

## A new species of pomacentrid fish with notes on other damselfishes of the Kermadec Islands

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### Abstract

A new species of pomacentrid, *Parma kermadecensis*, is described from four specimens collected during 1984 and 1985 at the Kermadec Islands. It is closely related to *P. polylepis* from south-eastern Australia, Lord Howe Island, Norfolk Island, and New Caledonia. The two species differ, however with regards to both juvenile and adult coloration, and head morphology. A key to the species of *Parma* is included and notes are provided on four pomacentrids that occur at the Kermadec Islands: *Chromis dispilus*, *Chrysiptera rapanui*, *Parma alboscapularis*, and *Stegastes fasciolatus*.

### Introduction

Damselfishes (Pomacentridae) are among the most speciose and conspicuous of all fish groups associated with tropical and subtropical reefs. Although most of the estimated 300 species are confined to warm seas, several genera including *Parma* of the south-western Pacific and southern Australia, are inhabitants of temperate latitudes. The present paper describes a new member of this genus that was recently procured on separate expeditions to the Kermadec Islands by M. Kingsford (March, 1984) and M. Francis (October, 1985). The Kermadec Islands, lying some 900 km north-east of North Island, New Zealand are of special interest to biologists because of their remoteness, mixture of temperate and tropical faunal elements, and the scarcity of collections from there. A detailed report of the fish fauna is currently being prepared by M. Francis, R. Grace, and C. Paulin.

The methods of counting and measuring are the same as those described by Allen (1972) except the length of the dorsal and anal spines are measured proximally at the base of the spine rather than the point where the spine emerges from the scaly sheath. Caudal cavity is the horizontal distance between the longest and shortest caudal rays. The last dorsal and anal rays are split near their bases giving the appearance of two rays, but were counted as a single element.

The counts and proportions which appear in parentheses in the description of *Parma kermadecensis* represent the adult paratype if differing from the holotype. Morphometric proportions for both adult and juvenile types are expressed as percentage of the standard length (abbreviated SL) in Table 1. Type specimens

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are deposited at the National Museum of New Zealand, Wellington (NMNZ), New Zealand Oceanographic Institute, Wellington (NZOI); and Western Australian Museum, Perth (WAM).

The genus *Parma* was comprehensively reviewed by Allen and Hoese (1978), who provided a key to the eight known species. An additional species, *P. bicolor* from Western Australia was later (1979) described by Allen and Larson. An updated version of Allen and Hoese's key that incorporates *P. bicolor* and *P. kermadecensis* is presented below.

**Table 1** Morphometric proportions of type specimens of *Parma kermadecensis* (in thousandths of the standard length)

Character	Holotype	Paratypes		
	NMNZ P.17849	WAM P28425-002	WAM P28425-002	NZOI P967
Standard length (mm)	201.3	201.7	44.7	198.7
Greatest depth of body	528	537	485	552
Greatest width of body	230	223	183	249
Head length	308	308	349	326
Snout length	122	126	101	120
Diameter of bony orbit	68	64	136	78
Width of bony interorbital	113	120	82	124
Least depth of caudal peduncle	160	169	159	172
Length of caudal peduncle	111	104	116	133
Snout to origin of dorsal fin	410	423	447	425
Snout to origin of anal fin	727	719	685	680
Snout to origin of pelvic fin	442	413	443	441
Length of dorsal fin base	638	657	597	659
Length of anal fin base	208	227	201	237
Length of pectoral fin	265	300	295	317
Length of pelvic fin	266	311	329	298
Length of pelvic spine	152	171	213	192
Length of 1st dorsal spine	88	81	116	78
Length of 2nd dorsal spine	122	124	181	124
Length of longest dorsal spine	156	186	201	176
Length of longest dorsal ray	248	262	260	293
Length of 1st anal spine	62	74	78	66
Length of 2nd anal spine	158	169	224	172
Length of longest anal ray	199	229	257	229
Length of caudal fin	308	331	313	284
Caudal concavity	140	187	107	132

**Systematics**

**Key to the species of *Parma***

- 1a Inferior limb of preopercle naked, vertical scale rows from upper edge of gill opening to base of caudal fin 30 to 38; tubed lateral-line scales 21 to 28 . . . . . 2
- 1b Inferior limb of preopercle scaled; vertical scale rows from upper edge of gill opening to base of caudal fin 36 to 46; tubed lateral-line scales 25 to 35 . . . . . 6

- 2a Preopercle largely naked, scales covering about half total area, arranged in 3-4 transverse rows below sub-orbital; snout profile convex; predorsal scales extending to about anterior margin of eye; preorbital naked; tubed lateral-line scales 18 to 22 ..... 3
- 2b Preopercle mostly scaled, scales covering more than half total area, arranged in 6-7 transverse rows; snout profile concave or more or less straight; predorsal scales extending to level of posterior nostrils; pre-orbital scaled on posterior section; tubed lateral-line scales 22 to 28 ..... 4
- 3a Tubed lateral-line scales 18 to 20; most of body pale (yellow in life) with head and anterodorsal part of body dark (blue in life) (south-western Australia) ..... *bicolor* Allen and Larson
- 3b Tubed lateral-line scales 21 to 22; colour not as in 3a, most of head and body mottled brown, lighter ventrally (Victoria; Tasmania; South Australia; Western Australia) .. *victoriae* (Günther)
- 4a Lower margin of preorbital only slightly produced, not forming triangular projection; scale rows between lateral-line and first dorsal spine 5 to 6; upper corner of operculum frequently with white patch (New South Wales) ..... *microlepis* Günther
- 4b Lower margin of preorbital distinctly triangular; scale rows between lateral-line and first dorsal spine 4; upper corner of operculum without white patch ..... 5
- 5a Lower margin of preorbital with notch in front of triangular projection; soft dorsal rays usually 19 or 19½; surface of preorbital smooth without bony ridges; whitish bar on middle of sides absent (Queensland; New South Wales) ..... *oligolepis* Whitley
- 5b Lower margin of preorbital without notch in front of triangular projection; soft dorsal rays usually 17½; surface of preorbital with bony ridges, at least in adults; whitish bar on middle of sides (New South Wales) .. *unifasciatus* (Steindachner)
- 6a Lower margin of preorbital and suborbital discontinuous, separated by patch of scales and skin (not apparent without magnification in specimen less than about 90 mm SL); adults with poor to well developed bony knobs above anterior corner of eye; juveniles with alternating dark and light bands across head and body ..... 7

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- 6b Lower margin of preorbital and suborbital continuous, not separated by patch of scales; specimens of all sizes without bony knobs above eye; specimens of all sizes without alternating dark and light bands across head and body ..... 8
- 7a Bony knobs well developed above anterior corner of eye and at mid-interorbital in specimens more than about 100 mm SL, becoming more noticeable with increased size; ground colour of adults dark, dusky brown; juveniles less than about 100 mm SL with pale bar at rear of head and two pale bars across middle of side, pale band on caudal peduncle absent, ocellus present at base of last dorsal spines (New South Wales; S Queensland; Lord Howe Island; Norfolk Island; New Caledonia) ..... *polylepis* Günther
- 7b Bony knobs only slightly developed above anterior corner of eye at any size, absent from mid-interorbital; ground colour of adults medium to light brown (whitish in life); juveniles less than about 100 mm SL with pale (yellow in life) bar at rear of head and three pale (yellow in life) bars across body, including caudal peduncle, ocellus at base of last dorsal spines absent ..... *kermadecensis* sp. nov.
- 8a Tubed lateral-line scales usually 32 to 35; occipital slightly arched; snout profile distinctly concave; predorsal scales extending to about anterior margin of eye; vertical scale rows from upper edge of gill opening to base of caudal fin 43 to 46; head and body usually light brown in preservative, frequently with pair of faint dusky bars on sides (Western Australia) ..... *occidentalis* Allen and Hoesé
- 8b Tubed lateral-line scales 25 to 32; occipital not arched, confluent with contour of head profile; snout profile convex; predorsal scales extending to level of nostrils; vertical scale rows from upper edge of gill opening to base of caudal fin 36 to 41; head and body entirely dark brown in perspective ..... 9
- 9a Surface of preorbital with bony tubercles or ridges, at least in adults; pectoral rays usually 22, occasionally 21 (Lord Howe Island; New Zealand; Kermadec Islands) ..... *alboscapularis* Allen and Hoesé
- 9b Surface of preorbital without bony tubercles; pectoral rays usually 21, occasionally 20 (Western Australia) .... *mccullochi* Whitley

*Parma kermadecensis* sp. nov.

Figures 1-4; Table 1

**Holotype**

NMNZ P17849, 201.3 mm SL, collected with handspear at Te Konui Point Boat Cove, Raoul Island, Kermadec Islands (approximately 29°17'S, 177°53'W) in 20 metres by M. Francis on 20 October 1985.

**Paratypes**

NZOI P967, 198.7 mm SL, Herald Islets, north-eastern Raoul Island, Kermadec Islands (29°14'S, 177°51'W), 0.5 m, spear, R.S. Singleton, 11 June 1980 and WAM P28425-002, 2 specimens, 44.7-201.7 mm SL, collected at type locality with handspear by M. Kingsford on 21 March 1984.

**Diagnosis**

A species of the pomacentrid genus *Parma* characterised by a combination of features that include a scaly inferior preopercular limb, 25 to 30 lateral line scales, irregular ridges and bony tubercles on surface of preorbital, bony knobs only moderately developed in front of eye and lacking in the mid-interorbital region. It is closely allied to *P. polylepis* Günther from south-eastern Australia, Lord Howe Island, Norfolk Island, and New Caledonia. Both species have similar distinctively banded juvenile colour patterns, however, *P. kermadecensis* possesses an extra pale band on the caudal peduncle and furthermore it lacks an ocellus at the base of the posteriormost dorsal spines. *Parma polylepis* adults differ by having well developed bony knobs in front of the eye and in the mid-interorbital region.

**Description**

Dorsal rays XIII, 18; anal rays II, 14; pectoral rays 21 (22); pelvic rays I, 5; branched caudal rays 13; gill rakers on first arch 7 + 12 (6 or 7 + 11 to 14), total 16 to 21; tubed lateral-line scales 25 (25 to 30); vertical scale rows from upper edge of gill opening to base of caudal fin 36 (34 to 36); horizontal scale rows from base of dorsal fin to terminal lateral-line scale (exclusive of dorsal base sheath scales) 3 or 4; from lateral-line to anal fin origin 18 (15 to 18); teeth elongate and narrow with rounded to nearly flat tips, about 50 to 60 in a single row in each jaw of adults.

Body ovate, laterally compressed, the greatest depth 1.9 (1.8 to 1.9) in the standard length, greatest width 2.3 (2.2 to 2.4) in depth. Head profile rounded, the head length contained 3.2 (3.1 to 3.2) times in the standard length; snout 2.5 (2.4 to 2.7), eye 4.5 (4.2 to 4.8); interorbital 2.7 (2.6), least depth of caudal peduncle 1.9 (1.8 to 1.9), length of caudal peduncle 2.8 (2.5 to 3.0), of pectoral fin 1.2 (1.0), of pelvic fin 1.2 (1.0 to 1.1), caudal concavity 2.2 (1.6 to 2.5) all in head length.

Pair of small nasal openings on each side of snout, the posterior nares inconspicuous; mouth oblique, terminally located; lateral-line gently arched (3 to 5

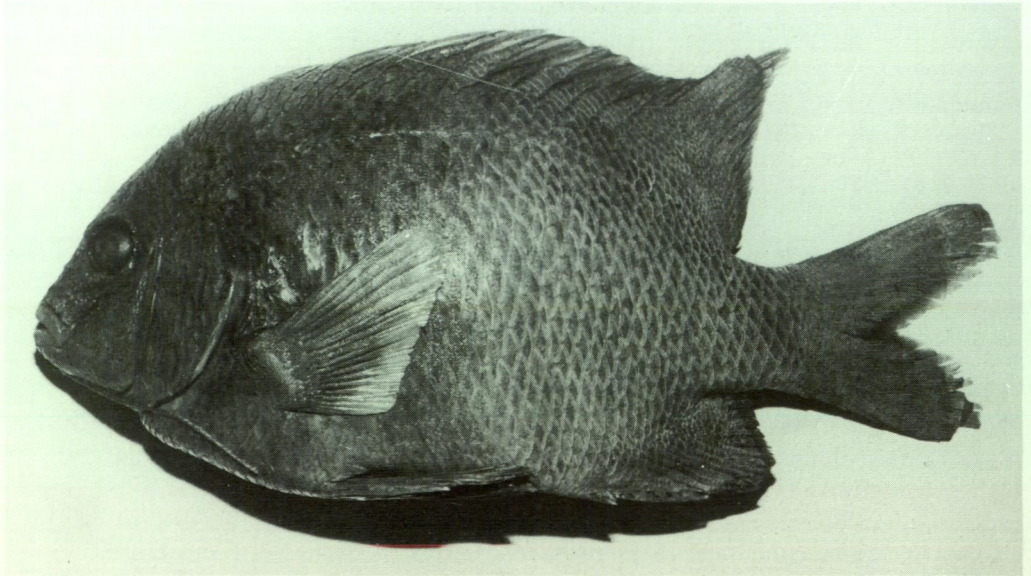


Figure 1 *Parma kermadecensis*, holotype, 201.3 mm SL, Te Konui Point Boat Cove, Raoul Island, Kermadec Islands.

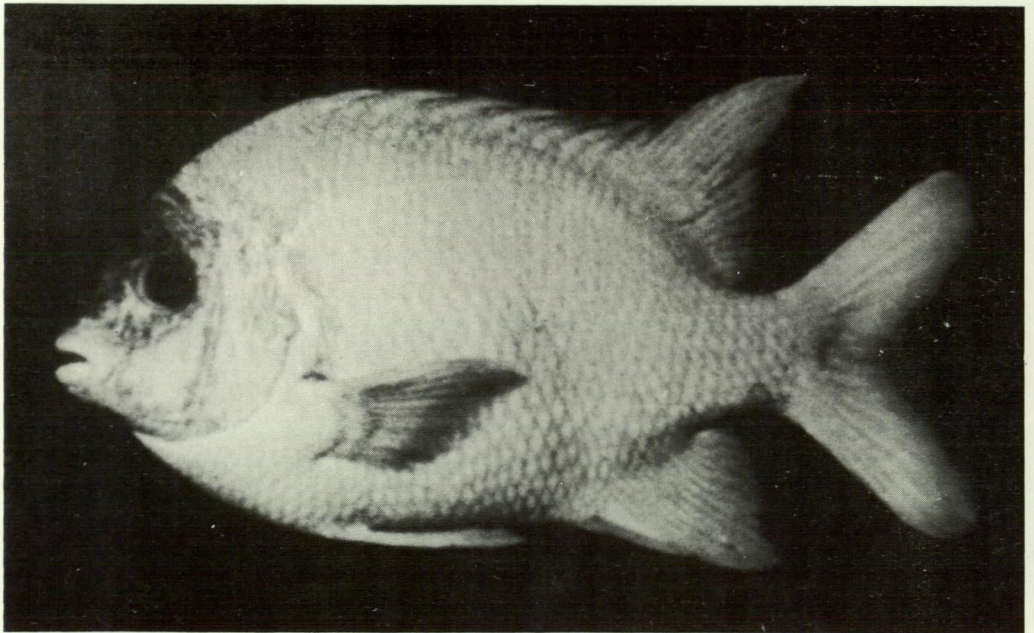


Figure 2 *Parma kermadecensis*, underwater photograph of mature adult, Meyer Island, Kermadec Islands (photograph by J. Voot).



Figure 3 Juvenile colour pattern of *Parma kermadecensis* (drawing by R. Swainston).

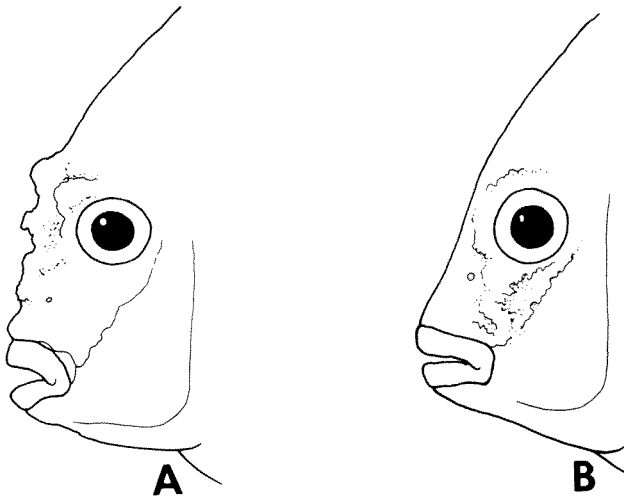


Figure 4 Head profiles of *Parma* species: (A) *P. polylepis*, adult; (B) *P. kermadecensis*, adult (drawings by R. Swainston).

scale rows beneath dorsal fin), terminating below anterior section of soft dorsal fin; preorbital extremely rugose without scales; suborbital with a few scales posteriorly; snout, lips, chin, and isthmus naked; remainder of head and body scaled; scales finely ctenoid; predorsal scales extending to about mid-interorbital (front of eye on juvenile); preopercle scale rows about 6-7 with additional row of scales (may be embedded) on inferior limb; small sheath scales covering basal two-thirds of membranous portion of spinous dorsal fin and most of soft dorsal,



anal, pectoral, and caudal fins; margin of preorbital and suborbital jagged due to bony ridges and tubercles; margin of preopercle weakly crenulate; margin of opercle smooth except large flattened spine at angle and one or more lesser projections on upper edge.

Origin of dorsal fin at level of third tubed lateral-line scale; spines of dorsal fin gradually increasing in length to about sixth or seventh spine; remaining spines gradually decreasing in length; length of first dorsal spine 3.5 (3.8 to 4.2), of seventh dorsal spine 2.0 (1.7 to 1.9), of longest soft dorsal ray 1.2 (1.1 to 1.2), of first anal spine 5.0 (4.1 to 4.9), of second anal spine 1.9 (1.8 to 1.9), of longest soft anal ray 1.6 (1.3 to 1.4), of caudal fin 1.0 (0.9 to 1.1), all in the head length; caudal fin forked with rounded lobes; pectoral fins pointed.

Colour of holotype in alcohol: head and body medium brown, slightly yellowish on breast, abdomen, and lower part of head; fins brownish except outer edge of pectorals pale tan. The adult paratypes are similarly coloured except the yellow hue is absent.

Colour of juvenile paratype in alcohol: head and side of body with alternating pale grey and dark brown bars as indicated in Figure 3; several narrow dark brown bars radiating from eye, one across side of snout, another below middle of eye to rear part of chin, and a third across upper edge of preopercle; one or two brown spots, about half size of pupil, on middle of opercle; dorsal and anal fins with continuation of light and dark bands of body; caudal fin pale greyish with some dusky brown at base and along dorsal and ventral margins; pelvic fins dark brown; pectoral fins mainly translucent.

Colour of live adults (from underwater Ektachrome transparencies by M. Francis and J. Voot): most of body and fins very pale bluish-grey, the scale centres lighter, giving an overall impression of a nearly white fish; head brownish blue, particularly on nape, interorbital, and snout, giving a "masked appearance". One photographed adult had the entire head and breast region suffused with yellowish brown. Field notes taken by J. Voot in May 1983 indicate that some adults have a distinct, broad pale greenish bar just behind the head extending from the nape to the pectoral region. He further stated that the eyes are dark blue and the lips are very pale orange-yellow. Also there are small streaks of yellow between the eye and rear edge of the preopercle.

Colour of live juveniles (from underwater Ektachrome transparencies by M. Francis): head and body with striking pattern of alternating yellow and black alternating bars as indicated in Figure 3; chin and lips yellow; caudal fin translucent or dusky with yellow V-shaped area and dark brown bar at base extending out along dorsal and ventral margins; dorsal, anal, and pelvic fins narrowly edged with bright blue; anteriormost part of pelvic fin dark brown, remainder of fin paler dusky brown; bars radiating from eye as described for preserved material except blue rather than brown; also small scattered blue spots on head, particularly on interorbital, nape, and opercle; similar blue spots near dorsal and ventral edge of caudal peduncle, just behind base of last dorsal and anal rays.



## Remarks

According to field notes of M. Francis and M. Kingsford the species is relatively common throughout the Kermadec Islands. A number of pairs and solitary juveniles were observed on each dive between about 3 and 20 m. Adults appeared to be strongly territorial and were associated with cracks and crevices of the reef.

As mentioned in the diagnosis *P. kermadecensis* is most closely related to *P. polylepis* differing most notably with regards to colour pattern of both juvenile and adults, and also in the development of bony knobs in the orbital region and forehead. The latter feature is strongly developed in *P. polylepis* and poorly developed in *P. kermadecensis* (see Figure 4). The two species further differ from other *Parma* in having the lower margin of the preorbital and suborbital discontinuous, being separated by a patch of scales. Although this feature is clearly evident in the juvenile paratype of *P. kermadecensis* it is difficult to detect in the holotype and adult paratypes.

The species is named *kermadecensis* in reference to the type locality, the only place it has been collected. The Kermadec Islands represent the easternmost record for the genus *Parma*.

## Notes on other pomacentrids of the Kermadec Islands

Five species of pomacentrids, including *Parma kermadecensis*, were noted by M. Francis and M. Kingsford during 1984 and 1985.

### *Chromis dispilus* Phillips

Ayling and Cox (1982) reported that this species is common off rocky coasts between North Cape and East Cape along the northeastern coast of New Zealand. It occurs down to depths of about 60 m. Kermadec specimens are deposited at NMNZ. A colour illustration was provided by Doak (1978) of a New Zealand fish.

### *Chrysiptera rapanui* Greenfield and Hensley

This species was previously known only from Easter Island (Greenfield and Hensley, 1970). Although specimens from the Kermadec Islands are essentially identical to those from Easter Island with regards to meristic and morphometric data, there are pronounced colour differences. Fish from both areas are basically blackish or very dark brown posteriorly and mainly pale on the anterior part of the body; also the caudal fin, adjacent peduncle, and posteriormost rays of the dorsal, anal, and pelvic fins are pale. The colour differences between the two populations are primarily related to the pale areas. Live individuals from Easter Island are mainly bluish anteriorly with the pale parts of the fins whitish. In addition, much of the anterodorsal portion of the head and body is blackish and there is a large blackish spot covering the pectoral fin base. These observations are based on Ektachrome transparencies taken underwater by the author and the colour illustration of a freshly dead specimen in Allen (1975). Underwater photographs of Kermadec specimens, taken by M. Francis, indicate that the anterior half of the

body is yellow-orange and the pale fin parts are similarly coloured. There is only a small brownish spot at the uppermost portion of the pectoral fin base. Intraspecific colour variation related to geography is not uncommon in pomacentrids. It is found in a number of species from the Indo-west Pacific region including *Acanthochromis polycantha* (Bleeker), *Amblyglyphidodon leucogaster* (Bleeker), *Chrysiptera rex* (Snyder), *C. rollandi* (Whitley), *C. unimaculata* (Cuvier), *Paraglyphidodon nigroris* (Cuvier), *Pomacentrus philippinus* (Evermann and Seale), *Stegastes fasciolatus* (Ogilby), and *S. insularis* (Allen and Emery). The last mentioned species has two colour variants related to widely separated insular populations (Christmas Island, Indian Ocean and Marcus Island [Minami-Tori Shima] in the western Pacific and thus resembles the situation of *Chrysiptera rapanui*. The distribution of both these fishes probably represent relics of former widespread species. I have examined 17 specimens of *C. rapanui* (NMNZ P.17755, P.17778, P.17863), 26-41 mm SL, from Raoul Island and Meyer Island.

***Parma alboscapularis* Allen and Hoese**

This species is common at a number of localities along the north-east coast of the North Island of New Zealand (Ayling and Cox, 1982). It occurs throughout the Kermadec Islands and is also known from Lord Howe Island (Allen and Hoese, 1975). Colour illustrations were provided by Allen (1975) and Doak (1978). I have examined five juvenile specimens (NMNZ P.13356), 22-78 mm SL from Raoul Island.

***Stegastes fasciolatus* (Ogilby)**

This species is one of the most widely distributed members of the family, occurring from East Africa to Easter Island and the Hawaiian Islands. It is found throughout the Kermadec Islands. However, it is primarily an inhabitant of tropical coral reefs. Illustrations of regional colour variants were provided by Allen and Emery (1985). I have examined four specimens (WAM P.28425-003, 106-135 mm SL from Raoul Island.

**Acknowledgements**

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