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A Revision of the Labrid Fish Genus *Bodianus* With Descriptions of Eight New Species

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ABSTRACT. The genus *Bodianus* (family Labridae), distributed in tropical and warm temperate waters of the three major oceans, comprises at least 43 species, eight of which are described here as new. On the basis of phylogenetic analysis, 10 subgenera are recognized, three taking new names. The subgenera include: the Western Pacific *Priobodianus* n.subgen. with the two species *B. cylindriatus* and *B. thoracotaeniatus*; the Indo-West Pacific *Trochocopus* with the eight species *B. bimaculatus, B. izuensis, B. masudai, B. neopercularis* n.sp. (Marshall Islands), *B. opercularis, B. sanguineus, B. sepiacaudus* n.sp. (Indonesia and Pacific Line Islands) and *B. tanyokidus*; the monotypic Eastern Atlantic *Pseudolepidaplois* with *B. scrofa*; the antitropical *Verreo* with the six Pacific species *B. bathycapros* n.sp. (Hawaiian Islands), *B. flavifrons, B. flavipinnis, B. frenchii, B. oxycephalus* and *B. unimaculatus*, and the southwestern Australian *B. vulpinus*; the Indo-West Pacific *Peneverreo* n.subgen. with the four species *B. leucosticticus, B. paraleucosticticus* n.sp. (Papua New Guinea, New Caledonia and Rarotonga), *B. rubrisos* n.sp. (Japan, Taiwan and Indonesia) and *B. trilineatus*; the Indo-Pacific *Paralepidaplois* n.subgen. with the three allopatric species *B. diana* (Indian Ocean), *B. dictynna* n.sp. (Western Pacific) and *B. prognathus*; the Indo-Pacific *Lepidaplois* with the three species *B. axillaris, B. mesothorax* and *B. neilli*; the monotypic Indo-Pacific *Euhypsocara* with *B. anthioides*; *Diastodon* with the eight Indo-Pacific species *B. albotaeniatus, B. bilunulatus, B. busellatus* n.sp. (south central Pacific), *B. loxozonus, B. macrognathos, B. macrourus, B. perditio*, and *B. solatus* n.sp. (western Australia), and the Eastern Atlantic *B. speciosus*; and, *Bodianus* with the Atlantic *B. insularis, B. pulchellus* and *B. rufus*, and the Eastern Pacific *B. diplotaenia* and *B. eclancheri*. Separate keys to species occurring in the Indo-Pacific and Atlantic-eastern Pacific regions are provided.

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Contents

Introduction

Generic placements of the 43 species allocated to *Bodianus* in this study have previously been controversial, and the genus is more broadly defined here than before. Historically, taxonomic arrangements have merely resulted in the identification of small groups possessing obvious morphological modifications (e.g., *Verreo* and *Euhypsocara*) or have aligned species on the basis of primitive or convergent character states. Taxonomic assemblages based on the extent of cephalic squamation, degree of the formation of scaly basal sheaths on the dorsal and anal fins, and numbers of body scales as reflected in number of lateral-line scales can be polyphyletic. Until recently, these characters have been utilized as primary characters in many classifications. A phylogenetic analysis was undertaken for this study to construct a natural classification that groups species using currently accepted objective methodology.

The genus *Bodianus* is defined here osteologically as that group of labrids whose adult members (with the possible exception of *B. cylindriatus* and *B. thoracotaeniatus*) possess a prominent frontal shelf on the neurocranium, posteriorly roofing a distinct medial ethmoid-frontal depression, and a sharply angled anteroventral profile of the dentary with an interdigitating joint at the symphysis. In this genus the ethmoid-frontal depression is distinctive in being formed primarily by the ventral deflection of the anterior end of the frontals, the undersurface of the depression in turn being overlapped by the posterior flange of the medial ethmoid (Gomon, 1997: figs 17, 20c, 21). The species of the genus *Bodianus* are separable from those of the closely related genera *Xiphocheilus* and *Choerodon* that appear to have convergently developed an ethmoid-frontal depression and an analogous association with the posterior flange of the medial ethmoid (but no anterior frontal shelf, no sharply angled anteroventral profile on the dentary and no interdigitating symphyseal joint), in having more numerous dorsal-fin rays (XII, 10 or 11, versus XII, 8 or XIII, 7), more numerous anal-fin rays (III, 11 or 12, versus III, 9 or 10, rarely 11), more numerous vertebrae (11 + 17, versus 10 + 17, rarely 11 + 16) and more numerous lateral-line scales (29–42 + 2, versus 27 + 2).

Bodianus is represented in all warm oceans, with the greatest diversity in the Indo-West Pacific. Although most species are found in relatively shallow tropical waters, a few occur at greater depths, and some have a warm temperate distribution.

Methodology

General terminology and methodology used in this study follows that of Gomon (1997). In addition, length of posterior lobe of dorsal and anal fins are measured from the posterior end of the fin base to the posterior tip of the fin. Length of the dorsal and ventral lobes of the caudal fin is the horizontal distance from the posterior edge of the hypurals to the posterior tip of each fin lobe. Figures enclosed by parentheses following meristic values indicate number of specimens or structures (e.g., pectoral fins, lateral lines) exhibiting counts. Meristic values for the holotype of each species are indicated by an asterisk where those data were available. Lengths expressed are standard lengths (SL) unless stated as total length (TL).

Most labrids are protogynous hermaphrodites and have three distinct colour patterns corresponding with age and sexual development. To be consistent with current practice, the following terms are used in referring to these colour stages: *juvenile* (post-larval immature individual), *initial-phase adult* (mature female) and *terminal-phase adult* (mature male). The last equates with the *secondary-phase adult* of Gomon (1997). References to descriptions of the colour pattern for a developmental phase are omitted where relevant material was unavailable or where there is no clear distinction between the two adult phases.

Institutional acronyms used to denote the present location of specimens follow Leviton *et al*. (1985). Numbers enclosed by parentheses following catalogue numbers in *Material examined* refer to the number and size range (mm SL) of specimens; where standard lengths were not recorded, "≈" indicates estimated measurements. Specimens examined are currently maintained in alcohol unless otherwise indicated. Type status is indicated where applicable. In referring to localities, the abbreviation "I." Stands for "Island" and "Is." for "Islands".

The genus *Bodianus* includes a number of closely related but taxonomically distinct populations that have been recognized by authors variously as subspecies or species over the years. For clearly different, but allopatric populations, the author feels that the community is best served by recognizing these taxa at the species level. Subfamilial taxonomic designations other than genera and species are often ignored by all but the dedicated taxonomist and recognition of these populations at the species level emphasizes their biological and evolutionary significance.

To develop a better understanding of the interrelationships of species and construct a classification reflecting those relationships a cladistic analysis of external morphological, osteological and coloration characters was employed (Hennig 1950, 1966). A summary of characters considered to be phylogenetically informative and incorporated into the analysis is provided in Table 11. Because of the limited material available for 20 species, only 23 of the 43 could be assessed for the full range of characters and were thus considered appropriate for the analysis. Although some osteological details remain unclear due to the absence of cleared and stained material, *B. cylindriatus* was considered to be very primitive on the basis of external features and added to the group, with missing skeletal character states inferred from radiographs. The fellow hypsigenyin *Polylepion cruentum* and non-hypsigenyin labrids *Cheilinus trilobatus* and *Symphodus tinca* were used as outgroup taxa. A maximum parsimony analysis was carried out with heuristic searches and random addition of taxa using unordered characters with the computer program PAUP* 4.0 (Swofford, 2000). Thirty-five shortest trees were found (tree length = 121 steps), a strict consensus of which is reproduced in Fig. 64. Bremer support values (Bremer, 1988) were calculated to estimate branch support using the computer programs TreeRot 2.0 (Sorenson, 1999) and PAUP* 4.0. All branching clades have support values of 1, except for Clade 1 (5), Clades 8, 9 and 18 (3) and Clade 39 (0). This is not surprising given the high ratio of taxa to characters, but still provide moderate support for the relationships. Opinions on character state polarity presented in the sections *Morphological and anatomical variation* and *Coloration* are included to allow

the reader to evaluate the strength of characters supporting the monophyly of clades (Table 13). Character polarities were based on observations of labroids and labrids (see introductory remarks under *Morphological and anatomical variation*), and examples of other genera of the tribe Hypsigenyini specifically (Gomon, 1997). The 20 species not included in the analysis were aligned with resultant groupings in the classification on the basis of shared synapomorphies, where evident, or overall similarity. A list of cleared and stained specimens examined for assessing osteological characters appears in Gomon (1997).

Bodianus Bloch

Bodianus Bloch, 1790, p. 22; type species: *Bodianus bodianus* Bloch (= *B. rufus*) by tautonomy.

Harpe Lacepède, 1803, p. 426; type species: *Harpe caeruleo-auereus* Lacepède (= *B. rufus*) by monotypy.

Diastodon Bowdich, 1825, p. 238; type species: *Diastodon speciosus* Bowdich (= *B. speciosus*) by monotypy

Cossyphus Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 102; type species: *Bodianus bodianus* Bloch (= *B. rufus*), by subsequent designation (D.S. Jordan, 1917), name preoccupied by *Cossyphus* Olivier, 1791.

Ronchifex Gistel, 1848; type species: *Bodianus bodianus* Bloch (= *B. rufus*), a replacement name for *Cossyphus* Valenciennes.

Lepidaplois Gill 1862, p. 140; type species: *Labrus axillaris* Bennett (= *B. axillaris*) by monotypy.

Trochocopus Günther, 1862, p. 100; type species: *Trochocopus opercularis* Günther (= *B. opercularis*) by subsequent designation (D.S. Jordan, 1919).

Euhypsocara Gill, 1863, p. 222; type species: *Cossyphus anthioides* Günther (= *B. anthioides*) by monotypy.

Gymnopropoma Gill, 1863, p. 222; type species: *Cossyphus bilunulatus* Valenciennes (= *B. bilunulatus*) by monotypy.

Cheiliopsis Steindachner, 1863, p. 1113; type species: *Cheiliopsis bivittatus* Steindachner (= *B. opercularis*) by monotypy.

Verreo Jordan & Snyder, 1902, p. 619; type species: *Cossyphus oxycephalus* Bleeker (= *B. oxycephalus*) by monotypy.

Verriculus Jordan & Evermann, 1903, p. 191; type species: *Verriculus sanguineus* Jordan & Evermann, (= *B. sanguineus*) by monotypy.

Chaeropsodes Gilchrist & Thompson, 1909, p. 260; type species: *Chaeropsodes pictus* Gilchrist & Thompson (= *B. perditio*) by monotypy.

Pseudolepidaplois Bauchot & Blanc, 1961, p. 53; type species: *Pseudolepidaplois pfaffi* Bauchot & Blanc (= *B. scrofa*) by monotypy.

Diagnosis. Anterodorsal surface of neurocranium with depressed adjoining medial ethmoid-frontal surface, and posterior flange of medial ethmoid overlapping frontals ventrally, frontals wide in dorsal view, transverse bony shelf arising from bone enclosing supraorbital cephalic laterosensory canals roofing posterior end of anterior frontal recess; dentary triangular in lateral profile; symphysis of lower jaw with interdigital joint; vertebrae 11 + 17; dorsal fin long based, continuous, of uniform height, with XII (rarely XIII or XIV), 9–11 (usually 10) rays; anal fin with III (rarely 0 or I), 11–13 (usually 12) rays; dorsal and anal fins each with scaly basal sheath ½–4 scales high; lateral line smoothly curved, uninterrupted, with 29–48 + 2 pored scales; mouth large with two pairs of prominent canines (modified incisiform teeth in one species) at the front of each jaw and another (rarely 2 or 3) at posterior end of upper jaw, teeth laterally in jaws on raised dental ridge.

Description. Dorsal-fin rays XII (rarely XIII or XIV), 9–11 (usually 10); anal-fin rays III (rarely 0 or 1), 11–13 (usually 12); caudal-fin rays 9–12 (rarely 8, usually 10 or 11) + 12 + 9–11 (rarely 7 or 8, usually 9 or 10); pectoral-fin rays ii, 13–16 (rarely 11 or 12, usually 14 or 15; first ray unsegmented and unbranched, second segmented and unbranched); pelvic-fin rays, I, 5; lateral-line scales 29–48 (about 30 or 31 + 2 in 34 of 43 species; species typically with two and rarely 3 pored scales posterior to posterior edge of hypural plate); scales above lateral line 3–7½; scales below lateral line 8½–20; predorsal scales 8–42; vertebrae 11 + 17; pleural ribs ending on 11th vertebra; epipleural ribs ending on 11th to 16th vertebra; total gill rakers 12–23. See Tables 2 and 3 for comparative values of morphometric and meristic characters among species.

Body and caudal peduncle moderately slender to moderately deep; head and snout bluntly rounded to sharply pointed; dorsal outline of snout and forehead slightly concave to convexly curved in lateral aspect; nape straight to convexly curved; interorbital wide; jaws obtuse to attenuate.

Dorsal and anal fins with scaly basal sheath of ½ to 4 scales high. Predorsal scales in advance of transverse posttemporal cephalic laterosensory canal on nape absent or noticeably smaller than those posteriorly, those on dorsal midline of head reaching forward nearly to vertical through posterior extent of orbit or beyond, in advance of anterior nostrils in some; scales lateral to dorsal midline sometimes reaching slightly anterior to those on midline. Cheek scales reaching anteriorly in advance of corner of mouth above gape in some species but not quite reaching corner in others, reaching near orbital margin dorsally; scales covering preopercle to free posterior and ventral edges, or not, leaving naked margin. Opercle and interopercle completely covered with large scales except for naked membranous opercular flap dorsoposteriorly; scales covering or almost covering subopercle in many indistinct rows, reaching forward to or nearly to anterior end of ventral preopercular edge; scales extending onto lower jaw in some species, reaching slightly in advance of center of jaw in a few. Posterior edge of preopercle smooth to serrate. Lateral-line scales with laterosensory canal tube simple in some species, becoming branched in others, branched tubes extremely dendritic in large individuals of some species; primary canal tubes usually bent dorsoposteriorly near posterior margin of scale. Mouth mostly horizontal; posterior corner just anterior to vertical through forward extent of orbit in some species, below center of eye in others, or in between; lower lip broad and flap-like, lapping onto ventral side of jaw; upper lip narrow, exposed along entire length of jaw or concealed posteriorly by facial skin when mouth closed; posterior end of maxilla concealed when mouth occluded; crease at corner of mouth curved downward. Cephalic sensory canal pores numerous but in line with or from short branches off major canals. Gill rakers on upper limb of first arch often distinctly shorter than those of lower limb; rakers on upper limb narrow and simple, bifurcate or arborescent; those on lower limb usually broad and simple, although rakers nearest angle of arch bifurcate to arborescent in some species.

Jaw teeth caniniform (anterior teeth incisiform in one species). Upper jaw with 2 prominent canines anteriorly, often of nearly equal size, though first sometimes markedly smaller than second; first canine usually directed

Table 1. Names proposed for species of *Bodianus* and their current names.

proposed name	current name
Lepidaplois aldabrensis Smith, 1956	*Bodianus diana* (Lacepède)
Lepidaplois albomaculatus Smith, 1957	*Bodianus axillaris* (Bennett)
Cossyphus albo-taeniatus Valenciennes, 1839	*Bodianus albotaeniatus* (Valenciennes)
Crenilabrus anthioides Bennett, 1831	*Bodianus anthioides* (Bennett)
Cossyphus atrolumbus Valenciennes, 1839	*Bodianus perditio* (Quoy & Gaimard)
Lepidaplois atrorubens E.K. Jordan, 1925	*Bodianus albotaeniatus* (Valenciennes)
Cossyphus aurifer De Vis, 1884	*Bodianus perditio* (Quoy & Gaimard)
Cossyphus axillaris Valenciennes, 1839	*Bodianus axillaris* (Bennett)
Labrus axillaris Bennett, 1831	*Bodianus axillaris* (Bennett)
Bodianus bathycapros n.sp.	*Bodianus bathycapros* n.sp.
Cossyphus bellis Ramsay & Ogilby, 1887	*Bodianus unimaculatus* (Günther)
Labrus bilunulatus Lacepède, 1802	*Bodianus bilunulatus* (Lacepède)
Bodianus busellatus n.sp.	*Bodianus busellatus* n.sp.
Bodianus bimaculatus Allen, 1973	*Bodianus bimaculatus* Allen
Bodianus blochi Lacepède, 1803	*Bodianus rufus* (Linnaeus)
Bodianus bodianus Bloch, 1790	*Bodianus rufus* (Linnaeus)
Lepidaplois Bourboni Fourmanoir & Guézé, 1961	*Bodianus leucosticticus* (Bennett)
Cossyphus boutoni Sauvage, 1891	*Bodianus anthioides* (Bennett)
Harpe caeruleo-auereus Lacepède, 1803	*Bodianus rufus* (Linnaeus)
Crenilabrus caninus Lowe, 1839	*Bodianus scrofa* (Valenciennes)
Crenilabrus chabrolii Lesson, 1830	*Bodianus macrourus* (Lacepède)
Crenilabrus croceus Lesson, 1830	*Bodianus macrourus* (Lacepède)
Verreo cylindriatus Tanaka, 1930	*Bodianus cylindriatus* (Tanaka)
Labrus diana Lacepède, 1802	*Bodianus diana* (Lacepède)
Bodianus dictynna n.sp.	*Bodianus dictynna* n.sp.
Harpe diplotaenia Gill, 1862	*Bodianus diplotaenia* (Gill)
Cossyphus eclancheri Valenciennes, 1846	*Bodianus eclancheri* (Valenciennes)
Crenilabrus elegans Kuhl & Van Hasselt, 1839	*Bodianus mesothorax* (Bloch & Schneider)
Sparus falcatus Bloch, 1791	*Bodianus rufus* (Linnaeus)
Bodianus flavifrons Gomon, 2001	*Bodianus flavifrons* Gomon, 2001
Bodianus flavipinnis Gomon, 2001	*Bodianus flavipinnis* Gomon, 2001
Cossyphus Frenchii Klunzinger, 1880	*Bodianus frenchii* (Klunzinger)
Labrus hirsutus Lacepède, 1802	*Bodianus macrourus* (Lacepède)
Bodianus insularis Gomon & Lubbock, 1980	*Bodianus insularis* (Gomon & Lubbock)
Bodianus izuensis Araga & Yoshino, 1975	*Bodianus izuensis* Araga & Yoshino
Labrus javensis Bloch (in Bloch & Schneider, 1801)	*incertae sedis*
Cossyphus latro De Vis, 1885	*Bodianus perditio* (Quoy & Gaimard)
Labrus leucosticticus Bennett, 1831	*Bodianus leucosticticus* (Bennett)
Lepidaplois loxozonus Snyder, 1908	*Bodianus loxozonus* (Snyder)
Lepidaplois luteopunctatus Smith, 1957	*Bodianus trilineatus* (Fowler)
Lepidaplois macrognathos Morris, 1974	*Bodianus macrognathos* (Morris)
Labrus macrourus Lacepède, 1802	*Bodianus macrourus* (Lacepède)
Cossyphus maldat Valenciennes, 1839	*Bodianus macrourus* (Lacepède)
Bodianus masudai Araga & Yoshino, 1975	*Bodianus masudai* Araga & Yoshino
Labrus Mesothorax Bloch & Schneider, 1801	*Bodianus mesothorax* (Bloch & Schneider)
Crenilabrus modestus Garret, 1864	*Bodianus albotaeniatus* (Valenciennes)
Scarus mordax Gray, 1854	*Bodianus mesothorax* (Bloch & Schneider)
Harpe naevius Eigenmann, 1894	*Bodianus pulchellus* (Poey)
Cossyphus neilli Day, 1867	*Bodianus neilli* (Day)
Bodianus neopercularis n.sp.	*Bodianus neopercularis* n.sp.
Cossyphus nigromaculatus Gilchrist & Thompson, 1908	*Bodianus perditio* (Quoy & Gaimard)

continued …

Table 1 (continued). Names proposed for species of *Bodianus* and their current names.

proposed name	current name
Cossyphus octomaculatus Sauvage, 1891	*Bodianus axillaris* (Bennett)
Cossyphus opercularis Guichenot, 1847	*Bodianus opercularis* (Guichenot)
Trochocopus opercularis Günther, 1862	*Bodianus opercularis* (Guichenot)
Cossyphus oxycephalus Bleeker, 1862	*Bodianus oxycephalus* (Bleeker)
Pseudolepidaplois pfaffi Bauchot & Blanc, 1961	*Bodianus scrofa* (Valenciennes)
Bodianus paraleucosticticus n.sp.	*Bodianus paraleucosticticus* n.sp.
Harpe pectoralis Gill, 1862	*Bodianus diplotaenia* (Gill)
Labrus perditio Quoy & Gaimard, 1834	*Bodianus perditio* (Quoy & Gaimard)
Chaeropsodes pictus Gilchrist & Thompson, 1909	*Bodianus perditio* (Quoy & Gaimard)
Bodianus prognathus Lobel, 1981	*Bodianus prognathus* Lobel
Cossyphus pulchellus Poey, 1860	*Bodianus pulchellus* (Poey)
Lepidaplois richardsoni Fowler, 1908	*Bodianus albotaeniatus* (Valenciennes)
Bodianus rubrisos n.sp.	*Bodianus rubrisos* n.sp.
Labrus rubrolineatus Lacepède, 1802	*Bodianus macrourus* (Lacepède)
Labrus rufus Linnaeus, 1758	*Bodianus rufus* (Linnaeus)
Trochocopus rufus Macleay, 1879	*Bodianus frenchii* (Klunzinger)
Trochocopus sanguinelentus De Vis, 1883	*Bodianus perditio* (Quoy & Gaimard)
Verriculus sanguineus Jordan & Evermann, 1903	*Bodianus sanguineus* (Jordan & Evermann)
Labrus scrofa Valenciennes, 1839	*Bodianus scrofa* (Valenciennes)
Labrus semiruber Lacepède, 1802	*Bodianus rufus* (Linnaeus)
Bodianus sepiacaudus n.sp.	*Bodianus sepiacaudus* n.sp.
Bodianus solatus n.sp.	*Bodianus solatus* n.sp.
Diastodon speciosus Bowdich, 1825	*Bodianus speciosus* (Bowdich)
Labrus spilonotus Bennett, 1835	*Bodianus macrourus* (Lacepède)
Cossyphus spilotes Guichenot, 1865	*Bodianus diana* (Lacepède)
Lepidaplois strophodes Jordan & Evermann, 1903	*Bodianus albotaeniatus* (Valenciennes)
Bodianus tanyokidus Gomon & Madden, 1981	*Bodianus tanyokidus* Gomon & Madden
Bodianus thoracotaeniatus Yamamoto, *in* Okamura *et al*., 1982	*Bodianus thoracotaeniatus* Yamamoto
Cossyphus tredecimspinosus Günther, 1862	*Bodianus speciosus* (Bowdich)
Lepidaplois trilineatus Fowler, 1934	*Bodianus trilineatus* (Fowler)
Lepidaplois trotteri Fowler & Bean, 1923	*Bodianus loxozonus* (Snyder)
Cossyphus unimaculatus Günther, 1862	*Bodianus unimaculatus* (Günther)
Lutjanus verres Bloch, 1791	*Bodianus rufus* (Linnaeus)
Cossyphus vulpinus Richardson, 1850	*Bodianus vulpinus* (Richardson)
Cossyphus zosterophorus Bleeker, 1857	*Bodianus anthioides* (Bennett)

anteroventrally to ventrally and occasionally slightly mesially; second usually directed ventrally and often partially anteriorly or laterally; teeth on dental ridge usually small or of moderate size, most in single row, based on crest of ridge posterior to anterior canines; in some species, teeth based laterally on ridge, especially anteriorly, forming row confluent with anterior canines; single (occasionally 0, 2 or 3) prominent canine at posterior end of jaw, often curved and directed anteriorly and/or laterally. Lower jaw with 2 prominent anterior canines; first canine ⅓ to nearly equal size of second; first canine usually directed anterodorsally to dorsally and slightly mesially; second usually directed somewhat dorsally and often partially anteriorly or laterally; teeth on dental ridge small to moderately large, usually forming 2 or 3 series in single row based on crest of ridge posterior to anterior canines; anteriormost teeth occasionally based somewhat laterally as in upper jaw; very large specimens often with additional rows of small blunt teeth on dental ridge posteromesial to anterior canines. Vomer usually naked but with 1–3 canines in some species.

Dorsal-fin spines and segmented rays subequal, except posteriorly in some species, segmented rays progressively longer posteriorly; spines pungent, each with membranous fleshy flag at tip; posterior tip of fin rounded to pointed, sixth segmented ray filamentous with tip reaching beyond ends of middle caudal-fin rays in some species. Anal-fin spines pungent, progressively longer posteriorly; segmented rays subequal, except posteriorly in some species, posterior tip of fin rounded to pointed, filamentous extension of eighth ray reaching beyond tips of middle caudal-fin rays in some species. Caudal fin rounded, truncate or double emarginate; uppermost and lowermost branched rays produced into lobes or filaments in some species. Pectoral fin rounded to nearly falcate, lower portion broadly rounded. Pelvic fin short, distinctly not reaching anus, to elongate with filamentous tip reaching posterior end of anal-fin base.

Coloration. As with most labrids, juveniles often have prominent patterns that differ markedly from adult coloration, many with distinctive black spots associated with

Table 2. Selected proportional morphometric values expressed as percent of standard length for species of *Bodianus*.

	number of specimens	standard length (mm)	body depth	head length	snout length	orbital length	inter-orbital distance	dorsal-fin base	anal-fin base	depth of caudal peduncle
cylindriatus	4	112–190	21.3–25.5	31.8–34.2	7.6–10.4	7.9–9.7	5.0–6.3	47.0–52.3	21.1–23.9	12.9–14.4
thoracotaeniatus	2	132–137	24.1–27.1	36.3–37.5	10.9–11.7	9.4–9.6	6.9	49.0–49.9	21.1–22.4	13.9–14.7
bimaculatus	7	27.8–48.9	25.6–28.1	34.5–36.5	8.6–9.4	8.6–8.8	6.4–6.8	48.2–54.7	25.1–25.6	14.9–16.9
izuensis	5	54.7–82.4	27.5–28.3	34.1–35.1	8.2–10.4	7.5–8.2	7.3–7.6	53.6–54.7	25.1–25.4	16.2–16.8
masudai	4	84.5–145	25.7–30.8	36.0–37.9	11.1–13.5	6.1–7.7	6.2–6.5	49.6–53.5	22.6–27.7	14.6–16.7
neopercularis n.sp.	2	83.3–97.2	22.6–25.1	35.2–36.9	12.4–12.7	7.7–7.8	5.5–6.8	49.1–52.7	27.3–27.6	13.2–14.1
opercularis	11	44.0–112	20.9–24.6	35.2–37.9	10.8–13.6	6.2–8.4	5.0–6.2	48.7–53.0	22.3–27.6	12.5–14.1
sanguineus	3	58.9–149	24.6–28.9	35.3–36.2	10.7–12.8	5.9–8.3	5.8–7.0	52.6–53.1	25.3–26.8	13.7–16.4
sepiacaudus n.sp.	4	70.0–73.2	22.3–25.0	34.8–36.9	10.4–12.7	6.9–7.7	5.1–5.9	45.9–51.3	23.3–24.8	12.8–14.1
tanyokidus	5	131–177	23.0–24.6	35.4–37.4	11.2–13.5	6.1–7.0	5.9–6.9	47.5–49.0	22.8–24.9	13.1–13.9
scrofa	5	205–393	32.0–39.1	34.6–39.4	12.6–15.8	5.6–6.7	7.3–9.6	51.6–54.5	24.2–25.9	16.7–17.7
bathycapros n.sp.	6	380–456	30.4–38.6	34.2–38.6	14.4–17.6	4.9–5.4	—	47.3–52.1	20.7–23.3	11.9–14.0
flavifrons	15	293–422	34.2–39.8	36.0–38.6	14.0–17.3	5.8–7.5	6.9–9.2	44.0–53.6	20.3–23.4	13.8–15.8
flavipinnis	17	165–346	32.3–39.5	34.4–39.1	12.0–14.3	6.7–9.1	7.6–8.9	49.2–56.2	20.1–24.0	13.2–14.9
frenchii	11	62.5–283	33.1–38.5	30.7–37.6	10.6–12.6	5.8–10.4	6.9–8.9	48.4–51.3	19.0–22.8	14.1–15.6
oxycephalus	2	234–290	34.4–35.6	37.2–40.3	16.0–17.4	6.8–8.2	8.5	44.4–49.0	19.2–23.0	12.4–13.5
unimaculatus	23	147–365	30.4–36.0	34.0–40.1	12.6–17.1	5.8–8.6	6.5–8.6	46.4–53.1	19.4–23.2	12.2–14.5
vulpinus	8	123–375	31.1–36.3	33.1–37.5	11.5–16.3	5.9–9.1	6.2–7.7	48.0–52.0	21.8–24.5	13.3–14.6
leucosticticus	5	136–161	31.2–34.3	35.1–37.3	10.6–12.0	6.7–8.3	7.3–8.9	46.3–51.2	18.8–24.0	15.7–17.0
paraleucosticticus n.sp.	2	71.9–99.1	30.9–34.6	36.1–38.0	10.1–10.8	8.7–9.6	7.0–7.5	50.9–53.5	24.1–25.7	15.2–16.0
rubrisos n.sp.	3	141–202	36.3–41.1	38.2–40.2	11.5–13.2	7.7–8.3	8.2–8.8	50.0–58.9	22.6–26.1	15.2–18.4
trilineatus	12	52.8–230	32.6–38.4	36.3–39.0	9.5–16.4	6.4–11.4	7.1–8.9	46.0–54.6	21.6–25.5	15.8–16.7
diana	10	36.7–150	29.4–32.4	33.2–38.7	10.4–13.1	6.9–10.0	6.8–8.0	48.6–52.0	17.8–25.3	15.1–17.6
dictynna n.sp.	20	26.0–144	29.8–35.4	34.9–44.9	9.9–16.0	5.9–12.3	6.5–8.5	46.5–53.8	19.3–25.8	14.3–17.1
prognathus	4	50.5–153	25.9–27.5	39.0–41.0	13.1–18.9	6.4–9.5	6.1–7.3	44.0–46.4	21.4–22.8	13.5–14.5
axillaris	21	31.3–143	28.9–34.7	32.1–37.0	8.9–11.9	6.8–10.9	6.9–9.3	47.3–54.0	19.9–25.6	15.3–18.1
neilli	14	45.3–170	27.1–36.4	33.4–38.8	10.1–13.3	6.1–9.3	7.3–9.5	48.1–54.1	21.0–25.2	16.1–19.1
mesothorax	22	34.3–134	30.0–37.7	33.7–39.3	9.9–12.2	7.2–11.9	7.7–9.6	44.3–53.3	18.9–24.6	15.4–18.7
anthioides	8	44.7–161	31.8–37.4	29.8–32.7	8.2–10.3	6.0–9.6	8.3–10.4	48.8–57.2	22.0–26.0	19.0–20.5
albotaeniatus	13	32.7–328	32.7–38.8	33.8–40.7	10.7–14.6	5.3–10.8	—	49.5–57.1	22.4–26.7	17.1–18.5
bilunulatus	15	45.6–303	30.9–36.0	33.3–39.3	9.8–12.5	4.8–11.6	7.2–9.3	46.6–53.8	21.9–28.1	15.1–16.9
busellatus n.sp.	12	84.1–315	31.4–35.6	32.9–38.9	9.5–13.6	5.5–7.4	5.2–7.4	47.5–52.6	23.6–28.2	14.1–18.2
loxozonus	13	91.9–243	33.3–37.7	34.7–37.8	11.0–13.3	5.6–8.3	8.0–10.0	47.7–53.1	23.1–27.6	14.6–18.5
macrourus	12	69.8–258	30.4–37.3	33.2–38.8	10.3–13.2	6.0–9.6	7.4–9.7	47.6–54.2	22.1–26.2	14.8–16.6
perditio	17	30.4–460	32.1–38.2	33.0–38.8	10.2–12.8	5.0–10.8	7.4–8.2	45.1–56.8	22.0–26.7	16.4–18.4
solatus n.sp.	9	136–350	31.2–38.8	33.9–37.5	11.1–14.2	5.4–7.3	6.4–9.0	46.1–56.3	21.7–26.5	15.8–18.8
speciosus	21	84.4–385	31.0–39.6	32.1–36.4	9.0–13.6	5.3–10.0	7.0–10.7	46.5–56.4	21.8–25.5	15.2–17.6
diplotaenia	29	36.7–447	30.5–39.7	31.9–38.8	8.4–17.1	4.1–9.3	6.5–14.1	44.5–55.4	16.9–23.1	15.0–18.8
eclancheri	17	67.0–340	31.7–41.0	31.9–36.1	9.7–13.4	5.1–8.4	9.0–14.5	50.7–60.7	18.2–23.8	16.7–21.0
insularis	18	24.1–270	30.8–40.1	32.8–38.6	9.0–14.5	5.2–9.8	7.7–9.9	47.4–54.4	18.9–25.7	14.8–18.7
macrognathos	2	158–228	30.2–33.2	33.7–33.9	10.0–10.2	6.4–6.6	8.1–8.8	49.9–51.7	20.5–21.6	16.9–18.1
pulchellus	16	55.1–181	28.8–33.2	30.7–35.9	8.3–13.7	5.7–8.9	7.3–9.1	48.2–53.3	18.7–24.1	16.0–18.2
rufus	39	27.8–273	28.5–36.0	31.7–38.1	7.7–14.9	5.1–9.9	7.5–10.0	44.6–55.6	17.4–25.6	16.4–19.4

fins and in some contrasted with pale spots on the body. Initial-phase adult patterns tend to be more colourful than those of terminal-phase adults that may be dark or drab. All species are recognizable on the basis of colour patterns alone.

Distribution. Representatives of this genus are found in most tropical marine shelf waters, as well as a few temperate regions. Only *B. frenchii* and *B. flavipinnis* are completely confined to temperate and sub-tropical latitudes, with distributions restricted to southern Australia and New Zealand. A few others including the *B. perditio* and *B. vulpinus* species complexes have an antiequatorial distribution.

All species appear to be consistently associated with coral and rocky reefs, occurring in depths of 1 to more than 340 m. As with most fish groups, species have discrete vertical distributions, although they can be generally categorized as shallow or deep dwelling.

Etymology. *Bodianus* after *Bodiano* or *Pudiano*, from the Portuguese *pudor*, meaning modesty (Jordan & Evermann, 1896).

Discussion. The senior synonym *Bodianus*, was proposed by Bloch (1790) for a large polyphyletic assemblage that included labrids, serranids, and lutjanids. The name is applicable to this labrid genus on the basis of tautonomy

Table 2 [continued]. Selected proportional morphometric values expressed as percent of standard length for species of *Bodianus*.

posterior lobe of dorsal-fin	posterior lobe of anal fin	pectoral-fin length	pelvic-fin length	first dorsal-fin spine	second dorsal-fin spine	last dorsal-fin spine	first anal-fin spine	third anal-fin spine	uppermost caudal-fin rays	medial caudal-fin rays
14.0–14.6	8.6–10.5	16.1–19.6	17.3–24.6	6.0–8.6	7.0–8.8	11.3–11.9	4.1–4.8	9.2–10.0	23.3	21.9–23.3
15.4–15.7	12.0–12.6	19.8–20.1	33.9–34.4	6.1–8.2	8.0–11.4	14.8–16.1	5.9–7.2	13.1–14.4	—	23.7
12.1–13.7	11.1–14.9	19.3–20.9	18.0–18.8	5.2–7.2	7.2–9.8	12.9–14.1	4.9–5.5	12.9–13.1	—	22.7–25.3
14.7–15.5	12.2–12.4	19.9–22.3	19.4–20.3	5.8–6.0	7.6–8.4	11.0–11.8	4.2–5.3	10.5–11.5	—	23.2–24.5
13.5–14.8	10.7–12.4	18.6–21.9	17.6–19.0	5.6–6.3	6.8–7.5	11.2–11.9	5.1–5.6	10.0–12.4	20.2–20.8	20.4–25.9
8.7–12.2	8.4–8.8	15.6–17.7	16.2–16.6	5.6–6.0	6.1–6.5	9.6–12.1	5.5–5.6	11.8–12.0	17.8–20.0	19.2–20.1
9.5–12.5	10.0–11.5	15.4–18.3	15.4–16.7	5.0–6.1	6.2–7.8	10.7–12.2	4.6–5.7	9.5–13.2	—	19.4–22.3
13.1–13.9	10.4–11.7	18.0–18.7	16.5–17.7	4.2–5.5	6.1–6.8	8.2–12.4	4.1–4.7	8.1–11.2	—	21.0–21.2
8.9–11.7	7.9–12.1	16.2–17.3	15.1–17.1	4.9–6.1	5.9–7.4	9.3–11.6	4.0–6.3	9.4–11.3	15.0–19.6	14.6–20.9
12.2–13.9	10.0–11.0	16.4–18.3	16.1–17.5	5.1–5.9	6.3–7.2	10.2–11.5	4.3–6.0	9.5–10.7	—	19.8–24.7
12.6–13.8	10.4–11.2	20.2–21.9	20.3–21.3	6.1–7.5	7.2–8.4	9.2–11.7	5.2–6.5	10.6–11.3	24.7	20.5–21.9
9.7–12.0	8.5–9.2	18.3–20.6	17.7–19.3	6.5–8.1	7.4–8.1	9.6–12.8	6.8–8.8	11.2–13.6	23.7–26.7	14.3–20.8
7.6–12.9	8.4–10.8	19.9–23.4	18.3–22.2	4.0–6.3	6.0–7.8	10.3–13.1	5.1–6.6	11.0–14.2	21.7–25.4	22.4–26.2
11.3–14.1	7.1–11.5	20.5–23.6	18.2–22.2	4.1–7.8	7.0–10.4	11.3–14.2	4.4–7.4	11.1–15.8	19.4–24.8	19.9–23.6
9.6–13.9	8.4–11.9	19.2–22.4	18.0–22.1	5.4–6.3	6.7–8.4	10.6–13.5	5.6–8.3	11.6–15.2	—	21.1–25.1
11.1	9.1	22	20.3	6	7.9	10.6–13.4	6.8–7.0	12.8–15.1	26.8	20.2–23.5
8.6–18.2	7.1–10.3	19.6–22.0	19.2–27.9	4.5–6.9	6.4–7.0	10.9–14.3	5.2–7.7	10.9–16.0	22.0–35.0	18.8–22.0
11.5–15.4	9.0–11.5	20.1–22.0	19.6–31.2	5.7–6.7	7.4–8.9	12.8–15.2	7.3–8.8	13.3–14.4	23.8–48.8	19.8–25.6
13.2–14.3	8.5–10.1	20.9–24.5	18.1–19.8	6.0–7.7	7.5–8.8	13.1–14.8	6.4–7.5	13.6–15.5	—	21.4–23.1
12.5–13.6	8.8–9.8	23.5–25.5	21.1–22.7	7.8–8.1	9.5–10.3	15.0–16.7	6.6–8.1	15.1–17.7	26.1–26.8	25.0–25.5
14.1–15.5	9.1–12.1	22.3–24.2	18.4–20.3	5.7–7.8	7.3–9.5	13.6–15.9	6.8–7.4	13.6–15.4	23.4–26.7	22.6–26.7
10.1–14.2	8.8–11.2	22.7–24.4	18.6–22.0	5.6–7.1	7.1–9.1	9.6–14.7	4.5–7.1	10.4–13.8	21.2–26.0	21.4–25.4
11.3–14.1	8.8–10.9	18.5–22.1	17.2–20.6	4.3–6.2	6.3–9.0	13.1–18.4	5.4–6.7	12.8–18.1	—	20.7–26.2
11.4–14.1	8.5–11.5	16.5–23.0	16.5–23.0	4.1–7.0	5.2–8.5	13.7–20.5	4.5–8.8	13.1–19.6	22.9–26.4	20.5–26.0
11.7–12.4	8.1–9.2	—	17.2–20.3	4.8–6.0	6.5–7.6	13.5–17.6	4.4–6.2	12.6–17.0	—	19.4–22.2
12.0–14.5	9.2–10.5	21.6–24.9	19.9–26.5	4.4–7.2	5.0–9.9	13.8–19.4	4.3–8.7	11.5–19.2	—	22.5–27.0
10.6–13.3	8.4–10.6	20.7–24.7	19.9–24.8	4.0–6.6	5.7–7.5	12.0–16.5	5.2–9.1	10.3–18.5	—	21.3–24.3
12.5–15.7	9.7–11.9	20.9–24.7	19.7–23.9	4.7–7.3	6.2–8.7	14.8–19.9	4.5–7.3	14.5–20.4	—	23.5–29.4
13.8–17.5	8.3–11.6	22.8–25.0	20.7–29.3	5.8–9.2	5.7–12.3	15.4–26.4	3.9–6.8	12.5–22.8	32.5–66.9	23.5–29.4
10.0–12.8	9.0–11.4	19.8–23.2	19.9–34.0	5.5–7.5	7.6	9.8–18.0	4.7–5.1	9.5–16.5	25.4–32.8	20.4–26.3
9.6–13.1	8.6–11.8	20.6–23.3	21.1–31.6	5.1–6.7	6.3–8.6	9.5–17.3	3.9–6.8	8.1–16.9	26.5–30.6	20.4–27.4
9.0–13.0	8.7–11.2	19.8–25.2	22.0–26.2	4.9–6.8	6.3–8.7	8.0–12.5	4.3–6.1	8.5–12.9	23.7–33.8	18.4–24.0
11.7–14.8	11.4–13.8	21.5–25.2	25.5–31.0	4.3–6.7	5.9–8.6	8.2–16.1	3.5–5.5	8.0–14.1	25.0–32.1	20.0–25.5
11.9–16.1	10.3–14.3	20.0–23.6	22.3–31.7	5.0–7.0	6.7–9.3	10.3–15.0	3.7–6.5	9.5–14.5	24.6–29.7	20.2–23.6
11.0–13.7	8.0–13.8	21.9–27.5	17.4–28.5	4.9–7.7	6.5–7.6	9.1–14.0	3.8–6.6	6.9–13.1	28.0–35.3	21.3–24.8
10.4–12.6	10.0–16.3	20.9–23.0	24.4–32.2	3.7–7.7	6.7–8.5	8.0–13.8	4.1–6.5	8.4–12.6	28.4–37.3	20.2–25.5
12.0–14.1	8.0–12.7	21.2–25.0	21.8–33.2	4.2–6.6	5.6–7.9	11.0–18.3	4.2–6.6	9.8–16.3	27.1–39.4	21.3–27.2
13.6–37.3	11.4–55.1	20.7–26.7	19.4–38.6	3.4–5.9	4.8–8.5	8.9–18.8	3.3–6.2	7.3–14.4	26.4–71.5	18.4–28.9
14.5–21.4	13.7–22.0	24.0–29.4	24.5–31.3	4.6–6.9	5.8–8.8	8.7–16.4	4.0–5.5	7.7–15.8	25.4–30.8	21.3–32.4
12.0–24.2	11.6–29.6	20.3–24.5	19.6–30.5	4.1–6.5	5.1–8.9	9.1–16.4	4.2–6.6	8.6–15.9	22.6–37.0	19.8–26.6
11.1–11.6	9.3–9.5	19.5–22.2	20.4–24.0	5.3–5.7	6.3–6.7	10.3–10.4	3.9–4.0	9.7–9.8	29.6	21.3
19.4–25.8	16.7–26.8	20.4–25.7	22.1–31.7	4.7–6.6	6.1–8.1	10.6–17.1	4.4–6.8	10.7–16.4	27.8–38.8	20.5–26.2
12.3–38.1	12.3–32.7	22.6–26.0	21.4–35.9	4.1–6.5	5.7–8.2	10.8–16.0	5.0–7.1	10.6–15.5	22.5–36.0	20.0–26.2

(*Bodianus bodianus* Bloch, 1790 = *Labrus rufus* Linnaeus, 1758). Lacepède (1803) retained Bloch's *Bodianus* mostly as originally presented and then proposed an additional genus and species, *Harpe caeruleo-auereus* (= *B. rufus*), based on a manuscript description of Plumier and a somewhat embellished figure by Aubriet.

Cuvier (1817) referred *Lutjanus verres* Bloch (= *B. rufus*) to his genus *Crenilabrus*. Swainson (1839) incorrectly interpreted Cuvier's remarks as indicating that *L. verres* was the type of *Crenilabrus*. *Crenilabrus* appears instead to be a junior synonym of *Symphodus* (Rafinesque, 1810). Bowdich's (1825) *Diastodon* was erected for her *D. speciosus*, described in the same study, without comparison with other labrid genera. The species is here referred to *Bodianus*, making *Diastodon* a junior synonym of it. Valenciennes (*in* Cuvier & Valenciennes, 1839) noted that Bloch's *Bodianus* was unnatural and proposed the genus *Cossyphus* to encompass the type species and fourteen other labrid species, also recognizing the synonymy of *Harpe caeruleo-auereus* with *B. bodianus*. *Cossyphus* was subsequently also widely used for the genus despite an attempt by Gistel (1848) to replace it with *Ronchifex*, because it was preoccupied by *Cossyphus* Olivier (1791).

Gill (1862) pointed out that *Harpe* had priority over *Cossyphus*, the two being based on the same type species, and restricted the name to those species "whose median dorsal and anal rays become much extended in the adult". In the same study, he proposed *Lepidaplois* for *Cossyphus*

Table 3. Selected meristic values for species of *Bodianus*.

	spines	dorsal-fin rays segmented rays	total rays	anal-fin rays segmented rays	caudal-fin rays procurrent rays dorsal	caudal-fin rays procurrent rays ventral	pectoral-fin rays branched rays	lateral-line scales	scales above lateral line	scales below lateral line	predorsal-scales	total gill rakers
cylindriatus	12	10	22	11	10	10	14–15	30 (31)	2–3	8½–10½	25–27	13,17
thoracotaeniatus	12	11	23	11	10	9,11	15	29	2½	10	21–24	15–16
bimaculatus	12	10	22	12	10–11	10	14	31	3½	10–11	8–10	16–17
izuensis	12	9–10	21–22	12	10	10	14–15	30	4½	10½–12	8–9	14
masudai	12	10	22	12	10	10	15	31	4½	11	11–12	14–15
neopercularis n.sp.	12	10	22	12	10	10	15	40–43	4–4½	12–15	11–12	15
opercularis	12	10 (9)	22 (21)	12	10	8–10	15 (14)	41–43(40,44,46)	3–4½	13–14½	9–13	15–17
sanguineus	12	10	22	12	12	11	15	38–40	4½	14	9–10	15
sepiacaudus n.sp.	12	10	22	12	10–11	9–10	15 (14)	35–40	4–4½	12–13	11–12	13–15
tanyokidus	12	10	22	12	11	10	15	38–40 (36,41)	4–4½	13–14	11–12	12–17
scrofa	12	10–11	22–23	12–13	9–10	9	15 (16)	44–48	6–7½	16–20	19–26	17–18
bathycapros n.sp.	12	10–11	22–23	11–12	9	9	15 (14)	31–32 (30)	5–6	13–15	22–28	14–15
flavifrons	12	10	22	11	9	9	15 (16)	31(30,32,33)	5½–7	12–16	15–27	13–16
flavipinnis	12	11(10,12)	23(22,24)	12 (11)	8–9	8–9	15 (14,16)	32–34 (35)	5–6½	11–16	15–24	14–17
frenchii	12	10	22	11 (10)	8–9	9	14 (15)	34–39 (32,40)	5–7	12–15	17–23	16
oxycephalus	12	11	23	12	9	9	14–15	31	5	12	13	23
unimaculatus	12	11 (10)	23 (22)	12	9 (8)	9 (10)	15 (14,16)	31–32 (30,33)	5–6	10–16	14–24	12–17
vulpinus	12	11 (10)	23 (22)	12	9–10	9–10	15	31 (30)	5½	12½–13½	17–20	14–16
leucosticticus	12	10	22	12	10 (11)	10 (9)	14	30 (29)	4½	11–13	27–31	17–19
paraleucosticticus n.sp.	12	10	22	12	10–11	10–11	14	30	4½–5	11–13	18	15,17
rubrisos n.sp.	12	10	22	12	9–10	9	14	30 (29,31)	4½	11–12½	19–31	16–17
trilineatus	12	10	22	12	10 (9)	9–10	14 (13)	29–30	4–4½	11–13½	19–33	17–19
diana	12	10	22	12 (9)	10–11	10	14 (11,13,15)	30	4–4½	12–13	17–25	15–17
dictynna n.sp.	12	10	22	12 (11)	10 (11)	9–10	14 (13,15)	30 (29)	3½–4½	11–14	20–28	15–18
prognathus	12	10 (8)	22 (20)	12 (11)	10–11	10–11	14	30	4½	11½–12½	21–23	14–17
axillaris	12	10 (9)	22 (21)	12 (13)	9–11	9–10	14 (11,13,15)	30 (29)	4–5	12–14	28–35	15–18
neilli	12	10	22	12	10–11	9–10	14 (13)	30 (31,32)	4½–5	11–14	25–31	17–19
mesothorax	12 (13)	10 (9)	22	12 (11)	9–11	8–11	14 (12,13,15)	30 (29)	4–4½	12–14	29–36	15–19
anthioides	12	10	22	12	9–10	9–10	14 (12,15)	30 (29)	4–4½	11–14½	31–42	18–19
albotaeniatus	12	10	22	12	10	10	15 (13–14)	31–32 (30)	5½–6½	12½–15½	10–18	17–21
bilunulatus	12	10	22	12 (13)	9–11	9–11	14 (15)	31–32	5–6½	12–14	12–18	17–21
busellatus n.sp.	12	10–11	22–23	12–13	9–10	9–10	15 (14)	30–32 (33)	5½–6½	13½–15	10–16	15–20
loxozonus	12	10	22	12	9–10	9–10	15	31 (32)	5–5½	11½–12½	17–22	17–21
macrourus	12	10	22	12 (11)	9–11	9–11	15	31 (30,32)	5–6½	11½–14	14–22	17–23
perditio	12	10	22	12	9–10	9–10	15	31 (30)	5½–6½	12–15	12–19	19–23
solatus n.sp.	12	10	22	12	10–11	10–11	14 (13,15)	31	5½–6½	11–14½	15–21	16–19
speciosus	12 (13)	10	22 (23)	12	10–11	9–11	15 (14,16)	31 (30,32)	5½–6½	11–14½	11–16	14–17
diplotaenia	12	10 (11)	22 (23)	12	8–12	9–11	15	31	5½	12½–14	13–18	16–20
eclancheri	12 (14)	10 (9)	22 (23)	11–12	10–11	9–10	15(16)	31–32 (33)	5–5½	12½–15	12–18	16–17
insularis	12 (13)	10 (9)	22	12 (11)	10–11	10–11	14 (15)	31 (32)	5½–6½	13–16	19–25	15–17
macrognathos	12	10	22	12	11–12	11	15	40–41	6½	14½–17	17–18	18
pulchellus	12	10	22	12	9–11	10–11	14 (13)	31 (32)	5–6	11½–13½	16–20	14–17
rufus	12	10	22	12 (11)	9–11	7–11	14 (13,15)	31	4½–5½	12–14	17–22	16–20

axillaris. The following year, Gill (1863) observed that *Cossyphus* as limited by Bleeker (1862a) and Günther (1862) was "scarcely natural" and suggested it be split into five genera: *Harpe, Lepidaplois* and three new genera, *Euhypsocara* for *Cossyphus anthiodes, Gymnopropoma* for *C. bilunulatus* and *Achoerodus* for *C. Gouldii*. Gill's distinguishing characteristics included dentition, squamation, fin development and head shape. Three of the five genera gradually gained acceptance, but *Euhypsocara* and *Gymnopropoma* did not. Of the five, only *Achoerodus* is considered here to be generically distinct from *Bodianus*.

In the interim, Günther (1862) proposed the genus *Trochocopus* for three species, *Cossyphus darwinii, T. opercularis*, and *Labrus scrofa* (the last as an appended remark, p. 506). The first is a species of *Semicossyphus* Günther (1861), whereas the second, designated the type of the genus by D.S. Jordan (1919), and last are here referred to *Bodianus*. Steindachner's (1863) *Cheiliopsis* was proposed for his *C. bivittatus*, a junior synonym of *Bodianus opercularis*, identifying *Cheilopsis* as a synonym of *Bodianus* and *Trochocopus*.

Jordan & Snyder (1902) concluded that *Bodianus* held priority over *Harpe*, and proposed the genus *Verreo* for *Cossyphus oxycephalus* Bleeker (1862b). Jordan & Evermann (1903) erected *Verriculus* for their *V. sanguineus*, distinguishing it from *Nesiotes* (subsequently recognized by G.S. Myers [1932] to be a pseudochromid). Both *Verreo* and *Verriculus* are synonymous with *Bodianus* (Gomon & Randall, 1978).

Gilchrist & Thompson's (1909) *Chaeropsodes*, erected for their *C. pictus* (= *B. perditio*), was not compared with other labrid genera and is clearly a junior synonym of *Bodianus*. *Pseudolepidaplois* described by Bauchot & Blanc (1961) for their *P. pfaffi* (= *B. scrofa*) is synonymized here with *Bodianus*.

A factor contributing to the difficulty of placing in synonymy names based on distinct colour forms associated with different states of sexual development is the inconsistent size at which sexual transformation and consequently change in colour pattern takes place in many species. This is especially apparent in *B. axillaris* with some specimens having adult coloration as small as 56.5 mm, whereas others have juvenile patterns at more than twice that size. Moreover, a number of large specimens with the juvenile colour pattern are mature females. More information is required before the precise relationships between coloration and physiological development is fully understood.

The 43 species of *Bodianus* described and discussed are presented below in cladistically arranged subgeneric groupings. The rationale for recognition of species groups at the subgeneric level is given in the section on *Relationships* following species treatments. A summary of names proposed for the 43 species and their senior synonyms is presented in Table 1. All but one are confidently referred to recognized species. The exception, *Labrus javensis* Bloch (*in* Bloch & Schneider, 1801), for which the type no longer appears to be extant, cannot be identified from the description. Separate keys are provided for the Atlantic-Eastern Pacific and Indo-West and Central Pacific regions for ease of use.

Key to Atlantic and eastern Pacific species of the genus *Bodianus*

1 Lateral-line scales 44–48 ..... (eastern Atlantic) ..... *scrofa*

—— Lateral-line scales 30–31 2

2 Anteriormost pair of prominent teeth in upper jaw and both pair of prominent anterior teeth in lower jaw distinctly incisiform ... . (southeastern Pacific) ..... *eclancheri*

—— Both pairs of prominent anterior teeth in each jaw caniniform, only slightly compressed at most 3

3 Pectoral-fin rays ii, 15 (rarely 14 or 16); juveniles with prominent black spot posteriorly on dorsal fin or with two moderately narrow interrupted dark brown stripes on body that persist in initial-phase adults; adults otherwise with broad black bar on dorsal half of body below last few dorsal-fin spines or darkly pigmented (dark blue in life) with vertical white bar midlaterally on side posterior to pectoral fin 4

—— Pectoral-fin rays ii, 14 (rarely ii, 15); juveniles and adults without prominent dark stripes (except occasionally as faint lines radiating posteriorly from eye on head) or black bars on body or black spot posteriorly on dorsal fin; large specimens, if darkly pigmented without vertical white bar midlaterally on side posterior to pectoral fin 5

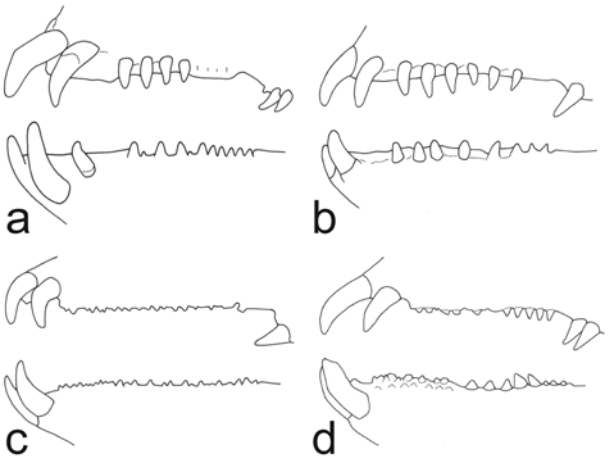

Fig. 1. Jaw dentition: (*a*) *Bodianus frenchii*, 90.8 mm SL, WAM P25781-005; (*b*) *Bodianus unimaculatus*, 215 mm SL, USNM 47820; (*c*) *Bodianus dictynna* n.sp., 109 mm SL, USNM 217877; and, (*d*) *Bodianus macrognathos*, 228 mm SL, ANSP 138146.

4 Juveniles and initial-phase adults of moderate size with two distinct, moderately narrow interrupted dark brown stripes on body and two dorsoventrally positioned prominent dark brown spots on fleshy caudal-fin base in life; terminal-phase adults darkly pigmented (dark blue in life) with vertical white bar midlaterally on side posterior to pectoral fin; terminal-phase adults with fleshy hump on forehead ..... (eastern Pacific) ..... *diplotaenia*

—— Juveniles pale (bluish in life) with prominent black spot posteriorly on dorsal fin; adults with broad black bar on dorsal half of body below last few dorsal-fin spines and black stripes along dorsal and ventral edges of caudal fin; terminal-phase adults without fleshy hump on forehead ..... (eastern Atlantic) ..... *speciosus*

5 Juveniles pale (golden yellow in life) with faint lines radiating posteriorly from eye; black spot anteriorly on dorsal fin in juveniles not extending posteriorly beyond fifth spine; adults mostly dusky (solid red to nearly black in life) with distinct dark dusky margins posteriorly on dorsal and anal fins and along upper and lower edges of caudal fin; adults often with pair of faint dusky lines radiating posteriorly from eye; snout distinctly pointed in adults (Fig. 2a) ..... (islands of Mid-Atlantic) ..... *insularis*

—— Juveniles bicoloured (blue and yellow, gray or red and yellow, or red, white and yellow in life) or pale (mostly yellow in life), when pale, black spot anteriorly on dorsal fin very large, extending posteriorly to about eighth spine; adults usually bicoloured with well defined dusky and pale areas (colours in life as in bicoloured juveniles) or pale; terminal-phase adults occasionally dusky (large specimens reddish yellow or blue black in life) with distinct dark dusky margins posteriorly on dorsal and anal fins and along upper and lower edges of caudal fin, but with pale patch dorsally on caudal peduncle and/or without dusky lines radiating posteriorly from eye; snout bluntly pointed in adults (Fig. 2b) 6

6 Gill rakers 17–19; pectoral fin without distinct blackish tip (some specimens, especially larger terminal-phase adults, with dusky smudge distally); juveniles blue anteriorly in life, pigment confined anterodorsally in larger individuals, yellow elsewhere .... (central western Atlantic) ..... *rufus*

—— Gill rakers 15–16; pectoral fin with distinct blackish tip, except in juveniles; small juveniles mostly yellow in life, larger specimens grey then red anteriorly on head and back, white anteroventrally and red on belly ..... (central western Atlantic) ..... *pulchellus*

Key to Indo-West and Central Pacific species of the genus *Bodianus*

1 Scales on dorsal midline of head not reaching forward to above anterior extent of orbit 2

—— Scales on dorsal midline of head reaching in advance of above anterior extent of orbit 27

2 Anal-fin rays III, 11; lateral-line scales 31–36 3

—— Anal-fin rays III, 12–13 (rarely 11); lateral-line scales usually less than 34 or more than 37 4

3 Branched pectoral-fin rays 15; lateral-line scales 31–32; head with prominent yellow markings in life ..... (Coral Sea, New Caledonia, Kermadec Is) ..... *flavifrons*

—— Branched pectoral-fin rays 14; lateral-line scales 34–36; head without prominent yellow markings in life ..... (southern Australia) ..... *frenchii*

4 Lateral-line scales more than 34 5

—— Lateral-line scales 30–31 10

5 No black mark on operculum except as part of prominent lengthwise stripe; predorsal scales 17–18; greatest body depth more than 30% SL ..... (northwestern Indian Ocean) ..... *macrognathos*

—— Prominent black spot on operculum; greatest body depth less than 30% SL 6

6 One or more canines present on vomer; prominent dark spot near center of caudal-fin base, persisting in preserved specimens; unbranched procurrent caudal-fin rays 12 dorsally, 11 ventrally ..... (Hawaiian Islands) ..... *sanguineus*

—— Vomerine teeth absent; small dark spot sometimes present near center of caudal-fin base in life, but fading in preservative; unbranched procurrent caudal-fin rays 9–11 dorsally, 8–10 ventrally 7

7 Black spot on operculum reaching below dorsal extent of pectoral-fin base; head and sides without broad red or black lateral stripes, but sometimes with narrow brown line just above lateral midline in life ..... (Comoro Islands, Mauritius, Japan) ..... *tanyokidus*

—— Black spot on operculum not reaching below dorsal extent of pectoral-fin base; three broad red or black lateral stripes on head and sides, in life 8

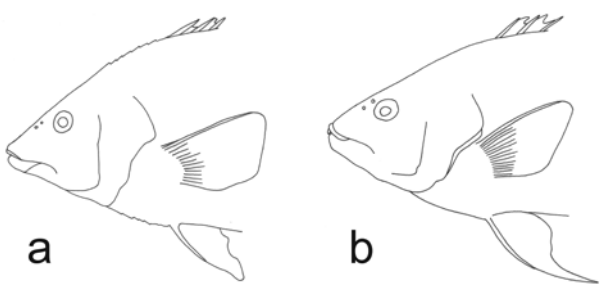

Fig. 2. Lateral view of head showing snout profile in (*a*) *Bodianus insularis* and (*b*) *Bodianus pulchellus*.

8 Lateral-line scales 35–40; three moderately broad black stripes merging on caudal peduncle and base of caudal fin in small individuals, stripes red anteriorly in terminal phase adults ..... (Indonesia, Line Islands) ..... *sepiacaudus* n.sp.

—— Lateral-line scales 40–46; three moderately broad parallel red stripes on head and body in life, ventral two converging on caudal fin; black pigment present only as spot on operculum and blotch anteriorly on dorsal fin 9

9 Pelvic fin almost completely covered by oval red spot in life; anal fin red with narrow white distal margin..... (Marshall Islands) ..... *neopercularis* n.sp.

—— Pelvic fin white with, at most, small reddish blotch posteriorly in live large individuals; basal half of anal fin red, distal half white ..... (western Indian Ocean, Red Sea, Cocos-Keeling) ..... *opercularis*

10 Prominent black spot on operculum; greatest body depth less than 29% SL 11

—— No prominent black spot on operculum; greatest body depth more than 29% SL 13

11 Black opercular spot extending ventrally below upper extent of pectoral-fin base; three broad red stripes on head and body in life, lowermost converging on middle stripe below eye ..... (Japan, New Caledonia) ..... *masudai*

—— Black opercular spot not reaching ventrally below upper extent of pectoral-fin base; head and sides without broad stripes or with two or three parallel prominent black stripes 12

12 Body pale (with numerous narrow red stripes in life); prominent black spot (ocellated in life) present on scaly caudal-fin base immediately above lateral line ..... (Indian Ocean, western Pacific) ..... *bimaculatus*

—— Two or three moderately broad black stripes on body; black spot on scaly caudal-fin base, if present, indistinguishable from second black stripe ..... (Japan, New Caledonia, Australia) ..... *izuensis*

13 Dorsal-fin rays XII, 11 (rarely 10 or 12); prominent anterior canines in jaws aligned with succeeding teeth posteriorly (anteriormost teeth following prominent canines based slightly laterally on dental ridge; Fig. 1b) 14

—— Dorsal-fin rays XII, 9–10 (rarely 11); prominent anterior canines in jaws rarely aligned with succeeding teeth posteriorly (anteriormost teeth following prominent canines based mostly on crest of dental ridge; Fig. 1c) 18

14 Caudal fin slightly rounded when spread, upper and lower corners not produced; lateral-line scales 32–35 (usually 32–33); initial-phase adults without broken red lateral stripes in life; terminal-phase adults without prominent black spot near center of dorsal fin ..... (southeastern Australia, New Zealand) ..... *flavipinnis*

—— Caudal fin truncate when spread, upper and lower corners sometimes produced in terminal-phase adults; lateral-line scales usually 30–31; initial-phase adults with three or four broken lateral stripes on body in life; terminal-phase adults with prominent black spot centrally on dorsal fin 15

15 Terminal-phase adults with posterior corners of caudal fin pointed, but not produced into filaments, and with live body coloration comprising several rows of red spots dorsally, plus row of about three white spots immediately below dorsal-fin base, or with continuous red midlateral stripe plus two broken red stripes dorsally, both patterns in addition to prominent black spot centrally in dorsal fin; initial-phase coloration comprising row of red spots on ventral half of body in addition to three broken red stripes with black cores on dorsal half 16

—— Terminal-phase adults with posterior corners of caudal fin produced into filaments and with mostly uniform coloration, dorsal half of body reddish in life, ventral half mostly white, large white blotch sometimes present below posterior half of dorsal fin and prominent blue-edged black spot located centrally on dorsal fin; initial-phase coloration comprising three broken red stripes with black cores on dorsal half of body or with faint reddish midlateral stripe and segment of dorsolateral red stripe centrally 17

16 Terminal-phase adults with continuous red midlateral stripe and two broken red stripes on dorsal half of body below dorsal fin in life, dorsal fin with prominent black spot centrally; initial-phase adults unknown ..... (Hawaiian Islands) ..... *bathycapros* n.sp.

—— Terminal-phase adults with three or four rows of elongate red spots on body, and row of about four white spots immediately below dorsal fin in life; dorsal fin with prominent black spot centrally; initial-phase adults having three broken red stripes with black cores on dorsal half of body and row of red spots on ventral half posteriorly ..... (Japan) ..... *oxycephalus*

17 Terminal-phase adults often with large white blotch on each side below posterior half of dorsal fin and with pink anal fin in life; initial-phase adults having three broken red stripes with black cores on dorsal half of body .....
..... (Southern Pacific, southeastern Australia to Easter Island) ..... *unimaculatus*

—— Terminal-phase adults without white blotch on body and with yellow anal fin in life; initial-phase adults with faint reddish midlateral stripe and segment of dorsolateral red stripe centrally ..... (southwestern Australia) ..... *vulpinus*

18 Pelvic fin not reaching anus in all but very small specimens that have fin approaching anus; juveniles with 3 or 4 longitudinal series of prominent white spots or broken stripes on brown background; adults with 3 to 5 distinct white spots in longitudinal row on side just below dorsal fin and without prominent black blotch, spot, saddle or band below posterior half of dorsal fin; posterior corners of terminal phase adults not produced; teeth in lower jaw behind prominent anterior canines short, of nearly equal size, usually numerous (Fig. 1c) 19

—— Pelvic fin reaching to or past anus in all but some juveniles that have fin almost reaching anus; juvenile colour patterns not including longitudinal series of prominent white spots or broken stripes on brown background; adults without white spots or with no more than 2 white spots below dorsal fin and with prominent black blotch, spot, saddle or band below posterior half of dorsal fin (some terminal-phase adults lacking black markings but with posterior corners of caudal fin produced); teeth in lower jaw behind prominent anterior canines usually short anteriorly and posteriorly, intermediate teeth distinctly longer (Fig. 1d) 21

19 Jaws attenuate and distinctly produced, snout length 13–18% SL, 16–18% SL in individuals greater than 75 mm SL ..... (Line Is) ..... *prognathus*

—— Jaws attenuate but not distinctly produced, snout length 9–16% SL, 12–16% SL in individuals greater than 75 mm SL 20

20 Snout and head above level of mouth in juveniles brown in life with numerous small to irregular white spots, those below and behind eye usually distinct, though often horizontally aligned; terminal-phase adults without prominent black spot posteriorly on dorsal fin, centrally on anal fin, and on pelvic fin ..... (Indian Ocean) ..... *diana*

—— Head above level of mouth in juveniles brown in life with few white spots, snout usually devoid of spots laterally; spots on top of head sparse and frequently large, those below and behind eye often conjoined to form irregular stripes; terminal-phase adults with prominent black spot posteriorly on dorsal fin, centrally on anal fin and on pelvic fin ..... (northwestern Australia, Western Pacific) ..... *dictynna* n.sp.

21 Pectoral-fin base with prominent black spot; 4 prominent red to yellow stripes on sides in life, dorsal stripes each with lengthwise series of small black dots anteriorly ..... (Papua New Guinea, New Caledonia, Rarotonga) ..... *paraleucosticticus*

—— Pectoral-fin base without prominent black spot; sides without prominent red to yellow stripes in life, some adults with numerous fine red to brown longitudinal lines, each following a scale row; sides without lengthwise rows of small black dots 23

22 Scales present posteriorly on lower jaw, extending anterior to forward end of ventral preopercular edge (scales often embedded); adults with distinct black band encircling body posteriorly and black marginal stripe on anal fin 23

—— Scales absent on lower jaw; not extending anterior to forward end of ventral preopercular edge; adults without black band encircling body posteriorly and black marginal stripe on anal fin 24

23 Black band encircling body posteriorly in adults oriented vertically, almost as broad below lateral line as above; posterior edge of band not reaching past posterior edge of hypurals ventrally; juveniles unknown ..... (Mauritius, Réunion, St. Brandon's Shoals) ..... *macrourus*

—— Black band encircling body posteriorly in adults angled posteroventrally, much narrower below lateral line than above; posterior edge of band usually reaching past posterior edge of hypurals ventrally in all but small specimens; juveniles with two broad black bands posteriorly on body, the second covering posterior half of caudal peduncle ..... (central and western Pacific) ..... *loxozonus*

24 Head with posteriorly flared blackish stripe or series of spots directed posteriorly from corner of mouth; adults with black saddle-like spot on dorsal half of body below posterior end of dorsal fin and on anterodorsal portion of caudal peduncle (terminal-phase adults of some species with spot reduced or absent), but not preceded by pale band; juveniles with broad black band encircling body posteriorly and covering most of anal fin to outer edge, not preceded by white band; black spot at anterior end of dorsal fin extending posteriorly little, if at all, past fourth spine in very large adults 25

—— Head without blackish markings; large black spot or smudge often below dorsal fin posteriorly, but not extending onto caudal peduncle; broad pale band often dorsally, below center of dorsal fin; juveniles with broad black band encircling body below posterior half of dorsal fin and base of anal fin in very small individuals, not extending onto lower third of body in larger juveniles leaving black spot on anterior portion of anal fin, band preceded by white band dorsally; black spot anteriorly on dorsal fin extending posteriorly to about seventh spine in very large adults 27

25 Pectoral-fin rays ii, 14 (rarely 15); black vertical band on body of juveniles with clearly defined anterior and posterior margins, posterior margin well in advance of hypural edge; initial-phase adults with large dark saddle almost always extending below lateral line, but rarely near posterior edge of hypurals; terminal-phase adults not darkly mottled ..... (Indian and western Pacific Oceans) ..... *bilunulatus*

—— Pectoral-fin rays ii, 15 (rarely 13–14); black vertical band on body of juveniles with diffuse anterior margin or with posterior margin on or posterior to rear edges of hypurals; initial-phase adults with dark saddle rarely extending ventrally to lateral line or with saddle extending posteriorly to rear edge of hypurals; terminal-phase adults sometimes darkly mottled 26

26 Juveniles with posterior marking of black vertical band on body well in advance of hupural edge; initial-phase adults yellowish in life with dark saddle almost always entirely above lateral line and well in advance of posterior edge of hypurals; terminal-phase adults darkly mottled ..... (Hawaiian Islands & Johnston Island) ..... *albotaeniatus*

—— Juveniles with black vertical band on body extending to or beyond posterior edge of hypurals; initial-phase adults pinkish in life with dark saddle extending below lateral line anteriorly and to or nearly to posterior edge of hypurals; terminal-phase adults unknown .. .. (southern central Pacific) ..... *busellatus* n.sp.

27 Pectoral-fin rays ii, 15; gill rakers 19–23; initial-phase adults bright yellow, larger individuals usually with distinct yellow lines or spots on head; terminal-phase adults pink with discrete yellow spots on head and yellow margins to anal and caudal fins, and black blotch at tip of pectoral fin .... (southwestern Indian Ocean, Japan, southern Pacific Ocean) ..... *perditio*

—— Pectoral-fin rays ii, 13–14; gill rakers 16; initial-phase adults mostly pink to orange in life, without yellow lines or spots on head; terminal-phase adults predominently reddish orange, devoid of discrete yellow markings and without black blotch on pectoral-fin tip ..... (Western Australia) ..... *solatus* n.sp.

28 Anal fin III, 11; scales above lateral line 3 29

—— Anal fin III, 12 (rarely 11 or 13); scales above lateral line 4–5 30

29 Lateral-line scales 30–31; head with prominent yellow markings in life; body without distinct orange red stripe midlaterally; dorsal fin without black markings ..... (Japan, Hawaii, Coral Sea) ..... *cylindriatus*

—— Lateral-line scales 29; head without yellow markings in life; body with distinct orange red stripe midlaterally; dorsal fin with prominent black marginal stripe anteriorly and spot behind last few spines ..... (Japan) ..... *thoracotaeniatus*

30 Snout rounded; dorsal and ventral corners of caudal fin prolonged into filaments ..... (Indian, western and central Pacific Oceans) ..... *anthioides*

—— Snout sharply pointed; dorsal and ventral corners of caudal fin not prolonged into filaments 31

31 Prominent black spot distally on dorsal and anal fins immediately posterior to last spine; juveniles and some females with prominent large white spots, one on belly immediately anterior to anal-fin origin ..... (Indian, western and central Pacific Oceans) ..... *axillaris*

—— Adults without distinct black spot on dorsal and anal fins posterior to last spine; juveniles without large white spot on belly immediately anterior to anal-fin origin 32

32 Adults with prominent ventrally tapered black band angled from base of last few dorsal-fin spines to pectoral-fin base; body grey or brownish grey anterior to band in life and white posterior to it; juveniles dusky (brownish in life) with several prominent pale (yellow in life) spots, one spot encircling dorsal side of pectoral-fin base, but none on belly or midlaterally below lateral line .... (western and central Pacific) ..... *mesothorax*

—— Adults without prominent black band on body; juveniles with or without prominent pale spots, but not as above 33

33 Vomerine teeth absent; adults pale (rose red anterodorsally, yellow posteroventrally in life) without stripes or horizontal rows of spots; juveniles blackish with prominent white spots, including large horizontally elongate spot midlaterally posterior to pectoral-fin base and below lateral line ..... (central Indian Ocean) ..... *neilli*

—— One or more canines on vomer; body in life with three or more interrupted red or black stripes or horizontal rows of spots 34

34 Juveniles and initial phase adults with row of three to six small yellow to white spots dorsally on side between two red stripes immediately below dorsal fin; black pigment on red stripes when apparent not broken into distinct segments; pale interspaces between dorsal three red stripes with one or two discrete longitudinal rows of fine black spots; red stripe directed from corner of mouth to pectoral-fin base; pectoral-fin base with prominent black spot persisting in initial phase adults; black spot anteriorly in dorsal fin persisting in young adults, replaced by red spot in larger adults .. (western Indian Ocean, Japan, Indonesia) ..... *leucosticticus*

—— Juveniles and adults without discrete pale spots dorsally on side; black pigment on red stripes when apparent broken into distinct segments of nearly equal length; pale interspaces between dorsal three red stripes without discrete rows of fine black spots (sometimes spots in one or more irregular rows); yellow stripe directed from corner of mouth to pectoral-fin base or stripe absent; black spot on pectoral-fin base replaced by red spot or persisting as narrow red line in young adults; black spot anteriorly in dorsal fin if present in juveniles lost prior to maturation 35

35 Underside of head below eye and in advance of preopercular edge immaculate in juveniles and initial-phase adults; caudal fin truncate; adults with four broken red stripes separated by pale spaces containing irregular longitudinal rows of small red dots; segments of stripes irregularly obscured with black in small initial-phase adults, black pigment gradually lost with growth, persisting longest in dorsal-most stripe ..... (Japan, Taiwan and Indonesia) ..... *rubrisos* n.sp.

—— Juveniles and initial-phase adults with narrow yellow to red stripe ventrally on side below level of pectoral-fin base and with yellow stripe directed from corner of mouth to pectoral-fin base; caudal fin slightly rounded; adults with five narrow yellow to red stripes, dorsal three obscured by black separated into 3–5 segments of equal length; terminal-phase adults with thin, straight red lines and rows of red spots in life, sometimes extending to below underside of pectoral-fin base ..... (eastern Africa) ..... *trilineatus*

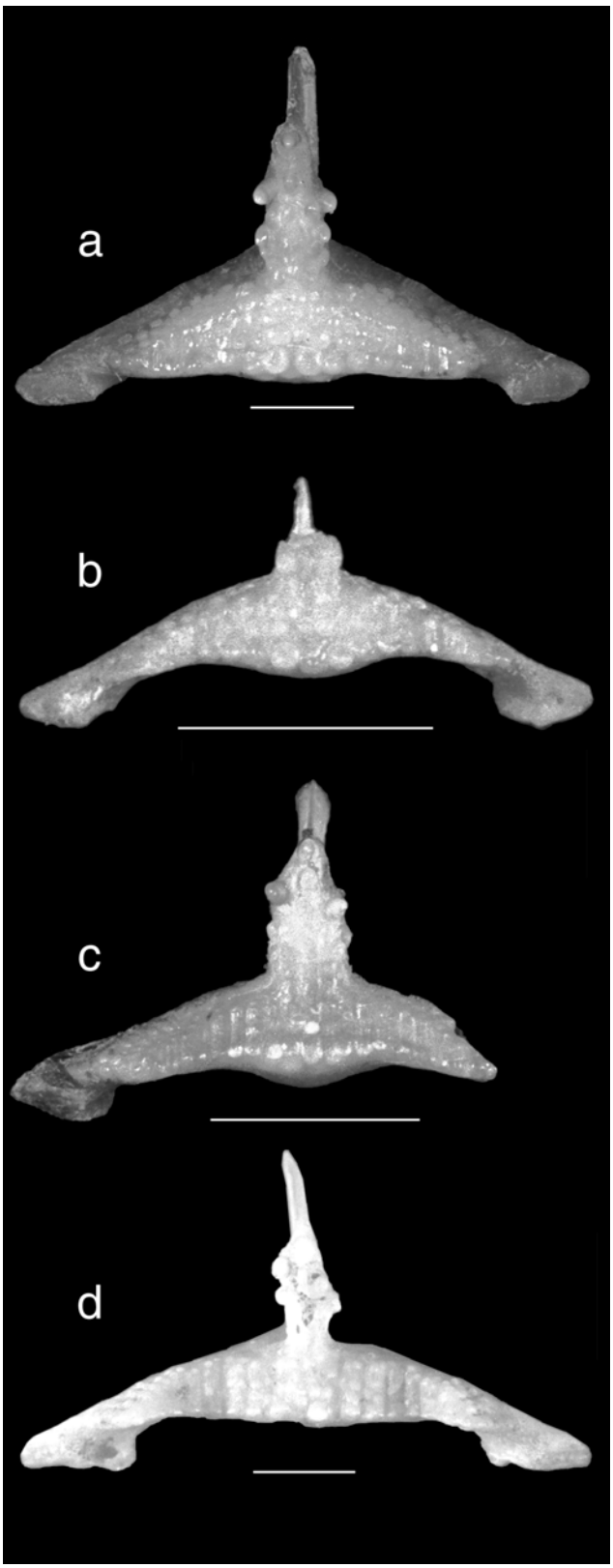

Fig. 3. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus cylindriatus*, 129 mm SL, MNHN 1995-007; (*b*) *Bodianus bimaculatus*, 53.6 mm SL, BPBM 15725 (anterior head of dentigerous surface missing); (*c*) *Bodianus izuensis*, 91.9 mm SL, NMV A4830 (right lateral condyle missing); and, (*d*) *Bodianus opercularis*, 132 mm SL, RUSI 1213. Scale lines represent 2 mm.

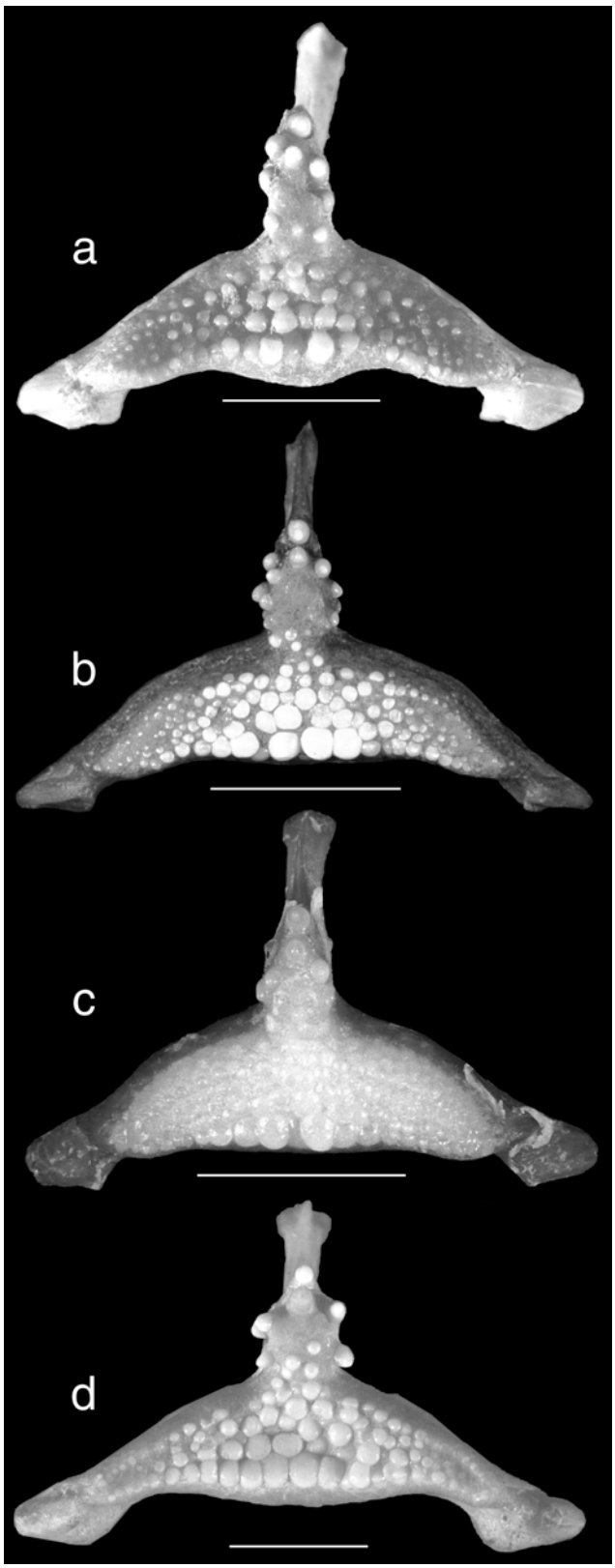

Fig. 4. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus scrofa*, 215 mm SL, USNM 94529; (*b*) *Bodianus flavipinnis*, 168 mm SL, AMS E2988; (*c*) *Bodianus frenchii*, 145 mm SL, WAM P.26616-017; and, (*d*) *Bodianus unimaculatus*, 215 mm SL, USNM 47820. Scale lines represent 5 mm.

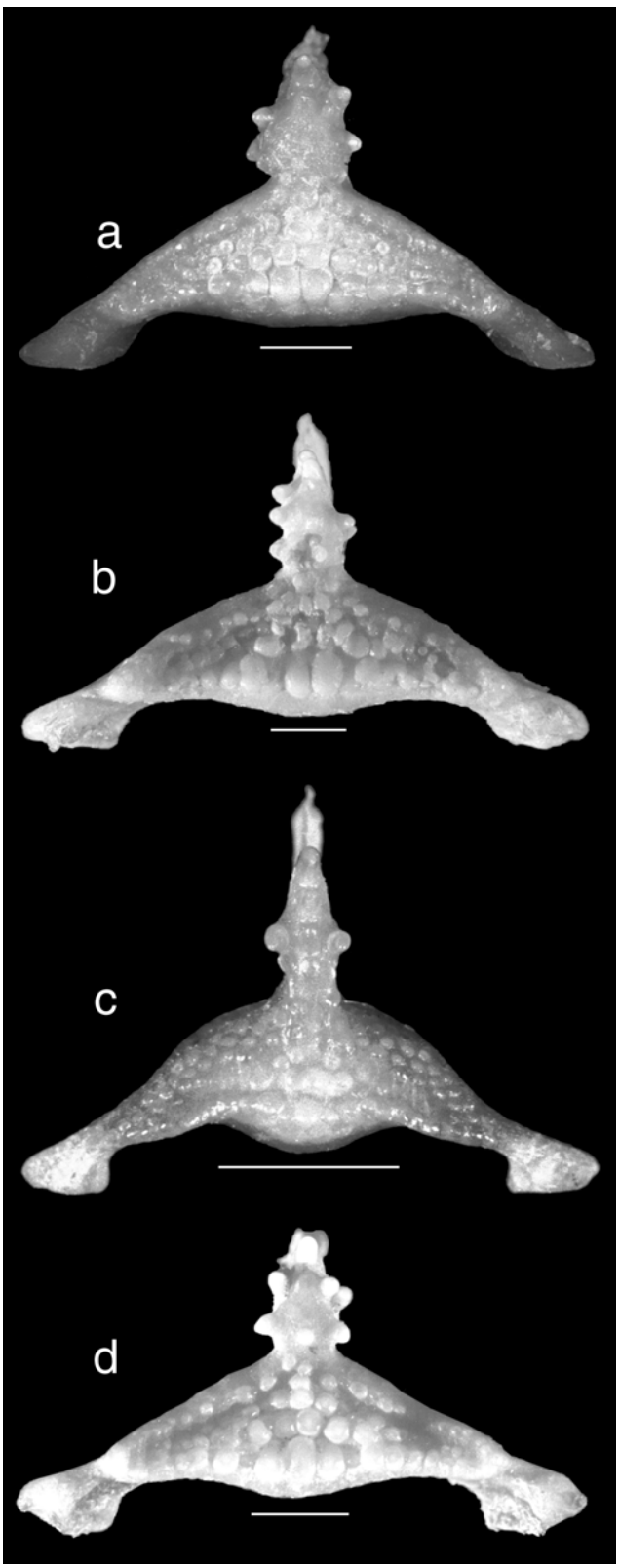

Fig. 5. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus vulpinus*, 149 mm SL, NMV A1770; (*b*) *Bodianus leucosticticus*, 155 mm SL, SMBL-F-72079; (*c*) *Bodianus trilineatus*, 71.1 mm SL, USNM 217862; and, (*d*) *Bodianus dictynna* n.sp., 138 mm SL, USNM 217877. Scale lines represent 2 mm.

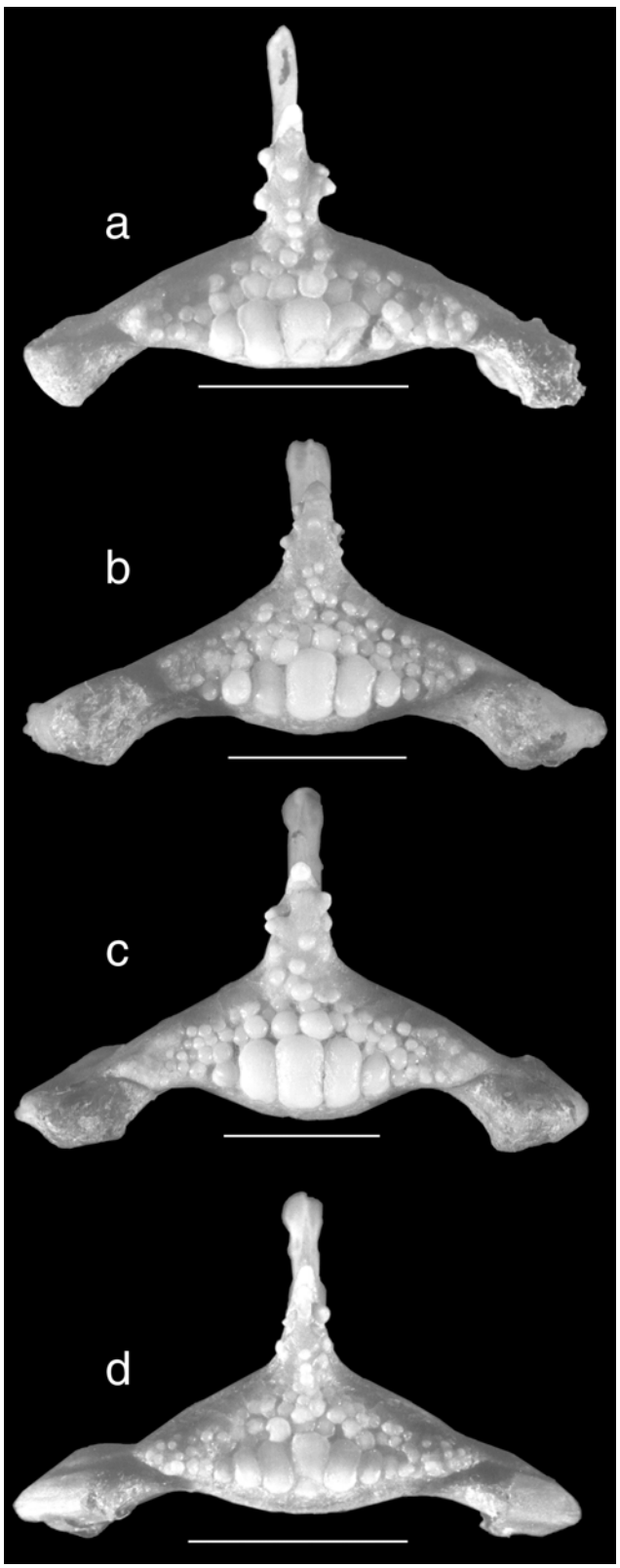

Fig. 6. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus axillaris*, 143 mm SL, USNM 205083; (*b*) *Bodianus mesothorax*, 129 mm SL, USNM 154032; (*c*) *Bodianus neilli*, 170 mm SL, USNM 217883; and, (*d*) *Bodianus anthioides*, 136 mm SL, USNM 112247. Scale lines represent 5 mm.

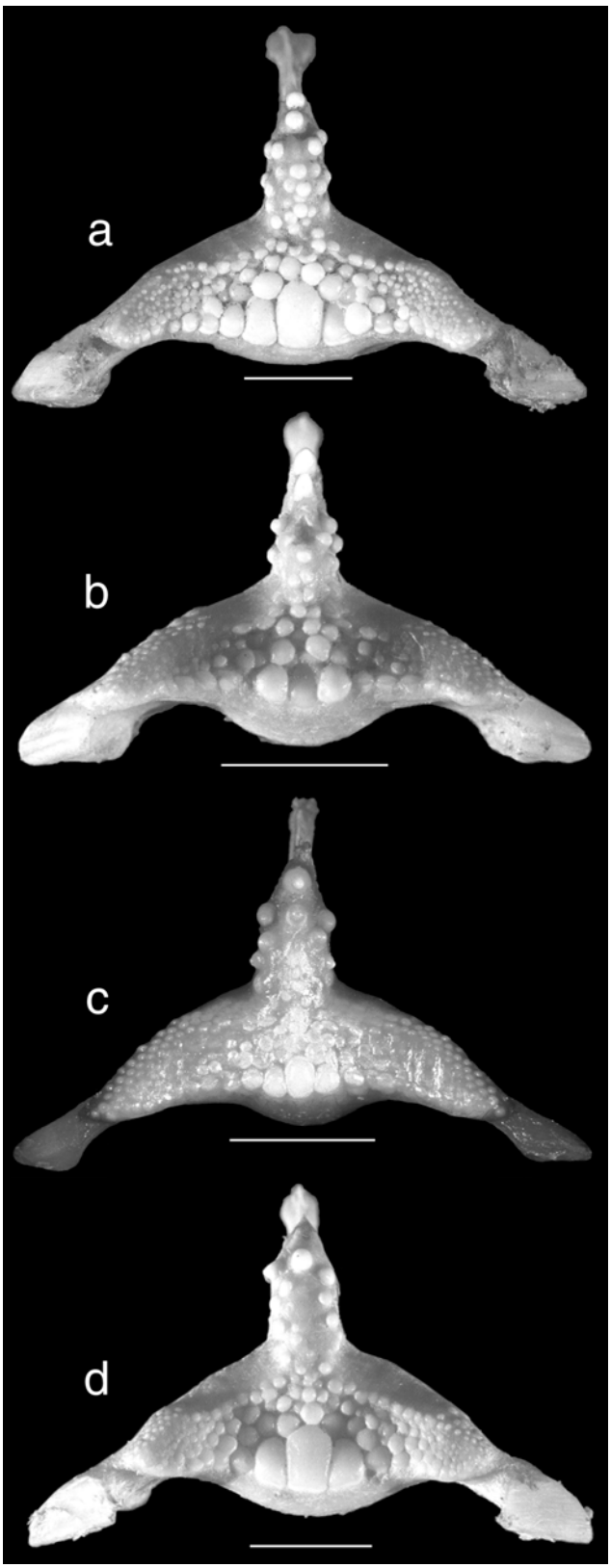

Fig. 7. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus bilunulatus*, 231 mm SL, USNM 153765; (*b*) *Bodianus perditio*, 157 mm SL, USNM 71655; (*c*) *Bodianus solatus* n.sp., 207 mm SL, WAM P.25354-025, paratype; and, (*d*) *Bodianus speciosus*, 187 mm SL, USNM 217896. Scale lines represent 5 mm.

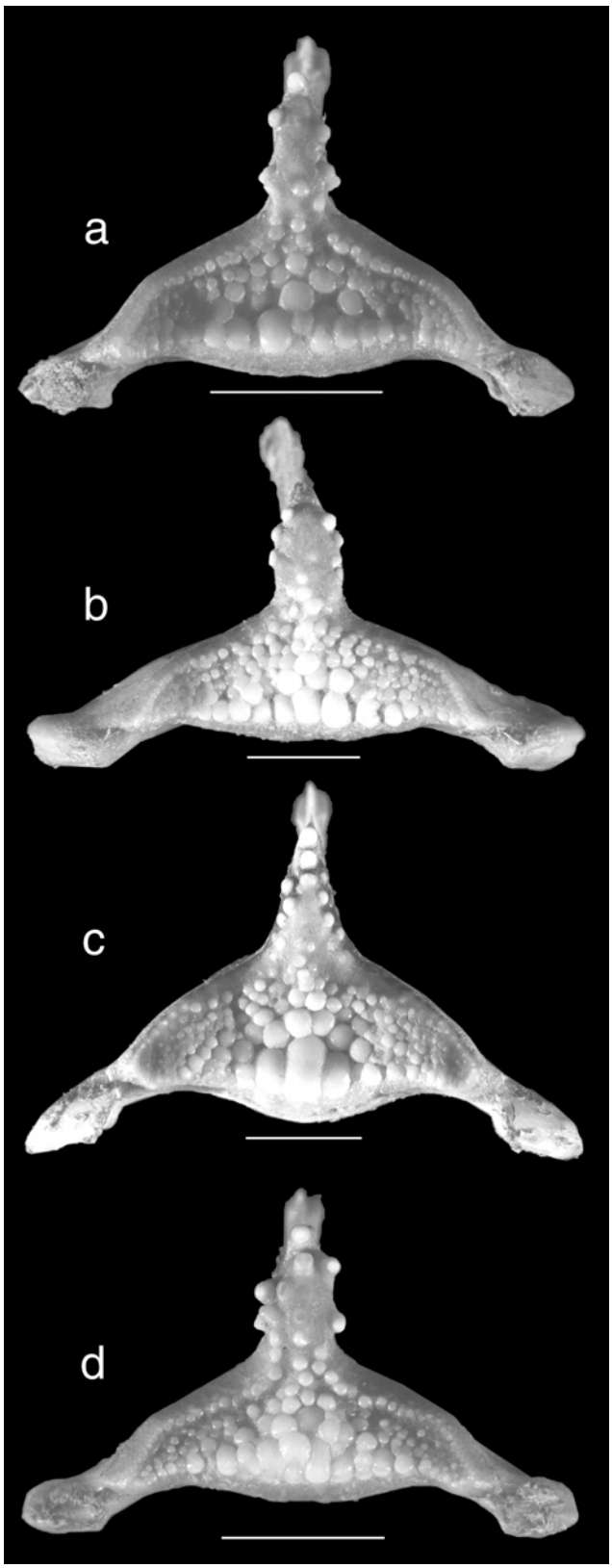

Fig. 8. Dorsal view of lower pharyngeals (anterior end at top): (*a*) *Bodianus diplotaenia*, 203 mm SL, USNM 80857; (*b*) *Bodianus insularis*, 253 mm SL, BMNH 1927.12.7.72, paratype; (*c*) *Bodianus macrognathos*, 228 mm SL, ANSP 138146; and, (*d*) *Bodianus rufus*, 201 mm SL, USNM 80859. Scale lines represent 5 mm.

Subgenus *Priobodianus* n.subgen.

Type species. *Verreo cylindriatus* Tanaka, 1930.

Diagnosis. Ethmoid-frontal depression very shallow at most; transverse axis of lower pharyngeal (Fig. 3a) narrow with straight posterior margin; pharyngeal teeth aligned anteroposteriorly and transversely, latter in 3 or 4 rows; teeth rounded and of similar size, medial teeth in posteriormost row only slightly enlarged; anterior head of pharyngeal long with 1 or 2 enlarged canines medially and on either side; vomerine teeth present; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw in two or three series sequentially, defined by differing lengths, posterior series shortest; dorsal fin with XII, 10 or 11 rays; anal fin with III, 11 rays; lateral line with 29–31 pored scales, each with simple laterosensory tube; 2–3 scales above lateral line; 8½–10½ scales below lateral line; predorsal scales 21–27, reaching to or in advance of anterior nostril; cheek scales reaching forward onto posterior end of upper lip, covering preopercle, subopercle and most of opercle, reaching forward on lower jaw in advance of anterior nostril; scaly basal sheath on base of dorsal and anal fins extremely low, ½ scale high; body slender, caudal peduncle deep; head and snout pointed; jaws not attenuate; lateral-line scales with single unbranched laterosensory canal tube; posterior corner of mouth below anterior half of eye; posterior tips of dorsal and anal fins rounded; caudal fin truncate; pectoral fin broadly rounded; species small, maximum length about 150 mm SL; adults with red spot centrally on caudal-fin base; ontogenetic and sexual polychromatism unknown.

Etymology. *Priobodianus*, from the Latin *prior* for "earlier" or "former" and Portuguese name "Bodiano" (see above derivation of *Bodianus*) in reference to the primitive features in the species allocated to this subgenus and the hypothesized early if not initial divergence of this line within the evolution of the genus.

Discussion. Both species referred to this subgenus are so poorly represented in collections that specimens were unavailable for clearing and staining. Radiographs reveal very little, if any depression of the ethmoid-frontal region and the lower pharyngeal of *B. cylindriatus* is very generalized, with a dental pattern hypothesized as primitive for labrids (Gomon, 1997). Squamation of both species is similarly that hypothesized as primitive for the family. The two are tentatively placed in a single subgenus diagnosed by the above mentioned primitive features and referred to *Bodianus* on the basis of similar dorsal fin and anal-fin counts, the number of lateral-line scales and the presence of a scaly sheath on the base of both the dorsal and anal fins, albeit an extremely low one. Juveniles of both species are apparently absent from collections.

Bodianus cylindriatus (Tanaka)

Figs 3a, 9–10; Plate 1A; Tables 2–3

Verreo cylindriatus Tanaka, 1930, p. 941, pl. 187, fig. 513, Tokyo market.

Morphological diagnosis. Dorsal-fin rays XII, 10; caudal-fin rays 10 + 12 + 10; pectoral-fin rays ii, 14–15; lateral-line scales 30–31 (rarely 31); scales above lateral line 2–3; scales below lateral line 8½–10½; predorsal scales 25–27; total gill rakers 13–17. See Table 2 for morphometric values. Upper jaw with prominent anterior canines of similar size; dental ridge low with two consecutive rows of shorter canines, first with 4 teeth slightly longer than 4–5 in second row; moderately large canine at posterior end of upper jaw. Lower jaw with first prominent anterior canine ≈½–⅔ size of second, directed anterodorsally and slightly laterally; dental ridge low with 2 series of smaller caniniform teeth laterally, first with about 4 teeth slightly longer than 6–7 in second. Lateral teeth in both jaws of similar sizes. Body shallow (21.3–25.5% SL); snout (7.6–10.4% SL) and head (31.8–34.2% SL) short. First soft ray of pelvic fin not prolonged as filament, reaching just beyond anus at most.

Reaches a length of at least 142 mm SL.

Pigmentation in alcohol. Uniformly pale.

Colour in life. Adults (Plate 1A)—body dark pink above grading to white below with large red spot midlaterally on scaly caudal-fin base. Head with broad yellow line extending from tip of snout to underside of eye and bending ventrally onto lower portion of operculum, and broad yellow stripe directed posteriorly from hind margin of eye. Dorsal fin pink basally and yellow distally with dark red membrane between first three spines. Anal fin white with dark red triangular marking at anterior end of base. Caudal fin yellow with reddish upper and lower margins. Pectoral fin clear, vertically elongate red spot on scaly base. Pelvic fin yellow with white leading edge.

Colour photos of this species appear in Masuda *et al*. (1984, pl. 195B), Chen (1980, pl. 7, fig. 38) and Okamura & Amaoka (1997, p. 519).

Distribution. This Western Pacific species is known from Tosa Bay, Kochi Prefecture, Japan (Yamamoto, *in* Okamura *et al*., 1982), from the Kanmu Seamount of the Northwestern Hawaiian Islands (Randall & Chen, 1985) and from the Coral Sea between Australia and New Caledonia (Fig. 10) at depths of at least 250–370 m.

Etymology: *cylindriatus*, from the masculine Latin noun *cylinder*, "roller" and *atus*, "having the nature of", apparently in reference to the narrow body. The apparent

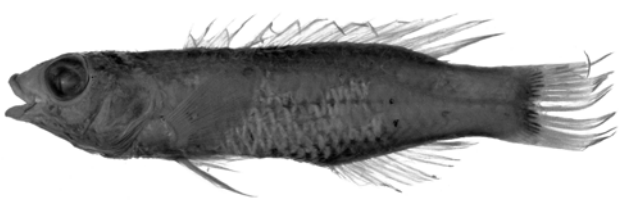

Fig. 9. *Bodianus cylindriatus*, adult, 112 mm SL, CSIRO H651-03, off central Great Barrier Reef, Queensland.

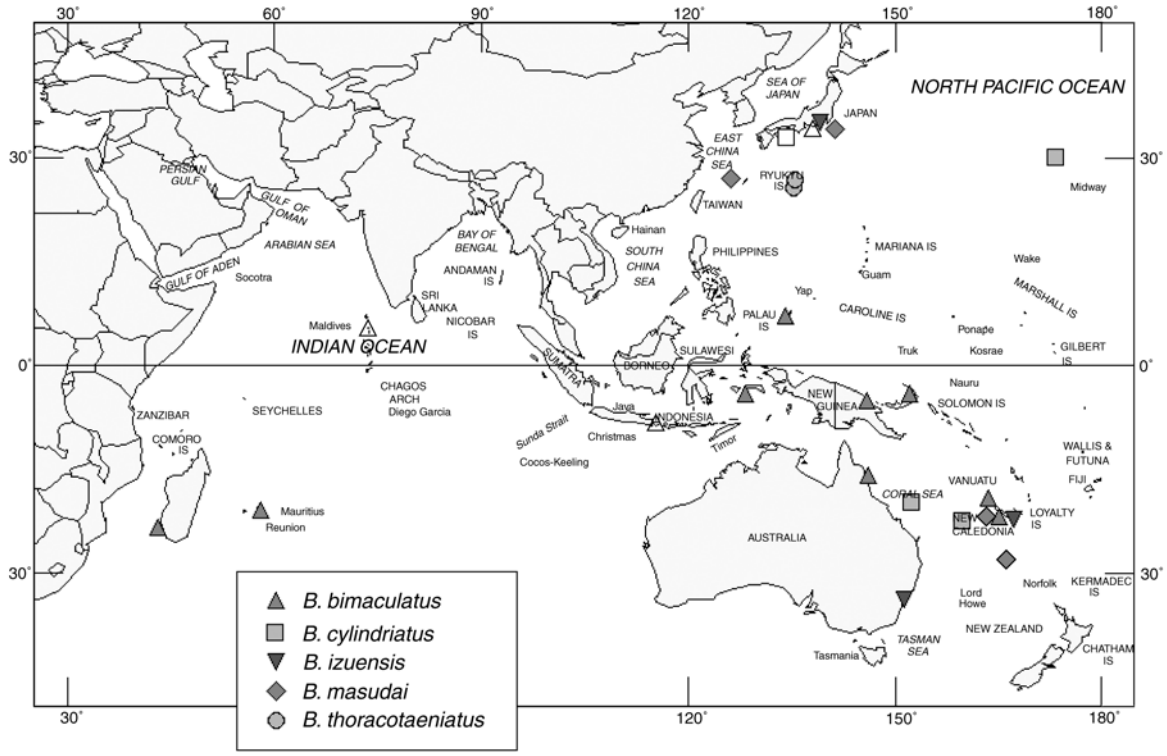

Fig. 10. Distributional records for specimens examined of species of the subgenera *Priobodianus* and *Trochocopus* (in part). Unfilled symbols represent other verified records.

absence of juveniles in collection and rarity of adults makes the determination of colour variation associated with ontogeny and sexual development impossible.

Comparison. This species is easily distinguished from the other member of the subgenus, *B. thoracotaeniatus*, by colour pattern, lacking a prominent reddish brown stripe from the eye to the base of the tail and black distal margin along the anterior two-thirds of the dorsal fin. In addition, it generally has a shallower body, shorter head and blunter snout.

Discussion. Initially described in the genus *Verreo*, this species is not closely related to those referred here to that subgenus.

Material examined. **Pacific Ocean**, HAWAIIAN ISLANDS, *Kanmu Seamount* BPBM 30346 (1, 142); CORAL SEA, *Chesterfield Bank*, Banc Nova MNHN 1995-0007 (1, 129); AUSTRALIA, *Queensland*, off central Great Barrier Reef CSIRO H651-03 (1, 112).

Bodianus thoracotaeniatus Yamamoto

Figs 10–11; Plate 1B; Tables 2–3

Bodianus thoracotaeniatus Yamamoto, *in* Okamura *et al*. 1982, p. 245, fig. 170, 26°45.7'N 135°19.4'E, 26°44.0'N 135°24.0'E (Kyushu-Palau Ridge, northwestern Pacific).

Morphological diagnosis. Dorsal-fin rays XII, 11; caudal-fin rays 10 + 12 + 7–9; pectoral-fin rays ii, 15; lateral-line scales 29; scales above lateral line 2½; scales below lateral line 8–10; predorsal scales ≈21–24; total gill rakers 15–16. See Table 2 for morphometric values. Upper jaw with anterior canines of similar size; 7–12 smaller canines on dental ridge posterior to anterior canines, last few sometimes smaller, coalesced at base and set apart from others; prominent canine at posterior end of jaw. Lower jaw with first prominent anterior canine ≈⅘ length of second; two or three consecutive series of smaller canines on dental ridge, first of 6–10 teeth, second with about 6–10 much smaller teeth sometimes separable into two groups, teeth confluent at base with acute tips. Body of moderate depth (24.1–27.1% SL); snout (10.9–11.7% SL) and head (36.3–37.5% SL) moderately long. First soft ray of pelvic fin faintly thicker and prolonged as filament, tip reaching distinctly beyond anus, to base of third anal-fin ray in some.

Reaches a length of at least 148 mm SL.

Pigmentation in alcohol. Initial-phase adults (Fig. 11)—head, body and fins uniformly pale except for dark subdistal stripe on anterior two thirds of dorsal fin formed from series of dorsoventrally elongate dark blotches, each on membrane following dorsal-fin spine, prominent larger dark spot between last dorsal spine and fourth soft ray.

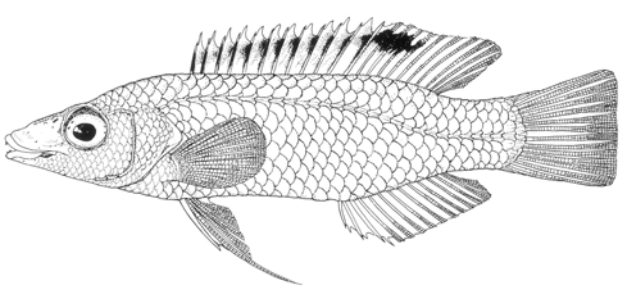

Fig. 11. *Bodianus thoracotaeniatus*, adult, 120 mm SL, HUMZ 75062, holotype, 26°45.7'N 135°19.4'E–26°44.0'N 135°24.0'E, 345 m (after Yamamoto, *in* Okamura *et al*., 1982).

Terminal-phase adults—as described for initial-phase adults, but dark stripe on dorsal fin to margin and without large dark spot between last dorsal spine and fourth soft ray.

Colour in life. Initial-phase adults—pale orange red above, white below, the two areas separated by a broad orange red stripe on the lateral midline of head and body; orange red spot of moderate size centrally on fleshy caudal-fin base. Dorsal fin white or cream with broad blackish brown submarginal stripe stretching from first spine to third or fourth segmented ray, portion posterior to last spine broad and spot-like. Anal fin white with narrow orange stripe somewhat distally. Pectoral fin transparent. Pelvic fin translucent except for white first segmented ray.

Terminal-phase adults (Plate 1B)—as described for initial-phase adults, except lateral stripe higher on side relative to depth of body, red spot at the base of the caudal fin replaced by smaller dark brown spot and distinct broad black marginal stripe on spinous portion of dorsal fin.

In addition to the figure accompanying the original description, colour photos of this species appear in Masuda *et al*. (1984, pl. 1950) and Okamura & Amaoka (1997, p. 519).

Distribution. This species is only known conclusively from the Kyushu-Palau Ridge east of Okinawa (Fig. 10), at depths between 320 and 395 m.

Etymology: *thoracotaeniatus*, a combination of the masculine Greek noun *thorakos*, for "breastplate", and feminine Latin noun, "ribbon", "in reference to its diagnostic filamentously prolonged pelvic-fin ray" (Yamamoto, *in* Okamura *et al.*, 1982).

Comparison. See *Comparison* for *B. cylindriatus*.

Discussion. A photograph of a 175 mm SL specimen sent by Shen for identification and reproduced here as Plate 1B is remarkably similar to examples and photos of smaller specimens of this species examined, but differs in having a much deeper body and in having differences in coloration as noted in the colour description of terminal-phase adults. Although the specimen was not available for examination, vertical fin ray values taken from the photo appear to agree with the above account. The differences are considered to be sexually dimorphic.

Material examined. **Pacific Ocean**, KYUSHU-PALAU RIDGE, HUMZ 80398 (1, 137, paratype of *B. thoracotaeniatus*), 79220 (1, 132, paratype of *B. thoracotaeniatus*).

Subgenus *Trochocopus*

Trochocopus Günther, 1862
Cheiliopsis Steindachner, 1863
Verriculus Jordan & Evermann, 1903

Type species. *Trochocopus opercularis* Günther, 1862, by subsequent designation (D.S. Jordan, 1919).

Diagnosis. Ethmoid-frontal surface slightly depressed; transverse axis of lower pharyngeal (Fig. 3b–d) narrow with straight or slightly convex posterior margin; pharyngeal teeth aligned anteroposteriorly and transversely, latter in 3 or 4 rows; teeth rounded and of similar size, medial teeth in posterior most row only slightly enlarged; anterior head of pharyngeal slender with 1 or 2 enlarged canines medially and on either side; vomerine teeth present or absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw usually in two or three series sequentially, defined by differing lengths, posterior series shortest; dorsal fin with XII, 10 (rarely 9) rays; anal fin with III, 12 rays; lateral line with 30–46 pored scales, each with simple laterosensory tube; 3½–4½ scales above lateral line; 10–15 scales below lateral line; predorsal scales 8–12, not quite reaching forward to vertical through posterior extent of orbit; cheek scales not extending forward to corner of mouth, posterior and ventral edges of preopercle broadly naked, lower jaw naked; scaly basal sheath on base of dorsal and anal fins low, ½–2 scales in depth; head and snout pointed; jaws not attenuate; posterior tips of dorsal and anal fins rounded; caudal fin usually rounded; pectoral fin usually rounded; species small, maximum length 60–180 mm SL; prominent dark spot on opercle; at least some juveniles and adults dichromatic, initial- and terminal-phase adult dichromatism minimal.

Etymology. Apparently from the Greek *trocho* for "anything round" and *kope*, "oar", in reference to the rounded oar-shaped spot on the gill cover of the type species.

Discussion. The name *Trochocopus* was proposed by Günther (1862) as a genus to accommodate the species *T. opercularis* Günther (type species as subsequently designated by D.S. Jordan [1891]) and *T. darwinii* (Jenyns), and appended to include *T. scrofa* (Valenciennes). These species are not closely related and, contrary to Günther's diagnosis, do not all lack scales on the base of the soft dorsal fin. The first and third species have a distinct, though low, scaly sheath basally on both the dorsal and anal fins. *Cheiliopsis* was erected by Steindachner (1863) for his *C. bivittatus*, a junior synonym of *B. opercularis*, making it synonymous with *Trochocopus*. The genus *Verriculus* was proposed by Jordan & Evermann (1905) for their *V. sanguineus*, a clear member of this assemblage (see Gomon & Randall, 1978, for a detailed discussion).

Though superficially resembling species of *Priobodianus*, the eight species referred here to *Trochocopus* have a distinctly, if only slightly depressed ethmoid-frontal surface of the neurocranium with a clear roof to the fossa dorsoposteriorly. They share a prominent black opercular spot that appears nowhere else in the genus, at least among adults, and what is likely to be a monophyletic reduction in the extent of predorsal squamation anteriorly. The further development of basal sheaths on the dorsal and anal fins are probably also shared modifications. They retain a relatively unspecialized lower pharyngeal configuration.

Bodianus bimaculatus Allen

Figs 3b, 10, 12; Plate 1C–E; Tables 2–3

Bodianus bimaculatus Allen, 1973, p. 386, fig. 1, Bairakaseru I., Ngemelis Is., Palau Archipelago.

Morphological diagnosis. Dorsal-fin rays XII, 9 (1) or 10 (8); caudal-fin rays 10 (1) or 11 (7) + 12 + 9 (1) or 10 (7); pectoral-fin rays ii, 14; lateral-line scales 30–31; scales above lateral line 3½; scales below lateral line ≈10 or 11; predorsal scales ≈8–10; total gill rakers 14 (1), 15 (2) or 16

(1). See Table 2 for morphometric values. Body and caudal peduncle of moderate depth; snout of moderate length. Scaly basal sheath on dorsal and anal fins not more than 1 or 1½ scales deep. Posterior corner of mouth immediately posterior to vertical through forward extent of orbit. Upper jaw with first prominent anterior canine ≈½ to ⅓ length of second; about 4–12 small teeth on dental ridge; usually single prominent canine at posterior end of jaw. Lower jaw with first prominent anterior canine ≈½ to ⅗ length of second; teeth on dental ridge in a single row, usually separable into 2 series; first series of 6–9 teeth close behind anterior canines, small anteriorly, becoming progressively longer posteriorly, 6–10 uniformly short teeth in second series. One or 2 canines on vomer. Pelvic fin distinctly not reaching anus.

Largest specimen examined 59 mm SL.

Pigmentation in alcohol. Juveniles—pale with narrow dusky line midlaterally from snout to below posterior portion of dorsal fin and large dark spot just above center of caudal-fin base. Small dark spot at anterior end of dorsal fin.

Initial-phase adults (Fig. 12)—body pale with distinct dark spot on operculum and caudal-fin base. Opercular spot circular with flattened posterior edge, slightly larger than pupil of eye, dorsoposteriorly on opercle immediately above level of dorsal-most pectoral-fin ray base, but not extending onto membranous opercular flap; largest specimen with ocellated opercular spot at posterior end of narrow dusky stripe directed posteriorly from posterior center of orbit. Spot on caudal-fin base slightly smaller than opercular spot, immediately above lateral line at posterior edge of hypurals. Dorsal fin pale with dark spot between first 3 spines. Anal, caudal and pectoral fins pale. Pelvic fin pale with dusky streaks in freshly preserved specimens.

Terminal-phase adults—as described for initial-phase adults except dark area on dorsal fin covering membrane between first 3 spines extending as dark submarginal stripe to just beyond tip of last spine, dark stripe separated from distal edge of fin by narrow pale marginal stripe.

Colour in life. Juveniles (Plate 1C)—yellow with narrow black line just above lateral midline from snout to below posterior portion of dorsal fin and large dark spot ocellated with paler yellow just above center of caudal-fin base. Black spot on operculum developing with growth. Medial fins yellow; black spot at anterior end of dorsal fin; caudal fin with posterior corners hyaline, making margin of pigmented area broadly pointed centrally. Paired fins hyaline.

Initial-phase adults (Plate 1D)—body yellowish to pinkish with 5 narrow red stripes, underside of head and body below level of ventralmost stripe white. Dorsalmost red stripe originating anterodorsally on head, passing posteriorly just below dorsal-fin base to posterior end of fin base; second stripe directed posteriorly from dorso-

Fig. 12. *Bodianus bimaculatus*, adult, 48.8 mm SL, USNM 208347, paratype, Agulpelu, Palau Islands (photo reversed).

posterior edge of orbit to dorsal side of black spot on caudal-fin base; fourth stripe extending from dorsal corner of pectoral-fin base to caudal-fin base slightly below center of base; fifth stripe running from center of pectoral-fin base posteriorly to lower fourth of caudal peduncle. Black spot ocellated in yellowish white or pink at base of caudal fin just above lateral line. Head pink to reddish above ventral edge of eye, white below; large black spot rimmed with yellow dorsoposteriorly on operculum at posterior end of narrow reddish grey stripe directed posteriorly from posterior center of orbital edge; reddish stripe directed posteroventrally from posteroventral edge of orbit to opercular edge; broad yellow stripe directed posteriorly from upper lip and corner of mouth to opercular edge. Dorsal fin white with black spot between anterior 3 spines, continued posteriorly as grey submarginal streak on last 10 spines and intervening membranes, and broad yellow basal stripe with narrow submarginal yellow stripe; fleshy tips of spines white. Anal fin white with broad basal yellow stripe and broad submarginal yellow stripe. Caudal fin white with 5 angled longitudinal yellow stripes; midlateral stripe narrow, remaining 4 broad; dorsal-most and ventralmost stripes diffuse distally. Pectoral fin transparent with broad yellow band on fleshy base extending onto proximal ends of rays. Pelvic fin white with elongate yellow spots and marks.

Terminal-phase adults (Plate 1E)—lemon yellow or mostly scarlet above lower edge of pectoral-fin base and white below; scarlet individuals with coloration intensified in those areas corresponding with stripes described for initial-phase adults; yellow individuals with mauve stripe midlaterally on head and sides, overlain with large red patch-like spots extending ventrally on sides and faint reddish brown stripe just above from rear edge of eye to caudal-fin base; black opercular spot as described for initial-phase adult. Spinous portion of dorsal fin with black submarginal stripe expanded to cover membranes between first three spines, bright blue distal margin, and grey basal portion; soft portion of fin with broad yellow submarginal and basal stripes. Anal fin yellow with broad blue submarginal stripe. Caudal fin mostly yellowish. Pelvic fin bluish white with lengthwise elongate golden blotches.

Colour illustrations of the species appear in Masuda *et al*. (1975, p. 103, fig. F; 1984 pl. 195M, initial-phase adult), Allen & Steene (1987, pl. 83-6, terminal-phase adult), Randall *et al*. (1990, p. 299 top, initial-phase adult), Kuiter (1992, p. 148C, adult; 1998, p. 179, lower right, adult), Kuiter & Debelius (1994, p. 219, lower left, terminal-phase adult), Okamura & Amaoka (1997, p. 466, adults) and R.F. Myers (1999, pl. 108H, adult).

Distribution. This species is known from the Shizuoka Prefecture in Japan (Masuda *et al*., 1975), the Palau Archipelago, New Guinea, New Britain, New Caledonia, Poor Knights Islands in New Zealand (Francis, pers. comm.) and Queensland, Australia, in the western Pacific, and Madagascar, Mauritius and the Maldives in the Indian Ocean (Fig. 10). As in the other deep dwelling species of the subgenus *Trochocopus, B. bimaculatus* will undoubtedly prove to be more widely distributed with future collecting. The species is among the shallowest ranging members of the subgenus having been collected in depths of 30–60 m. Allen (1973) reported the species as "being moderately common" on deep reefs associated with vertical dropoffs in Palau.

Etymology: *bimaculatus*, from the Latin *bis*, "two or twice" and feminine noun *macula*, "spot", in reference "to the characteristic black spots on the opercle and caudal peduncle" (Allen, 1973).

Comparison. *Bodianus bimaculatus* is distinguishable from all members of the subgenus, except *B. izuensis* and *B. masudai*, by its low lateral-line scale count (30–31 + 2, versus 34–46 +2). It differs from the latter two in having a higher total number of rakers on the first gill arch (16–17, versus 14–15) and lacking distinct body stripes (*B. izuensis* with black stripes and *B. masudai* with red stripes that often fade in preservation). *Bodianus bimaculatus* is further separable from *B. masudai* in having 14 rather than 15 branched pectoral fin rays.

Discussion. This is the smallest species of *Bodianus* known. Maturity is attained in some females at 40 mm SL and in some males at 48 mm. It is rivalled in diminutive size only by the closely related *B. izuensis*, in which males mature by 82 mm.

Although there appear to be red and yellow forms of this species, no morphological differences are apparent. Pyle (pers. comm.) observed juveniles and adults of both living together on deep reefs of Papua New Guinea, but did not see them interact. At depths in excess of 60 m, bright neon yellow individuals occurred in groups around isolated rocks on muddy slopes, and individuals with broader red lines on the flanks were more often seen near ledges or beneath overhangs on drop-offs. Additional material is required to assess the significance of these colour differences.

Material examined. **Indian Ocean**, MADAGASCAR, Tulear BPBM 17936 (1, 44.2); MAURITIUS, BPBM 22545 (3, 21.6–58.9). **Pacific Ocean**, PALAU IS., Agulpelu AMS I.16763-001 (2, 35.0–41.1, paratypes of *B. bimaculatus*), BPBM 12444 (1, 37.8, holotype of *B. bimaculatus*), USNM 208347 (1, 48.8, paratype of *B. bimaculatus*); INDONESIA, Ambon WAM P25233-010 (1, 40), P25239-001 (1, 70); NEW GUINEA, Madang BPBM 15871 (2, 27.8–40.3), Bootless Inlet WAM P29625-006 (1, 55); NEW BRITAIN, *Rabaul* BPBM 15725 (1, 53.6, cleared and stained), WAM P28180-004 (7, 18–41); NEW CALEDONIA, MNHN 1995-0008 (1, 48.5); AUSTRALIA, *Queensland*, Escape Reef AMS I.22608-011 (1, 63), I.22622-006 (1,40), WAM P27483-004 (1, 39).

Bodianus izuensis Araga & Yoshino

Figs 3c, 10, 13; Plate 1F–G; Tables 2–3

Bodianus izuensis Araga & Yoshino, *in* Masuda *et al*., 1975, p. 296, pl. 103, fig. G, Izu Oceanic Park, Shizuoka Prefecture, Japan.

Morphological diagnosis. Dorsal-fin rays XII, 9 (1) or 10 (4); caudal-fin rays 9 (1) or 10 (4) + 2 + 10; pectoral-fin rays ii, 14 (2) or 15 (8); lateral-line scales 30; scales above lateral line 4–4½; scales below lateral line 10½–12; predorsal scales ≈8–10; total gill rakers 14–18. See Table 2 for morphometric values. Body and caudal peduncle of moderate depth; snout short. Scaly basal sheath on dorsal and anal fins ½–2 scales in depth. Posterior corner of mouth just posterior to vertical through forward extent of orbit. Upper jaw with first prominent anterior canine slightly smaller than second; 2–10 moderately developed canines on dental ridge in small individuals, less distinct in larger specimens; 1–2 (usually 2) prominent canines at posterior end of jaw. Lower jaw with first prominent anterior canine slightly more than half size of second; teeth on dental ridge in 2 or 3 series, forming single row; first series with 3–9 small canines becoming progressively longer posteriorly, originating immediately posterior to anterior canines; first series followed by a series of 4–10 short canines, and sometimes 2 slightly larger canines terminally. 1 or 2 canines on vomer. Pelvic fin distinctly not reaching anus.

Largest specimen examined 91.9 mm SL.

Pigmentation in alcohol. Juveniles—body pale with three dark stripes, ventralmost about half as wide as those above; dorsal-most arising on top of snout and extending to top of caudal peduncle, separated by pale strip on dorsal midline from snout to posterior part of soft dorsal fin; second stripe extending from upper jaw to eye and beyond to base of caudal fin just above lateral midline; third running from corner of mouth through pectoral-fin base to lower half of caudal-fin base, section of stripe anterior to pectoral fin less intense than elsewhere. Fins pale or translucent, apart from dark stripe somewhat distally on spinous portion of dorsal fin.

Initial-phase adults (Fig. 13a)—body pale, usually with 3 broad dark jagged stripes; dorsal-most stripe originating just above anterior edge of orbit, passing posteriorly slightly below dorsal-fin base to about centralmost segmented rays where stripe meets fin base and becomes confluent with stripe of opposite side, combined dorsal stripe terminating at posterior edge of hypurals; second stripe originating on upper lip at tip of snout, passing horizontally backward through center of eye (interrupted by eye) to basal portion of caudal fin just above termination of lateral line; third stripe originating on posterior edge of operculum just anterior to upper half of pectoral-fin base, passing posteriorly across fin base to basal portion of caudal just posterior to ventral half of caudal peduncle, third stripe less distinct in larger individuals; portions of stripes on head also faint in larger specimens; head otherwise pale except for distinct large dark spot on opercular flap obscured in small specimens by second stripe; spot circular to somewhat dorsoventrally elongate, above level of dorsal-most pectoral-fin ray base and not extending to posterior edge of operculum. Dorsal fin pale to transparent with jagged broad dark stripe on distal half of fin just ventral to distal edge,

Fig. 13. *Bodianus izuensis*: (*a*) initial-phase adult, 54.7 mm SL, SMBL 72102, paratype, Izu Oceanic Park, Japan; and, (*b*) terminal-phase adult, 82.4 mm SL, SMBL 72103, paratype, Izu Oceanic Park, Japan.

stripe terminating near ventralmost segmented fin rays, stripe faint but broader near termination in larger individuals. Anal, pectoral and pelvic fins pale to transparent. Caudal fin pale to transparent with small dusky spot at center of fin base in small specimens.

Terminal-phase adults (Fig. 13b)—largest individuals examined, presumably representing terminal-phase adults, lacking or nearly lacking ventralmost dark lateral stripe on body of initial-phase adult and other dark markings except two dorsal stripes and dark opercular spot. In general, dark stripes become less intense anteriorly, ventrally and to some degree posteriorly, with increasing size. Largest specimen with middle stripe well developed on head, dark stripe on dorsal fin expanded anteriorly on soft portion of fin and with dark pigment scattered on caudal and anal fins.

Colour in life. Juveniles (Plate 1F)—white with 3 black stripes as described for preserved specimens, stripes with narrow reddish brown edges, especially anteriorly; ventralmost stripe becoming mostly reddish brown anterior to pectoral-fin base with growth.

Initial-phase adults (Plate 1G)—body white to yellowish white with 3 broad black on reddish brown stripes, dorsal 2 stripes usually black posterior to head, ventralmost stripe with extent of black fading with growth. Area on head between stripes reddish brown above, whitish below; large spot on operculum black. Dorsal fin yellow with very broad jagged black submarginal stripe on anterior ¾ of fin. Anal, caudal and pelvic fins yellow. Pectoral fin mostly transparent.

Terminal-phase adults—(see comment under *Pigmentation in alcohol*) some large individuals with ventralmost stripe missing from head and represented only by faint reddish brown stripe on body; dorsal two stripes reddish brown with black markings confined to irregular zigzag pattern on sides behind head; body and fins below middle stripe otherwise white. Largest specimen examined with two dorsal stripes broad, black and well defined; specimen with other black markings as described above.

Colour illustrations of this species appear in Masuda *et al*. (1975, p. 103, fig. G; 1984, pl. 195N, initial-phase adult), Kuiter (1992, p. 148, D, adult; 1993, p. 371, top left, adult, and top right, juvenile) and Okamura & Amaoka (1997, p. 466, bottom left, juvenile, bottom right, terminal-phase adult).

Distribution. *Bodianus izuensis* has been reported from off Shizuoka Prefecture, Japan (Fig. 10), near Sydney, Australia, and Bularia, New Caledonia. It occurs at depths of about 30–35 m on deep rocky reefs (Masuda *et al*., 1975).

Etymology: *izuensis*, named after the Izu Peninsula and Izu Oceanic Park, Shizuoka Prefecture, Japan, the locality in which this species was first collected.

Comparison. *Bodianus izuensis* is similar to *B. bimaculatus* with which it shares a low lateral-line scale count (see *Comparison* for that species), a somewhat less sharply pointed snout for the subgenus and a small maximum size. It is distinguishable from *B. bimaculatus* in having prominent black stripes on the body.

Discussion. Like *B. bimaculatus, B. izuensis* occurs at depths that are shallow for the subgenus, but is less widely distributed geographically, and probably has an anti-equatorial distribution.

Material examined. **Pacific Ocean**, JAPAN, *Shizuoka Pref*., Izu Oceanic Park SMBL F72102 (1, 54.7, paratype of *B. izuensis*), 72103 (1, 82.4, paratype of *B. izuensis*); NEW CALEDONIA, MNHN 1995-0009 (1, 54.4); AUSTRALIA, *New South Wales*, Botany Bay NMV A4830 (1, 91.9), A9518 (1, 42.5).

Bodianus masudai Araga & Yoshino

Figs 10, 14; Plates 1H–J; Tables 2–3, 5

Bodianus masudai Araga & Yoshino, *in* Masuda *et al*., 1975, p. 297, pl. 103, fig. H, Izu Oceanic Park, Shizuoka Prefecture, Japan

Morphological diagnosis. Dorsal-fin rays XII, 10; caudal-fin rays 10 + 12 + 10; pectoral-fin rays ii, 15; lateral-line scales 31; scales above lateral line 4½; scales below lateral line ≈11; predorsal scales ≈11 or 12; total gill rakers 14 (1) or 15 (1). See Tables 2 and 4 for morphometric values. Body slender; caudal peduncle of moderate depth; head and snout elongate. Scaly basal sheath on dorsal and anal fins no more than 1 scale in depth. Posterior corner of mouth immediately anterior to or on vertical through anterior extent of orbit. Upper jaw with first prominent anterior canine equal to or slightly smaller than second; ≈9 or 10 canines of moderate length on dental ridge in largest specimens, best developed posteriorly; prominent canine at posterior end of jaw. Lower jaw with first prominent anterior canine ≈½–¾ size of second; dental ridge on anterior half of jaw nearly smooth in small specimens, with 3–7 small canines in larger individuals; first series followed by 4–7 moderately long canines and third series of 0–4 much smaller canines. Vomer with or without 1 or more canines. Pelvic fin distinctly not reaching anus.

Reaches at least 149 mm SL.

Pigmentation in alcohol. Juveniles—body pale with 3 moderately broad dark stripes; dorsal-most originating on tip of snout, passing posteriorly above eyes onto nape and along base of dorsal fin, terminating middorsally on caudal peduncle, intervening dorsal surface of head dusky; second stripe directed from lateral side of snout tip to anterior rim of orbit, and from posterior edge of orbit to caudal peduncle just above lateral line; large anteriorly tapering dark spot superimposed on second stripe midway between posterior edge of preopercle and posterior margin of opercular flap above level of pectoral-fin base in larger specimens; third stripe passing posteriorly from ventral margin of eye across ventral half of pectoral-fin base, horizontally to posterior end of anal-fin base, merging with second stripe across caudal peduncle; additional narrow dusky stripe extending from lower side of head beneath posterior extent of eye along ventral profile of body and anal-fin base to proximal

Fig. 14. *Bodianus masudai*, adult, 109 mm SL, SMBL 72081, paratype, Seto-Zaki, Japan (photo reversed).

end of last ray. Dorsal fin dark with narrow pale outer margin. Anal fin dark with narrow pale edge ventrally. Caudal fin dark, an extension of dark area on caudal peduncle, with pale outer edge. Pectoral fin pale; pelvic fin dark.

Adults (Fig. 14)—body in small recently preserved specimens mostly pale with 3 faint dusky stripes, dorsal-most stripe directed posteriorly from dorsoposterior side of eye, passing along back just ventral to dorsal-fin base and terminating at posterior end of base; second stripe directed posteriorly from center of posterior orbital edge to dorsolateral surface of caudal peduncle slightly before posterior edge of hypurals; third stripe directed from posteroventral edge of orbit to fleshy pectoral-fin base, then posteriorly to center of caudal-fin base just past posterior edge of hypurals. Head with large circular to diamond-shaped dark spot on operculum reaching to posterior edge of opercular flap. Spot above proximal end of dorsal-most pectoral-fin ray but usually extending ventrally below level of ray base as narrow dark margin on operculum; dark margin reaching ventrally to level of center of pectoral-fin base in one specimen. Dorsal, anal and caudal fins pale with faint dusky markings in recently preserved material; dorsal fin with large dusky spot between anterior 3 spines and broad dusky marginal stripe between about first and sixth segmented rays; caudal fin with very broad dusky distal band interrupted midlaterally by broad pale space; anal fin with irregular dusky marginal stripe, stripe expanded in breadth between first and second, sixth and ninth, and tenth and twelfth segmented rays. Pelvic fin pale basally with large dark spot covering distal portion of fin; spot covering most of fin in small specimens, confined to distal tip in larger individuals.

Colour in life. Juveniles (Plate 1H)—as described above with darkly pigmented areas black, yellow spaces (at least in Japanese population) separating three black stripes on body, and remaining pale areas white; mid-dorsal portion of head and nape brownish.

Adults (Plate 1I, 1J)—body with 3 broad red stripes on white background in Southern Hemisphere individuals; in Northern Hemisphere individuals background yellow dorsally, undersurface of body below ventral stripe white; dorsal stripe covering dorsal surface of body from above eye to posterior end of dorsal-fin base; second stripe originating on anterior tip of snout, interrupted by eye, then continuing posteriorly to termination on fleshy caudal-fin base just above posterior end of lateral line; third stripe directed posteriorly across dorsal half of fleshy pectoral-fin base onto flanks, terminating on fleshy caudal-fin base just below posterior end of lateral line; large intensely black spot superimposed on middle stripe at opercular edge. Dorsal fin red with narrow white or yellow dorsal stripe expanding posteriorly to cover posterior tip of fin; membrane between first 3 spines blackish, at least basally; distal half of fin between first and sixth segmented rays black. Anal fin red with narrow white basal stripe and irregular black marginal stripe. Caudal fin membrane black, black area sometimes separated into dorsal and ventral components by irregular red midlateral stripe; fin rays red, at least basally. Pectoral fin transparent. Pelvic fin white basally, intensely black distally.

Colour illustrations of this species appear in Masuda *et al*. (1975, p. 103, fig. H; 1984, pl. 195O), Burgess & Axelrod (1972 p. 130, fig. 211, as "possible *Bodianus oxycephalus*") and Okamura & Amaoka (1997, p. 466, adult).

Distribution. *Bodianus masudai*, initially known only in Japan from the Shizuoka and Wakayama Prefectures in the north to Okinawa in south, has an antitropical distribution, recorded now also in the Southern Hemisphere from New Caledonia (Fourmanoir, pers. comm.; Fig. 10) and Norfolk Island. Specimens have been collected from rocky reefs at depths of 30–113 m, but the species may be more common at greater depths.

Etymology: *masudai*, named for Hajime Masuda who collected the holotype and co-authored the study in which the original description was presented.

Comparison. Of the eight species in the subgenus, *B. masudai* is unique in having a distinctly pointed snout and few lateral-line scales (31 +2). It resembles *B. neopercularis* of the western Pacific, *B. opercularis* of the western Indian Ocean and *B. sepiacaudus* of the western and central Pacific in having a prominent red striped colour pattern in adults, but differs from them in having the opercular spot reaching below the upper end of the pectoral-fin base and in having fewer lateral-line scales (35–46 + 2 collectively for the other three species). *Bodianus masudai* also differs from these three species in having the lowermost red body stripe of adults originating on the ventral edge of the eye rather than on the underside of the jaw. It appears to be most closely related to *B. sepiacaudus* in sharing with that species a distinctly patterned juvenile. Juveniles of both have prominent black stripes that coalesce on the caudal peduncle and fin. In *B. masudai*, the stripes on the dorsal half of the body are separated by a yellow or white interspace, whereas they are white in *B. sepiacaudus*. The configuration on the anterior end of the ventral body stripe of each species is like that of its respective adult.

Discussion. Northern Hemisphere individuals of this species appear to differ consistently from those occurring in the Southern Hemisphere in having distinct yellow interspaces between the prominent red stripes on the dorsal half of the body, but seem morphologically the same. Initial- and terminal-phase adults have not been distinguished in this species.

Material examined. **Pacific Ocean**, JAPAN, *Wakayama Pref*., Seto-zaki SMBL F72081 (1, 109, paratype of *B. masudai*), *Ryukyu Is*., Okinawa, Naha URB 78-0155 (1, 145); AUSTRALIA, *Tasman Sea*, Norfolk Ridge NMV A25112-001 (2, 84.5–85.5).

Bodianus neopercularis n.sp.

Figs 15–16; Plate 2A–B; Tables 2–4

Type material. HOLOTYPE: NMV A21610 (1, 97.2) Marshall Islands, Kwajalein Atoll, oceanside west reef between islands Ennubuj and Annylabegan, 9°15'N 167°30'E, 50 m, collected by J. Johnson, 28 March 1999. PARATYPE: NMV A21611 (1, 83.3) Marshall Islands, Kwajalein Atoll, oceanside west reef, 9°15'N 167°30'E, 50 m, collected by B. Greene, June 1999.

Diagnosis. A species of the subgenus *Trochocopus* with: ii, 15 pectoral-fin rays; 40–43 lateral-line scales; 11–12 predorsal scales; 15 total gill rakers; shallow body depth, 22.6–25.1% SL; long snout, 12.4–12.7% SL; eye of moderate size, orbital diameter 7.7–7.8% SL; shallow caudal peduncle, 13.2–14.1% SL; short posterior lobes on dorsal (8.7–12.2% SL) and anal (8.4–8.8% SL) fins; short pectoral

Table 4. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus opercularis* examined and types of *Bodianus neopercularis* n.sp.

	B. neopercularis n.sp. holotype	*B. neopercularis* n.sp. paratype	*B. opercularis*
number of specimens	1	1	8
standard length (mm)	97.2	83.3	44.0–112
body depth	25.1	22.6	20.9–24.6
head length	36.9	35.2	35.2–37.9
snout length	12.7	12.4	10.8–13.6
orbital diameter	7.8	7.7	6.2–8.4
predorsal length	38.5	36.5	—
preanal length	63.1	63.4	—
preanus length	59.6	61.7	—
dorsal-base length	52.7	49.1	48.7–53.0
anal-base length	27.6	27.3	22.3–27.6
caudal-peduncle depth	14.1	13.2	12.5–14.1
caudal-peduncle length	9.8	12.2	—
dorsal-fin length	1.4	61.3	56.6–64.4
anal-fin length	36.4	35.7	33.2–38.8
pectoral-fin length	17.7	15.6	15.4–18.3
pelvic-fin length	16.6	16.2	15.4–16.7
dorsal-fin spine 1	6.0	5.6	5.0–6.1
dorsal-fin spine 2	6.5	6.1	6.2–7.8
dorsal-fin spine 12	12.1	9.6	10.7–12.2
anal-fin spine 1	5.5	5.6	4.6–5.7
anal-fin spine 3	12.0	11.8	9.5–13.2
caudal-fin length—top	17.8	20.0	—
caudal-fin length—middle	20.1	19.2	19.4–22.3
caudal-fin length—bottom	19.2	18.5	—

fin, 15.6–17.7% SL; pelvic fin of moderate length, 16.2–16.6% SL; posterior corner of mouth at vertical midway between anterior extent of orbit and center of eye; dental ridge in upper jaw with several tooth tips near center of jaw and lower jaw irregular with several canines of moderate size about midway along ridge; vomerine teeth absent; adults with three broad lengthwise red stripes separated by narrow white to yellowish interspaces and black spot behind eye on operculum; anal fin red with narrow white distal stripe; and, pelvic fin with large red spot leaving only narrow white edges anteriorly and distally.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10 + 12 + 10; pectoral-fin rays ii, 15; lateral-line scales 40 (41 and 43) + 2; scales above lateral line 4½; scales below lateral line ≈12 (≈15); predorsal scales ≈11 (≈12); total gill rakers 15. See Tables 2 and 5 for morphometric values.

Fig. 15. *Bodianus neopercularis* n.sp., adult, 97.2 mm SL, NMV A21610, holotype, oceanside west reef between islands Ennubuj and Annylabegan, Kwajalein Atoll, Marshall Islands, 9°15'N 167°30'E, 50 m.

Body slender, caudal peduncle of moderate depth; head and snout elongate, pointed; dorsal outline of snout, forehead and nape straight in lateral profile; jaws not attenuate.

Scaly basal sheath on dorsal and anal fins very low, at most 1 scale in depth. Predorsal scales not quite reaching forward to above posterior extent of orbit on dorsal midline of head; scales lateral to midline reaching above posterior extent of orbit. Cheek scales not quite reaching forward to posterior corner of mouth, reaching markedly short of free preopercular edge posteriorly and ventrally, leaving broad naked preopercular margin; scales on subopercle reaching forward somewhat short of below anterior end of ventral preopercular edge; lower jaw naked. Lateral-line scales with singular, unbranched laterosensory canal tube flexed dorsoposteriorly near posterior edge of scale. Posterior edge of preopercle smooth. Posterior corner of mouth below about midpoint between anterior extent of orbit and center of eye. Gill rakers narrow, of moderate length and mostly simple; rakers slightly shorter on upper limb than on lower.

Upper jaw with first prominent anterior canine ≈⅔ length of second, first canine directed anteroventrally and curved ventrally; second distinctly curved, directed ventrally and very slightly laterally; dental ridge mostly irregular with several distinct tips of teeth; single prominent canine at posterior end of jaw, directed strongly anteriorly and somewhat ventrolaterally. Lower jaw with first prominent anterior canine ≈½ length of second; first canine directed anterodorsally then curved dorsally and slightly mesially; second directed mostly dorsally and slightly laterally; apex of dental ridge irregular with several canines of moderate size about midway along ridge. Vomerine teeth absent.

Posterior tip of dorsal fin narrowly rounded, not quite reaching posterior edge of hypurals. Posterior tip of anal fin nearly pointed, reaching or almost reaching posterior edge of hypurals. Caudal fin slightly rounded. Posterior edge of pectoral fin truncate dorsally, broadly rounded ventrally. Pelvic fin short, tip reaching well short of anus.

Pigmentation in alcohol. Initial-phase adults (Fig. 15)—body pale except for triangular dark spot about half width of eye on opercle; spot above level of pectoral-fin base midway between posterior edge of preopercle and posterior margin of opercle. Fins mostly pale except for dark spot between first 3 dorsal-fin spines, and dusky pigment posteriorly on pelvic fin.

Terminal-phase adults—similar to initial-phase adults with dark spot at front of dorsal fin much less apparent and dark opercular spot elongated vertically and greatly reduced to vertical dusky mark on one side of holotype, spot larger and darker on reverse side. Pelvic fin with only slight trace of dusky pigment posteriorly.

Colour in life. Initial-phase adults (Plate 2A)—body white with 3 broad red stripes separated by very narrow white interspaces; dorsal-most stripe running from midline of snout, above eye along base of dorsal fin to dorsal side of caudal peduncle, separated on dorsal midline of head and nape by very narrow white interspace; second stripe broadest, but only slightly, extending from tip of snout across eye to dorsal half of caudal-fin base; third directed from underside of head below posterior half of mouth across all but dorsal-most edge of pectoral-fin base to ventral third of caudal-fin base. Distinct triangular black spot on second stripe midway between free edges of opercle and preopercle.

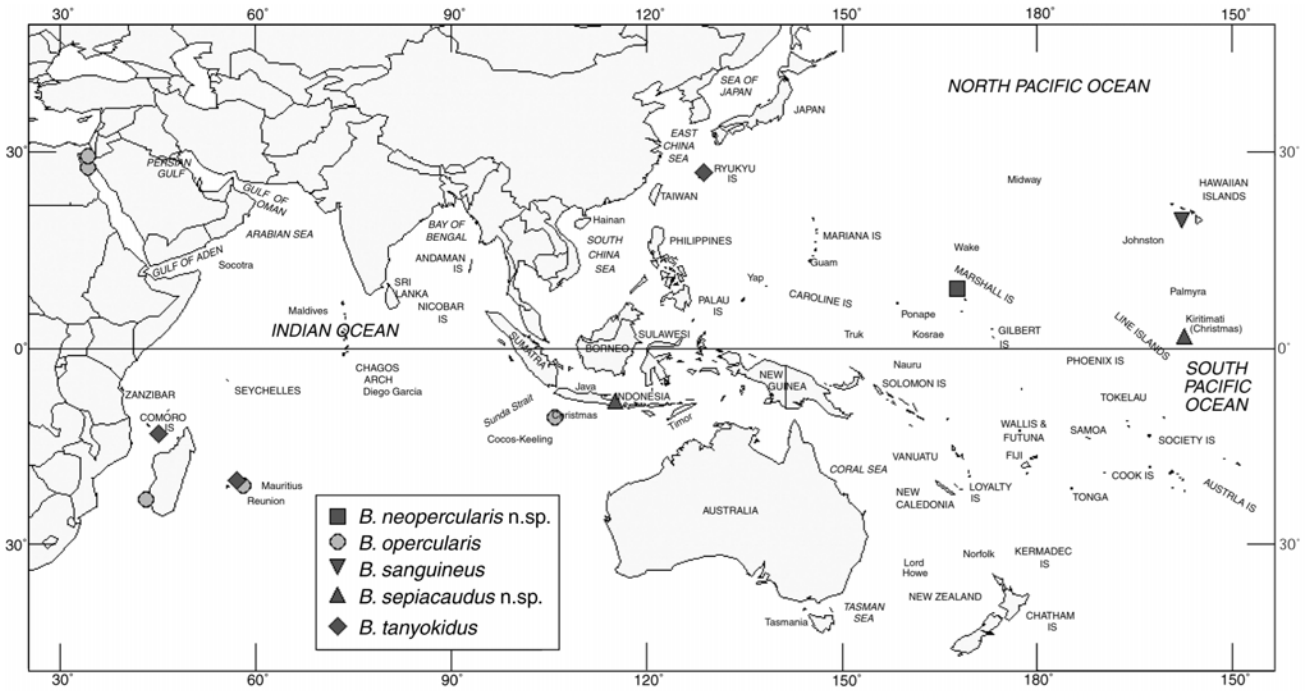

Fig. 16. Distributional records for specimens examined of selected species of the subgenus *Trochocopus*.

Dorsal fin red with narrow white basal and marginal stripes, transparent posteriorly. Anal fin red with narrow white distal stripe. Caudal fin with red extensions of second and third body stripes tapering posteriorly, and edged with narrow white margins; broadly transparent at corners. Pectoral fin transparent. Pelvic fin white with large oval red spot covering all but narrow anterior and anterodistal edges.

Terminal-phase adults (Plate 2B)—holotype as described for initial-phase adults but with narrower white to yellowish stripe-like interspaces on body, almost no dark opercular spot on left side, though spot better developed on right, and caudal fin more suffused with red.

A colour photograph of this species from Micronesia, misidentified as *B. opercularis*, appears in R.F. Myers (1999, pl. 109G, adult).

Distribution. *Bodianus neopercularis* is known with certainty only from the 2 types collected at Kwajalein Atoll, in the Marshall Islands (Fig. 16), but is no doubt more broadly distributed. The types were collected on vertical dropoffs at depths of about 50 m.

Etymology: *neopercularis*, from the Latin *ne* "not" and neuter noun *operculum* "cover", to indicate that this species has the appearance of *B. opercularis*, but is a separate species.

Comparison. The very similar *B. neopercularis* and *B. opercularis* differ only in detail, including the deeper and less pointed head of the former, in specimens of comparable size, and differences in coloration. In *B. neopercularis*, pale spaces between red horizontal stripes are narrower and red stripes slightly broader in specimens of equivalent size, the dorsal-most stripe impinges little if at all onto the base of the dorsal fin, the ventralmost stripe covers virtually all of the pectoral-fin base, the black opercular spot is smaller and diminishes in size with growth, dorsal fin has a black mark between the anterior spines, the red on the anal fin is more expansive covering all but a narrow white distal margin, the red on the pelvic fin encompasses all but the white narrow anterior and broader anterodistal edges, and the broad transparent or whitish corners of the caudal fin become suffused with red in larger specimens.

Discussion. *Bodianus opercularis* and *B. neopercularis* probably represent allopatric cognates currently confined in distribution to the Indian and Western Pacific Ocean basins, respectively.

Bodianus opercularis (Guichenot)

Figs 3d, 16–17; Plate 2C–D; Tables 2–4

Cossyphus opercularis Guichenot, 1847, p. 283, Madagascar or Bourbon (Réunion).
Trochocopus opercularis Günther, 1862, p. 100, Mauritius?
Cheiliopsis bivittatus Steindachner, 1863, p. 1113, Mauritius.

Morphological diagnosis. Dorsal-fin rays XII, 9 (2) or 10* (11); caudal-fin rays 10 + 12 + 8 (1), 9* (9) or 10 (2); pectoral-fin rays ii, 14 (4) or 15 (17); lateral-line scales 40 (1), 41 (5), 42 (6), 43* (3), 44 (1) or 46 (1); scales above lateral line 3*–4½; scales below lateral line ≈13*–14½; predorsal scales ≈9–13; total gill rakers 15 (1), 16 (3) or 17 (3). See Tables 2 and 5 for morphometric values. Body slender, caudal peduncle of moderate depth; head and snout elongate. Scaly basal sheath on dorsal and anal fins at most 1½ scales in depth. Posterior corner of mouth at vertical midway between anterior extent of orbit and center of eye. Upper jaw with first prominent anterior canine slightly smaller than second; dental ridge mostly smooth or with several to numerous very small teeth; single prominent canine at posterior end of jaw. Lower jaw with first prominent anterior canine ≈½–⅔ length of second; dental ridge with 2 series of teeth, anterior series with 7–12 short canines arising close behind anterior canines, becoming progressively longer posteriorly, second series with 7–12 very short close set canines immediately following first series. Vomerine teeth absent. Pelvic fin distinctly not reaching anus.

Pigmentation in alcohol. Juveniles (Fig. 17a)—body pale with 3 moderately broad dusky stripes; dorsal-most stripe originating anterodorsally on nape, passing posteriorly along base of dorsal fin and terminating middorsally on caudal peduncle; second stripe directed from side of snout tip to anterior rim of orbit, and from posterior edge of orbit to scaly caudal-fin base just above posterior end of lateral line, segment of stripe on head posterior to eye prominent; large anteriorly tapering dark spot superimposed on second stripe midway between posterior edge of preopercle and posterior margin of opercular flap above level of pectoral-fin base; third stripe passing posteriorly from cheek below eye, across ventral half of pectoral-fin base, along base of anal fin to ventral side of scaly caudal-fin base; dark spot on stripe on ventral half of fleshy pectoral-fin base and basal tips of fin rays (on lateral and axial side of fin). Dorsal fin pale with broad dusky marginal stripe reaching posteriorly to about fourth segmented ray; anterior end of stripe covering entire membrane between first 2 spines, posterior end of stripe between tips of first 4 segmented rays somewhat darker. Anal fin pale with posteriorly broadened dusky basal stripe, distal outline connecting base of third spine and tip of last segmented ray, distal edge of stripe somewhat darker than basal portion, manifested as narrow midlateral stripe in faded specimens. Caudal fin pale with dusky extensions of 3 body stripes; dorsal-most extension angled from dorsal end of fin base to posterior edge of fin slightly above center; second directed in 2 or 3 very narrow dusky stripes from just above center of caudal-fin base to center of posterior edge of fin; third extending from ventral end of fin base to posterior edge of fin slightly below center. Pectoral and pelvic fins pale.

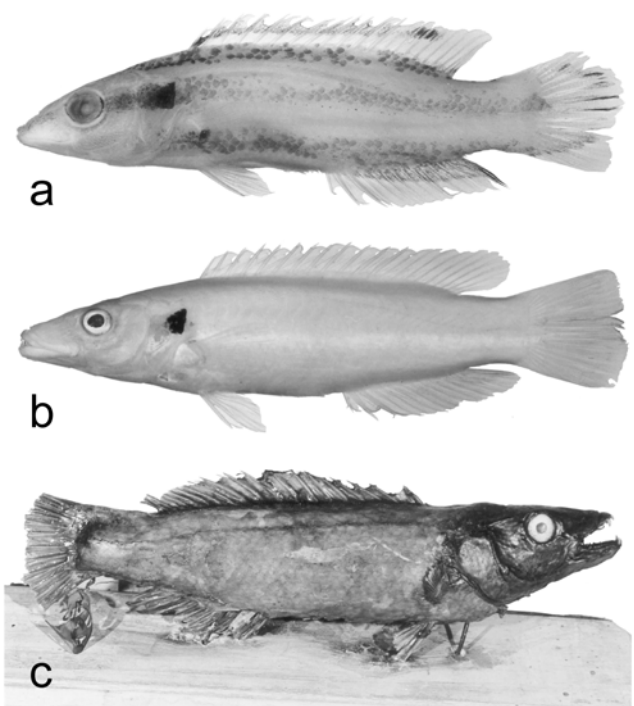

Fig. 17. *Bodianus opercularis*: (*a*) juvenile, 52.8 mm SL, BPBM 20454, Mauritius (photo reversed); (*b*) adult, 112 mm SL, BPBM 20455, Elat, Israel; and, (*c*) adult, 143 mm SL, MNHN A. 8271, lectotype, Madagascar.

Adults (Fig. 17b)—body pale except for dark spot, slightly smaller than eye on opercle; spot almost square to circular, usually tapered anteriorly, above level of pectoral-fin base midway between posterior edge of preopercle and posterior margin of opercle. Fins mostly pale except for remnants of dusky juvenile stripes, including marginal stripe on dorsal fin (particularly along tips of first 4 segmented rays), darker distal margin of basal stripe on anal fin (especially at posterior tip of fin), and distal half of narrow midlateral stripes on membranes between middle 3 or 4 caudal-fin rays. Recently preserved specimens with 1–3 very pale moderately narrow stripes on body, most apparent running from tip of snout to just below posterior center of caudal peduncle, others extending from above orbit to dorsal side of caudal peduncle and along underside of body from below eye to posterior end of anal-fin base.

Colour in life. Juveniles (Plate 2C)—as described below for adults except red stripes on body and fins suffused with black, especially at anterior end of dorsal fin, posteriorly on dorsal fin (forming blackish spot between last spine and fourth segmented ray) and ventrally on pectoral-fin base; pelvic fin almost entirely white.

Adults (Plate 2D)—body white with 3 moderately broad red stripes; dorsal-most stripe running from above eye along base of dorsal fin to dorsal side of caudal peduncle; second stripe broadest, extending from tip of snout across eye to dorsal half of caudal-fin base; third directed from underside of head below posterior half of mouth across ventral half of pectoral-fin base to ventral third of caudal-fin base. Distinct black spot on second stripe midway between free edges of opercle and preopercle. Dorsal fin white, transparent posteriorly, with dorsal-most red body stripe overlapping on basal edge of fin and moderately broad red submarginal stripe terminating posteriorly near fourth segmented ray. Anal fin white with moderately broad red basal stripe. Caudal fin whitish with red continuations of second and third body stripes; second stripe extending in moderately narrow midlateral red line to center of posterior edge of fin; third angled as moderately broad stripe to posterior edge of fin just below center; narrow red horizontal line on distal half of fin just above midlateral stripe; distinct white spot basally above midlateral red stripe; second white spot or extension of background white of body basally between midlateral stripe and angled ventral stripe. Pectoral fin transparent. Pelvic fin white with red spot on distal half of fin.

Colour illustrations of this species appear in Gomon & Madden (1981, Fig. 1, adult) and Allen & Steene (1987, pl. 83, 5, adult).

Distribution. *Bodianus opercularis* occurs in the Red Sea and Indian Ocean (Fig. 16) from the Gulf of Aqaba in the north to Madagascar and Mauritius in the south and Christmas Island to the east. The species is found along the eastern coast of Africa, as indicated by photographs provided by M. Smith of specimens collected in Tiwi, Kenya. *Bodianus opercularis* occurs at intermediate depths for this subgenus, having been taken in 42–61 m on deep rock and coral reefs and along vertical dropoffs.

Etymology: *opercularis*, from the neuter Latin noun *operculum* "cover", in reference to the prominent black spot on the gill cover of this species.

Comparison. *Bodianus opercularis* most closely resembles *B. neopercularis, B. sanguineus* and *B. tanyokidus* in having numerous lateral-line scales (together 36–46) and a sharply pointed head. It is separable from the last two in possessing 10 dorsal and 8–10 (rarely 10) ventral unbranched caudal-fin rays (versus 11–12 and 10–11), in having a distinct red-striped livery and in lacking a prominent dark spot near the center of the scaly caudal-fin base (spot fades with preservation in *B. tanyokidus*). It differs from *B. neopercularis* as described in *Comparison* for that species. It is similar to *B. sepiacaudus* in general coloration but the black pigmentation of juveniles does not persist in adults, nor does it have the lateral body stripes broadly fused on the caudal peduncle at any size. *Bodianus sepiacaudus* is separable from *B. opercularis* in having many fewer lateral-line scales (34 + 2).

Discussion. Distinct initial- and terminal-phase colour patterns were not observed in this species.

Some confusion has arisen about the synonymy of *B. opercularis, B. sanguineus* and *B. tanyokidus* (see Gomon & Madden, 1981 for detailed synonymies of *B. opercularis* and *B. tanyokidus*) due to their similarity, especially in long preserved specimens, the paucity of specimens of all three in collections, and the present poor condition of the syntypes of *B. opercularis* (Fig. 17c). Guichenot's description of *Cossyphus opercularis* (1847), although detailed, does not touch on any definitive character relative to the three. This is understandable as the two specimens had been mounted and dried before Guichenot had the opportunity to examine them and had already faded to a nearly uniform yellow colour. Still, a faint stripe on the body, somewhat paler than the surrounding body colour just below the lateral midline, is still visible on one of the specimens. The stripe is presumed to be the same remnant of a white interspace separating adjacent red stripes that is apparent in more recently preserved specimens of *B. opercularis*. The larger of the two syntypes of *Cossyphus opercularis*, MNHN A.81, having approximately the same total length reported in Guichenot's description, "17 cent.", is here designated the lectotype.

Günther (1862) described his *Trochocopus opercularis* from a mounted specimen originally belonging to a Dr Janvier. The two syntypes of Guichenot's *C. opercularis* were similarly recorded as coming from Janvier and were prepared in the same manner. In Günther's study Guichenot's species was reported as originally described, and then recognized as a senior synonym of *T. opercularis* in an appendix (p. 506).

Although the type of Steindachner's (1863) *Cheiliopsis bivittatus* was not examined, his description is detailed. Based on the present understanding of the distributions of species that share the morphological characters presented in the description, Steindachner's species is clearly *B. opercularis*.

Material examined. **Red Sea**, GULF OF AQABA, *Elat* BPBM 20455 (1, 112), HUJF 7004 (1, 103), USNM 217905 (1, 88.4), *Ras Muhammad* BPBM 20772 (2, 44.0–103), 20800 (2, 86.6–105). **Indian Ocean**, MADAGASCAR, MNHN A. 8271 (1, 143, lectotype of *C. opercularis*), A. 8272 (1, 123, paralectotype of *C. opercularis*); MAURITIUS, BMNH 1840.12.12.12 (1, 119, holotype of *T. opercularis*), 1879.3.4.4 (1, 126), BPBM 20454 (1, 52.8), 21025 (2, 58.2–79.4), RUSI 1213 (2, 117–132); CHRISTMAS I., WAM P26108-001 (1, 104).

Bodianus sanguineus (Jordan & Evermann)

Figs 16, 18; Plate 2E–F; Tables 2–3

Verriculus sanguineus Jordan & Evermann, 1903, p. 191, Hilo, Hawaiian Islands.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 12 + 12 + 11; pectoral-fin rays ii, 15; lateral-line scales 38 (2), 39* (3) or 40 (1); scales above lateral line 4½; scales below lateral line ≈14; predorsal scales ≈9* or 10; total gill rakers 15. See Table 2 for morphometric values.

Body moderately slender, caudal peduncle of moderate depth, head and snout elongate. Scaly basal sheath on dorsal and anal fins at most ½ scale in depth. Posterior corner of mouth below anterior extent of orbit. Prominent anterior canines of upper jaw about equal in size; usually several small teeth midway along jaw followed by 3 larger teeth; prominent canine at posterior end of jaw. First prominent anterior canine of lower jaw about ¾ length of second; teeth posterior to anterior canines in 2 series, first with 9–11 teeth beginning close behind second canine, small anteriorly, progressively longer posteriorly, those in large individuals often in irregular sized and spaced groups; 3–11 (usually 6 or more) uniformly small, close set teeth in second series. One or more canines on vomer. Pelvic fin short, not reaching anus.

Largest specimen examined 149 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 18a)—as described below for adults except without dark marginal line on opercle extending below dorsal side of pectoral-fin base and without dusky stripe on body.

Adults (Fig. 18b)—body mostly pale with dark spot on dorsoposterior margin of operculum and another on base of caudal fin; opercular spot large, triangular, abruptly tapered anteriorly, extending from corner of mouth nearly to posterior edge of preopercle; diffuse faint black stripe

Fig. 18. *Bodianus sanguineus*: (*a*) juvenile, 58.9 mm SL, BPBM 17244, Oahu, Hawaiian Islands (photo by W. Madden); and, (*b*) adult, 134 mm SL, BPBM 20799, Hawaii, Hawaiian Islands (photo by J. Randall, reversed).

extending from posterior edge of orbit to above pectoral-fin base; black spot on opercle superimposed on blackish stripe (with narrow black extension passing ventrally along posterior margin of opercle in large specimens); short black streak on snout in front of lower edge of eye; small black spot at base of caudal fin just above lateral line. Dorsal fin yellow; spinous portion edged in violet with violet stripe along basal half. Caudal fin yellow. Anal fin deep red. Pelvic fins yellow. Pectoral fins reddish with yellow base.

Colour in life. Juveniles (Plate 2E)—as described below for adults except posterior end of caudal peduncle mostly yellow.

Adults (Plate 2F)—(in part after Jordan & Evermann, 1905) head and trunk deep red; broad yellow stripe with reddish hue on dorsal half of body from just behind eye along back beneath dorsal fin to dorsal side of caudal-fin base; lips mostly yellow; horizontal yellow stripe from corner of mouth nearly to posterior edge of preopercle; diffuse faint black stripe from posterior edge of orbit to above pectoral-fin base; black spot on opercle superimposed on blackish stripe, with narrow black extension passing ventrally along posterior margin of opercle in large specimens; short black streak on snout in front of lower edge of eye; small black spot at base of caudal fin just above lateral line. Dorsal fin yellow; spinous portion edged in violet with violet stripe along basal half. Caudal fin yellow. Anal fin deep red. Pelvic fin yellow. Pectoral fin reddish with yellow base.

A colour illustration of this species appears in Jordan & Evermann (1905, pl. 25, adult).

Distribution. *Bodianus sanguineus* is known from only three specimens taken in deep waters off the Hawaiian Islands of Hawaii and Oahu (Fig. 16). Its poor representation in collections is undoubtedly due to its deep distribution, as R. Pyle (pers. comm.) reported he has seen it on almost every dive he has made in excess of 100 m off Hawaii. He encountered it most often in pairs, one individual usually being much larger than the other. The species appears to be among the deepest ranging of the subgenus, having been collected at depths of 67 to 238 m, though apparently preferring depths of 100–120 m.

Etymology: *sanguineus*, a Latin adjective meaning "bloody" or "blood-red", in reference to the bright red coloration of this species.

Comparison. *Bodianus sanguineus* most closely resembles *B. neopercularis, B. tanyokidus* and *B. opercularis* in having a sharply pointed snout and relatively numerous lateral line scales (38–46 + 2 in the three). It differs from the last 3 species in having 12 dorsal and 11 ventral unbranched caudal-fin rays (rather than 10–11 and 8–10 rays, respectively) and in possessing vomerine teeth.

Discussion. Distinct initial- and terminal-phase colour patterns have not been reported for this species. The specific name *sanguineus* has been misapplied on two occasions to *B. tanyokidus* as discussed by Gomon & Madden (1981).

Material examined. **Pacific Ocean**, HAWAIIAN ISLANDS, *Oahu* BPBM 17244 (1, 58.9), *Hawaii* BPBM 20799 (1, 134), Hilo USNM 50677 (1, 149, holotype of *V. sanguineus*).

***Bodianus sepiacaudus* n.sp.**

Figs 16, 19; Plate 2G–H; Tables 2–3,5

Type material. HOLOTYPE: NMV A 18420 (1, 70.0) Indonesia, Bali (?), 1996, via Scott W. Michael. PARATYPES: BPBM 37402 (1, 86.7) Line Islands, Kiritimati Atoll, west side, 45 m (150 feet), local divers, via Phil Wilder, September, 1996; BPBM 37425 (1, 73.2) Line Islands, Kiritimati Atoll, local divers, via Phil Wilder, December, 1996; NSMT-P 61459 (1, 73.0) unknown locality, acquired though Hawaiian aquarium fish supplier, via H. Tanaka and O. Kubota, March 1999.

Fig. 19. *Bodianus sepiacaudus* n.sp., adult, 70.0 mm SL, NMV A 18420, holotype, Indonesia, Bali (precise locality in doubt, see *Discussion*).

Diagnosis. A species of the subgenus *Trochocopus* with: ii, 14–15 pectoral fin rays; 35–40 lateral-line scales; 12–13 scales below lateral line; 11–12 predorsal scales; 13–15 total gill rakers; shallow body, depth 22.3–25.0% SL; eye of moderate size, orbital diameter 6.9–7.7% SL; narrow interorbital space, 5.1–5.9% SL; shallow caudal peduncle, 12.8–14.1% SL; short posterior lobes on dorsal (8.9–11.7% SL) and anal (7.9–12.1% SL) fins; short pectoral fin, 16.2–17.3% SL; pelvic fin of moderate length, 15.1–17.1% SL, tip reaching midway between fin origin and anus; posterior corner of mouth below anterior extent of orbit; upper jaw with first prominent anterior canine ≈¾ length of second; dental ridge smooth with regular series of granular teeth, one or two prominent canines at posterior end of jaw; lower jaw with first prominent anterior canine ≈½ length of second; dental ridge with 8–10 small erect canines increasing slightly in length from front to back, followed by 8–10 shorter teeth; vomerine teeth absent; pelvic fin short, tip midway between fin origin and anus; body white with three broad black lengthwise stripes in juveniles, ventral two merging on caudal peduncle and covering all by white outer margin of tail; and, adults with black stripes replaced by red anteriorly increasingly with growth, and prominent black spot on operculum behind eye, caudal fin black basally followed by broad white band circled with red.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10 (3) or 11* + 12 + 9 (2) or 10* (2); pectoral-fin rays ii, 14 (2) or 15* (6); lateral-line scales 35*, 36*, 37, 38 (2) or 40 (2) + 2; scales above lateral line 4* (2) or 4½; scales below lateral line ≈12 or 13* (2); predorsal scales ≈11 or 12*; total gill rakers 12, 14* (2) or 15. See Tables 2 and 4 for morphometric values.

Body moderately slender, caudal peduncle of moderate depth; dorsal outline of snout, forehead and nape straight in lateral profile; jaws not attenuate.

Scaly basal sheath on dorsal and anal fins very low, at most 1 scale in depth. Predorsal scales not quite reaching forward to above posterior extent of orbit on dorsal midline of head; scales lateral to midline reaching above posterior extent of orbit. Cheek scales not quite reaching forward to posterior corner of mouth, reaching markedly short of free preopercular edge posteriorly and ventrally, leaving broad naked preopercular margin; scales on subopercle reaching forward somewhat short of below anterior end of ventral preopercular edge; lower jaw naked. Lateral-line scales each with a singular, unbranched laterosensory canal tube flexed dorsoposteriorly near posterior edge of scale. Posterior edge of preopercle nearly smooth. Posterior corner of mouth reaching to below (or just posterior to that point) anterior extent of orbit. Gill rakers narrow, moderately long and mostly simple on lower limb; rakers much shorter on upper limb than on lower.

Upper jaw with first prominent anterior canine ≈¾ length of second, first canine directed anteroventrally and curved ventrally; second distinctly curved, directed ventrolaterally; dental ridge smooth with regular series of granular teeth, one* or two prominent canines posteriorly directed strongly anteriorly and somewhat ventrolaterally. Lower jaw with first prominent anterior canine ≈½ length of second; first canine directed dorsally and slightly mesially; second directed dorsolaterally; apex of dental ridge with 8–10 (7* and 9*) small erect canines increasing slightly in length from front to back, followed posteriorly by 8*–10 distinctly shorter teeth. Vomerine teeth absent.

Posterior tip of dorsal fin broadly rounded, not reaching posterior edge of hypurals. Posterior tip of anal fin narrowly rounded, not quite reaching posterior edge of hypurals. Caudal fin slightly rounded. Posterior edge of pectoral fin truncate dorsally, broadly rounded ventrally. Pelvic fin short, tip reaching just beyond midpoint between origin of fin and origin of anal fin.

Pigmentation in alcohol. Juveniles—body pale with 3 moderately broad dark stripes; dorsal-most stripe originating on tip of snout, passing posteriorly above eyes onto nape and along base of dorsal fin, terminating middorsally on caudal peduncle; second stripe directed from side of snout tip to anterior rim of orbit, and from posterior edge of orbit to caudal peduncle just above lateral line; large anteriorly tapering dark spot superimposed on second stripe midway between posterior edge of preopercle and posterior margin of opercular flap above level of pectoral-fin base in larger specimens; third stripe passing posteriorly from lower jaw across ventral half of pectoral-fin base, horizontally to posterior end of anal-fin base, fusing with second stripe across caudal peduncle; additional narrow dusky stripe extending from lower side of head beneath posterior extent of eye along ventral profile of body and anal-fin base to proximal end of last ray. Dorsal fin pale with dark basal and marginal stripes, basal stripe extending from dorsal body stripe. Anal fin pale with posteriorly broadened dusky basal stripe continuous with stripe on underside body. Caudal fin dark, a continuation of dark area on caudal peduncle, with pale outer edge. Pectoral and pelvic fins pale.

Initial-phase adults (Fig. 19)—pigmentation as in juveniles except stripes generally dusky with intensely dark areas progressively restricted to posterior part of body; spot on opercle remaining intensely dark at all sizes. Markings on fins likewise dusky with intensely dark area on caudal progressively restricted to base.

Terminal-phase adults—similar to initial-phase adults with dark areas only posteriorly, that associated with caudal fin confined to central portion of scaly base.

Colour in life. Juveniles (Plate 2G)—body pigmentation described above inky black, remaining pale areas immaculate white; dusky narrow stripe on underside of head somewhat reddish brown anteriorly; stripe passing through orbit red on eye.

Initial-phase adults (Plate 2H)—body white with red stripes obscured by black posteriorly, amount of red revealed progressively increasing with growth; distinct black spot on second stripe midway between free edges of opercle and preopercle. Dorsal fin white, transparent posteriorly, with dorsal-most red/black body stripe overlapping on basal edge of fin, moderately broad red/black submarginal stripe and white outer edge. Anal fin white with moderately broad red/black basal stripe confluent with adjacent stripe on body and hyaline outer margin. Caudal fin black basally (contiguous with black area on caudal peduncle) followed by broad white band and clear margin. Pectoral fin transparent. Pelvic fin apparently white.

Terminal-phase adults—as in initial-phase adults with black confined to posterior third of dorsal-most body stripe, extending irregularly forward to about pectoral-fin base on second and third stripes, and mostly absent from ventralmost stripe. Caudal fin with black area confined to scaly base, followed by narrow red band immediately posterior to it centrally, dorsally and ventrally, broad white band midway along the fin and narrow red marginal band.

Distribution. *Bodianus sepiacaudus* is known conclusively from Sulawesi (near Maliku) and Flores (Pomana Besar), Indonesia in the Western Pacific, and Fiji (Pyle, pers. comm.) and Kiritimati Atoll, Line Islands in the Central Pacific (Fig. 16). Kuiter (pers. comm.) has photographed it at depths of 25–50 m, noting that adults occur in groups along ledges on steep dropoffs at depths greater than 20 m, with juveniles observed at about 50 m.

Etymology: *sepiacaudus*, from the Latin nouns *sepia* "ink" and *cauda* "tail", in reference to the inky black caudal peduncle and base of the caudal fin that characterize this species.

Comparison. *Bodianus sepiacaudus* resembles *B. masudai, B. neopercularis* and *B. opercularis* within the subgenus *Trochocopus* in having prominent broad red longitudinal stripes running the length of the head and body in large adults. Like *B. neopercularis* and *B. opercularis*, this species is separable from *B. masudai* in having the stripe that passes through the pectoral-fin base directed onto the lower jaw rather than upwards to the ventral edge of the eye, in having the black opercular spot not reaching below the upper end of the pectoral-fin base and in lacking a black spot on the pelvic fin of adults. The diagnostic colour character states, however, are likely to be primitive, at least for the subgenus, as they are manifested elsewhere variously within and outside the subgenus. In contrast, the close similarity of colour patterns between juveniles of *B. masudai* and *B. sepiacaudus* suggests a sister relationship for the two as the basic pattern is both unusual and unique to these two

species within the genus, at least among those species for which the juvenile pattern is known. The longitudinal bands on the body of juveniles in both are intensely black and broadly fused to one another on the caudal peduncle and caudal fin, and are edged with white posteriorly. In the smallest specimens of *B. opercularis* examined, the body stripes are suffused with black posteriorly but don't merge on the caudal peduncle. The lateral-line scale count in *B. sepiacaudus* of 35–40 falls between those of *B. masudai* (31) and the caudal in both *B. neopercularis* and *B. opercularis* (40–46).

Discussion. This species was first brought to my attention by Kuiter (pers. comm.) in the form of photographs taken off Sulawesi and Flores, Indonesia in 1995. Subsequent photos of aquarium fish were received from Michael and Tanaka, with the holotype and paratypes eventually coming also through the aquarium trade. According to Michael (pers. comm.), the holotype was obtained from a wholesale dealer in Bali, but the fish may have come from elsewhere in Indonesia. The paratypes received from Pyle at the request of Randall, were taken by wholesale aquarium fish collectors at Kiritimati Atoll in the Central Pacific and maintained by an aquarium fish supplier in Honolulu until their death.

Table 5. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus masudai* examined and types of *Bodianus sepiacaudus* n.sp.

	B. sepiacaudus n.sp. holotype	*B. sepiacaudus* n.sp. paratypes	*B. masudai*
number of specimens	1	3	4
standard length (mm)	70.0	73.0–86.7	84.5–145
body depth	22.3	22.8–25.0	25.7–30.8
head length	36.9	34.8–36.3	36.0–37.9
snout length	12.7	10.4–11.6	11.1–13.5
orbital diameter	7.7	6.9–7.3	6.1–7.7
predorsal length	38.4	35.6–36.7	36.8–36.9
preanal length	63.3	62.6–65.6	67.1–69.6
preanus length	61.1	60.4–62.9	63.9–67.8
dorsal-base length	45.9	49.7–51.3	49.6–53.5
anal-base length	23.3	23.8–24.8	22.6–27.7
caudal-peduncle depth	13.4	12.8–14.1	14.6–16.7
caudal-peduncle length	13.3	13.3–14.2	11.2–12.6
dorsal-fin length	57.6	58.6–62.9	60.9–67.0
anal-fin length	32.7	32.5–36.9	33.7–39.6
pectoral-fin length	17.3	16.2–16.6	18.6–21.9
pelvic-fin length	17.1	15.1–16.8	17.6–19.0
dorsal-fin spine 1	6.1	4.9–5.5	5.6–6.3
dorsal-fin spine 2	7.4	5.9–6.8	6.8–7.5
dorsal-fin spine 12	11.6	9.3–10.4	11.2–11.9
anal-fin spine 1	6.3	4.0–4.5	5.1–5.6
anal-fin spine 3	11.3	9.4–9.9	10.0–12.4
caudal-fin length—top	19.6	15.0–18.0	20.2–20.8
caudal-fin length—middle	20.9	14.6–19.1	20.4–25.9
caudal-fin length—bottom	19.6	16.1–17.5	—

Bodianus tanyokidus Gomon & Madden

Figs 16, 20; Plate 2I, Tables 2–3

Bodianus tanyokidus Gomon & Madden, 1981, p. 122, figs 2 and 3, Mauritius.

Morphological diagnosis. Dorsal-fin rays XII, 10; caudal-fin rays 11 + 12 + 10; pectoral-fin rays ii, 15; lateral-line scales 36 (1), 38 (2), 39* (3), 40* (3) or 41 (1), scales above lateral line 4 or 4½*; scales below lateral line ≈13* or 14; predorsal scales ≈11* or 12; total gill rakers 12 (1), 15 (1), 16* (1) or 17 (1). See Table 2 for morphometric values. Body and caudal peduncle moderately slender; head and snout elongate. Scaly basal sheath on dorsal and anal fins about ½–1½ scales in depth. Corner of mouth at vertical just anterior to or posterior to forward extent of orbit. Upper jaw with prominent anterior canines of similar size; dental ridge with irregular surface, usually with several to 13 distinct canines, teeth larger posteriorly; single prominent canine of posterior end of jaw. Lower jaw with first prominent anterior canine about ⅔ to ¾ size of second; dental ridge mostly smooth along anterior ¼ to ⅖ of jaw, with up to 6 small teeth, followed by 5–7 canines of moderate size and terminal series of 3–10 very short canines. Vomerine teeth absent. Tip of pelvic fin distinctly not reaching anus.

Reaches at least 177 mm SL.

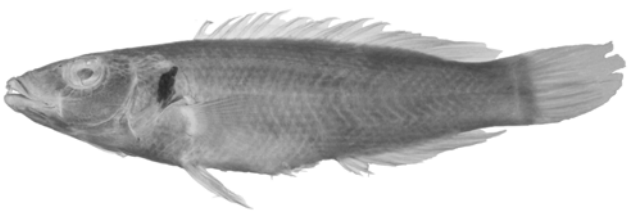

Fig. 20. *Bodianus tanyokidus*, adult, 131 mm SL, MCZ 5811, holotype, Mauritius.

Pigmentation in alcohol. Adults (Fig. 20)—body pale except for dorsoventrally elongate dark spot on operculum, spot extending ventrally from dorsal end of operculum just below anteriormost lateral-line scale to opercular edge at level of about sixth branched pectoral-fin ray base, spot not extending to edge of membranous opercular flap, leaving broad pale marginal space posteriorly. Fresh specimens with small dusky spot just above center of scaly caudal-fin base and with faint incomplete dusky stripe on lateral midline of side.

Colour in life. Adults—(Plate 2I; based in part on watercolour painting of holotype by Col. Nicholas Pike, painting no. 173, reproduced in Gomon & Madden, 1981, fig. 3; also see Gudger, 1929) body orangish brown above, whitish below, sides and caudal peduncle suffused with yellow, 1 or 2 broken reddish brown narrow midlateral stripes or series of spots extending from just above pectoral-fin base to above anterior third of anal fin; 2 horizontally aligned small reddish brown spots near center of scaly caudal fin base. Head rosy pink to brownish above, white below with yellow markings including yellow lips, vertically elongate yellow patch on cheek below front of eye and large yellow patch ventrally on operculum. Dorsal fin pink midlaterally with broad yellow marginal stripe expanding posteriorly to cover most of the posterior edge of fin. Anal

fin yellow with broad midlateral pink stripe. Caudal fin yellow, intensely at base, with 2 diagonal pink stripes, first from the dorsoposterior corner of caudal peduncle to center of posterior edge of fin and second from ventroposterior corner of caudal peduncle to center of fin edge. Pectoral fin pinkish with yellow basal band; second yellow band on fleshy base along basal ends of rays. Pelvic fin yellow, spine pink.

Colour illustrations of a somewhat faded specimen appear in Gushiken (1972, fig. 68, adult, as "*Verriculus sanguineus*"), Masuda *et al*. (1975, p. 103, fig. J, adult) and Masuda *et al*. (1984, pl. 196A, adult).

Etymology: *tanyokidus*, from the Greek adjective *tany*, "long", and noun *okidos*, "ear-ring", in reference to the dorsoventrally elongate black opercular spot.

Distribution. This species is known from five specimens collected at three localities, the Comoro Islands and Mauritius in the Indian Ocean and Okinawa in the Pacific (Fig. 16).

Comparison. *Bodianus tanyokidus* resembles *B. neoperc-ularis, B. opercularis* and *B. sanguineus* in having more numerous lateral-line scales (36–41 + 2), a slender body and a distinctly pointed head. The species is distinguishable from the first two in having 11 dorsal and 10 ventral unbranched caudal-fin rays (versus 10 and 8–10), in not having a distinctive red striped colour pattern in life, in developing a darkish spot on the scaly caudal-fin base in live specimens, in having the opercular spot extending ventrally, at least to the level of the upper edge of the pectoral-fin base, and in reaching a large size for the genus (at least 177 mm SL, versus 143 mm SL). It is separable from *B. sanguineus* in having fewer unbranched caudal-fin rays (12 dorsal and 11 ventral in *B. sanguineus*), in lacking vomerine teeth, and in not having the darkish spot on the scaly base of the caudal fin persisting in long preserved specimens. This species also resembles *B. masudai* somewhat in body shape and size of the opercular spot, but differs in having more numerous lateral line scales (31 + 2 in *B. masudai*) and lacking the distinctive red striped pattern.

Discussion. This species has been misidentified and reported in the literature as *Cossyphus opercularis* (Gudger, 1929), *Lepidaplois sanguineus* (Fourmanoir, 1955) and *Bodianus sanguineus* (Fourmanoir, 1957). The confusion led to the placement of *Verriculus sanguineus* Jordan & Evermann (1903) in synonymy with *Cossyphus opercularis* Guichenot (1847) by Smith (1957). The three species are, however, distinct as discussed by Gomon & Madden (1981).

Bodianus tanyokidus appears to be somewhat deeper dwelling than *B. opercularis* with which it is sympatric in the western Indian Ocean. This preference for greater depths is probably responsible for its poor representation in collections. The report of 32 lateral-line scales for this species by Masuda *et al*. (identified as *Bodianus* sp., 1975, p. 298) is erroneous.

Material examined. **Indian Ocean**, COMORO ISLANDS, RUSI 2373 (1, 150, paratype of *B. tanyokidus*); MAURITIUS, BMNH 1878.5.23.8 (1, 131, paratype of *B. tanyokidus*), MCZ 5811 (1, 163, holotype of *B. tanyokidus*). **Pacific Ocean**, JAPAN, *Ryukyu Is*., Okinawa, Naha URB 78-0153 (1, 168, paratype of *B. tanyokidus*), uncatalogued (1, 177, paratype of *B. tanyokidus*).

Subgenus *Pseudolepidaplois*

Pseudolepidaplois Bauchot & Blanc, 1961

Type species. *Pseudolepidaplois pfaffi* Bauchot & Blanc, 1961, by monotypy.

Diagnosis. Ethmoid-frontal surface slightly depressed; transverse axis of lower pharyngeal (Fig. 4a) moderately deep with distinctly convex posterior margin medially; pharyngeal teeth aligned somewhat transversely in about 5 rows; teeth rounded and of mostly uniform size laterally, those medially slightly larger, largest centrally in posteriormost row; anterior head of pharyngeal long with 2 or 3 blunt canines of similar size to those behind, positioned medially and on either side; vomerine teeth absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth slightly aligned with prominent anterior canines in upper jaw, those in lower jaw not aligned, separable into two series sequentially, defined by differing lengths, posterior series shortest; dorsal fin with XII, 10 or 11 rays; anal fin with III, 12 or 13 rays; lateral line with 44–48 pored scales, each with simple laterosensory tube; 6–7½ scales above lateral line; 16–20 scales below lateral line; predorsal scales 19–26, reaching forward to vertical through anterior extent of orbit; cheek scales not extending forward to corner of mouth, posterior and ventral edges of preopercle broadly naked, lower jaw naked; scaly basal sheath on base of dorsal and anal fins low, 1–2 scales in depth; head and snout pointed; jaws and snout slightly attenuate; posterior tips of dorsal and anal fins rounded; caudal fin truncate to slightly rounded; pectoral fin broadly rounded; species moderately large, maximum length 270 mm SL; juveniles with brown and white reticulate pattern; initial- and terminal-phase adult dichromatism minimal.

Etymology. *Pseudolepidaplois*, from the Greek *pseudo*, "false", *lepidos*, "scale" and *ploion*, "ship", in reference to the similarity of characteristics between the type species and those placed at the time in the genus *Lepidaplois*.

Discussion. The genus *Pseudolepidaplois* proposed by Bauchot & Blanc (1961) for their *P. pfaffi* and subsequently *P. scrofa* (1962), was distinguished from *Bodianus, Diastodon* and *Lepidaplois* on the basis of differences in body proportions, head shape and number of lateral-line scales. The first two are generalized conditions common to this species and less modified labrids, whereas the last occurs frequently in groups living in colder conditions, be they associated with non-tropical latitudes or greater depths. Osteologically *Pseudolepidaplois* is also little modified and resembles species of the subgenus *Verreo*. The slight realignment of the anteriormost lateral teeth in the upper jaw with the prominent anterior canines described above may support a relationship with *Verreo*. The two groups are geographically separated by the expanse of the Indian Ocean, suggesting a lengthy evolutionary separation if they are closely related. The subgenus is monotypic.

Bodianus scrofa (Valenciennes)

Figs 4a, 21, 57; Plates 2J, 3A–B; Tables 2–3

Labrus scrofa Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 93, Cap-Vert, Madere, Canaries (Cape Verde Islands, Madeira, Canary Islands).
Crenilabrus caninus Lowe, 1839, p. 84, Madeira.
Pseudolepidaplois pfaffi Bauchot & Blanc, 1961, p. 54, fig. 4, Tenerife (Canary Islands).

Morphological diagnosis. Dorsal-fin rays XII, 10* (6) or 11 (2); anal-fin rays III, 12* (5) or 13 (3); caudal-fin rays 9* (2) or 10 (4) + 12 + 9; pectoral-fin rays ii, 15 (12) or 16 (1); lateral-line scales 44* (2), 45* (3), 46 (4), 47 (1) or 48 (2); scales above lateral line 6*–7½; scales below lateral line ≈16–20 (19*); predorsal scales ≈19–26 (24*); total gill rakers 17 (1) or 18 (3). See Table 2 for morphometric values. Body and caudal peduncle of moderate depth. Scaly basal sheath on dorsal and anal fins 1 or 2 scales in depth. Predorsal scales reaching anteriorly to or slightly in advance of vertical through anterior extent of orbit. Posterior corner of mouth not quite reaching vertical at center of eye. Upper jaw with prominent anterior canines of equal size; 6–11 canines on dental ridge, usually based slightly on lateral face of ridge; teeth often originating close behind enlarged anterior canines, becoming slightly longer posteriorly; enlarged canine (rarely 2) at posterior end of jaw. Lower jaw with first prominent anterior canine ≈⅖–⅘ length of second; dental ridge without teeth on anterior ⅕–¼ of jaw; posteriorly teeth in single row, separable into 2 series; initial series with 7–9 canines, gradually increasing in length posteriorly; second series with 3–7 equally short canines, continuing to posterior end of jaw. Tip of pelvic fin almost reaching anus.

Largest specimen examined 268 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 21a)—body dusky with 2 rows of large pale spots; dorsal row with 8 horizontally elongate spots on or above lateral line; first spot dorsoposterior to eye, last dorsally on scaly caudal-fin base; second row on ventral half of body; first spot large, extending horizontally from posteroventral margin of orbit to opercular edge; second spot small, on pectoral-fin base; remaining spots on side with last spot ventrally on scaly caudal-fin base; head also with elongate pale spot anterior to eye and second between orbit and corner of mouth; ventral side of head and chest pale. Dorsal fin slightly dusky with large dark spot extending from first to fifth spine; several large pale spots along basal edge of fin. Remaining fins mostly pale; caudal fin with dark marginal band along posterior edge of scaly base; pectoral fin with similarly dark spot covering pectoral-fin base ventrally.

Adults (Fig. 21b)—body pale, distinct dark blotch encircling anus and continuing dorsally to form dusky vertical bar on lower ⅓ of body; several rows of faint dusky edged scales ventrally on sides posterior to dusky bar and along back just above lateral line; narrow dusky line directed anteriorly from orbit at level of center of eye across snout to orbit of opposite side; second dusky line directed anteroventrally from orbit to center of upper jaw; third dusky line crossing forehead above center of eye and directed posteriorly across dorsal side of head toward origin of lateral line. Distinct pale area on lower half of side anterior to dusky vertical bar and posterior to pectoral-fin base, area crossed by about 7 curved narrow dusky to dark bars (in 2 large specimens examined, possibly artefact of preservation). Dorsal fin pale with elongate dark spot covering much of area between first and sixth spines; fin membrane between segmented rays slightly dusky basally. Membranes between middle ⅔ of caudal-fin rays dark, remainder of fin pale. Anal fin pale, though slightly dusky anteriorly. Pectoral and pelvic fins pale.

Fig. 21. *Bodianus scrofa*: (*a*) juvenile, 36.3 mm SL, MMF 3205, Madeira; and, (*b*) adult, 205 mm SL, ANSP 139672, Sao Miguel, Azores (photo reversed).

Colour in life. Juveniles (Plate 2J)—body reddish brown with about 3 irregular longitudinal blackish stripes, midlateral stripe narrow, stripes just below dorsal fin and posterior to ventral part of pectoral-fin base somewhat broader; 3 longitudinal rows of irregular white spots, one middorsally, another just below dorsal-most blackish stripe and less prominent series just above ventralmost blackish stripe; rows more or less extending forward on head; pectoral-fin base with large black spot ventrally and smaller white spot dorsally; fleshy caudal-fin base with two vertically aligned white spots, edged posteriorly with black. Dorsal fin reddish brown anteriorly with prominent black spot between first and seventh spine and white fleshy tips to spines; white blotches basally near center of fin and posteriorly, membranes blackish, becoming clear distally. Caudal fin hyaline with black membranes centrally near base; anal fin hyaline with brown stripe angled from tip of second spine to posterior end of fin base. Pectoral and pelvic fins hyaline.

Initial-phase adults (Plate 3A)—body red dorsally, scales with narrow darker red edges, white ventrally, broad yellow stripe midlaterally on sides; black band extending upward from anus onto ventral third of side with several narrow grey wavy vertical bands apparent anterior to it; bluish grey-edged scales scattered on chest and above base of anal fin; head red above level of mouth, white, suffused with yellow below; upper lip yellow; narrow yellow to white line directed forward from eye, second anterodorsally from upper end of orbit, lines continuous with corresponding lines from opposite side; additional yellow to white irregular markings on side of head, ventrally on hind edge of preopercle and

forward edge of opercle. Dorsal fin reddish anteriorly with large violet or black spot between first 3 or 4 spines; remaining portion of fin yellow (sometimes extending forward midlaterally) with rays edged in red; outer edge with fine blue margin. Anal fin pale yellow to white with narrow bluish margin. Dorsal and ventral edges of caudal fin red; middle rays yellow; membranes between middle rays black. Pectoral-fin rays yellow, edged with red; membranes hyaline. Pelvic fin white to yellow.

Terminal-phase adults (Plate 3B)—body olivaceous with broad red midlateral stripe from membranous opercular flap to scaly base of caudal fin; snout, nape, opercular membrane, pectoral-fin base and thorax greenish grey; head with red orange vermiculations and highlights more or less corresponding with yellow markings of initial-phase adults; underside of head pink. Dorsal fin greenish grey anteriorly with large violet or black spot between first 3 or 4 spines; posterior portion of fin reddish basally; distal margin with narrow blue edge. Anal fin mostly white, with reddish hues basally and narrow blue margin. Dorsal and ventral edges of caudal fin yellowish; basal ends of rays pink. Pectoral-fin rays edged with red; membranes hyaline. Pelvic fin white.

Distribution. This species is restricted to the eastern North Atlantic (Fig. 57), including the Azores, Madeira, Canary Islands (Bauchot & Blanc, 1961, holotype of *P. pfaffi*) and Brava at the southern end of the Cape Verde Islands (de Franca & Vasconcelos, 1962), but is not known from the African coast. *Bodianus scrofa* has been collected almost solely by hook and line from moderately deep waters with rocky bottom.

Etymology: *scrofa*, a feminine Latin noun meaning "breeding sow", apparently in reference to the common name hogfish.

Discussion. A comprehensive discussion of the synonymy of this species and species referred to *B. speciosus* may be found in Bauchot & Blanc (1962). The allocation of names by these authors is considered correct, but for different reasons. Although Bauchot & Blanc recognized the inaccuracy of Bowdich's (1825) description and figures in allocating the name *Diastodon speciosus*, they placed great emphasis on discrepancies between the original account of *Labrus iagonensis* and the species recognized here as *B. scrofa* to point out the inapplicability of *iagonensis* to the latter species. Many of Bowdich's species descriptions are inaccurate and give an impression they were based on the primitive drawings presented in her publication, rather than on specimens she examined. These illustrations seem to have been hastily drawn and demonstrate little attention to detail. The discrepancies in meristic values between the text description and the figure of *L. iagonensis*, which does resemble *B. scrofa*, could be due to mistakes by the artist. The name is not recognized here as a senior synonym of *B. scrofa* as the description could also apply to other labrids that occur at this locality. To consider it a senior synonym without presenting conclusive evidence to support the decision would only serve to add to the existing confusion. This is especially the case for *iagonensis* as the name has also been applied to the species treated in this study as *B. speciosus* (Fowler, 1936).

Valenciennes' *Labrus scrofa* (*in* Cuvier & Valenciennes, 1839) was based on two specimens and several drawings from "Cap Vert", Madeira and the Canary Islands. A 540 mm mounted specimen (MNHN A.8200) collected in "Cap Vert" is here designated the lectotype. "Cap Vert" is likely to have been a reference to the Cape Verde Islands rather than Cape Verde, Senegal, as this species has not been reported from the coastal waters of Africa (Brito, pers. comm.). Apparently none of the Madeiran specimens on which Lowe (1839) based his *Crenilabrus caninus* was retained. A more complete description published in 1841, however, leaves no doubt to which species he referred. *Pseudolepidaploid pfaffi*, described by Bauchot & Blanc (1961) based on a specimen from Tenerife, Canary Islands, was subsequently synonymized with *Pseudolepidaplois scrofa* by Bauchot & Blanc (1962).

The adult coloration of this species (Plate 3A, 3B) is remarkably similar to the terminal-phase pattern of *B. oxycephalus* (Plate 3J, and Okamura & Amaoka, 1997, p. 469. center bottom row). As the form of this pattern is unusual within the genus, its presence in both may reflect the close relationship between *Pseudolepidaplois* and *Verreo* suggested above.

Material examined. **Atlantic Ocean**, AZORES, *Sao Miguel*, ANSP 139672 (1, 205); MADEIRA IS., Madeira BMNH 1895.5.28.73 (1, 273), uncatalogued (1, 510), MMF 3205, (1, 36.3), MNHN A.8195 (1, 301, mount, paralectotype of *C. scrofa*), USNM 23328 (1, 268), 94529 (2, 215–268); GREAT SALVAGE IS., BMNH 1895.5.28.137 (1, 393); CAPE VERDE IS., MNHN A.8200 (1, 540, mount, lectotype of *C. scrofa*).

Subgenus *Verreo*

Verreo Jordan & Snyder, 1902

Type species. *Cossyphus oxycephalus* Bleeker, 1862, by monotypy.

Diagnosis. Ethmoid-frontal surface slightly depressed; transverse axis of lower pharyngeal (Figs 4b–d, 5a) moderately deep with nearly straight to slightly convex posterior margin; pharyngeal teeth aligned transversely in 4–6 rows; teeth rounded and of mostly uniform size laterally or becoming progressively smaller toward periphery, those medially slightly to distinctly larger; anterior head of pharyngeal long with 4–11 blunt canines of similar size to those behind or slightly larger, 1 or 2 medially at anterior end and others distributed on either side; vomerine teeth present or absent; teeth laterally in jaws aligned with prominent anterior canines, anteriormost teeth based laterally on bony dental ridge, those posteriorly on crest, teeth in lower jaw usually in two or three series sequentially defined by differing lengths, posterior series usually shortest; dorsal fin with XII, 10 or 11 (rarely 12) rays; anal fin with III, 11 or 12 (rarely 10) rays; lateral line with 30–40 pored scales, each with simple laterosensory tube; 5–7 scales above lateral line; 10–16 scales below lateral line; predorsal scales 13–28, reaching forward to or slightly in advance of vertical through center of eye; cheek scales extending forward to or almost to corner of mouth, posterior and ventral edges of preopercle broadly naked, lower jaw naked; scaly basal sheath on base of dorsal and anal fins of moderate height, 1½–3 scales in depth; body moderately deep, caudal peduncle of moderate depth; head and snout pointed; jaws only slightly attenuate at most; posterior tips

of dorsal and anal fins rounded to slightly pointed; caudal fin slightly rounded, truncate or double emarginated, corners becoming filamentous in some; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer in some; species large, maximum length 285–465 mm SL; juvenile coloration poorly known; initial- and terminal-phase adult dichromatism distinctive in some, but not others.

Etymology. *Verreo*, from the Latin *verres* for "boar", in reference to the common name "boarfish" or "pigfish" widely used for members of this genus.

Discussion. The genus *Verreo* was erected by Jordan & Snyder (1902) for *Cossyphus oxycephalus* on the basis of unique dentition. Gomon & Randall (1978) pointed out that the basic arrangement of teeth of this species is essentially the same as in other members of the genus and that the minor variation does not merit generic distinction. It is, however, a unique derivation relative to other species in the genus, being approached only by the monotypic subgenus *Pseudolepidaplois*. All of the seven species in this subgenus have antitropical to temperate distributions, and two have elevated numbers of lateral line scales, as does *P. scrofa*. They also share primitive osteological conditions and relatively little expansion of the scaly sheaths on the dorsal and anal fins.

The seven species referred to the subgenus, can be further subdivided into two groups on the basis of dorsal and anal-fin counts: a two species complex comprising *B. frenchii* and *B. flavifrons* with XII, 10 dorsal-fin rays, III, 11 anal-fin rays and vomerine teeth, and a five species assemblage comprising *B. bathycapros, B. oxycephalus, B. unimaculatus, B. vulpinus* and *B. flavipinnis* with XII, 11 dorsal-fin rays, III, 12 anal-fin rays and no vomerine teeth. The first four species of the larger assemblage were long regarded as a single species, and referred to as either *B. oxycephalus* or *B. vulpinus*. There is little doubt the four populations in this complex, three distributed in the Pacific and the fourth occurring in the Indian Ocean off south-western Australia, are species and together they form a monophyletic assemblage, referred to below as the *B. vulpinus*-complex.

Bodianus bathycapros n.sp.

Figs 22–23; Plate 3C; Tables 2–3, 6

Type material. HOLOTYPE: BPBM 17245 (1, 422) Hawaiian Islands, Nihoa, Tamashiro Market. PARATYPES: BPBM 4713 (1, 456) Hawaiian Islands, Oahu, J.W. Thompson; BPBM 20464 (1, 402) Hawaiian Islands, Necker Bank, Gary Naftel; BPBM 24809 (1, 415) Hawaiian Islands, Oahu, off Makapuu Ledge, 256 m (140 fathoms), 30 September 1980, hook and line, Robert Y. Oshiro; BPBM 28814 (1, 408) Hawaiian Islands, Necker Island (SW), 165 m (90 fathoms), 7 March 1979, hook and line, "Easy Rider", Stephen Ralston; USNM 51199 (1, 380) Hawaiian Islands.

Diagnosis. A species of the subgenus *Verreo* with: 10–11 segmented dorsal-fin rays; 11–12 segmented anal-fin rays; 30–32 lateral-line scales; 14–15 total gill rakers; moderately long, only slightly attenuate snout, 14.4–17.6% SL; posterior corner of mouth just in front of vertical through anterior extent of orbit; vomerine teeth absent; caudal fin truncate, dorsal-most and ventralmost caudal-fin rays slightly longer than middle rays but not filamentous, forming pointed dorsal and ventral lobes, uppermost caudal-fin rays 23.7–26.7% SL; posterior tip of pelvic fin not quite reaching to anus; body pale pink to white with about 15 narrow horizontal red lines and three distinctly broader red stripes dorsally, upper two broken into distinct segments of equal length; third stripe on lateral midline uninterrupted from opercular edge to caudal-fin base; dorsal fin with prominent black spot basally, between seventh and tenth spines.

Fig. 22. *Bodianus bathycapros* n.sp., terminal-phase adult, 434 mm SL, BPBM 17245, holotype, Nihoa, Hawaiian Islands.

Description. Dorsal-fin rays XII, 11; anal-fin rays III, 12; caudal-fin rays 9 + 12 + 9; pectoral-fin rays ii, 14 (1) or 15* (11); lateral-line scales 30 (1), 31 (4), or 32* (7) + 2; scales above lateral line 5½; scales below lateral line ≈13 or 14; predorsal scales 22–28 (23 in holotype); total gill rakers 14 (4) or 15* (2). See Tables 2 and 6 for morphometric values.

Body moderately deep, caudal peduncle of moderate depth; head sharply pointed; dorsal outline of forehead and snout somewhat concave in large specimens; nape with slight convex curve; snout and jaws slightly attenuate.

Scaly basal sheath on dorsal and anal fins moderately low, ≈1½–2½ scales in depth, predorsal scales reaching forward almost to above center of orbit on dorsal midline of head. Cheek scales extending forward to corner of mouth, not reaching to edge of preopercle posteriorly and ventrally leaving broad naked preopercular margin, especially ventrally; scales on subopercle not quite reaching forward to below anterior end of ventral preopercular edge; lower jaw naked. Lateral-line scales each with a singular straight unbranched laterosensory canal tube. Posterior edge of preopercle minutely serrate to smooth. Posterior corner of mouth just in front of vertical through anterior extent of orbit. Gill rakers on upper limb of first arch distinctly smaller than those of lower limb; rakers on upper limb arborescent at tip.

Upper jaw with second prominent anterior canine about equal to or slightly smaller than first; first canine directed anteroventrally; second directed mostly ventrally and often somewhat anterolaterally; ≈5–11 teeth on dental ridge posterior to prominent anterior canines also prominent, distinctly caniniform and in single row, teeth moderately large anteriorly, becoming progressively shorter posteriorly, teeth originating close behind prominent anterior canines, those posteriorly on crest of dental ridge; single large straight canine usually at posterior end of jaw, directed anteroventrally. Lower jaw with first prominent anterior canine usually ≈⅔ to ⅘ length of second, distinctly longer than second in one specimen examined; first canine directed anterodorsally and slightly mesially; second directed anterodorsally; teeth on dental ridge in 2 series forming

Table 6. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus oxycephalus, Bodianus unimaculatus* and *Bodianus vulpinus* examined and types of *Bodianus bathycapros* n.sp. Values marked with * are for the holotype of the species.

	B. bathycapros n.sp. holotype	*B. bathycapros* n.sp. paratypes	*B. oxycephalus*	*B. unimaculatus*	*B. vulpinus*
number of specimens	1	5	2	23	8
standard length (mm)	422	380–456	234–290*	147–365	123–375
body depth	35.3	30.4–38.6	34.4*–35.6	30.4–36.0	31.1–36.3
head length	37.4	34.2–38.6	37.2*–40.3	34.0–40.1	33.1–37.5
snout length	15.9	14.4–17.6	16.0*–17.4	12.6–17.1	11.5–16.3
orbital diameter	5.1	4.9–5.4	6.8*–8.2	5.8–8.6	5.9–9.1
predorsal length	43.6	36.9–42.4	46.6	38.9–42.3	38.3–44.4
preanal length	63.5	67.4–69.2	75.6	63.4–68.1	62.6–68.0
preanus length	60.0	60.7–63.9	70.9	58.9–64.0	59.0–64.6
dorsal-base length	51.7	47.3–52.1	44.4–49.0*	46.4–53.1	48.0–52.0
anal-base length	22.8	20.7–23.3	19.2–23.0*	19.4–23.2	21.8–24.5
caudal-peduncle depth	13.3	11.9–14.0	12.4*–13.5	12.2–14.5	13.3–14.6
caudal-peduncle length	16.7	14.0–16.1	14.8	14.6–18.0	13.5–15.8
dorsal-fin length	63.3	59.0–63.2	55.6	55.6–69.5	59.5–64.8
anal-fin length	31.5	29.2–32.3	28.3	28.5–32.4	32.3–35.0
pectoral-fin length	20.6	18.3–19.6	22.0	19.6–22.0	20.1–22.0
pelvic-fin length	19.3	17.7–18.9	20.3	19.2–27.9	19.6–31.2
dorsal-fin spine 1	6.0	6.5–8.1	6.0	4.5–6.9	5.7–6.7
dorsal-fin spine 2	7.4	8.1	7.9	6.4–7.0	7.4–8.9
dorsal-fin spine 12	12.8	9.6–11.6	10.6–13.4*	10.9–14.3	12.8–15.2
anal-fin spine 1	8.8	6.8–8.3	6.8–7.0*	5.2–7.7	7.3–8.8
anal-fin spine 3	13.6	11.2–13.5	12.8–15.1*	10.9–16.0	13.3–14.4
caudal-fin length—top	25.6	23.7–26.7	26.8	22.0–35.0	23.8–48.8
caudal-fin length—middle	20.8	14.3–20.1	20.2–23.5*	18.8–22.0	19.8–25.6
caudal-fin length—bottom	—	22.1	23.1	24.4–28.7	33.1

single row; 8–11 teeth of uniform moderate size in first series, originating close behind and in line with prominent anterior canines, usually followed immediately by 1–3 equally short canines in second series also based on crest of dental ridge. Large specimens with numerous tiny teeth on dental ridge posteromesial to anterior canines in both jaws. Vomerine teeth absent.

Posterior tips of dorsal and anal fins rounded to slightly pointed, not quite reaching posterior edge of hypurals. Caudal fin truncate, dorsal-most and ventralmost caudal-fin rays becoming slightly longer than middle rays but not filamentous, forming pointed dorsal and ventral lobes. Pectoral fin broadly rounded below, posterior margin mostly straight, upper rays distinctly longer. Posterior tip of pelvic fin not quite reaching anus.

Largest specimen examined 456 mm SL.

Pigmentation in alcohol. Adults (Fig. 22)—pale; dorsal fin with large dark spot basally between fifth and ninth spines, extending to last spine in some individuals.

Colour in life. Adults (Plate 3C)—pale pink to white with about 15 narrow horizontal red lines, each following scale row on side of body and three distinctly broader red stripes dorsally, upper two broken into distinct segments; dorsal-most stripe consisting of about four nearly equal segments just below dorsal-fin base; second stripe with about three segments overlying lateral line; third stripe uninterrupted on lateral midline from opercular edge to caudal-fin base; head with two red stripes radiating posteriorly from eye, upper confluent with dorsal-most stripe on side, lower confluent with second lateral stripe. Dorsal fin pink to orange with prominent black spot basally, usually between seventh and tenth spines, but extending to last spine in some. Caudal and anal fins orange, anal with narrow white margin. Pectoral fin transparent, basal edge reddish. Pelvic fin white, mixed with orange along leading edge.

Distribution. *Bodianus bathycapros* is restricted to deep waters (165–256 m) of the Hawaiian Islands (Fig. 23). Chave & Mundy (1994) observed this species from a submersible at depths of 185–190 m over various substrates.

Etymology: *bathycapros* from the Greek *bathys*, "deep", and *kapros*, "wild boar", in reference to the deep dwelling habits of this Hawaiian pigfish.

Comparison. The allopatric *B. bathycapros, B. oxycephalus, B. unimaculatus* and *B. vulpinus* are extremely close, sharing dorsal-fin counts (XII, 11), anal fin counts (III, 12) and a presumably very similar initial-phase adult coloration with three or four broken red stripes. *Bodianus bathycapros* is the only species of this *B. vulpinus*-complex that has an uninterrupted midlateral stripe in the adult phases. See *Comparison* under *B. oxycephalus* for more detail.

Discussion. Since its first detection in Hawaiian waters (Jordan & Evermann, 1903) this species has been identified as *Verreo oxycephalus* (= *B. oxycephalus*) or a perceived synonym of it (Gomon & Randall, 1978). The two species, however, differ markedly in colour pattern and maximum size attained, the Hawaiian species reaching a size that is

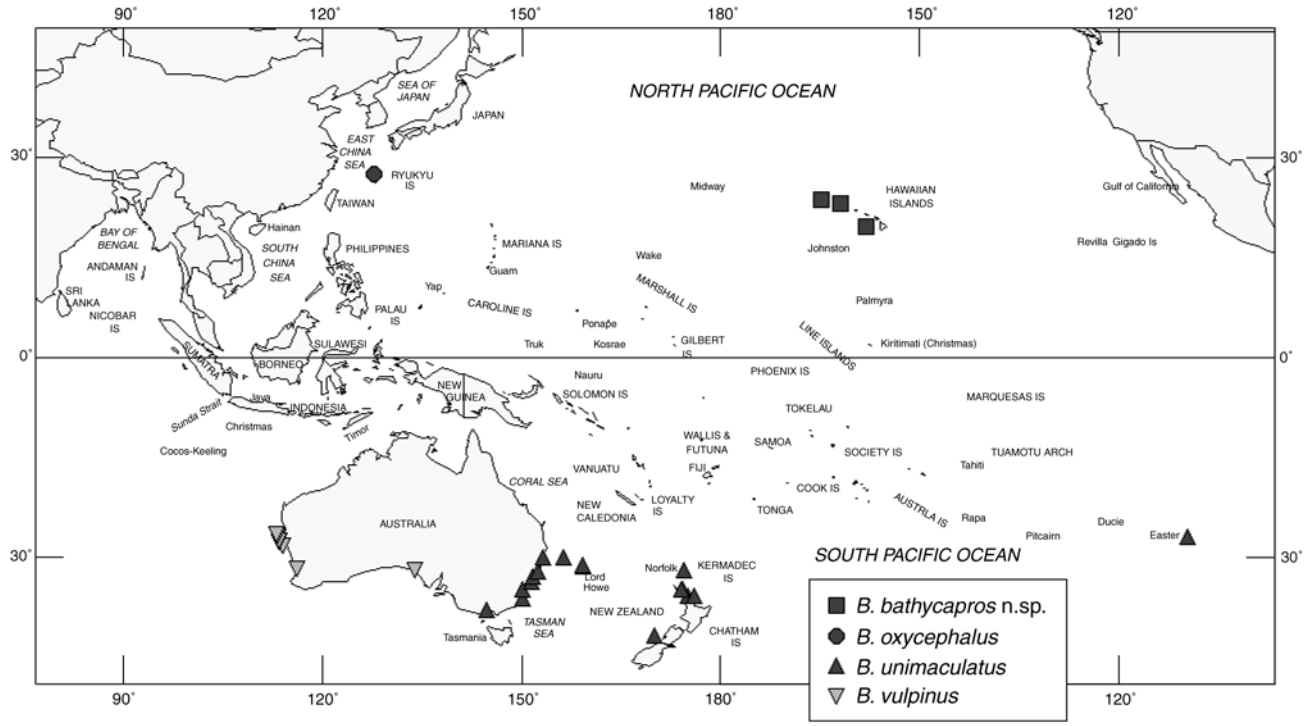

Fig. 23. Distributional records for specimens examined of selected species of the subgenus *Verreo*.

considerably larger than that of the other three in the *B. vulpinus*-complex (see *Discussion* in *B. vulpinus* treatment). Unlike its Southern Hemisphere cognates, both *B. bathycapros* and *B. oxycephalus* appear to retain at least a vestige of the prominent red striped pattern of initial-phase adults in their terminal-phase adult stage. As available museum specimens are insufficiently preserved to determine sex from reproductive organs, this remains uncertain. It is likely, however, based on the sizes of type specimens, all of which are larger than the largest specimen examined for any of the other three species in the complex.

Bodianus flavifrons Gomon

Figs 24–25; Plate 3D; Tables 2–3

Bodianus flavifrons Gomon, 2001, p. 412, fig. 2, New Caledonia, Sud Iles-des-Pins, 22°58.5'S 167°16.5'E.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 11; caudal-fin rays 9 + 12* (13) or 13 (1) + 9; pectoral-fin rays ii, 15* (26) or 16 (2); lateral-line scales 30 (1), 31* (7), 32 (1) or 33 (1); scales above lateral line 5½–7 (6*); scales below lateral line ≈12–16 (14*); predorsal scales ≈15–27 (19*; usually 19–22); total gill rakers 13–16 (15*). See Table 2 for morphometric values. Head and snout of moderate length, not attenuate; posterior corner of mouth just in advance of vertical through anterior extent of orbit. Upper jaw with two prominent anterior canines, second slightly smaller than first; 4–10 (9* and 10*) teeth on dental ridge posterior to prominent anterior canines moderately large anteriorly, first in series only slightly smaller than second canine, becoming progressively shorter posteriorly, distinctly caniniform and in single row, originating close behind prominent anterior canines, those posteriorly on crest of dental ridge; 1*–3 large canines at posterior end of jaw. Lower jaw with first prominent anterior canine ≈⅔ length of second; 6–11 (7* and 11*) teeth of moderate size in single row on dental ridge, those near middle of row longest, originating close behind and in line with prominent anterior canines on lateral surface of dental ridge. One or more canines on vomer. Scaly basal sheath on dorsal and anal fins 2½ scales in depth. Posterior tips of dorsal and anal fins rounded to bluntly pointed; caudal fin nearly truncate to slightly rounded. Posterior tip of pelvic fin reaching nearly to anus in largest specimens.

Largest specimen examined 422 mm SL.

Pigmentation in alcohol. Initial-phase adults (Fig. 26)—pale. Dorsal fin with dark spot basally between first two spines.

Terminal-phase adults—pale; back with dusky areas in freshly preserved specimens; upper corner of pectoral-fin base with dark mark. Dorsal fin with dark spot between first three spines.

Colour in life. Initial-phase adults (see Gomon, 2001, fig. 3)—pale pink above and white below with yellow markings on head, including two broad stripes crossing dorsal midline of snout and forehead respectively, narrow stripe directed posteroventrally from corner of mouth and yellow hue ventrally on opercle below level of eye; stripe across snout

Fig. 24. *Bodianus flavifrons*, initial-phase adult, 378 mm SL, NMNZ P.34380, paratype, South of Raoul Island, Kermadec Ridge.

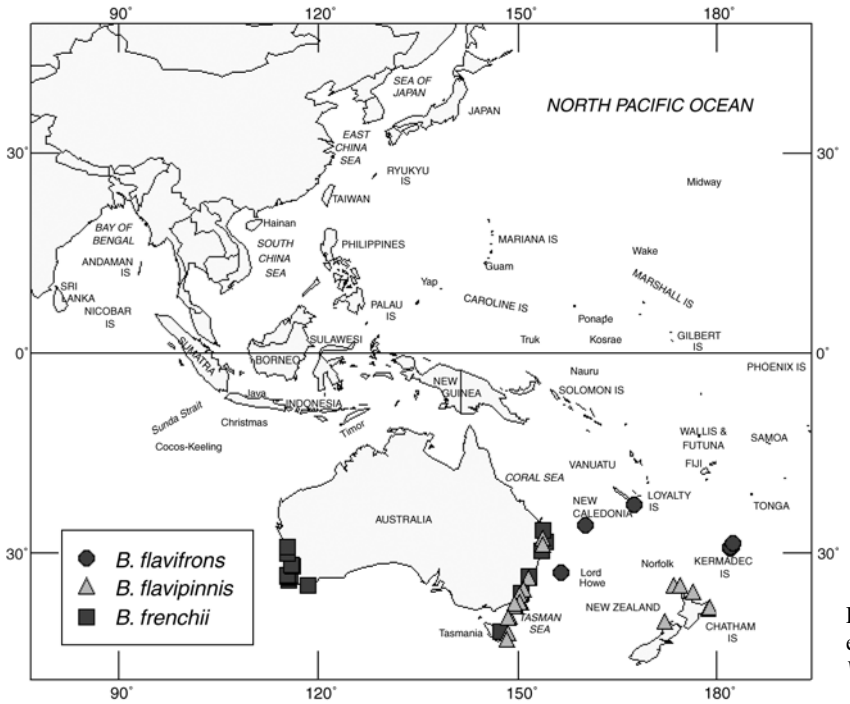

Fig. 25. Distributional records for specimens examined of selected species of the subgenus *Verreo*.

directed posteriorly to lower half of eye and forming yellow rim ventrally; stripe across forehead angled from dorsoposterior margin of eye to upper end of gill opening, suffused with orange behind eye; upper half of pectoral-fin base with narrow red blotch, lower half white. Dorsal and caudal fins pale pink, dorsal with faint pale yellow stripe covering basal ⅔ of fin to about middle of soft portion and with red spot basally between first three or four spines. Anal and pelvic fins white. Basal half of pectoral fin pale yellowish with white blotch near base.

Terminal-phase adults (Plate 3D)—mostly as with initial-phase adults except pink and yellow coloration more intense, yellow markings on head especially so, with faint third yellow facial stripe across nape paralleling stripe on forehead, fading above gill opening but continuing on back beneath dorsal-fin base as irregular greenish marks; yellow stripe extending from corner of mouth merging with yellow area on gill cover; upper half of pectoral-fin base with narrow red blotch superimposed with black, lower half yellow then white.

Etymology: *flavifrons*, a combination of the Latin adjective *flavus*, "yellow", and feminine noun *frons*, "brow" or "forehead", in reference to the distinctive yellow markings on the head of adults of this species.

Distribution. *Bodianus flavifrons* is known from the southwestern Pacific off Newcastle, New South Wales, Australia, off the southern tip of New Caledonia, on the Lord Howe Ridge and on the Kermadec Ridge northeast of New Zealand (Fig. 23) at depths of 114–340 m.

Comparison. This species is very similar to *B. frenchii*, with which it shares dorsal and anal-fin counts, but is recognizable by its lower lateral-line scale value of 30–33 (versus 34–38) and distinctive yellow facial markings (no bands or stripes in *B. frenchii*).

Discussion. Juveniles of this species are not known, the smallest specimen yet collected measuring just under 300 mm SL. Based on vertical fin counts, *Bodianus flavifrons* and *B. frenchii* probably form a natural group. The distinctive yellow facial markings in adults of *B. flavifrons*, are matched only by those of the eastern Atlantic *B. scrofa*, perhaps supporting the relationship between *Verreo* and *Pseudolepidaplois* suggested above.

Material examined. **Pacific Ocean**, NEW CALEDONIA, Sud Iles-des-Pins MNHN 1995-0006 (1, 366, holotype), NMV A15091 (1, 322, paratype); KERMADEC RIDGE, South of Raoul Island AMS I.40442-001 (1, 372, paratype), NMNZ P.34380 (1, 378, paratype), NMNZ P.34402 (1, 355, paratype), NMNZ P.34410 (1, 377, paratype), NMNZ P.34413 (1, 387, paratype), NMNZ P.34416 (1, 422, paratype), NMNZ P.34420 (1, 379, paratype), NMNZ P.34421 (1, 364, paratype), NMNZ P.34425 (1, 397, paratype), NMNZ P.34438 (1, 372, paratype); CORAL SEA, Lord Howe Ridge ORSTOM 88-307 (1, 325, paratype); AUSTRALIA, *New South Wales*, off Newcastle CSIRO CA3772 (1, 293, paratype).

Bodianus flavipinnis Gomon

Figs 4b, 25–26; Plate 3E; Tables 2–3

Bodianus flavipinnis Gomon, 2001, p. 408, fig. 1, off Ulladulla, New South Wales, Australia.

Morphological diagnosis. Dorsal-fin rays XII, 10 (3), 11* (26) or 12 (1); anal-fin rays III, 11 (1) or 12* (29); caudal-fin rays 8* (2) or 9 (17) + 11 (1) or 12* (19) + 8* (3) or 9 (17); pectoral-fin rays ii, 14 (1), 15* (57) or 16 (1); lateral-line scales 32* (21), 33 (23), 34* (10) or 35 (1); scales above lateral line 5–6½ (usually 5½*); scales below lateral line ≈11–16 (usually about 15*); predorsal scales ≈15–24 (modally 22*); total gill rakers 14 (1), 15 (3), 16* (7) or 17(3). See Table 2 for morphometric values. Head and snout of moderate length; only slightly attenuate; posterior corner of mouth on or just in advance of vertical through anterior extent of orbit. Upper jaw with second prominent anterior canine about equal to or slightly smaller than first; 4–9 (most frequently 5, 6* or 7*) teeth on dental ridge posterior to prominent anterior canines moderately large anteriorly, first

in series only slightly smaller than second canine, becoming progressively shorter posteriorly, distinctly caniniform and in single row, originating close behind prominent anterior canines, those posteriorly on crest of dental ridge; single (rarely 2) large canine at posterior end of jaw. Lower jaw with with first prominent anterior canine only slightly shorter than second; teeth on dental ridge in 2 or 3 series forming single row; anterior teeth small but distinct anteriorly, close behind and in line with prominent anterior canines, becoming slightly longer posteriorly, 7–15 (9* and 10*) in number, sometimes separable into anterior and lateral series, anterior series of 2–5 teeth immediately behind anterior canines and second, lateral series of 4–5 slightly longer teeth, posterior teeth of lateral series based on crest of dental ridge; anterior and lateral series followed immediately by 2–6 (5*) equally short canines of posterior series. Large specimens with numerous tiny teeth on dental ridge posteromesial to anterior canines in both jaws. Vomerine teeth absent. Scaly basal sheath on dorsal and anal fins 2½–3 scales in depth. Posterior tips of dorsal and anal fins rounded; caudal fin truncate to slightly rounded. Posterior tip of pelvic fin distinctly not reaching anus.

Largest specimen examined 368 mm SL.

Pigmentation in alcohol. Adults (Fig. 26)—uniformly pale.

Colour in life. Adults (Plate 3E)—red above and white below with two large white blotches above lateral line and below third to fourth and eleventh to twelfth dorsal-fin spines respectively; head red above level of mouth and white below, red area extending farther ventrally on operculum; dorsoposterior rim of eye yellow. Dorsal fin orange anteriorly and yellow posteriorly. Caudal fin with yellow hue. Anal fin white with yellow hue posteriorly. Pectoral fin bright yellow. Pelvic fin white.

Colour illustrations of this species appear in Doak (1972, pl. 40 bottom, adult, as "*Lepidaplois* sp."), Francis (1988, fig. 86, adult, as "*Bodianus* sp.") and Gomon (2001, fig. 1, adult).

Distribution. *Bodianus flavipinnis* occurs in warm temperate waters of eastern Australia from southeastern Queensland to southeastern Tasmania and New Zealand around the North Island and the northern tip of the South Island at about 150 m (Fig. 25). It has also been sighted by divers at the Poor Knights Islands in depths below 30 m (Doak, 1972: 95). Francis (1988) indicated that it is found in caves and archways on reefs.

Etymology: *flavipinnis*, from the Latin adjective *flavus*, "yellow", and noun *pinna*, "fin", in reference to the bright yellow pectoral fin that is characteristic of this species.

Fig. 26. *Bodianus flavipinnis*, adult, 317 mm SL, NMNZ P.31643, East Cape, North Island, New Zealand.

Comparison. *Bodianus flavipinnis* shares meristic values with *B. bathycapros, B. oxycephalus, B. unimaculatus* and *B. vulpinus*, the combination of which is unique for the genus. It differs markedly from the other four in not having distinctive dichromatism between initial- and terminal-phases and in not having a prominent broken red striped pattern in mature adults.

Discussion. Juveniles of *B. flavipinnis* are not known, the smallest specimen examined measuring 165 mm SL. The distribution of this species overlaps only with the western extreme of the range of *B. unimaculatus* within the *B. vulpinus*-complex. *Bodianus flavipinnis* apparently occurs at somewhat greater depths and perhaps in more open areas than *B. unimaculatus*. As a consequence it is present in the southeastern Australian trawl fishery and appears in Sydney markets.

Material examined. **Pacific Ocean**, AUSTRALIA, *New South Wales*, off Ulladulla NMV A15092 (1, 214, holotype), AMS I.21561-001 (3, 194–248), AMS I.24627-001 (2, 195–198, paratypes), NMV A15093 (1, 189, paratype), North Head, Sydney Harbour AMS I.17235-001 (1, 165, paratype), Bermagui NMV A2066 (1, 256, paratype), Montague I. AMS IA.3477 (1, 178, paratype); *Victoria*, Gabo I. AMS E.5258 (1, 178, paratype), AMS E.2988 (1, 168), AMS E.5257 (1, 260), AMS I.12709 (1, 227), CSIRO CA158 (1, 226, paratype), Point Hicks CSIRO CA50 (1, 232, paratype), Cape Everard AMS E.5254 (1, 252, paratype), AMS E.2156 (1, 246), AMS E.5259 (1, 185), AMS I.12114 (218), East Gippsland NMV A4235 (2, 317–345, paratypes); *Tasmania*, Babel I. AMS E.5253 (1, 269, paratype), AMS E.5255 (1, 211), AMS E.5256 (1, 219), Schouten I. TMH D1607 (1, adult), Tasman I. TMH D1645 (1, adult). NEW ZEALAND, NMNZ P.33930 (1, 261), NSMT P.43354 (1, 224), *North Island*, Kaitaia NMNZ 7467 (1, 256, paratype), Farewell Spit NMNZ P.10728 (1, 368, paratype), central west coast NMNZ P.31287 (1, 275), P.31288 (1, 267), East Cape NMNZ P.31643 (1, 317), Great Barrier Island NMNZ P.31719 (1, 215), Cape Brett NMNZ P.33104 (1, 196), southern end of Ninety Mile Beach NMNZ P.33930 (1, 261), Bay of Islands NMNZ P.34382 (1, 222); *South Island*, Gisborne NMNZ P.13168 (1, 346, paratype), NSMT P.43354 (1, 224).

Bodianus frenchii (Klunzinger)

Figs 1a, 4c, 25, 27; Plate 3F–H; Tables 2–3

Trochocopus rufus Macleay, 1878, p. 35, pl. 5, fig. 3, King Georges Sound (Western Australia).

Cossyphus Frenchii Klunzinger, 1880, p. 400, King Georges Sound (Western Australia).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 10 (1) or 11 (4); caudal-fin rays 8* (1) or 9 (5) + 12 + 9; pectoral-fin rays ii, 14* (12) or 15 (1); lateral-line scales 34* (3), 35 (2), 36 (1), 37 (6) or 38 (1); scales above lateral line 5*–7; scales below lateral line ≈12–15 (13*); predorsal scales ≈19–23 (21*); total gill rakers 15 (1) or 16* (3). See Table 2 for morphometric values. Head and snout of moderate length, not attenuate; posterior corner of mouth immediately behind vertical through anterior extent of orbit. Upper jaw with prominent anterior canines of similar length in small specimens, second canine ⅔ to ⅘ length of first in larger individuals, followed by 2–6 progressively shorter, laterally based canines; 3–4 small canines on dental ridge posteriorly in very small specimens, coalesced with ridge in larger specimens; 1 or 2 slightly enlarged canines at posterior end of jaw (Fig. 1a). Lower jaw with first prominent anterior canine equal to or slightly smaller than second, distinctly smaller laterally based canine

often immediately posterior to second; teeth posterior to prominent canines quite variable; in general, about 2 or 3 moderately small canines anteriorly on dental ridge, these interspersed by several smaller canines in small specimens; anterior series followed by 2 or 3 moderately small canines based lateral to dorsal midline of dental ridge and terminal row of 2–7 short canines arising from midline of ridge, the series sometimes inseparable. One or more canines on vomer. Scaly basal sheath on dorsal and anal fins 2 or 3 scales in depth. Posterior tip of dorsal and anal fin rounded. Caudal fin truncate, dorsal-most and ventralmost rays slightly longer in large specimens forming barely detectable lobes. Pelvic fin reaching anus in small specimens, to or nearly to anus in larger specimens.

Largest specimen examined 283 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 27a)—body dark in very small individuals (less than ≈30 mm SL) to slightly dusky, pale below, with several pale bands and spots mostly dorsally on both sides; anteriormost band crossing midline of nape directly above dorsal end of opercular opening, directed ventroposteriorly behind pectoral-fin base (first band lost in specimens at length of about 60 mm SL); second band directed ventrally from scaly sheath at base of seventh to ninth dorsal-fin spines, reaching ventral side of body in very small individuals, confined to dorsal side in larger individuals and forming oval spot on and above lateral line in larger juveniles and adults; large pale spot on both dorsal and ventral midlines of caudal peduncle at posterior end of dorsal and anal-fin bases, spots connected anteriorly in small individuals by somewhat broken narrow pale band; additional spot dorsally and ventrally at posterior end of caudal peduncle. Rim of orbit dark. Dorsal fin slightly dusky with large dark ocellated spot slightly smaller than eye between tenth spine and fourth segmented ray on scaly basal sheath and proximal ¾ of fin; fin posterior to spot transparent; membrane between first 3 spines dark, especially ventrally, dark pigment extending posteriorly on distal edge of fin between spines, at least in larger specimens; pale band below seventh to tenth spines reaching to distal edge of fin only in very small individuals. Anal fin slightly dusky anteriorly with large dark ocellated spot of similar size to that on dorsal fin between third spine and seventh segmented ray on scaly basal sheath and proximal ⅔ of fin; fin transparent posterior to spot. Caudal fin pale or transparent to slightly dusky. Pectoral fin pale or transparent with large dark spot slightly smaller than eye covering fleshy fin base anteriorly and posteriorly (i.e. axilla of fin; this is last of dark spots to be lost in transforming from juvenile to adult colour patterns). Pelvic fin pale.

Initial-phase adults (Fig. 27b)—body slightly dusky to pale with 2 large pale spots in freshly preserved material; first spot on and above lateral line below seventh to ninth dorsal-fin spines; second on caudal peduncle just below posterior end of dorsal-fin base. Dorsal fin pale with membrane between first 3 spines dark, dark pigment extending posteriorly along distal edge of fin at tips of spines. Anal, caudal, pectoral and pelvic fins pale; eastern Australian specimens with dark distal margin.

Terminal-phase adults—similar to initial-phase adults, except pale spots on side, if present, less defined.

Fig. 27. *Bodianus frenchii*: (*a*) juvenile, 62.5 mm SL, USNM 217869, Rottnest Island, Western Australia; and, (*b*) adult, 145 mm SL, WAM P26616-017, Pt. Clune, Western Australia.

Colour in life. Juveniles (Plate 3F, 3G)—body black in very small specimens, grey to reddish brown in larger individuals; ventral surfaces of head and chest whitish in larger specimens; yellow band extending across nape above gill opening, second below seventh to ninth dorsal-fin spines; yellow spot at posterior end of dorsal-fin base opposite similar spot at posterior end of anal-fin base (2 spots connected anteriorly by narrow yellow band in very small specimens), spots also at dorsoposterior corner of caudal peduncle and at ventroposterior corner of caudal peduncle. Head reddish brown. Dorsal fin black anteriorly in very small specimens (with yellow band below seventh to ninth spines continuing to distal edge of fin), greyish in larger individuals with large black spot encircled by yellow (ventrolaterally) and blue (dorsoposteriorly) margin between tenth spine and fourth segmented ray; membrane between first 3 spines black, especially proximally; distal edge of fin between spines blackish, at least anteriorly; fin yellowish posterior to ocellated spot, at least in larger juveniles. Anal fin with large black spot encircled by yellow (dorsoanteriorly) and blue (ventroposteriorly) margin between third spine and seventh segmented ray; very small specimens with ventral edge of yellow band below seventh to ninth dorsal-fin spine continuing to distal edge of fin immediately anterior to ocellated spot; fin yellowish posterior to spot, at least in larger juveniles; sometimes narrow blue marginal stripe on fin, especially anteriorly. Caudal fin transparent in very small specimens, yellowish in larger juveniles, sometimes with bluish marginal band posteriorly. Pectoral fin pale with large black spot covering fleshy base. Pelvic fin whitish.

Initial-phase adults (Plate 3H)—body red to reddish brown, white below, with 2 large yellow spots, one on and above lateral line below seventh to ninth dorsal-fin spines and second below posterior end of dorsal-fin base, smaller than first. Dorsal fin red to reddish brown with black membrane between first 3 spines and blackish distal margin between tips of spines, at least anteriorly; outer margin

outlined with blue. Anal, caudal and pectoral fins red to reddish brown. Pelvic fin whitish.

Terminal-phase adults—similar to initial-phase adults with yellow spots on sides, if present, less defined.

Colour illustrations of this species appear in Coleman (1974, p. 83, initial-phase adult), Allen (1985, fig. 326, initial-phase adult; 1987, pl. 84-5, initial-phase adult), Kuiter (1993, p. 268, bottom left, initial-phase adult, and bottom right, juvenile) and Russell & Gomon (1994, fig. 595A, juvenile, and B, initial-phase adult).

Distribution. *Bodianus frenchii* is restricted to the temperate waters of southern Australia, with confirmed records from east of Mooloolaba, Queensland to northeastern Tasmania in the east and between about Port Denison, Western Australia and the York Peninsula, South Australia in the west (Fig. 25). In the east, it occurs on reefs at depths of 15–80 m. Scott (1962) reported the species (as "*L. vulpinus*"") to be reasonably common in somewhat deeper coastal waters off South Australia. In Western Australian waters it frequents deeper coastal reefs with juveniles preferring ledges and adults venturing into more open areas.

Etymology: *frenchii*, named after Herr French, an assistant of Dr V. Müller who collected many Australian fishes described by Klunzinger.

Comparison. See *Comparison* for *B. flavifrons*.

Discussion. Until recently, *B. frenchii* was consistently treated in the literature as B. *vulpinus* (Richardson, 1843), evidently as a result of the type locality, King Georges Sound on the southwestern coast of Australia, and the misperception that only a single species referable to the genus *Bodianus* occurs at that locality. As stated in the *Discussion* of *B. vulpinus*, the latter name applies to a species of a separate, *B. vulpinus*-complex.

The first available name for the species described here is *Trochocopus rufus* Macleay (1878), proposed for two specimens collected in King Georges Sound. The name is a junior homonym of *Bodianus rufus* (Linnaeus), the type species of the genus. *Cossyphus frenchii* Klunzinger (1880) based on a single specimen also from King Georges Sound is consequently the only name available for this species.

The widely used vernacular name for this species "foxfish" was probably adopted from the scientific name *vulpinus* that was long misapplied to it. The physical features of this species do not appear to provide a basis for such a reference.

Material examined. **Indian Ocean**, AUSTRALIA, *Western Australia*, Port Denison WAM P27955-017 (1, 97), Jurien Bay WAM P27951-023 (1, 131), Pt. Clune WAM P26616-017 (1, 145), P26620-018 (1, 82), Rottnest I. AMS I.20245-004 (2, 75.8–153), USNM 217869 (1, 62.5), WAM P25781-005 (1, 90.8), Garden Island CSIRO C2264 (1, 244), Geographe Bay AMS I.19629-005 (2, 120–224), WAM P26812-008 (1, 73), Cape Naturaliste WAM P28519-017 (1, 97), Canal Rocks WAM P28520-016 (1, 49), Dunksborough WAM P28517-013 (1, 214), Augusta WAM P28522-012 (2, 82–124), P28523-021 (1, 39), King Georges Sound AMS I.12683 (1, 281), I.16361-001 (2, 282–283, syntypes of *T. rufus*), SMNS 2685 (1, 240, holotype of *C. frenchii*). **Pacific Ocean**, AUSTRALIA, *Queensland*, Barwon Banks QMB I.22661 (1, 236); *New South Wales* BMNH 1925.11.11.9 (1, 262), Kingscliffe QMB I.29544 (1, 249), I.30171 (1, 203), North Solitary I. AMS I.17654-003 (1, 22.9), Montague I. NMV A9673 (1, 111); TASMANIA, BMNH 1875.11.12.5 (1, ≈430).

Bodianus oxycephalus (Bleeker)

Figs 23, 28; Plate 3I–J; Tables 2–3, 6

Cossyphus oxycephalus Bleeker, 1862, p. 129, Japan.

Morphological diagnosis. Dorsal-fin rays XII, 11; anal-fin rays III, 12; caudal-fin rays 9 + 12 + 9; pectoral-fin rays ii, 14 (1) or 15* (2); lateral-line scales 31; scales above lateral line 5; scales below lateral line ≈12; predorsal scales ≈23; total gill rakers 13. See Tables 2 and 6 for morphometric values. Head and snout of moderate length, slightly attenuate. Posterior corner of mouth on or slightly in advance of vertical through anterior extent of orbit. Upper jaw with second prominent anterior canine about equal to or slightly smaller than first; about 8 teeth on dental ridge posterior to prominent canines, moderately large anteriorly, becoming progressively shorter posteriorly, distinctly caniniform and in single row, originating close behind prominent anterior canines, those posteriorly on crest of dental ridge; single large canine at posterior end of jaw. Lower jaw with first prominent anterior canine ≈⅘ length of second; teeth on dental ridge in 2 series forming single row; 8–12 teeth in first series of uniform moderate size, originating close behind and in line with prominent anterior canines, posterior teeth based on crest of dental ridge; first series followed immediately by about 4 equally short canines. Large specimens with numerous tiny teeth on dental ridge posteromesial to anterior canines in both jaws. Vomerine teeth absent. Scaly basal sheath on dorsal and anal fins 2½–3 scales in depth. Posterior tips of dorsal and anal fins rounded to slightly pointed. Caudal fin truncate to double emarginate; dorsal-most and ventralmost caudal-fin rays becoming only slightly longer than middle rays at most. Posterior tip of pelvic fin nearly reaching anus.

Largest specimen examined 290 mm SL.

Fig. 28. *Bodianus oxycephalus*, terminal-phase adult, 234 mm SL, BPBM 10047, Naha, Okinawa, Japan.

Pigmentation in alcohol. Initial-phase adults (Fig. 28)—pale with 4 broken dusky stripes on sides, segments of stripes widely separated and of nearly equal length, each stripe usually separated into 3–6 segments; first and fourth stripes faint anteriorly, second and third converging on posterior margin of orbit; dusky stripe directed posteroventrally from corner of mouth. Fins pale. Moderately large specimens developing large dark spot somewhat basally on dorsal fin between sixth and tenth spines.

Terminal-phase adults—pale with prominent dark spot on dorsal fin between sixth and tenth spines.

Colour in life. Initial-phase adults (Plate 3I)—head and body pink above, white below, with 4 broken red stripes manifested as series of elongate rectangular spots,

superimposed with black in small individuals, uppermost comprising about 3 small spots adjacent base of dorsal fin, second with 3–5 larger spots on lateral line, third with 5–6 spots of similar size on lateral midline, and fourth with about 4 small spots confined to posterior portion of side, narrow red stripe directed posteroventrally from corner of mouth. Spinous portion of dorsal fin pink, segmented portion mostly transparent; anterior portion of anal fin pale pink. Pectoral and pelvic fins whitish. Large individuals with prominent black spot centrally on spinous portion of dorsal fin.

Terminal-phase adults (Plate 3J)—head and body red dorsally, becoming orange just above lateral midline of body, white ventrally with deeper red remnants of broken stripes on sides dorsally, these markings relatively small in large individuals, fading with growth; 3 or 4 white spots on side, 3 arranged in horizontal row dorsally, first small and below fifth dorsal-fin spine, second larger and below ninth or tenth dorsal-fin spine, third below first few segmented rays, fourth smaller, below and behind third, just under lateral line; head with two white stripes radiating posteriorly from posterior margin of orbit. Dorsal fin red with yellowish posterior lobe and a large black spot between the fifth and tenth spine. Anal and caudal fins red to yellowish. Pectoral fin yellowish with blackish mark outlining base dorsally. Pelvic fin white with yellowish leading edge.

Colour illustrations of this species appear in Burgess & Axelrod (1972, fig. 221, initial-phase adult; 1974, fig. 67, terminal-phase adult?), Masuda *et al*. (1975, p. 102, fig. j; 1984, pl. 196G initial-phase adult) and Okamura & Amaoka (1997, p. 469, center bottom row, terminal-phase adult, right bottom row, initial-phase adult).

Distribution. *Bodianus oxycephalus* is confined to the subtropical and warm temperate northwestern Pacific (Fig. 23) between Sagami Bay (Masuda *et al*., 1975; 1984), Japan, and the northeastern tip of Taiwan (Yu, 1968; Shen & Choi, 1976).

Etymology: *oxycephalus*, from the Greek *oxys*, "acute", and *cephalo*, "head", in reference to the sharply pointed head in this species.

Comparison. *Bodianus oxycephalus* most closely resembles *B. bathycapros*, as described above in the *Comparison* for that species. The two are readily separable on the basis of adult colour patterns, with *B. oxycephalus* having four prominent broken red stripes laterally on the body in initial-phase adults and only two, much fainter, broken red stripes dorsolaterally in terminal-phase adults, whereas *B. bathycapros* has two broken red stripes dorsolaterally and a third uninterrupted red stripe midlaterally in adults. In addition, terminal-phase adults of *B. oxycephalus* have a row of about three white blotches below the dorsal fin, like those of adult *B. diana, B. leucosticticus* and *B. rubrisos*, whereas *B. bathycapros* and *B. vulpinus* appear to lack these blotches altogether and terminal-phase adults of *B. unimaculatus* have only a single, large white blotch beneath the posterior end of the dorsal fin. Neither *B. bathycapros* nor *B. oxycephalus* develop the filamentous caudal-fin lobes of terminal-phase adults found in at least some populations of the other two species of the complex.

Discussion. *Cossyphus oxycephalus* (Bleeker, 1862) was based on a dry mounted adult specimen presently in the collection of the RMNH purported to be from "Japon?". The name was subsequently applied to the Hawaiian and southern Pacific populations of the *B. vulpinus*-complex. Gomon & Randall (1978), unaware these populations represented separate species, synonymized *oxycephalus* with *vulpinus*, a name that previously had been applied to the species recognized here as *Bodianus frenchii* (see *Comparison* under the treatment of that species).

Material examined. **Pacific Ocean**, JAPAN, RMNH 1248 (1, 290, mounted, holotype of *C. oxycephalus*), *Okinawa*, Naha BPBM 10047 (1, 234).

Bodianus unimaculatus (Günther)

Figs 1b, 4d, 23, 29; Plate 4A–C; Tables 2–3, 6

Cossyphus unimaculatus Günther, 1862, p. 110, Australia.
Cossyphus bellis Ramsay & Ogilby, 1887, p. 561, Shoalhaven, Australia.

Morphological diagnosis. Dorsal-fin rays XII, 10 (1) or 11* (13); anal-fin rays III, 12; caudal-fin rays 9 + 12 + 9 (3) or 10 (1); pectoral-fin rays ii, 14 (2), 15* (21) or 16 (1); lateral-line scales 31 (8), 32* (10) or 33 (2); scales above lateral line 5 or 6 (usually 5); scales below lateral line ≈10–14 (usually 10 or 11); predorsal scales ≈15–23; total gill rakers 14 (2), 15 (4) or 16 (4). See Tables 2 and 6 for morphometric values. Head and snout of moderate length, slightly attenuate. Posterior corner of mouth on or slightly in advance of vertical through anterior extent of orbit. Upper jaw with second prominent anterior canine about equal to or slightly smaller than first; 6–10 teeth on dental ridge posterior to prominent anterior canines moderately large anteriorly, becoming progressively shorter posteriorly, distinctly caniniform and in single row, originating close behind prominent canines, those posteriorly on crest of dental ridge; single large canine usually at posterior end of jaw (Fig. 1b). Lower jaw with first prominent anterior canine ≈⅔ to ⅘ length of second; teeth on dental ridge in 2 series forming single row; 8–12 teeth in first series of uniform moderate size, originating close behind and in line with prominent anterior canines, posterior teeth based on crest of dental ridge; first series followed immediately by 1–5 equally short canines of second series. Large specimens with numerous tiny teeth on dental ridge posteromesial to anterior canines in both jaws. Vomerine teeth absent. Scaly basal sheath on dorsal and anal fins 1½–3 scales in depth. Posterior tips of dorsal and anal fins rounded to slightly pointed. Caudal fin truncate to double emarginate; dorsal-most and ventralmost caudal-fin rays becoming slightly elongate but not filamentous, forming dorsal and ventral lobes, dorsal lobe much better developed than ventral lobe in very large adults. Posterior tip of pelvic fin reaching nearly to or slightly past anus.

Largest specimen examined 365 mm SL.

Pigmentation in alcohol. Juveniles—pale with two broken dusky stripes represented by pair of vertically aligned, widely separated, elongate dashes on dorsal half of body, ventralmost on lateral midline, both aligned with pair of diverging dusky segments directed posteriorly from posterior rim of orbit. Fins pale; dusky blotch developing between fifth and seventh spines just above scaly basal sheath in individuals of 50 mm SL; faint dusky marginal band on caudal fin.

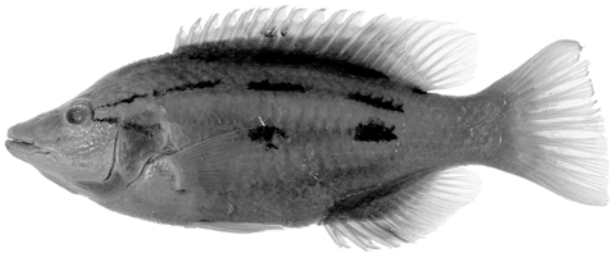

Fig. 29. *Bodianus unimaculatus*, initial-phase adult, 241 mm SL, NMNZ P.33981, Bay of Plenty, Alderman Islands, New Zealand.

Initial-phase adults (Fig. 29)—pale with 3 broken dusky stripes on dorsal half of body (occasionally fourth on ventral half), segments of stripes widely separated and of almost equal length; dorsal 2 stripes usually separated into 3 segments, third on lateral midline of side with but 2 segments (fourth stripe also with 2 segments when present); second and third stripes faint anteriorly, converging on posterior margin of orbit. Fins pale. Moderately large specimens developing large dark spot somewhat basally on dorsal fin between fifth or sixth and ninth spines.

Terminal-phase adults—recently preserved specimens pale with about 15 faint horizontal dusky lines on body, lines sometimes replaced by horizontal rows of small dusky spots dorsally. Prominent dark spot on dorsal fin between fifth and ninth spines; fins otherwise pale.

Colour in life. Juveniles (Plate 4A)—white, dorsal side of snout pale red; sides with about 15 fine red horizontal lines dorsally, lines more orange to yellow ventrally; 3 broken broad red stripes on side, second and third radiating from posterior margin of orbit; segments of stripes on caudal peduncle orange-red, often with two orange blotches ventrally; cores of two lateralmost pair of segments irregularly black. Fins yellowish-white, white marginally; dorsal fin with faint black blotch at base between fifth and seventh spines; caudal fin with faint grey distal margin; pectoral fin with reddish band across base.

Initial-phase adults (Plate 4B)—body pinkish white to yellow with horizontal lines and stripes as in juveniles except lines darker red; spinous portion of dorsal fin reddish, segmented portion yellowish tinged with red. Anal and caudal fins yellowish suffused with pink. Large specimens with large black spot centrally on dorsal fin.

Terminal-phase adults (Plate 4C)—body orange red to scarlet, white ventrally, head abruptly white below level of mouth; lower portions of sides with faint red longitudinal lines following scale rows, some specimens with tiny black spot on each scale dorsally on sides; large black spot ocellated with blue on spinous portion of dorsal fin, large yellow to white spot or fusion of smaller spots sometimes dorsally on side and scaly dorsal-fin base below segmented portion of dorsal fin.

Colour illustrations of this species appear in Gomon & Randall (1978, fig. 4, center, terminal-phase adult, as "*B. vulpinus*"), Doak (1972, pl. 39, top, initial-phase adult, bottom, juvenile, and pl. 40, terminal-phase adult, as "*Verreo oxycephalus*"), Grant (1978, colour-plate 215, initial-phase adult, as "*B. oxycephalus*"), Allen & Swainston (1988, pl. 70, fig. 730, terminal-phase adult, as "*B. vulpinus*"), Francis (1988, fig. 85, initial-phase adult, and fig. 84, terminal-phase adult, as "*B. vulpinus*"), Kuiter (1993, p. 268, top, initial-phase adult, and center, terminal-phase adult; 1996, p. 269, initial-phase adult), and Russell & Gomon (1994, fig. 596A, initial-phase adult and B, terminal-phase adult).

Distribution. *Bodianus unimaculatus* is the most widely distributed species in this complex, occurring in cool tropical and warm temperate waters of the southern Pacific. The species is known so far from off southeastern Australia, Lord Howe Island (Francis, 1991), Norfolk Island, New Zealand, the Kermadec Islands (Francis *et al*., 1987), Rapa and Easter Island (Fig. 23). Future collecting will likely reveal *B. unimaculatus* to occur at intermediate island localities. This species is reliably reported in the literature as far north as Noosa, Queensland in eastern Australia (Grant, 1978) and has been collected in Port Phillip Bay, Victoria in the south. *Bodianus unimaculatus* occurs at shallow depths of about 6–60 m (Doak, 1972) along "broken rocky coasts" and around offshore islands.

Etymology: *unimaculatus*, from the Latin *unus* "one", and *macula*, "spot", in reference to the prominent black spot usually present in the dorsal fin of this species.

Comparison. See *Comparison* under *B. bathycapros* and *B. oxycephalus*. Of the four species in the *B. vulpinus*-complex, *B. unimaculatus* most closely resembles *B. vulpinus* in coloration and morphology. Unlike the other two species that appear to retain some element of the broken red stripes characteristic of initial-phase adults in their terminal-phase adult patterns, the first two have a relatively uniform red pattern in the male stage. Both *B. unimaculatus* and *B. vulpinus* develop more elongate extensions of the posterior corners of the caudal fin in large adults than their two cognates. Although the initial-phase coloration of *B. unimaculatus* resembles that of *B. oxycephalus*, the ventral, fourth broken stripe usually present in the latter does not appear to occur in the former.

Discussion. Günther (1862) considered his *C. unimaculatus*, based on a single dry specimen collected in Australia (footnote, pg. 506), to be synonymous with *C. oxycephalus* Bleeker. He stated that publication dates would provide seniority. The two species, however, are clearly different. *Cossyphus bellis* was described by Ramsay & Ogilby (1887) from an adult specimen collected in Shoalhaven, Australia (AMS I.1362). Until recently, both *C. unimaculatus* and *C. bellis* were considered to be synonymous with *Bodianus oxycephalus*. Gomon & Randall (1978) recognized that *Cossyphus vulpinus*, Richardson (1850) referred to species of what are regarded here as the *B. vulpinus*-complex rather than *B. frenchii* (see *Discussion* in the treatment of the last species). Because *B. vulpinus* and *B. oxycephalus* refer to other species, *B. unimaculatus* is available for the widely distributed southern Pacific species.

Despite reports of variability in colour pattern for species in the *B. vulpinus*-complex, all seem to be consistent within a species. Consequently, the observed absence of a prominent pale marking on the back of an adult male specimen from Easter Island may indicate that individuals at that locality have diverged somewhat from those in populations of *B. unimaculatus* elsewhere. The current shortage of specimens in collections, however, prevents a comparison of the populations.

Material examined. **Pacific Ocean**, EASTER I., BPBM 6727 (1, 260), 6728 (1, 268), 6729 (1, 302); RAPA BPBM 12972 (2, 272–286); NEW ZEALAND, ANSP 103950 (1, 348), BMNH 1886.11.18.78 (1, 318), *North I*., Cape Brett ANSP 103845 (1, 316), Okahu I NMNZ P.34363 (1, 210), off Whangarei Harbour NMNZ D5055 (1, 224), east end of Red Mercury I. NMNZ P.21582 (2, 214–261), P.21596 (1 of 2, 225), Alderman Is, rocks SE of Ruamahui-nui NMNZ P.21597 (1, 212), Bay of Plenty NMNZ P.33981 (1, 241), Bay of Islands, Kingfish Reef, off Deepwater Cove NMNZ P.34537 (1, 205); LORD HOWE I. AMS IB.760 (1, 355), I.17418-002 (1, 365), BPBM 14907 (1, 257); AUSTRALIA, BMNH 1860.5.25.4 (1, 324, type of *C. unimaculatus*); *New South Wales* AMS IA.4930 (1, 272), IA.4931 (1, 244), USNM 176685 (1, 265), Coffs Harbour AMS I.20653-014 (1, 147), Newcastle CSIRO CA3771 (1, 238), Lake Macquarie AMS I.1677 (1, 307), Bird I. AMS I.9851 (1, 211), Port Jackson AMS I.2449 (1, 277), I.3066 (1, 250), I.4493-4495 (3, 236–276), I. 7400 (1, 235), I.9793 (1, 279), USNM 47820 (1, 215), 47848 (1, 316), 47849 (1, 279), 47897 (1, 233), 59872 (1, 284), Shoalhaven River AMS I.1362 (1, 220, type of *C. bellis*), Bermagui NMV A11851 (1, 293); *Victoria*, Port Phillip Bay NMV 61505 (1, 354), A45 (1, 326); *Eastern Tasman Sea*, Norfolk Ridge NMV A25112-002 (4, 34.6–91.2).

Bodianus vulpinus (Richardson)

Figs 5a, 23, 30; Plate 4D–E; Tables 2–3, 6

Cossyphus vulpinus Richardson, 1850, p. 71, Australia.

Morphological diagnosis. Dorsal-fin rays XII, 10 (1) or 11 (6); anal-fin rays III, 12; caudal-fin rays 9 (5) or 10 (3) + 12 + 9 (3) or 10 (5); pectoral-fin rays ii, 15; lateral-line scales 30 (3) or 31 (11); scales above lateral line 5–6 (usually 5½); scales below lateral line ≈12–14; predorsal scales ≈17–20 (usually 20); total gill rakers 15 (3) or 16 (2). See Tables 2 and 6 for morphometric values. Head and snout of moderate length, slightly attenuate. Posterior corner of mouth slightly in advance of vertical through anterior extent of orbit. Upper jaw with second prominent anterior canine about equal to or slightly smaller than first; 4–6 teeth on dental ridge posterior to prominent anterior canines moderately large anteriorly, becoming progressively shorter posteriorly, distinctly caniniform and in single row, originating close behind prominent canines, those posteriorly on crest of dental ridge; 1 or 2 large canines at posterior end of jaw. Lower jaw with first prominent anterior canine ≈⅔ to ⅘ length of second; teeth on dental ridge in 2 series forming single row; 7–10 teeth in first series of uniform moderate size, originating close behind and in line with prominent anterior canines, posterior teeth based on crest of dental ridge; first series followed immediately by 5–7 equally short canines. Large specimens with numerous tiny teeth on dental ridge posteromesial to anterior canines in both jaws. Vomerine teeth absent. Scaly basal sheath on dorsal and anal fins 2½ scales in depth. Posterior tips of dorsal and anal fins rounded to slightly pointed. Caudal fin truncate in smaller individuals; dorsal-most and ventralmost caudal-fin rays becoming elongate and filamentous, forming distinct dorsal and ventral lobes in larger individuals. Posterior tip of pelvic fin reaching anus.

Largest specimen examined 315 mm SL.

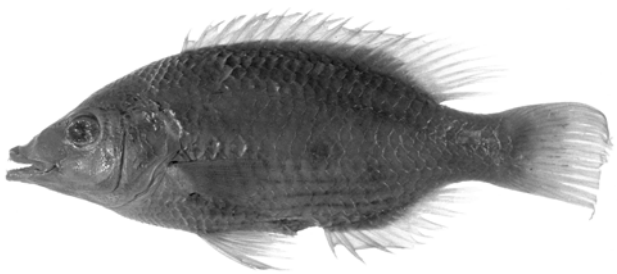

Fig. 30. *Bodianus vulpinus*, initial-phase adult, 149 mm SL, NMV A1770, southwest of Shark Bay, Western Australia.

Pigmentation in alcohol. Initial-phase adults (Fig. 30)—pale. Moderately large specimens developing large dark spot somewhat basally on dorsal fin between fifth or sixth and ninth spines.

Terminal-phase adults—pale. Prominent dark spot on dorsal fin between fifth and ninth spines; fins otherwise pale.

Colour in life. Initial-phase adults (Plate 4D)—head and body peach to pink above, white below, with red horizontal stripe directed posteriorly from eye fading near center of side; horizontally elongate red spot on upper portion of side below rear half of spinous portion of dorsal fin. Spinous portion of dorsal fin peach to pink, segmented portion yellowish tinged with red. Anal and caudal fins yellow. Pectoral and pelvic fins whitish. Large specimens with large black spot centrally on dorsal fin.

Terminal-phase adults (Plate 4E)—body red dorsally, white laterally and ventrally, head abruptly white below level of mouth; dorsal surface of head with two transverse yellow bands connecting eyes, first anteriorly across snout, second dorsally. Dorsal fin red anteriorly yellow on anterior half of soft rayed portion and transparent posteriorly; large black spot ocellated with blue between sixth to tenth dorsal-fin spines. Anal fin yellow with white basal margin. Caudal fin red, suffused with yellow especially on uppermost and lowermost segmented rays. Pectoral fin reddish dorsally with grey blotch at tip. Pelvic fin white with yellow leading edge.

A colour illustration of this species appears in Allen & Swainston (1988, fig. 730, pg. 113, initial-phase adult; fig. 730 on p. 158 of the same publication is a terminal-phase adult *B. unimaculatus*).

Distribution. *Bodianus vulpinus* occurs in sub-tropical and warm temperate waters off southwestern Australia from about Shark Bay, Western Australia to Ceduna, South Australia (Fig. 23). *Bodianus vulpinus* lives at depths of at least 100–250 m in areas with sandy bottom and some rock and coral rubble.

Etymology: *vulpinus*, from the feminine Latin noun *vulpes*, "fox", and *inus*, "pertaining to", perhaps in reference to the elongate fox-like snout in this species.

Comparison. See *Comparison* under *B. bathycapros, B. oxycephalus* and *B. unimaculatus*.

Discussion. Until recently, the specific name *vulpinus* was widely applied to the species treated in this study as *Bodianus frenchii*. Gomon & Randall (1978) pointed out that the original description of *Cossyphus vulpinus* Richardson, 1850 was diagnostic for what was considered at that time to be a widely distributed antitropical Pacific species and should replace the name *oxycephalus* that was then in general use for it. Subsequent analysis of this taxon has revealed it to be a species complex (the *B. vulpinus*-complex), rather than a single species, that includes a southeastern Indian Ocean representative along with three

species confined to the Pacific. Prior to Gomon & Randall's publication, the presence of the Indian Ocean form had been overlooked. No type locality is indicated in Richardson's description, even though specimen localities are reported for most other species described in his paper. In the introduction, Richardson notes that novel forms of Australian fishes with which he has become familiar on the basis of drawings, until that time "could not be systematically described without specimens, and the opportunity" then afforded him "by Mr Gray of inspecting a number of dried skins prepared on the spot by Mr Neill" had "given occasion to the present paper". The drawings mentioned in Richardson's introduction were "made by Deputy Assistant Commissary General Neill, in 1841, at King George's Sound". Because the type of this species was dried, as clearly indicated in Richardson's description, the specimen was most likely taken in the vicinity of King Georges Sound and prepared by Mr Neill. Unfortunately, a search for the specimen at the British Museum (Natural History), the repository for many of Richardson's types, was unsuccessful. A footnote at the bottom of the page introducing the genus *Cossyphus* in Günther's catalogue (1862) implies that Günther had not seen the specimen and that it was probably not in the collection at that time. As the characters given by Richardson restrict the choice of species to this complex and as the species described here is the only member of the complex that occurs in the vicinity of King Georges Sound, the name *B. vulpinus* is referred to this species.

It is not surprising that *B. vulpinus* most closely resembles *B. unimaculatus*, considering the short expanse of Australia's southern coast separating the two, and the great distance between *B. vulpinus* and the other representatives of the complex. Both species have the posterior corners of the caudal fin more produced and considerably more filamentous than their cognates. The initial-phase adult colour pattern in *B. vulpinus* has not only lost the ventral, fourth broken red stripe of *B. oxycephalus*, as has *B. unimaculatus*, but the remaining three stripes appear to be reduced as well.

Material examined. **Indian Ocean**, AUSTRALIA, *Western Australia*, Southwest of Shark Bay NMV A1770 (1, 149), A1917 (1, 244), A1697 (1, 315), A1789 (1, 123), A1710 (1, 187), A1849 (1, 284), Houtman Abrolhos WAM P27210-005 (1, 139), Perth CSIRO T546 (1, 195), *South Australia*, Ceduna CSIRO T169 (1, 375).

Subgenus *Peneverreo* n.subgen.

Type species. *Labrus leucosticticus* Bennett, 1831.

Diagnosis. Ethmoid-frontal surface moderately depressed; transverse axis of lower pharyngeal (Fig. 5b,c) moderately deep to deep with slightly to strongly convex posterior margin; pharyngeal teeth aligned transversely in 3 or 4 rows; teeth rounded, those medially of moderate size, lateral teeth much smaller, 4–6 slightly to distinctly larger ovoid molars in posterior row; anterior head of pharyngeal long with 6–8 canines of similar size to those immediately behind, 2 or 3 aligned anteroposteriorly on midline and on either side; vomerine teeth present; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw usually in two or three series sequentially, defined by differing lengths, posterior series shortest; dorsal fin with XII, 10 rays; anal fin with III, 12 rays; lateral line with 29–30 pored scales, each with simple laterosensory tube; 4–5 scales above lateral line; 11–13 scales below lateral line; predorsal scales 18–33, reaching forward to vertical through center of eye or to anterior nostril; cheek scales extending forward just in advance of corner of mouth, preopercle fully scaled or with only narrow naked margin at most, scales covering posterior half of lower jaw; scaly basal sheath on base of dorsal and anal fins low or of moderate height, 1½–3 scales in depth; posterior tips of dorsal and anal fins rounded; caudal fin slightly rounded to truncate; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer; species small or of moderate size, maximum length 100–300 mm SL; at least some initial- and terminal-phase adults with different melanistic pigmentation; juveniles similar to initial-phase adults, but with additional black spots on fins; initial-phase adult colour pattern comprising four or five lengthwise narrow red to orange stripes, some with black segments, and black spot on base of pectoral fin; terminal-phase adults similar but sometimes without black markings.

Etymology. *Peneverreo*, from the Latin *pene*, "near", and *verres*, "boar", in recognition of the close relationships and similarity of colour patterns between members of this subgenus and those of the subgenus *Verreo*.

Discussion. The four species referred to this subgenus are very similar in appearance and have often been misidentified in the literature. They share a narrow red striped colour pattern with a black spot on the base of the pectoral fin in juveniles and initial-phase adults. The red striped pattern is reminiscent of the initial-phase adult patterns of members of the *B. vulpinus*-complex, but has elements that differ from them. Species are also very similar osteologically to those of the subgenus *Verreo*, differing principally in lacking modifications to jaw dentition and vertical fin formulae that are diagnostic for that group.

Bodianus leucosticticus (Bennett)

Figs 5b, 31–32; Plate 4F–H; Tables 2–3, 7

Labrus leucosticticus Bennett, 1831, p. 166, Mauritius.
Lepidaplois Bourboni Fourmanoir & Guézé, 1961, p. 7, fig. 1, Réunion.

Morphological diagnosis. Caudal-fin rays 10* (4) or 11 (1) + 12 + 9 (1) or 10* (4); pectoral-fin rays ii, 14; lateral-line scales 29 (2) or 30 (8); scales above lateral line 4½; scales below lateral line ≈11–13 (12*); predorsal scales ≈26–31* deep, reaching forward to above anterior nostril on dorsal midline of head; total gill rakers 16 (1), 17 (1), 18 (2) or 19 (1). See Tables 2 and 7 for morphometric values. Body of moderate depth. Upper jaw with first prominent anterior canine about equal to or slightly smaller than second; first canine directed anteroventrally; second canine directed anteroventrally, slightly laterally and recurved posteroventrally; as many as 13 small teeth posterior to prominent anterior canines, best developed posteriorly; single prominent canine at posterior end of jaw directed anteroventrally, though somewhat stronger anteriorly. Lower jaw with first prominent anterior canine ½ to ⅘ size of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, often slightly

Fig. 31. *Bodianus leucosticticus*, initial-phase adult, 137 mm SL, SMBL 74001, Seto-zaki, Japan (photo reversed).

laterally and curved dorsally; dental ridge prominent on anterior ⅖ to ½ of jaw with irregular somewhat humped dorsal outline; up to about 6 moderately small teeth posteriorly on ridge (teeth more distinct along entire length of ridge in larger specimens); teeth on ridge followed by row of about 3–7 longer canines and a row of about 1–6 very short canines at posterior end of jaw. Caudal fin distinctly truncate posteriorly, dorsoposterior angle of fin very slightly lobate in type. Tip of pelvic fin reaching about ⅔ of distance from pelvic origin to anus in specimens of moderate size, approaching anus in very large individuals.

A species of moderate size, largest specimen examined 161 mm SL. Among *Material examined*, the largest specimen is a developing female; all others of similar size appear to have undifferentiated developing gonads.

Pigmentation in alcohol. Adults (Fig. 31a)—mostly pale with 4–5 narrow jagged dusky stripes on body; dorsal-most stripe originating on snout on mesial side of nostrils, directed posteriorly to just below anterior portion of dorsal fin (in 1 specimen continuing almost to below posterior end of dorsal fin); second stripe extending from dorsal edge of orbit to posterior end of dorsal-fin base; third running from dorsoposterior edge of orbit to posterior end of caudal peduncle midway between lateral line and dorsal outline of peduncle; fourth extending from ventroposterior edge of orbit to posterior end of caudal peduncle at level of lateral line (cephalic portion of stripe very faint to absent); fifth directed posteriorly from ventral end of pectoral-fin base, often very faint, usually fading before reaching caudal peduncle; stripes often faint posteriorly. Pale space between second and third stripes with parallel row of small dusky spots anteriorly; space between third and fourth stripes with 2 similar parallel rows of spots anteriorly. Freshly preserved specimens of moderate size with 5–7 parallel narrow dusky stripes on posterior end of caudal peduncle (3 confluent with dusky body stripes) and 3 moderately small pale spots immediately below second dusky body stripe evenly spaced under dorsal fin; first spot under about fifth spine, second under about ninth spine and third under second or third segmented ray. Head with broad dusky stripe extending from anterior edge of orbit to upper lip slightly posterior to snout tip. Recently preserved specimens with dusky blotch at corner of mouth. Dorsal fin pale with dusky blotch somewhat distally between first and third spines. Anal, caudal and pelvic fins pale. Pectoral fin pale with large dorsoventrally elongate dark spot on fleshy base and proximal edge of fin; axilla of fin similarly dark.

Colour in life. Juveniles (Plate 4F)—pink with 4 red stripes on side, second and third radiating from posterior margin of orbit, and fourth directed posteriorly from corner of mouth, each superimposed with irregular black core, fourth broken irregularly; 5 or 6 bright white to yellow spots just below dorsal stripe starting below middle of spinous dorsal-; additional pale spots irregularly below second and third stripes; caudal fin base with prominent pale margined black spot midlaterally; dorsal fin with prominent black spot bordered anteriorly with yellow at start of spinous and soft ray portions, spots connected by broad red marginal stripe; anal fin with large black spot anteriorly and smaller black

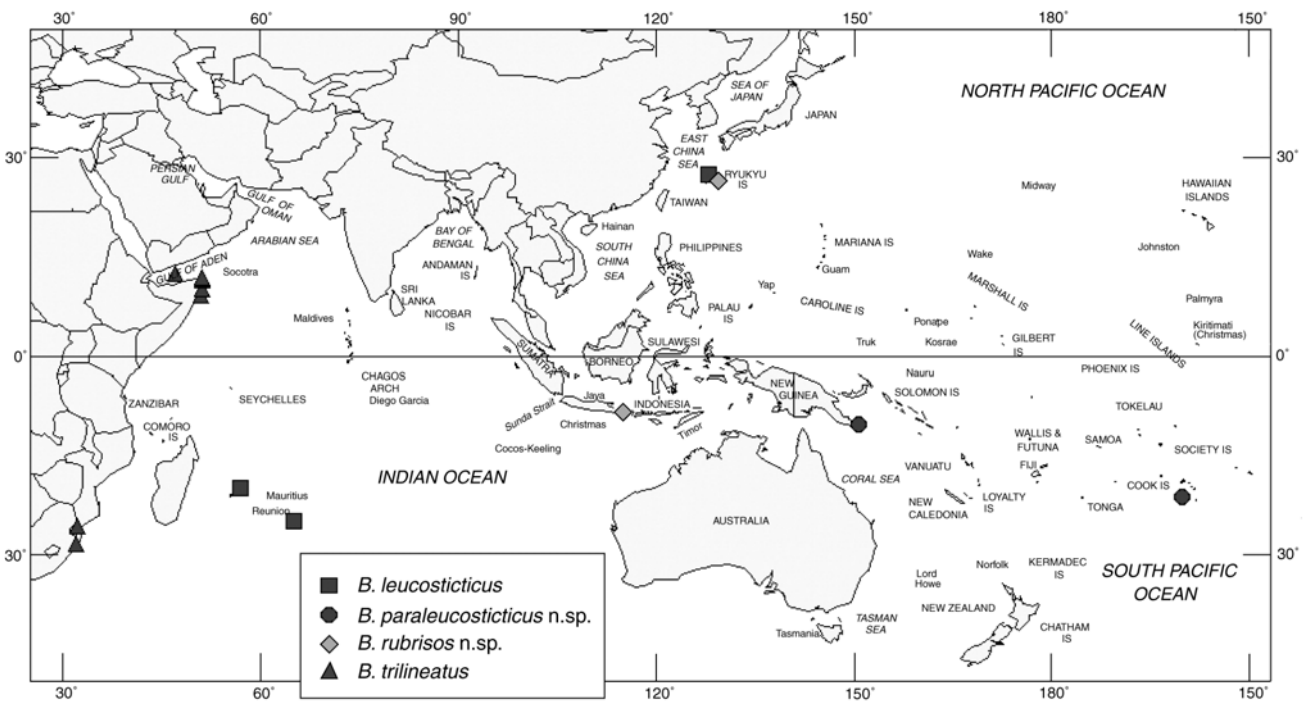

Fig. 32. Distributional records for specimens examined of species of the subgenus *Peneverreo*.

Table 7. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus leucosticticus* and *Bodianus trilineatus* examined and types of *Bodianus paraleucosticticus* n.sp. and *Bodianus rubrisos* n.sp. Values marked with † do not include one paratype and those with * are for the holotype of the species.

	B. paraleucosticticus n.sp.		*B. rubrisos* n.sp.		*B. leucosticticus*	*B. trilineatus*
	holotype	paratype	holotype	paratypes		
number of specimens	1	1	1	2	5	11
standard length (mm)	99.1	71.9	141	148–202	136–161	52.8–230
body depth	30.9	34.6	36.3	37.6–41.1	31.2–34.3	32.6–38.4
head length	36.1	38.0	38.5	38.2–40.2	35.1–37.3	36.3–39.0
snout length	10.1	10.8	11.5	12.3–13.2	10.6–12.0	9.5–14.6
orbital diameter	8.7	9.6	8.3	7.7†	6.7–8.3	6.4–11.4
predorsal length	38.6	40.3	41.8	40.0†	38.2*	38.6*
preanal length	63.9	63.1	66.3	62.1†	70.8*	67.9*
preanus length	59.9	58.4	62.0	59.9†	64.0*	—
dorsal-base length	50.9	53.5	53.0	50.0–58.9	46.3–51.2	46.0–54.6
anal-base length	24.1	25.7	22.6	24.5–26.1	18.8–24.0	21.6–25.5
caudal-peduncle depth	15.2	16.0	15.2	15.7–18.4	15.7–17.0	14.2–16.7
caudal-peduncle length	14.1	17.4	17.0	14.7†	13.6*	12.4*
dorsal-fin length	63.4	67.2	67.4	65.3–74.3	62.7*	59.3*
anal-fin length	33.9	34.5	31.7	34.4–38.2	32.3*	31.7*
pectoral-fin length	23.5	25.5	24.2	22.3–23.0	20.9–24.5	22.7–24.4
pelvic-fin length	21.1	22.7	19.7	18.4–20.3	18.1–19.8	17.9–22.0
dorsal-fin spine 1	7.8	8.1	7.1	5.7–7.8	6.0–7.7	5.6–7.1
dorsal-fin spine 2	9.5	10.3	8.4	7.3–9.5	7.5–8.8	7.1–9.1
dorsal-fin spine 12	15.0	16.7	14.3	13.6–15.9	13.1–14.8	9.6–14.7
anal-fin spine 1	6.6	8.1	6.9	6.8–7.4	6.4–7.5	5.4–7.2
anal-fin spine 3	15.1	17.7	13.6	13.9–15.4	13.6–15.5	10.4–13.8
caudal-fin length—top	26.1	26.8	23.4	25.7†	—	21.2–26.0
caudal-fin length—middle	25.0	25.5	22.6	23.0–26.7	21.4–23.1	21.4–25.4

spot posteriorly, both adjacent body; pectoral-fin base with distinct black spot. Pelvic fin with black spot distally. Fins otherwise transparent.

Initial-phase adults (Plate 4G)—body yellow with 5 moderately narrow reddish orange and black stripes (each stripe basically reddish orange with black core), stripes corresponding in position to dusky body stripes described above except ventralmost stripe originating at corner of mouth, passing posteriorly to anterior portion of pectoral-fin base where it becomes broad and temporarily terminates, arising again on posterior side of pectoral-fin base. Row of small black spots midway between and parallel to second and third stripes anteriorly; 2 similar rows of spots anteriorly between third and fourth stripes. Three moderately small white spots below second stripe, evenly spaced under dorsal fin. Broad grey stripe extending from anterior edge of orbit to upper lip. Large black spot covering posterior portion of fleshy pectoral-fin base and axilla of fin. Dorsal fin reddish orange with prominent black spot basally between second and fifth spines, immediately preceded by yellow basal spot. Caudal fin yellowish orange. Anal and pelvic fins yellow. Pectoral fins mostly transparent.

Terminal-phase adults (Plate 4H)—as described for initial-phase adults except black markings on red stripes reduced to series of black dots and prominent black spot at front of dorsal fin replaced with red spot, edged distally with black smudge.

Colour illustrations of this species appear in Masuda *et al*. (1975, p. 103, fig. E, initial-phase adult, as "*Bodianus trilineatus*"; 1984 pl. 195H, initial-phase adult, as "*Bodianus* n.sp.") and Okamura & Amaoka (1997, p. 469. terminal phase adult, as "*Bodianus* sp.").

Distribution. *Bodianus leucosticticus* is known from relatively few specimens collected in Mauritius and Réunion in the Indian Ocean and Japan and Taiwan (photo Shao, pers. comm.) in the western Pacific (Fig. 32). This species occurs on deep reefs (in 50 m off Japan, Masuda *et al*., 1975) and is likely to turn up in intermediate localities.

Etymology: *leucosticticus*, from the Greek *leukos*, "white", and *stiktos*, "spotted", in reference to the row of white spots along the back of adults in life.

Comparison. Within the subgenus, *Bodianus leucosticticus* is distinguishable from *B. paraleucosticticus* and *B. trilineatus* in having shorter pelvic fins that only approach the anus at most, and by minor aspects of colour pattern. *Bodianus leucosticticus* and *B. paraleucosticticus* differ from *B. rubrisos* and *B. trilineatus* in having a larger, more prominent black spot on the pectoral-fin base and accessory rows of small dark spots between the dark lateral stripes in initial-phase adults and a row of yellow to white spots dorsally on the side below the dorsal lateral stripe. *Bodianus leucosticticus* is separable from *B. paraleucosticticus* in having a red spot replacing the large black spot at the front of the dorsal fin in initial-phase adults and in having a red rather than yellow stripe at the level of the lower half of the pectoral-fin base. *Bodianus rubrisos* differs from *B. leucosticticus* in having a slightly deeper body (36.3–37.6% SL, vs 31.2–34.3% SL), longer head (38.2–38.5% SL, vs 35.1–37.3% SL) and more attenuate jaws.

Discussion. *Bodianus leucosticticus* closely resembles *B. paraleucosticticus* and *B. trilineatus*, the first and last species

having been confused in the literature (Masuda *et al*., 1975).

Bennett's *Labrus leucosticticus* (1831) based on a single adult specimen from Mauritius is poorly represented in the literature. The species was referred to the genus *Cossyphus* by Günther (1862), to *Lepidaplois* by Baissac (1953) and to *Bodianus* by Baissac (1976), all in reference solely to the type or original description. The name has been misspelled as "*leucostictus*" by a number of authors, as pointed out by Eschmeyer (1998) and Parenti & Randall (2000). Fourmanoir & Guézé (1961) described their *Lepidaplois Bourboni* from a single adult specimen taken in Réunion. They compared their species only with *B. diana* and were probably unaware of Bennett's *B. leucosticticus* or Günther's (1862) redescription of it.

Material examined. **Indian Ocean**, MAURITIUS, BMNH 1856.2.15 (1, 138, holotype of *L. leucosticticus*); RÉUNION, Bay de la Possession RUSI 421 (1, 161, holotype of *L. bourboni*); **Pacific Ocean**, JAPAN, *Wakayama Pref*., Seto-zaki SMBL-F 72079 (1, 155), 74001 (1, 137), 75049 (1, 136).

Bodianus paraleucosticticus n.sp.

Figs 32–33; Plate 4I–J; Tables 2–3, 7

Type material. HOLOTYPE: BPBM 36449 (1, 99.1) Rarotonga, R.L. Pyle, January 1991. PARATYPE: BPBM 36881 (1, 71.9) Papua New Guinea, Milne Bay Province, Boia Boia Wagai, East Point, off cape, 10°12'42"S 150°53'48" E, dropoff with ledges and caves, 91.5 m (300 feet), hand net, R.L. Pyle, 3 December 1995.

Diagnosis. A species of the subgenus *Peneverreo* with: 18–19 predorsal scales, reaching forward barely beyond above center of eye on dorsal midline of head; 15–17 total gill rakers; and, long spines in dorsal (1st spine 7.8–8.1% SL, 2nd spine 9.5–10.3% SL, and 12th spine 15.0–16.7% SL) and anal (1st spine 6.6–8.8% SL and 3rd spine 15.1–17.7% SL) fins; short maximum body length (longest specimen known 100 mm SL); sides of body with 4 narrow red stripes becoming yellow posteriorly and fifth stripe ventrally yellow; prominent black spot on fleshy pectoral-fin base; and, prominent black spot covering most of anterior end of dorsal fin between first and fourth spines.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10* or 11 + 12 + 10* or 11; pectoral-fin rays ii, 14; lateral-line scales 30 + 2; scales above lateral line 4½ or 5*; scales below lateral line ≈11*–13; predorsal scales ≈18; total gill rakers 15 or 17*. See Tables 2 and 7 for morphometric values.

Body moderately shallow, caudal peduncle of moderate depth; head and snout pointed; dorsal outline of snout and forehead mostly straight in lateral aspect; nape only slightly convex; jaws slightly attenuate.

Scaly basal sheath on dorsal and anal fins of moderate height, about 2½ scales in depth; distal outline of sheath gently curved though somewhat straighter posteriorly. Predorsal scales reaching forward barely beyond above center of eye on dorsal midline of head, nearly to above anterior edge of orbit somewhat laterally. Cheek scales reaching forward slightly in advance of corner of mouth on upper side of jaws, reaching nearly to free preopercular edge posteriorly and ventrally leaving only an irregular narrow naked preopercular margin; subopercle completely scaled, scales on lower jaw extending forward to midpoint between corner of mouth and anterior tip of lower jaw. Lateral-line scales each with singular laterosensory canal tube flexed dorsally near posterior edge of scale. Posterior edge of preopercle with minute serrations ventrally. Posterior corner of mouth at vertical midway between center of eye and forward extent of orbit. Gill rakers mostly simple, no abrupt difference in size between rakers on upper and lower limbs of gill arch.

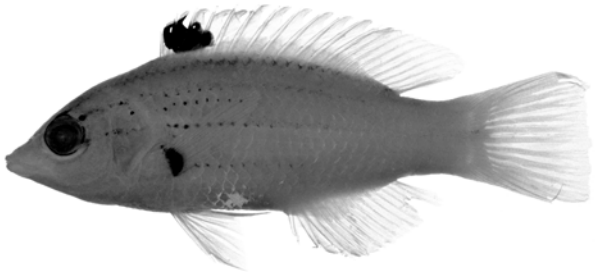

Fig. 33. *Bodianus paraleucosticticus* n.sp., adult, 99.1 mm SL, BPBM 36449, holotype, Rarotonga.

Upper jaw with first prominent anterior canine nearly equal or slightly smaller than second; first canine directed anteroventrally and curved ventrally; second canine directed ventrolaterally; 8–12 mostly small teeth of uneven size posterior to prominent anterior canines, best developed posteriorly; single (rarely 2) prominent canine at posterior end of jaw directed anteroventrolaterally, though somewhat stronger anteriorly. Lower jaw with first prominent anterior canine about ⅔ size of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, often slightly laterally and curved dorsally; dental ridge prominent on anterior half of jaw with 5–9 small teeth becoming progressively longer posteriorly; second row of 2 slightly larger teeth immediately behind followed closely by third row of 2 or 3 distinctly smaller teeth. Several small canines on vomer.

Posterior tip of dorsal fin rounded, not quite reaching posterior edge of hypurals. Posterior tip of anal fin broadly pointed, reaching distinctly short of posterior edge of hypurals. Caudal fin truncate. Pectoral fin with dorsal rays much longer than ventral rays; posterior edge of fin straight; fin broadly rounded ventrally. Tip of pelvic fin nearly reaching or just reaching past anus.

A moderately small species, largest specimen examined 99.1 mm SL.

Pigmentation in alcohol. Adults (Fig. 33)—body mostly pale with 4 narrow dusky stripes superimposed with irregular dark marks that fade in intensity about midway along body; dorsal-most stripe originating on nape just above and behind eyes, directed posteriorly to just below dorsal-fin origin; second stripe from dark mark on dorsal edge of orbit to posterior end of dorsal-fin base; third from dark mark on dorsoposterior edge of orbit to posterior end of caudal peduncle midway between lateral line and dorsal outline of peduncle; fourth from ventroposterior edge of orbit to posterior end of caudal peduncle at level of lateral line; stripes faint posteriorly. Spaces between second and third stripes, and third and fourth stripes each with parallel row of small unevenly spaced dusky spots anteriorly. Head

with faint broad dusky stripe from anterior edge of orbit to upper lip slightly posterior to snout tip; eye with dark rim posteriorly. Dorsal fin pale with prominent dark circular spot between first and fourth or fifth spines. Anal, caudal and pelvic fins pale. Pectoral fin pale with large dorso-ventrally elongate dark spot on fleshy base and proximal edge of fin; axilla of fin similarly dark.

Colour in life. Adults (Plate 4I, 4J)—body pink dorsally, white below, with 4 narrow red stripes becoming yellow posteriorly (corresponding in position to uppermost dusky body stripes described above); fifth stripe red on head and yellow on sides, originating at corner of mouth and continuing horizontally just below pectoral-fin base to underside of caudal peduncle (all five stripes completely yellow in smaller paratype). Row of small black spots along center of each of the upper 4 red and yellow body stripes anteriorly, with additional row about midway between and parallel with second and third, and third and fourth stripes anteriorly. Three moderately small white spots below second stripe, evenly spaced under posterior half of dorsal fin. Broad red stripe from anterior edge of orbit to upper lip. Large black spot covering posterior portion of fleshy pectoral-fin base and axilla. Dorsal fin yellow with pink spines and scaly base, membranes hyaline posteriorly, large black spot between first and fourth spines. Caudal fin mostly pale yellow. Anal fin white with faint orange to yellow blotches. Pelvic fin white. Pectoral fin mostly transparent.

Distribution. *Bodianus paraleucosticticus* is only known from the type series collected in Rarotonga and Papua New Guinea (Fig. 32) and a photo taken in New Caledonia (Laboute, pers. comm.). It occurs at depths of at least 50–115 m.

Etymology: *paraleucosticticus*, from the Greek *para*, "near", *leukos*, "white", and *stiktos*, "spotted", in reference to the close relationship between this species and *B. leucosticticus*.

Comparison. See *Comparison* under *B. leucosticticus*.

Discussion. This species is extremely similar to *B. leucosticticus*, differing from it in having a larger and more prominent black spot at the front of the dorsal fin and the ventral stripe on the side yellow rather than red, having longer medial-fin spines, having predorsal scales reaching forward on the dorsal midline of the head to about the center of the eye and apparently reaching a smaller maximum size. The distributions of the two species may be allopatric with *B. leucosticticus* confined to the continental Indo-West Pacific and *B. paraleucosticticus* restricted to the southwestern Pacific.

Bodianus rubrisos n.sp.

Figs 32, 34; Plate 5A–C; Tables 2–3, 7

Type material. HOLOTYPE: NTM S.1168-001 (1, 141) Indonesia, Bali, Singaraja fish market, 13 April 1984, B. Russell. PARATYPE: NTM S.13523-004 (1, 148) Arafura Sea, Northern Territory, 9°47.5'S 131°56.1'E, 97–103 m, 13 September 1992, R. Williams; URB 78-0154 (1, 202) Japan, Ryukyu Is., Okinawa.

Diagnosis. A species of the subgenus *Peneverreo* with: 25–27 predorsal scales, reaching forward to above or just in advance of anterior nostrils on dorsal midline of head; 16–17 total gill rakers; spines of moderate length in dorsal (1st spine 5.7–7.8% SL, 2nd spine 7.3–9.5% SL, and 12th 13.6–15.9% SL) and anal (1st spine 6.8–7.4% SL and 3rd spine 13.6–15.4% SL) fins; long maximum body length (longest specimen known 202 mm SL); deep body (36.3–41.1% SL), moderately long head (38.2–40.2% SL); jaws slightly attenuate, dorsal profile of snout noticeably concave; sides of body with 4 broken red stripes on paler background, upper 3 with about 4 segments of similar length, ventralmost comprising 2 or 3 segments, spaces between stripes with one or more longitudinal rows of small red dots in large specimens, but lacking black dots or white spots, red stripes obscured by black pigment in juveniles and small adults, pigment persisting longest in dorsal-most stripe; black spot on fleshy pectoral-fin base in juveniles and small adults, replaced with red spot or basal line in larger adults; prominent ocellated black spot at anterior end of dorsal fin only in small juveniles; and, distal corners of caudal fin red.

Fig. 34. *Bodianus rubrisos* n.sp.: (*a*) initial-phase adult, 141 mm SL, NTM S. 1168-001, holotype, Singaraja fish market, Bali, Indonesia (photo by D. Staples); and, (*b*) terminal-phase adult, 202 mm SL, URB 78-0154, paratype, Okanawa, Japan.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 9* or 10 + 12 + 9; pectoral-fin rays ii, 14; lateral-line scales 29*, 30* or 31 + 2; scales above lateral line 4½; scales below lateral line ≈11*–13; predorsal scales 25*–27; total gill rakers 16* or 17. See Tables 2 and 7 for morphometric values.

Body moderately deep, caudal peduncle of moderate depth; head and snout pointed; dorsal outline of snout and forehead slightly concave in lateral aspect; nape only slightly convex; jaws slightly attenuate.

Scaly basal sheath on dorsal and anal fins of moderate height, about 2½ scales in depth; distal outline of sheath gently curved though somewhat straighter posteriorly. Predorsal scales reaching forward to above (or in advance of) anterior nostrils on dorsal midline of head. Cheek scales reaching forward slightly in advance of corner of mouth on upper side of jaws, reaching nearly to free preopercular edge

posteriorly and ventrally leaving only an irregular narrow naked preopercular margin; subopercle completely scaled, scales on lower jaw extending forward slightly in advance of midpoint between corner of mouth and anterior tip of lower jaw. Lateral-line scales each with singular latero-sensory canal tube flexed dorsally near posterior edge of scale. Posterior edge of preopercle with minute serrations ventrally. Posterior corner of mouth just posterior to vertical through forward extent of orbit. Gill rakers mostly simple, no abrupt difference in size between rakers on upper and lower limbs of gill arch.

Upper jaw with first prominent anterior canine nearly equal second; first canine directed anteroventrally and curved ventrally; second canine directed ventrolaterally; 5–12 mostly small teeth of uneven size posterior to prominent anterior canines, best developed posteriorly; single (rarely 2) prominent canine at posterior end of jaw directed anteroventrolaterally, though somewhat stronger anteriorly. Lower jaw with first prominent anterior canine about ⅔ size of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, often slightly laterally and curved dorsally; dental ridge prominent on anterior half of jaw with about 6 small teeth followed by second row of 2 slightly larger teeth immediately behind followed closely by third row of about 6 smaller teeth (teeth of larger specimens of similar length). Several small canines on vomer.

Posterior tip of dorsal fin rounded, reaching posterior edge of hypurals. Posterior tip of anal fin broadly pointed, reaching distinctly short of posterior edge of hypurals. Caudal fin truncate. Pectoral fin with dorsal rays considerably longer than ventral rays; posterior edge of fin straight; fin broadly rounded ventrally. Tip of pelvic fin nearly reaching anus.

A moderately large species, largest specimen examined 202 mm SL, but photographs of individuals up to about 300 mm are known.

Pigmentation in alcohol. Initial-phase adults (Fig. 34a)—body pale with 3 narrow, dusky to dark stripes each broken into 3–5 segments of similar length on dorsal half of side and additional dots of similar intensity scattered on nape; dorsal-most stripe originating on dorsal edge of orbit and extending to posterior end of dorsal-fin base; second running from dorsoposterior edge of orbit to distal third of caudal peduncle midway between lateral line and dorsal outline of peduncle; third extending from posterior edge of orbit just above lateral midline more or less onto caudal peduncle. Spaces between first and second stripes, and second and third stripes each with lengthwise row of small unevenly spaced faint dusky spots anteriorly; similar spots on nape and between eyes. Snout dusky dorsally. Dorsal fin pale with dusky to dark margins to free membranous flap distally behind each spine and several uneven dark spots basally, most prominently behind base of fifth and tenth spines. Anal, caudal and pelvic fins pale. Pectoral fin pale with dark spot in axilla.

Terminal-phase adults (Fig. 34b)—pale.

Colour in life. Juveniles (Plate 5A)—pink above and white below with 4 broken red stripes on side, second and third radiating from posterior margin of orbit, and white stripe immediately below third broken red stripe; segments in stripes of similar size and separated by slightly paler pink vertical bands; each segment mostly obscured with black, black decreasing in width with growth revealing more of underlying red, starting with ventral stripe; two white-edged black spots on dorsal fin, first centered on fifth or sixth spine and second centered on twelfth; third white-edged black spot on scaly anal-fin base behind third spine; fourth near center of scaly caudal-fin base; pectoral-fin base covered with black spot. Pelvic fin apparently without spot. Fins otherwise transparent with white marginal pigment especially anteriorly, transparent areas becoming covered with white and pink with growth. Black spots decreasing in size with growth, those anteriorly on dorsal fin and on anal fin lost first.

Initial-phase adults (Plate 5B)—body pink dorsally, white below, with 4 narrow broken red stripes (corresponding in position to dusky body stripes described above) and red dots in irregular rows between them, red of broken stripes obscured with black in smaller adults, especially dorsally; red dots scattered on operculum ventrally but absent in front of preopercular edge. Vertically elongate red spot on fleshy pectoral-fin base; black spot in axilla of fin. Dorsal fin with broad pink marginal stripe, red and black spot basally between fifth and seventh spines and low black spot on base just posterior to last spine. Caudal fin with broad red posterior margin expanded anteriorly at corners. Anal and pelvic fins mostly white. Fins otherwise transparent.

Terminal-phase adults (Plate 5C)—body pink to tan, white ventrally on head and belly, with numerous horizontal rows of small red to yellowish brown dots and about 3 moderately narrow interrupted stripes of similar colour; dorsal-most stripe in about 3 segments extending from dorsal extent of gill opening horizontally to below central segmented dorsal-fin rays at level of lateral line; second stripe in about 3 segments on lateral midline of body, originating above pectoral-fin base and terminating below posterior end of first stripe; third stripe, comprising single segment posterior to pectoral-fin base near middle of side; ≈3 rows of dots above dorsal-most stripe, 2 or 3 rows between dorsal-most and midlateral stripe, 2 or 3 rows between midlateral and ventralmost, and sometimes 1 row below ventralmost stripe. Head with about 3 broken stripes of similar colour to body markings radiating from posterior side of eye; uppermost directed dorsoposteriorly from dorsal edge of orbit, second directed toward dorsal extent of gill opening from dorsoposterior edge of orbit and third directed toward pectoral-fin base from ventroposterior edge of orbit. Dorsal fin pink to yellowish tan with narrow red to yellowish brown basal stripe or row of spots on membrane between rays. Anal fin yellowish to white. Caudal fin red to reddish brown or yellowish. Pectoral fin yellowish with narrow red to yellowish brown band on fleshy base. Pelvic fin yellowish to white.

Colour illustrations of this species appear in Masuda et al (1975, p. 103, fig. A and 1984, pl. 196H, terminal-phase adult, as "*Bodianus luteopunctatus*"), Shen (1984, pl. 99, fig. 362-11, terminal-phase adult, as "*Bodianus luteopunctatus*") and Okamura & Amaoka (1997, p. 469. terminal phase adult, as "*Bodianus leucostictus*").

Distribution. *Bodianus rubrisos* is known from Japan, Taiwan and Bali, Indonesia. Photographs of it have been taken at depths of at least 50–70 m.

Etymology: *rubrisos*, from the Latin *rubri*, "red", and artificial combination of letters *sos*, in reference to the series of red Morse Code-like dots and dashes that make up the distinctive colour pattern in this species.

Comparison. See *Comparison* under *B. leucosticticus*.

Discussion. This species was initially thought to be the terminal adult phase of *B. leucosticticus*, but the recent acquisition of material and underwater photographs have proven it to differ from that species at all sizes. Masuda, *et al* (1975) identified a large specimen of this species as *B. luteopunctatus* (Smith, 1957), considered here to be a synonym of *B. trilineatus*. Although the two are similar in mostly lacking black pigment at this size, details of markings differ significantly between the two. The description of the juvenile colour pattern presented above is based on colour photos (Plate 5A, in part), one of which was initially misidentified as the young of *B. oxycephalus*.

Bodianus trilineatus (Fowler)

Figs 5c, 32, 35; Plate 5D–E; Tables 2–3, 7

Lepidaplois trilineatus Fowler, 1934, p. 492, fig. 47, Natal Coast (South Africa).

Lepidaplois luteopunctatus Smith, 1957, p. 102, pl. 1A, Delagoa Bay (Mozambique).

Morphological diagnosis. Caudal-fin rays 9 (1) or 10* (11) + 12 + 9 (4) or 10 (8); pectoral-fin rays ii, 13 (1) or 14* (25); lateral-line scales 29 (6) or 30* (12) + 2; scales above lateral line 4–4½*; scales below lateral line ≈11–13½*; predorsal scales ≈19–33 (modally about 22–24, 27*); total gill rakers 17 (2), 18 (7) or 19 (1). See Tables 2 and 7 for morphometric values. Body moderately deep. Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally, more anteriorly in large specimens; second directed ventrolaterally, angled more laterally in large specimens; some small teeth on dental ridge (1 specimen with teeth becoming gradually larger midway back on jaw); 0–2 (rarely 0) prominent canines at posterior end of jaw directed anteroventrally and somewhat laterally. Lower jaw with first prominent anterior canine about ⅔ length of second; first canine directed anterodorsally; second directed dorsolaterally; dental ridge usually with many equally small canines mostly arranged in single row, occasionally slightly larger teeth in groups of 2 or 3 based slightly lateral to others, especially near center or toward posterior end of jaw. Dentition extremely variable with one specimen having prominent hump in dental ridge about ⅓ way back on lower jaw opposing similar bulge on ventral side of premaxilla and prominent lateral teeth forming evenly serrated cutting edge. Caudal fin truncate to slightly rounded. Tip of pelvic fin usually reaching just short of anus, but almost always approaching it.

A moderately large species, largest specimen examined 230 mm SL.

Fig. 35. *Bodianus trilineatus*, initial-phase adult, 121 mm SL, USNM 217876, Somali Republic.

Pigmentation in alcohol. Juveniles—body pale with 3 narrow broken dark stripes on side above lateral midline becoming better defined with growth, ventralmost last to establish; distinct dark spot at posterior end of ventral stripe just posterior to hypurals. Narrow dark bar outlining basal ends of pectoral-fin rays basally on ventral ½ to ⅔ of fin. Prominent dark oval spot near base of dorsal fin between tenth spine and second soft ray and small dark spot at base of anal fin between last spine and first soft ray; fins otherwise pale.

Initial-phase adults (Fig. 35)—body pale with 3 narrow dark stripes on side above lateral midline. Each stripe divided into elongate segments of equal length by constrictions in stripe, each segment corresponding to segment of similar size in stripe directly above and/or below it; dorsal-most stripe with 3 elongate segments, second with 4, ventralmost with 5. Small black spot near posterior end of ventral stripe just posterior to hypurals. Lateral stripes continuing onto head and converging at eye as narrow faint dusky lines or series of dots. Two or 3 narrow faint dusky stripes on each side of nape and on anterior portion of side above dorsal-most dark stripe. Faint narrow dark curved bar basally on pectoral fin in all but largest specimens. Fins otherwise pale except for faint dusky pigment on membrane between first 2 or 3 dorsal-fin spines in some specimens.

Terminal-phase adults—pale, except for irregular scattered dark spots on back and along base of dorsal fin, spots most evident posteriorly.

Colour in life. Juveniles (Plate 5D)—salmon red above, white below, with five narrow red longitudinal stripes, ventral three bordered with yellow, dorsal two or three with irregular black cores; upper three converging on eye, fourth passing through upper half of pectoral-fin base and extending forward below eye to corner of mouth, fifth terminating on lower edge of pectoral-fin base; small individuals with distinct white lengthwise stripe midlaterally. Dorsal fin transparent except for large black spot circled with blue basally between tenth spine and first segmented ray. Caudal fin pinkish with black spot immediately posterior to hypural edge just above lateral line. Anal fin whitish with black spot on basal edge between last spine and first segmented ray. Ventral three-quarters of pectoral-fin base with crescentic black spot adjacent proximal ends of rays. Pelvic fins whitish.

Initial-phase adults (Plate 5E)—salmon red above, yellowish white below, with five narrow deep red horizontal lines on sides, upper three overlaid with broken black stripes comprising three to five segments of equal length stacked in vertical rows; lateral midline with small black spot just posterior to hypural edge; dorsal-most three red lines converging on eye on head; black to deep red marginal line on pectoral-fin base adjacent ventral two-thirds of fin rays. Dorsal and caudal fins mostly salmon red. Anal, pectoral and pelvic fins mostly white.

Terminal-phase adults (Plate 5F)—mostly salmon red with deep red dots at centers of scales on sides forming faint horizontal lines and rows of dots. Base of dorsal fin with small black dots on membranes between spines and soft rays.

Colour illustrations appear in Smith (1957, pl. 1A, terminal-phase adult, as "*Bodianus luteopunctatus*"), van der Elst (1981, pg. 190, initial-phase adult) and Smith & Heemstra (1986, pl. 24, 220.9, terminal-phase adult).

Distribution. *Bodianus trilineatus* is known only from the east coast of Africa between the Gulf of Aden and Natal in South Africa (Fig. 32) where it has been collected at depths of from 50 to 82 m.

Etymology: *trilineatus*, from the latin *tres*, "three", and *lineatus*, "of a line", in reference to the three prominent dark stripes on the side of the body in juveniles and initial-phase adults of this species.

Comparison. See *Comparison* under *B. leucosticticus*. *Bodianus trilineatus* also appears to have a more rounded caudal fin than its subcongeners.

Discussion. *Lepidaplois trilineatus* was described by Fowler (1934) from a single specimen collected off the Natal Coast, South Africa. Initial-phase adults have apparently been confused only with *B. leucosticticus* in the literature (Masuda *et al*., 1975). Smith's (1957) *L. luteopunctatus* was based on a terminal-phase adult specimen (Plate 5F) that lacks the prominent black markings of initial-phase adults considered by Fowler to be distinctive of the species. Although specimens with colour patterns intermediate between the typical initial-phase pattern of *B. trilineatus* and the holotype of *L. luteopunctatus* have not been collected, no morphological differences were detected and the two are considered here to be synonymous.

Material examined. **Indian Ocean**, AFRICA, *Gulf of Aden* BMNH 1939.5.24.965 (1, 167), *Somali Republic* USNM 217845 (2, 52.8–75.8), 217861 (1, 104), 217862 (3, 71.6–98.4, 1 specimen cleared and stained), 217876 (1, 121), 217885 (2, 72.1–168), *Mozambique*, Delagoa Bay RUSI 64 (1, 230 holotype of *L. luteopunctatus*), *South Africa*, Natal ANSP 55993 (1, 178, holotype of *L. trilineatus*), 91778 (1, 178).

Subgenus *Paralepidaplois* n.subgen.

Type species. *Labrus diana* Lacepède, 1802.

Etymology. *Paralepidaplois*, from the Greek *para*, "near", *lepidos*, "scales", and *ploion*, "ship", in recognition of the close relationship of members of this subgenus to those of the subgenus *Lepidaplois*.

Diagnosis. Ethmoid-frontal moderately depressed; transverse axis of lower pharyngeal (Fig. 5d) moderately deep with slightly convex posterior margin; pharyngeal teeth mostly aligned transversely in 3 or 4 rows; teeth rounded, those medially of moderate size, lateral teeth smaller, central tooth in posterior row distinctly largest; anterior head of pharyngeal short with 6–8 canines of similar size to those immediately behind, 2 or 3 aligned anteroposteriorly on midline and on either side; vomerine teeth absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in both jaws numerous, small, of similar height or coalesced to form continuous edge; dorsal fin with XII, 10 (rarely 8) rays; anal fin with III, 12 (rarely 9 or 11) rays; lateral line with 30 (rarely 29) pored scales; 3½–4½ scales above lateral line; 11–14 scales below lateral line; predorsal scales 17–28, reaching forward to vertical through center of eye; cheek scales extending forward nearly to or just in advance of corner of mouth, preopercle fully scaled, scales reaching forward on lower jaw just in advance of corner of mouth or jaw naked; scaly basal sheath on base of dorsal and anal fins of moderate height, 2½–3 scales in depth; posterior tips of dorsal and anal fins rounded to bluntly pointed; caudal fin slightly rounded to truncate; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays longer; species small, maximum lengths 145–210 mm SL; juveniles with brown and white reticulate pattern and prominent black spots associated with fins; initial- and terminal-phase adult dichromatism distinctive.

Discussion. The subgenus comprises three morphologically similar, allopatric species that are very similar to *B. axillaris, B. mesothorax* and, to a lesser extent *B. neilli*, of the subgenus *Lepidaplois*, especially with regard to attenuation of the snout, small maximum size attained and general similarity of juvenile colour pattern. Species of *Paralepidaplois* are readily separable from species of *Lepidaplois* in having predorsal scales not reaching in advance of, or even to, above the anterior extent of the orbit and in having the tips of the pelvics reaching far short of the anus in all but small juveniles. Their jaw dentition is unique among members of the genus in that teeth on the posterior side of the prominent anterior canines are usually numerous, uniform in size and evenly spaced on the dental ridge.

Bodianus diana (Lacepède)

Figs 36–37; Plate 5G–I; Tables 2–3, 8

Labrus diana Lacepède, 1802, p. 450, "le grand Océan equatorial" (Indian Ocean?)
Cossyphus spilotes Guichenot, 1865, p. c.–13, I'll de la Réunion.
Lepidaplois aldabrensis Smith, 1956, p. 932, pl. 24A, Aldabra.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10 (6) or 11 (4) + 12 + 10; pectoral-fin rays ii, 11 (1), 13 (1), 14 (19) or 15 (3); predorsal scales ≈22–25; total gill rakers 15 (1) or 17 (5). See Tables 2 and 8 for morphometric values. Head and snout elongate; jaws attenuate. Cheek scales reaching forward on upper side of mouth to below or slightly in advance of anterior extent of orbit, scales reaching forward on lower jaw slightly in advance of posterior corner of mouth; single scale usually apparent midway between corner of mouth and anterior tip of jaw. Upper jaw with first prominent anterior canine equal to or slightly smaller than second; first canine directed anteroventrally, tip often curved ventrally; second canine directed ventrolaterally and slightly anteriorly, tip occasionally curved ventrally; dental ridge mostly straight with ≈6–21 very small canines; single moderately large prominent canine at posterior end of jaw directed anteroventrally and slightly laterally in small individuals, directed more anteriorly in larger specimens. Lower jaw with first prominent anterior canine ≈⅔–¾ length of second; first canine directed anterodorsally and usually slightly laterally, tip often curved dorsally; dental ridge usually long and continuous with about 15–22 very small canines in single row; teeth becoming only slightly larger posteriorly; teeth occasionally separable into 2 series. Pelvic fin short, posterior tip approaching anus only in small individuals.

A moderately small species, largest specimen examined 169 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 36a)—body dusky, with 4 horizontal rows of large rectangular pale spots, each adjacent pair of rows separated by row of numerous, much smaller, poorly defined pale spots, overall pattern in all but

Table 8. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus diana* and *Bodianus prognathus* examined and types of *Bodianus dictynna* n.sp.

	Bodianus dictynna n.sp. holotype	*Bodianus dictynna* n.sp. paratypes	*B. diana*	*B. prognathus*
number of specimens	1	13	10	4
standard length (mm)	91.2	26.0–135	36.7–150	50.5–153
body depth	33.2	30.7–35.4	29.4–32.4	25.9–27.5
head length	36.9	35.6–44.9	33.2–38.7	39.0–41.0
snout length	13.3	9.9–15.2	10.4–13.1	13.1–18.9
orbital diameter	7.8	5.9–12.3	6.9–10.0	6.4–9.5
predorsal length	—	38.9–44.8	—	—
preanal length	—	64.2–72.5	65.3	—
preanus length	—	59.0–65.1	60.3	—
dorsal-base length	48.7	48.3–51.6	48.6–52.0	44.0–46.4
anal-base length	23.1	22.5–25.8	17.8–25.3	21.4–22.8
caudal-peduncle depth	15.8	14.6–17.1	15.1–17.6	13.5–14.5
caudal-peduncle length	—	14.0–16.9	13.7	—
dorsal-fin length	11.6	59.7–65.7	59.8–65.7	55.6–58.6
anal-fin length	9.6	31.9–36.3	28.3–36.0	29.5–32.0
pectoral-fin length	20.7	16.5–23.0	18.5–22.1	19.7–21.8
pelvic-fin length	17.9	17.9–23.0	17.2–20.6	17.2–20.3
dorsal-fin spine 1	5.9	4.8–7.0	4.3–6.2	4.8–6.0
dorsal-fin spine 2	7.1	5.2–8.5	6.3–9.0	6.5–7.6
dorsal-fin spine 12	13.7	13.7–19.4	13.1–18.4	13.5–17.6
anal-fin spine 1	6.0	5.4–8.8	5.4–6.7	4.4–6.2
anal-fin spine 3	17.1	13.1–19.6	12.8–18.1	12.6–17.0
caudal-fin length—top	—	22.9–26.4	—	—
caudal-fin length—middle	22.1	22.1–26.0	20.7–26.2	19.4–22.2
caudal-fin length—bottom	—	21.8–26.0	—	—

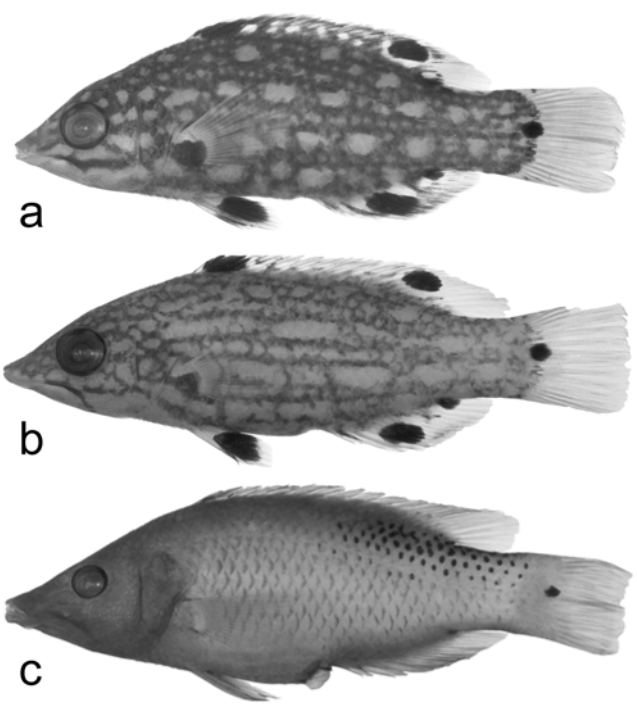

Fig. 36. *Bodianus diana*: (*a*) juvenile, 36.7 mm SL, ANSP 107515, Mahé, Seychelles Islands; (*b*) initial-phase adult, 49.9 mm SL, ANSP 107192, St. Joseph Island, Seychelles Islands; and, (*c*) terminal-phase adult, 116 mm SL, ANSP 107750, St. Joseph Island, Seychelles Islands.

very small individuals appearing reticulated; most scales having narrow dusky posterior margin; head above level of mouth, including snout, dusky, covered by numerous pale spots; underside of head mostly pale with dark dusky stripe directed posteriorly from corner of mouth; larger specimens with a second ventrally curved dark dusky line directed posteroventrally from corner of mouth. Anus circled by dark ring, most apparent in large individuals. Dorsal fin dusky with narrow pale marginal stripe and basal row of pale spots of moderate size on spinous portion; large dark spot between first and third spine and large ocellated dark spot between last spine and fourth segmented ray, pale spot of moderate size basally near posterior end of fin; posterior lobe of fin transparent. Anal fin dusky with narrow pale marginal stripe and row of about 4 pale spots of moderate size on scaly base and basal portion of fin; large dark spot between last spine and sixth segmented ray, second spot usually smaller than pupil of eye basally between last 2 or 3 rays. Caudal fin pale with moderately small dark spot on scaly base above posteriormost lateral-line scale. Pectoral fin pale; fleshy base and basal ends of rays on ventral ⅔ of fin covered by large dark spot, becoming less apparent in larger individuals. Pelvic fin pale with large dark spot covering all but basal and marginal edges of fin.

Initial-phase adults (Fig. 36b)—as described for juveniles, with overall pattern on sides more reticulate.

Terminal-phase adults (Fig. 36c)—mostly pale; back, scaly basal sheath on dorsal fin and head dusky; each scale on side below lateral line usually with dusky posterior margin; numerous tiny dark spots on side below posterior half of dorsal fin and on dorsal half of caudal peduncle, is

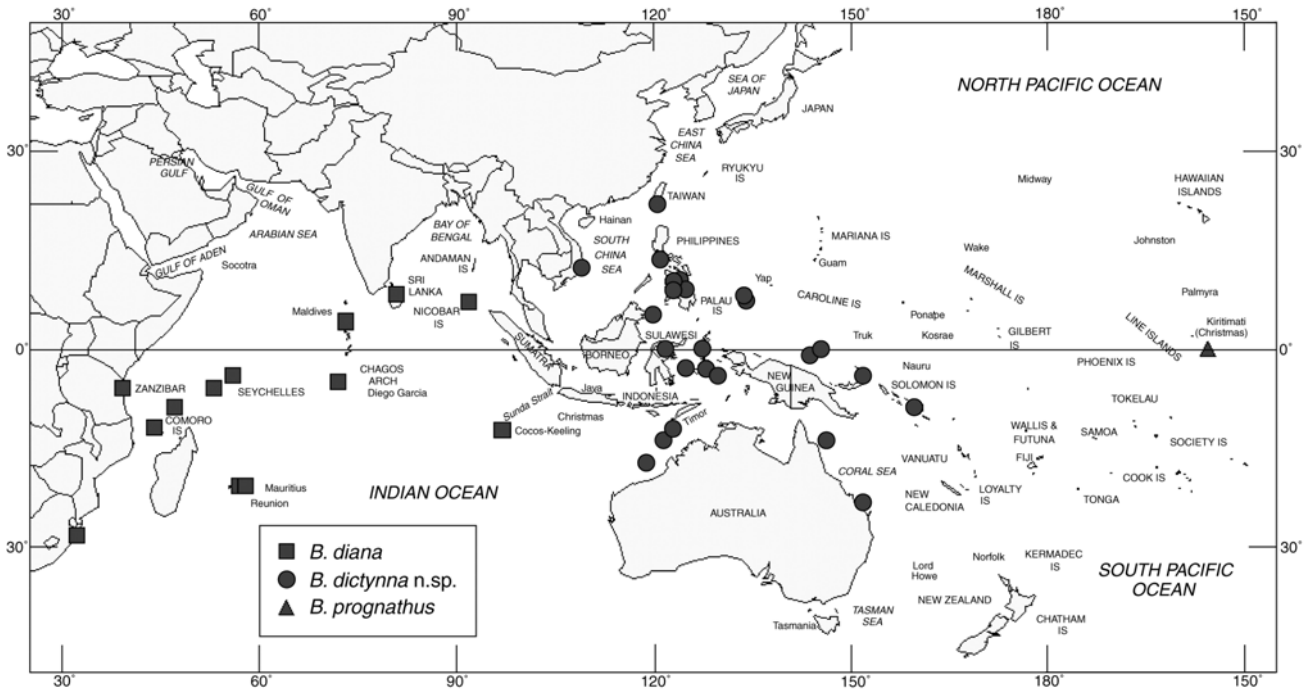

Fig. 37. Distributional records for specimens examined of species of the subgenus *Paralepidaplois*.

some specimens spots also slightly below lateral line and on scaly basal sheath of dorsal fin; 4 pale spots on back above lateral line, at least in freshly preserved material; anteriormost spot small, above and slightly posterior to dorsal end of gill opening; second spot of moderate size, just above lateral line beneath about fifth dorsal-fin spine; third, of moderate size, just below bases of ninth to eleventh dorsal-fin spines; fourth of moderate size, slightly below bases of third to fifth segmented dorsal-fin rays. Ventral side of head pale in small adults, dusky in larger specimens, ventrally curving dark dusky line directed posteroventrally from corner of mouth, less apparent in large adults. Dorsal fin dusky, posterior tip transparent; dark spot between first three spines. Anal fin dusky anteriorly, posterior tip transparent; dark spot, of moderate size, at posterior end of fin base, small in large specimens. Caudal fin pale with dark spot of moderate size on scaly base immediately above lateral midline of body. Pectoral fin transparent. Pelvic fin pale to slightly dusky.

Colour in life. Juveniles (Plate 5G)—body brown with alternating horizontal rows of large rectangular and small circular white spots giving sides reticulated appearance; head and snout above level of mouth brown with small white spots, ventral portion white with dark brown line line curving posteroventrally from corner of mouth, second brown line curving posteroventrally from corner of mouth in larger juveniles. Dorsal fin brown with narrow white marginal stripe and basal row of white spots; large black spot anteriorly between first and third spines; second large black spot ocellated with white immediately posterior to last spine; posterior lobe of fin transparent. Anal fin brown anteriorly and basally; narrow white marginal stripe distally; large black spot ocellated with white immediately posterior to last spine; second smaller black spot basally at posterior end of fin; distal portion of fin transparent posteriorly. Caudal fin white; moderately small black spot near center of scaly base. Pectoral fin transparent; large dark brown to black spot on fleshy pectoral-fin base and basal edge of fin, spot outlined dorsally, anteriorly and ventrally by white. Pelvic fin white with large black spot covering most of fin.

Initial-phase adults—as described for juveniles, with overall pattern on sides more reticulate. Transforming initial-phase adults (Plate 5H) loosing reticulate pattern but retaining four white spots below dorsal-fin base.

Terminal-phase adults (Plate 5I)—body reddish brown anterodorsally (including back, scaly dorsal-fin base, nape and head), with golden yellow sides and creamy white caudal peduncle, scales edged with red to reddish brown, at least anteriorly; chest, belly and scaly anal-fin base white; anus circled with black; numerous small black spots dorsally on caudal peduncle and below posterior half of dorsal fin; 4 moderately small prominent white spots dorsolaterally on back, first slightly anterior to dorsal-fin origin, second below about fifth segmented dorsal-fin ray; dark brown to black line on head directed posteroventrally from corner of mouth. Dorsal fin red, creamy white on basal portion of fin membrane; black spot between first and third spine; fin membrane transparent posteriorly. Anal fin whitish with prominent red spot anteriorly; small black spot at posterior end of fin base. Caudal fin with pink to red rays and scaly base dorsally and ventrally, the membrane white or pinkish white to transparent; moderately small black spot near center of scaly base. Pectoral fin transparent. Pelvic fin bright red with broad white hind margin.

Colour illustrations of this species appear in van der Elst (1981, p. 188, adult), Smith & Heemstra (1986, pl. 94, 220.8A, adult, B, juvenile), Allen & Steene (1987, pl. 84, adult), Randall *et al*. (1990, p. 299 center, juvenile), Kuiter & Debelius (1994, p. 219, lower right, terminal-phase adult) and Kuiter (1998, p. 178, top left, terminal-phase adult, top right, juvenile).

Distribution. *Bodianus diana* occurs throughout the tropical Indian Ocean and Red Sea (Randall, 1983, in part; Fig. 37). It is the most common *Bodianus* in the western Indian Ocean and, in particular, the Mozambique Channel (Fourmanoir, 1957). In addition to localities listed with *Material examined*, this species is reliably reported from Kenya (photo, Allen, pers. comm.), Gulf of Aden, Gulf of Oman and Pakistan (Manilo & Bogorodsky, 2003) and the Chagos Archipelago (Winterbottom et al, 1989). Although usually found at depths of 9–30 m, individuals have been taken at 36–49 m at Cocos-Keeling Atoll. The species is almost always associated with living coral reefs.

Etymology: *diana*, from the Latin noun, *Diana*, "goddess of the chase and the moon", apparently an allusion to the beautiful coloration and form of this species.

Comparison. *Bodianus diana* closely resembles *B. dictynna* and *B. prognathus*, having long been considered to be conspecific with the former. The three are separable from one another and from other closely related congeners as described below in *Comparison* under *B. dictynna*.

Discussion. *Labrus diana* was described by Lacepède (1802) from a drawing by Commerson. The specimen on which the illustration was based is not in the fish collection of the Museum national d'Histoire naturelle, Paris and is presumably lost, if it was originally retained by Commerson. Lacepède reported the species as occurring in "le grand Océan equatorial", probably referring to the tropical Indian Ocean, and perhaps Mauritius where several other of his species were originally collected by Commerson. Guichenot's (1865) *Cossyphus spilotes* was based on an adult specimen in very poor condition that was originally mounted and later placed in alcohol. Guichenot compared his new species only with "Cossyphe bodian" (= *Bodianus rufus*) and was probably unfamiliar with the appearance of Lacepède's *B. diana* as he lists the latter in the same publication as being among the species also occurring in Réunion. The absence of specimens identified as *C. diana* available to him was indicated by Guichenot's statement that his type of *C. spilotes* was the only representative of the species in the Paris collection. Consequently, his report of *C. diana* occurring in Réunion must have been based on information from another authority. *Lepidaplois aldabrensis* was described by Smith (1956) from a juvenile specimen of *B. diana*. Smith's error is understandable considering the marked colour transformation involved and the inconsistency in size at which colour transformation takes place.

Material examined. **Indian Ocean**, ZANZIBAR, BMNH 1868.5.30. 48 (1, 139), MCZ 14303 (1, 136); SOUTH AFRICA, *Natal* ANSP 90578 (1, 194); Comoro Is. CAS 35052 (3, 27.8–54.1, 2 specimens cleared and stained); ALDABRA RUSI, 281 (1, 73.0, holotype of *L. aldabrensis*); SEYCHELLES IS., *Amirante Is*., D'Arros I. ANSP 107529 (3, 17.2–37.7), St Joseph I. ANSP 107192 (2, 49.9–87.3), 107750 (1, 116), *Mahé* ANSP 107515 (2, 25.1–36.7); MAURITIUS, BMNH 1856.2.15.14 (1, 164), USNM 130983 (1, 150); RÉUNION, MNHN 1314 (1, 169, holotype of *C. spilotes*); CHAGOS ARCH., *Solomon Is*. ROM 37486 (1, 112), 37488 (2, 69.4–113), 37489 (1, 118), *Peros Banhos Is*. ROM 37484 (1, 130), 37485 (1, 78.3); MALDIVES IS., *Male Atoll*, Garu Faru SMF uncatalogued (1, 125); SRI LANKA, *Trincomallee* USNM 217899 (1, 118); NICOBAR IS., SMF uncatalogued (1, 116); COCOS-KEELING IS., ANSP 130197 (1, 72.9).

Bodianus dictynna n.sp.

Figs 1c, 5d, 37–38;
Plates 5J, 6A–B; Tables 2–3, 8

Type material. HOLOTYPE: USNM 217870 (1, 91.2) Solomon Is., Guadalcanal, Maru, "El Torito" Cr. Sta. 10-8. PARATYPES: BPBM 16092 (2, 61.2–109) Solomon Is., Savo I., SW side of reef, 12–35 m, 16 July 1973, J.E. Randall, spear; MNHN 1965-247 (1, 135) Vietnam, Nha-Trang, 12°15'N 109°20'E, 1962, P. Fourmanoir; NMV A15672 (1, 80.1) Papua New Guinea, Ninigo Is., along south edge of channel between Pelleluhu Group and Ninigo Group, 01°09.5'S 144°22.5'E, 36.5 m, 25 Oct 1978, V.G. Springer *et al*.; NMV A15673 (1, 46.1) Philippines, Liloan Point (Whirlpool Point), southern tip of Cebu, 09°24.8'N 123°18'E, 13.4–19.2 m, 29 Apr 1979, J. Libbey *et al*.; ROM 52964 (4, 40.4–63.8) Philippines, Negros Oriental, Tanon Strait, Mouth of Bais Bay, 09°36.54'N 123°26.56'E, 15 May 1987, R. Winterbottom *et al*.; USNM 217863 (1, 43.6) Taiwan, rocky shore of Mao-Pi Tou on SW coast, 21°55'20" N, 120°44'10" E, 38–43 ft, 6 May 1968, V.G. Springer, VGS 68-20; USNM 336613 (2, 26.0–73.2) Philippines, Negros Oriental, just off Bonbonon Point at southern tip of Negros I., 09°2.75'N 123°07.62'E, 0–18 m, 13 May 1978, V.G. Springer *et al*.

Other material examined. **Pacific Ocean**, PHILIPPINES, *Mindoro*, Calapan ANSP 96731 (3, 117–136), N.W. Verde Is. USNM 152353 (1, 126), *Negros Oriental*, Negros I. ROM 52979 (1, 24.5), USNM 336614 (1, 87.1), Siguijor I. ROM 52963 (2, 33.1–43.2), *Cebu*, Sumilon I. ROM 52965 (5, 30.8–49.8), *Tataan Is*., Tawi Tawi USNM 152354 (1, 134), *Sulade Is*. USNM 152355 (2, 143–144); INDONESIA, *Moluccas*, Gomomo I. USNM 152356 (1, 119), Tidore I. USNM 152656 (1, 95.0), Buru Is. USNM 152357 (1, 144), Ambon BMNH 1838.4.21.261 (1, 134), WAM P25236-007 (1, 49), Banda (?) USNM 217877 (2, 109–138); NEW GUINEA, Madang BPBM 15880 (1, 37), *New Britain*, Rabaul WAM P28172-015 (1, 76), P28181-015 (1, 42); SOLOMON IS., *Florida Is*. BPBM 15674 (1, 59), 16242 (3, 35.8–102), *Koruhika I*. AMS I.17498-008 (6, 75–111); AUSTRALIA, *Queensland*, Osprey Reef AMS I.25112-003 (1, 12), One Tree I. AMS I.15637-032 (1, 138), I.15682-041 (2, 111–115), I.15684-044 (1, 120), I.17929-012 (1, 125), I.20206-022 (1, 114), *Western Australia*, Ashmore Reef WAM P29047-026 (3, 35.1–48.1), Scott Reef WAM P30292-011 (1, 30.5), Rowley Shoals WAM P28026-016 (2, 41.2–66.0); CAROLINE IS., *Palau Is*., Augupelu Reef BPBM 9371 (1, 85), 9426 (2, 84–98), 13834 (1, 76), Eil Malk BPBM 6961 (1, 90.8).

Diagnosis. A species of the subgenus *Paralepidaplois* with: moderately elongate snout (9.9–16.0% SL); juveniles with few, if any, fine white spots between 3 or 4 prominent broken white lateral body stripes; juveniles and initial-phase adults with few, if any, pale spots on top of head and little, if any, brown coloration below black pectoral-fin spot; prominent black spot on pelvic fin and anteriorly on anal fin persisting in terminal-phase adults.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10* (10) or 11 (1) + 12 + 9(4) or 10* (7); pectoral-fin rays ii, 13 (1), 14* (20) or 15 (1); lateral-line scales 30 + 2; scales above lateral line 4–4½*; scales below lateral line ≈11–14* (usually about 13); predorsal scales ≈21–28 (27*); total gill rakers 15 (2), 16* (6), 17 (1) or 18 (2). See Tables 2 and 8 for morphometric values.

Body and caudal peduncle moderately slender; head and snout elongate, sharply pointed; dorsal outline of snout, forehead and nape nearly straight in lateral profile; jaws attenuate.

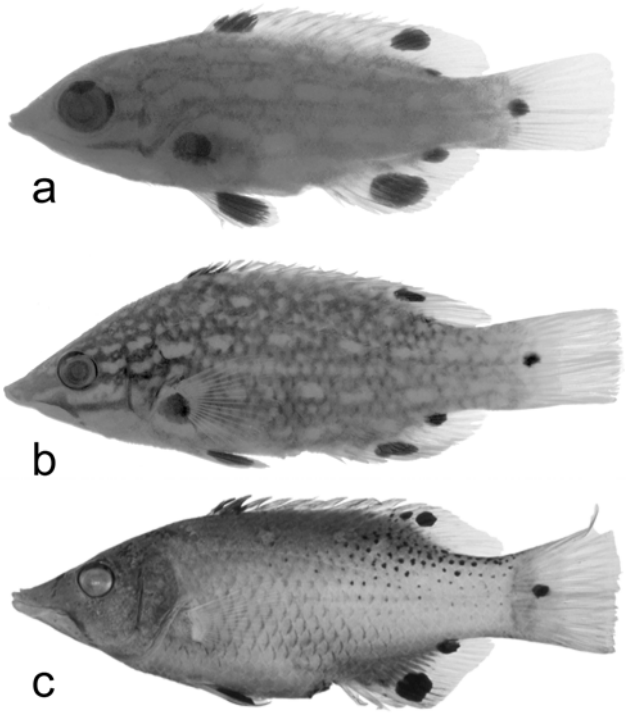

Fig. 38. *Bodianus dictynna* n.sp.: (*a*) juvenile, 26.0 mm SL, USNM 336613, paratype, just off Bonbonon Point at southern tip of island, Negros I., Negros Oriental, Philippine Islands, 9°2.75'N 123°7.62'E, 10–18 m; (*b*) initial-phase adult, 73.2 mm SL, USNM 336613, paratype, (see [*a*]); and, (*c*) terminal-phase adult, 91.2 mm SL, USNM 217870, holotype, Guadalcanal, Solomon Islands.

Scaly basal sheath on dorsal and anal fins moderately high, about 2½ scales in depth; distal outline of sheaths nearly straight anterodorsally and posterodorsally. Predorsal scales reaching forward to above center of orbit on dorsal midline of head; scales lateral to midline reaching only slightly farther forward; scales very small on top of head anterior to point midway between posterior edge of preopercle and posterior extent of orbit. Cheek scales reaching forward on upper side of mouth to below or slightly in advance of anterior extent of orbit, scales reaching free preopercular edge posteriorly and ventrally; subopercle completely scaled; scales reaching forward on lower jaw slightly in advance of posterior corner of mouth; single scale usually apparent midway between corner of mouth and anterior tip of jaw. Lateral-line scales each most frequently with singular laterosensory canal tube flexed dorsally near posterior end of scale; larger specimens often with accessory pores, sometimes with short to ornately elongate branches. Posterior edge of preopercle minutely serrate to smooth, usually minutely serrate on ventral portion. Posterior corner of mouth immediately posterior to vertical at anterior extent of orbit. Gill rakers on upper limb distinctly smaller than on lower; rakers mostly simple, although smaller specimens often have tiny arborescences on rakers of upper limb; raker closest angle of arch on lower limb sometimes broadly bifurcate.

Upper jaw with first prominent anterior canine equal to or slightly smaller than second; first canine directed anteroventrally, tip often curved ventrally; second canine directed ventrolaterally and slightly anteriorly, the tip occasionally curved ventrally; dental ridge mostly straight with ≈6–21 very small canines; single moderately large prominent canine at posterior end of jaw directed anteroventrally and slightly laterally in small individuals, directed more anteriorly in larger specimens (Fig. 1c). Lower jaw with first prominent anterior canine ≈⅔–¾ length of second; first canine directed anterodorsally and usually slightly laterally, tip often curved dorsally; dental ridge usually long and continuous with about 15–22 very small canines in single row, teeth becoming only slightly larger posteriorly, teeth occasionally separable into 2 series. Vomerine teeth absent. Horizontal axis of lower pharyngeal (Fig. 5d) moderately deep centrally as viewed from above, posterior margin moderately convex; teeth mostly aligned transversely in about three or four rows; teeth rounded, those medially of moderate size, lateral teeth smaller, central tooth in posterior row distinctly largest; anterior head of pharyngeal short and wide with two or three short canines of similar size to teeth immediately behind, on midline and on either side.

Posterior tip of dorsal fin rounded to truncate, usually reaching almost to posterior edge of hypurals, occasionally reaching posterior edge in very small or very large individuals. Posterior tip of anal fin bluntly pointed, usually reaching distinctly short of posterior edge of hypurals. Caudal fin slightly rounded in juveniles, truncate in larger individuals. Posterior edge of pectoral fin truncate dorsally with dorsal rays of similar length; rays progressively shorter ventrally with posteroventral edge of fin broadly rounded. Pelvic fin short, posterior tip approaching anus only in small individuals.

A moderately small species, largest specimen examined 144 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 38a)—body dusky, with 4 horizontal rows of large irregularly rectangular pale spots; in larger individuals, each adjacent pair of rows separated by row of faint pale marks or spots, one per scale in largest juveniles; overall pattern on sides manifested as interrupted pale stripes; head above level of mouth, mostly dusky, pale below, with dark dusky stripe directed posteriorly from corner of mouth, prominent pale stripe immediately above dark dusky stripe, top of head with pale spots mostly representing anterior continuations of rows of spots on sides, snout mostly devoid of pale spots; larger specimens with second ventrally curved dark dusky line directed posteroventrally from corner of mouth. Anus circled by dark ring, most apparent in large individuals. Dorsal fin dusky with narrow pale marginal stripe and basal row of pale spots of moderate size on spinous portion; large dark spot between first and third spine and large ocellated dark spot between last spine and fourth segmented ray; pale spot of moderate to small size basally near posterior end of fin; posterior lobe of fin transparent. Anal fin dusky with narrow pale marginal stripe and several pale spots of varying size on scaly base and basal portion of fin; large dark spot between last spine and sixth segmented ray, second spot usually equal to or larger than pupil of eye basally between last 2 or 3 rays; pale spots at base of fin developing into pale halo around each dark spot with growth. Caudal fin pale with moderately small dark spot on scaly base above posteriormost lateral-line scale. Pectoral fin pale; fleshy base and basal ends of rays on ventral ⅔ of fin covered by distinct pale ocellated dark spot. Pelvic fin pale with large dark spot covering all but basal and marginal edges of fin.

Initial-phase adults (Fig. 38b)—as described for juveniles, with overall pattern on sides appearing more reticulate.

Terminal-phase adults (Fig. 38c)—mostly pale; back, scaly basal sheath on dorsal fin and head dusky; each scale on side below lateral line usually with dusky posterior margin; numerous tiny dark spots on side below posterior half of dorsal fin and on dorsal half of caudal peduncle, in some specimens spots also slightly below lateral line and on scaly basal sheath of dorsal fin; 4 pale spots on back above lateral line, at least in freshly preserved material; anteriormost spot small, above and slightly posterior to dorsal end of gill opening; second spot of moderate size, just above lateral line beneath about fifth dorsal-fin spine; third, of moderate size, just below bases of ninth to eleventh dorsal-fin spines; fourth of moderate size, just below bases of third to fifth segmented dorsal-fin rays. Ventral side of head pale in small adults, dusky in larger specimens, with ventrally curving dark dusky line directed posteroventrally from corner of mouth (less apparent in large adults). Dorsal fin dusky, posterior tip transparent; dark spot between first three spines; second dark spot of moderate size immediately posterior to last spine. Anal fin dusky anteriorly, posterior tip transparent; large dark spot immediately posterior to last spine; second dark spot of moderate size at posterior end of fin base (smaller in large specimens). Caudal fin pale with dark spot of moderate size on scaly base immediately above lateral midline of body. Pectoral fin transparent. Pelvic fin pale to slightly dusky with large dark spot covering all but anterior and posterior edges of fin.

Colour in life. Juveniles (Plate 5J)—body brown with about 4 horizontal rows of large irregularly rectangular white spots manifested as broken white stripes; ventral portion of head white with dark brown line directed posteriorly from corner of mouth bordered dorsally by broad white stripe, second brown line curving posteroventrally from corner of mouth in larger juveniles. Dorsal fin brown with narrow white marginal stripe and basal row of white spots; large black spot anteriorly between first and third spines; second large black spot ocellated with white immediately posterior to last spine; posterior lobe of fin transparent. Anal fin brown anteriorly and basally; narrow white marginal stripe distally; large black spot ocellated with white immediately posterior to last spine; second smaller black spot similarly ocellated with white basally at posterior end of fin; distal portion of fin transparent posteriorly. Caudal fin white; moderately small black spot near center of scaly base. Pectoral fin transparent; large dark brown to black spot on fleshy pectoral-fin base and basal edge of fin, spot outlined dorsally, anteriorly and ventrally by white. Pelvic fin white with large black spot covering most of fin.

Initial-phase adults—as described for juveniles, with overall pattern on sides appearing more reticulate. Transforming initial-phase adults (Plate 6A) loosing reticulate pattern but retaining four white spots below dorsal-fin base.

Terminal-phase adults—(Plate 6B)—body reddish brown anterodorsally (including back, scaly dorsal-fin base, nape and head), sides creamy yellow with reddish brown margins to scales, caudal peduncle creamy white, chest, belly and scaly anal-fin base suffused with pink; anus circled with black; numerous small black spots dorsally on caudal peduncle and below posterior half of dorsal fin; 4 moderately small white spots dorsolaterally on back, first slightly anterior to dorsal-fin origin, second below about fifth segmented dorsal-fin ray; dark brown to black line on head directed posteroventrally from corner of mouth. Dorsal fin red or reddish brown; a large black spot between first and third spine; second black spot immediately posterior to last spine; fin membrane transparent posteriorly. Anal fin red; several creamy white blotches basally on fin membrane; large black spot immediately posterior to last spine, second smaller black spot at posterior end of fin base. Caudal fin with pink to red rays and scaly base dorsally and ventrally, membrane white or pinkish white to transparent; moderately small black spot near center of scaly base. Pectoral fin transparent, axilla creamy to yellowish white. Pelvic fin white with large black spot covering much of fin.

Colour illustrations of this species (most as "*Bodianus diana*") appear in Burgess & Axelrod (1972, pl. 214, adult; 1974, pl. 14, juvenile; 1975, pl. 351, adult), Masuda *et al*. (1975, p. 102, fig. B, adult; 1984, pl. 195K, juvenile and L, adult), Fourmanoir & Laboute (1976, p. 114, adult), Randall (1983, p. 111, top, adult), Shen (1984, pl. 99, figs 362-10a, juvenile, and 362-10b, adult), R.F. Myers (1989, pl. 88E, juvenile, and F, adult), Randall *et al*. (1990, p. 299 bottom, adult), Kuiter (1992, pg. 146A, adult, and B, juvenile; 1993, pg. 270 bottom left, adult, and right, juvenile; 1996, p. 271, adult, as *Bodianus* sp.), Kuiter & Debelius (1994, p. 219, lower left, terminal-phase adult), Okamura & Amaoka (1997, p. 467, bottom row left, juvenile, second row left, juvenile/initial-phase adult, third row left and top row, terminal-phase adults) and R.F. Myers (1999, pl. 109A, juvenile, and B, terminal-phase adult).

Distribution. *Bodianus dictynna* is found in the tropical western Pacific (Fig. 37) from the eastern coasts of the Indo-Malaysian Archipelago to Japan, Palau, western Micronesia, Samoa, Tonga and southeastern Australia. It is excluded from the Indian Ocean, except for offshore islands of northwestern Western Australia and the southern coasts of eastern Indonesia, west to about Java. Either this species or *B. diana* occurs in the Dampier Archipelago region, close to the Western Australian coast, but available records are visual and based on young individuals recorded prior to the distinction of the two species (B. Hutchins, pers. comm.). In addition to localities listed with *Material examined*, this species is reliably reported from Sagami Bay, Japan (Masuda *et al*., 1975), the western edge of Micronesia (R.F. Myers, 1989), Samoa (Wass, 1984), Tonga (Randall, 1986a), New Caledonia (Fourmanoir & Laboute, 1976) and Montague Island, New South Wales, Australia (Kuiter, pers. comm.). Although known from Kwajalein in the Marshall Islands (Randall, 1986a), it rarely occurs on the central Pacific geologic plate. Individuals are usually found at depths of 9–30 m. The species is almost always associated with living coral reefs. Juveniles are often found near black coral and gorgonians (R.F. Myers, 1989).

Etymology: *dictynna*, from the Latin noun, *Dictynna*, another name for Diana "goddess of the chase and the moon", in recognition of the extreme similarity and close relationship between this species and *B. diana*.

Comparison. *Bodianus diana* and *B. dictynna* are almost identical morphologically, the two differing from *B. prognathus* by the much longer snout of that species. Colour wise, juveniles of *B. dictynna* have less elaborate patterns than those of *B. diana*, with the additional longitudinal rows of fine white spots between each of the 3 or 4 prominent

broken white body stripes that are characteristic of the latter only faintly developed, if they are present at all. As a result the broken stripes are much more apparent in *B. dictynna*. Juveniles of *B. prognathus* are similar to those of *B. dictynna* in this regard, although the broken white stripes appear to be less uniformly developed in the former, producing a more randomly spotted appearance. This characterization of *B. prognathus*, however, is based on a single photo and it is unclear if the difference is consistent at all sizes, or for that matter, in all individuals. Juveniles and initial-phase adults of *B. diana* also have a pattern with more elaborate white spotting on the top of the head and the brown background coloration of the sides persisting as a distinct broad line below the white margined black spot at the base of the pectoral fin. Individuals of *B. dictynna* at these sizes have few if any spots on top of the head and little if any brown coloration below the pectoral spot. As mentioned above, adults of *B. dictynna* retain the prominent black pelvic-fin spot and anterior anal-fin spot of juveniles, but adults of *B. diana* and *B. prognathus* do not. In *B. diana* a brilliant red splash of colour appears in these two areas, but the areas are the same reddish brown as the general background colour in *B. prognathus* adults.

Discussion. *Bodianus dictynna* was long thought to be conspecific with *B. diana*. The practice of illustrating regional faunal guides with photographs from other localities has no doubt contributed to the confusion. Although morphologically the two appear to be identical, the colour differences are consistent throughout their quite substantial ranges. As there is no discernible colour variation in either population despite the size of their ranges and the two occur on either side of the western islands of the Indonesian chain, they are considered here to be separate species. Surprisingly, *B. dictynna* differs from the patterns of *B. diana* and *B. prognathus* that are more similar to each other, despite their their relative distributions. As this difference involves the apparent retention of the dark spots on the dorsal-, anal and pelvic fins that are features of the juveniles, it is likely that this is a paedomorphic condition. The scenario is more parsimonious than one involving a parallel loss of the markings in the other two populations.

Bodianus prognathus Lobel

Figs 37, 39; Plate 6C–E; Tables 2–3, 8

Bodianus prognathus Lobel, 1981, p. 45, figs 2–4, Fanning Atoll, Line Islands, Central Pacific.

Morphological diagnosis. Dorsal-fin rays XII, 10 (8 in 1 of 7); anal-fin rays III, 11 (1) or 12* (9); caudal-fin rays 10 (3) or 11 (4) + 12 + 10 (4) or 11 (3); pectoral-fin rays ii, 14; predorsal scales ≈21–23; total gill rakers 14 (1) or 17 (1). See Tables 2 and 8 for morphometric values. Head and snout extremely elongate, snout and jaws very attenuate, tubular. Cheek scales reaching forward to just short of posterior corner of mouth, lower jaw naked. Upper jaw with first prominent anterior canine equal to or slightly smaller than second; first canine directed anteroventrally, tip curved ventrally; second canine directed ventrolaterally and slightly anteriorly; dental ridge mostly straight with numerous tiny canines of similar size arranged in single row, teeth forming

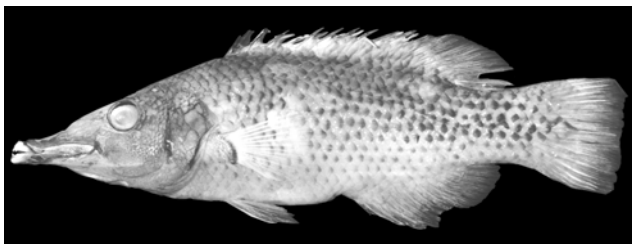

Fig. 39. *Bodianus prognathus*, terminal-phase adult, 178 mm SL, MCZ 54340, holotype, Fanning Atoll, Line Islands (photo by P. Lobel).

granular cutting edge in adults; single small canine usually at posterior end of jaw in juveniles, canine more prominent in adults and directed strongly anteriorly. Lower jaw with first prominent anterior canine ≈⅔–¾ length of second; first canine directed anterodorsally and slightly mesially, tip curved dorsally; second directed anterodorsally and slightly laterally; dental ridge elongate with numerous tiny canines of similar size arranged in single row, teeth mostly coalesced into serrate cutting edge in adults. Posterior tip of pelvic fin reaching anus in small juveniles and large adults; reaching somewhat short of anus in specimens of intermediate size.

A species of moderate size, largest specimen examined 210 mm SL.

Pigmentation in alcohol. Juveniles—body dusky, with 4 indistinct horizontal rows of elongate irregular pale spots, most scales having narrow dusky posterior margin; head dusky with broad broken pale stripe directed from lower edge of eye toward pectoral-fin base and several irregular pale spots posterior to eye. Dorsal fin dusky with basal row of pale spots of moderate size on spinous portion; large dark spot between first and third spines and large ocellated dark spot between last spine and fourth segmented ray; posterior lobe of fin transparent. Anal fin dusky with large dark spot between last spine and sixth segmented ray, preceded and followed basally by large blotch, second smaller dark spot basally between last 2 or 3 rays. Caudal fin pale with moderately small dark spot on scaly base above posteriormost lateral-line scale. Pectoral fin pale; fleshy base and basal ends of rays dark dusky on ventral ⅔ of fin, becoming less apparent in larger individuals. Pelvic fin pale with large dark spot covering all but basal and marginal edges of fin.

Initial-phase adults—body dusky above, pale below with 3 or 4 pale spots in single row on back above lateral line; anteriormost spot faint, above and slightly posterior to dorsal end of gill opening; second spot of moderate size, just above lateral line beneath fifth dorsal-fin spine; third of moderate size, just below bases of ninth to eleventh dorsal-fin spines; fourth of moderate size, slightly below bases of third to fifth segmented dorsal-fin rays; dark spots, one per scale, scattered on side above lateral line and below dorsal fin posteriorly and on top of caudal peduncle; head dusky above, pale below, with dark line curving posteroventrally from corner of mouth. Dorsal fin slightly dusky with dark spot between first and third spines; transparent posteriorly. Anal fin slightly dusky anteriorly with large dark spot between last spine and sixth segmented ray and smaller dark spot basally between last 2 or 3 rays. Caudal fin pale with moderately small dark spot on scaly base above posteriormost lateral-line scale. Pectoral fin pale. Pelvic fin with large dark spot covering all but basal and marginal pale edges of fin.

Terminal-phase adults (Fig. 39)—back, scaly basal sheath on dorsal fin and head dusky, body otherwise mostly pale; each scale on side below lateral line usually with duskier posterior margin; 3 or 4 pale spots on back as in initial-phase adults; small dark spots similarly scattered below posterior part of dorsal fin and dorsally on caudal peduncle. Fins pale to slightly dusky, without dark spots.

Colour in life. Juveniles (Plate 6C)—head and body brown with ill defined horizontal rows of white spots as described above. Dorsal fins brown with white and black markings as described above distally; large black spot ocellated with white immediately posterior to last spine; second smaller black spot basally at posterior end of fin; distal portion of fin transparent posteriorly. Caudal fin transparent with mottled brown rays basally. Pectoral fin transparent; large dark brown to black spot on fleshy pectoral-fin base and basal edge of fin, spot outlined dorsally, anteriorly and ventrally by white. Pelvic fin white basally with large black spot covering most of distal portion of fin.

Initial-phase adults—(Plate 6D) head and dorsal side of body reddish brown to rear of dorsal fin, yellowish to white below; 4–7 white spots of moderate size on dorsal half of side, four in dorsal row with first slightly anterior to dorsal-fin origin, second below about fifth dorsal-fin spine, third below center of fin, and fourth below about fifth segmented dorsal-fin ray, second row in some just above lateral midline with first below center of dorsal fin, second below termination of dorsal-fin base and third midway back on caudal peduncle; most scales on dorsal half of caudal peduncle and immediately below rear of dorsal fin with black spot distally; head with brown to black line curving posteroventrally from corner of mouth and white lower jaw; base of pectoral fin with dark red spot and smaller white spot dorsally; base of caudal fin with small black spot. Dorsal fin reddish brown with large black spot anteriorly between first and third spines and second black spot circled with white immediately posterior to last spine; posterior lobe of fin transparent. Anal fin reddish brown anteriorly and distally, white basally, with large black spot circled with white immediately posterior to last spine and smaller, similarly ocellated black spot basally at posterior end of fin; fin transparent posteriorly. Caudal fin pale pink to transparent with reddish brown dorsal and ventral margins. Pectoral fin transparent. Pelvic fin white with large black spot covering most of fin and reddish brown leading edge.

Terminal-phase adults (Plate 6E)—body red, darkest dorsally and distally on each body scale; 4 white spots of moderate size dorsolaterally on back, first slightly anterior to dorsal-fin origin, second below about fifth dorsal-fin spine, third below center of fin, and fourth below about fifth segmented dorsal-fin ray; base of pectoral fin with dark red spot and white spot; base of caudal fin usually with small black spot. Pectoral fin transparent. Other fins red with transparent membranes posteriorly.

Distribution. *Bodianus prognathus* is known from Fanning Atoll in the Line Islands and Birnie and Nikumaroro in the Phoenix Group (Allen, pers. comm.), both in the central Pacific (Fig. 37). It occurs near folious corals at depths of 7–20 m.

Etymology: *prognathus*, from the Greek *pro*, "forth", and *gnathos*, "jaws", in reference to the prominently elongate jaws in this species.

Comparison. This species is very similar to *B. dictynna* and *B. diana*, differing from the two only in the extreme attenuation and prolongation of the jaws and minor differences in coloration (see *Comparison* under *B. dictynna*).

Discussion. As *B. diana* has not been recorded elsewhere on the Pacific plate, the report of the species at Fanning Island by Chave & Eckert (1974), mentioned by Lobel (1981), is most likely as assumed by Lobel a misidentification of his *B. prognathus*. *Bodianus prognathus* may represent a relatively recent divergence resulting from the isolation of a small population of the ancestral form common to *B. dictynna* and it, or if the coloration of terminal-phase adults as discussed above is an indication, all three of the species of the subgenus. If so, it demonstrates the rapidity with which morphological variation can occur. Lobel compared the modification of the jaws of *B. prognathus* with the jaws of *Gomphosus*, a very distinctive labrid with elongate jaws, but otherwise with great similarities to *Thalassoma*. The latter two taxa are also close and the modifications are convergent (Westneat, pers. comm.).

Lobel's paratype MCZ 56322 is a juvenile specimen of *B. axillaris*, a species that was previously known from Fanning Atoll.

Material examined. **Pacific Ocean**, LINE ISLANDS, *Fanning Atoll* BPBM 20773 (2, 50.5–75.3, paratypes of *B. prognathus*), 20775 (2, 132–153, paratypes of *B. prognathus*), 31887 (4, 170–210).

Subgenus *Lepidaplois*

Type species. *Labrus axillaris* Bennett, 1831, by monotypy.

Etymology. *Lepidaplois*, from the Greek *lepidos* "scales", and *ploion*, "floating vessel" or "ship", in apparent reference to it as a scaly fish.

Diagnosis. Ethmoid-frontal surface moderately depressed; transverse axis of lower pharyngeal (Fig. 6a–c) moderately deep centrally with slightly to strongly convex posterior margin; pharyngeal teeth mostly aligned transversely in 3 or 4 rows; teeth rounded, those medially of moderate size, lateral teeth smaller, 3–7 distinctly large ovoid molars in posterior row, medial tooth noticeably largest with others progressively smaller laterally in some; anterior head of pharyngeal short and tapered with 6–8 canines of similar size to those immediately behind, 2–4 aligned antero-posteriorly on midline and on either side; vomerine teeth absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw in two or three sequential series, defined by differing lengths, posterior series usually shortest; dorsal fin with XII, 10 (rarely 8 or 9) rays; anal fin with III, 12 (rarely 11 or 13) rays; lateral line with 30 (rarely 29, 31 or 32) pored scales; 4–5 scales above lateral line; 11–14 scales below lateral line; predorsal scales 25–36, reaching forward nearly to, to or in advance of anterior nostril; cheek scales extending forward slightly in advance of orbit or to below anterior nostril, preopercle fully scaled, scales covering posterior half of jaw; scaly basal sheath on base of dorsal and anal fins of moderate height, 2–3 scales in depth; posterior tips of dorsal and anal fins rounded to bluntly pointed; caudal fin slightly rounded to truncate;

pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer; species small, maximum length 150–170 mm SL; juveniles dark brown or black with prominent black spots associated with fins and large pale spots on sides; adults bicoloured, dusky to dark anteriorly and pale posteriorly.

Discussion. The subgenus comprises three mostly allopatric species that are almost identical morphologically and have very similar colour patterns.

Bodianus axillaris (Bennett)

Figs 6a, 40–41; Plate 6F–G; Tables 2–3

Labrus axillaris Bennett, 1831, p. 166, Mauritius.
Cossyphus axillaris Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 131, Isle-de-France (Mauritius).
Cossyphus octomaculatus Sauvage, 1891, p. 454, Mauritius.
Lepidaplois albomaculatus Smith, 1957, p. 101, fig. 1, Mauritius.

Morphological diagnosis. Dorsal-fin rays XII, 9 (1) or 10* (20); anal-fin rays III, 12* (18) or 13 (3); caudal-fin rays 9* (2), 10 (15) or 11 (1) + 12 + 9 (3) or 10* (15); pectoral-fin rays ii, 11 (1), 13 (3), 14* (41) or 15 (5); lateral-line scales 29 (1) or 30* (38); predorsal scales ≈28–35 (usually about 31*); total gill rakers 15 (1), 16 (5), 17* (8) or 18 (3). See Table 2 for morphometric values. Predorsal scales reaching forward about to anterior nostril on dorsal midline of head, scales lateral to midline reaching slightly anterior to anterior nostril. Cheek scales reaching forward on upperside of jaws to below nostrils. Upper jaw with second prominent anterior canine nearly equal to or slightly smaller than first; first canine directed anteroventrally, tip often more strongly anteriorly; second directed anteroventrally, tip recurved ventrally and slightly laterally, dental ridge smooth to irregularly surfaced posterior to anterior canines without teeth or with few to about 11 very small canines; single large canine at posterior end of jaw directed anteroventrally and slightly laterally. Lower jaw with first prominent anterior canine considerably narrower and about ¾–⅘ length of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, tip often recurved dorsolaterally; teeth on dental ridge extending well posteriorly, in about 2 or 3 poorly defined series, first series with about 6–12 very short canines on anterior ⅖–⅗ of jaw followed by 2–8 canines of moderate length, and terminal series of 2–6 canines of similar size or slightly smaller. Caudal fin slightly rounded posteriorly in small juveniles, truncate in larger specimens; dorsoposterior tip of fin in largest specimens only slightly longer than ventral rays. Pelvic fin distinctly pointed, slightly filamentous in larger specimens; tip of fin usually extending to or nearly to anus; some specimens with tip reaching distinctly short of anus; tip reaching to base of first anal fin spine in at least one large adult.

A moderately small species, largest specimen examined 143 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 40a,b)—body dark with 9 large pale spots; first spot covering anterior tip of snout anterior to orbit; second laterally on nape dorsoposterior to orbit; third, a dorsoventrally elongate spot extending from posteroventral edge of operculum and fleshy pectoral-fin base to prepelvic area where it is confluent with spot of opposite side; fourth on back above lateral line and on dorsal fin between fourth and eighth spines; fifth on belly immediately anterior to and slightly above first anal-fin spine, confluent with that of opposite side ventrally; sixth above lateral line below base of last 5 or 6 dorsal-fin rays; seventh on lower third of body above base of last 5 or 6 anal-fin rays; eighth on dorsal third of caudal-fin base, and ninth on ventral third of caudal-fin base. Posterior end of dorsal and anal fins transparent; remainder of fins dark except where noted above. Caudal fins pale. Pectoral fin transparent. Pelvic fin dark. Moderately large juveniles with body and fins less dark, but with 5 moderately large intensely dark spots apparent, first covering membrane between first 3 dorsal-fin spines, second between last dorsal-fin spine and fourth segmented ray distal to scaly basal sheath, third between last anal-fin spine and fifth segmented ray distal to scaly basal sheath, fourth covering most of pelvic fin and fifth on ventral ⅔ of pectoral-fin base. Large and transforming juveniles with pigment on caudal peduncle differentiated into numerous narrow dusky to dark stripes separated by narrower, pale interspaces. Segmented rays at posterior ends of dorsal and anal fins dusky, at least basally. Dorsal and ventral edges of caudal fin dusky to dark; fin rays in large area at center of fin dusky to dark. Dark spot on pelvic fin less distinct, subdivided into numerous smaller less intense spots.

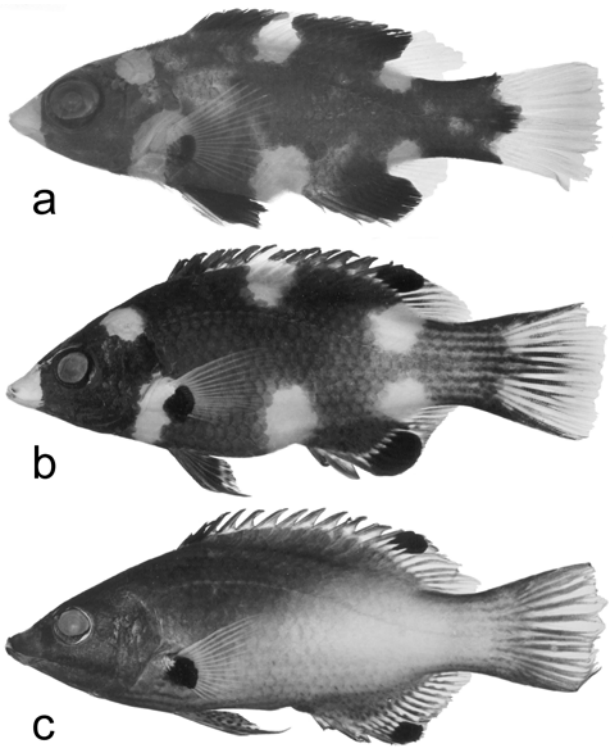

Fig. 40. *Bodianus axillaris*: (*a*) juvenile, 31.3 mm SL, ANSP 107219, Faon Island, Seychelles Islands (photo reversed); (*b*) transforming juvenile, 98.2 mm SL, ANSP 130624, Cocos-Keeling Atoll, and (*c*) adult, 128 mm SL, ANSP 130621, Cocos-Keeling Atoll.

Adults (Fig. 40c)—dusky anteriorly, pale posteriorly, areas separated by indistinct diagonal interface extending from near posterior end of dorsal-fin base to posteroventral side of pectoral-fin base. Posterior end of caudal peduncle and chest with numerous narrow dusky stripes. Head dark-dusky with narrow dark stripe directed posteriorly from

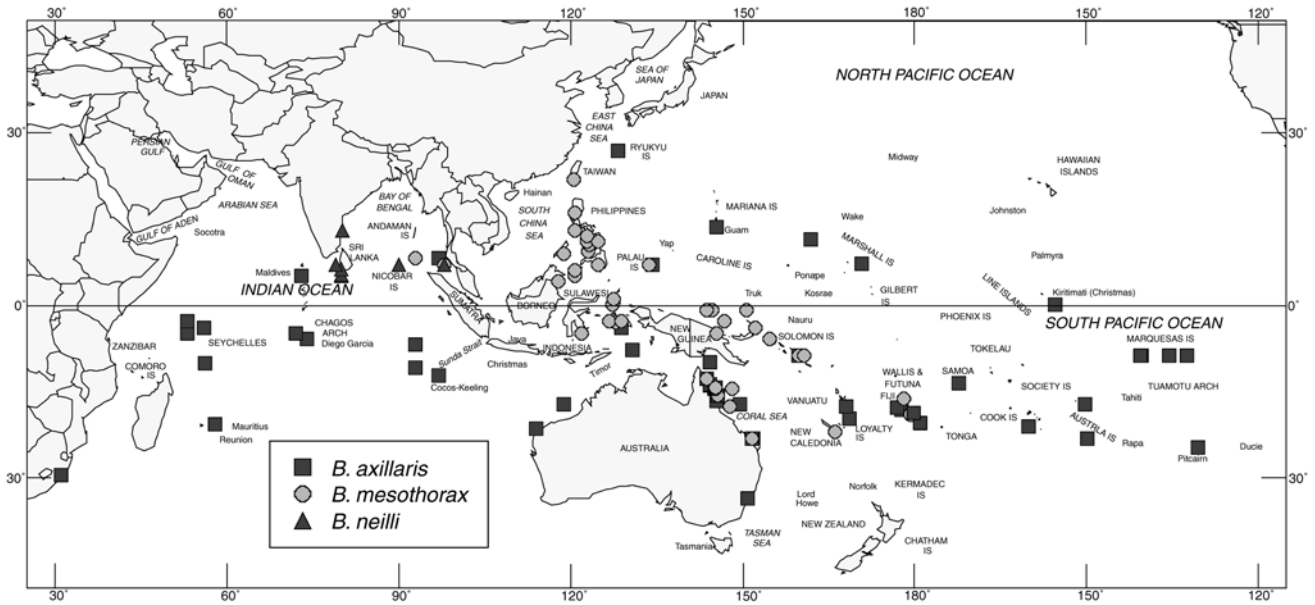

Fig. 41. Distributional records for specimens examined of species of the subgenus *Lepidaplois*.

corner of mouth. Dorsal fin with dusky distal edge of spinous portion separated from dusky scaly basal sheath by narrow pale stripe, segmented rays slightly dusky, intervening membranes pale; large dark spot between first 3 spines, second on distal half of fin between last spine and fourth segmented ray. Anal fin mostly pale with dusky rays and 2 rows of small spots extending from rays onto membranes; numerous small dusky spots occurring also on paler scaly basal sheath; large dark spot on distal half of fin between last spine and fifth ray. Caudal fin transparent with dusky rays. Pectoral fin transparent with pale rays; large dark spot on fleshy base, extending onto basal edge of fin below dorsal-most 2 rays and covering axilla of fin. Pelvic fin pale with dusky spine and first segmented ray; numerous tiny dark dusky spots covering remainder of fin.

Colour in life. Juveniles (Plate 6F)—black with 9 large white spots; first on tip of snout, second laterally on nape, third anterior to pectoral-fin base and on chest, fourth near center of back extending onto dorsal fin, fifth on lower portion of side above anus, sixth directly beneath posterior fifth of dorsal fin, seventh directly above posterior third of anal fin, eight dorsally on caudal-fin base and ninth ventrally on caudal-fin base. Caudal, pectoral and posterior ends of dorsal and anal fins transparent. Black areas on larger juveniles suffused with red, especially posteriorly and just above dorsal edge of scaly basal sheath on dorsal fin. Posterior ends of dorsal and anal fins with blackish rays and yellowish membrane. Caudal fin with dorsal and ventral edges and basal portion of central rays blackish. Five large black spots apparent in large juveniles, first at anterior end of dorsal fin, second immediately posterior to last dorsal-fin spine, third immediately posterior to last anal-fin spine, fourth on pelvic fin, and fifth on pectoral-fin base. Spot on pelvic fin broken into numerous black spots in maturing individuals.

Adults (Plate 6G)—reddish grey anteriorly, white with tinges of yellow posteriorly, the diagonal interface extending between posterior end of dorsal fin and posteroventral edge of pectoral-fin base; numerous narrow yellow stripes posteriorly on caudal peduncle and on chest, stripes often somewhat greyish on chest. Head with black stripe directed posteroventrally from corner of mouth. Spinous portion of dorsal fin grey with reddish membranes basally, segmented rays grey to brown with intervening membranes yellow anteriorly and transparent posteriorly; black spot between first 3 spines, second prominent black spot distally just posterior to last spine. Anal fin yellow to yellowish white with grey to brown rays and numerous small spots; fin membrane transparent posteriorly; prominent black spot distally just posterior to last ray. Caudal fin transparent with yellow to greyish or brownish rays, rays darkest on dorsal and ventral edges of fin. Pectoral fin transparent with yellow fin rays; prominent black spot on fleshy fin base extending onto basal portion of fin and covering axilla of fin. Pelvic fin whitish or yellowish with grey to brown spine and first segmented ray; usually numerous small spots of similar colour on posteromesial side of first segmented ray.

Colour illustrations of this species appear in Burgess & Axelrod (1973a, fig. 307, adult; 1973b, figs 32 and 33, juveniles, and unnumbered fig. on p. 590, adults; 1974, fig. 16, transforming juvenile, and figs 17 and 18, adults), Masuda *et al*. (1975, p. 102, fig. C, adult, and fig. D, juvenile; 1984, pl. 195F, juvenile, as "*Bodianus mesothorax*", and J, adult), Fourmanoir & Laboute (1976, p. 114, top, adult, and bottom, juvenile), Randall (1983, p. 110, middle, transforming juvenile, and bottom, adult), Shen (1984, pl. 100, figs 362-16, juvenile, as "*Bodianus prognathus*", 362-12b, transforming juvenile/adult, and 362-12a, adult), Smith & Heemstra (1986, pl. 89, 220.6, juvenile, and pl. 93, 220.6, adult), Allen & Steene (1987, pl. 83, 7, juvenile, and 8, adult), Allen & Swainston (1988, pl. 47, fig. 727 below, juvenile, and above, adult), R.F. Myers (1989, pl. 88C, juvenile, and D, adult), Randall *et al*. (1990, p. 298 center, juvenile, and bottom, adult), Kuiter (1992, p. 146, figs C, adult, and D, juvenile; 1993, p. 269, center, adult, bottom left, transforming juvenile, and bottom right, juvenile; 1996, p. 271, adult and juvenile; 1998, p. 178, center left, terminal-phase adult, center right, juvenile and bottom left, transforming juvenile), Kuiter & Debelius (1994, p. 219, center left, juvenile), Okamura & Amaoka (1997, p. 467, central column, upper and middle, adults, bottom, juvenile) and R.F. Myers (1999, pl. 108C, juvenile, and D, adult).

Distribution. *Bodianus axillaris* is one of the most widely ranging species of the genus, occurring from the Red Sea to Pitcairn Island in the south central Pacific (Fig. 41). Within this area the species appears to be excluded only from the coasts of India and Sri Lanka, most of Indonesia and the Philippines. In addition to those localities listed in *Material examined*, reliable distributional records for this species include Gulf of Oman, Gulf of Aden and Somalia (Manilo & Bogorodsky, 2003), Taiwan (Shen & Choi, 1976), Okinawa and greater Japan (Jordan & Snyder, 1902; Masuda *et al*., 1975), Bali and Flores Islands, in southern Indonesia (Kuiter, pers. comm.) and throughout Micronesia (R.F. Myers, 1989). Adults of *B. axillaris* occur commonly in clear shallow waters at depths of 1–8 m. and are consequently well represented in collections. Large individuals do occasionally occur at somewhat greater depths, having been collected below 27 m at Cocos-Keeling Atoll. Juveniles are often found in caves and beneath ledges in moderately deep waters, occurring regularly at depths of 14 to 26 m. The species is almost always associated with well-developed coral reefs.

Etymology: *axillaris*, from the latin noun *axilla*, "arm pit", in apparent reference to the prominent black spot in the axilla of the pectoral fin.

Comparison. *Bodianus axillaris* closely resembles *B. mesothorax* and *B. neilli* in general morphology and overall colour pattern, but is readily separable from both on the basis of colour detail. The most obvious difference in pigmentation is the presence of a prominent black spot on both the anal fin and the posterior portion of the dorsal fin in adults of *B. axillaris*, neither of which persist in adults of the last two. In general, pale spots on juveniles of *B. axillaris* are larger and more distinct than on those of the other two and the anteriormost pale spot covers the entire tip of the snout in *B. axillaris*, but is confined to the dorsal midline of the snout in *B. mesothorax* and *B. neilli*. *Bodianus axillaris* also differs from *B. neilli* in having predorsal scales reaching forward to above the anterior nostril (versus slightly in advance of above the anterior extent of the orbit, but distinctly not to above the nostrils).

Discussion. Despite the extremely broad distribution of this species, it is represented in the literature by only four synonyms, two based on juvenile specimens and two on adults. Furthermore, the two names based on adults are homonyms with *Labrus axillaris* Bennett (1831) described from a single BMNH specimen, and *Cossyphus axillaris* Valenciennes (*in* Cuvier & Valenciennes, 1839) based on several coloured drawings and a specimen in the MNHN. Bennett's description is not mentioned in the latter treatment.

Sauvage's description (1891) of *Cossyphus octomaculatus* is a repetition of Lienard's (in Bouton, 1843) account of "Cossyphe a huit taches". Sauvage attributed the species to Lienard, merely latinizing Lienard's vernacular name. Although no type specimen was retained, the description is detailed and, without doubt, based on a juvenile of this species. The tentative reference of *C. octomaculatus* to *Lienardella mirabillis* (= *Choerodon fasciatus*) by Fowler & Bean (1928) appears to have been the only published attempt to affix the name, albeit erroneously.

Smith's *Lepidaplois albomaculatus* (1957) is based on a colour painting (now in AMNH) of a juvenile specimen of this species by Col. Nicholas Pike. Gudger (1929) was unable to match the painting to a Pike specimen at the MCZ, leading him to speculate that the specimen was lost. A specimen (USNM 13217) collected by Pike in Mauritius and closely resembling the painting is likely to be the type. Smith (1964) subsequently recognized his species to be the juvenile of *B. axillaris* and illustrated the ontogenetic change in colour pattern from juvenile to adult.

Gill (1862) erected the genus *Lepidaplois* for the species "*Cossyphus axillaris* Cuv. et Val." that he recognized as differing from New World species then placed in the genus *Cossyphus* in not having the dorsal and anal-fin rays extended in adults. Subsequently, Gill (1863) defined the genus as encompassing species of *Cossyphus* having the following combination of characters: "dorsal and anal fins never produced into falciform lobes; limbs of preoperculum scaly; head oblong, snout produced in front." Until relatively recently, *Lepidaplois* has been widely used for most shallow-dwelling, warm water species of *Bodianus* occurring outside the Americas. As indicated above, however, these are primitive characters and alone do not distinguish a monophyletic group.

Sexual development and transformation occurs across a broad range of sizes in this species (see *Discussion* accompanying the description of the genus). Juveniles of this species have been observed to act as cleaners (R.F. Myers, 1989).

Material examined. **Red Sea**, *Koseir* SMF 1171 (1, 141). **Indian Ocean**, AFRICA, *Durban* BMNH 1915.7.6.23 (1, 98.5), USNM 259505-F1 (1, 17.2); COMORO IS. *Grande Comore I*. CAS 32543 (2, 33.2–53.1, 1 specimen cleared and stained), *Mayotte I*. USNM 217851 (1, 108); MADAGASCAR, BMNH 1964.5.7.1 (1, 134); SEYCHELLES IS., *Amirante Is*., Arros I. USNM 217878 (3, 30.7–92.4), *Mahé I*. ANSP 107448 (1, 25.5), *Faon I*. ANSP 107219 (1, 31.3); AGALEGA, USNM 217849 (1, 95.4); MAURITIUS, BMNH 1856.2.15.13 (1, 136, holotype of *L. axillaris* Bennett), MNHN 10 (2, 137–138, syntypes of *C. axillaris* Valenciennes), USNM 13217 (1, 121, probable holotype of *L. albomaculatus*), 205083 (2, 141–143); CHAGOS ARCH., *Solomon Is*. ROM 37468 (1, 79.3), 37476 (1, 92.8), 37477 (1, 118), 37479 (1, 80.2), 37480 (1, 87.5), *Peros Banhos Is*. ROM 37475 (1, 65.6), 37478 (2, 70.5–96.0), 37481 (1, 44.1), 37482 (2, 42.9–44.3), 37483 (1, 87.0); MALDIVES IS., *Rasdu Atoll*, Weligandu SMF 7465 (1, 108); COCOS-KEELING ATOLL, ANSP 130621 (2, 99.3–128), 130624 (2, 98.2–103), WAM P29919-004 (2, 21–67); NICOBAR IS., *Tillanchong*, Castle Bay SMF 5917 (1, 106); THAILAND, *Similian I*. USNM 217872 (1, 93.9); AUSTRALIA, *Western Australia*, Rowley Shoals WAM P27668-010 (1, 36), Northwest Cape WAM P25369-002 (1, 50). **Pacific Ocean**, JAPAN, Okinawa CAS-SU 7045 (1); INDONESIA, *Banda*? USNM 217852 (1, 115); NEW GUINEA, *Trobriand I*. AMS I.17097-021 (1, 75.3); AUSTRALIA, *Queensland*, Ashmore Reef AMS I.33738-001 (4, 110–120), Cape Melville AMS I.20755-019 (1, 36), I.20774-032 (1, 104), Lizard I. AMS I.19436-002 (1, 84), I.19445-036 (3, 96–117), I.21422-045 (1, 125), Escape Reef AMS I.22578-045 (1, 117), I.22594-001 (1, 103), I.22616-018 (1, 95), Cairns MCZ 36802 (2, 90.8–134), One Tree I. AMS I.15685-048 (1, 105), Heron I. AMS I.15430-001 (1, 103), *New South Wales*, Clovelly AMS I.17168-005 (1, 35.5), Bare I. AMS I.15674-001 (1, 26.6), Sydney Harbour AMS I.15921-001 (1, ≈29); MARIANA IS., *Guam* BPBM 127 (1, 150), 6341 (1, 116), 7410 (1, 55), USNM 109390 (1, 99.1), *Palau*, Augupelu Reef BPBM 9498 (1, 104); MARSHALL IS., *Eniwetok* BPBM 9008 (1, 122), *Majuro* BPBM 9663 (1, 110); SOLOMON IS., *Florida I*. AMS I.17492-018 (1, 69); NEW HEBRIDES, *Aneityum* BMNH 1861.5.31.58 (1, 131, skin), 1867.3.9.276 (1, 137, skin), *Efate* AMS I.17473-011 (1, 121); FIJI IS., *Viti Levu* BPBM 22395 (1, 47.8), Beqa AMS I.18448-007 (1, 109), *Lau Group*, Ono Ilau USNM 335173 (1, 97.8), *Totoya I*. USNM 335175 (1, 74.5); SAMOA, (?) USNM 17868 (1, 70.1); COOK IS., *Rarotonga* ANSP 84258 (1, 138); AUSTRAL IS., *Rapa* BPBM 12849 (1, 152); SOCIETY IS., *Tahiti* BMNH 1873.4.3.26 (1, 120), *Moorea* BPBM 9060 (1, 132), 11623 (1, 45.5), 11626 (1, 68); TUAMOTU ARCH., *Pitcairn I*. BPBM 13250 (1, 49), 13259 (1, 157); MARQUESAS IS. AMS I.21769-006 (1, 135), *Nuka Hiva* AMS I.22015-028 (1, 106), BPBM 9109 (1, 105), 12555 (1, 137), 12761 (1, 71), *Hiva Oa* BPBM 12107 (1, 26), *Fatu Hiva* BPBM 11671 (1, 124); LINE IS., *Fanning I*. BPBM 7538 (1, 140).

Bodianus mesothorax (Bloch & Schneider)

Figs 6b, 41–42; Plate 6H–I; Tables 2–3

Labrus Mesothorax Bloch & Schneider, 1801, p. 254, India orientali (Indian Ocean).

Crenilabrus elegans Kuhl & Van Hasselt, *in* Cuvier & Valenciennes, 1839, p. 130, Batavia (Indonesia; name unavailable, introduced as a synonym of *Cossyphus mesothorax*).

Scarus mordax Gray, 1854, p. 64, Mari Indico (Indian Ocean).

Morphological diagnosis. Dorsal-fin rays XII (59) or XIII (1), 9 (3) or 10 (57); anal-fin rays III, 11 (3) or 12 (57); caudal-fin rays 9 (2), 10 (34) or 11 (23) + 12 + 8 (1), 9 (12), 10 (42) or 11 (4); pectoral-fin rays ii, 12 (2), 13 (11), 14 (109) or 15 (2); lateral-line scales 29 (2) or 30 (30); predorsal scales ≈29–36; total gill rakers 15 (1), 16 (8), 17 (33), 18 (16) or 19 (1). See Table 2 for morphometric values. Cheek scales reaching forward on upper side of jaws to below or slightly in advance of below anterior extent of orbit. Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally; second directed ventrolaterally and occasionally slightly anteriorly; dental ridge often uneven; few, if any, tiny teeth in smaller specimens, ≈5–13 small canines in larger specimens, teeth most prominent posteriorly; 1 (rarely 0 or 2) moderately large canine at posterior end of upper jaw directed anteroventrally and somewhat laterally. Lower jaw with first prominent anterior canine ≈⅔–⅘ size of second, usually about ⅘, at least in larger specimens; first canine directed anterodorsally and slightly mesially, second directed anterodorsally and often slightly laterally; dental ridge prominent on anterior ⅖–⅔ of jaw, often somewhat humped and uneven in lateral profile; lateral teeth usually in about 3 series, anteriormost series usually based on dental ridge with about 5–13 minute to moderately small teeth, teeth usually becoming progressively longer posteriorly; second series with about 3–7 canines of moderate size; third series with about 0–7 very small canines. Caudal fin mostly truncate. Pelvic fin pointed, tip reaching to or nearly to anus.

A moderately small species, largest specimen examined 147 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 42a)—body dusky, slightly darker anterodorsally, with about 10 small to moderately large pale spots; spots usually encircled in part by dark dusky pigment; first spot moderately small, on dorsal midline of snout at anterior tip of upper jaw; second small, dorsally elongate but not continuous with that of opposite side, directed dorsally from dorsal edge of orbit; third of moderate size, triangular, on nape above posterior end of preopercle; fourth moderately large, on back between lateral line and anterior dorsal-fin base between third and sixth spines; fifth moderately large, above lateral line, directed anteroventrally from scaly dorsal-fin base between last spine and sixth segmented ray; sixth small, on dorsal surface of caudal peduncle immediately posterior to posterior end of dorsal-fin base; seventh moderately large, horizontally elongate, immediately posterior to fleshy pectoral-fin base and on dorsal half to third of base anteriorly as well as ventroposterior margin of operculum; eighth moderately large, low on side and posterior half of scaly anal-fin base; ninth and tenth spots of moderate size at dorsoposterior and ventroposterior corners of scaly caudal-fin base; additional, less distinct spot usually on cheek posteroventral to eye. Ventral surface of head somewhat pale; dusky dark stripe directed posteriorly from corner of mouth, terminating near posterior edge of operculum. Dorsal fin dusky, posterior lobe transparent; dark spot between first and third spines; second, larger, oval spot midlaterally between last spine and sixth segmented ray. Anal fin pale to transparent with large dark spot midlaterally between last spine and sixth segmented ray, and second smaller dark spot basally at posterior end of fin. Caudal fin transparent with moderately narrow continuous dark band on scaly base outlining ninth and tenth pale spots posteriorly. Pectoral fin transparent with dark spot on ventral half of fleshy base continued onto ventral half of basal edge of fin, spot also encircling ventral half of fin base ventrally and posteriorly. Pelvic fin slightly dusky.

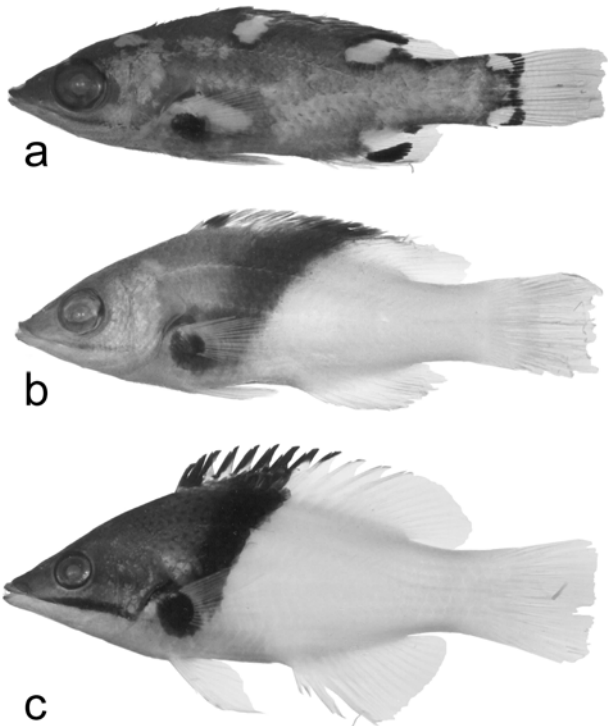

Fig. 42. *Bodianus mesothorax*: (*a*) juvenile, 34.3 mm SL, USNM 217866, Kiriwina, Trobriand Islands, (*b*) adult, 47.1 mm SL, USNM 217865, Chuan-fan-shih, Taiwan (photo reversed); and, (*c*) adult, 85.6 mm SL, BPBM 11346, Viti Levu, Fiji Islands.

Adults (Fig. 42b,c)—body dusky anterodorsally, pale posteriorly, areas separated by ventrally tapering dark band; band broad dorsally, between fourth to seventh and tenth dorsal-fin spines at base of dorsal fin, usually broadest in smaller specimens; band terminating in rounded point just posterior to upper half of pectoral-fin base. Diffuse dark dusky spot often near basal center of each scale on nape and anterior portion of back. Ventral surface of head, chest and fleshy pectoral-fin base pale; pale underside and dusky upper side of head separated by narrow dark stripe directed posteriorly from corner of mouth to posterior edge of operculum; stripe seemingly continuous with narrow dark line running dorsoposteriorly from prepectoral surface just mesial to end of head stripe; narrow dark line running along, and partially covered by, posterior edge of opercle, turning

posteriorly on dorsal side of pectoral-fin base and joining large dark spot covering axilla of pectoral fin, fleshy pectoral-fin base and all but dorsal end of basal fin edge. Dorsal fin dusky anteriorly, pale posteriorly; dark spot covering fin between first and third spines; dark band on body continuing dorsally to distal edge of fin, then posteriorly along fin edge to tip of last spine. Anal, caudal, pectoral and pelvic fins pale to transparent.

Colour in life. Juveniles (Plate 6H)—body brown, paler brown to tan posteriorly (at least in larger juveniles), demarcation angled from posterior end of dorsal-fin base to ventral side of pectoral-fin base; 10 bright yellow spots on body, one dorsally at tip of snout, second above center of orbit, third dorsolaterally on nape posterior to orbit, fourth between lateral line and anterior portion of dorsal-fin base, fifth above lateral line and below first few segmented dorsal-fin rays, continuing onto scaly basal sheath, sixth dorsally on caudal peduncle at posterior end of dorsal-fin base, seventh posterior to pectoral-fin base and on dorsal portion of fleshy fin base anteriorly, continuing onto posteroventral edge of operculum, eighth ventrally on side, covering posterior half of scaly anal-fin base, ninth and tenth at dorsoposterior and ventroposterior corners of scaly caudal-fin base, respectively; spots more or less edged with dark brown; ventral side of head pale brown to tan; dark brown stripe directed posteriorly from corner of mouth almost to opercular edge. Dorsal fin brown, posterior tip transparent; black spot between first and third spines; second larger black spot posterior to last spine. Anal fin transparent to yellowish with large black spot centrally and smaller black spot basally at posterior end of fin. Caudal fin transparent with narrow dark brown or black band at posterior edge of scaly base. Pectoral fin transparent with black spot on ventral half of fleshy base anteriorly and posteriorly. Pelvic fins brownish to yellowish.

Adults (Plate 6I)—body grey to brownish grey anterodorsally, white posteriorly with numerous narrow yellow stripes, areas separated by anteroventrally tapering black band angled from near center of dorsal-fin base to just behind and above center of pectoral-fin base; several rows of dark grey spots on nape and back anterior to black band. Ventral side of head, chest and prepectoral area bluish grey; narrow black stripe directed posteriorly from corner of mouth, stripe blue in large specimens. Dorsal fin grey anteriorly, yellow basally in larger specimens, yellow to transparent posteriorly; black spot covering fin between first and third spines; black band on side continuing to distal edge of fin. Anal fin and scaly base yellow. Caudal fin with yellow rays, membranes transparent. Pectoral fin transparent, large black spot covering fleshy base, axilla of fin and basal edge of fin; small yellow spot at dorsal corner of fin base; narrow black line running from dorsal side of black pectoral spot, then ventrally along posterior edge of operculum and terminating at posterior end of stripe directed posteriorly from corner of mouth. Pelvic fin yellow.

Colour illustrations of this species appear in Burgess & Axelrod (1972, fig. 216, adult; 1974, fig. 15, large or transforming juvenile; 1975, fig. 349, adult), Masuda *et al*. (1975, p. 103, fig. B, adult; 1984, pl. 195I, juvenile, as "*Bodianus axillaris*", and G, adult), Shen (1984, pl. 99, figs 362-9a and b, adult), R.F. Myers (1989, pl. 88G, juvenile, and H, adult), Randall *et al*. (1990, p. 300 center, juvenile and bottom, adult), Kuiter (1992, p. 146, fig. E, adult, and F, juvenile; 1993, p. 270, center left, juvenile, center right, transforming juvenile, and top right, adult; 1996, p. 271, adult and juvenile), Kuiter & Debelius (1994, p. 219, top left, juvenile, top right, terminal-phase adult) Okamura & Amaoka (1997, p. 469, left top, adult, right column, top, transforming juvenile, second and third from top, juveniles) and R.F. Myers (1999, pl. 109E, juvenile, and F, adult).

Distribution. *Bodianus mesothorax*, confined in distribution to the western Pacific between Wakayama Prefecture, Japan (Masuda *et al*., 1975) in the north and Sydney, Australia (Kuiter, 1993), New Caledonia and Fiji in the south (Fig. 41), is extremely well represented in museum collections. The species enters the Indian Ocean along the western coast of Malaysia and Indonesia and occurs at least in the Nicobars at the edge of the Andaman Sea. It is evidently excluded from the oceanic mid-Pacific plate. Like *B. axillaris*, adults of *B. mesothorax* occur mostly at depths of 1 to 20 m on coral and rock reefs, especially on steep, coral-rich slopes. In the Indonesian and Philippine regions, it mostly replaces *B. axillaris*. Juveniles are not well represented in collections, but do appear to occur in depths similar to those of adults.

Etymology: *mesothorax*, from the Greek *mesos*, "middle", and masculine noun *thorax*, "breast plate", apparently in reference to the prominent diagonal black band on the body of adults of this species.

Comparison. See *Comparison* under *B. axillaris*. *Bodianus mesothorax* differs from *B. axillaris* in colour pattern, losing all prominent black spots on the body and fins in adults, except the spot on the base of the pectoral fin.

Discussion. The original description of *Labrus mesothorax* Bloch & Schneider (1801), was a joint effort, the initial diagnosis supplied by Bloch and subsequently added to by Schneider. It was based on a figure and, possibly, description by Renard (1718). Valenciennes (*in* Cuvier & Valenciennes, 1839) recognized *mesothorax*, placing it in his genus *Cossyphus*. In the same account, he both introduced and synonymized *Crenilabrus elegans*, attributing the name and manuscript description on which it was based to Kuhl and Van Hasselt. The description and accompanying drawing supplied by Kuhl and Van Hasselt were probably prepared from one of two specimens currently in the fish collection of the RMNH. Gray (1854) published a manuscript by Gronow (see Wheeler, 1958, for a detailed account) that includes a description of *Scarus mordax*, a name referable to *B. mesothorax*. The type specimen and a pencil sketch of this species made by one of Gronow's artists are now in the BMNH.

Unlike most of the other closely related species, the juvenile colour pattern of *B. mesothorax* apparently persists only for a short period of time, with transformation into the adult pattern occurring at a relatively small size. Consequently, though this species is probably the best represented member of the genus in collections, specimens with juvenile patterns are rare. The largest specimen examined with juvenile pigmentation measures 35.2 mm SL.

Material examined. BMNH 1853.11.12.89 (1, 134, skin, holotype of *S. mordax*). **Indian Ocean**, NICOBAR IS., *Tillanchong*, Castle Bay SMF 5915 (1, 117); THAILAND, *Phuket*, Patong Beach ROM 69105 (1, 92.0). **Pacific Ocean**, TAIWAN, *Chuan-fan-shih* USNM 217865 (1, 47.1), 217867 (1, 84.7); PHILIPPINES, USNM 218503 (1, 85.9, cleared and stained), *Luzon* AMS I.15851-003 (1, 111), USNM 152617 (1, 117),

152618 (1, 102), 152619 (1, 87.1), 152785 (1, 128), 152786 (1, 114), 152787 (1, 124), 152789 (1, 117), 152792 (3, 105–118), 152793 (1, 147), 152794 (2, 125–132), 152795 (1, 120), 152796 (2, 130–139), 152799 (1, 115), 152805 (1, 121), 154031 (1, 86.7), *Mindoro* USNM 152803 (1, 90.1), 152804 (1, 129), *Burias I.* USNM 13566 (1, 112), *Masbate* USNM 152880 (1, 116), *Leyte* USNM 154029 (1, 128), *Palawan* NMV A15680 (1, 81.8), A15681 (1, 108), USNM 56025 (1, 111), 152798 (1, 130), 152800 (1, 121), *Cebu* NMV A15682 (1, 27.0), *Southern Negros Oriental* NMV A15679 (1, 53.8), *Siguijor* NMV A15678 (1, 62.1), *Mindanao* USNM 152791 (1, 122), 152797 (1, 105), 152802 (1, 136), *Silino I.* USNM 152801 (1, 115), *Jolo I.* USNM 152790 (1, 115), *Tonquil I.* USNM 152784 (2, 114–126), *Siasi I.* USNM 152788 (1, 105), *Mabu I.* USNM 154030 (1, 110); BORNEO, *Danawan* and *Si Amil Is.* USNM 152806 (1, 100); INDONESIA, *Java* RMNH 1247 (1, 147, mount, collected by Kuhl and Van Hasselt), 2126 (1, 126), SMF 13332 (1, 35.2), *Pulau Seribu*, Pulau Tikus USNM 217847 (2, 66.6–82.3), *Celebes*, Limbe Strait USNM 152616 (2, 109–122), Sadaa I. USNM 152807 (1, 97.6), Binang Unang I. USNM 152810 (2, 98.1–115), Kabaena I. USNM 217853 (1, 107), Buton I. USNM 217854 (3, 71.1–116); *Moluccas*, Tidore I. USNM 152808 (1, 111), Halmahara RMNH 4141 (1, ≈125), Gillolo I. USNM 152809 (1, 83.9), Buru I. USNM 154032 (1, 129), Ambon BMNH 1858.4.21.277 (1, 117), Ceram BMNH 1855.3.24.11 (1, 105); NEW GUINEA, Madang AMS I.17085-019 (1, 93) USNM 217874 (1, 98.0), *Hermit Is.* NMV A15671 (1, 79.5), A15676 (1, 101), *Ninigo Is.* NMV A15674 (1, 27.3), A15675 (1, 64.9), A15677 (1, 73.2), *Trobriand Is.*, Briwasi I. USNM 217882 (1, 118), Kiriwina USNM 217866 (2, 34.3–50.7); BISMARCK ARCH., Admiralty Is. WAM P27824-043 (1, 21), P27826-057 (1, 27), Duke of York I. BMNH 1879.6.20.5 (1, 111); SOLOMON IS., *Bouganville I.* ANSP 133157 (2, 102–108), *Florida I.* BPBM 16140 (1, 34), *Malaita I.* AMS I.15360-123 (1, 108), I.17496-004 (1, 94), I.22619-016 (1, 46), BPBM 16196 (2, 93–108), *Guadalcanal* BPBM 16055 (1, 52); AUSTRALIA, *Queensland*, Tijou Reef AMS I.26265-032 (1, 99), Escape Reef AMS I.2258-021 (1, 76), I.22595-001 (1, 100), I.22619-016 (1, 46), I.22637-006 (1, 103), Lizard I. AMS I.18740-036 (1, 117), I.19455-051 (1, 86), I.19464-062 (1, 111), Wistari Reef BPBM 14537 (1, 96); NEW CALEDONIA, *Noumea* USNM 202658 (2, 69.3–89.1); FIJI IS., *Mberga barrier reef* BPBM 14607 (1, 86), *Stuart I.* and *Yanuca I.* AMS I.18360-003 (1, 115), *Viti Levu* AMS I.18352-017, (1, 135), I.19195-003 (1, 103), BPBM 11346 (3, 47.8–85.6), *Matuku I.* USNM 335174 (1, 123); CAROLINE IS., *Palau Is.*, Agulpelu Reef BPBM 9433 (1, 58), Auloptagel I. BPBM 7210 (1, 94), Malakal Harbor BPBM 9967 (1, ≈80).

Bodianus neilli (Day)

Figs 6c, 41, 43; Plates 6J, 7A; Tables 2–3

Cossyphus neilli Day, 1867, p. 560, Madras (India).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10* (10) or 11 (1) + 12 + 9 (2) or 10* (9); pectoral-fin rays ii, 13 (4) or 14* (25); lateral-line scales 30 (22), 31 (2) or 32 (1) + 2; predorsal scales ≈25–31 (usually about 29*); total gill rakers 17* (5), 18 (8) or 19 (1). See Table 2 for morphometric values. Cheek scales reaching forward beyond corner of mouth on upper jaw, to below anterior nostril in some specimens. Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally in small specimens, angled much more strongly anteriorly in larger; second canine directed mostly ventrally, angled slightly laterally in larger individuals; few teeth on dental ridge, especially anteriorly, teeth more and more pronounced posteriorly in progressively larger individuals; single enlarged posterior canine usually present, directed strongly anteriorly, directed slightly ventrally and angled laterally in very large specimens. Lower jaw with first prominent anterior canine ≈⅔ size of second; first canine directed anterodorsally and slightly mesially, angled strongly anteriorly in large specimens; second directed anterodorsally, the tip often curving dorsally, second canine rarely angled laterally; prominent dental ridge occupying approximately anterior ⅓–½ of jaw with few small teeth; dental ridge followed by series of 2–10 (usually 5 or 6) canines of moderate size, often slightly longer posteriorly, then row of 0–6 (usually about 4) short canines terminally on jaw; individual lateral teeth less separable into series in small specimens. Caudal fin mostly truncate, very slightly rounded at most; dorsal-most rays longer than middle rays in large specimens, forming short lobe; ventral rays little produced at any size. Pelvic fin somewhat variable in length, tip reaching just to anus in some and falling far short of it in others.

A moderately small species, largest specimen examined 170 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 43a)—body dark, overall background consisting of numerous narrow dark stripes; chest, belly and ventral side of head pale. Several circular to horizontally elongate immaculate spots on side; 2 moderately large spots between lateral line and dorsal-fin, first below third to sixth dorsal-fin spines, second below center of soft portion of dorsal-fin; smaller spot midway between first 2 spots just below scaly fin base. Two large elongate spots just below lateral midline, first originating at posterior edge of operculum, covering dorsal half of fleshy pectoral-fin base and terminating below about fifth or sixth dorsal-fin spine, second originating below about eighth dorsal-fin spine and terminating below center of soft portion of dorsal-fin; moderately small spot on lateral line on anterior half of caudal peduncle; moderately small spots on head, 1 dorsally on side of head slightly anterior to dorsal-fin origin, second just anterior to first, third, smaller spot above center of orbits, fourth on anterodorsal margin of orbit, fifth slightly posteroventral to second, sixth, elongate

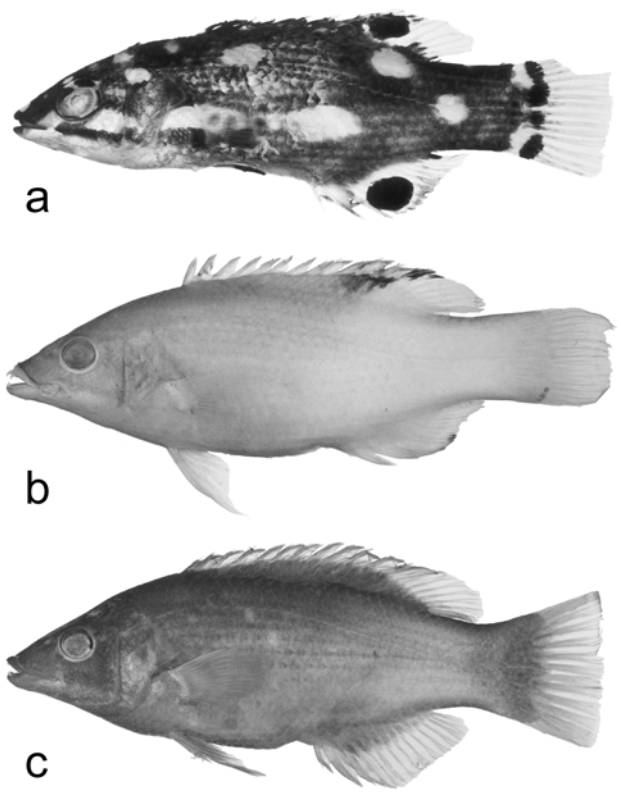

Fig. 43. *Bodianus neilli*: (*a*) juvenile, 45.3 mm SL, BPBM 19027, Colombo, Sri Lanka; (*b*) adult, 110 mm SL, USNM 217881, Chalaw, Sri Lanka; and, (*c*) adult, 131 mm SL, BPBM 19050, Colombo, Sri Lanka (photo reversed).

spot on cheek posteroventral to eye, seventh anteroventral to eye between orbit and upper jaw, and eighth middorsally on snout. Narrow dark stripe slightly darker than dark area on dorsal portion of head directed posteriorly from corner of mouth, separating dark and pale halves of head. Two immaculate spots on scaly caudal-fin base, first on dorsal third and second on ventral third, each followed posteriorly by intensely dark spot; 2 smaller, similarly dark spots equally spaced between first 2 dark spots. Spinous portion of dorsal-fin dusky with intensely dark spot between first 2 spines, tiny immaculate spot at base of first spine and 2 small immaculate spots on dorsoposterior margin of dark anterior spot; large intensely dark spot between tenth spine and center of segmented portion of fin, spot with narrow pale halo; posterior portion of fin transparent except for several dark marks on bases of last couple of rays. Similar large intensely dark spot centrally on anal fin, spot also with narrow immaculate halo, halo somewhat broader basally; remainder of fin dusky except for tiny dark spot at base of last 1 or 2 rays. Caudal fin transparent. Small intensely dark spot on ventral half of fleshy pectoral-fin base; fin transparent. Pelvic fin intensely dark with immaculate spot basally and narrow immaculate margin.

Adults (Fig. 43b,c)—body slightly dusky above level of lower jaw and anterior to diagonal between base of last dorsal-fin spine and ventral side of pectoral-fin base; remainder of body pale; slightly darker dusky line directed posteriorly from corner of mouth. Smaller adults with a dark-dusky to dark blotch near base of last 2 dorsal-fin spines extending toward tip of first 2 segmented dorsal-fin rays. Adult specimens fading rapidly in preservation.

Colour in life. Juveniles (Plate 6J)—body dark brown, almost black, overall background comprising numerous horizontal narrow dark brown stripes; ventral side of head, chest and belly white; prominent circular to horizontally elongate snow white spots on head and sides, 2 moderately large elongate spots just below lateral midline of side, 2 smaller elongate to circular spots just above lateral midline, remainder of white spots more or less circular, scattered on head, dorsal half of body, caudal peduncle and bases of fins. Black line on head directed posteriorly from corner of mouth. Large ocellated black spot posteriorly on dorsal-fin, another centrally on anal fin; smaller black spot anteriorly on dorsal-fin, second on pelvic fin and third on ventral half of fleshy pectoral-fin base; 4 vertically aligned black spots on scaled caudal-fin base, middle 2 small, occasionally absent; caudal, pectoral and posterior tip of dorsal and anal fins mostly transparent.

Adults (Plate 7A)—body rose red on dorsal portion of sides anterior to segmented dorsal-fin rays and on head above level of lower jaw; ventral side of head, chest and abdomen white; remainder of sides and anterior portion of caudal peduncle yellow. Anterior ¾ of dorsal-fin red, posterior ¼ yellow. Anal fin yellow with large red blotch between first and fifth segmented rays. Posterior portion of caudal peduncle and caudal fin red. Broad red band on fleshy pectoral-fin base. Pelvic fins yellow with streaks of red. Yellow and white portions of fins and body suffused with red in large individuals.

Colour illustrations of this species appear in Burgess & Axelrod (1973a, p. 444, fig. 310, juvenile; 1973b, pp. 588 and 589, figs 29–31, as "*Bodianus luteopunctatus*", adults, and p. 591, unnumbered figure, as "*Bodianus diana*", juvenile; 1974, p. 858, fig. 24, insert, as "*Bodianus diana*", juvenile) and Wheeler (1975, colour fig. 398, as "*Bodianus pulchellus*").

Distribution. *Bodianus neilli* is apparently restricted to the coast of India, Sri Lanka, the Maldive Islands (Burgess & Axelrod, 1973b, as "*B. luteopunctatus*") and the Andaman Sea, where it occurs on coral reefs at depths of 5–18 m (Fig. 41). It evidently replaces *B. axillaris* (with which it has been confused) in the first two areas.

Etymology: *neilli*, named for A.G. Brisbane Neill, a friend of Day who communicated with Albert Günther and Pieter Bleeker on Day's behalf (Whitehead & Talwar, 1976).

Comparison. See *Comparison* under *B. axillaris*. Adults of *B. neilli* are separable from those of its two subcongeners in lacking prominent dark markings.

Discussion. *Bodianus neilli* most closely resembles *B. axillaris* with which it has been confused. The species was evidently considered to be a variety of *B. axillaris* by Valenciennes (*in* Cuvier & Valenciennes, 1839), as a coloured drawing of a specimen of *B. neilli* is with Valenciennes' original manuscript description of *C. axillaris* at the MNHN and was evidently the basis for one of his published colour accounts.

Day (1867) described *Cossyphus neilli* from an adult collected at Madras, India, now in the BMNH. He then figured and synonymized the specimen as a variety of *B. axillaris* (Day, 1877). Subsequently, the name remained in synonymy with that species. An adult of *B. neilli* was confused with *B. luteopunctatus* by Burgess & Axelrod (1973b) and juveniles mistaken as *B. diana* by the same two authors (Burgess & Axelrod, 1973b, 1974).

Material examined. **Indian Ocean**, INDIA, *Madras* BMNH 1868.5.14.1 (1, 148, holotype of *C. neilli*), 1889.2.1.4296 (1, 154, dry skin); SRI LANKA, *Chilaw* USNM 217881 (1, 110), *Colombo*, Negombo Reef BPBM 19027 (3, 45.3–166), 19050 (2, 69.7–131), *Weligama* USNM 217880 (1, 134), Hikkaduwa SMF 13272 (2, 128–137), USNM 217871 (1, 136), *Matara* USNM 217883 (3, 124–170); THAILAND, *Phuket* ROM 68859 (2, 99.6–126), 68860 (1, 31.8).

Subgenus *Euhypsocara*

Euhypsocara Gill, 1863

Type species. *Crenilabrus anthioides* Bennett, 1831, by monotypy.

Etymology. *Euhypsocara*, from the Greek *eu*, "primitive", *hypsi*, "on high", and *kara*, "head", in reference to the very rounded head in the type species.

Diagnosis. Ethmoid-frontal moderately depressed; transverse axis of lower pharyngeal (Fig. 6d) deep centrally with slightly convex posterior margin; pharyngeal teeth mostly aligned transversely in about 4 rows; teeth rounded of mostly uniform moderate size, except for several slightly larger teeth centrally and 7–9 distinctly large ovoid molars in posterior row, medial tooth noticeably largest with others progressively smaller laterally; anterior head of pharyngeal short and tapered with 6–8 canines of similar size to those immediately behind, 2–4 aligned anteroposteriorly on midline and on either side; vomerine teeth present; teeth laterally in jaws based on crest of bony dental ridge,

anteriormost teeth not aligned with prominent anterior canines, those in lower jaw mostly in single series, occasionally followed by several shorter teeth; dorsal-fin with XII, 10 rays; anal fin with III, 12 rays; lateral line with 30 (rarely 29) pored scales; 4–4½ scales above lateral line; 11–14½ scales below lateral line; predorsal scales 31–42, reaching forward in advance of anterior nostril; cheek scales extending forward in advance of anterior nostril, preopercle fully scaled, scales covering posterior half of jaw; scaly basal sheath on base of dorsal and anal fins of moderate height, 2–2½ scales in depth; posterior tips of dorsal and anal fins bluntly pointed; caudal fin lunate, upper and lower rays filamentous in juveniles; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer; species small, maximum length over 160 mm SL; juveniles and adults with similar bicoloured pattern, reddish anteriorly and white posteriorly.

Discussion. This monotypic subgenus is morphologically distinct from other *Bodianus* subgenera but has an adult colour pattern that closely resembles those of *Lepidaplois* species.

Bodianus anthioides (Bennett)

Figs 6d, 44–45; Plate 7B–C; Tables 2–3

Crenilabrus anthioides Bennett, 1831, p. 167, Mauritius.
Cossyphus zosterophorus Bleeker, 1857, p. 75, Amboina (Indonesia).
Cossyphus boutoni Sauvage, 1891, p. 452, Mauritius.

Morphological diagnosis. Caudal-fin rays 9 (4) or 10 (3) + 12 + 9 (5) or 10 (2); pectoral-fin rays ii, 12 (1), 14 (19) or 15 (2); lateral-line scales 29 (1) or 30 (13); scales below lateral line usually 12½; predorsal scales usually about 36; total gill rakers 18 (3) or 19 (4). See Table 2 for morphometric values. Head blunt; forehead convexly rounded; outline of snout nearly vertical in lateral aspect; outline of nape slightly convex; jaws obtuse. Upper jaw with prominent anterior canines of similar size, first slightly smaller in larger individuals; first canine directed mostly ventrally in small specimens, angled more anteroventrally and curved ventrally in larger individuals; second canine directed ventrally and slightly laterally; dental ridge massive anteriorly in large specimens, ridge with several small canines in smaller specimens, canines becoming prominent in larger individuals; 1 or 2 (often 2) enlarged canines posteriorly, directed anteroventrolaterally. Lower jaw with first prominent anterior canine ⅓–½ length of second, first much narrower than second; first canine directed anterodorsally and slightly mesially, second directed anterodorsally and recurved dorsolaterally, especially in large individuals; dental ridge prominent on anterior half of jaw but mostly devoid of teeth; teeth on posterior half of jaw mostly in single series, slightly longer posteriorly; series occasionally followed by 1 or 2 distinctly shorter canines. Caudal fin distinctly emarginate, dorsal and ventral rays forming extremely elongate filaments in juveniles, reaching length of more than 2.5 times those of middle rays (only 1.6 times in the largest specimen examined). Posterior tip of pelvic fin reaching just short of or to anus, reaching little past anus at most.

A moderately small species, largest specimen examined 161 mm SL.

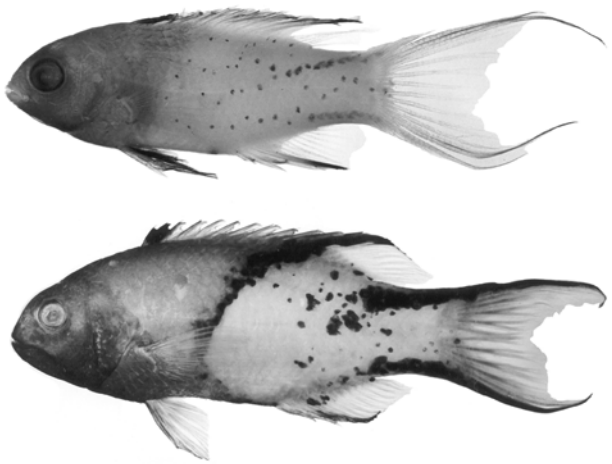

Fig. 44. *Bodianus anthioides*: (*a*) juvenile, 44.7 mm SL, BPBM 13403, Dahab, Israel; and, (*b*) adult, 152 mm SL, BPBM 12733, Eniwetok Atoll, Marshall Islands.

Pigmentation in alcohol. (No distinctive change in pigmentation occurs with growth or change in sex in this species.) Juveniles (Fig. 44a)—pigmentation as described below for adults except for pale area on anterior tip of head forward of eye, greater confinement of dusky area anteriorly on body leaving area posterior to pelvic-fin base pale, restriction of dark wedge-shaped band to tips of dorsal-fin membrane with band extending little, if at all, onto sides, and dark pelvic fin with pale posterior margin.

Adults (Fig. 44b)—body dusky anteriorly (uniformly so, except for darker region ventrally on head, especially on subopercle, isthmus and along lower jaw), pale with dark markings posteriorly, juncture of areas along diagonal between base of last 2 dorsal-fin spines and posterior side of pectoral-fin base (anterior dusky area continuing to anus anteroventral to reverse diagonal between pectoral-fin base and anus); interface between dusky and pale areas accented dorsally in some specimens by dark wedge-shaped band or series of irregular spots tapering anteroventrally from scaly basal sheath of dorsal-fin. Pair of broad dark stripes or series of spots directed posteriorly from posterior third of body onto caudal fin, dorsal stripe high on caudal peduncle usually originating below or just forward of posterior end of dorsal-fin base and continuing onto dorsal-most caudal-fin rays, ventral stripe low on caudal peduncle, usually beginning above or just in advance of posterior end of anal-fin base and continuing onto ventralmost rays of caudal fin; variable number of small to large dark spots or irregular marks often scattered over posterior half of body and scaly base of dorsal and anal fin; broad dark ring circling anus Dorsal fin with large dark spot between first 3 spines; elongate extension of dark wedge-shaped bar from side directed posterodorsally to tip of last spine and along distal margin of fin at tips of first few segmented rays; fin dusky anterior to dark mark, pale or transparent posterior to it. Anal fin pale to transparent, usually with broad black marginal stripe or remnant of it on anterior ⅔ of fin. Caudal fin pale with continuation of 2 dark stripes from caudal peduncle on dorsal-most and ventralmost rays, tapering to point near tips. Pectoral fin transparent. Pelvic fins dusky to pale with dusky streaks in large specimens.

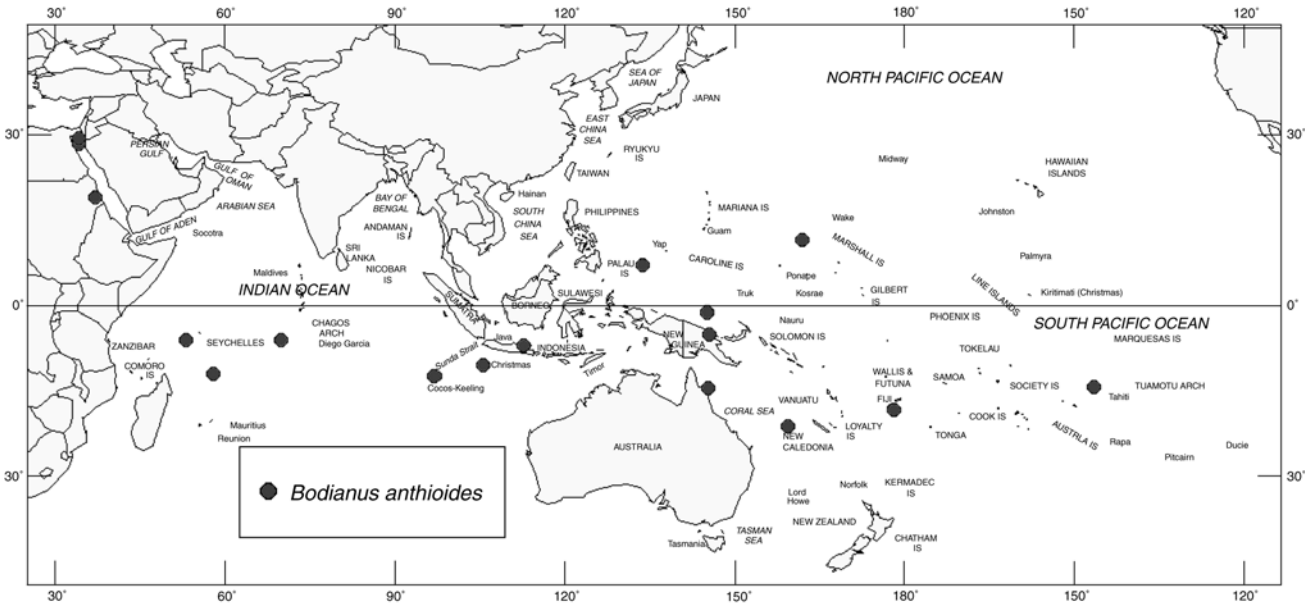

Fig. 45. Distributional records for specimens examined of species of the subgenus *Euhypsocara*.

Colour in life. Juveniles (Plate 7B)—head and anterior portion of body yellowish brown to brown, body white posteriorly without pink shading or red marks; large white spot covering anterior tip of head; pelvic fin black; coloration otherwise as described below for adults, except black band on body incompletely developed or absent.

Adults (Plate 7C)—body reddish brown to brown anteriorly, white posteriorly (suffused with pink in large specimens) with 2 broad black stripes suffused with red on caudal peduncle, one dorsally and one ventrally, stripes reaching to tips of forked caudal fin; variable number of small red to large black spots or irregular marks on white area, including black ring around anus; bicoloured halves of body separated by anteroventrally tapering diagonal black band, band originating dorsally at tips of anterior segmented dorsal-fin rays and terminating posterior to pectoral-fin base. Head suffused with black ventrally, indistinct black line directed posteroventrally from corner of mouth. Dorsal fin yellow to yellowish brown anterior to black body band, with large black spot at anterior end of fin; fin white or pinkish white to transparent posterior to black bar. Anal fin white to pinkish white posteriorly, becoming transparent at tip; broad red to black marginal stripe on anterior ⅔ of fin. Pectoral fin transparent. Pelvic fin red with black streaks.

Colour illustrations of this species appear in Masuda *et al*. (1975, p. 103, fig. c, adult, and fig. d, juvenile; 1984, pl. 195D, juvenile, and E, adult), Fourmanoir & Laboute (1976, p. 131, adult), Darom (1976, fig. 35, juvenile), Randall (1983, p. 111, middle, adult), Shen (1984, pl. 99, fig. 362-8, adult), Smith & Heemstra (1986, pl. 93, 220.5, adult), Allen & Steene (1987, pl. 843, juvenile), R.F. Myers (1989, pl. 88A, adult), Randall *et al*. (1990, p. 298 top, juvenile), Kuiter (1992, p. 148, fig. A, adult, and B, juvenile; 1998, p. 179, top left, terminal-phase adult, top right, juvenile), Kuiter & Debelius (1994, p. 218, lower left, terminal-phase adult, lower right, juvenile), Okamura & Amaoka (1997, p. 467, right column, bottom, juvenile, second from bottom, adult) and R.F. Myers (1999, pl. 108A, juvenile, and 108B, adult).

Distribution. *Bodianus anthioides* occurs throughout much of the tropical Indo-Pacific ranging from the Red Sea to the Tuamotu Archipelago (Fig. 45). Reliable records of *B. anthioides* for localities other than those listed in *Material examined* include eastern Africa to 21° S (Smith, 1957), Kenya (photo, Allen, pers. comm.), Somalia (Manilo & Bogorodsky, 2003), Okinawa (Masuda *et al*., 1975), Taiwan (Shen & Choi, 1976), Micronesia to the Line Islands (R.F. Myers, 1999) and New Caledonia (Fourmanoir & Laboute, 1976). Adults occur near coral reefs at depths of about 20–60 m, whereas juveniles have been taken at about 6 m within the Red Sea. Despite the marked difference in morphological appearance between this species and most others of the genus, *B. anthioides* appears to fill the same ecological niche, at least as adults, as do other species of *Bodianus*.

Etymology: *anthioides*, from the masculine Greek noun *anthias*, a common name for members of the anthiine serranid fishes, and *oides*, "having the form of", in reference to the similarity of this species to various anthiine species.

Comparison. *Bodianus anthioides* is very distinctive, sharing a broadly curved blunt snout only with large individuals of *B. macrognathos* within the genus. The two are readily separable from one another on the basis of number of lateral-line scales and colour pattern, *B. anthioides* having 29 or 30 scales and a bicoloured pattern (darkly pigmented anteriorly and mostly pale posteriorly) and *B. macrognathos* having 40 or 41 scales and several broad dark stripes dorsally on the head and body or with an overall dusky pattern. *Bodianus anthioides* is the only member of the genus with extremely filamentous upper and lower caudal fin lobes in juveniles. The species attains a standard length of 161 mm and never approaches the maximum size of *B. macrognathos* (over 595 mm). The general adult colour and scale patterns of *B. anthioides* markedly resemble those of *B. mesothorax*. The latter however, never develops a filamentous caudal fin and has the more typical acutely pointed snout. Unlike many species of this genus, there is relatively little change in the colour pattern of *B. anthioides* as individuals mature.

Discussion. Gill (1863) found *B. anthioides* sufficiently distinct in head morphology to erect the genus *Euhypsocara*

for it alone. Its skeletal structure, however, is essentially the same as in other advanced species of *Bodianus* despite the foreshortening of the snout. The taxonomic distinction based on the one character consequently does not appear to be warranted.

Though not initially indicated as such, an uncatalogued dry skin of this species from Mauritius at the BMNH may be the type of *Crenilabrus anthioides* Bennett (1831). The names *Cossyphus zosterophorus* Bleeker (1857) and *Cossyphus boutoni* Sauvage (1891) were apparently introduced in ignorance of Bennett's name and description as neither author compared his species description with it. Bleeker's oversight was corrected by Günther (1862) and then acknowledged by Bleeker (1862c). Sauvage took his description directly from Lienard (in Bouton, 1843), latinizing Lienard's vernacular name, "cossyphe de Bouton", and attributing the species to that author. Neither Bleeker nor Sauvage felt the species merited separate generic recognition.

The morphology of *B. anthioides* suggests a plankton feeding life style, but this is not borne out by either field observations (Springer, pers. comm.) or gut content analyses. Still, juveniles, which have proportionately longer caudal filaments than adults, may feed higher in the water column. The retention of the structures by adults may be a paedomorphic condition.

Intraspecifically, all specimens examined from the oceanic Pacific have 10 + 9 or 10 unbranched procurrent caudal rays, whereas specimens from other localities have 9 + 9 rays. Apart from individual variation in colour pattern, no other differences were noted.

Material examined. **Red Sea**, GULF OF AQABA, *Dahab* BPBM 13403 (1, 44.7), USNM 217879 (1, 116), *Elat* SMF 4520 (1, 142); PORT SUDAN, BMNH 1975.4.5.55 (1, 25.5). **Indian Ocean**, SEYCHELLES IS., *Amirante Is*., D'Arros I. ANSP 107579 (1, 91.0), St Joseph I. ANSP 108117 (1, 121), 108132 (1, 125), 108139 (2, 128–136); MAURITIUS, BMNH 1978.10.10.2 (1, 161, skin, probable holotype of *L. anthioides*), USNM 112247 (1, 136); CHAGOS ARCH., *Solomon Is*. ROM 37469 (1, 96.9), 37471 (2, 87.9–115); COCOS-KEELING IS., Turk Reef ANSP 130196 (1, 110); CHRISTMAS I., WAM P26080-007 (1, 126), P26109 (1, 87). **Pacific Ocean**, INDONESIA, *Ambon* BMNH 1858.4.21.449 (1, 140), RMNH 6538 (3, 142–146, 143 and 146 mm specimens are types of *C. zosterophorus*); NEW GUINEA, *Madang* BPBM 15859 (1, 78.4), *Hermit Is*., Amot I. USNM 335172 (1, 76.0); AUSTRALIA, *Queensland*, Lizard I. AMS I.19454-010 (1, 100), I.25064-001 (1, 23); PALAU IS., *Baivakaseru I.* BPBM 13476 (1, 89); MARSHALL IS., *Eniwetok Atoll* BPBM 12733 (1, 152); FIJI, *Viti Levu*, Suva Harbour AMS I.18577-001 (1, 61); TUAMOTU ARCH., *Manihi* BPBM 14021 (2, 74.1–105, small specimen cleared and stained); COOK IS., *Rarotonga* BPBM 13089 (1, 161).

Subgenus *Diastodon*

Diastodon Bowdich, 1825
Gymnopropoma Gill, 1863
Chaeropsodes Gilchrist & Thompson, 1909

Type species. *Diastodon speciosus* Bowdich, 1825, by monotypy.

Etymology. *Diastodon*, from the Greek *diastole*, "spread", and *odon*, "tooth", referring to the separated prominent anterior canines of the upper jaw in members of this subgenus and other species of *Bodianus*.

Diagnosis. Ethmoid-frontal surface moderately depressed; transverse axis of lower pharyngeal (Fig. 7a–d) moderately deep to deep centrally with slightly to deeply convex posterior margin; pharyngeal teeth rounded, mostly aligned transversely at center in about 2–4 rows, those laterally forming large ovoid patch with 6 or more rows on either side, lateralmost teeth extending onto lateral edge of pharyngeal, those medially of moderate size, except for about 3–9 distinctly large ovoid molars in posterior row, medial 1–3 teeth noticeably largest with others progressively smaller laterally, lateral teeth markedly smaller; anterior head of pharyngeal long, densely covered with canines of similar size to those immediately behind; vomerine teeth absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw in two or three series sequentially, defined by differing lengths, posterior series shortest; dorsal-fin with XII (rarely XIII), 10 (rarely 11) rays; anal fin with III, 12 (rarely 11 or 13) rays; lateral line with 31–41 pored scales; 5–6½ scales above lateral line; 11–17 scales below lateral line; predorsal scales 10–22, reaching forward near vertical through posterior extent of eye; cheek scales extending forward to or just in advance of corner of mouth, posterior and ventral edges of preopercle narrowly to broadly naked, lower jaw naked or with elongate patch of scales below posterior third of mouth; scaly basal sheath on base of dorsal and anal fins moderately high, 1–4½ scales in depth; posterior tips of dorsal and anal fins rounded to bluntly pointed, slightly filamentous in very large specimens of some; caudal fin slightly truncate to double emarginated, corners produced in some; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer; species large, maximum lengths 245–600 mm SL; juveniles of most with black band encircling body posteriorly and adults usually with prominent black blotch or band, at least in part, below posterior half of dorsal-fin; initial- and terminal-phase adult dichromatism distinctive in some.

Discussion. *Diastodon* is the most diverse of *Bodianus* subgenera with 9 species and is apparently the only subgenus with species in each of the three major ocean basins. Although earlier analyses favored an affinity with the subgenus *Bodianus*, the phylogenetic analysis presented below supports the inclusion of *B. macrognathos* in *Diastodon* based primarily on pharyngeal characters. *Bodianus macrognathos* has a number of modified features that imply it has experienced considerable genetic drift. Its restricted geographical distribution may reflect a small population size that could have contributed, as hypothesized below for *B. solatus* and *B. vulpinus* (see *Relationships*).

Bowdich provided a single brief description for her genus *Diastodon* and the new species for which she created it. Although Gill (1863) erected the genus *Gymnopropoma* for *Cossyphus bilunulatus* alone, several other species fit his generic diagnosis: "posterior canine tooth developed; scales l.l. 30–34 (–36); falciform lobes; limbs of preoperculum naked; snout convex". The generic name and assemblage does not appear again in the literature, except in synonymies.

Chaeropsodes was proposed by Gilchrist & Thompson (1909) for *Chaeropsodes pictus* also described in the publication, but not compared with any other genus. The only character presented in the generic diagnosis that does not agree with those of *Bodianus* is the dorsal-fin count (XI, 12). This is probably an aberrant condition for the dorsal-fin of the type.

Bodianus albotaeniatus (Valenciennes)

Figs 46–47; Plate 7D–F; Tables 2–3, 9

Cossyphus albo-taeniatus Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 141, Sandwich Islands (Hawaiian Islands).
Crenilabrus modestus Garrett, 1864, p. 106, Sandwich Islands (Hawaiian Islands).
Lepidaplois strophodes Jordan & Evermann, 1903, p. 190, Honolulu market.
Lepidaplois richardsoni Fowler, 1908, p. 433, fig. 7, Victoria (Hawaiian Is. ?, see Gomon & Randall, 1978).
Lepidaplois atrorubens E.K. Jordan, 1925, p. 23, pl. 1, fig. 3, Honolulu market.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; pectoral-fin rays ii, 13 (1), 14 (2) or 15* (31); caudal-fin rays 10 + 12 + 10; lateral-line scales 30 (1), 31*(17) or 32 (10); scales above lateral line 5½, 6* or 6½; scales below lateral line ≈12½*–15½ (usually 13–15); predorsal scales ≈10–18 (14*); total gill rakers 17 (2), 18* (3), 19 (6), 20 (1) or 21 (1). See Tables 2 and 9 for morphometric values. Lower jaw naked. Upper jaw with prominent anterior canines of similar size; first canine slightly smaller than second in juveniles, slightly larger than second in some large adults; both canines directed mostly ventrally in juveniles; first canine slanted anteroventrally in adults; second directed ventrally, angled slightly anteriorly and laterally in larger specimens; lateral teeth in juveniles few in number, small, isolated, scattered on narrow dental ridge, becoming coalesced into ridge in small adults; numerous individual teeth developing in single row, especially posteriorly in larger adults; 1 or 2 (rarely 0) prominent canines at posterior end of jaw, directed anteroventrally and slightly laterally. Lower jaw with prominent anterior canines distinctly unequal; first canine ⅔–⅘ size of second; first canine directed anterodorsally and slightly mesially, more dorsally in juveniles; second directed dorsally in smaller specimens, slanting anterodorsally and slightly laterally, recurving dorsally in larger specimens; lateral teeth basically in single row forming about 3 series; anterior series largely coalesced on anterior ¼–⅖ of jaw, with 0–6 short canines posteriorly, teeth more or less confluent with second series in juveniles and small adults, up to 7 short blunt canines forming along this coalesced dental ridge in larger adults; teeth in second series seemingly more distinct, not based on raised dental ridge, 3–6 in number, moderately long, becoming longer posteriorly; third series with 0–6 contrastingly short canines of equal size at posterior end of jaw; numerous tiny rounded teeth forming on mesial side of dental ridge behind prominent anterior canines in both jaws of very large specimens. Caudal fin truncate in juveniles, only slightly rounded at most; dorsal-most and ventralmost rays elongate in larger specimens, forming narrow pointed lobes, dorsal lobe usually longer than ventral, reaching nearly 1.5 times that of middle rays. Tip of pelvic fin usually reaching to or just short of anus, rarely reaching much past it (to base of third anal-fin spine in one specimen).

Largest specimen examined 328 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 46a)—body mostly pale to dusky, with numerous darker narrow stripes posterior to head (stripes sometimes obscured in very small specimens, fading quickly in preservative) and broad, more or less distinct dark band posteriorly on sides and anterior end of caudal peduncle, band poorly defined anteriorly, becoming less dark anteriorly and grading with dusky sides forward on body; dusky area on body overlaid by numerous narrow slightly darker stripes; interface between pale and dusky areas in a straight line from tip of snout through center of eye to base of about ninth dorsal-fin spine; posterior margin of dark band distinct, anteriorly on caudal peduncle just posterior to posterior end of dorsal and anal-fin base; dark band extending anteriorly on distal portion of dorsal-fin about to tip of tenth spine; caudal peduncle immaculate posterior to dark band. Head with dark wedge-shaped stripe following line of upper jaw posteriorly from corner of mouth; dorsal side of snout, nape and anterior portion of back abruptly pale; 2 moderately narrow dusky stripes directed dorsoposteriorly from posterior edge of orbit and dusky marks or spots occasionally on cheek. Dorsal fin pale anterior to dark area associated with dorsal end of dark body band; small dark spot sometimes between second and third spines; posterior tip of fin transparent. Anal fin dark, occasionally with narrow transparent posterior tip. Caudal fin pale to transparent. Pectoral fin transparent. Pelvic fin dusky.

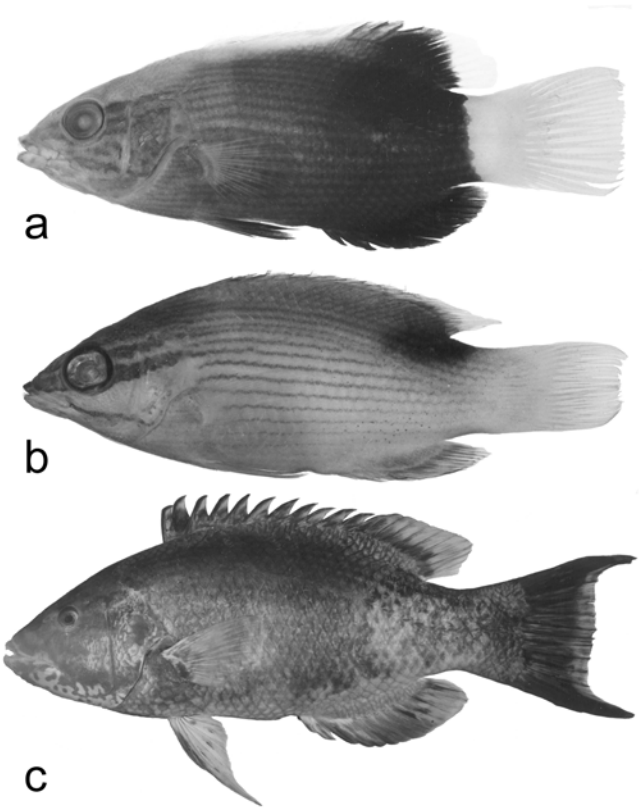

Fig. 46. *Bodianus albotaeniatus*: (*a*) juvenile, 54.5 mm SL, BPBM 10025, Oahu, Hawaiian Islands; (*b*) initial-phase adult, 59.9 mm SL, BPBM 14651, Oahu, Hawaiian Islands; and, (*c*) terminal-phase adult, 332 mm SL, BPBM 11653, Oahu, Hawaiian Islands (photo by J. Randall).

Initial-phase adults (Fig. 46b)—body mostly pale, slightly dusky dorsally; numerous narrow dusky stripes often on sides posterior to head; large dark saddle-like spot posterodorsally on body below soft portion of dorsal-fin not extending below lateral line and often well above it, confluent with that of other side dorsally on caudal peduncle (at least immediately posterior to posterior end of dorsal-

Table 9. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus albotaeniatus* and *Bodianus bilunulatus* examined and types of *Bodianus busellatus* n.sp. Values marked with * are for types of the species.

	B. busellatus n.sp. holotype	*B. busellatus* n.sp. paratypes	*B. albotaeniatus*	*B. bilunulatus*
number of specimens	1	11	13	15
standard length (mm)	252	84.1–315	32.7–328	45.6–303
body depth	32.9	31.4–35.6	32.7–38.8	30.9–36.0
head length	34.0	32.9–38.9	33.8–40.8	33.3–39.3
snout length	12.2	9.5–13.6	10.7–14.6	9.8–12.5
orbital diameter	5.5	5.2–7.4	5.3–10.8	4.8–11.6
predorsal length	—	37.4–41.6	37.7–42.9	36.7–38.3
preanal length	—	63.9–67.3	—	—
preanus length	50.8	61.3–63.6	—	—
dorsal-base length	25.3	47.5–52.6	49.5–57.1	46.6–53.8
anal-base length	15.9	23.6–28.2	22.4–26.7	21.928.1
caudal-peduncle depth	—	14.1–18.2	17.1–18.5	15.1–16.9
caudal-peduncle length	—	12.6–16.8	—	—
dorsal-fin length	61.9	58.0–64.5	59.4–68.3	58.8–66.1
anal-fin length	35.8	34.0–39.2	32.9–36.9	32.5–37.3
pectoral-fin length	20.6	19.8–25.2	19.8–23.2	20.6–23.3
pelvic-fin length	23.1	22.0–26.2	19.9–34.0	21.1–31.6
dorsal-fin spine 1	5.5	4.9–6.8	5.5–7.5	5.1–6.7
dorsal-fin spine 2	6.3	6.3–8.7	7.6*	6.3–8.6
dorsal-fin spine 12	8.0	8.0–12.5	9.8–18.0	9.5–17.3
anal-fin spine 1	4.7	4.3–6.1	4.7*–5.1*	3.9–6.8
anal-fin spine 3	9.1	8.5–12.9	9.5–16.5	8.1–16.9
caudal-fin length—top	23.7	23.7–33.8	25.4–32.8	26.5–30.6
caudal-fin length—middle	18.7	18.4–24.0	20.4–26.3	20.4–27.4
caudal-fin length—bottom	—	25.6–30.4	24.8–28.1	—

fin base), spot covering posterior scaly basal sheath of dorsal-fin in small adults, excluded from sheath in larger specimens, posterior margin of spot usually reaching less than half way from posterior end of dorsal-fin base to posterior edge of hypurals, anterior margin usually barely reaching forward to below anterior segmented dorsal-fin rays, spot diminishing in size in larger individuals; head dusky dorsally, often with several narrow dusky stripes on nape and snout; 2 (occasionally 3) prominent moderately narrow dark stripes directed dorsoposteriorly from posterior margin of orbit, ventralmost continuing forward from anteroventral rim of orbit to upper lip or tip of snout; dark wedge-shaped stripe following line of upper jaw directed posteroventrally from corner of mouth, usually narrow, sometimes broken into spots and irregular marks; similar marks occasionally on cheek, operculum and underside of head. Dorsal fin pale with moderately small dark spot centered between second and third dorsal-fin spines, extending variously onto membrane anterior to second spine and posterior to fourth spine. Caudal, pectoral and pelvic fins pale.

Terminal-phase adults (Fig. 46c)—narrow dusky stripes indistinct or absent, replaced with dusky to dark mottling; irregular dusky mottling especially evident on pale underside of head; dark caudal saddle small or absent. Dorsal, anal, caudal and pelvic fins dusky to dark, especially basally.

Colour in life. Juveniles (Plate 7D)—body white ventrally, pale grey above with numerous dark grey to black stripes; body slightly brownish anteriorly in larger individuals; stripes merging with dark grey to black band posteriorly on body, band connecting distal margins of anal fin and soft portion of dorsal-fin; dorsal side of snout, nape and anterior portion of back bright yellow; narrow stripes on head dark grey, brownish in larger individuals. Pelvic fin grey, at least anteroventrally.

Initial-phase adults (Plate 7E)—body pale yellow dorsally and posteriorly; numerous narrow reddish brown stripes anteriorly, becoming yellow posteriorly; dorsal side of head and nape pale yellow with narrow reddish brown stripes middorsally; stripes dorsoposterior and anteroventral to eye dark brown; small spots and marks on cheek, operculum and underside of head reddish brown to brown; narrow stripe or series of spots directed ventroposteriorly from corner of mouth dark brown. Dorsal fin yellowish white with narrow yellow marginal stripe anteriorly on spinous portion, uniformly bright yellow on soft portion. Anal fin and caudal fin bright yellow. Pectoral fin mostly transparent. Pelvic fin white or pale yellow, often with pale reddish brown spine.

Terminal-phase adults (Plate 7F)—body wine red to purplish brown or brown, becoming bluish grey ventrally; dark brown stripes, at most, very faint; black caudal peduncular spot very small or absent; ventral side of head whitish with irregular markings of bluish grey. Unscaled portion of dorsal-fin dark bluish grey with deep blue spot on second interspinous membrane. Anal fin and paired fins bluish grey; anal and pelvic fins with sparse dark grey to black mottling. Caudal fin blackish.

Colour illustrations of this species appear in Jordan & Evermann (1905, pl. 23, as "*Lepidaplois strophodes*", juvenile, and pl. 24, initial-phase adult), Gomon & Randall (1978, p. 38, fig. 4, upper figure, initial-phase adult), Burgess

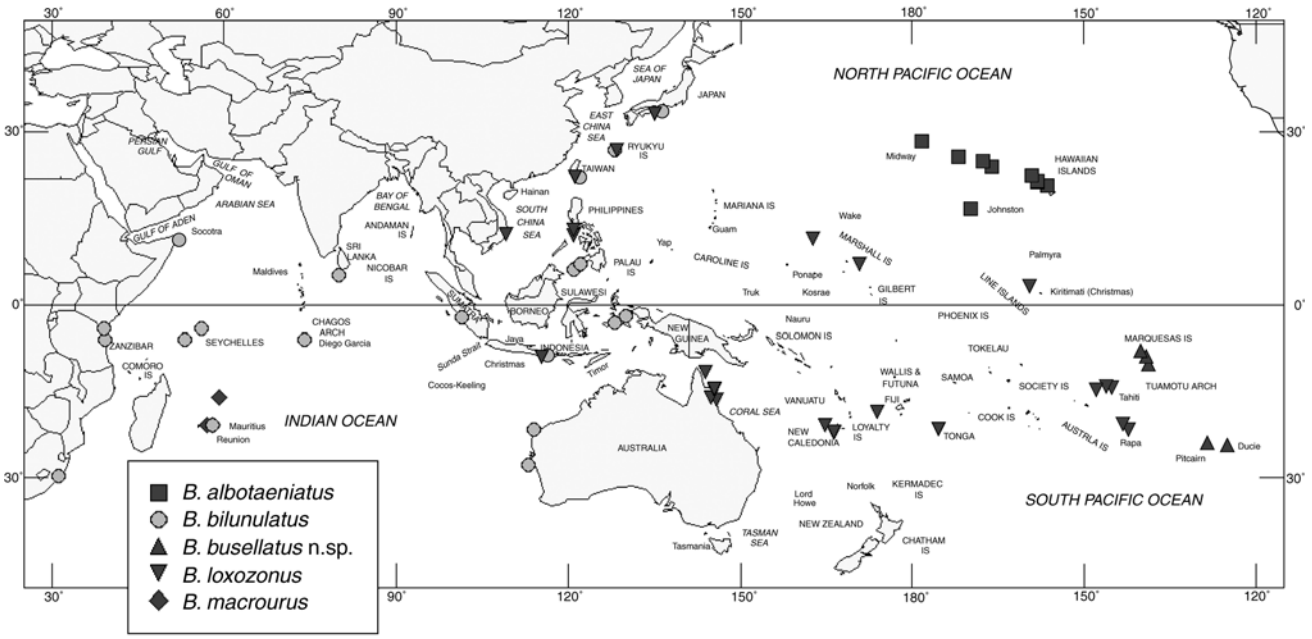

Fig. 47. Distributional records for specimens examined of selected Indo-Pacific species of the subgenus *Diastodon*.

& Axelrod (1973a, p. 445, fig. 313, initial-phase adult) and Klausewitz (1976, p. 78, juvenile).

Distribution. This species is restricted to the Hawaiian Islands and Johnston Island in the central Pacific Ocean (Fig. 47). Specimens have been examined from islands along the Hawaiian chain from Kure Atoll, north of Midway, to Maui in the south, collected at depths of 8–35 m. Strasburg *et al.* (1968) recorded individuals from submarine observations in 30–110 m. off Oahu. *Bodianus albotaeniatus* is common in rock and coral areas throughout those parts of the Hawaiian Islands that are not exploited by commercial aquarium fish collectors (Randall, pers. comm.).

Etymology: *albotaeniatus*, formed from the Latin adjective *albus*, "white", and Latin noun *taenia*, "fillet or ribbon", in apparent reference to "un large ruban nacre" (broad pearly ribbon) extending from below the eye to the membranous lobe of the opercle mentioned in the original description. This pearly ribbon undoubtedly refers to the white expanse below the dark cephalic stripe intersecting the eye ventrally in adults of moderate size.

Comparison. *Bodianus albotaeniatus, B. bilunulatus* and *B. busellatus* are so similar that they have long been considered the same species. Within the subgenus *Diastodon*, the three differ from *B. loxozonus* and *B. macrourus* in lacking scales on the lower jaw in advance of the anterior end of the ventral preopercular edge, and from all other subcongeners in having a well defined, black saddle-like spot confined to the dorsal half of the caudal peduncle and body below the posterior end of the dorsal-fin in adults of moderate size. Juveniles of *B. albotaeniatus, B. bilunulatus* and *B. busellatus* have a broad black or blackish band stretching across the posterior end of the body that mostly covers the entire anal fin and the anterior half of the caudal peduncle, but do not have a pale band immediately preceding it or a separate black blotch or band on the fleshy caudal-fin base. Although the colour pattern of juvenile *B. macrourus* is not fully known there is evidence that the black band on the body may not cover the anterior end of the anal fin but extends posteriorly to envelope about ¾ of the caudal peduncle.

Juveniles of *B. albotaeniatus* differ from those of its sibling species, *B. bilunulatus* and *B. busellatus*, in having the broad black band posteriorly on the body with an indistinct, diffuse anterior border and a distinct posterior margin, the latter positioned well in advance of the posterior edge of the hypurals. Initial-phase adults of this species differ from individuals of the other two at a similar size in having a moderately small peduncular saddle that never extends below the lateral line, nor reaches very far anteriorly or posteriorly. In addition, individuals of this species at this size have a mostly yellow ground colour, in contrast to the pink background colour of the other two subspecies. Terminal-phase adults without peduncular saddles differ at least from those of *B. bilunulatus* in being darkly mottled instead of mostly uniformly dusky with a slightly darker back. Members of this species have modally fewer branched pectoral-fin rays than individuals of *B. bilunulatus* (14, versus 15).

Discussion. Gomon & Randall (1978) recognized *B. albotaeniatus* as a subspecies of *B. bilunulatus* deciding to highlight the extremely close relationship of three taxonomically distinct, allopatric populations. As discussed in *Methodology*, this study considers these populations to represent separate species. *Bodianus albotaeniatus* is separated from each of its two sibling species by 3200–4000 km.

The lengthy synonymy of this species was thoroughly examined in the study by Gomon & Randall (1978). To summarize, *Cossyphus albo-taeniatus* Valenciennes (*in* Cuvier & Valenciennes, 1839) was described from two initial-phase adult specimens; *Crenilabrus modestus* Garrett (1864) and *Lepidaplois atrorubens* E.K. Jordan (1925) were named after terminal-phase adults and *Lepidaplois strophodes* Jordan & Evermann (1903) was based on juveniles. *Lepidaplois richardsoni* was described by Fowler (1908) after a initial-phase adult specimen he reported to have come from Victoria in southern Australia; the specimen

was probably taken, instead, in the Hawaiian Islands. This conclusion is based on the observation that, although the closely related *B. bilunulatus* has been collected in tropical western Australia, it does not occur near Australia's southern coast. The extremely damaged type specimen retains remnants of a pigment pattern more like that of *B. albotaeniatus*, than *B. bilunulatus*. Other specimens treated in the same publication may also have come from Hawaii supporting a contention that Fowler was dealing with a mixed collection (Gomon & Randall, 1978).

Material examined. HAWAIIAN ISLANDS, MNHN A.3699 (2, 138–150; larger specimen designated lectotype of *C. albo-taeniatus* by Gomon & Randall, 1978, smaller specimen paralectotype), USNM 51026 (1, 215), 51037 (1, 174), 84087 (1, 91.0), ANSP 33125 (1, specimen dry and mostly destroyed, holotype of *Lepidaplois richardsoni*; see discussion in Gomon & Randall, 1978, concerning collection locality), *Kure Atoll* USNM 202796 (1, 301), *Pearl and Hermes Reef* USNM 92264 (1, 250), *Laysan* BPBM 4545 (4, 250–340), 4553 (1, 325), 4555 (1, 295), 4556 (1, 300), *Gardner I.* BPBM 4557 (1, 275), *French Frigate Shoals* BPBM 4554 (1, 285), 4558 (1, 163), *Kauai* BPBM 12673 (7, 23–68), *Oahu* BPBM 4544 (1, 343), 4546 (2, 110–115), 4549 (1, 260), 4550 (1, 145), 4551 (1, 120), 4552 (2, 257–396), 6015 (1, 220), 7976 (1, 121), 8900 (1, 18), 10025 (4, 32.7–54.5), 10622 (3, 20.0–30.5), 11653 (1, 332), 12743 (1, 186), 14651 (1, 59.9), USNM 50672 (1, 94.6, holotype of *Lepidaplois strophodes*), 55052 (1, 132), 55508 (1, 265), 55509 (1, 99.2), 87241 (1, 303, holotype of *Lepidaplois atrorubens*), 126017 (1, 163), 151561 (2, 138–196), *Maui* USNM 82746 (1, 90.4); JOHNSTON IS., USNM 26830 (1, 328).

Bodianus bilunulatus (Lacepède)

Figs 7a, 47–48; Plate 7H–I; Tables 2–3, 9

Labrus bilunulatus Lacepède, 1802, p. 454, le grande Océan equatorial (Mauritius?).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12* (14) or 13 (2); pectoral-fin rays ii, 14* (37) or 15 (4); caudal-fin rays 9 (1), 10* (12) or 11 (2) + 12 + 9 (1), 10* (12) or 11 (2); lateral-line scales 31* (21) or 32 (5); scales above lateral line 5*–6½ (usually 5 or 5½); scales below lateral line ≈12–14* (usually 13½); predorsal scales ≈12–18; total gill rakers 17 (3), 18 (4), 19 (5) or 21 (1). See Tables 2 and 9 for morphometric values. Lower jaw naked. Upper jaw with prominent anterior canines of similar size; first canine slightly smaller than second in juveniles, slightly larger than second in some large adults; both canines directed mostly ventrally in juveniles; first canine slanted anteroventrally in adults; second directed ventrally, angled slightly anteriorly and laterally in larger specimens; lateral teeth in juveniles few in number, small, isolated, scattered on narrow dental ridge, becoming coalesced into ridge in small adults; numerous individual teeth developing in single row in larger adults, especially posteriorly; 1 or 2 (rarely 0) prominent canines at posterior end of jaw, directed anteroventrally and slightly laterally. Lower jaw with prominent anterior canines distinctly unequal; first canine ⅔–⅘ size of second; first canine directed anterodorsally and slightly mesially, more dorsally in juveniles; second directed dorsally in smaller specimens, slanting anterodorsally and slightly laterally, recurving dorsally in larger specimens; lateral teeth basically in a single row forming about 3 series; anterior series largely coalesced on anterior ¼–⅖ of jaw, with 0–4 short canines posteriorly, teeth more or less confluent with second series in juveniles and small adults, up to 7 short blunt canines forming along coalesced dental ridge in larger adults; 3–10 teeth in second series seemingly more individual, not based on raised dental ridge, moderately long, becoming longer posteriorly; third series with 2–7 distinctly short canines of equal size at posterior end of jaw; numerous tiny rounded teeth forming on mesial side of dental ridge behind prominent anterior canines in both jaws of very large specimens. Caudal fin truncate in juveniles, only slightly rounded at most; dorsal-most and ventralmost rays elongate in larger specimens forming narrow pointed lobes, dorsal lobe usually longer than ventral, reaching nearly 1.5 times that of middle rays. Tip of pelvic fin usually reaching to or just short of anus, rarely reaching much past it (to base of second anal-fin spine in one specimen).

Largest specimen examined 310 mm SL.

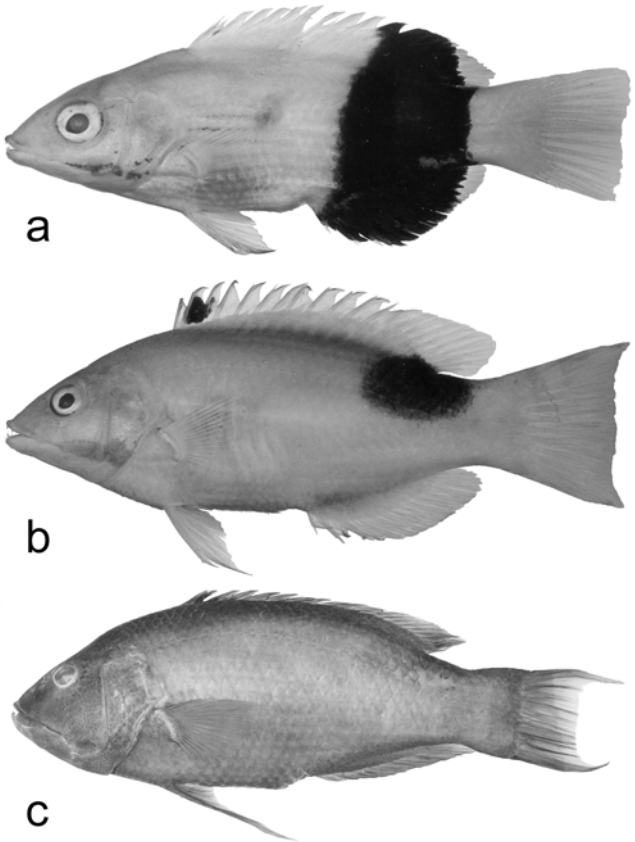

Fig. 48. *Bodianus bilunulatus*: (*a*) juvenile, 56.2 mm SL, WAM P25370-003, Northwest Cape, Western Australia; (*b*) initial-phase adult, 131 mm SL, WAM P25320-003, Goss Island, Houtman Abrolhos, Western Australia; and, (*c*) terminal-phase adult, 303 mm SL, ANSP 103551, Mahé, Seychelles Islands (photo reversed).

Pigmentation in alcohol. Juveniles (Fig. 48a)—body mostly pale to dusky, with numerous darker narrow stripes posterior to head (stripes sometimes obscured in very small specimens, fading quickly in preservative) and broad, more or less distinct dark band posteriorly on sides and anterior end of caudal peduncle, anterior and posterior margins of band distinct, area adjacent anteriorly abruptly pale; anterior margin of dark band extending ventrally from last dorsal-fin spine to near origin of anal fin; vertical posterior margin of band well anterior to posterior edge of hypurals, usually falling between posterior end of dorsal-fin base and longitudinal midpoint of caudal peduncle; caudal peduncle

immaculate posterior to dark band. Dark band extending anteriorly on distal portion of dorsal-fin to near tip of tenth spine. Head with dark wedge-shaped stripe following line of upper jaw posteriorly from corner of mouth; 2 moderately narrow dusky stripes directed dorsoposteriorly from posterior edge of orbit and dusky marks or spots occasionally on cheek. Dorsal fin pale anterior to dark area associated with dorsal end of dark body band; small dark spot sometimes between second and third spines; posterior tip of fin transparent. Anal fin dark, occasionally with narrow transparent posterior tip. Caudal fin pale to transparent. Pectoral fin transparent. Pelvic fin slightly dusky to almost dark.

Initial-phase adults (Fig. 48b)—body mostly pale, slightly dusky dorsally; often numerous narrow dusky stripes on sides posterior to head; large dark saddle-like spot on dorsal half of body and caudal peduncle, anterior margin below last spine or first few segmented rays of dorsal-fin, ventral margin reaching below lateral line; posterior margin usually midway between posterior end of dorsal-fin base and posterior edge of hypurals, approaching latter only in very large individuals; spot on either side confluent dorsally on caudal peduncle (at least immediately posterior to posterior end of dorsal-fin base); spot covering posterior scaly basal sheath of dorsal-fin in small adults, excluded from sheath in larger specimens, but not diminishing in size with growth, perhaps slightly larger in largest specimens examined; head dusky dorsally, often with several narrow dusky stripes on nape and snout; 2 (occasionally 3) prominent moderately narrow dark stripes directed dorsoposteriorly from posterior margin of orbit, ventralmost continuing forward from anteroventral rim of orbit to upper lip or tip of snout; stripes dorsally on head, including those directed from eye, sometimes united into uniform dusky area above ventral margin of orbit; usually broad, dark wedge-shaped stripe following line of upper jaw directed posteroventrally from corner of mouth, not broken into spots or irregular marks; small dusky spots on operculum, but rarely on cheek. Dorsal fin pale with moderately small dark spot centered between second and third dorsal-fin spines, extending variously onto membrane anterior to second spine and posterior to fourth spine. Caudal, pectoral and pelvic fins pale.

Terminal-phase adults (Fig. 48c)—mostly pale with little evidence of caudal saddle (some slightly dusky in this area); dorsal side of body dusky from occiput to below last dorsal-fin spine, reaching ventrally almost to lateral line below anterior end of dorsal-fin; dusky area continuing to posterior end of fin base on scaly basal sheath. Fleshy caudal-fin base and dorsal-most and ventralmost caudal-fin rays dusky.

Colour in life. Juveniles (Plate 7G)—numerous narrow stripes on body reddish brown; broad band posteriorly on body extending from distal edge of posterior third of dorsal-fin to distal margin of anal fin uniformly black. Dorsal side of snout, nape and back below first few dorsal-fin spines bright yellow to brownish orange. Dorsal fin bright yellow to yellowish orange. Anal fin uniformly black with narrow transparent margin posteriorly. Pelvic fin mostly white with more or less blackish distal margin anteroventrally.

Initial-phase adults (Plate 7H)—dorsal portion of body and posterior end of caudal peduncle pink; numerous narrow stripes red anteriorly and posteriorly; stripes breaking up in very large specimens forming short narrow red band on each scale; dorsal side of head pink to red with narrow red stripes middorsally; stripes dorsoposterior and anteroventral to eye red or orangish red; small spots on operculum pink to red, cheek pale pink in very large specimens; stripe posteroventral to corner of mouth grey, more or less suffused with red to reddish brown. Dorsal fin mostly transparent anteriorly with narrow yellow or yellowish orange midlateral and marginal stripes; fin yellow posteriorly, becoming reddish orange basally posterior to spines in small adults; fin in larger specimens pink to red anteriorly, pink to pinkish white posteriorly. Anal fin yellowish white with narrow yellowish or yellowish orange basal and marginal stripes in small adults, suffused with pink in larger specimens. Caudal fin pink, transparent distally, with yellowish orange dorsal and ventral rays in smaller adults; fin in larger specimens pink to red, pinkish white distally. Pectoral fin transparent, pinkish white in larger specimens; basal tips of rays outlined by narrow reddish pink band. Pelvic fin white or pinkish white; some specimens with anteroventral margin reddish to grey.

Terminal-phase adult (Plate 7I)—body pink, whitish below; red bar on each body scale behind head and above lower level of pectoral-fin base; faint grey blotch at posterior end of dorsal-fin base; head mostly red, yellowish white on lower jaw and underside of head; grey streak directed ventroposteriorly from corner of mouth. Dorsal fin reddish grey, darker grey anteriorly; black spot between first 3 spines. Anal fin reddish grey, darker anteriorly. Caudal fin red, grey on dorsal and ventral edges. Pectoral fin yellow, dorsobasal quarter of fin reddish; narrow red band on fleshy fin base. Pelvic fin grey.

Colour illustrations of this species appear in Burgess & Axelrod (1972, p. 143, fig. 246, initial-phase adult; 1974, p. 856, fig. 20, juvenile), Bleeker (1862c, pl. 38, fig. 3, initial-phase adult), Masuda *et al*. (1975, p. 102, fig. G, initial-phase adult, and fig. H, juvenile; 1984, pl. 196D, juvenile and E, adult), Fourmanoir & Laboute (1976, p. 114, initial-phase adult), Kyushin *et al*. (1977, p. 298, labelled *Bodianus hirsutus*, upper figure, terminal-phase adult, and lower figures, initial-phase adults), Schaller (1978, p. 37, juvenile), van der Elst (1981, p. 187, initial-phase adult), Gomon (1983, pl. 1, initial-phase adult), Gloerfelt-Tarp & Kailola (1984, p. 232, initial-phase adult), Shen (1984, pl. 100, figs 362-17a and b, juvenile, as "*B. macrurus*"), Allen (1985, figs 324 and 325, initial-phase adult), Smith & Heemstra (1986, pl. 89, 220.7, initial-phase adult, pl. 94, 220.7, terminal-phase adult), Allen & Steene (1987, pl. 84, 1, juvenile, and 2, initial-phase adult) and Allen & Swainston (1988, pl. 47, fig. 728 below, juvenile and above, terminal-phase adult), Kuiter (1992, p. 147, A, juvenile, and B and C, adult; 1996, p. 269, initial-phase adult and juvenile; 1998, p. 179, center left, juvenile, upper center right, initial-phase adult), Kuiter & Debelius (1994, p. 220, center left, initial-phase adult), Okamura & Amaoka (1997, p. 468, bottom row, right and center, juveniles, left, initial-phase adult, middle row, right and center, initial-phase adults, left, terminal-phase adult, top row, right, initial-phase adult, center, terminal-phase adult) and R.F. Myers (1999, pl. 108E, juvenile, F, initial-phase adult and G, terminal-phase adult, pl. 109 D, terminal-phase adult, as *B. loxozonus*).

Distribution. This species is by far the most widely ranging of the three in the *B. bilunulatus*-complex with a distribution extending from the east coast of Africa in the western Indian Ocean eastward to Japan, the Philippines and New Caledonia in the western Pacific (Fig. 47). Although the species has been taken along the western coast of Australia, it is evidently absent from the east coast. Other notable distributional gaps that are probably include the Red Sea and northwestern Indian Ocean. Southernmost records of this species include Durban in southern Africa and the Abrolhos Islands off Western Australia. The species does not appear to occur north of the Wakayama Prefecture in Japan. In addition to localities listed with *Material Examined*, reliable distributional records from the literature include: Somalia (Manilo & Bogorodsky, 2003); Naze, Koniya and Bonin Island, Wakayama Prefecture, Japan (Yamakawa, 1971; Masuda *et al*., 1975); Taichung, Taiwan (Yu, 1968); Palau (R.F. Myers, 1999); Bali, Indonesia (Nichols, 1941); and the Coral Sea (Fourmanoir & Laboute, 1976).

The relatively poor representation of this species in collections, especially from Indonesia and southeast Asia, may be due to its occurrence on deep offshore reefs. This habitat is poorly collected at many localities. Specimens have been taken at depths of 8–160 m.

Etymology: *bilunulatus*, formed from the Latin adverb *bis*, "twice", and Latin diminutive noun *lunula* (*luna* + *ulus*), "somewhat like the moon" in apparent reference to the lunate caudal fin (double emarginate with filamentous lobes) in the type specimen.

Comparison. See *Comparison* under *B. albotaeniatus*. Juveniles of *B. bilunulatus* differ from those of the sibling species, *B. albotaeniatus* and *B. busellatus*, in having the broad black band posteriorly on an otherwise mostly pale body, the band having distinct anterior and posterior margins and the posterior margin of the band positioned well in advance of the posterior edge of the hypurals. Initial-phase adults of this species differ in having a large black peduncular saddle usually, if not always, extending below the lateral line, but rarely reaching posteriorly near the posterior edge of the hypurals. At this stage, individuals have a pink ground colour, instead of yellow as in *B. albotaeniatus*. Terminal-phase adults of *B. bilunulatus* without black peduncular saddles differ at least from *B. albotaeniatus* in having a mostly uniform dusky body with a slightly darker back (versus a darkly mottled body in the latter subspecies). *Bodianus bilunulatus* has a higher modal number of branched pectoral-fin rays (15, versus 14) than do the other two species.

Discussion. *Bodianus bilunulatus* has long been confused with three other closely related species with which it is broadly sympatric: *B. loxozonus, B. macrourus* and *B. perditio*. The four have been variously misidentified in publications, although *B. bilunulatus* has largely been spared the confusion found in synonymies of *B loxozonus* and *B. macrourus*. For the most part, juveniles of these species in museum collections have been identified as *B. macrourus* or one of its synonyms.

This widely ranging species was described only once despite its marked ontogenetic dichromatism.

Material examined. **Indian Ocean** USNM 44564 (1, 166), AFRICA, *Durban* BMNH 1920.7.23.31 (1, 232), *Zanzibar* BMNH 1868.5.30.137 (1, 175), *Mombasa* BMNH 1913.4.7.126 (1, 195), SMF 13722 (1, 54.0); MAURITIUS, BPBM 20194 (1, 173), MNHN A.8267 (1, 310, dry skin—holotype of *Labrus bilunulatus*), USNM 19965 (1, 198); SEYCHELLES IS., *Mahé* ANSP 103551 (1, 303), *Amirante Is*., St Joseph I. ANSP 107146 (1, 45.6); SRI LANKA, *Matara* USNM 217892 (1, 206); CHAGOS ARCH., *Solomon Is.*, Isle de la Passe ROM 35931 (1, 21.3), 37487 (3, 95.0–201); AUSTRALIA, *Western Australia*, Northwest Cape WAM P25370-003 (1, 56.2), P29312-001 (1, 81), Dongara, Canarvon NMV A18155 (1, 343), Houtman Albrolhos WAM P25320-003 (1, 131). **Pacific Ocean**, PHILIPPINES, *Jolo* USNM 152170 (1, 210), 153765 (1, 231), *Zamboanga* USNM 57914 (2, 178–183), 152168 (1, 236), 153764 (1, 233), 153766 (1, 294); INDONESIA, *Banda I*.? USNM 217888 (1, 194), *Ambon* BPBM 19500 (1, 104), *Misol I*. BMNH 1870.8.31.29-30 (3, 140–189); OKINAWA, BPBM 19189 (1, 258).

Bodianus busellatus n.sp.

Figs 47, 49; Plates 7J, 8A; Tables 2–3, 9

Type material. HOLOTYPE: BPBM 11760 (1, 252) Marquesas Is., Fatu Hiva, northeast of Matakumu Point, depth 13–16 m, spear, collected by J.E. Randall, 18 April 1971. PARATYPES: BPBM 11062 (1, 310) Marquesas Is., Nuka Hiva, 1.2 km southwest of Marquisienne Bay, depth 86 m, hook and line, collected by J. Haywood, 9 May 1971; BPBM 12235 (1, 305) Marquesas Is., Hiva Oa, southwest coast of island near Hanaotia, boulder bottom, depth 12 m, spear, collected by J.E. Randall, 27 April 1971; BPBM 12338 (1, 84.1) Marquesas Is., Nuku Hiva, Sentinelle de l'Est, west side, depth 13 m, collected by Dean B. Cannoy, 3 May 1971; 16588 (1, 264) Henderson I., 0.8 km south of northwest corner of island, edge of coral reef, depth 34 m, spear, collected by J.E. Randall, 11 January 1971; BPBM 17133 (4, 214–285) Pitcairn Group, Ducie Atoll, off small boat passage at dropoff, depth 36 m, hook and line, collected by G. and J. Haywood, 14 January 1971; CAS 41735 (1, 99.0) same collection data as BPBM 12338; NMNZ P.31385 (1, 315) Pitcairn Group, Ducie Atoll, 24°41.50'S 124°46.50'W, 74 m, collected from craypot by P. Sharples, 18 May 1994; USNM 218892 (1, 166) same collection data as holotype.

Other material examined. **Pacific Ocean**, MARQUESAS IS., *Fatu Hiva* BPBM 11735 (1, 116).

Diagnosis. A species of the subgenus *Diastodon* with: 14–15 (modally 15) pectoral-fin rays; 10–16 predorsal scales; narrow interorbital space, 5.2–7.4% SL; and, horizontally elongate dark saddle on caudal peduncle in initial-phase adults reaching beyond posterior edge of hypurals posteriorly, extending below lateral line under posterior portion of dorsal-fin anteriorly, anterior end of spot in large adults somewhat narrower and more removed from basal edge of dorsal-fin.

Description. Dorsal-fin rays XII, 10* (9) or 11 (3); anal-fin rays III, 12 (3) or 13* (9); pectoral-fin rays ii, 14* (1) or 15* (23); caudal-fin rays 9 (2) or 10* (9)+ 12 + 9 (1) or 10* (10); lateral-line scales 30 (4), 31* (13), 32 (5) or 33 (1); scales above lateral line 5½–6½ (6*); scales below lateral line ≈13½–15 (14½*); predorsal scales ≈10–16*; total gill rakers 15(1), 16(1), 17 (3), 18* (2) or 20 (2). See Tables 2 and 9 for morphometric values.

Body moderately deep; head and snout moderately pointed; dorsal outline of forehead and nape with gentle convex curve in lateral aspect; snout and jaws not attenuate.

Scaly basal sheath on base of dorsal and anal fins

moderately high, about 1–3½ scales in depth (usually 2½–3 scales); distal margin of sheath smoothly curved. Predorsal scales reaching just short of or barely to above posterior extent of orbits on dorsal midline of head, reaching least anteriorly in largest specimens; scales lateral to dorsal midline reaching slightly in advance of above posterior edge of orbit. Scales on cheek reaching forward just in advance of corner of mouth on upper side of jaws, not extending to free preopercular edge posteriorly and ventrally leaving broad naked preopercular margin; scales on subopercle not quite reaching forward to below anterior extent of ventral edge of preopercle; lower jaw naked. Lateral-line scales each with singular unbranched laterosensory canal tube, at least anteriorly in smaller specimens; larger specimens with or without branched canal tubes (posterior scales usually with branched tubes); tube branches mostly short, not highly convoluted, but often numerous when present. Scale immediately preceding first lateral-line scale in very large specimens occasionally with short tube resembling those of lateral-line scales; this scale is distinguishable from lateral-line scales in being closely attached to posterior edge of post-temporal and is not included in lateral-line scale count. Posterior edge of preopercle finely serrate ventrally in small specimens, almost smooth in larger individuals. Posterior corner of mouth posterior to vertical through forward extent of orbit, below center of eye in larger specimens. Gill rakers on upper limb distinctly narrower and somewhat shorter than adjacent rakers on lower limb; rakers on upper limb usually bifurcate distally, to somewhat arborescent, especially near angle; rakers on upper limb mostly simple, except raker closest angle often broadly bifurcate.

Upper jaw with prominent anterior canines of similar size; first canine slightly smaller than second in juveniles, slightly larger than second in some large adults; both canines directed mostly ventrally in juveniles; first canine slanted anteroventrally in adults; second directed ventrally, angled slightly anteriorly and laterally in larger specimens; lateral teeth in juveniles few in number, small, isolated, scattered on narrow dental ridge, becoming coalesced into ridge in small adults; numerous individual teeth developing in single row, especially posteriorly in larger adults; 1 or 2 (rarely 0) prominent canines at posterior end of jaw, directed anteroventrally and slightly laterally. Lower jaw with prominent anterior canines distinctly unequal; first canine ⅔–⅘ size of second; first canine directed anterodorsally and slightly mesially, more dorsally in juveniles; second directed dorsally in smaller specimens, slanting anterodorsally and slightly laterally, recurving dorsally in larger specimens; lateral teeth basically in single row forming about 3 series; anterior series mostly coalesced on anterior ¼–⅖ of jaw with 1 or 2 short canines posteriorly, teeth more or less confluent with second series in juveniles and small adults, up to 7 short blunt canines forming along this coalesced dental ridge in larger adults; 4–9 teeth in second series seemingly more individual, not based on raised dental ridge, moderately long, becoming longer posteriorly; third series with distinctly 4–6 short canines of equal size at posterior end of jaw; numerous tiny rounded teeth forming on mesial side of dental ridge behind prominent anterior canines in both jaws of very large specimens. Vomerine teeth absent.

Posterior tip of dorsal fin slightly rounded, truncate in very large specimens; tip of fin not reaching posterior edge of hypurals, almost reaching edge in juveniles and some adults. Posterior tip of anal fin bluntly pointed to pointed, usually reaching well short of hypural edge, though approaching it in largest specimen examined. Caudal fin truncate in juveniles, only slightly rounded at most; dorsal-most and ventralmost rays elongate in larger specimens, forming narrow pointed lobes, dorsal lobe usually longer than ventral, reaching nearly 1.5 times that of middle rays. Pectoral fin with dorsal-most rays slightly longer than those below; ventral outline of fin very broadly rounded; dorsoposterior angle of fin slightly pointed in very large specimens. Tip of pelvic fin usually reaching or not quite reaching anus, rarely reaching much past it.

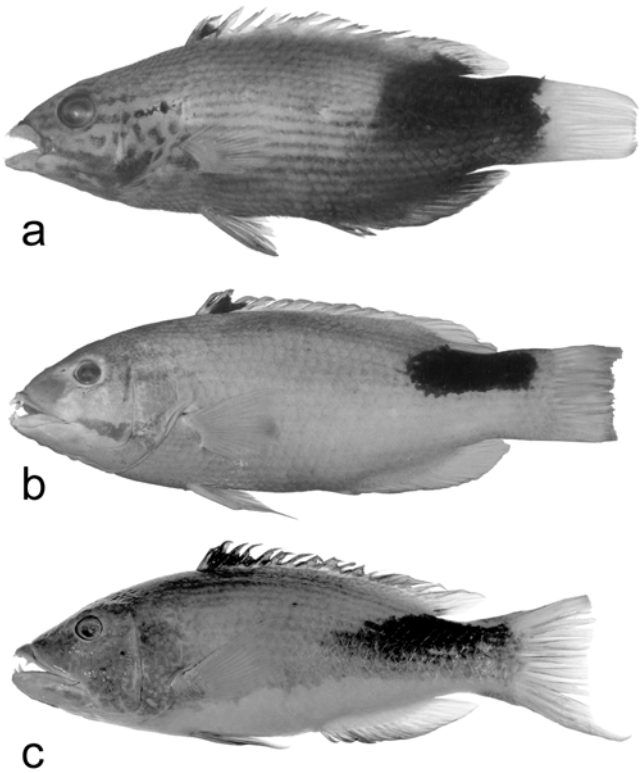

Fig. 49. *Bodianus busellatus* n.sp.: (*a*) transforming juvenile, 84.1 mm SL, BPBM 12338, paratype, Naku Hiva, Marquesas Islands; (*b*) initial-phase adult, 252 mm SL, BPBM 11760, holotype, Naku Hiva, Marquesas Islands (photo reversed); and, (*c*) terminal-phase adult, 315 mm SL, NMNZ P.31385, paratype, Pitcairn Group, Ducie Atoll, 24°41.50'S 124°46.50'W, 74 m.

Largest specimen examined 315 mm SL.

Pigmentation in alcohol. Juveniles—(although small juvenile specimens are unavailable, 84.1 mm paratype in Fig. 49a appears to have a pattern intermediate between juvenile and initial-phase adult patterns indicating the following juvenile condition) body mostly pale to dusky, with numerous darker narrow stripes posterior to head and broad, more or less distinct dark band posteriorly on sides and anterior end of caudal peduncle, extending from distal margin of soft portion of dorsal fin to distal edge of anal fin; anterior margin of band extending from about last dorsal-fin spine to anal fin origin; posterior margin between posterior edge of hypurals and posterior edge of scales covering caudal-fin base; caudal peduncle immaculate posterior to dark band. Dark band extending anteriorly on distal portion of dorsal fin nearly to tip of tenth spine. Head with dark wedge-shaped stripe following line of upper jaw posteriorly from corner of mouth; 2 moderately narrow dusky stripes directed dorsoposteriorly from posterior edge of orbit and dusky marks or spots occasionally on cheek.

Dorsal fin pale anterior to dark area associated with dorsal end of dark body band; small dark spot sometimes between second and third spines; posterior tip of fin transparent. Anal fin dark, occasionally with a narrow transparent posterior tip. Caudal fin pale to transparent. Pectoral fin transparent. Pelvic fin mostly dusky.

Initial-phase adults (Fig. 49b)—body mostly pale, slightly dusky dorsally; often numerous narrow dusky stripes on sides posterior to head; large dark saddle-like spot dorsoposteriorly on body with ventral margin reaching below lateral line, at least anteriorly; anterior edge of spot below anterior segmented dorsal-fin rays (streaks extending farther forward in largest specimen), posterior margin posterior to rear edge of hypurals, spot confluent with that of other side dorsally on caudal peduncle; wedge-shaped dusky stripe directed posteroventrally from corner of mouth broad, not broken into spots or irregular marks; head dusky dorsally, often with several narrow dusky stripes on nape and snout; 2 (occasionally 3) prominent moderately narrow dark stripes directed dorsoposteriorly from posterior margin of orbit, ventralmost continuing forward from anteroventral rim of orbit to upper lip or tip of snout; dark wedge-shaped stripe following line of upper jaw directed posteriorly from corner of mouth; cheek otherwise immaculate. Dorsal fin pale with moderately small dark spot centered between second and third dorsal-fin spines, variable extending onto membrane anterior to second spine and posterior to fourth spine. Caudal, pectoral and pelvic fins pale.

Terminal-phase adults (Fig. 49c)—dorsal ⅔ of side dusky with evidence of narrow darker stripes following horizontal scale rows just below dorsal fin, lower third of sides abruptly pale; distinctly darker saddle on upper half of caudal peduncle similar to initial-phase adults, descending anteroventrally wedge to below center of dorsal fin midway down side; saddle on either side separated on dorsal midline by distinct pale hiatus; several small pale marks on saddle midlaterally on caudal peduncle; head dusky with pale mottling low on cheek and opercle, underside pale. Dorsal fin dark, except for pale posterior lobe and narrow pale basal edge; darkest between about second and fifth spines; anterior ⅔ of anal fin dark to dusky, posterior third pale, especially basally; caudal fin pale, except for dusky dorsal and ventral edges and dusky margins to basal half of fin rays; leading half of pelvic fin dusky, paler half paler; pectoral fin pale.

Colour in life. Initial-phase adults (Plate 7J)—body pale pinkish above, white below, with numerous narrow reddish brown stripes mostly above level of pectoral-fin base; stripes breaking up little, if at all, to form band on each scale in larger specimens; head mostly pinkish, underside white; reddish brown to reddish orange stripes extending onto head above lower edge of eye; stripes on head extremely vermiculated, continuing on anterior side of eye to upper lip; large greyish brown wedge-shaped stripe directed posteroventrally from corner of mouth; spots and marks on operculum of a similar colour; large black saddle-like spot dorsally on caudal peduncle extending from beneath first few segmented rays of dorsal fin and below lateral line to just beyond posterior edge of hypurals. Dorsal fin reddish pink anterior to fourth or fifth segmented ray, white posteriorly, with yellow marginal stripe on spinous portion of fin; large black spot between first 5 spines. Anal fin pink anteriorly, becoming white posteriorly. Caudal fin white or pinkish white with reddish pink dorsal and ventral margins; basal portion of fin along posterior edge of scaly fin base red, extending posteriorly as red streaks, especially in interradial spaces. Pectoral fin yellowish pink along leading edge, becoming whitish posteromesially. Pelvic-fin rays pink, membranes white.

Terminal-phase adults (Plate 8A)—upper ⅔ of body deep red with slight brownish cast; centers of scales on sides whitish blotched with red; lower ⅓ of body pinkish with yellow stripes following scale rows posteriorly; thorax and abdomen tinted purple; large elongate spot dorsally on caudal peduncle black; head similar to sides but redder, pale areas on cheek scales bluish; broad brown stripe extending from corner of mouth to opercular edge. Entire spinous portion and anterior soft portion of anal fin mottled bluish grey except for large black spot between first few spines; scaly basal sheath and remainder of soft portion of fin red. Anal fin also mottled with bluish grey anteriorly and red posteriorly, but with pink scaly basal sheath. Caudal fin red with dusky upper and lower edges. Pectoral-fin rays yellow, edged with pale red; membranes transparent. Pelvic fin pale bluish grey with darker leading edge.

Distribution. This species has been taken only in Fatu Hiva and Nuku Hiva within the Marquesas Islands of the central Pacific, and Henderson Island and Ducie Atoll in the Pitcairn Group to the southeast (Fig. 47). Although regions adjoining these islands have not been thoroughly sampled, it has not been encountered elsewhere in the Tuamotu Archipelago even though the area has been explored (Randall, pers. comm.). The population is separated from populations of *B. albotaeniatus* and *B. bilunulatus* by over 3200 km to the north and 5600 km to the west. The specimens cited here were taken in depths of 13–74 m, at least one coming from the edge of a coral reef.

Etymology: *busellatus* from the Latin prefix *bu*, "large", and noun *sella* for "saddle", plus the adjectival suffix *atus*, in reference to the large black saddle-like spot on the caudal peduncle of this species. The spot is considerably larger in individuals of this species than in those of its cognates.

Comparison. See *Comparison* under *B. albotaeniatus*. Although no juveniles of this species have been been collected, the smallest specimen examined (84.1 mm SL; Fig. 49a) has a transforming colour pattern that suggests a broader black band exists posteriorly on the body in juveniles. Consequently, juveniles of *B. busellatus* may differ from those of *B. albotaeniatus* and *B. bilunulatus* in having the posterior margin of the black band lying near or even posterior to the posterior edge of the hypurals. Initial-phase adults of this species are distinguishable from those of the other two in having a horizontally elongate peduncular saddle reaching beyond the posterior edge of the hypurals posteriorly, and extending below the lateral line beneath the posterior portion of the dorsal fin anteriorly. The anterior end of this spot in larger individuals is somewhat narrower and more removed from the basal edge of the dorsal fin than in the other two species. In addition, initial-phase adults have basically a pink ground colour like that of *B. bilunulatus*, instead of yellow as in *B. albotaeniatus*. Terminal-phase adults of *B. busellatus* appear to retain the more extensive dark saddle on the caudal peduncle.

Morphologically, *B. busellatus* differs from *B. bilunulatus* in having modally 15 (versus 14) branched pectoral-fin rays.

Bodianus loxozonus (Snyder)

Figs 47, 50; Plate 8B–E; Tables 2–3

Lepidaplois loxozonus Snyder, 1908, p. 95, Naha, Okinawa.
Lepidaplois trotteri Fowler & Bean, 1923, p. 19, Pomotou Islands (= Tuamotu Is., Serle I., see *Discussion* below).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 9 (6) or 10* (5) + 12 + 9 (3) or 10* (8); pectoral-fin rays ii, 15; lateral-line scales 31* (18) or 32 (1); scales above lateral line 5* or 5½; scales below lateral line ≈11½ to 12½*; predorsal scales ≈17–22*; total gill rakers 17 (1), 18 (3), 19* (4), 20 (4) or 21 (1). See Table 2 for morphometric values. Scales on lower jaw in elongate patch reaching anteriorly beyond angle of mouth, usually to below posterior ⅓ of mouth, scales usually not confluent with cheek scales, sometimes not continuous with scales on subopercle, when interrupted subopercular scales usually terminating anteriorly below forward end of ventral preopercular edge. Upper jaw with prominent anterior canines of similar size or with first canine slightly smaller than second, latter most often in smaller specimens; both canines directed ventrally in small specimens, first angled more and more anteroventrally and second slightly laterally in larger specimens; several tiny teeth on dental ridge in small specimens, teeth best developed posteriorly; larger specimens with teeth more prominent, especially posteriorly; some individuals with up to 4 nearly free canines posteriorly on reduced dental ridge; 1 or 2 (usually 1) prominent canines of moderate to moderately small size directed antero-ventrally at posterior end of jaw, posterior canines directed slightly laterally in large specimens. Lower jaw with first prominent anterior canine ≈⅔ size of second; both canines directed mostly dorsally, anterior canines slanted mesially; first canine directed more anterodorsally in large specimens, second slightly laterally; dental ridge on anterior ⅕–⅓ and occasionally more of jaw with few tiny teeth; 2 series of caniniform teeth posteriorly in single row, first with 3–9 moderately short teeth (usually about 7) becoming progressively longer posteriorly, second with 1–8 (usually about 5) equally short teeth at posterior end of jaw. Very large specimens with several rows of tiny rounded teeth formed on inner face of dental ridge posteromesial to anterior canine of lower jaw. Caudal fin truncate or barely rounded, dorsal and ventral rays produced into narrow elongate tapering lobes in adults; upper lobe longest, reaching more than 1.5 times length of middle rays in largest specimens. Pelvic fin elongate, posterior tip reaching beyond anus, reaching base of second anal-fin spine in one specimen.

A species of moderate size, largest specimen examined 243 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 50a)—pale with two broad dark bands posteriorly on body, first covering body between posterior half of dorsal fin and anal fin and second on posterior half of caudal peduncle, bands separated by narrow immaculate space; underside of head and body forward of dark bands similarly dark; dark body band extending upwards to margin of dorsal fin and covering entire anal fin ventrally; remainder of dorsal fin, caudal fin and pectoral fins pale; pelvic fins dark.

Initial-phase adults (Fig. 50b,c)—body pale to slightly dusky, usually with numerous narrow dusky stripes, especially dorsally; small individuals from western areas usually with distinct dusky stripes, those from eastern areas with stripes obscured by diffuse dusky pigment; dorsal stripes terminating anteriorly on snout and upper jaw; broad vertical dark band posteriorly on body; dorsal portion of band covering scaly sheath at base of segmented dorsal-fin rays; ventral portion of band in large specimens narrow and directed posteriorly, reaching ventral profile of body posteriorly on caudal peduncle and extending onto ventral caudal-fin rays; eastern individuals with band dark and well defined at all sizes, equally dark ventrally as dorsally, band usually confined dorsally between base of first segmented dorsal-fin ray and edge of second scale caudad of posterior end of dorsal-fin base; western individuals with dark band ill-defined, especially ventrally and in smaller specimens, dorsally band usually extending from base of last dorsal-fin spine to edge of third scale caudad of posterior end of dorsal-fin base; caudal peduncle immaculate posterior to band; small pale spot present or absent on anterior edge of dark band just above lateral line in western specimens, larger pale spot usually in this position in eastern specimens. Dorsal fin pale to slightly dusky with low, domed extension of dark body band posteriorly and moderately large dark spot between first 3 or 4 spines anteriorly; some smaller specimens with narrow marginal and submarginal dusky stripes on fin except at posterior tip. Anal fin pale to dusky usually with dark marginal stripe covering membranous portion of fin anteriorly and tapering to point posteriorly (usually terminating on distal edge of fin before reaching

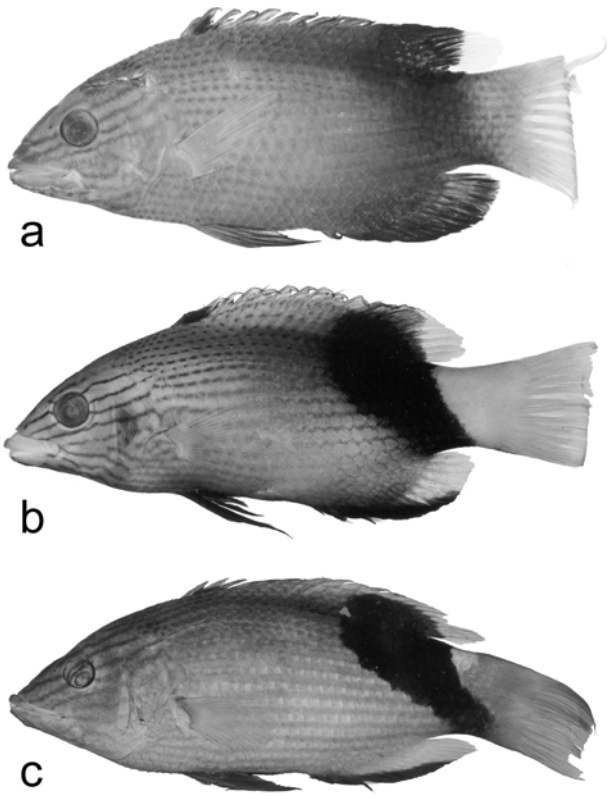

Fig. 50. *Bodianus loxozonus*: (*a*) transforming juvenile, 92.5 mm SL, BPBM 13010, Rapa, Austral Islands; (*b*) initial-phase adult, 102 mm SL, ANSP 12194, Eniwetok Atoll, Marshall Islands (photo reversed); and, (*c*) adult, 157 mm SL, ANSP 86453, Takaroa, Tuamotu Archipelago.

posterior tip in large specimens); dark band extending onto scaly fin base only in small specimens from eastern areas, extending onto scaly fin base and sometimes onto ventral portion of body anterior to fin in western specimens of small to moderate sizes. Caudal fin pale to slightly dusky with dark body band tapering posteroventrally to ventral margin of fin in large specimens. Pectoral fin pale, pelvic fin dark.

Terminal-phase adults, as described for initial-phase adults except immaculate area directly behind dark band restricted to small saddle on dorsal half of caudal peduncle, dark band diffuse ventrally, remainder of caudal peduncle posterior to dark band less pale and often with faint indications of dusky stripes.

Colour in life. Juveniles (Plate 8B)—anterior half of body reddish orange with black undersurface, posterior half with two broad black bands and a snow white interspace, covering anterior half of caudal peduncle; anterior black band covering posterior half of dorsal fin dorsally and entire anal fin ventrally; anterior half of dorsal fin reddish orange; caudal fin snow white; pectoral fin transparent; pelvic fins black.

Initial-phase adults (Plate 8C,D)—reddish brown dorsally, white to bluish white ventrally; numerous narrow pale blue stripes formed from series of horizontally elongate spots (spot on each body scale) on back and scaly base of dorsal fin, stripes continuing onto head as distinct pale blue horizontal lines terminating on snout and upper jaw; spots and stripes becoming broader and whiter ventrally, manifested as pale ground colour; narrow interspaces between stripes and rows of spots golden yellow to orange, appearing as yellowish orange stripes; irregular golden yellow stripes and spots directed anterodorsally on ventral half of head; nearly vertical to diagonal broad black band posteriorly on body originating dorsally on posterior third of scaled dorsal-fin base and terminating ventrally on lower surface of caudal peduncle; dorsal end of band continuing little onto dorsal-fin membrane; caudal peduncle posterior to band snow white. Dorsal fin yellowish orange with large black spot between first 3 or 4 spines; broad pale blue midlateral stripe on spinous portion of fin; numerous fine diagonal lines on soft portion. Posterior tip of fin mostly transparent. Membranous portion of anal fin mostly orange with posteriorly tapering broad black marginal band and several narrow pale blue stripes or series of spots superimposed; scaly base of fin golden orange with bluish white centers to scales as on adjacent portion of side. Caudal fin snow white. Pectoral fins whitish to transparent. Pelvic fin black with pale blue on bases of segmented rays in large specimens.

Terminal-phase adults (Plate 8E)—as described for initial-phase adults, except snow white area directly behind black band restricted to small saddle on dorsal half of caudal peduncle, black band becoming diffuse ventrally, remainder of caudal peduncle posterior to dark band with orange and white stripes. Caudal fin orange, often with tiny distinct orange spots on translucent membrane distally.

Colour illustrations of this species appear in Burgess & Axelrod (1974, p. 856, initial-phase adult; 1975, p. 1578, initial-phase adult; 1976, p. 1736, initial-phase adult), Fourmanoir & Laboute (1976, p. 115, initial-phase adult), Masuda *et al*. (1975, p. 102, fig. 1, terminal-phase adult; 1984, pl. 196F, terminal-phase adult), Shen (1984, pl. 100, fig. 362-15, terminal-phase), R.F. Myers (1989, pl. 88B, terminal-phase), Randall *et al*. (1990, p. 300 top, initial-phase adult), Kuiter (1992, p. 145, terminal-phase adult; 1996, p. 271, initial-phase adult), Kuiter & Debelius (1994, p. 220, top, initial-phase adult), Okamura & Amaoka (1997, p. 469, left column, bottom two, juveniles, middle, initial-phase adult) and R.F. Myers (1999, pl. 109C, terminal-phase adult).

Distribution. *Bodianus loxozonus* is confined to the tropical waters of the central and western Pacific, ranging from the Wakayama Prefecture, Japan (Masuda *et al*., 1975), southeast coast of Asia, Queensland, Australia, and New Caledonia eastward to Fanning Island (Line Islands), the Tuamotu Archipelago, Marquesas Islands and Austral Islands (Fig. 47). In addition to localities listed in *Material examined*, specimens referable to this species have been reliably recorded from Taiwan (Shen, 1984), Bali and Iriomote Island, Indonesia (Kuiter, 1992) and Galvez Banks in the Marianas (R.F. Myers, 1989). It does not occur, however, in the Hawaiian Islands. This species occurs in shallow waters associated with clear lagoons and offshore coral reefs at depths of 3–40 m (R.F. Myers, 1989).

Etymology. From the Greek *loxos*, "slanting", and feminine noun *zone*, "belt", in reference to the prominent black oblique band posteriorly on the body of adults of this species.

Comparison. *Bodianus loxozonus* closely resembles *B. macrourus* morphologically, but differs slightly from it in coloration. The two are distinguishable from the closely related *B. albotaeniatus, B. bilunulatus, B. busellatus, B. perditio* and *B. solatus* in possessing scales on the lower jaw. Adults of *B. loxozonus* are separable from those of *B. macrourus* in having the prominent band posteriorly on the body angled sharply posteroventrally rather than positioned vertically. Juveniles of the former have a second black band covering the posterior half of the caudal peduncle, but those of the latter appear to lack the additional band. Juvenile *B. loxozonus* also have the first band covering the anal fin but terminating at the posterior end of the fin base, whereas the band in juvenile *B. macrourus* may not cover the anterior end of the anal fin but does extend posteriorly beyond the middle of the caudal peduncle.

Discussion. The similarity of *B. loxozonus* to *B. macrourus* is apparent from the confusion in the literature about the appropriate name for the Pacific species. The species was commonly regarded as *macrourus* or its junior synonym *hirsutus* before (Günther, 1876; Ishikawa & Matsuura, 1979; Jordan & Seale, 1907) and after (Fowler & Bean, 1928; Herre, 1934; Kamohara, 1953; Yu, 1968; and others) the publication of Snyder's *L. loxozonus*. In fact until the 1970's, the latter name was recognized by only a few authors (Snyder, 1912; Masuda *et al*., 1975; Fourmanoir & Laboute, 1976).

Lepidaplois loxozonus was described by Snyder (1908) on the basis of three adult specimens obtained from the Naha, Okinawa market. Snyder compared his species with *L. macrourus* (Lacepède, 1802) and separated the two by differences in body markings.

As Fowler & Bean (1923) pointed out, the type specimen of *Lepidaplois trotteri* was recorded only from the Pomotou Islands, collected by the Wilkes Exploring Expedition. They observed that a watercolour of this fish was painted by a member of the expedition. The illustration, now at the USNM, bears hand written notes indicating it was by Joseph Drayton and that the specimen was taken in "August, 1839" from "Sertes Island". The Wilkes expedition traversed the Pomotou Islands (Tuamotu Archipelago) between 19 July

and 10 September, 1839 while sailing from Callao to Tahiti and visited Serle Island (Pukaruha or Puka Ruka) on the 16th of August (Wilkes, 1845; 1861). Wilkes does not mention Sertes Island. It is probable that the spelling of the island name on the painting was a mistake by the artist.

Considerable changes in colour pattern with growth and sexual development occur in individuals of this species, but there may also be a consistent geographical difference between individuals occurring in the eastern and western portions of its overall distribution as noted in colour descriptions. The relatively few specimens of this species in collections, however, prevents an adequate assessment of these variations. If the differences do warrant taxonomic recognition of the populations, the name *trotteri* is available for the eastern population and *loxozonus* would apply to the remaining population in the West.

Material examined. **Pacific Ocean**, JAPAN, *Ryukyu Is*., Okinawa, Naha USNM 62233 (1, 156, holotype of *L. loxozonus*), 74580 (1, 243); VIETNAM, *Nha Trang* MNNH 1965-248 (2, 91.9–152); PHILIPPINES, *Mindoro* USNM 153486 (1, 178), *Bataan* USNM 153767 (1, 223), *Luzon* USNM 153487 (1, 185): MARSHALL IS., *Eniwetok Atoll* BPBM 12194 (1, 102), *Arnoux Atoll* MNHN A.7419 (1, 180); AUSTRALIA, *Queensland*, Lizard I. AMS I.19455-037 (1, 210), I.19455-053 (2, 165–197), I.19462-043 (1, 113); NEW CALEDONIA, BPBM 11420 (1, 212), *Noumea* AMS IB.4444 (1, 205), *Dumbea Pass* USNM 217889 (1, 231); TONGA IS., *Vava'u* BMNH 1874.11.18.7 (1, 177); LINE IS., *Fanning I*. BPBM 7600 (1, 253), 7669 (2, 241–265); MARQUESAS IS., *Fatu Hiva* BPBM 11735 (1, 126); TUAMOTU ARCH., *Takaroa* ANSP 86453 (1, 157), BPBM 9084 (2, 182–185), 13106 (1, 247), *Manihi* BPBM 13107 (1, 168), 13108 (1, 174), *Rangiroa* BPBM 12789 (1, 220), *Serle I.* USNM 82970 (1, 225, holotype of *L. trotteri*); AUSTRAL IS., *Rapa* BPBM 12954 (1, 94.5), 13010 (1, 92.5), *Morotiri* BPBM 13046 (1, 192).

Bodianus macrognathos (Morris)

Figs 1d, 8c, 51, 54; Plate 8F–G; Tables 2–3

Lepidaplois macrognathos Morris, 1974, p. 632, figs 1–2, North Kenya Banks, off Kenyika Island.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 11 (1) or 12 (1) + 12 + 11; pectoral-fin rays ii, 15; lateral-line scales 40–41; scales above lateral line 6½; scales below lateral line ≈14½–17; predorsal scales ≈17–18; total gill rakers 18. See Table 2 for morphometric values. Head blunt, especially in large adults; dorsal outline of nape, forehead and snout convexly curved in lateral aspect, strongly curved with snout almost vertical in very large specimens; snout short. Scales extending forward slightly in advance of posterior corner of mouth on lower jaw. Upper jaw with second prominent anterior canine ⅔–¾ size of first; first canine directed anteroventrally and slightly mesially; second directed ventrally and slightly anterolaterally; dental ridge with about 2–4 tiny teeth, as well as small row of close set teeth posteriorly; single moderately small prominent canine posteriorly directed anteroventrally (Fig. 1d). Lower jaw with first prominent canine about ⅔ length of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally; dental ridge without distinct teeth on anterior quarter to half of jaw, followed by 2 somewhat indistinct series, first series with about 2–4 moderately long canines and second with 4–6 slightly shorter and more closely set canines. Posterior tips of dorsal and anal fins rounded, slightly filamentous in very large specimens, reaching about ⅔ of way from posterior end of fin base to posterior end of hypurals in smaller specimens, to or nearly to posterior edge of hypurals in largest individuals. Caudal fin truncate with dorsal and ventral rays noticeably produced, filamentous rays reaching more than 1.3 times length of middle rays. Posterior tip of pelvic fin falling far short of anus in smaller specimens, nearly reaching anus in larger specimens.

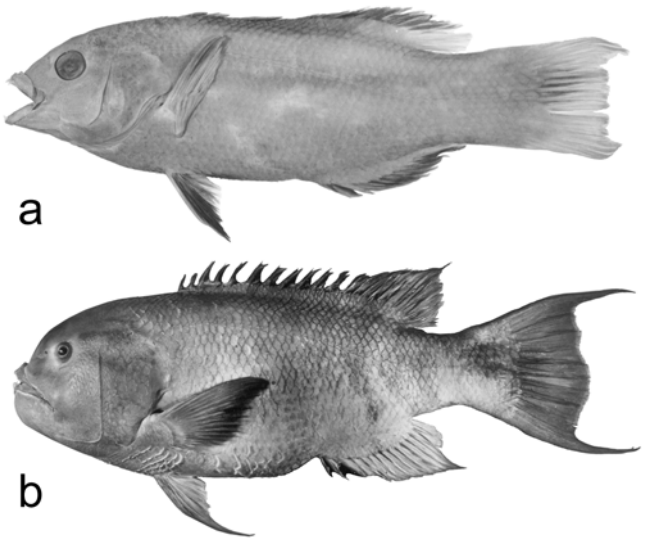

Fig. 51. *Bodianus macrognathos*: (*a*) initial-phase adult, 158 mm SL, USNM 217894, Somali Republic; and, (*b*) terminal-phase adult, 595 mm SL, BPBM 21008, Matrah, Oman.

A large species, largest specimen examined 595 mm SL.

Pigmentation in alcohol. Juveniles—unavailable but likely to resemble initial-phase adults.

Initial-phase adults (Fig. 51a)—body mostly pale with several dusky lateral stripes; broad middorsal stripe originating on head above center of eye, continuing posteriorly to below last dorsal-fin spine, covering ≈4 or 5 scale rows immediately below dorsal fin; second, midlateral stripe originating on posterior margin of orbit just below center of eye, extending posteriorly as relatively narrow stripe just above center of opercular flap onto side, then broadening to form elongate wedge-shaped stripe that posteriorly covers almost entire dorsal half of caudal peduncle; additional stripe on head just dorsal to and parallel with midlateral stripe, stripe about as broad as midlateral stripe, but terminating before reaching upper end of gill opening; broad dusky stripe or blotch on snout directed anteriorly downward from eye; small dark spot near posterior end of upper lip. Dorsal fin with dusky stripes and dark membranes between spines; broad dusky horizontal stripe middorsally on body continued posteriorly on soft portion of fin above scaly basal sheath; fin pale below stripe. Anal fin dark to dusky, except anal-fin spines and basal portion of anal fin posteriorly pale. Caudal fin pale except for dark interradial membranes posterior to lateral body stripe. Pectoral fin pale with elongate dark blotch covering several rays and associated interradial membranes dorsally. Pelvic fin dark except for pale spine and membrane connecting fin to midventral surface of body.

Terminal-phase adults (Fig. 51b)—body mostly pale, back slightly dusky; two short faint dusky stripes radiating posteriorly from eye; chin and underside of head dusky.

Dorsal-fin membranes dark anteriorly (anterior to about fifth segmented ray in 595 mm specimen), pale or mottled dark and pale posteriorly; dorsal-fin spines dusky. Anal fin pale. Caudal fin membranes dusky to dark; rays mostly pale or slightly dusky. Pectoral fin pale basally, with dark submarginal band and transparent distal border. Pelvic fin mostly pale with dusky leading edge.

Colour in life. Initial-phase adults (Plate 8F)—body white with two black lateral stripes; broad middorsal stripe covering back from nape to base of last dorsal-fin spine; second moderately narrow stripe extending from eye to dorsal half of caudal peduncle, stripe flairing slightly as it proceeds posteriorly; broad black stripe on snout directed anteriorly downward from eye; Dorsal fin mostly covered anteriorly by extension of black stripe on dorsal midline of body, stripe becoming marginal posteriorly, soft portion of fin white basally. Anal fin white with black marginal stripe. Caudal fin white with black posterior extension of lateral body stripe nearly reaching hind margin. Pectoral fin mostly white with blackish blotch dorsally. Pelvic fin black except for white spine.

Terminal-phase adults (Plate 8G)—(in part adapted from Morris, 1974) body pinkish red to grey with three or four irregular broad mottled whitish bands traversing sides, one behind pectoral fin, one or two above anal fin and one across caudal peduncle; chin slate blue. Dorsal fin membranes black anteriorly; fins otherwise similar to pigment on sides.

Distribution. This species is known from the Gulf of Oman, off the Somali Coast and from the coast of Kenya along the western edge of the Indian Ocean (Fig. 54). It has also been reliably reported from the coasts of Pakistan and western India (Manilo & Bogorodsky, 2003). Specimens have been taken at depths of 27–65 m, the holotype coming from an area with a rough bottom contour. Juveniles have been observed in 3 m (Mee, pers. comm.).

Etymology: *macrognathos*, from the Greek *makros*, "long", and feminine noun *gnathos*, "jaw", in reference to the "unusually massive lower jaw" considered a diagnostic feature of the species by the author (Morris, 1974).

Comparison. *Bodianus macrognathos* is readily distinguished from other species of the genus in having the combination of a short snout, large adults with a bluntly curved head in lateral profile, 40 or 41 lateral-line scales, and filamentous caudal-fin rays. The species resembles *B. anthioides* in the form of the head and fins, but differs from it in having more numerous lateral-line scales, a darkly striped pigment pattern in juveniles and small adults and in attaining a much larger size. *Bodianus macrognathos* gets particularly large (largest specimen known 595 mm SL) for the genus.

Discussion. Morris (1974) compared *B. macrognathos* with *L. anthioides, L. modestus* (= *B. albotaeniatus*), *Pseudolepidaplois pfaffi* (= *B. scrofa*) and *Lepidaplois (Pariolanthus) grandisquamus* (= *Decodon grandisquamus)*, concluding that it was not especially close to any one of them. His suggestion that it might merit generic recognition, however, is unwarranted.

Material examined. **Indian Ocean**, ARABIAN PENINSULA, Oman, Matrah BPBM 21008 (1, 595); AFRICA, *Somali Republic* ANSP 138146 (1, 228), USNM 217894 (1, 158).

Bodianus macrourus (Lacepède)

Figs 47, 52; Plate 8H–I; Tables 2–3

Labrus hirsutus Lacepède, 1802, p. 429 and 473, vol. 3, pl. 20, fig. 1, grand golfe de l'Inde (Indian Ocean, Mauritius).
Labrus rubrolineatus Lacepède, 1802, p. 433 and 481, Madagascar and Réunion.
Labrus macrourus Lacepède, 1802, p. 438 and 500, vol. 3, pl. 9, fig. 3, grande Océan equatorial (Indian Ocean?).
Crenilabrus croceus Lesson, 1830, p. 133, pl. 38, Tombeau, Île de France (Mauritius).
Crenilabrus chabrolii Lesson, 1830, p. 133, pl. 38, Tombeau, Île de France (Mauritius).
Labrus spilonotus Bennett, 1835, p. 207, Île de France (Mauritius).
Cossyphus maldat Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 114, mers d l'Inde (including Isle-de-France; Indian Ocean, Mauritius).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 11 (1) or 12* (11); caudal-fin rays 9 (2), 10*(6) or 11 (1) + 12 + 9 (1), 10* (7) or 11 (1); pectoral-fin rays ii, 15; lateral-line scales 30 (1), 31* (19) or 32 (2); scales above lateral line 5–6½ (usually 5½); scales below lateral line ≈11½–14 (usually 13–13½); predorsal scales ≈14*–22 (usually about 17); total gill rakers 17 (1), 18 (1), 19 (6), 20 (2) or 23 (1). See Table 2 for morphometric values. Oval patch of scales on posterior ⅓ of lower jaw immediately anterior to ventral preopercular margin. Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally; second directed ventrally and slightly laterally; dental ridge with about 7–15 tiny teeth becoming slightly larger posteriorly, usually about 4 canines of moderate size at posterior end of row; large canine at posterior end of jaw directed anteroventrally and slightly laterally. Lower jaw with first prominent anterior canine ≈⅗–⅘ length of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally and slightly laterally, tip recurved dorsally and slightly laterally; dental ridge on about anterior third of jaw with series of 1–7 small teeth, often becoming progressively longer posteriorly; first series followed by 2 more series, all 3 in single row; second series with 1–5 canines of moderate or moderately large size; third series with about 3–7 equally short canines. Caudal fin truncate to barely rounded with dorsal-most and ventralmost rays produced in adults, almost 1.3 times length of middle rays in large adults. Pelvic fins elongate, reaching anus in juveniles and at least to third anal-fin spine in largest adults.

A moderately large species, largest specimen examined 258 mm SL.

Pigmentation in alcohol. Initial-phase adults (Fig. 52a)—body pale with numerous parallel narrow dusky stripes, especially dorsally; dark band posteriorly on body, farther and farther posteriorly in progressively larger individuals until anterior edge connects base of about sixth or seventh segmented dorsal-fin ray with posterior end of anal-fin base in largest specimens; at this size posterior edge of band mostly vertical, though concave at level of lateral line, and ventral edge of band reaching just beyond posterior edge of hypurals. Dorsally, narrow dusky body stripes reaching anteriorly onto head, terminating at tip of snout and along upper jaw; ventrally, stripes on head somewhat vermiculated, some pale interspaces forming pale spots and

Fig. 52. *Bodianus macrourus*: (*a*) initial-phase adult, 112 mm SL, MNHN A. 7408, Mauritius; and, (*b*) terminal-phase adult, 258 mm SL, USNM 217898, St. Brandon's Shoals, Western Indian Ocean.

irregular marks. Caudal peduncle posterior to dark body band immaculate. Dorsum of largest initial-phase adults dusky, undersides of body much paler. Dorsal fin with dusky to dark area associated with dark body band narrower than in juveniles, located more posteriorly and covering all but pale posterior tip of fin; dark spot between anteriormost 3 spines. Anal fin not associated with dark body band; fin mostly dusky with broad dark margin and scaly basal sheath. Caudal and pectoral fins pale; pelvic fin dusky to dark.

Terminal-phase adults (Fig. 52b)—as in initial-phase adults, except markings ventrally on head more complex and pelvic fin entirely dark.

Colour in life. Initial-phase adults (Plate 8H)—body reddish brown above including scaled dorsal-fin base, white below, with numerous narrow pale blue stripes extending from tip of snout to broad vertical black band encircling body posteriorly; white area including scaly base of anal fin with similarly narrow golden yellow stripes running from head to black band on body; stripes on head forming in form of irregular dots and marks; in large adults, golden yellow stripes outlining scales ventrally on body resulting in reticulated pattern. Black band on caudal peduncle reaching dorsally onto scaly dorsal-fin base and dorsal-fin membranes posteriorly, but only onto scaly base of anal fin to distal edge of sheath ventrally; band posterior to anal-fin base in largest specimen with no black on anal-fin base. Caudal peduncle white posterior to black band. Dorsal fin with black spot between anteriormost 3 spines; remainder of spinous portion pale blue with yellowish orange midlateral stripe or series of spots; several rows of yellowish orange spots on soft portion of fin anterior to black band. Anal fin with black marginal stripe; basal portion of fin pale blue with 2 rows of large yellowish orange spots; largest specimen with very broad black marginal stripe obscuring outer row of spots. Caudal fin milky. Pectoral fin transparent with narrow blue line at base of rays and narrow red line adjacent anterior edge of blue line, at least dorsally. Leading edge of pelvic fin black, segmented rays pale blue.

Terminal-phase adults (Plate 8I)—as in initial-phase adults, except caudal fin pink, reddish at dorsal and ventral extremes; faint tiny orange spots distally on medial portion of fin in largest specimen. Pelvic fin black.

Colour illustrations of this species appear in Gomon (1983, pl. 1, initial-phase adult) and Allen & Steene (1987, pl. 84,6, initial-phase adult).

Distribution. This species is apparently restricted to Mauritius, Réunion and St. Brandon's Shoals in the western Indian Ocean (Fig. 47). Records outside this area appear to be based on specimens of *B. bilunulatus, B. loxozonus* or *B. perditio*. *Bodianus macrourus* occurs on coral reefs at depths of about 13–40 m. (Harmelin-Vivien, pers. comm.).

Etymology: *macrourus*, from the Greek *makros*, "long", and feminine noun *oura*, "tail", in reference to the elongate tail depicted in a pencil drawing of this species on which the original description was based (Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 119).

Comparison. See *Comparison* under *B. loxozonus*. Small juveniles of *B. macrourus* do not appear to exist in museum collections.

Discussion. The synonymy of *B. macrourus* is among the most complex of members of the genus and was mostly treated by Valenciennes (*in* Cuvier & Valenciennes, 1839). In summary, the first three available names were proposed by Lacepède in the same study (1802): *Labrus hirsutus* (p. 429) based on a coloured drawing by Commerson reproduced as plate 20 in Lacepède's Volume 3, *L. rubrolineatus* (p. 433) after a manuscript description by Commerson, and *L. macrourus* (p. 438) after a pencil drawing by Commerson's artist reproduced as Plate 9 in his Volume 3. All three of these were based on a single specimen now deposited in the MNHN. Lesson (1828) acknowledged Lacepède's three names and proposed a fourth *Crenilabrus croceus* based on a 180 mm specimen from Mauritius. In 1830, Lesson repeated his 1828 description verbatim, placed *C. croceus* in synonymy and proposed a fifth name *Crenilabrus Chabrolii* for the species. Bennett (1835) proposed *Labrus spilonotus* for two specimens from Réunion now in the BMNH, remarking that it closely resembles Commerson's "*Labro rubro-lineato*" and may be identical with it. Valenciennes (*in* Cuvier & Valenciennes, 1839) reviewed much of the nomenclatural history of the species and proposed an additional name, *Cossyphe maldat*, for the species. Seven specimens in the MNHN have been listed as syntypes.

Because of the simultaneous publication of the three earliest names for this species by Lacepède, confusion remained as to the name having priority. The first name in Lacepède's study *hirsutus* was by far the most common in early literature, but Günther's (1862) revision of the group recognized *macrourus*, the last name proposed by Lacepède, under the emended spelling *macrurus*. As Günther's is the first account that clearly expresses a choice of the three names, it satisfies the criteria outlined in the International Code of Zoological Nomenclature for such a case (1964; Article 24a), and gives priority to *B. macrourus* on the basis of first reviser.

Material examined. **Indian Ocean**, ST. BRANDON'S SHOALS, USNM 217898 (1, 258); MAURITIUS, BMNH 1855.12.26.404 (1, 203, syntype of *L. spilonotus*), 1855.12.26.405 (1, 155, syntype of *L. spilonotus*), 1934.2.22.33 (1, 188), MNHN A.7408 (1, 112, syntype of *C. maldat*),

A.7409 (1, 181, syntype of *C. maldat*), A.7415 (1, 132, syntype of *C. maldat*), A.7416 (1, 168, syntype of *C. maldat*), A.7417 (1, 183, syntype of *C. maldat*), A.7418 (1, 180, holotype of *C. croceus* and *C. chabrolii*, syntype of *C. maldat*), A.8268 (1, 197, holotype of *L. hirsutus, L. macrourus* and *L. rubrolineatus*, syntype of *C. maldat*), USNM 217844 (1, 194); RÉUNION, MNHN 1965-14 (1, 220).

Bodianus perditio (Quoy & Gaimard)

Figs 7b, 53–54; Plates 8J, 9A–B; Tables 2–3, 10

Labrus perditio Quoy & Gaimard, 1834, p. 702, pl. 20, fig. 4, Tonga-Tabu (Tonga).
Cossyphus atrolumbus Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 123, Isle-de-France (Mauritius).
Trochocopus sanguinolentus De Vis, 1883, p. 287, Hutchinson Shoal, Cape Moreton (Australia).
Cossyphus aurifer De Vis, 1884, p. 146, Moreton Bay (Australia).
Cossyphus latro De Vis, 1885, p. 878, Moreton Bay (Australia).
Cossyphus nigromaculatus Gilchrist & Thompson, 1908, p. 197, Natal (South Africa).
Chaeropsodes pictus Gilchrist & Thompson, 1909, p. 260, Durban Mkt (South Africa).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 9 (1) or 10 (10) + 12 + 9 (2) or 10 (9); pectoral-fin rays ii, 15; lateral-line scales 30 (2) or 31 (3); scales above lateral line 5½–6½; scales below lateral line 12–15 (usually about 13½); predorsal scales ≈12–19 (usually more than 14); total gill rakers 19 (2), 20 (6), 21 (3), 22 (1) or 23 (1). See Tables 2 and 10 for morphometric values. Lower jaw naked. Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally and sometimes slightly mesially, often curving ventrally; second directed mostly ventrally, occasionally angled slightly anteriorly and/or laterally; teeth on dental ridge mostly granular, best developed posteriorly short rounded canines in largest adults; prominent posterior canines not detectable in specimens shorter than 230 mm SL, larger specimens occasionally with 1 or 2 small canines directed anteroventrally. Lower jaw with first prominent anterior canine ≈½–⅓ size of second; first canine directed anterodorsally and slanted slightly mesially; second directed dorsally or anterodorsally and recurved dorsally; dental ridge on anterior ¼–⅓ of jaw with few distinct teeth; teeth posterior to dental ridge in single row, separable into 2 or 3 series; those of first series caniniform, becoming longer posteriorly, ≈3–6 in number; second series with 3–8 short canines of nearly equal length, last few sometimes abruptly longer; 3–7 very short canines of equal size in third series, when present (47.3 mm juvenile with about 4 evenly spaced short canines laterally on upper jaw, each adjoining pair of canines interspersed with about 3 distinctly shorter canines; lateral teeth of lower jaw not coalesced into cutting ridge anteriorly, but well defined immediately behind anterior canines). Caudal fin truncate in juveniles, dorsal-most and ventralmost rays elongate in adults forming pointed upper and lower lobes, reaching more than 1.5 times middle rays in adults. Pelvic fin elongate, tip reaching just short of anus in juveniles, to base of first anal-fin spine in largest adults.

A moderately large species, largest specimen examined 460 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 53a,b)—pale with broad dark band posteriorly on body, vertical anterior margin of band between base of tenth or eleventh dorsal-fin spine and base of first segmented anal-fin ray, diagonal posterior margin of band connecting upper side of caudal peduncle somewhat posterior to end of dorsal-fin base and base of about eighth segmented anal-fin ray, ventral portion of band gradually fading with centers of scales becoming pale; distinct vertical white bar about ⅔ as broad as eye on dorsal half of body just anterior to dark band; dark body band extending upwards onto dorsal fin, edge following eleventh spine to fin margin and then tapering to near bases of last few segmented rays leaving pale posterior distal area on fin; additional dark spot on membranes between first 3 spines; ventral edge of dark body band extending onto anal fin and covering middle half of scaly basal sheath, band projecting as short irregular marks on fin membrane; large immaculate spot about size of eye midlaterally on caudal peduncle immediately anterior to posterior edge of hypurals; small dark spot on dorsoposterior edge of immaculate spot dorsally on scaly base of caudal fin immediately posterior to posterior edge of hypurals. Caudal fin transparent with slightly dusky scaled base. Pectoral fin transparent to pale. Pelvic fin pale.

Initial-phase adults (Fig. 53c)—body pale, slightly dusky dorsally with elongate dark spot above lateral line between base of eleventh dorsal-fin spine and posterior end of dorsal-fin base (spot representing dorsal portion of dark band in juveniles); spot more diffuse and reaching less ventrally in large individuals; dark spot preceded by short immaculate band reaching downward 1 or 2 scale rows below lateral line; band manifested as large vertically elongate

Table 10. Selected morphological dimensions expressed as percent of standard length for specimens of *Bodianus perditio* examined and types of *Bodianus solatus* n.sp.

	B. solatus n.sp. holotype	*B. solatus* n.sp. paratypes	*B. perditio*
number of specimens	1	8	17
standard length (mm)	309	136–350	30.4–460
body depth	35.9	31.2–38.8	32.1–38.2
head length	36.2	33.9–37.5	33.0–38.8
snout length	14.2	11.1–14.0	10.2–12.8
orbital diameter	5.8	5.4–7.3	5.0–10.8
predorsal length	38.5	36.4–41.3	35.9–36.8
preanal length	68.0	61.5–69.6	62.0–63.8
preanus length	66.3	59.4–65.2	58.6–59.4
dorsal-base length	49.8	46.1–56.3	45.1–56.8
anal-base length	25.4	21.7–26.5	22.0–26.7
caudal-peduncle depth	16.6	15.8–18.8	16.4–18.4
caudal-peduncle length	14.2	14.2–18.3	14.9–15.0
dorsal-fin length	61.2	56.8–64.3	56.9–69.3
anal-fin length	36.5	32.3–38.7	31.7–39.6
pectoral-fin length	22.3	20.9–23.0	21.9–27.5
pelvic-fin length	25.6	24.4–32.2	17.4–28.5
dorsal-fin spine 1	4.9	3.7–7.7	4.9–7.7
dorsal-fin spine 2	6.9	6.7–8.5	6.5–7.6
dorsal-fin spine 12	10.0	8.0–13.8	9.1–14.0
anal-fin spine 1	4.7	4.1–6.5	3.7–6.5
anal-fin spine 3	10.6	8.4–12.6	6.9–13.1
caudal-fin length—top	28.4	31.0–37.3	28.0–25.3
caudal-fin length—middle	20.3	20.2–25.5	21.3–24.8
caudal-fin length—bottom	27.5	29.9–35.5	28.8

immaculate spot in large specimens. Head above level of mouth slightly dusky with numerous pale spots, spots usually apparent in naked area of head dorsum, even in faded specimens. Dorsal fin with dark spot variously covering fin membrane anteriorly, confined to area between first 3 spines in small adults, covering anterior end of fin posteriorly to seventh spine in largest specimens examined; immaculate bar or spot continuing little, if at all, onto scaly fin base; dark spot on body covering scaly base posterior to eleventh spine but usually not extending onto fin membrane, forming dark streaks on ventral portions of segmented rays just above scaly base in some specimens; remainder of fin pale. Anal, caudal, pectoral and pelvic fins pale; very large specimens with dusky to dark mark on dorsal-most pectoral-fin rays at or near tip of fin.

Terminal-phase adults (Fig. 53d)—pigmentation as in large initial-phase adults with very diffuse dark spot on back below center of dorsal fin.

Colour in life. Juveniles (Plate 8J)—body golden yellow with broad black band or spot posterodorsally on body extending slightly below lateral line at base of posterior ⅖ of dorsal fin, black band breaking up ventrally; moderately narrow ventrally tapered, yellowish to snow white band immediately preceding black band; moderately large yellowish white spot centered at posterior end of caudal peduncle; small black spot dorsally on scaly base of caudal fin. Dorsal fin with small black spot anteriorly and with dorsal extensions of yellowish white and black bands centrally and posteriorly; remainder of fin golden yellow anteriorly and transparent posteriorly. Anal fin with moderately large elongate black spot somewhat anteriorly, transparent posteriorly. Caudal, pectoral and pelvic fins golden yellow. Larger juveniles without yellowish white spot on caudal peduncle and black spot on anal fin, with black and yellowish white bands confined to dorsal half of body and scaly base of dorsal fin and with previously transparent areas of fins golden yellow.

Initial-phase adults (Plate 9A)—golden yellow suffused with red; head and anterior portion of body with numerous golden yellow spots; ventral side of head, chest and belly snow white. Large black spot posterodorsally on side below last several dorsal-fin spines and soft portion of dorsal fin, immediately behind prominent yellowish white spot or band. Fins yellow; dorsal with black spot between first few spines.

Terminal-phase adults (Plate 9B)—head and body red, retaining golden spots of initial-phase adults; black blotch dorsolaterally on side becoming more diffuse with black pigment merely outlining scales of area in very large individuals. Dorsal fin with anterior black spot covering all of fin anteriorly in very large adults; remainder of fin golden yellow with membranes becoming more reddish basally in large individuals, red streaks directed to distal margin on soft portion of fin in individuals of similar size. Anal fin golden distally, reddish basally. Caudal fin golden yellow, becoming more red basally with red streaks on membranes between rays directed distally in large specimens. Pectoral fin reddish with golden yellow spots anterodorsally and diffuse blackish spot distally on dorsal-most rays in large individuals. Pelvic fin golden yellow with longitudinal red streaks and blackish anteroventral edge in large individuals.

Colour illustrations of this species appear in Burgess & Axelrod (1974, fig. 21, 22, 23, initial-phase adults), Masuda *et al*. (1975, p. 102, fig. E, terminal-phase adults and fig. F. initial-phase adult; 1984, pl. 196B, initial-phase adult, and C, terminal-phase adult), Grant (1975, colour plate 134a, terminal-phase adult), Fourmanoir & Laboute (1976, p. 115, top, terminal-phase adult, center, initial-phase adult, and bottom, juvenile), van der Elst (1981, p. 189, initial-phase adult), Gomon (1983, pl. 1, terminal-phase adult), Shen (1984, pl. 100, fig. 362-14, small adult), Randall (1986b, pl. 90, 220.10, terminal-phase adult), Allen & Swainston (1988, pl. 47, fig. 729 below, juvenile and above, terminal-phase adult), Randall *et al*. (1990, p. 301 top, terminal-phase adult), Kuiter (1992, p. 148, figs E, terminal-phase adult, and F, juvenile; 1993, p. 269, top left, terminal-phase adult, and top right, juvenile) and Okamura & Amaoka (1997, p. 468, top row, left, terminal-phase adult and p. 470, left column, bottom 2, juveniles, middle, initial-phase adult and top 2, terminal-phase adults).

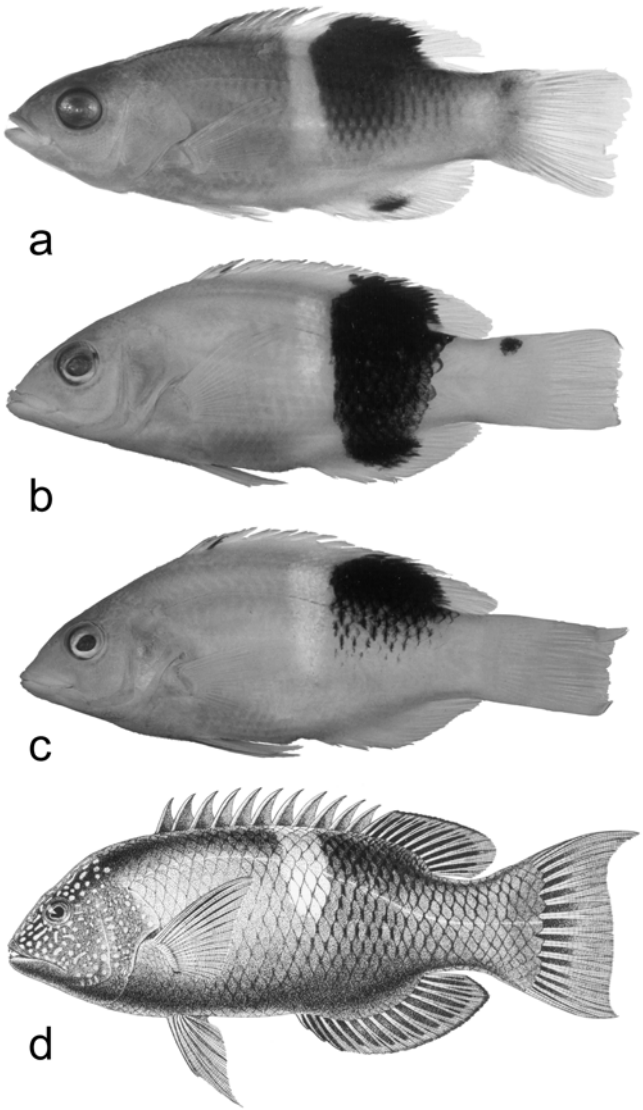

Fig. 53. *Bodianus perditio*: (*a*) juvenile, 47.3 mm SL, BPBM 14961, Thompsons Bay, New South Wales, Australia; (*b*) juvenile, 69.8 mm SL, USNM 217846, St. Brandon's Shoals, western Indian Ocean; (*c*) initial-phase adult, 89.2 mm SL, USNM 217848, St. Brandon's Shoals, western Indian Ocean; and, (*d*) terminal-phase adult, ≈330 mm TL, Wakanoura, Japan (after Jordan & Snyder, 1902, fig. 2).

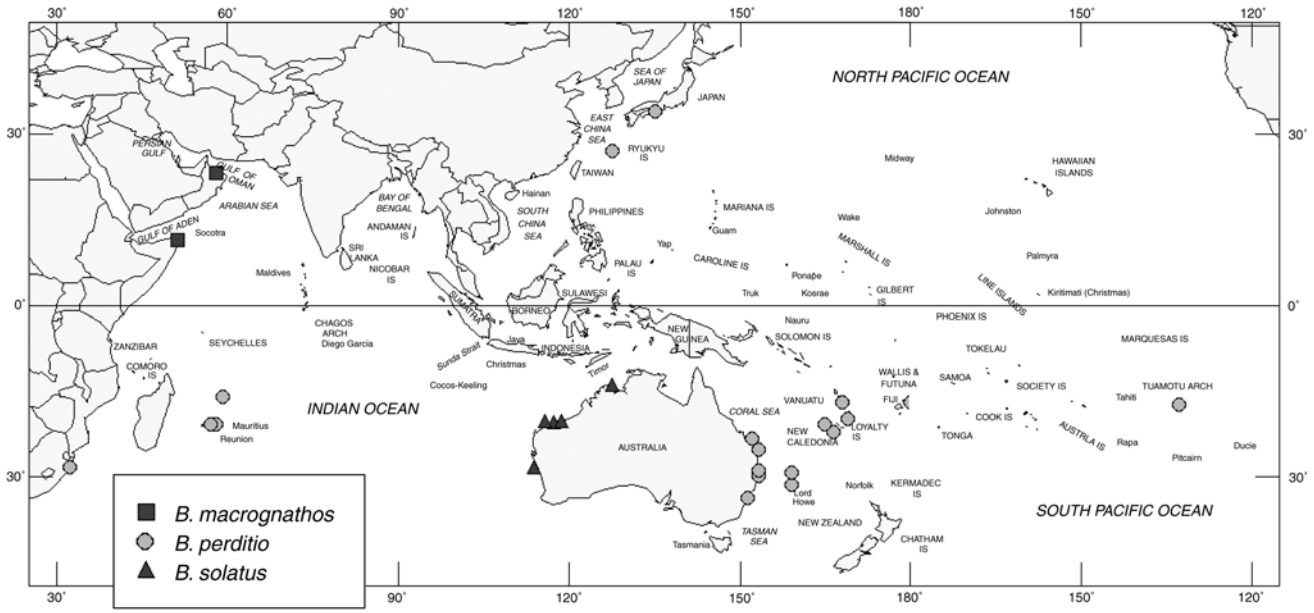

Fig. 54. Distributional records for specimens examined of selected Indo-Pacific species of the subgenus *Diastodon*.

Distribution. *Bodianus perditio* occurs along the northern and southern edges of the tropics in the Indo-Pacific from the Natal coast of South Africa in the west to Mangareva in the east (Fig. 54). In the Northern Hemisphere, the species is mostly restricted to Taiwan (Shen & Choi, 1976) and Japan, northward to Sagami Bay (Masuda *et al*., 1975). In addition to localities listed for *Material examined*, the species is reliably recorded from northern Madagascar (Randall, 1986b) and Norfolk Island (Francis, 1991, fig. 30). In Australia, *B. perditio* occurs off the southern Queensland and northern New South Wales coast south to Sydney Harbour, in the northeast, but is replaced by the very closely related *B. solatus* along the northwest coast. Fourmanoir & Laboute (1976) report the species to be extremely common in New Caledonia where it constitutes about 12% (by weight) of the fishes taken by hook and line. The species is found on deep offshore reefs as adults (Grant, 1972; Masuda *et al*., 1975), but juveniles may occur as shallow as 9 m.

Etymology: *perditio*, from the masculine Latin noun *perditis*, "destruction", in reference to the precarious position in which the vessel "Astrolabe" found itself around the time the holotype was collected (see Valenciennes, *in* Cuvier & Valenciennes, 1839, p. 126–127, for a discussion of the perils referred to by Quoy and Gaimard).

Comparison. *Bodianus perditio* closely resembles *B. solatus*, described below, both in general morphology and coloration. It is separable from that species in having ii, 15, rather than ii, 13–14 pectoral-fin rays, more numerous rakers on the first gill arch (19–23, versus 16), a prominent yellow overall coloration in initial-phase adults, numerous small yellow spots covering the head of terminal-phase adults, and at best poorly developed posterior canines in the upper jaw. It is also similar to the eastern Atlantic species *B. speciosus*, and, to a lesser extent, *B. albotaeniatus, B. bilunulatus, B. busellatus, B. loxozonus* and *B. macrourus*. *Bodianus perditio* differs from the last two in lacking scales on the lower jaw, and all six in usually having a large black blotch dorsally on the body at the base of the posterior half of the dorsal fin and a moderately broad pale band preceding the black marking.

Discussion. Although there is some variation in coloration in this species over the full extent of its distribution, differences are relatively minor considering the broad gaps between southern Pacific, northwestern Pacific and Indian Ocean populations. The most obvious difference between Indian Ocean and Pacific populations is the greater persistence of the pale and black bands immediately posterior to the center of the body in large juveniles and small initial-phase adults of the former. The black band in these fish reaches well below the lateral midline even in some small initial-phase adults, whereas it is confined to the dorsal half of the side at a much smaller size in Pacific populations. A black spot on the dorsoposterior corner of the caudal peduncle also persists in the Indian Ocean population but is lost early in the Pacific populations.

The presence of seven names in the literature can be attributed to its extremely broad distribution, and the marked difference in coloration between initial-phase and terminal-phase adults. *Labrus perditio* described by Quoy & Gaimard (1834) was based on a specimen of moderate size (175 mm) that is no longer extant. Although a number of discrepancies exist between the original description and the species treated here, the colour pattern is unmistakable and could be of no other. Valenciennes (*in* Cuvier & Valenciennes, 1832) noted the similarity between his *Cossyphus atrolumbus* and the two species, *C. bodianus* (= *B. rufus*) and *C. maldat* (= *B. macrourus*), but did not compare it with *C. perditio*, the next species treated in his study. Presumably, he was distracted by the above mentioned differences in description. Specimens on which *C. atrolumbus* and *C. perditio* were based, are also from two widely separated localities, Mauritius (western Indian Ocean) and Tonga-Tabu (southern central Pacific), respectively. Three specimens at the MNHN are listed as syntypes of *C. atrolumbus* in the collection catalogue. MNHN A.8262 is here designated lectotype to

affix the name should Indian and Pacific Ocean populations prove to be taxonomically separate. De Vis' three species, *Trochocopus sanguinolentus* (1833), *Cossyphus aurifer* (1884) and *Cossyphus latro* (1885) were based on large specimens (400, 450 and 500 mm respectively) collected in Moreton Bay, Australia. A dry specimen (QMB I.3094, 400 mm TL) in the Queensland Museum, Brisbane, is probably the only remaining type and may be that of *Trochocopus sanguinolentus*. The original descriptions of all three species are consistent with *B. perditio*. In particular, the yellow or golden spots on the head described for the first two are found elsewhere in the genus only in *B. speciosus*, confined to the eastern Atlantic. The third, *C. latro*, was described from a dry specimen (the description matching the above mentioned possible type in all but size) and is referred to *B. perditio* on the basis of the caudal fin having "lobes elongated", the presence of 33 lateral-line scales and having "the eight anterior dorsal spines and webs black". No other known species of *Bodianus*, and certainly no other southern Queensland species in the genus, has this combination of characters. Two species, *Cossyphus nigromaculatus* and *Chaeropsodes pictus*, were described by Gilchrist & Thompson (1908 and 1909, respectively) from terminal-phase adults, both taken off Natal, South Africa. Although neither type was available for examination, the type of the second species is undoubtedly a specimen of *B. perditio* with an aberrant dorsal fin. Smith (1957) incorrectly synonymized *C. nigromaculatus* with *Lepidaplois hirsutus*, but was clearly referring to *B. bilunulatus*. The following characters listed in Gilchrist & Thompson's description of *C. nigromaculatus* distinguish it as a terminal-phase adult of *B. perditio*: "spinous dorsal black; a black spot on distal anterior edge of pectorals; scales on posterior half of body covered with minute dark specks".

Bodianus perditio is the sole species of the genus with tiny canines at the rear of the upper jaw in juveniles and small canines at this position in larger individuals.

Material examined. **Indian Ocean**, AFRICA, *South Africa*, Natal ANSP 73241 (1, 353), 73251 (1, 245); ST. BRANDON'S SHOALS, USNM 217846 (1, 69.8), 217848 (1, 89.2); MAURITIUS, BMNH 1842.5.10.31 (1, 99, skin), 1842.5.10.33 (1, 75, skin), MNHN A.7397 (1, 270, paralectotype of *C. atrolumbus*), A.8262 (1, 181, skin, lectotype of *C. atrolumbus*), A.8263 (1, 335, mount, paralectotype of *C. atrolumbus*); RÉUNION, MNHN 1965-15 (1, ≈210). **Pacific Ocean**, JAPAN, Wakanoura USNM 50239 (1, 252), 71782 (1, 230), 71783 (1, 130), *Ryukyu Is*., Okinawa, Loo Choo USNM 6441 (1, 196), 71615 (1, 238), Naha USNM 71648 (1, 181), 71655 (2, 141–157), 153468 (1, 392); AUSTRALIA, *Queensland*, Saumarez Reef BMNH 1862.1.6.6 (1, 380, mount), One Tree I. AMS I.15682-055 (1, 370), Moreton Bay QMB I.3094 (1, 346, mount, possible holotype of *T. sanguinolentus*), *New South Wales*, Solitary I. AMS I.15692-002 (1, 336), Sydney Harbour AMS I.18734-001 (1, 65), Thompson's Bay BPBM 14961 (2, 30.4–47.3); LORD HOWE I. AMS I.1808 (1, 245), I.7869 (1, 224); NEW CALEDONIA, USNM 206522 (1, 335), *Noumea* MNHN 1964-311 (1, ≈215); NEW HEBRIDES, *Aneityum* BMNH 1860.7.18.23 (1, 151, skin), *Erromanga* AMS I.13289 (1, 238); FIJI IS., *Minerva Reefs* BMNH 1850.11.4.48 (1, 377, mount); TUAMOTU ARCH., *Mangareva I.* BPBM 14275 (1, 189), 14293 (7, 217–320).

Bodianus solatus n.sp.

Figs 7c, 54–55; Plate 9C–D; Tables 2–3, 10

Type material. HOLOTYPE: CSIRO H1473-2 (1, 248) Australia, Western Australia, North of Cape Lambert, 19°43.7'S 117°16.0'E to 19°43.4'S 117°14.3'E, 64–66 m, FRV Soela, Frank and Bryce demersal trawl, 23 September 1988. PARATYPES: (Western Australia) CSIRO CA280 (1, 267) Northwest of Port Hedland, 19°09'S 117°59'E to 19°09'S 118°01'E, 86 m, FRV Courageous, demersal trawl, 19 May 1978; CSIRO CA2172 (1, 146) Northeast of Monte Bello Islands, 20°07.0'S 115°59.0'E to 20°05.0'S 116°00.0'E, 65–66 m, FRV Soela, demersal trawl, 2 December 1979; CSIRO H1472-2 (1, 136) North of Cape Lambert, 19°48.8'S 117°18.7'E to 19°46.6'S 117°20.7'E, 61 m, FRV Soela, Frank and Bryce demersal trawl, 23 September 1988; WAM P25354-025 (1, 207) Monte Bello Islands, Taiwanese trawler, April 1975; WAM P25925-001 (1, 350) west end of Bernier Island, 24°52'S 113°08'E, 73 m, R. Walker, 28 August 1977; WAM P26687-002 (1, 248) Australia, Western Australia, Coral Bay; WAM P27875-001 (1, 348) Houtman Abrolhos, 70 km SW of Coral Bay, 23°10'S 113°16'E, 104–108 m, D. Heald *et al.*, 12 August 1979; WAM P29692-001 (1, 164) Houtman Abrolhos, 1970.

Diagnosis. A species of the subgenus *Diastodon* with: 13–15 (modally 14) pectoral-fin rays; 15–21 predorsal scales; 16–19 total gill rakers; elongate pelvic fin, 24.4–32.2% SL; and, posterior corners of caudal fin produced into prominently slender lobes, 28.4–37.3% SL; overall reddish adult coloration dorsally without contrasting black markings or pale spots on head, large black blotch below posterior half of dorsal fin in initial-phase adults preceded by vertical white band below eighth to eleventh dorsal-fin spines, and back of terminal-phase adults suffused with black, except for reddish space below eighth to eleventh dorsal-fin spines; and, pale pelvic fins.

Description. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 10 (7) or 11* (2) + 12 + 10 (7) or 11* (2); pectoral-fin rays ii, 13 (1), 14* (15) or 15 (2); lateral-line scales 31 + 2; scales above lateral line 5½–6½*; scales below lateral line 12–15 (usually about 13½, 14½*); predorsal scales ≈15–21 (about 16*); total gill rakers 16 (2), 18*(5) or 19 (2). See Tables 2 and 10 for morphometric values.

Body moderately deep, caudal peduncle of moderate depth; head and snout broadly pointed; forehead and snout with slight convex curve; nape slightly convex above dorsal end of preopercle, forehead and snout nearly straight; jaws not attenuate.

Scaly sheath on base of dorsal and anal fins smoothly curved, deep, about 2½ scales in depth. Predorsal scales reaching forward to or just short of above posterior extent of orbit on dorsal midline of head, scales lateral to midline reaching midway between center and posterior extent of orbit. Cheek scales extending anteriorly just forward of corner of mouth on upper side of jaws, reaching far short of free preopercular edge posteriorly and ventrally leaving broad naked preopercular margin; scales on subopercle reaching forward to below anterior end of ventral preopercular edge; lower jaw naked. Lateral-line scales each with singular, unbranched laterosensory canal tube flexed dorsally; occasionally few short branches on posterior scales in large specimens. Scale attached to posterior edge of posttemporal immediately preceding first lateral-line scale often with short lateralis tubule (not included in lateral-line scale count). Posterior edge of preopercle finely serrate. Posterior corner of mouth distinctly posterior to vertical through forward extent of orbit. Gill rakers on upper limb

of first arch distinctly smaller to nearly equal those on lower limb; rakers on upper limb arborescent distally, those on lower limb mostly simple.

Upper jaw with prominent anterior canines of similar size; first canine directed anteroventrally and sometimes slightly mesially, often curving ventrally; second directed mostly ventrally, occasionally angled slightly anteriorly and/or laterally; up to 12 small teeth on dental ridge, even distinct in smallest specimens, becoming granular with growth, best developed posteriorly; 1* or 2 posterior canines not especially enlarged, directed anteroventrally. Lower jaw with first prominent anterior canine ≈½–⅓ size of second; first canine directed anterodorsally and slanted slightly mesially; second directed dorsally or anterodorsally and recurved dorsally; dental ridge on anterior ¼–⅓ of jaw with few distinct teeth; teeth posterior to dental ridge in single row, separable into 2 series; ≈4–10 (4* and 5*) in first series caniniform, becoming longer posteriorly, based on posterior end of dental ridge; second series with 2–8 (3*) similarly short canines. Vomerine teeth absent. Horizontal axis of lower pharyngeal (Fig. 7c) deep centrally (as viewed from above), posterior margin distinctly convex; teeth somewhat aligned transversely at center, in about 2 or 3 rows, those laterally forming large ovoid patch with 6 or more rows on either side, lateralmost teeth extending onto lateral edge of pharyngeal; teeth rounded, those medially of moderate size, lateral teeth smaller, 3 slightly larger ovoid molars in posterior row, flanked on either side by about three smaller teeth of similar size; anterior head of pharyngeal of moderate length covered with short canines similar to teeth immediately behind.

Posterior tip of dorsal fin bluntly rounded, truncate in very large adults, not reaching hypural edge. Posterior tip of anal fin bluntly pointed to pointed, reaching far short of posterior edge of hypurals. Caudal fin with elongate pointed upper and lower lobes, reaching more than 1.8 (1.4 in holotype) times length of middle rays in adults. Pectoral fin bluntly pointed dorsally, rays distinctly shorter ventrally. Pelvic fin elongate, tip reaching to anus* or beyond in adults, to base of third anal spine in some.

A moderately large species, largest specimen examined 350 mm SL.

Pigmentation in alcohol. Initial-phase adults (Fig. 55a)—body pale, with large, elongate, darker blotch above lateral line between base of eleventh dorsal-fin spine and posterior end of dorsal-fin base; blotch preceded by short immaculate band. Dorsal fin pale, with dark spot between first 2 spines, fin membrane between subsequent few spines only slightly dusky at most; dark blotch on side covering scaly base posterior to eleventh spine but not extending onto fin membranes. Other fins pale.

Terminal-phase adults (Fig. 55b)—pale, with distinctly dusky back, nape and scaly dorsal-fin sheath extending ventrally to within about one scale row of lateral line; dusky back broken by faint pale hiatus below last few dorsal-fin spines; interorbital space, region anteroventrally around eye and scaly caudal-fin base dorsally and ventrally sometimes with faint dusky pigment. Dorsal-fin membranes slightly dusky anterior to eighth spine with dark spot between first three spines; remainder of dorsal fin and other fins pale.

Colour in life. Initial-phase adults (Plate 9C)—reddish dorsally, white ventrally, scales on sides with reddish centers and white margins, breadth of margins increasing ventrally; large black blotch below posterior half of dorsal fin, becoming diffuse at level of lateral line; black blotch preceded by vertical white band extending ventrally from between eighth and eleventh dorsal-fin spines; head uniformly reddish above level of mouth, white below; dorsal fin grey anterior to eighth or ninth spines and reddish posteriorly, membranes between first two spines black; anal and pelvic fins white; caudal and pectoral fins mostly reddish.

Fig. 55. *Bodianus solatus* n.sp.: (*a*) 136 mm SL, initial-phase adult, CSIRO H1472-2, paratype, North of Cape Lambert, Western Australia, 19°48.8'S 117°18.7'E to 19°46.6'S 117°20.7'E, 61 m; and, (*b*) terminal-phase adult, 248 mm SL, CSIRO H1473-2, holotype, north of Cape Lambert, Western Australia, 19°43.7'S 117°16.0'E to 19°43.4'S 117°14.3 E, 64–66 m.

Terminal-phase adults (Plate 9D)—red above and white below as in initial-phase adults; back suffused with black except for reddish space below eighth to eleventh dorsal-fin spines; dorsal fin dark grey anteriorly and red posteriorly, membranes between first 3 spines black; anal fin pink with white base; caudal fin red; pectoral fin mostly red; pelvic fin white with red leading edge.

Colour illustrations of this species appear in Gloerfelt-Tarp & Kailola (1984, p. 232, as "*Bodianus perditio*", initial-phase adult) and Sainsbury *et al*. (1984, p. 257, top fig., as "*Bodianus perditio*", initial-phase adult).

Distribution. Confined to the western coast of Australia between the Monte Bello Islands and the Houtman Abrolhos (Fig. 54).

Etymology: *solatus*, a Latin adjective meaning "sunburnt", in reference to the dominant reddish coloration characterizing adults of this species.

Comparison. See *Comparison* under *B. perditio*. Initial-phase adults of this species are virtually identical in appearance to *B. perditio* after preservation, but can be distinguished by their pectoral-fin ray formula of ii, 14 (rarely 13 or 15), rather than ii, 15, and the total number of gill rakers on the first arch, 16–19, versus 19–23. In life, adults of *B. solatus* are reddish, lacking the prominent yellow hue characteristic of initial-phase *B. perditio* and the yellow cephalic spots of its terminal-phase adult.

Discussion. *Bodianus solatus* and *B. perditio* have been confused in the literature (Gloerfelt-Tarp & Kailola, 1984; Sainsbury *et al*., 1984). Allen & Swainston's (1988) illustration of *B. perditio* reported from Northwestern Australia is unmistakably that species but is based on a photo from another locality. Their diagnostic comments apply to both *B. perditio* and *B. solatus*.

The close similarity between *B. solatus* and *B. perditio* suggests that the two are cognates. The confinement of *B. solatus* to the cooler tropical region of Western Australia, with *B. perditio* occurring at similar latitudes in both the southern Pacific and northwestern Pacific is similar in some regards to the Western Australian *B. vulpinus* and the remaining Pacific species in the *B. vulpinus*-complex. The *B. vulpinus*-complex is also an anti-tropical assemblage with widely separated northwestern Pacific, southern Pacific and southeastern Indian Ocean populations. Both complexes have distinctly different representatives on either side of the Australian continent, with the distribution of the western representative greatly restricted and that of the eastern population extending over much of the tropical and subtropical Pacific south of about 20°S. The restricted geographical distribution, and associated small size of the Western Australian populations, may have accelerated the evolutionarily divergence from related populations.

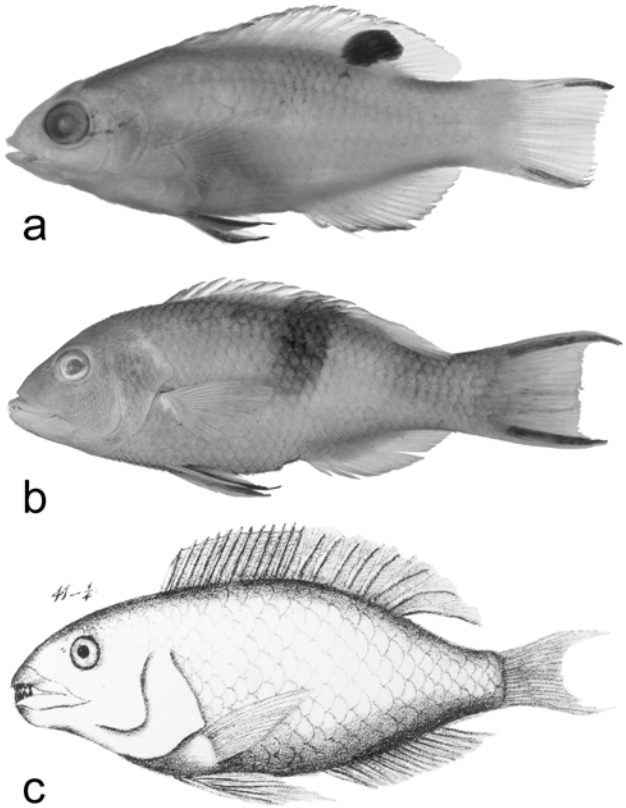

Fig. 56. *Bodianus speciosus*: (*a*) juvenile, 45.1 mm SL, BMNH 1977.3.21.136, Prampram, Ghana; (*b*) initial-phase adult, 127 mm SL, USNM 217896, Guinea; and, (*c*) adult, holotype, St. Jago, Cape Verde Islands (after Bowdich, 1825, fig. 41).

Bodianus speciosus (Bowdich)

Figs 7d, 56–57; Plate 9E–G; Tables 2–3

Diastodon speciosus Bowdich, 1825, p. 238, fig. 41, St Jago (Cape Verde).

Cossyphus tredecimspinosus Günther, 1862, p. 107, no locality (Hasslar collection).

Morphological diagnosis. Dorsal-fin rays XII (27) or XIII (1), 10; anal-fin rays 0 (1), I (1) or III (26), 12; caudal-fin rays 10 (21) or 11 (7) + 12 + 9 (2), 10 (23) or 11 (3); pectoral-fin rays ii, 14 (4), 15 (50) or 16 (2); lateral-line scales 30 (1), 31 (48) or 32 (3); scales above lateral line 5½–6½ (usually 5½); scales below lateral line 11½–14½ (usually 13½); predorsal scales ≈12–16 (usually ≈13 or 14); total gill rakers 14 (1), 15 (9), 16 (14) or 17 (5). See Table 2 for morphometric values. Lower jaw naked. Upper jaw with prominent anterior canines nearly equal or with second canine slightly shorter than first (¾–⅘ length); first canine directed anteroventrally, sometimes curved ventrally; second canine directed ventrally to ventrolaterally and occasionally slightly anteriorly; dental ridge with few small teeth, teeth best developed posteriorly and in larger individuals; 0–2 prominent posterior canines, often somewhat weakly developed in smaller individuals and relatively small in adults, canines directed anteroventrally. Lower jaw with first prominent anterior canine ½–⅘ size of second, canines nearly equal in larger individuals; first canine directed anterodorsally, slightly laterally and recurved dorsally; dental ridge mostly smooth on anterior half of jaw in small specimens, with up to 8 teeth in large individuals, posterior teeth larger and more distinct; series of teeth on dental ridge followed by 2 additional series, first with 2–5 (usually 3) moderately long canines, second with 2–6 equally short canines. Caudal fin truncate, only slightly rounded at most; dorsal-most and ventralmost rays produced only slightly in smallest specimen examined (84.4 mm SL), forming very long tapering dorsal and ventral lobes in larger specimens reaching 1.7 times length of middle rays in some. Pelvic fin elongate, tip reaching just past or just short of anus in small specimens, very elongate in large adults, reaching to base of first segmented anal-fin ray in one specimen.

A moderately large species, largest specimen examined 255 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 56a)—head and body pale, 2 narrow dusky stripes directed dorsoposteriorly from posterior edge of orbit; dorsal fin pale with large dark spot extending from scaly basal sheath nearly to distal edge of fin between last spine and seventh segmented ray, distal edge of fin dusky; anal fin pale with dusky distal edge; caudal fin pale with broad dark stripe along both dorsal and ventral edges; pectoral fin pale; pelvic fin pale except for dark stripe on first ray.

Initial-phase adults (Fig. 56b)—body pale with moderately broad dark band dorsally on body below last 4 dorsal-fin spines, band less prominent ventrally and extending slightly onto lower half of body in large specimens; scales on dorsal half of sides each with narrow dusky basal band, banded scales restricted to back in large specimens; unpigmented spot about eye size immediately below last 6 or 7 segmented dorsal-fin rays. Head with 2 narrow dusky stripes directed posteriorly and slightly dorsally from posterior rim of orbit, first originating posteroventrally and second midposteriorly; stripes most

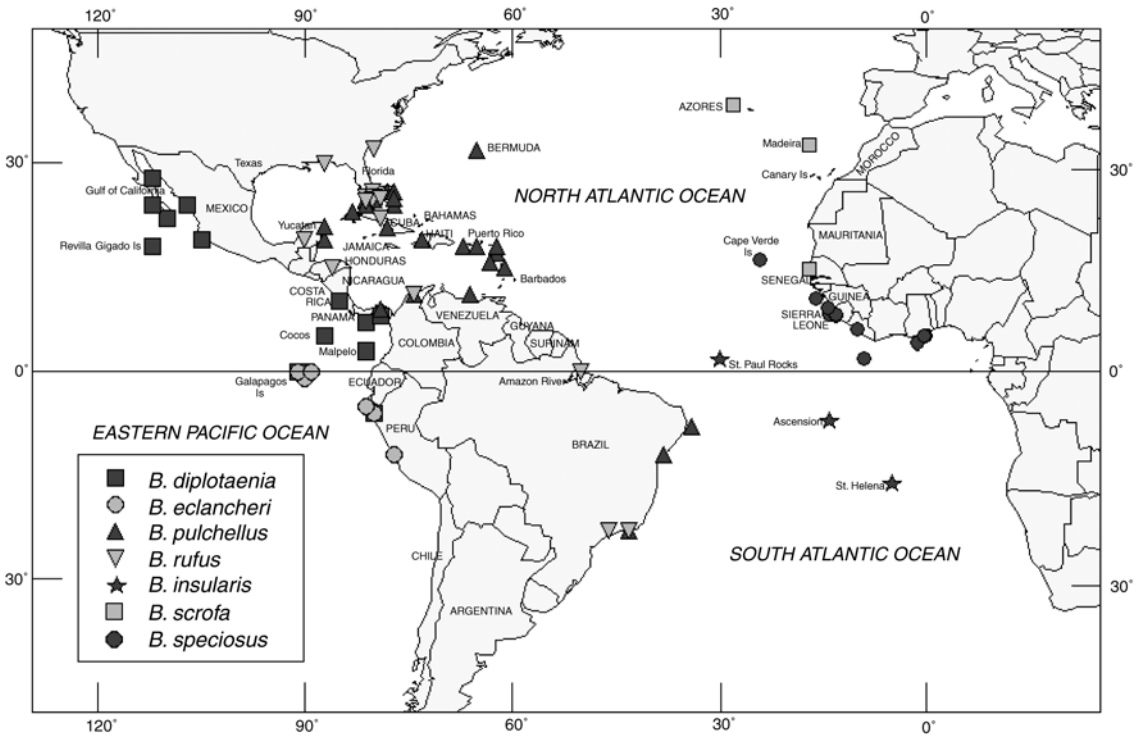

Fig. 57. Distributional records for specimens examined of Atlantic and eastern Pacific species of the subgenera *Pseudolepidaplois, Diastodon* and *Bodianus*.

prominent in smaller specimens, less evident in large individuals; dorsal side of head and back in very large specimens often slightly dusky. Dark band on side continuing dorsally onto scaly base of dorsal fin and to distal margin of fin between eighth and eleventh spines; fin pale to slightly dusky anterior to band and pale posteriorly with narrow dark (in small specimens) to dusky marginal stripe. Anal fin pale with narrow dark to dusky marginal stripe. Caudal fin pale with narrow dark submarginal stripe dorsally and ventrally on elongate rays; stripes extending from fin base to tips of elongate lobes, faint in very large specimens; small dusky marks or spots scattered on fin. Pectoral fin pale, with dark dusky blotch on distal half of uppermost rays; narrow dusky band on scaly base of fin along proximal ends of rays in some specimens. Pelvic fin with narrow dark stripe along first segmented ray; stripe dusky and confined to distal portion of fin in very large specimens.

Terminal-phase adult—as described for initial-phase adult.

Colour in life. Juveniles (Plate 9E)—pale purple with darker edges to scales dorsally on sides and snow white spot about half size of eye immediately below sixth to eighth dorsal-fin rays; head golden yellow above with 2 irregular narrow blackish stripes directed posteriorly from eye. Dorsal fin pale purple with large white-edged black spot between last spine and sixth soft ray. Anal fin pale purple. Pelvic fin pale purple with blackish stripe along first soft ray. Dorsal, anal and pelvic fins with bright blue margins.

Initial-phase adults (Plate 9F)—body red with black band tinged with violet on back below last 4 dorsal-fin spines reaching slightly below lateral line; each scale dorsolaterally on body but confined to back in very large specimens with short blackish to deep red basal band; underside of body and head below level of mouth yellow to yellowish white, at least in large specimens whitish or yellowish white spot between lateral line and posterior segmented dorsal-fin rays in smaller adults, spot indistinct in very large individuals. Cheeks and dorsal side of head, back and caudal peduncle suffused with violet in very large specimens; lateral side of head with numerous small orange spots in large individuals. Two short, narrow deep red stripes directed backward from posterior rim of orbit. Fins mostly red or reddish. Dorsal fin with narrow blue to blackish marginal stripe, faint in very large individuals; black body band continuing to distal margin of dorsal fin between eighth and eleventh spines; spinous portion of fin tinged with violet in large specimens. Anal fin with blue to blackish marginal stripe, faint in very large individuals. Blue to black submarginal stripe dorsally and ventrally on caudal fin. Pectoral fin with blue to blackish stripe along first segmented ray.

Terminal-phase adults (Plate 9G)—body reddish brown with black band of initial-phase adults below center of dorsal fin expanding ventrally and anteriorly to cover lower half of thorax, followed posteriorly by broad white band expanding ventrally and posteriorly to envelope anal fin and continuing to tip of lower caudal fin lobe along ventral profile of caudal peduncle and fin; remainder of caudal peduncle suffused with black; lower side of head below level of mouth and chest white; two short blackish stripes directed posteriorly from eye; axilla of pectoral fin reddish. Dorsal fin reddish brown anteriorly with upper end of midlateral black band extending to distal margin and white posteriorly; caudal fin with broad black stripe along each lobe and intervening dirty white space from scaly base to posterior margin, dorsal edge of upper lobe also white; pectoral and pelvic fins black. Intensity of pigmentation varying with behavioural state.

A colour illustration of this species appears in Roule (1919, pl. 4, fig. 1, apparently terminal-phase adult, 480 mm TL).

Distribution. *Bodianus speciosus* is distributed along the tropical western coast of Africa (Fig. 57) from Cameroon to Guinea and in the offshore Cape Verde Islands (Roule, 1919; da Franca & Vasconcelos, 1962). The species appears to be common at depths of 20–40 m as evidenced by the many specimens collected in the 1973 International Guinean Trawling Survey. Juveniles occur, at least occasionally, in rocky areas at depths of 10–12 m.

Etymology: *speciosus*, a Latin adjective meaning "beautiful", in reference to the attractive coloration of this species.

Comparison. This species most closely resembles *B. perditio* and *B. solatus* in morphology and overall colour pattern. The three are readily separable on the basis of details in colour pattern. In addition, *B. speciosus* has 14–17 gill rakers on the first arch, whereas *B. perditio* has 19–23, and has a modal pectoral-fin value of ii, 15, rather than ii, 14 as in *B. solatus*. *Bodianus speciosus* is distinguishable from the closely related *B. loxozonus* and *B. macrourus* in lacking scales on the lower jaw, and from *B. bilunulatus* in having a dark band below the last few dorsal-fin spines, rather than below the segmented rays and on the caudal peduncle.

Discussion. The confusion associated with the synonymy of *B. speciosus* was discussed by Bauchot & Blanc (1962), and their decision to apply the name *Diastodon speciosus* Bowdich (1825) to this species is supported here. The crude illustration of *D. speciosus* accompanying Bowdich's description, reproduced here as Fig. 56c, clearly shows the presence of filamentous lobes on the caudal fin. The character alone distinguishes it from *B. scrofa*, the other eastern Atlantic *Bodianus*.

Cossyphus tredecimspinosus was described by Günther (1862) from a moderately large individual with XIII dorsal-fin spines. The extreme deformation of the first few dorsal pterygiophores indicates that the additional fin spine is aberrant. The specimen otherwise matches *B. speciosus*.

Material examined. **Atlantic Ocean** BMNH 1855.9.19.915 (1, 229, holotype of *C. tredecimspinosus*); CAPE VERDE IS., BMNH 1864.6.6.5-6 (2, 252–385); AFRICA, USNM 217886 (2, 156–174); *Guinea* MNHN 1969-18 (3, ≈110–270), 1969-20 (1, ≈115), USNM 217887 (2, 137–169), 217890 (1, 255), 217895 (3, 168–188), 217896 (10, 84.4–205), 217897 (5, 105–232), *Liberia*, Bushrod I. USNM 193635 (1, 164), 193642 (1, 108), *Ghana* MNHN 1969-19 (1, ≈215), USNM 217875 (1, 148), 217891 (1, 252), Prampram BMNH 1977.3.21.136 (1, 44.9), *Cameroon*, Mbode CAS-SU 55251 (1, 138), 68595 (1, 142).

Subgenus *Bodianus*

Bodianus Bloch, 1790
Harpe Lacepède, 1803
Cossyphus Valenciennes, *in* Cuvier & Valenciennes, 1839
Ronchifex Gistel, 1848.

Type species. *Bodianus bodianus* Bloch, 1790, by tautonomy.

Etymology. See *Etymology* in generic treatment above.

Diagnosis. Ethmoid-frontal surface strongly depressed; transverse axis of lower pharyngeal (Fig. 8a–d) moderately deep centrally with slightly convex posterior margin; pharyngeal teeth rounded, somewhat aligned transversely at center in about 5 rows, those at periphery forming continuous margin, teeth medially of moderate size with largest teeth at center of posterior row and those along side progressively smaller, lateral teeth uniformly small; anterior head of pharyngeal long, with 5–10 teeth of similar size to those immediately behind aligned in about three lengthwise rows; vomerine teeth absent; teeth laterally in jaws based on crest of bony dental ridge, anteriormost teeth not aligned with prominent anterior canines, those in lower jaw in 2–4 series sequentially, defined by differing lengths, posterior series usually shortest; dorsal fin with XII (rarely XIII or XIV), 10 (rarely 9 or 11) rays; anal fin with III, 12 (rarely 11) rays; lateral line with 30–32 (rarely 33) pored scales; 4½–6½ scales above lateral line; 11½–16 scales below lateral line; predorsal scales 12–25, reaching forward to vertical through posterior extent of orbit or just in advance of vertical through center of eye; cheek scales extending forward nearly to or just in advance of corner of mouth, preopercle with narrow to broad naked margin, scales not quite reaching or reaching just in advance of corner of mouth on lower jaw; scaly basal sheath of dorsal and anal fins high, 2½–4 scales in depth; posterior tips of dorsal and anal fins rounded to pointed, becoming filamentous in adults; caudal fin truncate to slightly rounded, posterior margin sometimes jagged, corners produced into long filaments in some; pectoral fin broadly rounded below, dorsoposterior margin mostly straight, upper rays distinctly longer; species small to moderately large, maximum lengths 230–450 mm SL; polychromatism ontogenetically and between sexes in some.

Discussion. The subgenus *Bodianus* with five species is confined to Atlantic and Eastern Pacific

Bodianus diplotaenia (Gill)

Figs 8a, 57–58, Plate 9H–J; Tables 2–3

Harpe diplotaenia Gill, 1862, p. 140, Cape San Lucas, Lower California.
Harpe pectoralis Gill, 1862, p. 141, Cape San Lucas, Lower California.

Morphological diagnosis. Dorsal-fin rays XII, 10* (24) or 11 (1); anal-fin rays III, 12; caudal-fin rays 8 (1), 10* (6), 11 (17) or 12 (1) + 11 (1) or 12 (24) + 9 (1), 10 (9) or 11* (15); pectoral-fin rays ii, 15; lateral-line scales 31; scales above lateral line 5½; scales below lateral line ≈12½–14 (usually 12½); predorsal scales ≈13–18 (14*, anterior scales often well embedded), usually not quite reaching anteriorly to above center of eye on dorsal midline of head, scales deeply embedded and difficult

to detect above eye; total gill rakers 16 (2), 17 (1), 18 (12), 19 (6) or 20 (2). See Table 2 for morphometric values. Dorsal outline of forehead and snout nearly straight in lateral aspect, nape slightly curved; large specimens with hump developing on dorsal midline of head between eyes, exaggerated in largest individuals. Small patch of scales ventrally on lower jaw below corner of mouth. Upper jaw with second prominent anterior canine usually smaller than first, often about ⅔–¾ size; tips of canines slightly flattened, at least in small specimens (anterior canines in both jaws displaying considerable wear and damage in adults); first canine directed anteroventrally and slightly mesially in all but very large individuals; second canine directed ventrally to anteroventrally with tips recurved ventrally; small juveniles with smooth dental ridge laterally; larger specimens with individual teeth developing along ridge, initially posteriorly; posterior teeth always better developed than anterior teeth; very large specimens with ≈10 moderately long canines of similar size; 1 or 2 posterior canines on each side directed anteroventrally. Lower jaw with first anterior canine usually smaller than second, often about ½–¾ the size, both directed anterodorsally, first also slightly mesially; well-developed dental ridge on anterior half of jaw, mostly smooth in small juveniles, granular with several small teeth developing especially posteriorly in larger individuals; ridge followed variably by 2 or more series of teeth, usually with posterior row of 3 or 4 short canines separated from ridge by 1 or 2 series of longer teeth, teeth of these series often more or less confluent with teeth based posteriorly on dental ridge; in some specimens several of these constitute series of anterodorsally directed canines centrally on jaw; in very large individuals dental ridge very granular and humped anteriorly, teeth posterior to ridge in these specimens usually prominent, of similar size and mostly confluent. Posterior tip of dorsal fin truncate in small juveniles, pointed and forming elongate filament in larger specimens. Posterior tip of anal fin bluntly pointed in small juveniles, similarly filamentous in large specimens. Posterior tip of dorsal and anal fins not reaching posterior edge of hypurals in small juveniles, extending beyond distal tips of middle caudal-fin rays in largest individuals; filamentous tip of anal fin usually longer than that of dorsal fin. Caudal fin mostly truncate in juveniles; uppermost and lowermost rays elongate in larger specimens forming filament at dorsal and ventral corners of fin, filaments reaching 2.6 times length of middle rays in extremely large specimens. Pelvic fin with posterior tip not quite reaching anus in smaller specimens; fin filamentous in larger specimens, reaching to posterior end of anal-fin base in at least one large specimen examined.

A large species, largest specimen examined 447 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 58a)—body mostly pale with 2 somewhat broken, broad dark stripes; first stripe directed dorsoposteriorly from center of orbital margin posteriorly to just above origin of lateral line, and then horizontally to dorsal side of caudal peduncle; second directed from posterior margin of orbit horizontally just above lateral midline to posterior midpoint of caudal peduncle; very small specimens with third similar but faint stripe ventroposteriorly; body pattern generally reticulated to finely striped in paler areas due to faint medial to marginal pale-dusky band on each scale and narrow pale dusky stripe following each scale row. Head with broad dark stripe extending from anteroventral margin of orbit forward to upper lip near tip of snout; second much narrower stripe often paralleling first stripe from anterior margin of orbit to tip of snout; dorsal side of head and snout often with dark vermiculations in slightly larger specimens; moderately narrow dusky to dark stripe directed posteroventrally from corner of mouth, head slightly dusky above stripe and abruptly pale below. Dorsal fin slightly dusky to dark, abruptly pale on posterior ⅔ of soft portion; a moderately large dark spot between anteriormost 3 spines. Anal fin dusky to dark anteriorly, abruptly pale on posterior third of fin. Caudal fin pale; 2 vertically aligned, horizontally elongate dark spots on scaly base posterior to posterior edge of hypurals. Pectoral fin pale with dusky to dark dorsoposterior tip in larger specimens; narrow dusky band on scaly base along proximal ends of rays. Pelvic fin pale to slightly dusky with dusky to dark streak distally on first segmented ray.

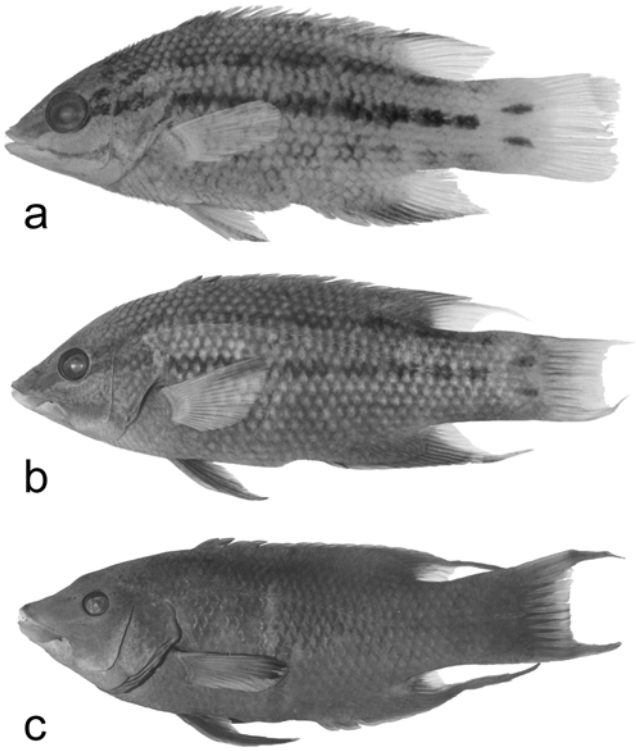

Fig. 58. *Bodianus diplotaenia*: (*a*) juvenile, 51.9 mm SL, USNM 217864, Isla Isabella, Galapagos Islands; (*b*) initial-phase adult, 153 mm SL, GCRL V76:15049, Playa del Coco, Costa Rica; and, (*c*) terminal-phase adult, 222 mm SL, USNM 107095, Isla de Coco, Costa Rica.

Initial-phase adults (Fig. 58b)—as described above for juveniles.

Terminal-phase adults (Fig. 58c)—body dark with elongate narrow pale band midlaterally on side below about fifth to seventh dorsal-fin spine, width of band about half diameter of eye (band often mostly faded in long preserved specimens); head dusky to dark above corner of mouth, abruptly pale on undersurface; dorsal and anal fins dark, posterior ends (about last 3 rays) proximal to dark filamentous rays pale. Caudal fin dark along elongate dorsal and ventral filaments and proximally on membranes between middle rays, distal portion between elongate rays pale. Pectoral fin slightly dusky with extensive dark dorsoposterior tip, dark tip continued anteroventrally as tapering submarginal streak, leaving broad, irregular, pale, distal margin. Pelvic fin dark with pale leading and trailing edge most often proximally.

Colour in life. Juveniles (Plate 9H)—uniformly lemon yellow, with black markings developing with growth; 2 interrupted blackish stripes developing on dorsal half of body radiating from posterior margin of orbit with third stripe ventrally on side in small specimens; 2 vertically aligned prominent blackish spots on scaly base of caudal fin. Dorsal fin with black spot between anteriormost 3 spines.

Initial-phase adults (Plate 9I)—body red to reddish brown with 2 interrupted black stripes dorsally as in juveniles, red darkest along edge of each scale; posterior end of caudal peduncle yellowish; large specimens with bluish white hue in center of scales on back; head with brownish stripe or composite stripe formed from several wavy lines extending from forward edge of orbit to tip of snout; underside of head white. Dorsal fin mostly red with yellowish cast, posterior segmented rays yellow; narrow blue marginal stripe on dorsal edge; black spot between first 2 or 3 spines. Anal fin red, last 4 or 5 segmented rays yellow; narrow blue marginal stripe on ventral edge. Caudal-fin rays yellow, membrane mostly transparent; upper and lower edges of fin tinged with red. Pectoral fin transparent with reddish rays; dorsal rays reddish brown distally. Pelvic fin red, transparent toward posterior edge; leading edge of fin bluish distally.

Terminal-phase adults (Plate 9J)—body red, blue or brownish grey with narrow yellow band on side below about fifth to seventh dorsal-fin spines. Head reddish in smaller individuals. Pectoral fin with black blotch near dorso-posterior corner.

Colour illustrations of this species appear in Thomson *et al*. (1979, pls 21a, terminal-phase adult, and 21b, initial-phase adult), Burgess & Axelrod (1984, figs 249, juvenile, 250, initial-phase adult, and 251 and 252, terminal-phase adults), Allen & Robertson (1994, pg. 197, top, terminal-phase adult and upper middle, initial-phase adult) and Grove & Lavenberg (1997, colour images 86, terminal-phase adult, and 87, initial-phase adult).

Distribution. *Bodianus diplotaenia* occurs along the Pacific coast of the Americas from the Gulf of California to Peru, and at the offshore islands of Clarion, the Revillagigedos, Clipperton (Snodgrass & Heller, 1905), Isla de Cocos and the Galapagos (Fig. 57). Mann (1954) recorded this species from the northern tip of Chile between Arica and Iquique. This species is associated with grass beds, coral reefs and rocky bottom (Grove & Lavenberg, 1997) and is often abundant near islands (Gilbert & Starks, 1904). *Bodianus diplotaenia* has been collected at depths of 1–15 m, but occurs to about 60 m (Grove & Lavenberg, 1997).

Etymology: *diplotaenia*, from the Greek *diploos*, "twofold", and feminine noun *tainia*, "ribbon", in reference to the two prominent dark stripes on the body of juveniles and initial-phase adults.

Comparison. *Bodianus diplotaenia* most closely resembles other American species of *Bodianus* and *B. insularis* from the islands of the southern Mid-Atlantic Ridge, but it shares the development of a fleshy hump on the forehead in large adults only with *B. eclancheri* within the genus. *Bodianus diplotaenia* is readily separable from the eastern Pacific *B. eclancheri* in having canines rather than incisors at the anterior tip of the jaws, from the western Atlantic *B. pulchellus* and *B. rufus* in having 15 rather than usually 14 branched pectoral-fin rays and in possessing a striped colour pattern in all but terminal-phase adults, and from *B. insularis* in having a prominent striped colour pattern on the body as well as on the head in all but terminal-phase adults.

Most specimens of this species examined have three segmented, unbranched caudal-fin rays dorsally and ventrally, whereas other species of *Bodianus* usually have two. In addition, the prominent anterior canines in the jaws of some specimens were more compressed than in any species other than *B. eclancheri*.

Discussion. Gill's (1862) *Harpe diplotaenia*, based on two specimens with a initial-phase adult colour pattern, holds page priority over his *Harpe pectoralis*, described from three specimens with a terminal-phase adult pattern. Differences between the two noted by Gill may be ascribed to ontogenetic change and individual variation. The larger specimen of *Harpe diplotaenia* (USNM 2986, 323 mm SL) is here designated lectotype for the purpose of fixing the senior name.

Neither function nor cause for the gibbous process on the forehead of sexually mature individuals is known. Structurally, the supporting mass consists solely of uniform spongy tissue. The hump starts forming in large initial-phase adults but usually does not become especially pronounced until after transformation to the terminal-phase adult pattern has occurred, suggesting hormonal control. This, however, does not appear to be a simple case of females having striped patterns with little hump development and males having terminal-phase adults patterns with well-developed humps, as many of the smaller individuals with terminal-phase adult colour patterns have ripe ovaries without externally apparent testicular development. Histological examination of fresh material may show that sufficient testicular development has taken place to provide hormones for hump development. The modification is found elsewhere in the tribe Hypsigenyini only in the three species of *Semicossyphus*. Two of these three, like *B. diplotaenia* and *B. eclancheri*, are also confined to the eastern Pacific.

Material examined. **Pacific Ocean**, MEXICO, USNM 6430 (1, 213), *Baja California*, Isla las Animas BPBM 7472 (2, 117–215), San Lucas NMCO 68-0445 (2), 68-0709 (1), USNM 2986 (1, 323, dry, lectotype of *H. diplotaenia*), 2988 (3, 230–447, dry, paralectotypes and lectotype of *H. pectoralis*), 4441 (1, 189, paralectotype of *H. diplotaenia*), *Guerrero*, Acapulco Harbour NMCO 68-0656 (1), *Colina*, Santiago Bay NMCO 68-0682 (11), *Julisco*, Chamela Bay NMCO 68-0690 (1), *Isla Maria Magdalena* NMCO 68-1305 (1); *Revilla Gigedo Is*., Socorro I. NMCO 68-0436 (6), 68-0437 (2), 68-0711 (1), 68-0716 (1), 68-0717 (1), 68-0722 (6), 68-0724 (6), 68-1008 (2), 68-1011 (2), 68-1615 (1), 68-1620 (1), USNM 46893 (1, 230), 46964 (1, 269), 47030 (1, 235), 94066 (1, 284), Clarion I. NMCO 68-0999 (2), 68-1002 (1), 68-1006 (1), 68-1007 (2), USNM 46880 (1, 366), 46891 (1, 334), 46898 (1, 277), 47029 (1, 370), 47176 (1, 318); COSTA RICA, *Playa del Coco* GCRL 15049 (1, 153), UCR 114-2 (1), 203-13 (1), *Isla San Jose* UCR 357-7 (1), UCR 432-13 (1), *Isla Murcielago* UCR 381-2 (5), *Isla del Coño* UCR 423-22 (1), *Isla de Coco* NMCO 68-0616 (1), UCR 714-9 (2), USNM 107095 (2, 217–222); PANAMA, *Perlas Is*. MCZ 44307 (1, 140), *Isla Coiba* MCZ 44306 (1, 171), *Isla Taboga* MCZ 45591 (2, 79–173), 45597 (4, 207–240), 25783 (2, 231–256), 45784 (3, 157–230), *Taboguilla I*. USNM 65437 (1, 190), *Panama City* USNM 31366 (1, 320), 78110 (1, 227), *Balboa* USNM 80854 (1, 320), 80855 (1, 231), 80857 (1, 203), 80858 (3, 199–252), 81461 (1, 45.1); COLUMBIA, *Bahia Utria* USNM 217884 (1, 155), *Malpelo I*. ANSP 107089 (1, 276); PERU, *Lobos de Afuera* USNM 77741 (1, 255), *Galapagos Is*., Albemarle Is. USNM 50076 (1, 365), 50077 (1, 323), Barrington I. SMF 5799 (3, 110–222), USNM 49790 (1, 248), Indefatigable SMF 5800 (1, 292), Isla Isabella USNM 217864 (7, 36.7–71.2, 1 specimen cleared and stained), James I. USNM 50083 (1, 260).

Bodianus eclancheri (Valenciennes)

Figs 57, 59; Plate 10A–B; Tables 2–3

Cossyphus eclancheri Valenciennes, 1846, p. 340, pl. 8, fig. 2, Galapagos.

Morphological diagnosis. Dorsal-fin rays XII, 10* (16) or XIV, 9 (1); anal-fin rays III, 11 (10) or 12* (7); caudal-fin rays 10* (15) or 11 (1) + 11 (2), 12 (13) or 13 (1) + 9 (4) or 10* (12); pectoral-fin rays ii, 15* (30) or 16 (2); lateral-line scales 31* (10), 32 (20) or 33 (2); scales above lateral line 5 or 5½; scales below lateral line ≈12½–15 (13 in type); predorsal scales ≈12–18 (15*), reaching to or nearly to above posterior extent of orbit on dorsal midline of head, reaching slightly in advance of posterior extent of orbit in juveniles, anterior scales embedded; total gill rakers 16 (7) or 17 (8). See Table 2 for morphometric values. Dorsal outline of nape in small specimens curved little in lateral profile, distinctly convex in large individuals; fleshy hump on forehead and posterior end of snout in adults, pronounced in large adults. Lower jaw naked. Upper jaw with first prominent canine very large and incisiform, markedly in large specimens; second canine usually somewhat compressed ≈⅕–⅔ length of first, relatively smaller in larger specimens, anterior canines more similar in juveniles; first canine directed anteroventrally and slightly mesially; second directed ventrally; dental ridge often very irregular and somewhat humped in large specimens, with 1–8 very low teeth, teeth best developed in very large specimens; 1 or 2 small canines at posterior end of jaw, directed anteroventrally. Lower jaw with relatively prominent anterior canines of similar size, mostly large and distinctly incisiform, especially in larger specimens; canines directed anterodorsally, first somewhat more anteriorly; dental ridge usually irregular with numerous very low granular teeth anteriorly, often with prominent hump posterior to anterior canines and about 2–4 canines of moderate size about midway back on jaw or slightly posteriorly, followed by about 4 canines of similar or slightly smaller size. Mesial side of dental ridge in both jaws often paved with numerous tiny teeth in large adults. Prominent anterior canines often of different size perhaps reflecting use and loss. Posterior tip of dorsal fin pointed in adults, filamentous (sixth and seventh segmented rays) in large specimens; posterior lobe of fin rounded below filament, jagged in largest specimens with eighth and ninth rays individually filamentous; posterior tip of fin not reaching posterior edge of hypurals in small adult specimens, reaching slightly beyond posterior edge of scaly caudal-fin base in some large specimens. Posterior tip of anal fin usually pointed in adults (rounded in one specimen examined), slightly filamentous in largest specimens; some large specimens with posterior edge of fin lobe jagged between filamentous tip and fin base as in dorsal fin; tip of fin not quite reaching hypural edge in smaller specimens, reaching nearly to posterior edge of scaly base in larger individuals. Caudal fin truncate with elongate dorsal lobe and less elongate ventral lobe in large specimens; posterior edge of fin jagged, especially dorsally in large specimens, with individual rays prolonged; dorsal lobe reaching 1.25 times length of middle rays in some specimens. Posterior tip of pelvic fin usually reaching between anus and base of first anal-fin spine in large specimens, not quite reaching anus in some and reaching to base of second spine in others (latter condition in larger specimens, though somewhat independent of size).

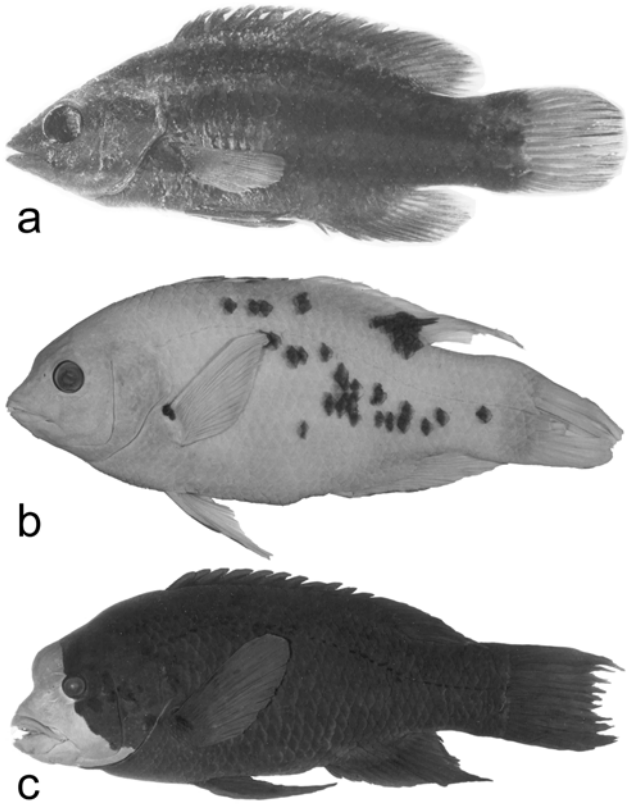

Fig. 59. *Bodianus eclancheri*: (*a*) juvenile, 67.0 mm SL, SMF 10751, Lima, Peru; (*b*) adult, 204 mm SL, USNM 217893, Isabella, Galapagos; and, (*c*) adult, 305 mm SL, SIO H53-148, Galapagos Islands.

A moderately large species, largest specimen examined 317 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 59a)—body pale with 3 or 4 moderately narrow dark stripes, dorsal-most stripe extending along base of dorsal fin, second originating middorsally on snout, splitting bilaterally above eyes and passing immediately above lateral line to posterior end of dorsal-fin base where it merges with dorsal stripe; third stripe running from upper lip near tip of snout to anteroventral edge of orbit and then from posterior edge of orbit to center of fleshy caudal-fin base, fourth stripe extending from corner of mouth to ventral edge of pectoral-fin base, then posteriorly to lower side of caudal peduncle, stripe faint beyond posterior end of anal fin; dark spot dorsally and ventrally at posterior end of caudal peduncle. Dorsal fin pale with dusky pigment basally on membrane between spines and broad dusky basal stripe and narrow midlateral stripe merging with basal stripe anteriorly. Caudal fin slightly dusky, pale basally. Pectoral and pelvic fin mostly pale.

Adults (Fig. 59b,c)—extremely variable; smaller specimens often dark with underside of head below level of mouth pale; others with pale area expanded to cover much of head and various portions of body, especially ventrally; still others mostly pale with a variable number of dark scales, patches of scales and areas on fins (dark and pale areas

distinctly demarcated in all forms of pattern). Large adults often totally dark or mostly dark with anterior half of head and ventral surface of head to opercular margin pale.

Colour in life. Juveniles (Plate 10A)—as described above for juveniles, with darkly pigmented areas black and pale areas mostly white.

Adults (Plate 10B)—(in part from Evermann & Radcliffe, 1917) extremely variable, from totally black with blue mottlings to partially black with remaining portion of body bright red, yellow, orange, brown or white, or practically any combination of these colours (colours may occur on almost any portion of body and to any extent; colours abruptly demarcated by the next colour without gradation from one to another); black and brown spots usually confined to whole scales or groups of scales on body, not often covering only part of a scale. Neither sex appears associated with a particular colour pattern.

Colour illustrations of this species appear in Wheeler (1975, colour fig. 410, adult, misidentified as *Pimelometopon darwini*), Burgess & Axelrod (1984, figs 247 and 248, adults), Allen & Robertson (1994, pg. 197, lower middle and bottom right, adults, and bottom left, juvenile) and Grove & Lavenberg (1997, colour image 88, adult).

Distribution. *Bodianus eclancheri* occurs in coastal waters of western South America from Peru to Chile, but is best known from the Galapagos Islands (Fig. 57). Because of the shallow depths at which this species occurs and its distinctive appearance, the species would certainly have been recognized and reported if it occurred elsewhere. Like *B. diplotaenia*, this species is found in rocky areas where it feeds on a wide variety of invertebrates and algae (Grove & Lavenberg, 1997).

Etymology: *eclancheri*, named for M. L'Eclancher.

Comparison. Within the genus, *B. eclancheri* has unique features of morphology and colour pattern. It is remarkable in having extensive variation in adult coloration, and develops striking, koi-like patterns with various combinations of red, orange, yellow, brown, black and white, the patterns often differing on either side of the body. Morphologically, the species has prominent anterior incisiform teeth in the jaws, in contrast to the anterior canines of its congeners. Large *B. eclancheri* develop an exaggerated scalloping of fin edges between adjoining branched rays of the caudal fin and posterior portion of the dorsal and anal fins. This condition is found in only a few other species of *Bodianus* where it is barely noticeable. Few species of the genus other than *B. eclancheri* have a natural variation in branched anal-fin rays (11 or 12). Finally, *B. eclancheri* and *B. diplotaenia* are alone within the genus in developing a gibbous process on the forehead in sexually mature individuals (see *Comparison* in species account of *B. diplotaenia*). *Bodianus eclancheri* most closely resembles American species of *Bodianus* and *B. insularis*. It is distinguishable from these, and all other species of *Bodianus*, by the above mentioned characters, especially dentition.

Discussion. *Bodianus eclancheri* was described by Valenciennes (1846) from a single adult specimen. No other names have been proposed for the species.

Although Evermann & Radcliffe (1917) point out that the colour patterns described above for this species are present in specimens from coastal Peru, all of the specimens examined for this study from coastal South America were of the dark or mostly dark form, whereas many of the specimens from the Galapagos exhibited large expanses of pale coloration. In addition, specimens from the coastal population appear to have a slightly shallower body with a depth of 34.1–40.3 (mean 37.0) as compared with 39.2–41.0 (mean 39.9) in the Galapagos population. Although the differences may indicate the two widely separated populations are genetically isolated to some degree, larger samples are required to ascertain if these differences are consistent.

Bodianus eclancheri is the only species of the genus so far reported to differentiate as males or females upon maturation (S. Hoffman, pers. comm.). Hoffman has observed the ratio of males to females as being approximately equal in the Galapagos Islands.

Material examined. **Pacific Ocean**, PERU, *Galapagos Is*. MNHN A.8255 (1, 182, mount, holotype of *C. eclancheri*), SIO H53-148 (1, 305), Albermarle I. USNM 49781 (1, 264), Charles I. USNM 49780 (1, 263), Isla Isabella USNM 217893 (2, 186–204), San Cristobal I. SIO H52-405-50A (2, 269–272), USNM 65436 (1, 263), Lobos de Tierra I. NMCO 68-0566 (3, 227–317), 68-0568 (1, 269), USNM 128095 (1, 198), 128096 (1, 182), *Lobos de Afuera Bay* USNM 77615 (4, 162 + 3 heads), *Paita Harbour* USNM 128097 (1, 107), *Lima* SMF 10751 (1, 67.0).

Bodianus insularis (Gomon & Lubbock)

Figs 2a, 8b, 57, 60; Plate 10C–E; Tables 2–3

Bodianus insularis Gomon & Lubbock, 1980: 106, figs 1–3, Ascension I., English Bay.

Morphological diagnosis. Dorsal-fin rays XII*, (21) or XIII (1), 9 (1) or 10* (21); anal-fin rays III, 11 (2) or 12* (20); caudal-fin rays 10* (5) or 11 (12) + 12 + 10* (7) or 11 (10); pectoral-fin rays ii, 14* (29) or 15 (2); lateral-line scales 31* (29) or 32 (1); scales above lateral line 5½–6½ (usually 5½); scales below lateral line ≈13–16 (usually 14 or 15); predorsal scales ≈19–25, reaching anteriorly to above center of eye on dorsal midline of head; total gill rakers 15 (1), 16 (13) or 17* (2). See Table 2 for morphometric values. Head and snout moderately pointed (Fig. 2a); dorsal profile of forehead and snout straight in lateral aspect, slightly curved in juveniles; nape with slight convex curve in adults, mostly straight in juveniles. Scales extending onto lower jaw usually in advance of posterior corner of mouth. Upper jaw with second prominent anterior canine about equal to or slightly shorter than first; first canine directed anteroventrally and occasionally slightly mesially; second canine usually directed ventrally, somewhat laterally and occasionally slightly anteriorly; dental ridge smooth or with only several tiny teeth anteriorly in juveniles, with ≈9–11 canines of small to moderate size in large adults, teeth largest posteriorly; usually single moderately large, slightly curved canine at posterior end of upper jaw, directed anteroventrally and somewhat laterally. Lower jaw with first prominent anterior canine ≈½–⅘ length of second, first canine relatively short in large specimens; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, tips usually curved slightly laterally; teeth on dental ridge in single row separable into about 3 or even

4 series; anteriormost series manifested as smooth to slightly uneven dental ridge on anterior ⅖ to ½ of jaw in juveniles, developing 4–9 more or less distinct short canines (canines becoming longer posteriorly) in adults; second series with about 1–4 usually longer teeth mostly confluent with first; 1–3 (rarely 3) moderately long teeth in third series, upright in juveniles, slanted anterodorsally in adults; 1–6 close set, uniformly short teeth in fourth series. Posterior tip of dorsal fin rounded in small juveniles, pointed in larger specimens, sixth segmented ray prolonged into filamentous extension in adults; fin tip not quite reaching posterior edge of hypurals in small juveniles (less than about 50–60 mm SL), extending past hypural edge in larger specimens (just beyond posterior margin of scaly caudal-fin base in 268 mm SL specimen). Posterior tip of anal fin rounded in small juveniles, pointed in larger specimens, eighth and ninth segmented rays prolonged to form filamentous extension in adults; fin tip not quite reaching posterior edge of hypurals in small adults, extending little past hypural edge in most larger specimens (reaching well beyond posterior margin of scaly caudal-fin base in 268 mm SL specimen). Caudal fin truncate to slightly rounded, especially in juveniles, uppermost and lowermost rays elongate in large adults forming dorsal and ventral fin filaments; filaments reaching 1.5 times length of middle rays in some specimens. Posterior tip of pelvic fin reaching near anus, ranging from just short of anus to slightly past it (reaching to base of first anal-fin spine in 258 mm SL specimen); fin somewhat filamentous in largest specimens.

A species of moderate size, largest specimen examined 270 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 60a,b)—body of specimens less than about 16 mm SL pale except for few scattered tiny melanophores; dorsal fin pale with black spot covering anterior end of fin between first and fourth spine, membrane slightly dusky between fourth and fifth spine; remaining fins pale to transparent. Larger juveniles with 2 dusky stripes radiating posteriorly from eye on head; melanophores denser on head and anterior portion of body conveying slightly dusky appearance anteriorly; broad dusky stripe anterior to eye; narrow dusky band on fleshy pectoral-fin base along proximal ends of rays; dusky distal stripe at tips of dorsal-fin spines; anal fin with dark dusky spot at anterior end. Moderately large juveniles as above except anterior ½–⅔ of fin slightly; dark spot anteriorly on dorsal fin between first 3 spines; body anteroventrally or anteriorly often slightly dusky; usually with prominent dusky stripes posterior to eye.

Initial-phase adults (Fig. 60c)—body dusky overall, scales darkest along posterior margin, usually much paler toward center; 2 dusky stripes still apparent posterior to eye on head; dorsal-fin spines dusky, those posteriorly pale; anal fin mostly dusky, paler posterior to ninth ray; caudal fin slightly dusky to pale with upper and lower edge darker (especially lower edge); pectoral fin transparent to slightly dusky with distinct dusky smudge near dorsoposterior corner; pelvic fin dusky, spine somewhat paler. Some specimens with horizontal rows of faint dots on sides, each dot formed by slightly darker area midproximally on exposed portion of each scale.

Terminal-phase adults (Fig. 60d)—pigmentation as in initial-phase adults except overall pigment darker on head, dorsally on body and on dorsal-, anal, pectoral and pelvic fins, as well as along dorsal and ventral edges of caudal fin.

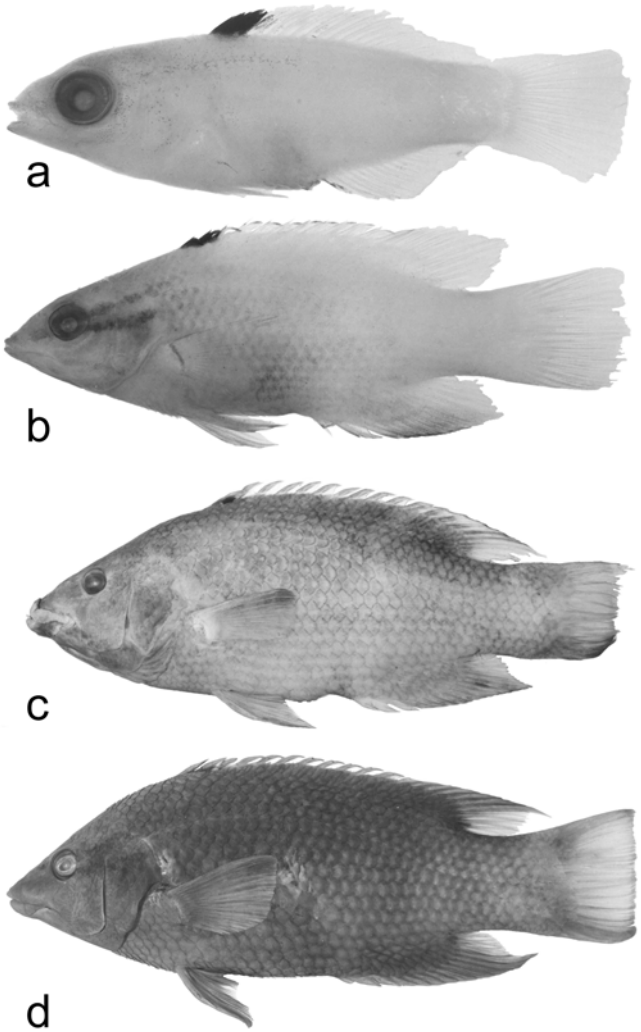

Fig. 60. *Bodianus insularis*: (*a*) juvenile, 15.2 mm SL, BMNH 1979.6.19.11, paratype, Southwest Bay, Ascension Island; (*b*) juvenile, 60.0 mm SL, BMNH 1979.6.19.16, paratype, Southwest Bay, Ascension Island; (*c*) initial-phase adult, 210 mm SL, BMNH 1979.6.19.10, holotype, English Bay, Ascension Island; and, (*d*) terminal-phase adult, 215 mm SL, USNM 218885, paratype, Northwest Bay, Ascension Island.

Colour in life. Juveniles (Plate 10C)—small individuals entirely yellow except for black spot at anterior end of dorsal fin. Larger juveniles yellow with bluish white spot on each body scale below lateral line; several dark grey stripes on head, including 2 posterior to eye and third broader stripe anterior to eye; faint grey stripe usually directed posteroventrally from corner of mouth; anterior portion of body sometimes slightly grey; largest juveniles with bluish white stripe posteriorly on lower lip, extending onto ventral margin of preopercle; dorsal fin yellow with black spot anteriorly (anterodistal edge of spot outlined in blue, blue turning purple and extending posteriorly as purple marginal stripe along tips of spines); membrane between last few segmented dorsal-fin rays transparent; anal fin yellow with purple marginal stripe extending posteriorly to tip of about sixth segmented ray; membrane between last few rays transparent; caudal-fin rays yellow, interradial membranes transparent; grey band on fleshy pectoral-fin base outlining

proximal edge of fin; pelvic fin yellow with purple leading edge, interradial membranes between inner rays transparent.

Initial-phase adults (Plate 10D)—body bright red with bluish white spot covering proximal portion of each scale posterior to head; bluish white area expanded covering most of scales on belly and on anal-fin base; lower jaw and ventral side of head bluish white, often suffused with grey; 2 red stripes directed posteriorly from eye and a broad red stripe on anterior side of eye; dorsal fin red with bluish purple marginal stripe along tips of spines, black spot between anterior 3 spines, interradial membranes between last few segmented rays transparent; anal fin red with bluish purple marginal stripe extending from fin origin nearly to pointed posterior tip of fin; interradial membranes between last few segmented anal-fin rays transparent; caudal-fin rays red, basal portion of interradial membranes red, membranes transparent distally; pectoral fin transparent, basal portion and dorsal edge of fin red, large blackish blotch on dorsoposterior corner of fin; pelvic fin red with bluish purple leading edge.

Terminal-phase adults (Plate 10E)—head reddish, underside of head below line from corner of mouth following ventral edge of upper lip white; body posterior to head dark grey to black suffused with red anteroventrally on sides, grey area darkest on distal margin of scales; breast whitish; 2 dark red lines posterior to eye; dorsal and anal fin grey to blackish with narrow blue marginal stripe along horizontal edge; last 4 or 5 segmented dorsal-fin rays yellow, interradial membranes associated with rays yellow basally, transparent distally; black spot between first 3 dorsal-fin spines, but less apparent than in smaller specimens; upper and lower edges of caudal fin dark grey to blackish, intermediate portion of fin yellow, distal portion greyish or transparent; some yellow patches occasionally midlaterally on caudal peduncle; red band on fleshy pectoral-fin base and in axilla of fin, fin rays yellow, transparent distally, interradial membranes transparent; dark grey to blackish blotch near dorsoposterior corner of pectoral fin; pelvic fin reddish, suffused with grey, leading edge blue.

Colour illustrations of this species appear in Gomon & Lubbock (1980, figs 1, juveniles, 2, initial-phase adult, and 3, terminal-phase adult).

Etymology: *insularis*, a Latin adjective meaning "of an island", in reference to the apparent restriction of this species to islands associated with the Mid-Atlantic Ridge.

Distribution. This species is known only from islands of the Mid-Atlantic Ridge, including Ascension Island, St Helena and St. Pauls Rocks (Fig. 57). Ecological data are available only for the holotype and ten paratypes taken during a single collecting trip to Ascension Island by R. Lubbock. The specimens were collected near rocks on calcareous algal rubble, rocks on sand and in an area of scattered rubble on relatively fine coralline debris. Capture depths ranged from 12 to 35 m.

Comparison. This species is very similar in morphology to American congeners. It is distinguishable from the eastern Pacific *B. diplotaenia* and *B. eclancheri* in having fewer pectoral-fin rays (ii, 14, rarely ii, 15, versus ii, 15, rarely ii, 16), in not developing a fleshy hump on the forehead of large adults and in not developing a darkly striped pattern extending the length of the body in smaller specimens. Although the darkly striped pattern in juveniles of *B. eclancheri* is lost well before a fleshy hump is produced, its incisiform anterior canines are unlike the typical caniniform teeth of *B. insularis* and are easily distinguished even at very small sizes. *Bodianus insularis* is separable from the western Atlantic *B. rufus* and *B. pulchellus* in never developing the bicoloured coloration characteristic of most adults of those species (either overall yellow, red or black, instead of having distinct regions of blue and yellow, red and yellow or red, yellow and white; some terminal-phase adult specimens of *B. rufus* are dark blue, blackish or reddish yellow overall; see species account of *B. rufus* for details) and in having a more typical, pointed snout in large specimens (Fig. 2a; large specimens of *B. rufus* and *B. pulchellus* usually have a bluntly pointed snout as shown in Fig. 2b). In addition, this species does not appear to develop fin filaments that are as long as those found in most specimens of *B. rufus* and *B. pulchellus* of comparable size. *Bodianus insularis* differs from most adult specimens of *B. rufus* in having a distinct blackish blotch in the dorsoposterior corner of the pectoral fin that is usually absent in the latter species (some specimens of *B. rufus* from the Central American Coast have a dusky smudge at this position). Very small juvenile specimens of *B. insularis* and *B. pulchellus* are extremely similar in being entirely yellow with a black spot at the anterior end of the dorsal fin. The two are distinguishable, however, by the size of the dorsal-fin spot that extends to or nearly to the eighth spine in *B. pulchellus* but only about half that distance in other species in the Atlantic and eastern Pacific. The only other species of the genus that develops filamentous extensions of the dorsal and anal fins is *B. macrognathos* of the northwestern Indian Ocean. This species is easily distinguished from *B. insularis* in having a rounded head and snout in lateral aspect and more numerous body scales (40 or 41 in the lateral line).

Discussion. There is some question as to what species Linnaeus affixed the name *Labrus rufus*, as his description was based on a specimen from Spain or the Americas, as well as on Catesby's (1743) account of "Turdus flavus". Because *B. insularis* was collected by early explorers and may have been available to scientists of Linnaeus' time, it is certainly possible that it is the species for which Linnaeus's name was intended. The absence of a type specimen for *L. rufus*, however, makes a determination impossible. *Labrus rufus* is consequently referred to the species that has traditionally taken the name (see *Discussion* in the account of *B. rufus* for more information).

Bodianus insularis has been long confused with the western Atlantic *B. rufus* (Valenciennes, *in* Cuvier & Valenciennes, 1839; Günther, 1862; Cadenat & Marchal, 1963), perhaps due in part to the large size of early specimens. Large *B. insularis* are uniformly dusky and resemble large adults of *B. rufus* and *B. diplotaenia*. *Bodianus insularis* was also misidentified as *B. pectoralis* (= *B. diplotaenia*; described from terminal-phase adults) because both have a pair of dark stripes radiating from the posterior side of the eye and a dark pectoral-fin tip.

Material examined. **Atlantic Ocean**, ST. PAULS ROCKS, BMNH 1879.5.14.29 (1, 268, paratype of *B. insularis*); ASCENSION I. BMNH 1927.12.7.72 (1, 253, paratype of *B. insularis*), 1932.2.19.47-49 (3, 213–235, paratypes of *B. insularis*), 1979.6.19.10 (1, 210, holotype of *B. insularis*), 1979.6.19.11-17 (7, 15.2–63.2, paratypes of *B. insularis*), 1979.6.19.18-19 (2, 25.3–30.4), MNHN 63-224 (1, 248, paratype of *B. insularis*), USNM 218885 (1, 215, paratype of *B. insularis*), 218891 (1,

55.5, paratype of *B. insularis*); ST. HELENA, BMNH 1867.10.8.17-18 (2, 216–238, paratypes of *B. insularis*), 1910.9.9.16 (1, 193, paratype of *B. insularis*), 1946.5.23.7 (1, 244), 1965.12.1.96 (1, 270, paratype of *B. insularis*), 1965.12.1.97 (1, 258, paratype of *B. insularis*), MNHN A.7413 (1, 218, paratype of *B. insularis*).

Bodianus pulchellus (Poey)

Figs 2b, 57, 61; Plate 10F–H; Tables 2–3

Cossyphus pulchellus Poey, 1860, p. 208, Cuba.
Harpe naevius Eigenmann, 1894, p. 630, Rio Janeiro (Brazil).

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 12; caudal-fin rays 9 (3), 10 (14) or 11 (6) + 12 + 10 (17) or 11 (5); pectoral-fin rays ii, 13 (1) or 14 (33); lateral-line scales 31 (18) or 32 (2); scales above lateral line ≈5–6; scales below lateral line ≈11½–13½; predorsal scales ≈16–20, reaching to above center of orbit on dorsal midline of head; total gill rakers 14 (1), 15 (10), 16 (4) or 17 (1). See Table 2 for morphometric values. Head and snout bluntly pointed, more so in larger specimens (Fig. 2b); dorsal outline of forehead and snout nearly straight in lateral profile; nape with slight convex curve. Scales extending anterior to corner of mouth on lower jaw, though embedded and often difficult to detect. Upper jaw with first prominent anterior canine about equal in size to second in smaller specimens, shorter than second in larger individuals, ≈⅔–⅘ second in largest; teeth on either side of symphysis set close together; first canine directed anteroventrally; second directed ventrolaterally, tip often curved slightly posteriorly; dental ridge with few tiny teeth in small specimens, 4–10 canines of small to moderate size in larger specimens, teeth progressively longer posteriorly; single (rarely 2) moderately large curved canine at posterior end of jaw, usually directed anteroventrolaterally. Lower jaw with first prominent anterior canine ≈⅖–⅔ length of second; first canine directed anterodorsally and slightly mesially; second directed anterodorsally and slightly laterally; teeth on dental ridge separable into about 4 series; first series poorly developed in small specimens, occupying almost anterior half of ridge, with up to 7 distinct teeth in larger individuals, teeth progressively longer posteriorly often merging with those of second series; second series with about 2–4 erect canines of moderate size followed immediately by third series of 1–3 anterodorsally slanted canines of similar or slightly larger size; fourth series with 3–6 equally short canines. Posterior tip of dorsal fin rounded in very small specimens, pointed in larger juveniles, sixth segmented ray elongate forming filamentous extension in all but small juveniles; tip not quite reaching posterior edge of hypurals in small specimens, reaching near or to posterior edge of scaly caudal-fin base in larger specimens (to midway between posterior margin of scaly fin base and posterior edge of fin in one very large specimen). Posterior tip of anal fin rounded in very small specimens, pointed in large juveniles, eighth and ninth rays elongate, forming filamentous extension in all but small juveniles; tip not quite reaching posterior edge of hypurals in small specimens, reaching near or to posterior edge of scaly caudal-fin base in larger specimens. Caudal fin truncate to very slightly rounded posteriorly, uppermost and lowermost branched rays elongate forming filamentous dorsal and ventral lobes in all but small juveniles, dorsal lobe reaching 1.7 times length of middle rays. Tip of pelvic fin reaching just short of anus in small specimens, reaching to or just past anus in larger specimens; largest specimens with fin tip filamentous, reaching to base of first or second anal-fin spine.

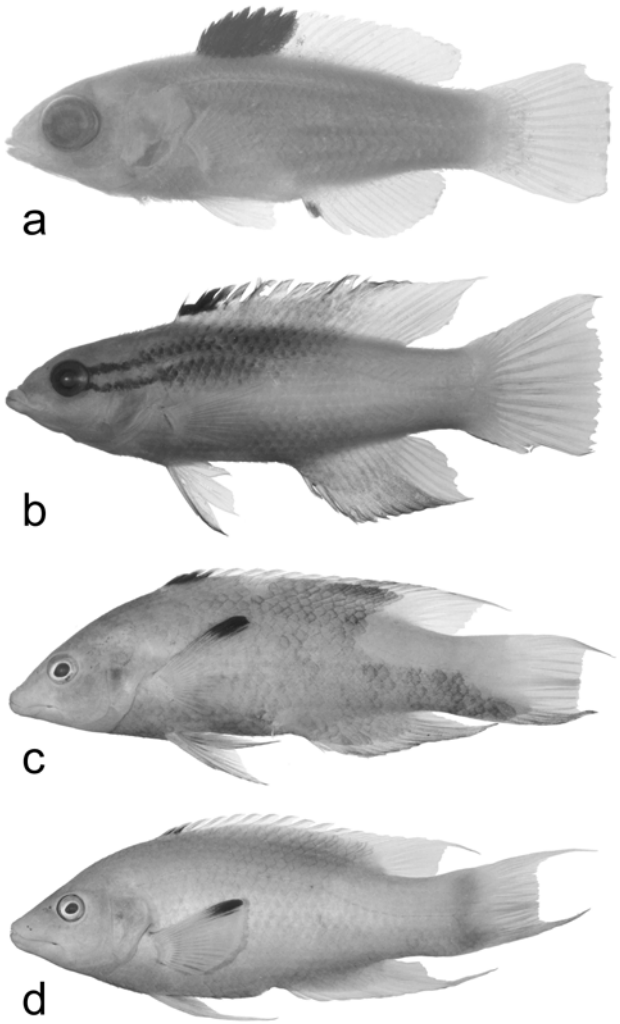

Fig. 61. *Bodianus pulchellus*: (*a*) juvenile, 17.3 mm SL, UMML 10220, Alligator Light, Florida; (*b*) juvenile, 48.2 mm SL, UMML 17828, Alligator Light, Florida; (*c*) adult, 108 mm SL, UMML 33232, Port Everglades, Florida; and, (*d*) adult, 151 mm SL, UMML 33232, Port Everglades, Florida.

A species of moderate size, largest specimen examined 232 mm SL.

Pigmentation in alcohol. Juveniles (Fig. 61a,b)—small specimens entirely pale except for large dark spot covering anterior end of dorsal fin prior to eighth spine; occasionally dark mark also on anterior edge of anal fin. Slightly larger specimens with 2 narrow dark dusky stripes directed posteriorly from eye, single broad stripe connecting anterior edge of eye and snout tip; stripes posterior to eye broad and diffuse dorsoanteriorly on back, separated by pale interspace along lateral line in slightly larger specimens; dorsal side of snout, forehead and nape, as well as rest of body below dusky stripes, pale. Larger juveniles with dusky pigment anterobasally on anal fin, pigment extending onto ventral sides of body and reaching farther posteriorly along anal fin in progressively larger specimens; largest juveniles with

dark spot on dorsal fin confined to area anterior to third spine and dusky pigment extending posteriorly to second segmented ray; anal fin dusky except for transparent area posteriorly associated with last few segmented rays; caudal fin with dusky margin basally; elongate dark spot distally on uppermost pectoral-fin rays and dusky margin along leading edge of pelvic fin; pale midlateral stripe remaining between dusky dorsal and ventral areas on body.

Adults (Fig. 61c,d)—pigmentation as in large juveniles but fading in large adults; large adults completely pale except for distinctive dark spot at dorsoposterior corner of pectoral fin and dark spot between anterior 3 dorsal-fin spines.

Colour in life. (The following description is mostly based on Feddern, 1963). Juveniles (Plate 10F)—body in very small individuals yellow with grey area anterior to eye and 2 narrow grey stripes directed posteriorly from eye; large black spot covering dorsal fin anterior to eighth spine; small black spot on anterior edge of anal fin; remainder of fins transparent. Juveniles slightly longer than 35 mm SL with posterior half of body yellow, yellow extending anteriorly along lateral line; 2 narrow reddish black stripes, fading to grey posteriorly, directed posteriorly from eye and separated by yellow stripe on lateral line; head and body grey above stripe, white below; dorsal fin yellow with deep blue spot anteriorly and purple distal border; anal fin yellow, transparent posteriorly, with purple border distally; caudal fin transparent with yellow rays; pectoral fin transparent; pelvic fin mostly yellow with a purple leading edge, transparent posteromesially. Larger juveniles with yellow confined to dorsoposterior portion of back and caudal peduncle; dorsal side of head and body anterior to yellow area along with ventral side of body posterior to head red, 2 red areas separated by white lateral stripe-like space confluent with white area covering ventral half of head; dorsal fin red anteriorly to about second segmented ray, yellow posteriorly, black spot between first 3 spines; tips of membranes on spinous portion of fin purple, yellow subdistally; anal fin changing from red to whitish in progressively larger individuals, transparent posteriorly in large juveniles; caudal fin transparent with yellow rays dorsally and medially, red ventrally; pectoral fin transparent with black smudge dorsoposteriorly; pelvic fin red along leading edge, transparent posteriorly.

Adults (Plate 10G,H)—as in large juveniles except red area on ventral side of body expanded dorsally in largest individuals almost totally obliterating pale lateral space; stripes posterior to eye, when present, evident as darker red streaks; red areas on dorsal and anal fins extending nearly to posterior end of fin in largest individuals. Large adults occasionally with blue in place of red areas, with distribution of colours otherwise the same.

A colour figure of this species appears in Randall (1968, fig. 224, adult).

Distribution. This species occurs throughout most of the tropical western Atlantic (Fig. 57) from Bermuda and offshore reefs east of the Carolinas southward to about Santos, Brazil (Menezes, pers. comm.). *Bodianus pulchellus* inhabits deeper waters than does the mostly sympatric *B. rufus*, replacing that species at about 18–110 m. The species never strays far from rock or coral cover.

Etymology: *pulchellus*, a Latin diminutive meaning "pretty", in reference to the attractive coloration of this species.

Comparison. *Bodianus pulchellus* is the smallest of the five Atlantic and eastern Pacific species of the subgenus *Bodianus*, all resembling one another in possessing well-developed filamentous posterior extensions of the dorsal and anal fins. It is distinguishable from the eastern Pacific *B. diplotaenia* and *B. eclancheri* in having fewer pectoral-fin rays, ii, 14 (rarely ii, 13) versus ii, 15 (rarely ii, 16), in not developing a prominent dark striped pattern in juveniles, and in not developing a fleshy hump on the forehead in large adults. *Bodianus pulchellus* differs from *B. insularis* in having a slightly shallower body (body depth/standard length 28.8–32.2, versus 30.8–40.1), in having the dark spot anteriorly on the dorsal fin reaching farther posteriorly (to the seventh or eighth spine in very small juveniles) and in having a distinctive red, yellow and white tricoloured pigmentation in larger specimens. *Bodianus pulchellus* is distinguished from the sympatric *B. rufus* in possessing a prominent black spot at the tip of the pectoral fin of large juveniles and adults, in having fewer total rakers on the first gill arch (14–16, 17 in 1 of 16 specimens; versus 17–20, 16 in 1 of 28 specimens) and in having a distinctive colour pattern.

Discussion. This species has been consistently recognized as *pulchellus* since Poey's (1860) description. As discussed in the following species account, the manuscript description on which *Labrus semiruber* Lacepède (1802) was based may indeed have been taken from a specimen of this species rather than of *B. rufus*. Lacepède's brief description (and for that matter Commerson's manuscript description), however, is insufficient to ascertain which species Commerson had at hand. In the absence of substantive information, *L. semiruber* is retained in synonymy with *B. rufus*. Eigenmann's (1894) *Harpe naevius* appears to have been based on an adult *B. pulchellus* that was compared only with *B. rufus*. The type specimen of *H. naevius* was not located.

Material examined. **Atlantic Ocean**, NORTH AMERICA, *South Carolina*, Charleston UMML 33231 (1, 137), *Florida*, Port Everglades UMML 33232 (2, 108–151), Bakers Haulover UMML 9508 (1, 160), 14134 (1, 156), Key Biscayne UMML 33229 (1, 22.6), Alligator Light UMML 6879 (3, 21.4–41.3), 7006 (1, 81.4), 7531 (4, 55.1–91.8), 7773 (1, 92.9), 9183 (2, 39.4–45.8), 9193 (5, 10.3–50.3), 9690 (3, 63.2–105), 10220 (1, 17.3), 11097 (1, 83.1), 17828 (7, 23.6–76.1), 18185 (1, 58.2), 19785 (4, 48.7–78.4), Looe Key UMML 9192 (1, 74.2), Pensacola Bay USNM 202924 (1, 181), *Texas* USNM 156614 (1, 133); CENTRAL AMERICA, *Mexico*, Golfo de Campeche USNM 188500 (1), *Honduras* UMML 2012 (1, 117); SOUTH AMERICA, *Colombia*, Santa Marta UMML 33230 (1, 49.6), Brazil, Amazon USNM 5814 (1, 140), Santos BMNH 1907.7.6.1 (1, 220), Rio de Janeiro BMNH 1923.7.30.270 (1, 182), USNM 23223 (1, 163); WEST INDIES, *Cuba* MCZ 14292 (1, 134, holotype of *C. pulchellus*), USNM 4752 (1, 147), 24958 (1, 114); *Bahama Is*., N. Bimini UMML 28566 (1, 26.4).

Bodianus rufus (Linnaeus)

Figs 8d, 57, 62; Plate 10 I–J; Tables 2–3

Labrus rufus Linnaeus, 1758, p. 284, America.
Bodianus bodianus Bloch, 1790, p. 24, pl. 223, Brazil.
Lutjanus verres Bloch, 1791, p. 7, pl. 255, Brazil.
Sparus falcatus Bloch, 1791, p. 17, pl. 258, Brazil.
Labrus semiruber Lacepède, 1802, p. 428, Brazil.
Bodianus blochi Lacepède, 1803, p. 280, Brazil.
Harpe caeruleo-auereus Lacepède, 1803, p. 426, pl. 8, type locality unknown.

Morphological diagnosis. Dorsal-fin rays XII, 10; anal-fin rays III, 11 (1) or 12 (51); caudal-fin rays 9 (1), 10 (18) or 11 (29) + 12 + 7 (1), 8 (1), 9 (3), 10 (33) or 11 (9); pectoral-fin rays ii, 13 (3), 14 (73) or 15 (3); lateral-line scales 31; scales above lateral line 4½–5½ (rarely 4½); scales below lateral line 12–14 (usually 12½–13); predorsal scales ≈17–22, reaching forward to above center of orbits on dorsal midline of head; total gill rakers 16 (1), 17 (8), 18 (9), 19 (9) or 20 (1). See Table 2 for morphometric values. Head and snout bluntly pointed, more so in larger specimens; dorsal outline of forehead and snout nearly straight in lateral profile, very slight concave curve before eyes in large specimens; nape nearly straight dorsally with slight convex curve in large specimens. Scales reaching in advance of corner of mouth on lower jaw, though embedded and often difficult to detect. Upper jaw with first prominent canine about equal to or slightly larger than second; first canine directed anteroventrally; second directed anteroventrally to ventrally and slightly laterally; 2–13 moderately small canines on dental ridge posterior to prominent anterior canines, teeth most numerous and best developed in largest specimens, progressively larger posteriorly in jaw; single moderately small to moderately large curved canine usually at posterior end of jaw directed anteroventrally and slightly laterally. Lower jaw with first prominent anterior canine ≈⅖–⅘ size of second, relatively smallest in largest specimens; first canine directed anterodorsally and slightly mesially; second directed anterodorsally, entire tooth or tip of tooth curved dorsolaterally; anterior half of dental ridge rough or with several small teeth in small specimens, ridge covered with uneven row of 3–8 more or less distinct teeth in larger specimens, row merging with second series of 1–4 canines of moderate size in larger specimens; third series of 1–3 anterodorsally slanted canines of moderately large size ≈⅗ of way back in jaw, followed by series of 2–6 equally short teeth. Posterior tip of dorsal fin narrowly rounded in very small specimens, pointed in larger juveniles, sixth segmented ray elongate, produced as filamentous extension of fin in all but small juveniles; tip not quite reaching beyond posterior edge of hypurals in small juveniles, reaching beyond posterior tip of middle caudal-fin rays in largest specimens. Posterior tip of anal fin rounded in very small specimens, pointed in larger juveniles, eighth and ninth segmented rays elongate forming filamentous extension of fin in all but small juveniles; tip not quite reaching posterior edge of hypurals in small specimens, reaching somewhat short of posterior tips of middle caudal-fin rays in largest specimens. Caudal fin truncate to very slightly rounded posteriorly, uppermost and lowermost branched rays becoming extremely elongate, forming filamentous dorsal and ventral lobes in all but small juveniles, ventral lobe often distinctly shorter than dorsal lobe, dorsal lobe reaching 1.6 times length of middle rays. Tip of pelvic fin almost reaching anus in small juveniles, reaching to and slightly beyond anus in adults; fin filamentous in large specimens, reaching to base of third anal-fin spine in some.

A species of moderate size, largest specimen examined 300 mm SL.

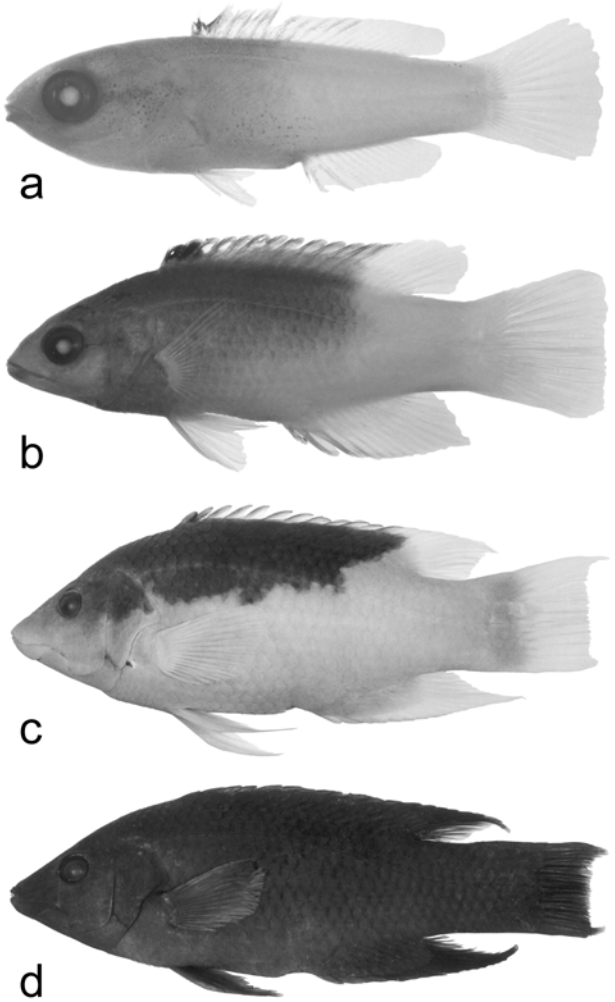

Fig. 62. *Bodianus rufus*: (*a*) juvenile, 13.5 mm SL, UMML 9198, Alligator Reef, Florida; (*b*) juvenile, 41.9 mm SL, UMML 9198, Alligator Reef, Florida; (*c*) initial-phase adult, 174 mm SL, UMML 33234, Sombrero Reef, Florida; and, (*d*) terminal-phase adult, 150 mm SL, UMML 23383, Courtown Cay, Nicaragua.

Pigmentation in alcohol. Juveniles (Fig. 62a,b)—small specimens with anterior half of body dusky, posterior half pale; dusky portion of body restricted to area above upperside of pectoral-fin base in larger specimens, head remaining dusky; 2 faint narrow stripes directed posteriorly from eye on head. Spinous portion of dorsal fin dusky (only anterior half in smallest specimens), soft portion pale; black spot on membrane between first 3 spines. Anal fin pale with narrow dusky marginal stripe anteriorly. Caudal and pectoral fin pale to transparent. Pelvic fin pale with dusky spine and leading edge.

Initial-phase adults (Fig. 62c)—pigmentation mostly as in larger juveniles; dusky area not reaching much below lateral line posteriorly; ventral half of head below lower edge of eye pale in larger specimens; narrow stripes posterior

to eye often faint or absent. Dusky anterior portion of dorsal fin reaching posteriorly to about third segmented ray. Anal, caudal, pectoral and pelvic fins pale. (See discussion below for exceptions.)

Terminal-phase adults (Fig. 62d)—body dusky with somewhat darker posterior edges on scales, body almost uniformly dark in some; head dusky, the chin somewhat paler in largest specimens. Fins dusky; dorsal and anal fins retaining pale area basally at posterior edge of fin; caudal fin with distinctly darker horizontal streaks on interradial membranes especially between middle rays; pectoral fin somewhat paler along posteroventral edge; pelvic fin with slightly paler leading edge.

The above progression in colour pattern development does not hold true for all localities, the dusky pattern developing at a much earlier stage in some areas and the distinctly dark pattern apparently not developing at all in others. In individuals that develop a dusky pattern early, a paler area is retained on the posterior end of the dorsal-fin base and the adjoining portion of the caudal peduncle. As the dusky pigment develops in these individuals, a darker blotch develops posteriorly on the dorsal and anal fins as in *B. anthioides*, reminiscent of black spots posteriorly on these fins in *B. axillaris*.

Colour in life. (The following description is mostly based on Feddern, 1963). Juveniles—small individuals whitish, iridescent blue anteriorly, yellow posteriorly; head pale grey above ventral edge of eye, blue below; 2 pale grey stripes on posterior side of eye. Dorsal fin dark grey anteriorly with black spot between first 3 spines; segmented rays yellow, membranes transparent. Anal fin dark grey on first 2 spines, third spine and segmented rays yellow, membranes transparent. Caudal fin with yellow rays and transparent membranes. Larger juveniles with bluish area confined anterodorsally; centers of scales in this area purplish blue, posterior edge of each scale outlined with reddish black; ventral half of head bluish white. Dorsal fin with bright blue rather than black spot anteriorly; spinous portion of fin purplish blue; segmented portion yellow. Anal fin yellow, transparent posteriorly, with narrow purplish blue marginal stripe anteriorly. Pelvic fin with greyish blue spine.

Initial-phase adults (Plate 10I)—colour as in large juveniles except ventral portion of head below eyes yellow, at least in large individuals; jaws yellowish, then reddish in progressively larger specimens; stripes posterior to eyes faint. Dorsal fin yellow anteriorly with narrow blue basal and marginal stripe, red in larger individuals; remaining portion of fin yellow. Red borders developing on dorsal and ventral margins of caudal fin and on pectoral fin; spot anteriorly on fin black. Large specimens reddish anterodorsally, as well as on dorsal-, anal, caudal and pelvic fins. Deeper dwelling individuals usually reddish anterodorsally.

Terminal-phase adults (Plate 10J)—entire fish dark purplish or bluish black with greyish chin and greying areas basally on posterior edge of dorsal and anal fins.

As discussed in the previous subsection, this succession in colour pattern, though basically occurring in fishes at most localities, does not hold true for all. A colour photograph in Hoese & Moore (1977, p. 10, bottom) shows a mostly blue adult with a whitish patch on the caudal peduncle at the posterior end of the dorsal-fin base. Minimal development of fin filaments suggests that the individual, presumably photographed off Texas, was not particularly large. A slightly smaller individual in a photo taken by D.W. Greenfield at Glovers Reef, east of Belize, has the anterior ⅔ of its body mostly blue, the posterior end of its dorsal fin and dorsal side of its body immediately below bright yellow, and the remainder of its body dusky yellow. These are consistent with differences observed in preserved material.

In addition to the above mentioned colour illustration in Hoese & Moore (1977), colour figures appear in Bianchini *et al*. (1977, species no. 148, juvenile) and Randall (1968, fig. 223, adult).

Distribution. *Bodianus rufus* occurs in tropical shallow waters of the western Atlantic (Fig. 57) from Bermuda and southern Florida to the state of Sao Paulo in Brazil (Menezes, pers. comm., based on an uncataloged specimen in the MZUSP). In addition to localities mentioned in *Material examined*, the species has been recorded from the northern Gulf of Mexico off Louisiana and Texas (Bright & Cashman, 1974; Sonnier *et al*., 1976). *Bodianus rufus* is commonly found near coral cover at depths of 1–6 m, but ranges to about 30 m in some areas. It is mostly replaced by *B. pulchellus* at greater depths.

Etymology: *rufus*, a Latin adjective meaning "red" or "reddish", apparently in reference to the overall reddish yellow coloration of some large individuals of this species. The name may have been based on Catesby's (1743) colour figure of this species referred to in Linnaeus' original description of *Labrus rufus*, although the initial-phase adult of *B. insularis* is also completely red (see *Discussion* for that species).

Comparison. *Bodianus rufus* resembles the four other Atlantic and eastern Pacific members of the subgenus *Bodianus* in general body shape, in shape of the scaly basal sheath on the dorsal and anal fins and in having posterior filamentous extensions of the dorsal and anal fins. The species is distinguishable from *B. diplotaenia* and *B. eclancheri* in having fewer pectoral-fin rays, ii, 14 (rarely ii, 13 or 15) versus ii, 15 (rarely ii, 16), in not developing prominent dark stripes in the juvenile stage, and in other aspects of colour pattern. *Bodianus rufus* differs from *B. insularis* in having a characteristically blunt snout in adults, in developing slightly longer filaments on the dorsal and anal fins in large individuals and in having a prominent bicoloured pigment pattern in all but very large individuals. *Bodianus rufus* is separable from the geographically sympatric *B. pulchellus* in lacking a prominent black spot at the tip of the pectoral fin (developing an overall dusky pectoral fin or smudge distally on the fin in dark terminal-phase individuals), in having more total gill rakers on the first arch (17–20, 16 in 1 of 28 specimens; versus 14–16, 17 in 1 of 16 specimens), in having a different colour pattern and in having a late development of filamentous fin rays.

Discussion. Some colour variation appears to occur in this species between localities. Members of a Central American population develop a dusky pattern at a very small size, similar to that of terminal-phase adults occurring elsewhere. This pattern differs from that of larger specimens found in most other areas in possessing a pale patch at the posterior end of the dorsal-fin base. No specimens with a truly dark pigmentation were observed from Florida and the Bahamas.

In this region, the typical bicoloured pattern persists to a very large size and is replaced by a much lighter overall dusky pattern (yellowish red in life, although a large bluish specimen is reported from Alligator Reef, Florida, by Feddern, 1963). Specimens from Cuba, Puerto Rico, Venezuela and Brazil, on the other hand, have the typical colour pattern development described above. In contrast, specimens from Bermuda may have either a bicoloured pattern at a very large size or a dusky pattern at an intermediate size.

This species has an extensive taxonomic history. Valenciennes (*in* Cuvier & Valenciennes, 1839, p. 103) reviewed at great length the treatment of this species in the literature, but confused the three species treated here as *B. rufus, B. pulchellus* and *B. insularis*. In fact, there remains doubt about which species Linnaeus (1758), described as *Labrus rufus*. Linnaeus' description cites two references for the basis of his description: "*Loefl*", evidently referring to "P. Loeflingii in *Hispaniam & Americam 1751*" mentioned in an introductory list of collections examined, and "Catesb. car. 2. p. 11. t. 11." (Catesby, 1743). The former pertains to a specimen from which Linnaeus obtained the meristic values presented, whereas the latter may have supplied the impetus for the name and perhaps the brief descriptive remarks. Unfortunately, the status of the "Loeflingii" collection and consequently the type specimen is unknown, making it impossible to identify to which of the three species the name applies. All three species fit the description, occur in the area where Loeflingii specimens were collected and were in early collections.

Four of the six species traditionally placed in synonymy with *B. rufus* are easily verifiable as synonyms: *Bodianus bodianus* Bloch (1790) based on a description and figure by Prince Maurice of Nassau, *Sparus falcatus* Bloch (1790) after a manuscript figure by Plumier, *Bodianus Blochi* Lacepède (1803) based on Bloch's *B. bodianus*, and *Harpe caeruleo-auereus* Lacepède (1803) after a manuscript description by Plumier and a figure by Aubriet. Valenciennes (1839) felt that Bloch's *Lutjanus verres* (1790) was described and figured from a dried specimen now in the Paris Museum (MNHN A.8260). This damaged specimen retains traces of the typical *B. rufus* colour pattern.

The identity of the remaining species, *Labrus semiruber* Lacepède (1802) based on a manuscript description by Commerson, however, remains uncertain. Although Lacepède's brief colour description "la partie antérieure de l'animal, rouge, et la postérieure jaune" may be construed to fit *B. rufus*, it more readily matches *B. pulchellus*. As Commerson's manuscript provides no further evidence, the identity of this species is still unresolved. To avoid confusion, *L. semiruber* is questionably retained in synonymy with *B. rufus*. The alternative, synonymizing it with *B. pulchellus*, would give it priority over an otherwise stable name.

Labrus plumierii Lacepède (1802), placed in synonymy with this species by Feddern (1963) is a haemulid, *Haemulon plumierii*, as pointed out by Cuvier (*in* Cuvier & Valenciennes, 1830, p. 231).

Material examined. **Atlantic Ocean**, MNHN 1.8260 (1, 249, skin); BERMUDA, USNM 10230 (1, 246), 20172 (1, 220), 21889 (1, 151); NORTH AMERICA, *Florida*, Key Biscayne UMML 31186 (1, 27.4), Long Reef UMML 3020 (1, 160), USNM 167646 (1, 107), Alligator Reef UMML 5503 (1, 82.2, cleared and stained), 9197 (1, 60.5), 9198 (14, 13.3–41.9), 9256 (1, 154), 9261 (1, 101), 10030 (1, 51.7), 10784 (15, 10.5–53.5), 18310 (1, 175), 19400 (4, 27.3–59.1), 19590 (1, 55.5), 19852 (7, 39.7–195), 19954 (2, 49.2–53.3), 20096 (2, 61.3–67.8), Tennessee Reef UMML 13546 (4, 16.6–26.2), Indian Key UMML 7359 (2, 12.4–20.2), Sugar loaf Key UMML 1639 (1, 217), Content Key UMML 33233 (2, 200–202), Marathon UMML 8740 (1, 240), UMML 33234 (5, 109–191); CENTRAL AMERICA, *Mexico*, Yucatan, Banco Chincherro UMML 9312 (1, 84.9), 9660 (1, 76.2), Cozumel I. UMML 9521 (2, 12.1–38.1), *Nicaragua*, Courtown Cay UMML 23383 (4, 70.3–151), *Panama*, Fort Sherman MCZ 45465 (1, 131), Porto Bello USNM 80859 (1, 201); SOUTH AMERICA, *Colombia*, Santa Marta UMML 30015 (1, 38.4), 30032 (1, 26.5) 30298 (4, 18.7–37.5), *Venezuela*, Los Roques I. UMML 15327 (1, 21.8), USNM 194111 (1, 273), *Brazil*, Bahia USNM 43347 (1, 159), Recife Pernambuco USNM 104283 (2, 138–171), Rio de Janeiro ANSP 9397 (1, 179); WEST INDIES, *Cuba* USNM 9817 (1, 182), 13043 (1, 222), Havana USNM 132992 (1, 203), Santa Cruz MCZ 14311 (1, 154), *Haiti* USNM 178486 (2, 153–168), Port-au-Prince USNM 133729 (1, 155), *Puerto Rico*, Congrejos UMML 1930 (2, 138–148), *Virgin Is*., St John UMML 6699 (1, 213), *Antigua* BMNH 1931.12.5.210-212 (2, 145–280), *Aves I*. UMML 32342 (1, 180), *Dominica* USNM 29853 (1, 300), 218884 (1, 39.1), 219379 (1, 34.7), *Barbados* USNM 21298 (1, 212), *Bahama Is*., Grand Bahama I. UMML 9262 (2, 95.9–147), Andros I. UMML 6121 (2, 25.8–28.2), 6580 (1, 27.8), Green Turtle Cay UMML 5848 (1, 22.8), Nassau USNM 38403 (1, 195).

Table 11. Summary of derived characters employed to compare taxa in the cladistic analysis. Numbers enclosed by parentheses refer to recognized character states (0 = plesiomorphic; 1 = apomorphic; 2 and 3 = extended transition series). See text for discussion.

1	Ethmoid-frontal depression present (0, 1, 2)
2	Anterior frontal shelf well developed (0, 1)
3	Combined frontals broad (0, 1)
4	Vomerine teeth absent (0, 1)
5	Four prominent canines at front of each jaw distinct from others (0, 1)
6	Jaw teeth at anterior end shifted laterally on dental ridge (0, 1)
7	Dental ridge present on jaws (0, 1)
8	Posterior teeth in lower jaw elongate (0, 1)
9	Profile of dentary triangular (0, 1)
10	Symphysis of lower jaw with interdigital joint (0, 1)
11	Infraorbitals with planar bony fringe (0, 1)
12	Anterior margin of pharyngeal forming narrow angle (0, 1, 2)
13	Dentigerous surface of pharyngeal small (0, 1)
14	Dentigerous surface of pharyngeal diamond-shaped (0, 1)
15	Distinct row of small teeth peripherally on pharyngeal (0, 1)
16	Small pharyngeal teeth overlapping onto anterior edge of lateral arms (0, 1)
17	Anterolateral margin of pharyngeal concave (0, 1)
18	Dense patch of small teeth laterally on pharyngeal (0, 1)
19	Medial pharyngeal tooth in posterior row enlarged (0, 1, 2)
20	Fifth hypural short (0, 1)
21	Maturation at 100 mm SL or less (0, 1, 2)
22	Head foreshortened (0, 1)
23	Adults with hump on nape (0, 1)
24	Segmented dorsal-fin rays increased to 11 (0, 1)
25	Segmented anal-fin rays decreased to 11 (0, 1)
26	Procurrent caudal-fin rays decreased to 7 (0, 1)
27	Dorsal and anal fins filamentous posteriorly (0, 1, 2)
28	Caudal fin with filamentous corners (0, 1, 2, 3)
29	Pelvic fins filamentous (0, 1)
30	Predorsal scales approximately 10 (0, 1)
31	Predorsal scales approximately 30 (0, 1)
32	Predorsal scales not reaching to nostrils (0, 1, 2)
33	Lower jaw scales not reaching to end of jaw (0, 1, 2)
34	Scaly sheath on bases of dorsal and anal fins (0, 1, 2, 3)
35	Adults bicoloured (0, 1)
36	Juveniles with discrete pale spots on body (0, 1)
37	Juveniles without distinct dark markings on body (0, 1)
38	Adults with dark spot on caudal peduncle (0, 1)
39	Prominent black spot, bar, or band posteriorly on body (0, 1, 2)
40	Opercle with dark spot (0, 1)
41	Head with numerous orange spots (0, 1)
42	Caudal fin with dark stripes dorsally and ventrally (0, 1)
43	Pectoral fins with dark tips (0, 1)

Morphological and anatomical variation

A detailed discussion of the morphological and anatomical variation within the labrid tribe Hypsigenyini was presented by Gomon (1997). Species of the genus *Bodianus*, like those of most other genera of hypsigenyins, are relatively conservative osteologically. Skeletal features that were observed to differ among species and are considered to be useful in testing interrelationships are associated with the neurocranium, jaws, pharyngeals and caudal skeleton. Bold numbers in square brackets in the following description of characters are those referenced in Table 11 and presented in the accompanying character matrix (Table 12). Although the interrelationships of major taxa referred to the Labroidei have long been debated (e.g., Stiassny & Jensen, 1987; Streelman & Karl, 1997; Clement, *et al*., 2004), most studies have retained the Cichlidae, if not the Embiotocidae and Pomacentridae. In the following discussion of characters, the Labroidei is regarded in the broader sense, incorporating the three families together with the Labridae. The last is similarly treated in the broadest sense as implied by Clement, *et al*. (2004) and Westneat (pers. comm.), in contrast to the suite of families suggested by Gomon (1997).

In the neurocranium, a ventral depression of the anterodorsal surface comprising the posterior half of the medial ethmoid and the anterior portion of the frontals ([**1**]; Gomon, 1997, figs 11–17), together with the formation of a bony shelf arising from bone enclosing the supraorbital

Table 12. Character matrix used to construct cladogram presented in Fig. 64; numbers at tops of columns correspond to character numbers in Table 11.

species	0 0 0 0 0 0 0 0 0 0 1 2 3 4 5 6 7 8 9	1 1 1 1 1 1 1 1 1 1 0 1 2 3 4 5 6 7 8 9	2 2 2 2 2 2 2 2 2 2 0 1 2 3 4 5 6 7 8 9	3 3 3 3 3 3 3 3 3 3 0 1 2 3 4 5 6 7 8 9	4 4 4 4 0 1 2 3
Cheilinus trilobatus	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 2 2 1 0 0	2 0 1 1 1 0 0 0 0 0	0 1 0 0
Symphodus tinca	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 2 0 0 0	1 0 2 2 0 0 0 0 1 0	0 0 0 0
Polylepion cruentum	0 0 0 0 1 0 1 0 0 0	0 0 2 0 0 0 0 0 0 0 0	1 0 0 0 1 0 0 0 0 0	0 1 0 0 0 0 0 0 0 0	0 0 0 0
Bodianus cylindriatus	0 1 1 0 1 0 1 0 1	1 1 0 0 0 0 0 0 0 0 0	1 0 0 0 0 1 0 0 0 0	0 0 0 0 0 0 0 0 0 0	0 0 0 0
B. bimaculatus	1 1 1 0 1 0 1 0 1	1 1 0 0 0 0 0 0 0 0 0	1 2 1 0 0 0 0 0 0 0	1 0 2 2 0 0 0 0 1 0	1 0 0 0
B. izuensis	1 1 1 0 1 0 1 0 1	1 1 0 0 0 0 0 0 0 0 0	1 2 1 0 0 0 0 0 0 0	1 0 2 2 0 0 0 0 1 0	1 0 0 0
B. opercularis	1 1 1 1 1 1 0 1 0 1	1 1 0 0 0 0 0 0 0 0 0	1 1 0 0 0 0 0 0 0 0	1 0 2 2 0 0 0 0 0 0	1 0 0 0
B. flavipinnis	1 1 1 1 1 1 1 1 0 1	1 1 2 0 0 0 1 0 0 0	1 0 0 0 1 0 1 0 0 0	0 0 1 2 1 0 0 0 0 0	0 0 0 0
B. frenchii	1 1 1 0 1 1 1 1 0 1	1 1 2 0 0 0 1 0 0 0	1 0 0 0 0 1 1 0 0 0	0 0 1 2 1 0 1 0 0 0	0 0 0 0
B. unimaculatus	1 1 1 1 1 1 1 1 0 1	1 1 1 0 0 0 0 0 0 1	1 0 0 0 1 0 1 0 2 0	0 0 1 2 1 0 0 0 0 0	0 0 0 0
B. vulpinus	1 1 1 1 1 1 1 1 0 1	1 1 1 0 0 0 1 0 0 0	1 0 0 0 1 0 1 0 3 1	0 0 1 2 1 0 0 0 0 0	0 0 0 0
B. scrofa	1 1 1 1 1 0 1 0 1	1 1 2 0 0 0 1 0 0 0	1 0 0 0 0 0 0 0 0 0	0 0 1 2 1 0 0 0 0 0	0 0 0 0
B. leucosticticus	2 1 1 0 1 0 1 0 1	1 1 1 0 0 0 1 0 0 1	1 0 0 0 0 0 0 0 0 0	0 1 0 1 1 0 0 0 0 0	0 0 0 0
B. dictynna n.sp.	2 1 1 1 1 0 1 0 1	1 1 2 0 0 0 1 0 0 1	1 0 0 0 0 0 0 0 0 0	0 1 1 1 1 0 0 0 1 0	0 0 0 0
B. axillaris	2 1 1 1 1 0 1 0 1	1 1 0 1 1 0 1 0 0 2	1 0 0 0 0 0 0 0 0 0	0 1 0 1 2 1 1 0 0 0	0 0 0 0
B. mesothorax	2 1 1 1 1 0 1 0 1	1 1 0 1 1 0 1 0 0 2	1 0 0 0 0 0 0 0 0 0	0 1 0 1 2 1 1 0 0 0	0 0 0 0
B. neilli	2 1 1 1 1 0 1 0 1	1 1 0 1 1 0 1 0 0 2	1 0 0 0 0 0 0 0 0 0	0 1 0 1 2 1 1 0 0 0	0 0 0 0
B. anthioides	2 1 1 0 1 0 1 0 1	1 1 0 1 1 0 1 0 0 2	1 0 1 0 0 0 0 0 3 0	0 1 0 1 2 1 0 0 0 0	0 0 1 0
B. albotaeniatus	2 1 1 1 1 0 1 0 1	1 1 2 0 0 1 1 1 0 2	1 0 0 0 0 0 0 0 2 1	0 0 2 2 2 0 0 0 0 2	0 0 0 0
B. macrognathos	2 1 1 1 1 0 1 0 1	1 1 2 1 1 1 1 1 0 2	1 0 0 0 0 0 0 1 2 1	0 0 2 2 2 1 0 0 0 0	0 0 0 1
B. perditio	2 1 1 1 1 0 1 0 1	1 1 2 0 0 1 1 1 1 1	1 0 0 0 0 0 0 0 2 1	0 0 2 2 2 0 0 0 0 1	0 1 0 1
B. solatus n.sp.	2 1 1 1 1 0 1 0 1	1 1 2 0 0 1 1 1 1 1	1 0 0 0 0 0 0 0 2 1	0 0 2 2 2 0 0 0 0 1	0 0 0 0
B. speciosus	2 1 1 1 1 0 1 0 1	1 1 2 0 1 1 1 1 1 2	1 0 0 0 0 0 0 0 2 1	0 0 2 2 2 0 0 1 0 1	0 1 1 1
B. diplotaenia	2 1 1 1 1 0 1 1 1	1 1 2 1 1 0 1 0 0 2	1 0 0 1 0 0 0 2 2 1	0 0 1 1 3 1 0 0 0 0	0 0 1 1
B. insularis	2 1 1 1 1 0 1 1 1	1 1 0 1 1 0 1 0 0 1	1 0 0 0 0 0 0 2 2 1	0 0 1 1 3 0 0 1 0 0	0 0 1 1
B. pulchellus	2 1 1 1 1 0 1 1 1	1 1 1 1 1 0 1 0 0 2	1 0 0 0 0 0 0 2 2 1	0 0 1 1 3 0 0 1 0 0	0 0 0 1
B. rufus	2 1 1 1 1 0 1 1 1	1 1 1 1 1 0 1 0 0 2	1 0 0 0 0 0 0 2 2 1	0 0 1 1 3 1 0 1 0 0	0 0 0 0

cephalic laterosensory canals [**2**], in species of *Bodianus* is likely to be a derived condition. This region is mostly flat in primitive labrids (Gomon, 1997, fig. 10). The extreme depression of the anterior ends of the frontals with only a slight depression, at most, of the posterior edge of the medial ethmoid to form the overall ethmoid frontal depression appears to be unique to this genus, at least within the family (Gomon, 1997, figs 17, 20c & 21). This contrasts with the marked depression of the posterior portion of the medial ethmoid with the anterior ends of the frontals deflected only slightly to meet the posterior edge of the medial ethmoid found in the closely related genera *Xiphocheilus* and *Choerodon* (Gomon, 1997, figs 12, 13, & 20b). Because of the differences in details of the formation of the ethmoid frontal depression between the two groups, the features are considered to be independently derived. Within the genus *Bodianus*, the degree of ethmoid frontal depression varies from no recognizable depression (character state 0), to slight depression (character state 1), to extreme depression (character state 2). The width of the combined frontals is thought to have been narrow anteriorly in the ancestral form, with an increase in the breadth of this region representing a modification ([**3**]; Gomon, 1997, fig. 17).

Virtually all labrid genera lack vomerine dentition, but a few species within the Hypsigenyini have several canines on the ventral surface of this bone (Gomon, 1997, fig. 22). As vomerine teeth are present in many primitive perciforms, their absence [**4**] is considered a modification within the Labridae.

Labrid jaw dentition is arranged generally in one or two rows; when present, the second row usually comprises one or two pairs of prominent canines based anterolateral to the first row at the anterior end of each jaw. In forms with a single row, anteriormost teeth are usually the largest with subsequent teeth progressively shorter, but in some posterior teeth are considerably larger than the others. As most perciforms with one or two rows of teeth in the jaws have teeth of uniform length or a gradual shift in length the presence of one or two remotely based pairs of teeth is likely to be derived [**5**]. All teeth in a single row, however, may not necessarily be derived from only one of the basic two rows. A few taxa include individuals in which the prominent anterior canines of the second row appear to have become aligned with more posterior teeth of the first row ([**6**]; Fig. 1a,b), either through a lateral shift of the first row or a dorsal migration of the second. The primitive condition, as occurs widely throughout the Labridae, is hypothesized as involving dentition arranged in two rows, the first or inside row lining the free edge of the dentary and premaxilla, the second consisting of two pairs of prominent canines anteriorly in each jaw immediately outside the first row (Fig. 1c,d). The teeth of the first row are thus effectively based on a prominent dental ridge [**7**]. Concurrently, the anterior teeth of the first row are lost or perhaps fused to one another leaving a naked dental ridge along the mesial side of the prominent anterior canines. In species that reach a large terminal-phase adult size, the mesial surface of this dental

ridge often becomes paved with many tiny rounded teeth that are most evident in very large individuals. In some species, the canines of the outer row are somewhat incisiform. This condition is considered derived as anterior teeth are most frequently caniniform in other labroids, as well as labrids. Lateral jaw teeth in labrids are also mostly caniniform and may be in one to three series sequentially, demarcated by size. In the vast majority of labroid species, lateral teeth are present in moderate numbers and posterior teeth are smaller than those preceding them. The presence of numerous lateral teeth of a mostly uniform size (Fig. 1c) and enlarged posterior lower jaw teeth ([**8**]; Fig. 1d) in some species of *Bodianus* are both considered modifications.

The lateral profile of the dentary varies considerably between labrid taxa from a mostly rectangular configuration with a nearly vertical anterior edge and horizontal ventral edge—the intervening angle being about 90°—to a triangular form with a nearly straight obliquely angled anteroventral outline—the angle between the former anterior and ventral edges approaching, if not equalling 180° ([**9**]; Gomon, 1997, fig. 26). The former condition is considered primitive as it is common to primitive perciforms (Greenwood, 1976). The formation of an interdigital joint at the symphysis of the dentary ([**10**]; Gomon, 1997, fig. 26b), as in other fishes, appears to be associated with a strengthening of the symphyseal joint. Forms consequently possessing such a structure are often those in which the anteroventral edge of the dentary has become obliquely angled placing a greater ventrolateral force on the jaw when occluded. The presence of an inderdigital joint at the symphysis of the dentaries is therefore considered derived, an absence primitive.

The number and shape of elements in the infraorbital series of labrids is relatively consistent, the most obvious modifications being an occasional reduction in total number of elements and change in form of some bones. A simple tubular construction of the second to seventh elements is likely to be an ancestral condition with the formation of a planar bony fringe along the edge opposite the orbit ([**11**]; Gomon, 1997, fig. 22c) representing a modified state (Gomon, 1997).

As the configuration of the labrid lower pharyngeal is unique to the family, a detailed comparison of labrid pharyngeal dentition with pharyngeal dentition of other labroids and perciforms is uninformative; however, as dentition in the majority of outgroups examined is evenly distributed and caniniform, similar to the pharyngeal dentition of many labrid species, the presence of evenly-sized blunt conical teeth covering the flattened surfaces exposed to the buccal cavity is likely to be primitive for the family. Labrids with a generalized body form tend to have pharyngeals with lateral arms that approach a perpendicular to the body axis, providing an inverted T-shape in dorsal view, rather than the inverted Y-shape in groups that have taken on a specialized lifestyle (eg, *Clepticus parrae*, Gomon, 1997, fig. 32d); the former is hypothesized to be the primitive condition. Variants from this arrangement that are considered to be derivations include: anterior profile of lower pharyngeal forming a more acute angle in dorsal view ([**12**], less than 125°—character state 1, less than 120°—character state 2), dentigerous surface on pharyngeal reduced, the width of the surface less than ⅔ width of pharyngeal ([**13**]), increased relative length of the dentigerous surface, the anterior-posterior length greater than ⅓ the width ([**14**]; Fig. 6), the peripheral teeth forming a distinct marginal row of teeth of even size, but detectably smaller than those encircled [**15**], much smaller teeth overlapping onto anterior surface of lateral pharyngeal arms [**16**], presence of a concavity in the dentigerous surface anterolaterally on each arm [**17**], presence of a dense patch of small teeth laterally on each arm [**18**], and presence of enlarged elliptical, molariform teeth posteromesially ([**19**], height of medial tooth in posterior row compared with width of dentigerous surface greater than 0.09—character state 1, greater than 0.15—character state 2; Figs 5b–d, 6, 7).

Although the caudal skeleton of labrids is relatively uniform, the size of the fifth hypural varies somewhat between groups with a smaller hypural—less than half the length of the complex comprising the ultimate centrum and fused hypurals 3 and 4—considered derived (Gomon, 1997; [**20**]).

Externally, labrids generally reach maturity when larger than 100 mm SL. This is certainly the case for the majority of *Bodianus* species. Although the size at maturity varies considerably among labroids, most of generalized form, as with many other perciform groups follow this trend. Maturation at 100 mm SL or less [**21**] is therefore considered apomorphic for the genus. Two degrees of miniaturization are recognized here: maturation at approximately 100 mm SL (character state 1) and at approximately 50 mm SL (character state 2). The general body shape in representatives of the family, as well as other labroids, is perch-like with individuals having a pointed snout of moderate length. A foreshortened snout is considered apomorphic [**22**]. The development of a hump-like swelling of the nape [**23**] occurs in a few relatively isolated species within the family, and only very rarely elsewhere among labroids. It is considered a modification for the genus *Bodianus*.

The evolutionary trend in fishes associated with meristic values is reductive (Greenwood, et al, 1966), unless associated with such specializations as a prolongation of the body. Within the tribe Hypsigenyini, the total number of dorsal-fin rays varies from 20 to 23, except in aberrant specimens, with six of its nine genera usually having 22 (Gomon, 1997). *Bodianus* has 12 dorsal-fin spines and is the only genus to have species (five of 43) with more than 22 dorsal elements as a regular condition. Based on the terminal divergence of the genus within the tribe (Gomon, 1997) the presence of ten segmented rays is considered primitive, with an increase of one ray to 11 [**24**] regarded as a modification, contrary to the general reductive trend. Members of the tribe Hypsigenyini have 9–13 segmented anal-fin rays, with the genera *Semicossyphus, Clepticus* and *Bodianus* having the highest numbers (12 in the vast majority). The presence of 12 segmented rays is taken as the primitive value, with an apparent reduction to 11 rays [**25**] considered to be a derivation (Gomon, 1997). The maximum number of procurrent caudal-fin rays observed in labrids is 11, with the typical value for the genus *Bodianus* being 8 or 9. The regular occurrence of 7 procurrent caudal-fin rays [**26**] for a species is considered apomorphic.

The development of filamentous projections of fins occurs occasionally in genera of a number of labrid lines, as it does in numerous other perciform groups. The absence of these features in a vast majority of labroid representatives suggests that their presence is derived, at least for the family Labridae. Within the genus *Bodianus* filamentous extensions

have developed variously on the posterior ends of the dorsal and anal fins ([**27**], the filaments varying from short, character state 1, to long, character state 2), the upper and lower corners of the caudal fin ([**28**], the filaments being short, character state 1, of moderate length, character state 2, or extremely elongate, character state 3), and the tip of the pelvic fins [**29**].

The extent of cephalic squamation varies considerably both within and outside the Labridae. The profusion of scales on the head in many labroid and perciform outgroups is considered to be a primitive condition, with a reduction of squamation representing a derived state (Gomon, 1997). A measure of this reduction is the number of predorsal scales and the anterior extent to which they develop. A census of predorsal scale numbers (Table 3), shows that they fall into three groups, with mean values of about 10, 20 and 30. Although numbers of predorsal scales vary considerably in outgroups, the genera *Decodon* and *Semicossyphus* both considered by Gomon (1997) as being closely related to *Bodianus* have ≈20 predorsal scales. The two most primitive species of the genus *Bodianus* based on virtually all other characters surveyed—*B. cylindriatus* and *B. thoracotaeniatus* (see below)—also have this value. The value is here taken as being primitive. A reduction to about 10 [**30**] and an increase to about 30 [**31**] are treated as modifications. In some species of the genus *Bodianus*, predorsal scales reach forward [**32**] in advance of the orbits (character state 0), but in others they only reach to above the orbits (character state 1) or fail to reach beyond the posterior extent of the orbits (character state 2). A second measure of cephalic squamation that does not always coincide with the extent of predorsal scale development is the extent of squamation on the underside of head and jaws [**33**]. In some species, scales appear as far forward as the anterior half of the lower jaw (character state 0), but in others they reach no farther than the center of the lower jaw (character state 1) or they do not reach onto the lower jaw at all (character state 2).

The presence of a scaly sheath basally on the dorsal and anal fins [**34**] appears to be a derivation, as the feature is poorly developed or absent in a majority of outgroup taxa (Gomon, 1997). Within the Labridae, the extent of scaly sheath development varies from no basal sheath, to a very low sheath formed by a half to one scale row (character state 0), to a moderately low sheath formed by about 2 scale rows (character state 1), to a sheath of moderate height with more than 2 scale rows (character state 2), to one that covers the basal two-thirds of the respective fin (character state 3).

Coloration

Differences or similarities in colour patterns that represent character states are often difficult to assess. These features are frequently among the first to change within and between populations, and distinguishing between synapomorphic and homoplasous conditions is invariably controversial. As colour characters, however, are often the only identifiable features that differ in morphologically conservative taxa, directional changes in coloration that are supported by morphological evidence are among the few characters available.

The primitive condition for colour pattern development in labroid fishes appears to involve the presence of three distinct, ontogenetically changing colour patterns. The metamorphosis from pattern to pattern is often controlled by social interactions between individuals and associated affects on sexual development. As protogynous hermaphroditism occurs in an overwhelming majority of labrids and all species of this genus that have been examined (Hoffman, 1980), every individual reaching the terminal-phase adult stage in most species has developed each pattern in the course of its lifetime. A particular pattern however does not necessarily coincide with a specific stage of sexual development (*i.e.*, immature, female, male) as colour pattern change may slightly precede changes in the ultrastructure of the gonad. Moreover, some species have relatively little change in coloration from juvenile to adult, or from female to male. The latter condition coincides in some cases with a reduction in maximum size attained by a species (e.g., *Bodianus bimaculatus*) and in others with an apparent need for protective coloration associated with the exploitation of a special ecological niche (e.g., the labrid *Clepticus parrae*). As mentioned in the *Methodology* section, to eliminate as much confusion as possible in referring to the patterns of various species, the stages are termed in this study *juvenile, initial-phase adult* and *terminal-phase adult* patterns.

In comparing labroid colour patterns, the recurrence of features in genus after genus suggests a plesiomorphy of the characters for the family. The juvenile pattern, probably more than any other, retains the greatest number, or at least the most easily recognized pigmentation characters throughout evolutionary lines. The retention of some of these in the adult pattern however may elicit an association of the character with that stage rather than an identification of it as a case of paedomorphy. Two of the most notable examples, a large black, often ocellated spot posteriorly on the dorsal fin and a prominent black spot on the fleshy pectoral-fin base, are not only found throughout the Labridae but occur extensively in the Pomacentridae as well. Although the former marking might be argued a convergently derived "eyespot", like those of chaetodontids, there is no clear reason why the black pectoral spot would evolve simultaneously. An alternative hypothesis for their co-occurrence would be that the characters are ancestral for both families. Other markings of juveniles that may be primitive for labrids based on their widespread presence throughout the family include a black spot at the anterior end of the dorsal fin, a black spot somewhat centrally on the fleshy caudal-fin base and a prominent large black, often ocellated spot posteriorly on the anal-fin. A black spot on the pelvic fin appears to be primitive for *Bodianus*. Although it is rare to find all of these markings in one species, most are present in juveniles of *Bodianus diana* and its cognates (Plates 5G, 5J, 6C). Within *Bodianus*, a recurring series of white spots or bands dorsally and often ventrally on the body of juveniles (e.g., *B. frenchii, B. axillaris*; Plates 3F, 6F), and persisting in some adults (e.g., *B. diana, B. perditio*; Plates 5I, 9A), may be primitive for many, if not all, of the species. These markings have a similar position in each of the species and may result from a modification of the pale banded (e.g., *Epibulus, Hemigymnus* and *Wetmorella*) or striped (e.g., *Labropsis, Diproctacanthus* and *Halichoeres marginatus*) markings found in juveniles of other labrid genera. The frequency of banding in juveniles of such a wide variety of genera would support a hypothesis that it is an ancestral pattern for the family. A chain-like pattern such as that in *B. scrofa* (Plate 2J) and species of the subgenus *Paralepidaplois* (e.g., *B. diana*, Plate 5G) may represent an

evolutionarily intermediate coloration between the banded and spotted pattern, and in some cases, between banded and striped patterns. Consequently, pale banded patterns of species of *Bodianus* may be homologous with similar markings occurring in species of the closely related genus *Choerodon* (e.g., *C. anchorago*, Fig. 63a,b). The nearly identical patterns occurring in a number of pomacentrid species may also be homologous.

The co-occurrence of patterns in species of *Bodianus* and *Choerodon*, however, do not always appear to be due to homology. One example is the presence of a very similar bicoloured adult pattern in several representatives of both genera (Figs 40c, 42c, 44b & 63c). In these species, the body is reddish or dusky anteriorly and whitish or pale posteriorly [**35**]. The interface of the two areas is diagonally between the posterior half of the dorsal-fin base and the base of the pectoral fin. The patterns are thought to be convergent as they occur in distantly related species, but not in evolutionarily intermediate taxa. Moreover, a comparable pattern is not readily apparent in other members of the family. The fine red or dusky stripes present in adults of many species of *Bodianus* (e.g., *B. bilunulatus*; Plate 7H) appear to be primitive for the genus as indicated by their presence in the primitive hypsigenyin *Polylepion*. They may also be the precursor of the prominent solid or broken red stripes in species such as *B. opercularis, B. unimaculatus* and *B. leucosticticus* (Plates 2D, 4B, 4H). The consistent presence of this pattern in initial-phase adults for those species that have the pattern in at least one of the developmental stages suggests that the feature was present in the ancestral form at that stage.

Initial-phase adults and terminal-phase adult colour patterns are often extremely complex and may differ considerably between species of labrids with few features other than those persisting from the juvenile stage recurring in distantly related taxa. In fact, the only easily recognizable aspect of pigmentation consistently found in tropical genera is a series of straight to wavy lines radiating from the eye. Such markings are common amongst cichlids and may be ancestral for the labroids.

Based on the above observations, the following ancestral pattern is hypothesized for the genus *Bodianus*: juveniles darkly pigmented with 5 or 6 narrow pale bands on the body posterior to the head; a prominent black spot anteriorly and posteriorly on dorsal fin, a third somewhat centrally on the fleshy caudal-fin base, a fourth posteriorly on the anal fin, a fifth on the fleshy pectoral-fin base and a sixth on the pelvic fin; initial-phase adults with red, horizontal stripes; initial- and terminal-phase adults with vermiculations around the eye.

Within *Bodianus*, the following series of events appears to have occurred: the pale bands of the primitive juvenile pattern interrupted to form pale interspaces of a dusky chain-like pattern and subsequently, if not simultaneously, intensified into prominent pale spots [**36**]; pale spots persisting in some adults simply as a dorsal row of spots or modified to form prominent pale dorsal bars or partial bands; black spots on fins and fin bases of juveniles variously retained or lost (the absence of pale and dark markings in juveniles [**37**], are therefore considered derived), persisting in adults of some lines (e.g., dark spot on caudal peduncle [**38**], red spot centrally on caudal peduncle [**39**]) and modified to form dark fin markings (e.g., dark pelvic fins)

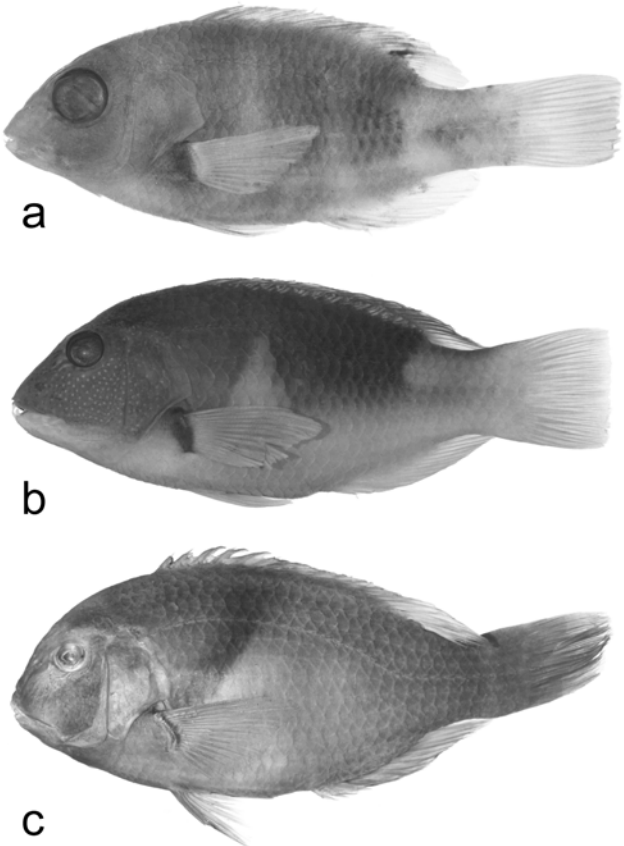

Fig. 63. Species of *Choerodon* with colour patterns that resemble those in *Bodianus*: (*a*) *Choerodon anchorago*, juvenile, 41.8 mm SL, USNM 218629, Darvel Bay, Borneo; (*b*) *Choerodon anchorago*, adult, 117 mm SL, ANSP 133156, Keraward Island, Bismarck Archipelago; and, (*c*) *Choerodon azurio*, adult, 218 mm SL, USNM 61665, Tokyo, Japan.

in others; dark markings such as bands, saddles or short bars dorsally on the body of adults (e.g., below soft portion of dorsal fin [**39**]: diffuse dark bar—character state 1, distinct dark bar or saddle—character state 2) either developing from dark spots in the dorsal and anal fin, from primitive dark bands between prominent pale bands on the body, or from both; the initial-phase adult pattern persisting with few changes, or modified so that several prominent red or brown stripes dominate, or mostly lost; terminal-phase adult pattern, when distinctively different, remaining plain.

Other colour features that appear in a few species of this genus and that may be derived as they are rare or absent in outgroups include: a prominent black spot on the membranous opercular flap [**40**], numerous blue and orange stripes on the head, numerous small orange spots on the head [**41**], anal-fin margin in adults entirely black, upper and lower margins of caudal fin each with a dark stripe [**42**] and pectoral fins with a dark blotch at the tip [**43**].

If the above hypothesis is valid it may have a bearing on studies that attempt to explain the occurrence of colour details in other perciforms (e.g., characters for formulating or testing hypotheses of relationships). For example, hypotheses proposed for the convergent evolution of colour characters such as eye spots and disruptive banded patterns may be based on homologous rather than analogous

features. The characters may still be functional, but the selective pressure would be directed toward the retention of existing patterns not toward parallel evolution. On the other hand, among brightly coloured fishes such as labrids there may not necessarily be a special significance for patterns, because among the bright colours of the coral reef environment, other bright colours would simply blend in with those about them. The only function of these diverse patterns may be one of recognition, be it for locating a mate or territorial defence. Such roles of colour patterns that are nonfunctional, except as a means of recognition, would explain the relative lability or ease of change associated with colour patterns in brightly coloured coral dwelling fishes.

Relationships

Hypotheses of intrageneric relationships are often more difficult to test than for relationships at higher taxonomic levels because of the much shorter time for the evolutionary development of easily recognizable synapomorphies. The absence of suitable material in a number of species for comparative osteological examination in this study also made the testing of alternative hypotheses difficult. In the superficially generalized *B. cylindriatus*, character states associated with the lower pharyngeal are based on pharyngeal bones removed from intact specimens, and remaining osteological characters were assessed from radiographs. The existence of recently discovered species made their examination impossible without delaying the publication of this already protracted study. As a consequence, only 24 of the 43 species referred here to the genus *Bodianus* are included in the analysis. The remaining 19 species were placed in subgeneric groupings based on observed shared characters distinguishing the groups as determined by the analysis. Characters chosen for use in formulating and testing trees using PAUP have been discussed above and are summarized in Table 11. Character states for each of the taxa incorporated are provided in Table 12. A strict consensus tree resulting from the analysis is shown in Fig. 64 with characters supporting branched clades summarized in Table 13 and discussed below. All species placed in the genus (Clade 5) apparently have derived states for the formation of a frontal shelf [**2**], breadth of the frontals anteriorly [**3**], dentary profile [**9**], nature of the symphysis between the paired dentary [**10**], and the construction of the second through seventh infraorbitals [**11**].

Both *B. cylindriatus* and *B. thoracotaeniatus* (Clade 6) seem to be primitive, relative to the other 41 species, for virtually all characters surveyed. The extremely flat ethmoid-frontal region in the two, as determined from radiographic profiles, contrasts with that of other representatives of the genus as mentioned in the introductory remarks. Although the precise nature of this difference cannot be assessed without preparing material for skeletal analysis, the two species are retained as primitive representatives of the genus on the basis of their similar meristic values (dorsal-fin rays XII, 10 or 11; anal-fin rays III, 11: lateral-line scales 29–31) and the presence of a scaly basal sheath on the dorsal and anal fins, albeit a very low one. The recognition of the two as constituting a monophyletic subgenus *Priobodianus* is supported by the presence of a prominent red spot at the center of the base of the caudal fin in adults of both. This feature is found nowhere else within the family, although adults of the primitive *Polylepion russelli*, placed by Gomon (1997) in the same tribe, have a red spot dorsally on the caudal-fin base. A recognizable depression of the ethmoid-frontal region in the remaining species of the genus (Clade 7) supports their recognition as a monophyletic group.

Table 13. Summary of characters supporting each of the branching clades depicted in the cladogram in Fig. 64. Character numbers correspond with those listed in Table 11 and discussed in the text.

branching clade	characters supporting clade	
	congruent	homoplastic
1	26	30, 32, 33
5	2, 3, 9, 10, 11	5, 7, 20
7	1	32, 33
8	40	30, 32
9	21, 22	38
13		16, 34
14	6, 26	
16	24	
18		28
22	1	19
25	34	14, 19
26		13, 14, 36
30		28
32		32, 29
33	15, 17	32, 33, 39
35	18	
40	8, 27, 34	13

The eight species of the subgenus *Trochocopus* (Clade 8), *B. bimaculatus, B. izuensis, B. masudai, B. neopercularis, B. opercularis, B. sanguineus, B. sepiacaudus* and *B. tanyokidus*, are separable from the remaining group of species (Clade 13) in possessing a primitive, very low scaly sheath on the dorsal and anal fins and in having a unique dark opercular spot [**40**]. In addition, the eight have a reduction in cephalic squamation [**32**], the predorsal scales not reaching forward to above the posterior extent of the orbit and only about one half to one third the number of predorsal scales [**30**] of their congeners. The disparity in scale number exists even when compared with species that have the predorsal scales confined to an equivalent portion of the nape. The presence of expanded scaly sheaths [**34**] in the remaining species supports the recognition of that group as a monophyletic unit.

Species of *Trochocopus* reach a relatively small maximum size, none of the specimens examined exceeding 177 mm SL. Of the eight, two, *B. bimaculatus* and *B. izuensis* (Clade 10), have a miniaturization [**21**] unequalled in the tribe, reaching sexual maturity at lengths of no more than 40.3 and 82.3 mm SL, respectively. The common ancestry of the two is further evidenced by the foreshortened head and jaws [**22**] with a reduced number of jaw teeth and a greater depression of the ethmoid-frontal area [**1**], as compared to that found in the other five species. Both *B. bimaculatus* and *B. izuensis* retain primitive vomerine dentition, as do *B. masudai* (in at least some specimens) and *B. sanguineus*. The loss of vomerine dentition [**4**] in *B. neopercularis, B. opercularis, B. sepiacaudus* and *B.*

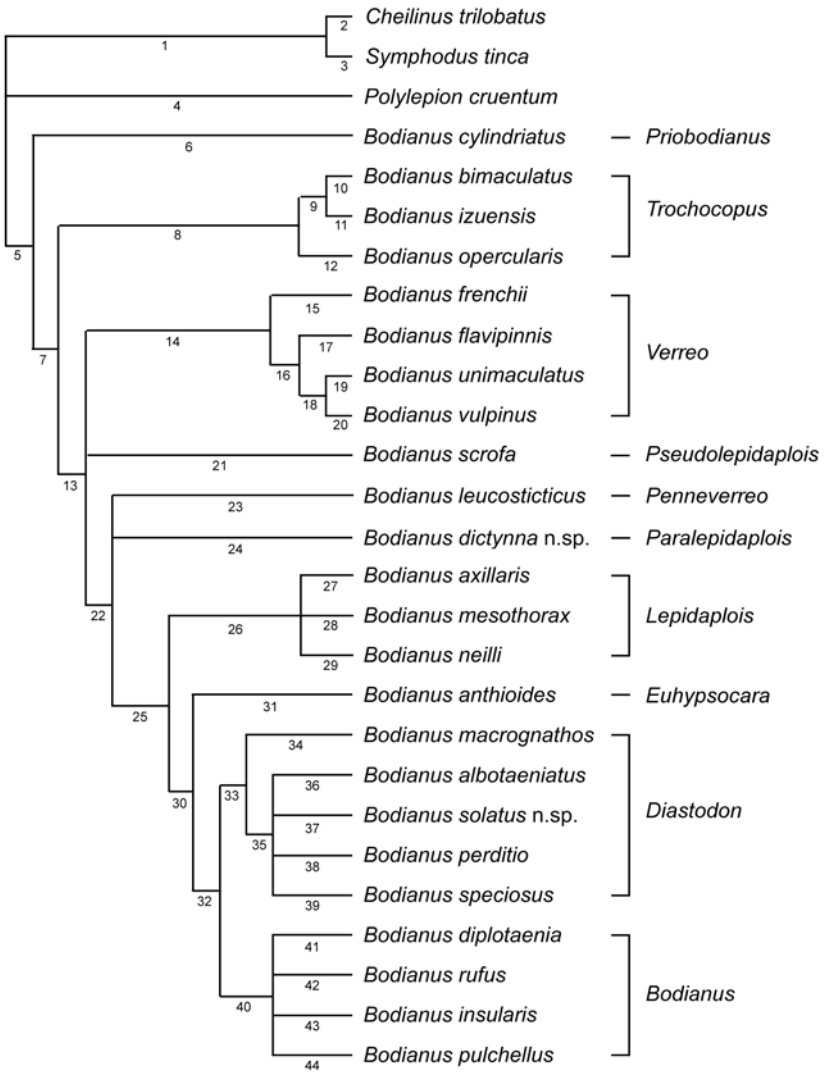

Fig. 64. Cladogram depicting hypothesized interrelationships of 24 selected *Bodianus* species, plus three designated labrid outgroup taxa, derived by analysing the character matrix presented in Table 12 with PAUP. Numbers identify clades discussed in *Relationships*. Assigned subgeneric groupings are indicated on the right.

tanyokidus may not be especially informative, however, as on the basis of other characters vomerine teeth appear to have disappeared several times within the genus. The extreme similarity of juvenile colour pattern in *B. masudai* and *B. sepiacaudus*, a pattern quite unlike that of other hypsigenyins points to a close common ancestry for these two. Likewise, the close similarity in morphology and coloration of *B. opercularis* and *B. neopercularis* suggests they arose from an immediate common ancestor. Apart from these observations, however, the distribution of characters in the eight species of *Trochocopus* were of little use in inferring interrelationships within the subgenus.

The remaining species (Clade 13) are separable into three groups, Clade 21 comprising the monotypic subgenus *Pseudolepidaplois* (Clade 15, *B. scrofa*), the subgenus *Verreo* (Clade 14) with seven species, and Clade 22 that is further divisible into six subgenera. The similarity in the reduction of cephalic squamation ([**32**]—predorsal scales reaching forward to the anterior extent of orbit in the latter and to above the center of the orbits in the former, [**33**]—lower jaw naked) and realignment of the prominent anterior canines in the jaws with teeth posteriorly ([**6**]—only slightly in *Pseudolepidaplois* as discussed above in the two subgeneric treatments, see also below) in species of *Verreo* and *Pseudolepidaplois* may support a monophyletic relationship encompassing the two subgenera. The unusual and remarkably similar series of broad golden stripes on the head of terminal-phase adults of *Pseudolepidaplois* and *B. flavifrons* within *Verreo* also supports the relationship. With the exception of derived characters that support its placement in Clade 13 and the reduction of cephalic squamation, *B. scrofa* appears to retain primitive characteristics for most characters compared. The high numbers of body scales in this species may be associated with its cold water distribution (Gomon, 1997). The seven species of the subgenus *Verreo, B. bathycapros, B. flavifrons, B. flavipinnis, B. frenchii, B. oxycephalus, B. unimaculatus* and *B. vulpinus*, share significant modifications in jaw dentition. This derivation involves a lateral shift of the anterior teeth normally arising from the crest of the dental ridge of the jaws, bringing them into alignment with the prominent anterior canines [**6**]. The result is a presence of two pairs of

prominent canines anteriorly in each jaw followed by a row of progressively smaller canines posteriorly (Fig. 1a,b). Species of the subgenus *Verreo* also have fewer procurrent caudal-fin rays (seven) both dorsally and ventrally [**26**]. The monophyly of Clade 22 is supported by the shared strong depression of the ethmoid-frontal region of the neurocranium [**1**] and marked increase in size of the posteriormost teeth centrally on the lower pharyngeal [**19**]. The primitive condition in pharyngeal tooth pattern as exemplified by representatives of previously diverging lines, involves teeth that appear circular in dorsal view and only gradually increase in size medially and posteriorly (Figs 3, 4, 5a).

The subgenus *Verreo* is composed of two species groups, one (Clade 19) with a pair of species, *B. frenchii* and *B. flavifrons*, and the other (Clade 20) with five species. The former can be distinguished by its number of segmented anal-fin rays decreased to 11 [**25**], a character value that is present elsewhere within the genus only in the two species of *Priobodianus*. The second group, characterized by the number of segmented dorsal-fin rays increased to 11 [**24**], comprises *B. flavipinnis* and the four members of the *B. vulpinus*-complex, *B. bathycapros, B. oxycephalus, B. unimaculatus* and *B. vulpinus*.

Within Clade 22, the analysis failed to resolve a trichotomy comprising subgenus *Peneverreo* (Clade 23) with four species, the subgenus *Paralepidaplois* (Clade 24) with three species and Clade 25. The subgenus *Peneverreo* comprising *B. leucosticticus, B. paraleucosticticus, B. rubrisos* and *B. trilineatus* has probably the greatest number of primitive character states, including the lowest scaly basal sheath on the dorsal and anal fins, extensive cephalic squamation (predorsal scales reaching in advance of the anterior nostril in 3 of the 4 species), a presence of vomerine teeth and a primitive configuration of pharyngeal teeth with teeth in the posterior row becoming progressively more elliptical medially (Fig. 5b,c). The general morphology of these species differs slightly from other species of *Bodianus* but the differences are difficult to qualify or quantify. Although the distinctive coloration of the four is mostly composed of elements that are likely to be primitive and that appear in some developmental stages of species of *Verreo*, their patterns are so close the four have been mistaken for one another. The four are considered here to be a monophyletic group.

Members of the other two clades possess deeper scaly basal fin sheaths on the dorsal and anal fins [**34**]. Within this group, the closely related species of *Paralepidaplois, B. diana, B. dictynna* and *B. prognathus* have midposterior pharyngeal teeth that are of similar size (Fig. 5d) to those of *Peneverreo*, although the anterior edges of the lateral arms of the lower pharyngeal in the two are less curved than in *Pseudolepidaplois, Verreo* and *Peneverreo*, and more closely resemble those of *Lepidaplois* and *Euhypsocara* (see below). *Bodianus diana, B. dictynna* and *B. prognathus* retain several primitive aspects of coloration, including a series of white spots dorsolaterally on the body of adults in life, that occur in some form in adults of several species of the subgenera *Verreo* and *Peneverreo* and a black spot centrally on the caudal-fin base, similar to that in some species of *Trochocopus*, as well as in juveniles of the genus *Semicossyphus*, elsewhere in the tribe Hypsigenyini. The black spot is absent, (presumably lost) in species of Clade 25, and the white spots are confined to the juvenile pattern, modified to form one or two large white spots or bars, or completely lost. *Bodianus diana, B. dictynna* and *B. prognathus* bear several features considered here to be uniquely modified and together are recognized as constituting the subgenus *Paralepidaplois*. Their synapomorphic characters include the most attenuate jaws within the genus (extremely so in *B. prognathus*), a very large number of remarkably even teeth on the dental ridge of each jaw ([**7**]; Fig. 1c), an absence of vomerine dentition [**4**] and reduced cephalic squamation ([**32**]—the predorsal scales reaching forward only to above the centers of the orbits, but the scales on the lower side of the head remaining much more extensive). The moderately slender body and attenuate snout in species of *Paralepidaplois* are similar to those of *B. axillaris, B. mesothorax* and *B. neilli*, and may have been further modified in others.

The monophyly of Clade 25 is evidenced by a greater development of the scaly basal sheaths on the dorsal and anal fins [**34**]. Most members of Clade 25 also have further modifications of pharyngeal teeth, including an anterior-posterior expansion of the dentigerous surface [**14**] and the central three to five in the posterior row being markedly larger than those laterally ([**19**], Figs 6, 7). In addition, all species examined osteologically have an anterior uncinate process on the second infrapharyngobranchial that is foreshortened and directed strongly forward (Gomon, 1997, fig. 31d). The presence of a more or less bicoloured pattern in the adult [**35**] of 8 of the 18 species referred to the clade, with no suggestion of such a pattern in any of the previously diverging groups within the genus, supports the hypothesis that a pattern close to that of *B. anthioides, B. axillaris, B. mesothorax* and *B. neilli* is a modification for this line. Other adult patterns are most likely to have been derived subsequently.

Within Clade 25, the presence of a distinctive juvenile colour pattern in *B. axillaris, B. mesothorax* and *B. neilli* (Clade 26) with contrasting pale spots in virtually identical positions on a dark background [**36**] is considered a synapomorphic condition supporting the monophyly of the three. The pattern is likely to have developed from one resembling the juvenile pattern of *B. diana, B. dictynna* and *B. prognathus* with the pale features developing from some of the pale interspaces between darker chain-like markings. The three species also share further modifications of the pharyngeal dentition, with the dentigerous area on the lower pharyngeal diamond-shaped when viewed from above ([**14**], Fig. 6a–c). The three species are considered to constitute the subgenus *Lepidaplois*. The remaining species (Clade 30) all have the posterior corners of the caudal fin developing filamentous extensions in adults ([**28**], and juveniles in the case of *B. anthioides*), a feature found elsewhere in the genus only in some members of the *B. vulpinus*-complex in the subgenus *Verreo*. This feature is considered apomorphic.

Within the subgenus *Lepidaplois*, the allopatric *B. axillaris* and *B. neilli* have slightly reduced predorsal squamation, with scales not reaching in front of the anterior nostril on the dorsal midline of the head, and are likely to represent a natural species pair. As indicated above, the two species have a bicoloured adult pigmentation, but they lack the dark ventrally tapering diagonal band of *B. mesothorax* separating the dusky and pale areas of the body. A colour pattern strikingly similar to that of *B. mesothorax* also occurs in *B. anthioides* within Clade 30. The presence of a dark

band is likely to be either a derivation for *B. mesothorax, B. anthioides* and Clade 32, or for Clade 25. The lower pharyngeal dentition is also very similar in the species of *Lepidaplois* and *B. anthioides* suggesting close ancestry. Relationships between *B. anthioides* and other representatives of the genus are obscured by its autapomorphic juvenile colour pattern that closely resembles the singular adult pattern. As mentioned, this is a distinct contrast to other species of *Bodianus*. The monophyly of Clade 30, supported by the development of caudal filaments [**28**], is accepted tentatively with *B. anthioides* regarded as a monotypic subgenus *Euhypsocara*. The monophyly of Clade 32 is supported by the development of filamentous pelvic fins [**29**] and further reductions in predorsal squamation [**32**] in species referred to it. The modification of pharyngeal dentition involves a reduction in size of the dentigerous surface and proliferation of teeth laterally on it ([**13**], [**14**], [**15**], [**17**], [**19**]).

Clade 32 is divisible into two subgenera. The subgenus *Diastodon* (Clade 33), comprises the nine species *B. albotaeniatus, B. bilunulatus, B. busellatus, B. loxozonus, B. macrognathos, B. macrourus, B. perditio, B. solatus* and *B. speciosus*. They share dental modifications on the pharyngeal, including the presence of a distinct row of small teeth peripherally [**15**] and the presence of concavities paved with small teeth laterally on the dentigerous surface [**17**], predorsal scales reaching forward only to above the posterior extent of the eye ([**32**], character state 2) and the absence of scales on the underside of the head in advance of the corner of the mouth [**33**], except for *B. loxozonus* and *B. macrourus* that have an isolated patch of scales on the posterior third of the lower jaw. All but *B. macrognathos* have a prominent black spot, saddle or bar dorsoposteriorly on the body of adults [**39**]. That species has a juvenile pattern, and to a lesser extent adult pattern, that are unlike those of its congeners and has a bluntly rounded head in adults reminiscent of *B. anthioides*. Its increased number of body scales, as reflected in a high lateral-line scale count, may very well be due to a prior influence of cold temperatures as is hypothesized for species like *B. scrofa*. It occurs in tropical waters at shallow to moderate depths. The dark markings in species of Clade 35 apparently have arisen as a modification of the posterior black dorsal-fin spot and anal-fin spot occurring in earlier divergents of the genus, the black oblique band found in *B. anthioides* and *B. mesothorax* or both. A spot is present on the dorsal fin in juveniles of *B. perditio* and *B. speciosus* (juveniles of *B. solatus* are unknown), but only the former has a spot on the anal fin. Among the eight species in Clade 35, *B. albotaeniatus, B. bilunulatus, B. busellatus, B. loxozonus* and *B. macrourus* share the presence of a complete black band encircling the body, including the anal fin, at about the level of the posterior end of the dorsal fin [**39**], at least in juveniles. Of that five, *B. loxozonus* and *B. macrourus* appear to be more closely related to one another than to other congeners in possessing a unique coloration consisting of numerous narrow, orange and blue stripes anteriorly on the body of adults, although the pattern in initial-phase adults *B. albotaeniatus, B. bilunulatus* and *B. busellatus* may be derived from such a pattern, or vis versa. *Bodianus loxozonus* and *B. macrourus* retain a more extensive patch of scales on the lower jaw, have the complete black band on the body persisting in the adult colour morph, and have both totally black pelvic fins and a broad black marginal band on the anal fin in adults. In *B. albotaeniatus, B. bilunulatus* and *B. busellatus* (Clade 36), the scales on the lower jaw are completely lost [**33**] and the black band is found only in the juvenile colour morph, being reduced to a dorsal saddle-like spot in adults. *Bodianus perditio* and B. speciosus, which only have a black band dorsally on the sides of adults, share the adult colour feature of small orange or reddish orange spots covering the head [**41**]. This pattern is found nowhere else within the genus, but may be a derivation of the anterior adult coloration in *B. loxozonus* and *B. macrourus*. Although *B. solatus* lacks the cephalic spots, the overall similarity between its adult colour patterns and morphology, and those of *B. perditio* is probably indicative of a close relationship. As with the greatly reduced black band dorsally on the side of terminal phase adults of *B. solatus*, the absence of cephalic spots may be a secondary derivation and may mask true relationships.

Species constituting the subgenus *Bodianus* (Clade 40) share the presence of a filamentous posterior extension of the dorsal and anal fin in adults [**27**], as well as a deep scaly sheath at the base of these fins [**34**]. The five species referred to this subgenus, *B. diplotaenia, B. eclancheri, B. insularis, B. pulchellus* and *B. rufus*, have the filamentous extension of the dorsal and anal fins developing early in adults [**27**], often possess moderately large anteriorly angled canines posteriorly in the lower jaw [**8**] and have a pointed head and snout even in large individuals (Figs 58–62). The five species are readily separable into three groups on the basis of apparent shared specializations. Among these, *B. diplotaenia* and *B. eclancheri* appear to be more closely related to each other than to any of the others in sharing the development of a gibbous hump on the forehead of terminal-phase adults [**23**]. This form of process is found elsewhere in the tribe Hypsigenyini only in the three species of *Semicossyphus*. *Bodianus diplotaenia* and *B. eclancheri* also have somewhat flattened, almost incisiform anterior canines and similarly pigmented juveniles that differ considerably from those of the other three. *Bodianus pulchellus* and *B. rufus* have lost practically all vestiges of the striped pattern except on the head of some individuals and have a modification of the more primitive bicoloured pigment pattern in initial-phase adults. The fifth species, *B. insularis*, has no feature that supports a closer relationship between it and either species pair. The species instead retains a number of primitive character states for the subgenus, including faint but recognizable remnants of striped (initial-phase adults) and bicoloured (terminal-phase adults) pigment patterns (at least in alcohol), dark markings on the pelvics, dark pectoral-fin tips and dark distal margins posteriorly on the dorsal and anal fins.

Zoogeography

The genus *Bodianus* with 43 species is circumtropically distributed, but occurs primarily in the Indo-Pacific region. Of the seven species distributed in the Atlantic or eastern Pacific (Fig. 57), six are representatives of a clade (Clade 32, Fig. 64) comprising the two subgenera *Diastodon* and *Bodianus* situated terminally on the generic tree. Only *B. scrofa* appears to have diverged sufficiently early to possibly represent a remnant of a population that was ancestral to the entire genus, if such a population did range into the Atlantic. The hypothesis, however, is not supported by other evidence. The cladogram presented in Fig. 64 with the two subgeneric clades diverging from the base (Clades 6 and 8) confined to the Indo-Pacific and only one (Clade 21) of the six subsequent divergents (Clades 14, 21, 23, 24, 26 and 31) represented in the Atlantic better supports an origin of the genus entirely within the Indo-Pacific.

Although the subgenus *Priobodianus* (Clade 6) is only known from the western Pacific, the distribution of the two deepwater species are based on only a handful of specimens that are unlikely to adequately represent the geographical limits of this clade.

The eight species of the subgenus *Trochocopus* (Clade 8) evidently arose from a tropical ancestor that had also developed a proclivity for deep habitats (none of the species occurs regularly at depths shallower than 30 m). Six of the eight are only known from the Indo-West Pacific, a seventh, *B. sepiacaudus* occurs both in Indonesia and the central Pacific and the eighth, *B. sanguineus*, has been taken only in the Hawaiian Islands (Figs 10, 16). Four (*B. bimaculatus, B. izuensis, B. masudai* and *B. opercularis*) occur at reasonably shallow depths for the subgenus. Most species of the subgenus have distributions that match those in other subgenera, one pattern being a concurrence of populations of the same, or very closely related species, in the Japanese islands and islands of the southwestern Indian Ocean. Deeper dwelling species like *B. (Trochocopus) tanyokidus* and *B. (Peneverreo) leucosticticus* with such distributions could occur, but may have been overlooked in areas between these two localities, as they may not be affected by the same barriers as shallow dwellers. *Bodianus masudai* has an antitropical distribution confined to the western rim of the Pacific and is showing signs of differentiating in the two hemispheres. This distribution recurs in a number of other species, like several species pairs of the labrid genus *Suezichthys*. The known distribution of *B. (Priobodianus) cylindriatus* is similar, but also extends into the Hawaiian region. *Bodianus sanguineus*, evidently confined to the Hawaiian region, may have arisen from an ancestral population bridging the gap between the region and the northern part of the western Pacific rim as hypothesized below for four species in the following subgenus. Four of the other seven Pacific species of *Trochocopus* and both species of *Priobodianus* occur in the Japanese region. The restriction of *B. opercularis* to the Red Sea and Indian Ocean and *B. neopercularis* to the western Pacific could be explained by the appearance of a barrier subdividing an ancestral population spanning the two ocean basins. The broad distribution of *B. bimaculatus* may simply be due to its relatively shallow dwelling nature and more frequent observation by divers, but could reflect the ancestral distribution for the subgenus.

The present antitropical distribution of the subgenus *Verreo* (Figs 23, 25) with none of its seven species occurring near the equator suggests an early isolation of the clade in a subtropical area. As both *Verreo* subgroups (Clades 15 and 16) and five of its seven species presently occur in Australasia, the ancestor may have been an endemic to this region. The two non-Australian members of the subgenus belong to the four species *B. vulpinus*-complex (Clade 18). The four are allopatric and evidently arose from a recent fractionation of the ancestral population that was widely and continuously distributed in the Pacific Ocean and southeastern Indian Ocean, perhaps during a period of worldwide glacial cooling as occurred in the Pleistocene (Hubbs, 1952). Subsequent equatorial warming would have eliminated species from the lower latitudes and caused the broad gaps now separating species. The mechanism is presumably the same as that responsible for the analogous range of *B. perditio* and *B. solatus* (Fig. 54).

Bodianus frenchii may have arisen from a portion of the clade (Clade 15) that was isolated on the Australian plate, as has been hypothesized for the genus *Achoerodus*, also of the tribe Hypsigenyini (Gomon, 1997). Presumably, the ancestral form had the same temperature tolerances as exist in the *B. vulpinus*-complex today. The more temperate distribution of *B. frenchii* probably resulted from a subjection of the Australian plate to colder conditions. The current presence of the two species of the *B. vulpinus*-complex in Australian waters, therefore, probably resulted from a more recent reintroduction of their ancestor (Clade 16).

The presence of *B. scrofa* in the Atlantic (Fig. 57) may represent a relict distribution of an early generic line, or, more likely, a subsequent invasion. If the species arose as a result of an introduction (expansion of an ancestral range) the ancestral population would either have been adapted to subtropical/ warm temperate conditions (as discussed above for the ancestral form of the subgenus *Verreo*, a rare distribution for the genus) entering the South Atlantic from the southern tip of South America or Africa and forced northward by subsequent climatic change, or a classical warm water Tethyan distribution that was subsequently restricted by climatic conditions in the Atlantic. The possible sister relationship between *Verreo* and *Pseudolepidaplois* discussed above and the current subtropical predilection of both favours the former scenario, despite the absence of a relative in either the southeastern Pacific and western Indian Ocean. The absence in both regions would require an extinction of the related taxon in intermediate localities.

The mostly sympatric nature of many of the remaining subgenera obscures possible mechanisms for the isolations leading to their differentiation. On the other hand, allopatry within the subgenera (i.e., *Peneverreo, Paralepidaplois, Lepidaplois, Diastodon* and to a lesser extent *Bodianus*) identify the geographical areas involved with more recent isolations.

The four species of the subgenus *Peneverreo* live on deepwater reefs and accordingly are represented by few specimens in collections (Fig. 32). *Bodianus trilineatus* appears to be restricted to the east African coast; *B. leucosticticus* occurs in other parts of the Indian Ocean and the northwestern edge of the Pacific (Mauritius, Japan and Taiwan); *B. rubrisos* is known from the western edge of the Pacific between Indonesia and Japan; and, *B. paraleucosticticus* is apparently confined to the Pacific so far known only from Papua New Guinea, New Caledonia and Rarotonga.

The distribution of *Paralepidaplois* is a familiar one biogeographically with *B. diana* confined to the Indian Ocean, *B. dictynna* restricted to the Western Pacific and *B. prognathus* apparently found only in the Central Pacific (Fig. 37). In the subgenus *Lepidaplois*, the range of the widely distributed *B. axillaris* overlaps with the much more restricted ranges of *B. neilli* and *B. mesothorax* only along their edges, suggesting a confinement of the ancestral population, at least in part, to the Indian plate (*B. neilli*), the Indonesian plate (*B. mesothorax*) and most of the remaining Indo-Pacific region (*B. axillaris*) occupied by the genus (Fig. 41). As species relationships in all three of these subgenera are unresolved based on available information, mechanisms for the isolation of ancestral populations remain untested.

Within *Diastodon*, the ancestral population appears to have separated into two distinct forms with subtropical or tropical affinities, the former giving rise to *B. perditio, B. solatus* and *B. speciosus*, and the later resulting in *B. albotaeniatus, B. bilunulatus, B. busellatus, B. loxozonus* and *B. macrourus* (Figs 47, 54). As discussed below, the origin of *B. macrognathos* is less clear. *Bodianus solatus* probably arose from the isolation of a portion of that ancestral population along the western Australian coast. The relatively small population within this restricted range may have facilitated a rapid character shift that now obscures ancestral relationships. A parallel exists in the similarly distributed *B. vulpinus*. *Bodianus speciosus* may have arisen from a distributional expansion of the ancestral population into the Atlantic and a subsequent isolation of the Atlantic population (Fig. 57), as speculated above for *B. scrofa*.

The clade (Clade 36) comprising *B. albotaeniatus, B. bilunulatus, B. busellatus, B. loxozonus* and *B. macrourus*, on the other hand, probably reflects the remaining ancestral distribution of *Diastodon* confined to tropical waters. These five species are separable into two groups, each with morphologically similar, almost entirely allopatric populations, whose combined ranges extend from the western Indian Ocean to the southeastern central Pacific. Members of one group, comprising *B. loxozonus* and *B. macrourus*, are confined to the to the central and western Pacific (excluding the Hawaiian Islands) and to the oceanic islands east of Madagascar in the Indian Ocean, respectively. The three species of *B. bilunulatus*-complex, *B. albotaeniatus, B. bilunulatus* and *B. busellatus*, have until recently been regarded as subspecies. They occur in the Hawaiian Islands, in the Indo-west Pacific and in the southeastern portion of the central Pacific, respectively. Despite the broad geographical range of both groups, species co-occur only along the northwestern edge of the Pacific and in the southwestern Indian Ocean. Absences of the *B. loxozonus*-complex from much of the Indian Ocean and the *B. bilunulatus*-complex from much of the southwestern Pacific Ocean may reflect ancestral distributions of those two groups confined to the separate oceanic basins. The distribution of the three species of *B. bilunulatus*-complex connecting Japan, Hawaii and the southern central Pacific follows a track recurring in other species (e.g., *B. sanguineus* and species of the subgenus *Trochocopus* occurring in Japan) and may indicate the pathway of ancestral population expansion. The position of barriers isolating *B. albotaeniatus, B. bilunulatus and B. busellatus* are apparent from current distributions.

The reason for the confinement of the last species of *Diastodon, B. macrognathos*, to the northeastern coast of Africa and the Arabian peninsula in the northwestern corner of the Indian Ocean (Fig. 54) remains unclear as the precise nature of its relationships with congeners is still in doubt. Some of its characters even suggest the species may have a closer affinity with the subgenus *Bodianus*. If the latter should prove to be the case, its current distribution could reflect either a recent invasion of the area by an ancestral eastern Atlantic population during a reopening of the Tethys Sea connection, or a relic of the early ancestral distribution of the subgenus. The numerous scales on the body of this species could conceivably have arisen from prolonged subjection to cooler conditions (Gomon, 1997) when the population was confined to the old western Tethys (Mediterranean), supporting an invasion hypothesis. The character cannot be explained easily by its present tropical distribution. If the species is, as suggested by the analysis, a species of *Diastodon*, its initial divergence and the broad distributions of the subsequent, two diverging lines obscure evolutionary events.

The remaining five species of the genus comprising the subgenus *Bodianus* are mostly confined to the tropical Atlantic and eastern Pacific (Fig. 57) and probably arose from an ancestor isolated in these waters. Prior to isolation, the population would have been contiguous with a population bridging the Indo-west Pacific that, when separated, gave rise to *Diastodon*. Based on the mostly tropical nature of the two subgenera, the separation probably occurred by the formation of a Middle East barrier across the primitive Tethyan Sea, although a mid-Pacific barrier cannot be ruled out entirely. Within the subgenus *Bodianus*, the morphological evidence supporting a common ancestry of the eastern Pacific species, *B. diplotaenia* and *B. eclancheri*, and a similar common ancestry of the Atlantic *B. insularis, B. pulchellus* and *B. rufus* is consistent with geological evidence for the formation of the Panamic barrier. This barrier, last established approximately three million years (late Pliocene), closed the previous interoceanic connection between the eastern Pacific and western Atlantic, isolating ancestral populations of the two clades (Lessios, 1998). The present confinement of *B. insularis* to islands of the mid-Atlantic ridge in the South Atlantic indicates the oceanic expanse between the islands and the African and South American continents remain today as substantial barriers. Concordant with tectonic theory, this distribution suggests that the ancestral population bridging the Atlantic was isolated in the eastern Atlantic, on islands near the mid-Atlantic ridge and in the eastern Pacific-western Atlantic by oceanic expanses that increased as the south American and African continents drifted apart. The eastern Atlantic population has apparently been eliminated, presumably by the recurrent cooling of the region widely thought to be responsible for the elimination of much of the former tropical fauna and flora of the area.

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Associate Editor: Jeff M. Leis.

Plate 1. (*A*) *Bodianus cylindriatus*, adult, 112 mm SL, CSIRO H 651-03, off central Great Barrier Reef, northeastern Queensland, Australia. (*B*) *Bodianus thoracotaeniatus*, adult, 175 mm SL, Taiwan (through S.-C.Shen). (*C*) *Bodianus bimaculatus*, juvenile, Izu, Japan (photo by T. Hirata); (*D*) initial-phase adult, Tulamben, Bali, Indonesia (photo by R. Kuiter); (*E*) terminal-phase adult, Izu, Japan (photo by T. Hirata). (*F*) *Bodianus izuensis*, juvenile, 42.5 mm SL, NMV A9518, Botany Bay, New South Wales, Australia (photo by R. Kuiter); (*G*) adult, 91.9 mm SL, NMV A4830, La Perouse, Botany Bay, New South Wales, Australia (photo by R. Kuiter). (*H*) *Bodianus masudai*, juvenile, Izu, Oshima, Japan (photo by R. Kuiter); (*I*) adult, Japan; (*J*) adult, 84.5 mm SL, NMV A25112.001, Tasman Sea, North Norfolk Ridge, 28°54.23'S 167°41.03'E, 113 m (photo by R. McPhee).

Plate 2. (*A*) *Bodianus neopercularis* n.sp., adult, 83.3 mm SL, NMV A21611, paratype, Kwajalein Atoll, Marshall Islands (photo by S. Johnson); (*B*) adult, 97.2 mm SL, NMV A21610, holotype, Kwajalein Atoll, Marshall Islands (photo by S. Johnson). (*C*) *Bodianus opercularis*, juvenile, 52.8 mm SL, BPBM 20454, Mauritius (photo by D. Pelicier); (*D*) adult, 112 mm SL, BPBM 20455, Elat, Gulf of Aqaba, Red Sea (photo by J. Randall). (*E*) *Bodianus sanguineus*, juvenile, 58.9 mm SL, BPBM 17244, Oahu, Hawaiian Islands (photo by B. Madden); (*F*) adult, 134 mm SL, BPBM 20799, Hawaii, Hawaiian Islands (photo by J. Randall). (*G*) *Bodianus sepiacaudus* n.sp., juvenile, approx. 20 mm SL, Flores Island, Indonesia (photo by R. Kuiter); (*H*) adult, 70.0 mm SL, NMV A18420, holotype, Bali?, Indonesia (photo by S. Michael). (*I*) *Bodianus tanyokidus*, adult, 145 mm SL, Mauritius (photo by P. Heemstra). (*J*) *Bodianus scrofa*, juvenile, Lanzarote, Canary Islands (photo by P. Wirtz).

Plate 3. (*A*) *Bodianus scrofa*, initial-phase adult, Faial, Azores (photo by P. Wirtz); (*B*) terminal-phase adult, Cape Verde Islands (photo by H. Debelius). (*C*) *Bodianus bathycapros* n.sp., initial-phase adult, 434 mm SL, BPBM 17245, holotype, Nihoa, Hawaiian Islands (photo by J. Randall). (*D*) *Bodianus flavifrons*, terminal-phase adult, 372 mm SL, NMNZ P.34438, paratype, Kermadec Ridge, North of Raoul Island, 28°48.10'S 177°48.10'W, 172 m (photo by A. Stewart). (*E*) *Bodianus flavipinnis*, adult, 196 mm SL, NMNZ P.33104, off Cape Brett, New Zealand (photo by A. Stewart). (*F*) *Bodianus frenchii*, juvenile, 22.9 mm SL, AMS I.17654-003, North Solitary Island, New South Wales, Australia (photo by R. Kuiter); (*G*) juvenile, 103 mm SL, NMV A9673, Montague Island, New South Wales, Australia (photo by R. Kuiter); (*H*) adult, approx. 225 mm SL, Recherche Archipelago, Western Australia (after Allen, 1985). (*I*) *Bodianus oxycephalus*, initial-phase adult, approx. 300 mm SL, Japan (photo by Masuda); (*J*) terminal-phase adult, approx. 350 mm SL, Izu Peninsula, Japan, 50 m (photo by Y. Kobayashi; photo reversed).

Plate 4. (*A*) *Bodianus unimaculatus*, juvenile, 51.8 mm SL, NMV A25112-001, Tasman Sea, North Norfolk Ridge, 28°54.23'S 167°41.03'E, 113 m (photo by R. McPhee); (*B*) initial-phase adult, 268 mm SL, BPBM 6728, Easter Island (photo by J. Randall); (*C*) terminal-phase adult, New Zealand (photo by M. Francis). (*D*) *Bodianus vulpinus*, initial-phase adult, Rottnest Island, Western Australia (photo by B. Hutchins); (*E*) terminal-phase adult, 375 mm SL, CSIRO H2065-1, W of Gantheaume Bay, Western Australia, 27°33.10'S 112°58.00'E, 218 m, (photo by A. Williams). (*F*) *Bodianus leucosticticus*, juvenile, Izu Oceanic Park, Japan, 70–75 m, (photo by H. Watanabe); (*G*) initial-phase adult, approx. 120 mm SL, Hachijo, Japan, 45 m (photo by S. Kato); (*H*) terminal-phase adult, 139 mm SL, Taiwan (photo by S.-C. Shen). (*I*) *Bodianus paraleucosticticus* n.sp., adult, 71.9 mm SL, BPBM 36881, paratype, Papua New Guinea, Milne Bay Province, Boia Boia Wagai, East Point, off cape, 10°12'42"S 150°53'48"E, 91.5 m (photo by J. Randall); (*J*) adult, 99.1 mm SL, BPBM 36449, holotype, Rarotonga, Cook Islands (photo by R. Pyle).

Plate 5. (*A*) *Bodianus rubrisos* n.sp., juvenile (unknown photographer); (*B*) initial-phase adult, 141 mm SL, NTM S.1168-001, holotype, Indonesia, Bali, Singaraja fish market, (photo by B. Russell); (*C*) terminal-phase adult, 250 mm SL, Japan (photo by H. Masuda). (*D*) *Bodianus trilineatus*, juvenile, 56 mm SL, RUSI 46503, Natal (photo by P. Heemstra); (*E*) initial-phase adult, Aliwal Shoal (photo by D. King); (*F*) terminal-phase adult, 230 mm SL, RUSI 64, holotype of *Lepidaplois luteopunctatus*, Delagoa Bay, Mozambique (illustration by M. Smith; after Smith, 1957, pl. IA, reversed). (*G*) *Bodianus diana*, juvenile, 40.5 mm SL, ROM 57036, Ile Ouenefou, Moheli Island, Comores, 12°23.12'S 43°42.47'E (photo by R. Winterbottom); (*H*) transforming juvenile, 78.3 mm SL, ROM 37485, Isle Fouquet, Peros Banhos, Chagos Archipelago, 5°27.05'S 71°48.95'E (photo by A. Emery and R. Winterbottom); (*I*) terminal-phase adult, approx. 180 mm SL, Sunda Strait, Java, Indonesia (photo by R. Kuiter). (*J*) *Bodianus dictynna* n.sp., juvenile, approx. 20 mm SL, Montague Island, New South Wales, Australia (photo by R. Kuiter).

Plate 6. (*A*) *Bodianus dictynna* n.sp., transforming juvenile, aquarium reared specimen, Montague Island, New South Wales, Australia (photo by R. Kuiter); (*B*) adult, 64.8 mm SL, ROM 52964, paratype, Mouth of Bais Bay, Tanon Strait, Negros Oriental, Philippines, 9°36.54'N 123°26.56'E (photo by R. Winterbottom). (*C*) *Bodianus prognathus*, juvenile, 50.5 mm SL, BPBM 20773, paratype, Fanning Atoll, Line Islands (photo by P. Lobel); (*D*) initial-phase adult, Phoenix Islands (photo by G. Allen); (*E*) terminal-phase adult, Phoenix Islands (photo by G. Allen). (*F*) *Bodianus axillaris*, juvenile, 46.5 mm SL, ROM 49923, Kadaru Lagoon, Fiji, 18°44.30'S 178°29.10 'E (photo by A. Emery and R. Winterbottom); (*G*) adult, 96.0 mm SL, ROM 37478, off Isle Anglause, Peros Banhos, Chagos Archipelago, 5°24.67'S 71°45.20'E (photo by A. Emery and R. Winterbottom). (*H*) *Bodianus mesothorax*, juvenile, 27.6 mm SL, ROM 49919, Dravuni Island, Fiji, 18°44.85'S 178°33.70'E (photo by A. Emery and R. Winterbottom); (*I*) adult, 92.0 mm SL, ROM 69105, Patong Beach, Phuket, Thailand, (photo by R. Winterbottom). (*J*) *Bodianus neilli*, juvenile, 24.4 mm SL, ROM 68860, Ko Racha Yai, Phuket, Thailand, 7°36.47'N 98°22.12'E (photo by R. Winterbottom).

Plate 7. (*A*) *Bodianus neilli*, adult, aquarium specimen (photo by R. Kuiter). (*B*) *Bodianus anthioides*, juvenile, approx. 65 mm SL, Tulamben, Bali, Indonesia (photo by R. Kuiter); (*C*) adult, 110.9 mm SL, ROM 57041, Recif Bambo, Mayottai, Comores, 12°56.90'S 45°13.30'E (photo by R. Winterbottom). (*D*) *Bodianus albotaeniatus*, juvenile, 90 mm SL, Kona, Hawaiian Islands (photo by J. Randall); (*E*) initial-phase adult, 240 mm SL, Kona, Hawaiian Islands (photo by J. Randall); (*F*) terminal-phase adult, 270 mm SL, Molokini, Hawaiian Islands (photo by J. Randall). (*G*) *Bodianus bilunulatus*, juvenile, approx. 40 mm SL, Tulamben, Bali, Indonesia (photo by R. Kuiter); (*H*) initial-phase adult, 104 mm SL, Ambon Bay, Indonesia (photo by J. Randall); (*I*) terminal-phase adult, 343 mm SL, NMV A18155, Dongara, Canarvon. (*J*) *Bodianus busellatus* n.sp., initial-phase adult, 264 mm SL, BPBM 16588, paratype, Henderson Island (photo by J. Randall).

Plate 8. (*A*) *Bodianus busellatus* n.sp., terminal-phase adult, 315 mm SL, NMNZ P.31385, paratype, Ducie Island, Pitcairn Group, 24°41.50'S 124°46.50'W (photo by A. Stewart). (*B*) *Bodianus loxozonus*, juvenile, approx. 40 mm, Hachijo, Japan, 5 meters (photo by Y. Miyamoto); (*C*) transforming juvenile, 96 mm SL, Rapa (photo by J. Randall); (*D*) initial-phase adult, Iriomote, Japan (photo by R. Kuiter); (*E*) terminal-phase adult, 225 mm SL, Rapa (photo by J. Randall). (*F*) *Bodianus macrognathos*, initial-phase adult, 132 mm SL, BPBM 34434, Oman, near Mirbat, Eagle's Retreat, 16°56'50"N 54°48'E, 6–8 meters (photo by J. Randall); (*G*) terminal-phase adult, Oman, 18 m (photo by H. Debelius). (*H*) *Bodianus macrourus*, initial-phase adult, approx. 100 mm TL, Mauritius, 22 meters (photo by R.F. Myers); (*I*) terminal-phase adult, 258 mm SL, USNM 217898, St. Brandon's Shoals, Indian Ocean (photo by V. Springer). (*J*) *Bodianus perditio*, juvenile, approx. 30 mm SL, New Caledonia (photo by J. Randall).

Plate 9. (*A*) *Bodianus perditio*, initial-phase adult, Amity, Queensland, Australia (photo by R. Kuiter); (*B*) terminal-phase adult, approx. 325 mm SL, aquarium specimen, Japan (photo by R. Kuiter). (*C*) *Bodianus solatus* n.sp., initial-phase adult, 136 mm SL, CSIRO H1471-02, paratype, North of Cape Lambert, Western Australia, 19°48.8–46.6'S 117°18.7–20.7'E (photo by T. Carter); (*D*) terminal-phase adult, 309 mm SL, CSIRO H1473-02, holotype, North of Cape Lambert, Western Australia, 19°43.7–43.4'S 117°16.0–14.3'E (photo by T. Carter). (*E*) *Bodianus speciosus*, juvenile, Ile de Goree, Senegal (photo by P. Wirtz); (*F*) initial-phase adult, Insel Sal, Cape Verde (photo by P. Wirtz); (*G*) terminal-phase adult, Murdeira Bay, Sal Island, Cape Verde Islands (photo by P. Wirtz). (*H*) *Bodianus diplotaenia*, juvenile, Birch Aquarium, San Diego, California (photo by R. Fenner); (*I*) initial-phase adult, Gulf of California (photo by M. Norman); (*J*) terminal-phase adult, Clipperton Island (photo by G. Allen).

Plate 10. (*A*) *Bodianus eclancheri*, juvenile, Galapagos Islands (photo by G. Allen); (*B*) adult, approx. 350 mm, Galapagos Islands, 15 meters (photo by R. Steene). (*C*) *Bodianus insularis*, juvenile, St. Helena (photo by R. Lubbock); (*D*) initial-phase adult, St. Helena (photo by A. Edwards); (*E*) terminal-phase adult, St. Paul's Rocks (photo by J. Gasparini). (*F*) *Bodianus pulchellus*, juvenile, Bimini, Bahamas (photo by P. Humann); (*G*) adult, aquarium specimen (photo by R. Kuiter); (*H*) adult, aquarium specimen (photo by R. Kuiter). (*I*) *Bodianus rufus*, initial-phase adult, Abrolhos, Brasil (photo by G. Allen); (*J*) terminal-phase adult, Bonaire (photo by P. Wirtz).

Plate 1

1A *Bodianus cylindriatus*

1B *Bodianus thoracotaeniatus*

1C *Bodianus bimaculatus*

1D *Bodianus bimaculatus*

1E *Bodianus bimaculatus*

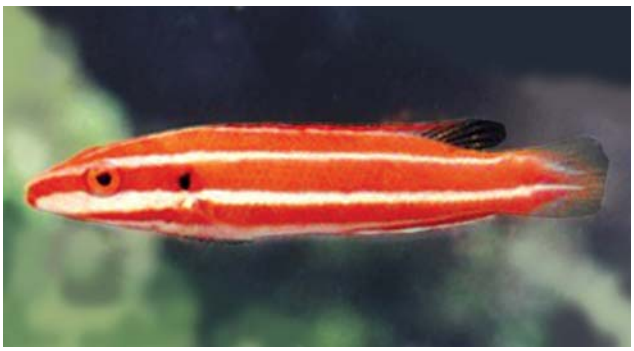
1F *Bodianus izuensis*

1G *Bodianus izuensis*

1H *Bodianus masudai*

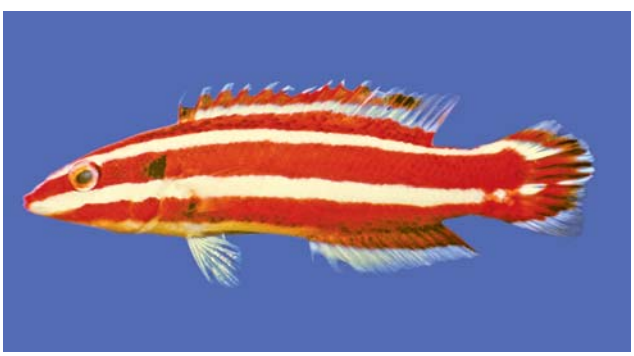
1I *Bodianus masudai*

1J *Bodianus masudai*



2A *Bodianus neopercularis* n.sp.

2B *Bodianus neopercularis* n.sp.



2C *Bodianus opercularis*

2D *Bodianus opercularis*

2E *Bodianus sanguineus*

2F *Bodianus sanguineus*

2G *Bodianus sepiacaudus* n.sp.

2H *Bodianus sepiacaudus* n.sp.

2I *Bodianus tanyokidus*

2J *Bodianus scrofa*

Plate 3

3A *Bodianus scrofa*

3B *Bodianus scrofa*

3C *Bodianus bathycapros* n.sp.

3D *Bodianus flavifrons*

3E *Bodianus flavipinnis*

3F *Bodianus frenchii*

3G *Bodianus frenchii*

3H *Bodianus frenchii*

3I *Bodianus oxycephalus*

3J *Bodianus oxycephalus*

4A *Bodianus unimaculatus*

4B *Bodianus unimaculatus*

4C *Bodianus unimaculatus*

4D *Bodianus vulpinus*

4E *Bodianus vulpinus*

4F *Bodianus leucosticticus*

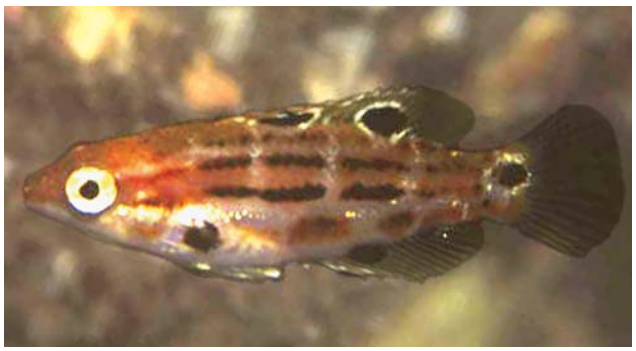
4G *Bodianus leucosticticus*

4H *Bodianus leucosticticus*

4I *Bodianus paraleucosticticus* n.sp.

4J *Bodianus paraleucosticticus* n.sp.

Plate 5



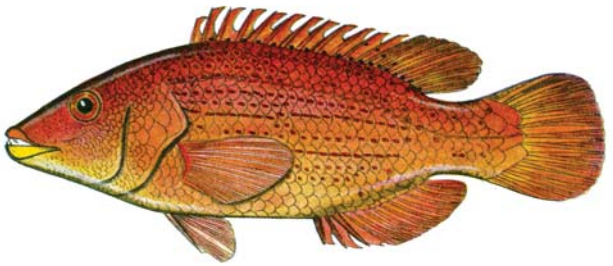
5A *Bodianus rubrisos* n.sp.

5B *Bodianus rubrisos* n.sp.

5C *Bodianus rubrisos* n.sp.

5D *Bodianus trilineatus*

5E *Bodianus trilineatus*



5F *Bodianus trilineatus*

5G *Bodianus diana*

5H *Bodianus diana*

5I *Bodianus diana*

5J *Bodianus dictynna* n.sp.

6A *Bodianus dictynna* n.sp.

6B *Bodianus dictynna* n.sp.

6C *Bodianus prognathus*

6D *Bodianus prognathus*

6E *Bodianus prognathus*

6F *Bodianus axillaris*

6G *Bodianus axillaris*

6H *Bodianus mesothorax*

6I *Bodianus mesothorax*

6J *Bodianus neilli*

Plate 7

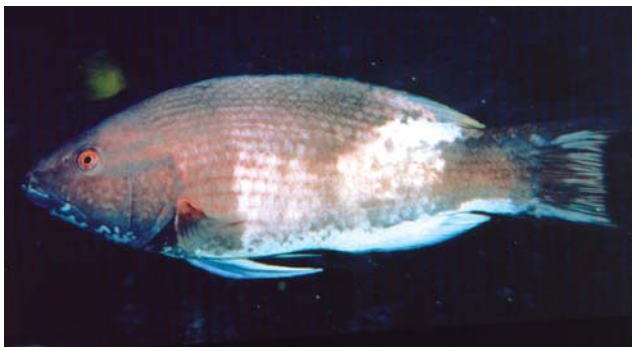
7A *Bodianus neilli*

7B *Bodianus anthioides*

7C *Bodianus anthioides*

7D *Bodianus albotaeniatus*

7E *Bodianus albotaeniatus*



7F *Bodianus albotaeniatus*

7G *Bodianus bilunulatus*

7H *Bodianus bilunulatus*

7I *Bodianus bilunulatus*

7J *Bodianus busellatus* n.sp.

8A *Bodianus busellatus* n.sp.

8B *Bodianus loxozonus*

8C *Bodianus loxozonus*

8D *Bodianus loxozonus*

8E *Bodianus loxozonus*

8F *Bodianus macrognathos*

8G *Bodianus macrognathos*

8H *Bodianus macrourus*

8I *Bodianus macrourus*

8J *Bodianus perditio*

Plate 9

9A *Bodianus perditio*

9B *Bodianus perditio*

9C *Bodianus solatus* n.sp.

9D *Bodianus solatus* n.sp.

9E *Bodianus speciosus*

9F *Bodianus speciosus*

9G *Bodianus speciosus*

9H *Bodianus diplotaenia*

9I *Bodianus diplotaenia*

9J *Bodianus diplotaenia*

10A *Bodianus eclancheri*

10F *Bodianus pulchellus*

10B *Bodianus eclancheri*

10G *Bodianus pulchellus*

10C *Bodianus insularis*

10H *Bodianus pulchellus*

10D *Bodianus insularis*

10I *Bodianus rufus*

10E *Bodianus insularis*

10J *Bodianus rufus*