4.1	(3.9-5.3)
Body depth	14.0-19.8	14.0-17.3	14.6	13.8-19.5
Pectoral fin length	13.8-18.1	16.6-18.9	16.6	11.4-17.3
1st predorsal length	26.9-30.1	26.0-29.3	26.0	25.6-29.0
2nd predorsal length	75.5-79.0	75.5-78.5	77.1	73.8-78.5
Preanus length	70.5-75.7	72.0-74.6	74.6	74.2-79.1
Caudal peduncle length	5.1-9.3	6.7-8.1	6.7	6.3-8.0
Caudal peduncle depth	3.4-6.1	3.9-4.6	3.9	3.5-4.5
Longest dorsal spine length	6.4-10.6	8.4-10.4	9.6	8.7-11.1
Longest dorsal ray length	8.2-10.0	9.4-9.8	9.8	8.3-12.0
Longest anal ray length	6.8-8.8	7.8-8.8	8.2	7.9-10.6
Length of 1st dorsal fin base	47.7-52.3	46.8-51.3	51.1	47.7-52.6
Length of 2nd dorsal fin base	15.7-18.9	16.2-19.1	16.4	15.2-18.1
Length of anal fin base	14.8-17.1	15.4-16.4	16.4	14.9-18.3

Selected morphometric data, summarized as minimum-maximum % SL, are given in Table 2. Greatest body depth 5.1-7.1 in SL. Lateral line branching below interspace between 4th-5th dorsal fin spines; upper lateral line following profile of back, extending to below last ray of second dorsal fin-2nd dorsal finlet; lower lateral line undulating mediolaterally, crossing caudal peduncle to caudal fin origin. Head length 3.1-3.4 in SL; fleshy orbit length 3.5-4.5 in HL. Snout length 2.5-2.7 in HL, its dorsal profile slightly concave; maxilla extending to below anterior margin of pupil; lower jaw prognathous. First dorsal fin originating on a vertical just before upper angle of operculum, anterior 12 spines subequal in length; second dorsal fin short based, 2.6-3.2 in base of first dorsal fin, its 2nd ray longest being just shorter than longest dorsal spine length; dorsal finlets not connected by membrane to membrane to base of last ray of second dorsal fin. Anal fin origin below origin of second dorsal fin, its base equal in length to base of second dorsal fin, 1st anal ray longest, anal finlets not connected by membrane to base of last

anal ray. Caudal fin deeply forked. Pectoral fin long, 1.7-2.2 in HL, extending to below base of 7th-9th dorsal spine and reaching past anterior part of lower lateral line; pelvic fins absent in adults.

Coloration (when fresh). Head and body metallic silver, darker dorsally; pupil silvery-yellow with brownish ring medially; dorsal fin dark grey with black margin and black blotch on anterior two interspinous membranes, pectoral fin dusky with broad blackish margin, second dorsal and anal fins pale grey, caudal fin dark grey.

Coloration (in preservative). Head and body uniform dark tan, opercle margin blackish; pupil silvery-yellow with broken dark ring; dorsal fin dark brown-grey with dark margin and black blotch on anterior two interspinous membranes, pectoral fin dusky with a broad dark margin (pale in juveniles 128-136 mm SL), remaining fins dusky.

DISTRIBUTION. — Subtropical South Pacific Ocean: benthopelagic at 80-800 m depth, occurring on seamounts of the Nazca and Sala y Gomez Ridges, off Easter Island, southern Fiji, northern New Zealand, on seamounts in the Tasman Sea, off east coast of Australia (PARIN, 1989 fig. 5; NAKAMURA & PARIN, 1993 fig. 79), and now verified for the New Caledonian region, being recorded from off the Bellona Plateau and seamounts "A", "B", Aztèque, Jumeau ouest, Jumeau est, and Stylaster, at 230-920 m depth (GRANDPERRIN & LEHODEY, 1992: 31; GRANDPERRIN *et al.*, 1992a: 23; GRANDPERRIN *et al.*, 1992b: 31; GRANDPERRIN *et al.*, 1992c: 23; LEHODEY *et al.*, 1992a: 27; LEHODEY *et al.*, 1992b: 25; LEHODEY *et al.*, 1992c: 27; LEHODEY *et al.*, 1992d: 19-20; LEHODEY *et al.*, 1993: 74-79; this study).

REMARKS. — Prior to our identification of *Rexea antefurcata* in catches made during cruise BERYX 2 (GRANDPERRIN & LEHODEY, 1992), the gemfish commonly captured during exploratory fishing on the southeastern seamounts of New Caledonia was routinely listed in cruise reports as *R. prometheoides*, viz.: LABOUTE (1989: 15, listed, major by-catch on southern seamounts); GRANDPERRIN *et al.* (1990: 17-19, listed, several specimens on seamounts Jumeaux and Stylaster, and south of Ile des Pins), GRANDPERRIN *et al.* (1991: 27-28, listed, 224 specimens, 19% of biomass, main bycatch on seamounts "B" and "D"). *Rexea prometheoides* has an Indo-West Pacific distribution and is known from northern Australian waters (NAKAMURA & PARIN, 1993: 48-49) and may occur in New Caledonian waters, but its presence off New Caledonia has yet to be verified. Based on our identifications of ORSTOM and NMNZ specimens, it is concluded, therefore, that most records of "*R. prometheoides*" from the southeastern New Caledonian seamounts should be referred to *R. antefurcata*.

During ORSTOM cruise BERYX 11, *Rexea antefurca* was caught by otter trawls but not by small, slow moving beam trawls and Waren dredges (LEHODEY *et al.*, 1993; pers. obs. CDR) which these agile fishes were presumably well able to avoid.

Data from over 12 meristic and 20 morphometric characters were collected during this study from 37 New Caledonian specimens, five Australian specimens, and one paratype, and compared with data presented by PARIN (1989) from 28 to 92 specimens (depending on the character) from the type locality off Chile and 50 specimens off Australia (Tables 1 & 2). In general, character variation is remarkably similar between populations, justifying the recognition of *R. antefurcata* from New Caledonia. There are, however, a few meristic and morphometric characters which appear to be different in New Caledonian specimens, and which warrant further comment.

Meristics. PARIN (1989: 109, Table 3) could only find one character differing between samples of *R. antefurcata* from the southeast and the southwest Pacific: the branching point of the lateral line which he found located slightly posteriad in specimens from the Tasman Sea, giving a similar range but modally different counts of tubular scales anterior to the lateral line fork (mode 11-12, S.E. Pacific vs mode 13-14, S.W. Pacific). On the basis of this difference, PARIN (1989) suggested it is possible that the Tasman Sea population should be taxonomically segregated. Counts of this character made during our study (Table 1) show a similar variation in mode, but between counts taken on the left sides (mode 13-14) and counts taken on the right sides (mode 11-12) of New Caledonian specimens. Thus, these differences in modal counts of tubed scales anterior to the lateral line branch are simply due to intraspecific variation, and do not justify taxonomic recognition.

Considerable confusion over the number of spines in the second dorsal fin has existed since the establishment of the genus by WAITE (1911) who originally described the fin as having two spines. Subsequent descriptions have varied from two unbranched rays (LINDBERG & KRASYUKOVA, 1989), one spine (MATSUBARA & IWAJ, 1952; MACHIDA, 1985), and one or two spines (NAKAMURA, 1984; 1986; LAST *et al.*, 1983; MAY & MAXWELL, 1985;

GLOERFELT-TARP & KAILOLA, 1984). In his review of the genus, PARIN (1989) stated in the generic diagnosis that the first two rays of the second dorsal fin were unbranched, and that the anal fin had one free spine and one unbranched ray. The family review by NAKAMURA & PARIN (1993) modified this diagnosis to one second dorsal fin spine, and one free and one comprised spine in the anal fin.

Study of radiographs of 43 New Caledonian, Australian, and Chilean specimens (including a paratype, see materials examined) has shown that in the usual state for *R. antefurcata* the second dorsal fin has two small spines: one small free spine that often just protrudes through the skin, and one larger "comprised" spine closely abutting with the first soft ray (Fig. 2). Only one specimen (NMNZ-P.27440, 340 mm SL) possesses one spine, and this is more or less intermediate in size to the small free spine and the larger comprised spines of the other specimens examined. Our exclusion of the larger comprised spine from the soft ray count of the second dorsal fin explains why the counts are consistently one less than those of PARIN (1989) and NAKAMURA & PARIN (1993) (Table 1). After adjustment of PARIN's (1989) data for direct comparison with our data, counts of the second dorsal fin soft rays from the East Pacific and Australian populations give frequency distributions which agree closely - Chile: 14 (9), 15 (30), 16 (4); Australia: 14 (6), 15 (20), 16 (2); vs New Caledonia: 14 (4), 15 (28), 16 (5) (cf. Table 1).

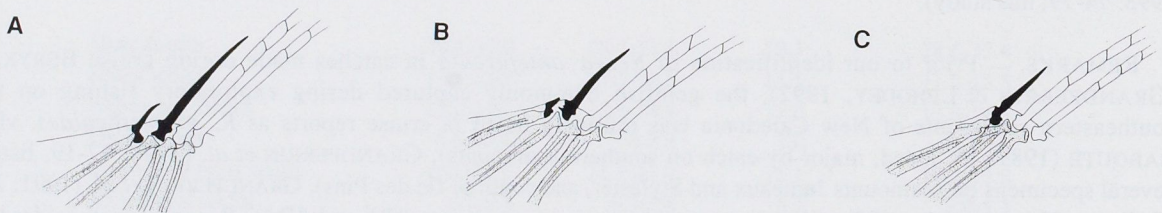


FIG. 2. — Configurations of second dorsal fin anterior spinous and soft rays of *Rexea antefurcata* Parin, 1989. — A: Paratype, Chile, AMS-I.27375-001, 315 mm SL, two spines anteriorly. — B: New Caledonia, NMNZ-P.29272, 319 mm SL, two spines anteriorly. — C: New Caledonia, NMNZ-P.27440, 340 mm SL, one spine anteriorly. Spines black, rays white, pterygiophores stippled. Drawn by Helen Casey from radiographs.

Morphometrics. In his world revision of *Rexea*, PARIN (1989) cited NAKAMURA *et al.* (1983) as the source for his methods of measurements, but his precise methods of measuring "interorbital distance" and "eye diameter" as translated from the Russian are not clear.

Two interorbital measurements were taken during the present study: interorbital width, the least measurement between the uppermost point on the fleshy margin of the orbits (NAKAMURA *et al.*, 1983); and bony interorbital width, the bony distance across the neurocranium at mid-orbit (HUBBS & LAGLER, 1964). There is considerable difference between these two measurements (e.g., "fleshy" interorbital width 5.2-8.8 %SL, bony interorbital width 2.9-4.8 %SL) (Table 2). Comparison of our "fleshy" interorbital width measurements with data for "interorbital distance" taken by PARIN (1989, Table 1) differ (5.2-8.8 %SL vs 3.9-5.3 %SL) (Table 2). Our data included a paratype with 5.7 %SL measured by PARIN but outside his range, therefore the methods of measurement must be different. Comparison of bony interorbital width shows better agreement between our data and PARIN's (2.9-5.0 %SL vs 3.9-5.3 %SL) (Table 2), including the paratype with 4.1 %SL which falls within both sets of data as should be expected. Therefore, it is concluded that the difference between "interorbital width" and "interorbital distance" is due to different methods of measurement. Comparison of bony interorbital width between samples shows reasonably good agreement.

PARIN (1989) did not distinguish which orbit measurements he used for "eye diameter" - orbit length: "greatest distance between free orbital rims", or the smaller eye length "greatest distance between margins of eye-ball" (NAKAMURA *et al.*, 1983: 408). Neither measurement is easy to make precisely, particularly in specimens that have

received both trawl and baritrauma damage. Comparison between our orbit length data and PARIN's eye diameter data (6.9-10.6 %SL vs 6.0-7.0 %SL, paratype 7.0 %SL) (Table 2) suggests that PARIN used the smaller measurement of eye length, and therefore these data are not directly comparable.

In summary, all characters which show apparent differences between populations of *Rexea antefurcata* recognized here can be accounted for by intraspecific variation and differences in methods of measurement and counting techniques used by different investigators.

Rexea alisae sp. nov.

Alis gemfish, Escolier de l'Alis

Fig. 3, Table 3

Rexea sp. cf. *bengalensis*: LEHODEY *et al.*, 1993: 79, listed, Aztèque seamount.

MATERIAL EXAMINED. — 10 specimens, 252-309 mm SL.

Norfolk Ridge. BERYX 11: stn 56, 23°23.05'S, 168°00.35'E (Aztèque seamount), 470-510 m depth, otter trawl, R. V. "Alis", 22 October 1992: holotype, 286 mm SL (MNHN 1994-46)*. — 5 paratypes (same location as holotype): 262 mm SL (AMS-I.32494-001)*; 252 mm SL (MNHN 1994-47)*; 309 mm SL (NMNZ-P.29162)*; 268 mm SL (NMNZ-P.30165)*; 270 mm SL (NMNZ-P.30166)*.

New Caledonia. MUSORSTOM 4: stn CC 202, 18°58.00'S, 163°10.5'E (Grand Passage, northwest of New Caledonia), 580 m depth, otter trawl, R. V. "Vauban", 20 September 1985: 4 non-type specimens (included in description), 254-271 mm SL (MNHN 1995-000)*.

DIAGNOSIS. — A species of *Rexea* differing from all others in having three to four dorsal finlets, four anal finlets, and the following combination of characters: second dorsal fin soft rays 13; two lateral lines, bifurcation below interspace between 6th and 7th dorsal fin spines; body naked (except tubed lateral line scales); length of second dorsal fin base in length of first dorsal fin base 2.4-2.5; pectoral fin short, 2.2-2.5 in head length, not extending to anterior part of lower lateral line; two small spines in second dorsal fin; pelvic spine reduced to a subdermal knob, originating on a vertical below middle of pectoral fin base; dorsal fin pale with dark distal margin, distal third of anterior two membranes dark black.

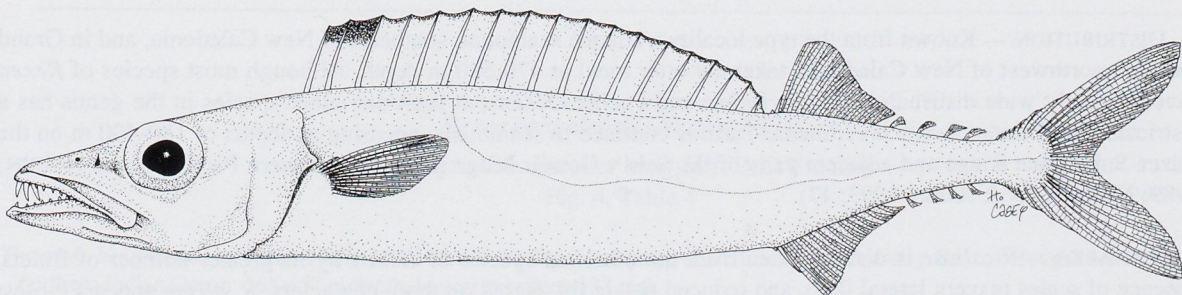


FIG. 3. — *Rexea alisae* sp. nov., holotype, MNHN 1994-46, 286 mm SL, Aztèque seamount, off New Caledonia. Drawn by Helen Casey.

DESCRIPTION. — Dorsal fin spines 18+2 (penultimate spine small and free, ultimate spine larger and comprised in second dorsal fin), dorsal fin rays 13, four (three or four, modally four) dorsal finlets; anal fin spines 1+1 (first small and free, second comprised in anal fin), anal fin rays 12, four anal finlets; pectoral fin rays 13 (13-14,

modally 13) (first ray simple, small); principal caudal fin rays 1+15+1, dorsal and ventral procurrent caudal fin rays 8/8 (1-6 very small); upper jaw with 3 (2-5) large fixed fangs and 0 (0-3) depressible fangs medially; 1 shorter fang anteriorly on each side of lower jaw and 18 (18-22) strong compressed teeth on premaxilla, vomer naked, palatine teeth present; tubed scales in upper lateral line 125 (holotype only), tubed scales anterior to branch 20 (20-25, modally 20, left side only); one gill raker on first arch at angle, remainder sinescent with 1-2 (1-3) spinules; pyloric caeca 8 (8-9, modally 8); vertebrae 19+15 = 34, epineurals present on vertebrae 1 to 29 (1 to 27-29); dorsal fin and anal fin pterygiophores bisegmental; 1st dorsal finlet pterygiophore bisegmental, 2nd-4th dorsal finlet pterygiophores trisegmental; 1st-4th anal finlet pterygiophores trisegmental; an elongate s-shaped bony stay posterior to last dorsal middle element and last anal middle element.

Selected morphometric data are given in Table 3. Body naked (except tubed lateral line scales), its greatest depth 6.1 (5.9-7.0) in SL, its width 11.2 (11.0-11.8) in SL. Lateral line branching below posterior half of interspace between 6th-7th dorsal fin spines; upper lateral line following profile of back, extending to below 3rd (2nd-4th) finlet; lower lateral line undulating mediolaterally, crossing caudal peduncle to caudal fin origin.

Head length 3.3 (3.1-3.3) in SL; fleshy orbit length 3.9 (3.4-4.1) in HL. Snout length 2.5 (2.5-2.7) in HL, its dorsal profile slightly concave; two nostrils present, anterior tubular and directed anteriorly, posterior an elongate slit; maxilla extending to a vertical midway between anterior margin of the fleshy orbit and the pupil; lower jaw prognathous. First dorsal fin originating on a vertical just behind upper angle of operculum, anterior 12 spines subequal in length; second dorsal fin short based, 2.4 (2.4-2.5) in base of first dorsal fin, its 2nd ray longest being just shorter than longest dorsal spine length; dorsal finlets not connected by membrane to base of last dorsal ray. Anal fin origin below origin of second dorsal fin, its base equal in length to base of second dorsal fin, 1st anal ray longest, anal finlets not connected by membrane to base of last anal ray. Caudal fin deeply forked. Pectoral fin short, 2.3 (2.2-2.5) in HL, extending to below the base of the 6th (6th-7th) dorsal spine, but not reaching the anterior part of the lower lateral line; pelvic fin reduced to sub-dermal nub.

Coloration (when fresh). Head and body metallic silver, darker dorsally; dorsal fin pale with dark margin and black blotch on anterior two interspinous membranes, remaining fins pale.

Coloration (in preservative). Head and body dark tan, darker dorsally; pupil silvery with elongate dusky blotch above and below iris; operculum with dark blotch equal in size to orbit length; dorsal fin pale with dark margin and black blotch on anterior two interspinous membranes, pectoral fin base with narrow dark blotch, caudal fin membranes dusky, remaining fins pale tan.

ETYMOLOGY. — Named for the ORSTOM research vessel “*Alis*”, based in Nouméa and responsible for the capture of the type specimens of this species together with many other new and rare marine taxa.

DISTRIBUTION. — Known from the type locality, Aztèque seamount, southeast of New Caledonia, and in Grand Passage, northwest of New Caledonia, taken by otter trawl at 470-580 m depth. Although most species of *Rexea* have relatively wide distributions in the Indian and Pacific Oceans, at least one other species in the genus has a restricted distribution. *Rexea brevilineata* Parin is confined to seamounts, occurring at depths of 180-400 m on the Nazca Submarine Ridge and adjacent parts of the Sala y Gomez Ridge in the southeastern Pacific Ocean (PARIN, 1989; NAKAMURA & PARIN, 1993: 47).

REMARKS. — *R. alisae* is distinguished from the other six species of *Rexea* by its greater number of finlets, absence of scales (except lateral line), and reduced pelvic fin. Based on these characters, *R. alisae* appears closest to *R. bengalensis*, but can be distinguished by a shorter pectoral fin length (2.2-2.5 vs 1.6-2.1 in HL) and ratios of first to second dorsal fin bases (2.4-2.5 vs 2.8-3.6). *Rexea alisae* shares high counts of dorsal and anal finlets (3-4 and 4 vs 3 and 3) and a naked body (except for lateral line scales) with *Rexichthys johnpaxtoni*, but *Rexea alisae* lacks the distinctive anterior projection of the lower lateral line, and the shape of the first dorsal fin is different (middle spine longest, vs second spine longest).

TABLE 3. — Selected measurements expressed as % standard length from type and non-type specimens of *Rexea alisae* sp. nov. captured off New Caledonia. (D = damaged).

	Paratype MNHN 1994-47	Paratype AMS I-32494-001	Paratype NMNZ P-30165	Paratype NMNZ P-30166	Holotype MNHN 1994-46	Paratype NMNZ P-29162	Min. - Max. n = 10 252-309
Standard length (mm)	252	262	268	270	286	309	252-309
Head length	30.7	30.8	31.6	31.6	30.6	30.9	30.6-32.5
Snout length	11.5	12.0	12.1	12.0	12.1	11.9	11.3-12.9
Upper jaw length	12.8	13.4	13.3	13.4			
13.2	13.1	12.8-14.0					
Orbit length	7.5	7.5	8.7	8.7	7.8	7.6	7.5-9.0
Postorbital head length	11.3	11.4	11.5	11.7	11.3	11.0	11.0-11.8
Interorbital width	7.3	6.8	8.3	8.4	7.1	6.5	6.5-9.3
Bony interorbital width	4.2	4.1	4.1	4.2	4.2	4.0	4.0-4.2
Body depth	14.6	15.1	16.9	17.0	16.4	16.1	14.2-17.0
Pectoral fin length	12.5	13.6	13.1	13.3	13.5	13.6	12.5-13.8
1st predorsal length	27.3	27.7	29.3	29.4	29.5	28.5	27.3-30.8
2nd predorsal length	75.0	75.1	75.4	76.3	75.3	76.1	74.0-76.4
Preanus length	69.8	71.2	70.7	69.2	70.0	71.8	69.2-71.8
Caudal peduncle length	6.7	7.3	6.7	7.3	7.1	7.2	6.6-7.7
Caudal peduncle depth	4.2	4.3	4.2	4.0	3.8	4.1	3.7-4.3
Longest dorsal spine (7-10th) length	7.8	9.2	8.8	8.9	8.7	8.8	7.8-9.2
Longest dorsal ray length	8.3	D	D	D	7.7	8.2	7.1-8.3
Longest anal ray length	7.3	7.4	7.5	7.1	7.3	D	7.1-7.5
Length of 1st dorsal fin base	48.1	47.8	47.2	48.5	47.8	48.8	47.2-48.8
Length of 2nd dorsal fin base	20.0	18.9	19.3	19.8	20.3	19.7	18.8-20.3
Length of anal fin base	19.0	18.7	19.2	19.7	20.0	20.0	18.2-20.0

Rexea bengalensis (Alcock, 1894)

Small gemfish, Escolier bengalais, Petit Escolier

Fig. 4, Table 4

Thyrssites bengalensis Alcock, 1894: 117-118, pl. VI fig. 6, original description, type locality Bay of Bengal off Madras, northern Indian Ocean, 265-457 m depth, largest specimen 133 mm.

Rexea prometheoides: DE BEAUFORT & CHAPMAN, 1951: 201, fig. 33, description, Makassar Strait, Sangi Islands, Ambon; length 173 mm.

Rexea bengalensis: PARIN, 1989: 103, description, key, lectotype designation, Arabian Sea to southern Japan and northern Australia. — PARIN & PAXTON, 1990: 115, fig. c, description, off Queensland Australia. — NAKAMURA & PARIN, 1993: 45, fig. 80, description, Indo-West Pacific.

MATERIAL EXAMINED. — 28 specimens, 125-196 mm SL.

New Caledonia (Grand Passage, northwest of New Caledonia). MUSORSTOM 4: stn CP 157, 18° 52.50'S, 163°16.90'E, 575 m depth, beam trawl, R. V. "Vauban", 15 September 1985: 152 mm SL (MNHN 1995-1067)*. — Stn CP 180, 18°56.80'S, 163°17.70'E, 450 m depth, beam trawl, 18 September 1985: 2 specimens, 154-163 mm SL (MNHN 1995-1068)* and 2 specimens, 140-157 mm SL (NMNZ-P.31382)*. — Stn CC 202, 18°58.00'S, 163°10.50'E, 580 m depth, otter trawl, 20 September 1985: 3 specimens, 138-156.5 mm SL (MNHN 1995-1069)*.

Chesterfield and Bellona Plateaus. MUSORSTOM 5: stn CP 365, 19°42.82'S, 158°48.00'E, 710 m depth, beam trawl, R. V. "Coriolis", 19 October 1986: 3 specimens, 156-182 mm SL (MNHN 1995-1070)*; 4 specimens, 168-196 mm SL (MNHN 1995-000)* and 2 specimens, 180-183 mm SL (NMNZ P.31383)*. — Stn CC 366, 19°45.40'S, 158°45.62'E, 650 m depth, otter trawl, 19 October 1986: 5 specimens, 149-170 mm SL (MNHN 1995-1071)*. — Stn CC 383, 19°40.85'S, 158°46.10'E, 600-615 m depth, otter trawl, 21 October 1986: 192 mm SL (MNHN 1995-1072)*.

Comparative specimens. — 5 specimens, 125-175 mm SL.

1 specimen, 175 mm SL (AMS-I.20919-009)*, Queensland, Australia. — 2 specimens, 125-147 mm SL (AMS I.21793-014)*, Queensland, Australia. — 2 specimens 128-153 mm SL (AMS-I.28137-002), Madagascar, western Indian Ocean.

DIAGNOSIS. — A species of *Rexea* with the following combination of characters two dorsal finlets and two anal finlets; two lateral lines, their point of bifurcation below 5th to 6th dorsal fin spines; body naked, except tubed lateral line scales; pectoral fin long, 1.6-2.1 in head length, extending past anterior part of lower lateral line; small pelvic spine present, 0.4-3.4%SL; dorsal fin pale with distinct black margin, distal three-quarters to one-half of anterior two interspinous membranes black; other fins pale; maximum size attained 200 mm SL, sexually mature at ca. 100 mm SL.

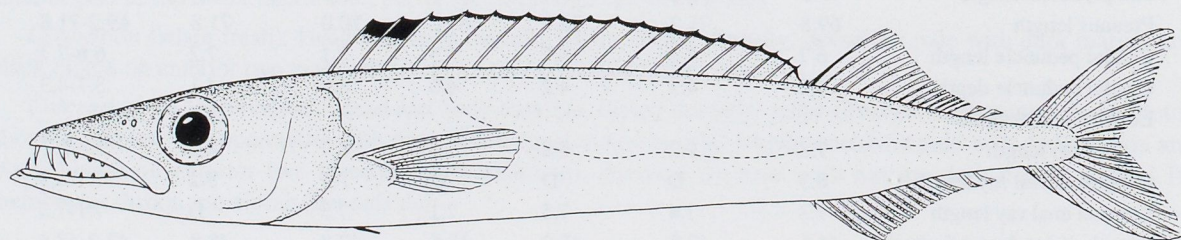


FIG. 4. — *Rexea bengalensis* (Alcock, 1894). Modified from NAKAMURA & PARIN (1993, fig. 80).

DESCRIPTION. — Dorsal fin spines 17-18+2 (modally 18) (penultimate spine small), dorsal fin rays 13-16 (modally 14), two dorsal finlets; anal fin spines 1+1 (first spine small and separate, second larger, comprised with fin), anal fin rays 11-13 (modally 12), two anal finlets; pectoral fin rays 14-15 (modally 14, first ray simple and small); principal caudal fin rays 1+15+1, dorsal and ventral procurrent caudal fin rays 7-8 and 7-8 (1-6 very small); upper jaw with 2-4 fixed and 0-3 depressible large fangs; lower jaw with 5-11 smaller compressed fangs, and 1-2 large slender fangs at tip; palatine teeth present; tubed scales in lateral line 84-100 (in four largest specimens examined); one gill raker on first arch at angle, remainder sinescent; pyloric caeca 6-8 (modally 7, $n = 20$); vertebrae 20+14 = 34; epineurals present on vertebrae 1 to 29-30; dorsal fin and anal fin pterygiophores bisegmental; the two dorsal finlet pterygiophores and the two anal finlet pterygiophores trisegmental; an elongate S-shaped bony stay posterior to last dorsal middle element and last anal middle element.

Selected morphometric characters, expressed as minimum-maximum %SL, are given in Table 4. Greatest body depth 5.3-7.8 in SL. Lateral line branching below interspace between 5th and 6th dorsal fin spines; upper lateral line following profile of back, extending to below last ray of second dorsal fin; lower lateral line undulating mediolaterally, crossing caudal peduncle to caudal fin origin. Head length 3.2-3.5 in SL; fleshy orbit length 3.6-4.4 in HL. Snout length 2.4-2.7 in HL, its dorsal profile slightly concave; maxilla extending to below anterior margin

of pupil; lower jaw prognathous. First dorsal fin originating on a vertical just before upper angle of operculum; second dorsal fin short based, 2.8-3.6 in base of first dorsal fin, its 2nd ray longest being just shorter than longest dorsal spine length. Anal fin origin below origin of second dorsal fin, its base equal to or less than length of base of second dorsal fin, 1st anal ray longest, anal finlets not connected by membrane to base of last anal ray. Caudal fin deeply forked. Pectoral fin long, 1.6-2.1 in HL, extending to below base of 7th-9th dorsal spine and reaching past anterior part of lower lateral line. Pelvic fin spine small, becoming relatively smaller with growth, viz: 3.4 to 0.4%SL.

TABLE 4. —Selected morphometric characters expressed as minimum-maximum % standard length from specimens of *Rexea bengalensis* (Alcock, 1894) captured in the Indo-West Pacific region, including New Caledonia and Australia. (ND = data not collected).

	New Caledonia	Australia	Madagascar	Indo-West Pacific
	This study	This study	This study	Parin (1989)
	n = 23	n = 3	n = 2	n = 8
Standard Length (mm)	138-196	125-175	128-153	99-178
Head length	28.3-31.3	29.0-31.6	29.8-30.2	29.6-34.7
Snout length	10.6-12.1	10.9-12.1	11.6-12.1	10.3-13.1
Upper jaw length	12.5-13.8	13.6-14.0	13.2-13.7	13.4-14.5
Orbit length	6.7-8.4	7.0-7.9	6.9-7.5	6.4-8.2
Bony interorbital width	3.7-4.8	4.1-4.6	4.9-5.1	4.0-5.0
Body depth	12.8-18.7	14.1-18.8	16.3-17.0	14.0-16.9
Body width	5.5-8.1	ND	ND	5.3-7.2
Pectoral fin length	14.6-18.2	15.0-17.1	15.6-18.1	
Pelvic spine length	0.4-3.4	2.2-ND	0.6-1.6	
Caudal peduncle length	5.2-7.8	6.1-8.1	6.6-7.3	5.7-7.2
Caudal peduncle depth	3.0-4.5	3.5-3.7	3.3-3.8	3.1-3.6
Length of 1st dorsal fin base	51.0-57.5	50.1-54.3	53.2-53.3	50.0-54.3
Length of 2nd dorsal fin base	15.3-18.3	16.6-17.0	18.2-18.8	15.6-18.0
Ratio of length of bases D1/D2	2.8-3.6	2.9-3.2	2.8-2.9	2.7-3.4
Length of anal fin base	13.8-17.0	14.9-15.8	16.1-16.7	14.6-17.8

Coloration (when fresh): not observed by present authors and not described in the literature, however, colour pattern probably similar to coloration when preserved, except body more metallic silver.

Coloration (in preservative). Head and body silvery, becoming brownish dorsally; pupil silvery-yellow; dorsal fin membrane lightly pigmented medially with a dark blackish margin and a dark black blotch distally on anterior two interspinous membranes; remaining fins pale.

DISTRIBUTION. — Indo-West Pacific: Madagascar to southern Japan and northwest of New Caledonia, benthopelagic at depths of 140-820 m (at 450-710 m in the New Caledonian region). This is the first record for New Caledonia, and the most easterly for the species to date.

REMARKS. — *Rexea bengalensis* is the smallest gemfish known and although widely distributed in the Indo-West Pacific region, remains poorly understood both taxonomically and biologically. Very few studies have treated the species since the original description by ALCOCK (1894) (see synonymy above) and most diagnoses have been almost entirely based on characters with ranges overlapping those of closely related species, making identification difficult.

The most detailed descriptions of *Rexea bengalensis* were provided by PARIN (1989), based on 39 specimens 93-192 mm SL, and by NAKAMURA & PARIN (1993) based on PARIN's account. Generally our description of *R. bengalensis* from New Caledonia agrees with those of PARIN (1989) and NAKAMURA & PARIN (1993). There is slight variation in some morphometric character ranges (Table 4), but these are simply range increases attributable to our measurement of 28 specimens compared with 8 specimens reported by PARIN (1989 Table 1). PARIN (1989: 103) noted geographic variation in ratio of lengths of dorsal fin bases between specimens from Australian and Japanese waters (3.0-3.4) and specimens from the Indian Ocean (2.7-3.0). While our two specimens from the Indian Ocean (also examined by PARIN) have low ratios (2.8-2.9), the wide range of ratios from New Caledonian (2.8-3.6) and Australian (2.9-3.2) specimens investigated during the present study (Table 4) indicate that there is no geographic separation in this character.

Rexea bengalensis can be distinguished from other species of *Rexea* by its small maximum size and, except for *R. antefurcata*, by a combination of position of lateral line bifurcation, long pectoral fin, and naked body (except lateral line scales). *Rexea bengalensis* is very similar to juvenile *R. antefurcata*, and may be particularly difficult to diagnose when skin and fins have been damaged. Intact specimens can be distinguished from juvenile *R. antefurcata* by the absence (vs presence) of small scales on the caudal peduncle (best observed after allowing the skin to dry), subtle differences in coloration of the dorsal fin membrane (pale grey with a distal black margin, vs uniform dark grey-brown with distal black margin), smaller pelvic fin spine in specimens of comparable size (spine less than 3.5%SL, vs greater than 5.0%SL at 130 mm SL) and, in specimens of 100-200 mm SL, the presence of developing or mature gonads (vs gonads immature, just thin strings).

R. bengalensis is a voracious predator consuming prey items almost half its size. Out of the 23 New Caledonian specimens examined during the present study, 12 were found to contain a whole squid, prawn or fish (one with a cepolid of 15 mm HL).

KEY TO REXEA SPECIES AND OTHER CLOSELY RELATED GEMFISHES OCCURRING IN NEW CALEDONIAN WATERS

(Note: gemfishes are herein defined as gempylids possessing a black blotch on anterior 2-3 membranes of spinous dorsal fin)

- 1 Lateral line single, mid-lateral for most of its length;
body entirely and finely scaled (at >20 cm SL) *Promethichthys prometheus*
(tropical and warm temperate waters)
- 1' Lateral line double, branching anteriorly near pectoral fin tip;
body naked (except lateral line), or naked anteriorly 2
- 2 Lower lateral line descending sharply to ventral profile, dividing into short anterior
and long posterior branches; 2nd-3rd dorsal fin spines longest, dorsal fin outline
uniformly descending posteriorly *Rexichthys johnpaxtoni*
(Tasman Sea and New Caledonia)
- 2' Lower lateral line curving down to mid-lateral position without anterior branch;
middle dorsal fin spines longest, dorsal fin outline arcuate 3
- 3 Dorsal fin soft rays 13; dorsal finlets 3-4; anal finlets 4; lateral line branches below
base of 6th-7th dorsal fin spine..... *Rexea alisae* sp. nov.
(New Caledonia)
- 3' Dorsal fin soft rays 14-19; dorsal finlets 2; anal finlets 2; lateral line branches below
base of 3rd-6th dorsal fin spine 4
- 4 Base of second dorsal fin (including finlets) 2.1-2.5 in base of first dorsal fin; pectoral fin
length 2.2-2.4 in HL, fin not extending past lower lateral line; broad patch of scales
extending from caudal peduncle to below middle of 1st dorsal fin base *Rexea prometheoides*
(Indo-West Pacific)

- 4' Base of second dorsal fin (including finlets) 2.7-3.6 in base of first dorsal fin; pectoral fin length 1.6-2.1 in HL, fin extending past lower lateral line; scales if present (excluding lateral line) confined to caudal peduncle and a narrow series along lower lateral line..... 5
- 5 Body naked (except lateral line); lateral line branching below 5th to 6th dorsal fin spine; medial part of spinous dorsal fin membrane pale grey; pelvic fin spine present, in specimens 100-200 mm SL spine decreasing in length from 3.3 to 0.4%SL; maximum size 200 mm SL, mature at 100 mm SL *Rexea bengalensis*
(Indo-West Pacific)
- 5' Body finely scaled on caudal peduncle and along lateral line region; lateral line branching below 4th to 5th dorsal fin spine; medial part of spinous dorsal fin membrane dark grey-black or brown; pelvic fin spine absent in specimens over 270 mm SL, in specimens 100-200 mm SL spine decreasing in length from 5.1 to 2.0%SL; maximum size over 700 mm SL, mature at over 250 mm SL..... *Rexea antefurcata*
(subtropical South Pacific Ocean).

ACKNOWLEDGEMENTS

We thank the following for their help during the course of this study: Bernard SÉRET (ORSTOM, Paris) for the loan of specimens and editorial comment, Trevor WILLIS (Museum of New Zealand) for preparing radiographs, Helen CASEY (Museum of New Zealand) for fish drawings, Mark McGROUTHER, Tom TRNSKI, Diane BROWN (Australian Museum, Sydney) for assistance during the visit of CDR to Sydney, and Chris PAULIN (Museum of New Zealand), John PAXTON (AMS) and Jacques RIVATON (ORSTOM Nouméa, who also kindly provided the French "Résumé") for constructive comments on the manuscript. The senior author visited New Caledonia and participated in ORSTOM research cruises BERYX 2 (1991) and BERYX 11 (1992) with funding assistance from the French Ministry of Foreign Affairs, Paris, which is gratefully acknowledged. During these two visits professional assistance, friendly help and many courtesies were received, particularly from René GRANDPERRIN, Michel KULBICKI, Jacques RIVATON, captain M. LE BOULCH, the officers and crew of R. V. "Alis" and staff of "Département d'Océanographie du Centre ORSTOM de Nouméa". Warm thanks are extended to all.

REFERENCES

- ANONYMOUS, 1988. — Rapport de la campagne de pêche à la palangre profonde dans la zone économique de la Nouvelle-Calédonie. « *Hokko Maru 107* »: février-mai 1988. Territoire de Nouvelle-Calédonie, Service Territorial de la Marine Marchande et des Pêches Maritimes, 57 pp.
- ALCOCK, A. W., 1894. — An account of a recent collection of bathybial fishes from Bay of Bengal and from the Laccadive Sea. *Asiatic Soc. Bengal.*, **63**(2): 115-137.
- BARRO, M., 1981. — Rapport de mission à bord du chalutier Japonais « *Kaimon Maru* » (26 novembre - 10 décembre 1980). ORSTOM, Nouméa, 21 pp.
- COLLETTE, B. B., POTTHOFF, T., RICHARDS, W. J., UEYANAGI, S., RUSSO, J. L. & Y. NISHIKAWA, 1984. — Scombroidei: development and relationships. In: MOSER, H. G. *et al.* (eds.). Ontogeny and systematics of fishes. Special Publication No. 1. American Society of Ichthyologists and Herpetologists, pp. 591-620.
- DE BEAUFORT, L. F. & W. M. CHAPMAN, 1951— *The Fishes of the Indo-Australian Archipelago. IX. Percomorphi (concluded), Blennoidea*. E. J. Brill, Leiden, 484 pp.
- FOURMANOIR, P. & J. RIVATON, 1979. — Poissons de la pente récifale externe de Nouvelle-Calédonie et des Nouvelles-Hébrides. *Cah. Indo-Pacifique*, **1**(4): 405-443.

- GLOERFELT-TARP, T. & P. J. KAILOLA, 1984. — *Trawled Fishes of southern Indonesia and northwestern Australia*. Australian Development Assistance Bureau, Canberra; Directorate General of Fisheries, Indonesia; German Agency for Technical Cooperation, 406 pp.
- GRANDPERRIN, R., LABOUE, P., PIANET, R. & L. WANTIEZ, 1990. — Campagne « AZTÉQUE » de chalutage de fond au sud-est de la Nouvelle-Calédonie (N. O. « *Alis* », 12-16 février 1990). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **7**: 1-21.
- GRANDPERRIN, R. & P. LEHODEY, 1992. — Campagne BERYX 2 de pêche au chalut de fond sur trois monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 22-31 octobre 1991). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **11**: 1-40.
- GRANDPERRIN, R., BENSCH, A., DI MATTEO, A. & P. LEHODEY, 1991. — Campagne BERYX 1 de pêche à la palangre de fond sur deux monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 8-18 octobre 1991). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **10**: 1-33.
- GRANDPERRIN, R., DI MATTEO, A., MOU-THAM, G. & J. -Y. PANCHE, 1992a. — Campagne BERYX 6 de pêche à la palangre de fond sur deux monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 12-18 février 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **16**: 1-28.
- GRANDPERRIN, R., DI MATTEO, A., HOFFSCHIR, C., LAPETITE, A. & J. -Y. PANCHE, 1992b. — Campagne BERYX 7 de pêche à la palangre de fond sur deux monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 25 mars - 3 avril 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **17**: 1-36.
- GRANDPERRIN, R., DESFONTAINE, P., DESGRIPPES, I., & E. FEUGIER, 1992c. — Campagne BERYX 9 de pêche à la palangre de fond sur trois monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 4 au 13 août 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **19**: 1-28.
- HUBBS, C. L., & K. F. LAGLER, 1964. — *Fishes of the Great Lakes Region*. University of Michigan Press, Ann Arbor, 213 pp.
- JOHNSON, G. D., 1986. — Scombroid phylogeny : an alternative hypothesis. *Bull. Mar. Sci.*, **39**: 1-41.
- LABOUE, P., 1989. — Mission d'observation halieutique sur le palangrier japonais « *Fukuju Maru* » du 21 novembre au 12 décembre 1988. *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **2**: 1-15.
- LAST, P. R., SCOTT, E. O. G. & F. H. TALBOT, 1983. — *Fishes of Tasmania*. Tasmanian Fisheries Development Authority, Hobart, 563 pp.
- LEHODEY, P., GALLOIS, F., HOFFSCHIR, C., LETROADEC, P. & G. MOU-THAM, 1992a. — Campagne BERYX 3 de pêche à la palangre de fond sur deux monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 26 novembre - 6 décembre 1991). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **12**: 1-37.
- LEHODEY, P., MARCHAL, P., GALLOIS, F. & C. NAUGES, 1992b. — Campagne BERYX 5 de pêche à la palangre de fond sur deux monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 28 janvier - 6 février 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **15**: 1-30.
- LEHODEY, P., HOFFSCHIR, C., MARCHAL, P. & J. -Y. PANCHE, 1992c. — Campagne BERYX 8 de pêche au chalut pélagique et à la palangre sur trois monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 7 au 16 avril 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **18**: 1-34.
- LEHODEY, P., MARCHAL, P., GALLOIS, F. & C. NAUGES, 1992d. — Campagne BERYX 10 de pêche à la palangre de fond sur trois monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 18 au 27 août 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **20**: 1-26.
- LEHODEY, P., RICHER DE FORGES, B., NAUGES, C., GRANDPERRIN, R. & J. RIVATON, 1993. — Campagne BERYX 11 de pêche au chalut sur six monts sous-marins du Sud-Est de la Zone Économique de Nouvelle-Calédonie (N. O. « *Alis* », 13 au 23 octobre 1992). *Rapp. Missions*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar., **22**: 1-93.
- 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: 802-832.
- LINDBERG, G. U. & Z. V. KRASYUKOVA, 1989. — *Fishes of the Sea of Japan and the Adjacent areas of the Sea of Okhotsk and the Yellow Sea. Part 4. Teleostomi XXIX Perciformes*. Smithsonian Institution Libraries & The National Science Foundation. Washington D.C., 602 pp.
- MACHIDA, Y., 1985. — Gempylidae. In: OKAMURA, O. (ed), *Fishes of the Okinawa Trough and the adjacent waters*. Japan Fisheries Resource Conservation Association, Tokyo, vol. 2: pp. 534-539.
- MATSUBARA, K. & T. IWAI, 1952. — Studies on some Japanese fishes of the Family Gempylidae. *Pacific Sci.*, **6**(3): 193-212.

- MAY, J. L. & J.G. H. MAXWELL, 1985. — *Field guide to Trawl Fishes from temperate waters of Australia*. CSIRO, Hobart, 492 pp.
- NAKAMURA, I., 1984. — Gempylidae. In: FISCHER, W. & G. BIANCHI (eds), FAO species identification sheets for fishery purposes. Western Indian Ocean, fishing area 51. Food and Agricultural Organisation of the United Nations, Rome Vol 1-6.
- NAKAMURA, I., 1986. — Gempylidae. In: SMITH, M. M. & P. C. HEEMSTRA (eds), *Smiths' Sea Fishes*. Macmillan South Africa, Johannesburg, pp. 825-829.
- NAKAMURA, I., FUJII, E. & T. ARAI, 1983. — The gempylid, *Nesiarchus nasutus* from Japan and the Sulu Sea. *Jap. J. Ichthyol.*, **29**(4): 408-415.
- NAKAMURA, I. & N. V. PARIN, 1993. — FAO species catalogue. Vol. 15. Snake mackerels and cutlassfishes of the world (Families Gempylidae and Trichiuridae). An annotated and illustrated catalogue of the snake mackerels, snoeks, escolars, gemfishes, sackfishes, domine, oilfish, cutlassfishes, scabbardfishes, hairtails, and frostfishes known to date. *FAO Fisheries Synopsis*, **125**(15): 1-136.
- PARIN, N. V., 1989. — A review of the genus *Rexea* (Gempylidae) with descriptions of three new species. *Vopr. Ikhtiol.*, **29**: 3-23 (in Russian). English version: *J. Ichthyol.*, **29**(2) (1989): 86-105.
- PARIN, N. V., 1990a. — An updated diagnosis of the genus *Rexichthys* and its position in the family Gempylidae. *Vopr. Ikhtiol.*, **30**(4): 531-536 (in Russian). English version: *J. Ichthyol.*, **30**(5) (1990): 14-20.
- PARIN, N. V., 1990b. — Preliminary review of the fish fauna of the Nazca and Sala y Gomez Submarine Ridges (southeastern Pacific Ocean). *Trudy Inst. Okenol.*, **125**: 6-36 (in Russian).
- PARIN, N. V., 1991. — Fish fauna of the Nazca and Sala y Gomez submarine ridges, the easternmost outpost of the Indo-West Pacific zoogeographic region. *Bull. Mar. Sci.* **49**(3): 671-683.
- PARIN, N. V. & J. R. PAXTON, 1990. — Australia's east coast gemfish. *Aust. Fish.*, **49**(5) supplement. Unpaged.
- REGAN, C. T., 1909. — On the anatomy and classification of the scombroid fishes. *Ann. Mag. Nat. Hist.*, Ser. 8, **3**: 66-75.
- RICHER DE FORGES, B., 1990. — Les campagnes d'exploration de la faune bathyale dans la zone économique de la Nouvelle-Calédonie. *Explorations for bathyal fauna in the New Caledonia economic zone*. In: CROSNIER, A. (ed.), Résultats des Campagnes MUSORSTOM, vol 6., *Mém. Mus. natn. Hist. nat.*, (A), **145**: 9-54.
- RIVATON, J., FOURMANOIR, P., BOURRET, P. & M. KULBICKI, 1989. — Catalogue des poissons de Nouvelle-Calédonie. Checklist of fishes from New Caledonia. Rapport Provisoire. *Catalogues*, ORSTOM Nouméa, Sciences de la Mer, Biol. Mar.: 1-170.
- SNYDER, J. O., 1911. — Descriptions of new genera and species of fishes from Japan and the Riu Kiu Islands. *Proc. U.S. Natl. Mus.*, **40** (no. 1836): 525-549.
- WAITE, E. R., 1911. — Additions to the fauna of New Zealand. No. II. *Proc. N. Z. Inst.* 1910, **43**: 49-51.