



Zootaxa 3988 (1): 001–095
www.mapress.com/zootaxa/

Copyright © 2015 Magnolia Press

Monograph

ISSN 1175-5326 (print edition)

ZOOTAXA

ISSN 1175-5334 (online edition)

<http://dx.doi.org/10.11646/zootaxa.3988.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:23ED7D54-A463-4156-B618-AF8A884C53D5>

ZOOTAXA

3988

A revision of the fish genus *Oxyurichthys* (Gobioidei: Gobiidae) with descriptions of four new species

FRANK L. PEZOLD¹ & HELEN K. LARSON²

¹College of Science & Engineering, Texas A&M University—Corpus Christi, Corpus Christi, TX; 78412-5806, USA;
frank.pezold@tamucc.edu

²Museum and Art Gallery Northern Territory, GPO Box 4646, Darwin, NT 0801, Australia; Museum of Tropical Queensland, Townsville, Queensland 4810, Australia; School of Marine and Tropical Biology, James Cook University, Townsville, Queensland 4811, Australia; helen.larson@nt.gov.au



Magnolia Press
Auckland, New Zealand

Accepted by E. Hilton: 5 Jun. 2015; published: 22 Jul. 2015

Licensed under a Creative Commons Attribution License <http://creativecommons.org/licenses/by/3.0>

FRANK L. PEZOLD & HELEN K. LARSON

A revision of the fish genus *Oxyurichthys* (Gobioidei: Gobiidae) with descriptions of four new species
(*Zootaxa* 3988)

95 pp.; 30 cm.

22 Jul. 2015

ISBN 978-1-77557-747-8 (paperback)

ISBN 978-1-77557-748-5 (Online edition)

FIRST PUBLISHED IN 2015 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

<http://www.mapress.com/zootaxa/>

© 2015 Magnolia Press

All rights reserved.

No part of this publication may be reproduced, stored, transmitted or disseminated, in any form, or by any means, without prior written permission from the publisher, to whom all requests to reproduce copyright material should be directed in writing.

This authorization does not extend to any other kind of copying, by any means, in any form, and for any purpose other than private research use.

ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

Table of contents

Abstract	3
Introduction	3
Methods	6
Systematics	7
KEY TO SPECIES OF OXYURICHTHYS	10
<i>Ctenoxylepis</i> new subgenus	11
<i>Oxyurichthys keiensis</i> (Smith, 1938)	14
Subgenus <i>Oxyurichthys</i>	17
<i>Oxyurichthys auchenolepis</i> Bleeker, 1876	18
<i>Oxyurichthys chinensis</i> new species	22
<i>Oxyurichthys cornutus</i> McCulloch & Waite, 1918	24
<i>Oxyurichthys heisei</i> Pezold, 1998	28
<i>Oxyurichthys limophilus</i> , new species	31
<i>Oxyurichthys lonchotus</i> (Jenkins, 1903)	34
<i>Oxyurichthys microlepis</i> (Bleeker, 1849)	39
<i>Oxyurichthys notonema</i> (Weber, 1909)	44
<i>Oxyurichthys nuchalis</i> (Barnard, 1927)	48
<i>Oxyurichthys ophthalmonema</i> (Bleeker, 1856)	51
<i>Oxyurichthys papuensis</i> (Valenciennes, 1837)	57
<i>Oxyurichthys paulae</i> Pezold, 1998	62
<i>Oxyurichthys petersii</i> (Klunzinger, 1871)	65
<i>Oxyurichthys rapa</i> new species	68
<i>Oxyurichthys stigmalo-phius</i> (Mead & Böhlke, 1958)	71
<i>Oxyurichthys takagi</i> Pezold, 1998	74
<i>Oxyurichthys tentacularis</i> (Valenciennes, 1837)	77
<i>Oxyurichthys uronema</i> (Weber, 1909)	81
<i>Oxyurichthys zeta</i> new species	84
Invalid and Dubious Names	87
Discussion	88
Acknowledgements	89
References	90

Abstract

The widespread tropical gobiionelline fish genus *Oxyurichthys* is monophyletic due to its species sharing two characters considered derived within the *Stenogobius* Group of the Gobiionellinae (Gobioidei: Gobiidae), a transversely broadened (spatulate) third neural spine that is usually bifid, and no preopercular cephalic lateralis canal. It is most closely related to *Oligolepis*, also of the Indo-west Pacific, and *Ctenogobius*, an Atlantic-eastern Pacific genus. Sixteen valid species of *Oxyurichthys* are redescribed and illustrated and four new species are described, *O. limophilus* from the western Indian Ocean, *O. rapa* from French Polynesia, and *O. chinensis* and *O. zeta* from the western Pacific. Nineteen species share two additional synapomorphies, a rounded fleshy tongue and a palatine lacking an elongate posterior strut, and form the sister group to the plesiomorphous *Oxyurichthys keiensis*, known from South Africa and Madagascar. One species, *O. stigmalo-phius*, occurs in the western Atlantic. There are no records of this genus from the continental eastern Pacific or the eastern Atlantic. Previous accounts from the Gulf of Guinea region of West Africa are references to *Gobionellus occidentalis*. Many *Oxyurichthys* species are limited to shallow estuarine and coastal waters with bottom substrates of silt or other fine sediments, but several are known from depths exceeding 10 m and are often collected by trawling.

Key words: Gobiionellinae, *Stenogobius* Group, *Oligolepis*, *Oxyurichthys*, *Ctenogobius*, *Gobius keiensis*

Introduction

Oxyurichthys species are large and distinctive gobies, widespread in the tropical Indo-west Pacific in a range of estuarine and coastal marine habitats. They are often collected by trawling and are usually present in artisanal fishmarkets throughout Southeast Asia. Forty-four nominal species have been described from 1837 to 1998, but the genus has never been reviewed or revised.

More recent attention has been paid to the higher classification of the genus and its relatives than to the species comprising them. Birdsong et al. (1988) placed *Oxyurichthys* in their Gobionellus Group, while Harrison (1989) discussed the relationship of *Oxyurichthys* to the oxudercines. Pezold & Larson (1986) pointed out that *Oxyurichthys* was monophyletic, sharing several uniquely derived character states. Pezold (1993) placed *Oxyurichthys* among the Gobionellinae, an action which Larson (2001) further refined by placing *Oxyurichthys* in a clade within the gobionellines, her *Stenogobius* Group, which included *Awaous*, *Gnatholepis*, *Gobionellus*, *Oligolepis*, *Rhinogobius* and *Stenogobius* among its closest relatives. Pezold (2004a) undertook a phylogenetic analysis of the genus *Gobionellus* and discussed its relationship to *Oxyurichthys*. He provided evidence for a monophyletic clade consisting of *Oxyurichthys*, *Oligolepis*, *Evorthodus* and *Ctenogobius*.

The first detailed description of *Oxyurichthys* was by Bleeker (1874). A few characters, among those included in that work, have shown to be particularly significant in determining the limits of the genus. First, he noted that *Oxyurichthys* species have a single row of upper jaw teeth (but may also have a subseries of rudimentary teeth forming an inner row in the upper jaw), and multiple rows of teeth in the lower jaw with the outer series being longer, and that no canines were present (Bleeker 1874). He also mentioned a scaleless median crest or strip on the nape and a lanceolate caudal fin. Bleeker later emended the description to read that the upper jaw had a single row of teeth and the lower jaw 2 to 4 rows of teeth with the outermost row extending all the way to the angle of the jaw (Bleeker 1876). This clarified what was meant by the outer series of teeth being “longer,” and emphasized the single row of teeth—at the expense of ignoring the occasional occurrence of a partial inner row in the upper jaw of some species. Bleeker (1876) also noted that the tongue was entire, as opposed to emarginate. Nine species were listed in that work, *O. microlepis*, *O. tentacularis*, *O. ophthalmonema*, *O. belosso*, *O. papuensis*, *O. cristatus*, *O. petersi* and *O. andamanensis*.

The next extensive examination of *Oxyurichthys* was published by Herre (1927) in his review of Philippine gobies and sleepers. He added some detail to Bleeker’s earlier observations; most notably he elaborated on the transition of scale form from ctenoid to cycloid anteriorly on the trunk, the squamation of the nape, the median fleshy crest that is present in many species, the narrow bony interorbital region, the presence of minute sensory papillae on the head (free neuromasts), the convex tongue, and the filamentous dorsal spines. Following Bleeker (1874), Herre (1927) stated that he did not recognize the distinction of *Gobiichthys* Klunzinger, 1871, for species with a tentacle on the eye. Klunzinger did not offer a tentacle as a diagnostic character for *Gobiichthys*, but the type species, *O. petersii*, is characterized by an ocular cirrus, as noted in its description. Herre (1927) comments that in his study of *Oxyurichthys* that he had observed “every gradation in the development of an ocular tentacle, from those with ordinary eyes or with a pigmented spot or bar, on through those with a slight protuberance in its place, up to species with a tentacle as long as the eye.” He also synonymized *Pselaphias* Jordan & Seale, 1906, with *Oxyurichthys* (type species: *Oxyurichthys ophthalmonema*), presumably for the same reason. Herre recognized a total of eight species of Philippine and South China Sea *Oxyurichthys*, including three new species. One of the species was based on a description of *Gobius argulus* Peters, 1868, now known to be a species of *Cryptocentroides* (Hoese & Larson, 2015).

Increasingly in the literature over the last century, *Oxyurichthys* seems to have been distinguished from other gobioid genera primarily in having a single row of teeth in the upper jaw, often in combination with a caudal fin with medially elongated rays. For example, Koumans (1953) recognized only six *Oxyurichthys* species from the Indonesian Archipelago; one of those is an *Oligolepis* species and another a gobiine, both of which share those features. Similarly, and perhaps because Koumans’ work (1931, 1941, 1953) has long been relied upon as a starting place for deciphering Indo-Pacific gobioid fish diversity, Menon & Govindan (1977) provided a key to *Oxyurichthys* from India when describing a new species of *Oligolepis* (as an *Oxyurichthys*). The key actually included three genera, but only one species was an *Oxyurichthys*. Ginsburg (1932) noted that *Oxyurichthys* and *Gobionellus* both had elongate caudal fins, but could be distinguished on the basis of a single row of teeth in the upper jaw in the former genus compared to multiple rows in the latter. The addition of *Gobionellus panamensis* (= *G. daguae*) and *G. liolepis* to *Gobionellus* (Ginsburg 1953) nullified the distinction as both of these species have a single row of teeth in the upper jaw. This problem surfaced with the discovery of *Oxyurichthys stigmalophius* (Mead & Bohlke, 1958), the only species of the genus occurring in the Western Hemisphere. In their description of *O. stigmalophius* (incorrectly assigned to *Gobionellus*), the authors, apparently relying upon generic and species diagnoses available in the literature, were partly confused by Koumans’ attributing *Oxyurichthys* a non-tubular anterior naris. Mead & Bohlke were further confused by comparisons with descriptions of *Gobionellus occidentalis*

that was incorrectly assigned to *Oxyurichthys* at the time of their work (Pezold 2004b). Gilbert & Randall (1979) revisited this confusion and compared *Oxyurichthys stigmatophius* (still assigned to *Gobionellus* at the time) with *Oxyurichthys microlepis*. They regarded the two species as congeneric, but resisted synonymizing *Gobionellus* with *Oxyurichthys* pending further study of a group of gobionelline genera.

Closer inspection of the relationships of *Oxyurichthys* to other gobionelline genera in recent years has allowed further refinement of the limits of the genus. Hoese (1986) reported four species from South African waters, and provided a key and illustrations for all four (two in color). *Oxyurichthys* was defined as including those species with paired anterior interorbital pores, two pairs of nasal canal pores, a single row of upper jaw teeth (with a partial row anteriorly in some large specimens), a transverse sensory papillae pattern, no flaps on the shoulder girdle, a tongue largely fused to the floor of the mouth with a free tip and a lower jaw that curves slightly upwards. It was also noted that preopercular pores were lacking. Pezold (1991) compared the genus to *Stenogobius* (including *S. laterisquamatus*), *Gobionellus oceanicus* and the *Paroxyurichthys typus* holotype when resolving the status of the genus *Paroxyurichthys*. *Oxyurichthys* was delimited from the other taxa in having a rounded tongue margin, a membranous crest on the nape of most species, no preopercular canal, fleshy lobes on the anterior surface of the first gill arch, 13 and 14 second dorsal and anal-fin elements respectively, a simple fourth neural spine (not flared), a diagonal posterior opercular papillae row, an A'BCDFH' oculoscapular canal pore pattern, a single row of teeth in the upper jaw, anterior nares lateral to the oculoscapular canals and no fleshy processes on the shoulder girdle. Pezold (1998) restated the diagnostic characters proposed in 1991, when describing three new species of *Oxyurichthys*, and recognized the new species as belonging to three different phenotypic groups within the genus. One group was characterized by ocular cirri, and included *O. ophthalmonema*, *O. tentacularis*, *O. uronema* and *O. paulae*. Another group, including *O. microlepis* and *O. takagi*, was identified as having cycloid scales midlaterally on the posterior trunk. *Oxyurichthys heisei* was grouped with *O. stigmatophius*, but any feature uniting the group was unexplained.

In this paper we review the species of *Oxyurichthys* throughout its known distribution and discuss their relationships to one another. We also list the nominal species of *Oxyurichthys* and clarify their current assignment (Table 1). Twenty species and two subgenera are recognized.

TABLE 1. Nominal species of *Oxyurichthys* and their status.

Nominal species	Taxonomic allocation
<i>Oxyurichthys amabilis</i> Seale, 1914	= <i>Oxyurichthys auchenolepis</i> Bleeker, 1876
<i>Euctenogobius andamanensis</i> Day, 1871	= <i>Oxyurichthys ophthalmonema</i> (Bleeker, 1856)
<i>Oxyurichthys tentacularis andamanensis</i> Mehta in Mehta, Mehta and Devi, 1990	= <i>Oxyurichthys tentacularis</i> (Valenciennes, 1837)
<i>Oxyurichthys argulus</i> (Herre, 1927)	= <i>Cryptocentroides insignis</i> (Seale, 1910)
<i>Oxyurichthys auchenolepis</i> Bleeker, 1876	= <i>Oxyurichthys auchenolepis</i> Bleeker, 1876
<i>Gobius belosso</i> Bleeker, 1854a	= <i>Oxyurichthys papuensis</i> (Valenciennes, 1837)
<i>Gobius (Oxyurichthys) coelidotus</i> Sauvage, 1880	= <i>Callogobius hasseltii</i> (Bleeker, 1851)
<i>Oxyurichthys cornutus</i> McCulloch and Waite, 1918	= <i>Oxyurichthys cornutus</i> McCulloch and Waite, 1918
<i>Euctenogobius cristatus</i> Day, 1873	= <i>Oxyurichthys microlepis</i> (Bleeker, 1849)
<i>Oxyurichthys dasi</i> Talwar, Chatterjee and Dev Roy, 1982	= possibly an <i>Amoya</i>
<i>Oxyurichthys formosanus</i> Nichols, 1958	= <i>Oligolepis formosanus</i> (Nichols, 1958)
<i>Oxyurichthys guibei</i> Smith, 1959	= <i>Oxyurichthys lonchotus</i> (Jenkins, 1903)
<i>Oxyurichthys heisei</i> Pezold, 1998	= <i>Oxyurichthys heisei</i> Pezold, 1998
<i>Oxyurichthys jaarmani</i> Weber, 1913	= <i>Oligolepis jaarmani</i> (Weber, 1913)
<i>Oxyurichthys laterisquamatus</i> Weber, 1907	= <i>Stenogobius laterisquamatus</i> (Weber, 1907)
<i>Gobiichthys lemayi</i> Smith, 1947	= <i>Oxyurichthys notonema</i> (Weber, 1909)
<i>Gobionellus lonchotus</i> Jenkins, 1903	= <i>Oxyurichthys lonchotus</i> (Jenkins, 1903)

.....continued on the next page

TABLE 1. (Continued)

Nominal species	Taxonomic allocation
<i>Gobius longicauda</i> Steindachner, 1893	= <i>Oxyurichthys uronema</i> (Weber, 1909)
<i>Gobius (Oxyurichthys) longimanus</i> Weber, 1909	= <i>Vanderhorstia longimana</i> (Weber, 1909)
<i>Oxyurichthys macrolepis</i> Chu and Wu, 1963	= <i>Arcygobius baliurus</i> ?
<i>Gobius macrurus</i> Bleeker, 1849	= <i>Oxyurichthys tentacularis</i> (Valenciennes, 1837)
<i>Apocryptes maculatus</i> Oshima, 1926	= <i>Oxyurichthys microlepis</i> (Bleeker, 1849)
<i>Gobius microlepis</i> Bleeker, 1849	= <i>Oxyurichthys microlepis</i> (Bleeker, 1849)
<i>Parapocryptes (Paenapocryptes) mindanensis</i> Herre, 1927	= <i>Oxyurichthys notonema</i> (Weber, 1909)
<i>Oxyurichthys nijsseni</i> Menon and Govindan 1977	= <i>Oligolepis nijsseni</i> (Menon and Govindan, 1977)
<i>Gobius (Oxyurichthys) notonema</i> Weber, 1909	= <i>Oxyurichthys notonema</i> (Weber, 1909)
<i>Gobius (Oxyurichthys) nuchalis</i> Barnard, 1927	= <i>Oxyurichthys nuchalis</i> (Barnard, 1927)
<i>Gobius (Oxyurichthys) occidentalis</i> Boulenger, 1909	= <i>Gobionellus occidentalis</i> (Boulenger, 1909)
<i>Oxyurichthys oculomirus</i> Herre, 1927	= <i>Oxyurichthys papuensis</i> (Valenciennes, 1837)
<i>Gobius ophthalmonema</i> Bleeker, 1856	= <i>Oxyurichthys ophthalmonema</i> (Bleeker, 1856)
<i>Oxyurichthys ornatus</i> Fourmanoir and Crosnier, 1964	= <i>Oxyurichthys</i> or <i>Amblyeleotris</i> ?
<i>Gobius papuensis</i> Valenciennes, 1837	= <i>Oxyurichthys papuensis</i> (Valenciennes, 1837)
<i>Oxyurichthys paulae</i> Pezold, 1998	= <i>Oxyurichthys paulae</i> Pezold, 1998
<i>Gobius petersenii</i> Steindachner, 1893	= <i>Oxyurichthys auchenolepis</i> (Bleeker, 1876)
<i>Apocryptes (Gobiichthys) petersii</i> Klunzinger, 1871	= <i>Oxyurichthys petersii</i> (Klunzinger, 1871)
<i>Oxyurichthys rumbia</i> Popta, 1922	= <i>Oxyurichthys cornutus</i> McCulloch & Waite, 1918
<i>Oxyurichthys saru</i> Tomiyama, 1936	= <i>Oxyurichthys auchenolepis</i> (Bleeker, 1876)
<i>Gobionellus stigmalocephalus</i> Mead and Böhlke, 1958	= <i>Oxyurichthys stigmalocephalus</i> (Mead and Böhlke, 1958)
<i>Oxyurichthys takagi</i> Pezold, 1998	= <i>Oxyurichthys takagi</i> Pezold, 1998
<i>Oxyurichthys talwari</i> Mehta, Devi and Mehta, 1989	= <i>Oxyurichthys ophthalmonema</i> (Bleeker, 1856)
<i>Gobius tentacularis</i> Valenciennes, 1837	= <i>Oxyurichthys tentacularis</i> (Valenciennes, 1837)
<i>Gobius (Oxyurichthys) uronema</i> Weber, 1909	= <i>Oxyurichthys uronema</i> (Weber, 1909)
<i>Oxyurichthys viridis</i> Herre, 1927	= <i>Oxyurichthys ophthalmonema</i> (Bleeker, 1856)
<i>Oxyurichthys visayanus</i> Herre, 1927	= <i>Oxyurichthys lonchotus</i> (Jenkins, 1903)

Methods

Counts and measures follow Pezold (1991, 1998). Standard length was measured as the straight-line distance from the tip of the snout to the base of the caudal fin. Caudal peduncle length was determined as the distance from the base of the posteriormost anal fin ray to the midpoint of caudal-fin base. Pectoral fin length was measured as the length of the longest pectoral-fin ray. Head width was measured as the transverse distance from the midpoint of the preopercle on each side. If the opercula were flared, they were pressed together to better approximate the non-flared condition. Interorbital width was measured as the least fleshy width from orbit to orbit. Jaw length was measured as the distance from the symphysis of the premaxillae to the angle of the jaw. Head length was measured from the tip of the snout to the bony edge of the posterodorsal corner of the opercle. Orbit length was measured as the greatest horizontal diameter. Snout length was measured from the tip of the snout to the anterior edge of the orbit along a line through the posterior nares. Pelvic fin length was taken as the length of the innermost (longest) rays. Caudal-fin length was the length of the longest caudal ray.

Lateral scale rows were counted from the dorsoposterior corner of the opercle in a straight line to the midpoint of the base of the caudal fin. Predorsal scales were the number of rows counted forward from the first dorsal-fin origin on the side of the nape along the groove paralleling the fleshy low midnape ridge or crest, or along a similarly positioned transect if a crest or ridge was not present. Transverse forward scale rows were counted from the anal fin origin to the first dorsal-fin base. Transverse rearward scale rows (TRB) were counted from the anal-fin origin to the second dorsal-fin base. Cycloid scales indicated in taxonomic descriptions and the key are believed to be secondary cycloid scales, sometimes also termed reduced ctenoid scales, as observed in other gobioid fishes (Kobayasi & Kondo 1959; Gierl et al. 2013).

The first element of the second dorsal and anal fins is a weak flexible spine and was included in counts referring to total fin elements. The last ray of the second dorsal and anal fin is branched at or below its muscular insertion and was counted as a single ray.

Osteological characters were examined from radiographs, cleared/stained specimens and some dissections. Osteological terminology follows Birdsong et al. (1988). Oculoscapular canal and canal pore terminology is according to Akihito et al. (1984). The system of Akihito et al. (1984) has been modified such that, when interorbital pores are single and median in position, they are underlined (as C and/or D). Cephalic free neuromast (papillae) pattern terminology follows Sanzo's (1911) system. An illustration of the cephalic papillae patterns observed on the side of the head is given for each species, but an extensive analysis of pattern variation was beyond the scope of this project. Materials examined are listed at the end of each species account. Collections identified but not used in descriptions are listed under "other material examined." Color names given (e.g. greyish orange) are those used in the *Methuen handbook of colour* (Kornerup & Wanscher 1978). Museum acronyms follow Sabaj Perez (2014). Comparisons given in species accounts highlight features that allow each species to be distinguished from other species with which it would most easily be confused.

Systematics

Oxyurichthys Bleeker, 1857

Oxyurichthys Bleeker, 1857: 464 (*Gobius belosso* Bleeker, 1854a: 316, Banten, Indonesia, by subsequent designation, by Bleeker, 1874: 324).

Gobiichthys Klunzinger, 1871: 479 (*Apocryptes (Gobiichthys) petersii* Klunzinger, 1871: 480, Qusier, Red Sea, by monotypy).

Pselaphias Jordan & Seale, 1906: 406 (*Gobius ophthalmonema* Bleeker, 1856: 208, Ternate, by original designation and monotypy).

Paeneapocryptes Herre, 1927: 261 (*Parapocryptes (Paeneapocryptes) mindanensis* Herre, 1927: 262, pl. 20, fig. 4, Mindanao, Philippines, by monotypy).

Included species. Twenty species are recognized for the genus: *Oxyurichthys keiensis*, *O. auchenolepis*, *O. chinensis* n. sp., *O. cornutus*, *O. heisei*, *O. limophilus* n. sp., *O. lonchotus*, *O. microlepis*, *O. notonema*, *O. nuchalis*, *O. ophthalmonema*, *O. papuensis*, *O. paulae*, *O. petersii*, *O. rapa* n. sp., *O. stigmalophius*, *O. takagi*, *O. tentacularis*, *O. uronema* and *O. zeta* n. sp.

Diagnosis. Members of this genus are distinguished from all other gobiionelline species of the *Stenogobius* Group (Larson 2001) in having a transversely broadened, distally bifid to spatulate, third neural spine, and cephalic lateralis canal development limited to oculoscapular canals with an A'BCDFH' pattern; there are no preopercular canals or disjunct canals above the opercle. This particular conformation of the cephalic lateralis is unique among all gobioid fishes examined (Pezold 1993).

Description. First dorsal fin with six flexible spines, filamentous and elongate in most species, second dorsal fin one flexible spine and 11 or 12 segmented rays, anal fin one flexible spine and 12 or 13 rays, pectoral fins 18–26 rays, pelvic fins I,5, with finely crenulate or fimbriate frenum, caudal fin elongate and acuminate with 17 segmented and 13–14 branched rays. Scales cycloid anteriorly, becoming larger and ctenoid posterolaterally along trunk in most species, three species, *O. microlepis*, *O. takagi* and *O. zeta*, with all scales cycloid, scales forming 27–92 diagonal rows in lateral series. No scales present on cheeks, opercle or interorbital region of head, nape scaled to above preopercle or naked. Abdomen naked to mostly scaled.

Head compressed, moderately large 19–30% SL in adults. Most species with membranous crest on nape. Eyes lateral, high on head forming part of dorsal profile, interorbital region narrow, most species with dark spot,

cornification or tentacle on dorsoposterior surface of the eye. Snout rounded, anterior nares tubular, posterior nares open pits. Mouth oblique, jaws elongate, rearward extension ranging from vertical below mid-eye to beyond posterior margin of orbit. Fleishy tongue truncate to bifurcate in one species, rounded in all others. Upper lip constricted at premaxillary symphysis in some species, approximately equal in width throughout its length in others (see Akihito [1972, Fig. 2], for illustration). Upper jaw teeth in two to three rows in one species, a single row (large specimens sometimes with partial rear row anteromedially) in all others, lower jaw teeth in multiple rows. Single, bi- or tripartite fleshy lobe on epibranchial of first gill arch in all but one species which has three elongate finger-like rakers; ceratobranchial with 3–5 triangulate rakers and two or three fused rakers at the angle (see Pezold [2004a, Fig. 3, E and F] for examples).

First dorsal-fin pterygiophore formula 3-12210, one to three epurals, usually two, two preanal pterygiophores, 26 vertebrae, 10 precaudal and 16 caudal. Neural spines with pointed tips, fourth neural spine not broadly expanded or flared axially, third neural spine transversely bifid and spatulate, neural arches complete over caudal vertebrae, forming neural foramen, in all but one species. Palatine lacking an elongate posterior strut in all but one species; basihyal spatulate to Y-shaped.

Cephalic lateralis canals comprised of oculoscapular canals with A'BCDFH' pore pattern, no preopercular lateralis canal, no disjunct segment over opercle. Free neuromasts on cheek transverse, horizontal cheek row *b* extending forward to second or third transverse suborbital row, horizontal cheek row *d* extending rearward beyond posteriormost transverse suborbital row, posterior opercular row diagonal (Fig. 1).

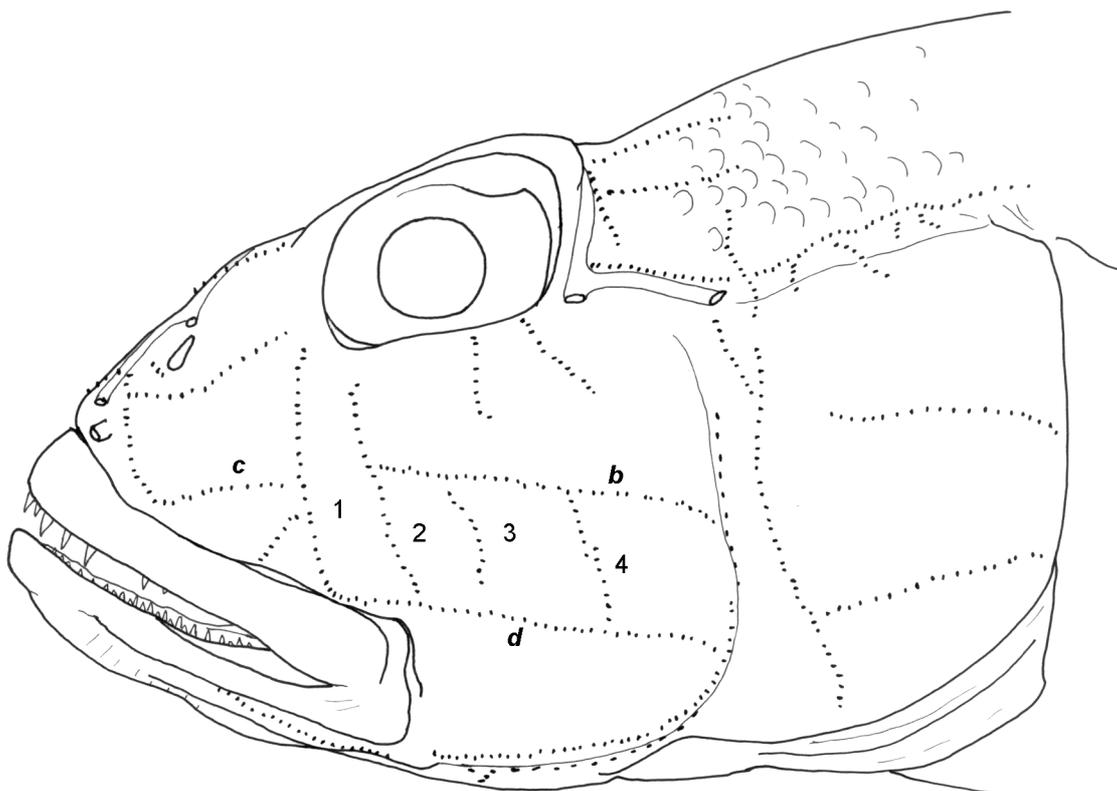


FIGURE 1. *Oxyurichthys auchenolepis*, sensory papillae pattern, URM P.13638, 99 mm male, Pattani, Thailand. Several papilla rows labelled as per Sanzo (1911).

Remarks. Species of this genus all share two synapomorphies—a transversely broadened, bifid to spatulate, third neural spine (Fig. 2) and a cephalic lateralis canal comprised of an oculoscapular canal with an A'BCDFH' pore pattern and no disjunct segment over opercle and no preopercular canal. A transversely bifid third neural spine has not been observed in other gobiionellines. This feature was observed in every *Oxyurichthys* specimen examined, including *O. keiensis*, *O. stigmalophius*, *O. microlepis*, *O. papuensis*, *O. ophthalmonema*, *O. tentacularis*, *O. takagi*, *O. randalli*, *O. heisei*, *O. limophilus*, and *O. paulae*. A similar spine is observed in the sicydiine genus *Sicydium*. Although the lack of a preopercular canal occurs in many other gobioid fishes (Takagi

1989), this condition is unique to *Oxyurichthys* among gobionellines of the *Stenogobius* Group as defined by Larson 2001. The structure of the oculoscapular canal is shared only with *Ctenogobius* (Pezold 1993).

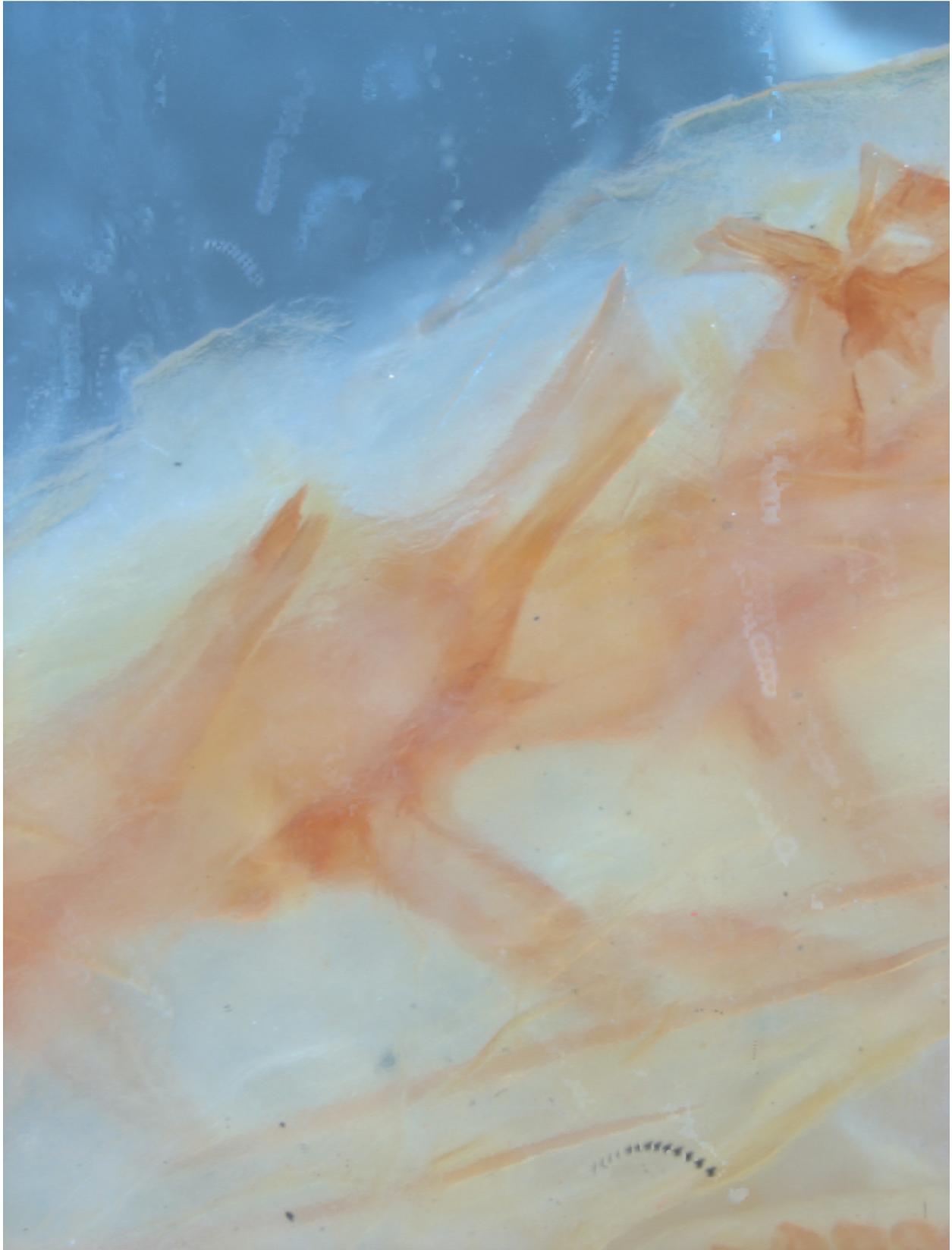


FIGURE 2. Photograph illustrating spatulate, bifid, spatulate third neural spine of *Oxyurichthys stigmalophius*. Photograph by Ryan Chabarria.

Gobiichthys Klunzinger, 1871, was proposed as a subgenus of *Apocryptes* with *Oxyurichthys petersii* the type species by monotypy. Klunzinger (1871) described the genus as having the following attributes. Two dorsal fins close together, but separated. The pelvic fins united, body scales ctenoid, small anteriorly, larger posteriorly. Teeth in one row in the upper jaw; smaller teeth in the lower jaw forming band of three to four rows, the outer row more or less horizontal, the inner row somewhat larger towards the middle teeth. No canines. Gill slits long, reaching beneath the interopercles. Caudal fin long and pointed. Head long and compressed. Lower jaw curved from the angle of the jaw. Although the combination of characters given for the genus above could apply to other gobioids, examination of a syntype, SMNS 1753, supports Bleeker's recognition of the taxon as a synonym of *Oxyurichthys* (Bleeker 1874).

Pselaphias Jordan & Seale, 1906, was established for *Oxyurichthys ophthalmonema* and was distinguished from *Oxyurichthys* by the possession of a tentacle on the eye. *Oxyurichthys ophthalmonema* was designated the type species by including it in parentheses after the genus name. As observed by Herre (1927), a variety of calluses, teats or tentacle-like structures may ornament the eyes of these species.

Herre (1927) described *Paeneapocryptes* as a subgenus of *Parapocryptes* distinguished from other members of the genus in having fewer dorsal- and anal-fin rays and a naked head and nape. The type species *P. mindanensis* was based upon a single specimen 33 mm long that was lost during the bombing of Manila in World War II. Koumans (1953) synonymized this species with *Oxyurichthys papuensis* based on examination of the holotype. Our own inspection of the original description and illustration in Herre (1927) led us to synonymize this species with *Oxyurichthys notonema*.

KEY TO SPECIES OF *OXYURICHTHYS*

(*O. auchenolepis* keys out in more than one couplet)

1. Second dorsal-fin elements I,11; anal-fin elements I,12; teeth in upper jaw in two to three rows; tongue truncate or emarginate; nape naked, no crest on midline *O. keiensis* (Smith, 1938) (South Africa, Madagascar, Seychelles)
- 1A. Second dorsal-fin elements I,12; anal-fin elements I,13; teeth in upper jaw in one row, occasionally one to few teeth behind row at front of jaw; tongue margin rounded; nape naked or scaled, membranous crest or ridge may be present on midline . . . 2
2. Tentacle, pale fleshy knob or callus present posterodorsally on eye in adults 3
- 2A. No tentacle, knob or callus on eye (distinct dark spot present in some species) 10
3. Fleshy knob or callus present on eye 4
- 3A. Membranous tentacle on eye in adults, may appear as knob or callus in juveniles 6
4. Upper lip constricted at premaxillary symphysis; anterior narial tube pale whitish to dusky; no distinct dark spot at caudal base, at most, may be diffuse oval blotch extending onto fin; nape crest sometimes reduced to low ridge, nape scales may cross midline; 52–72 lateral scales
. *O. auchenolepis* (Bleeker, 1876) (China, Japan, Philippines, Thailand, Singapore, Indonesia, northern Australia)
- 4A. Upper lip not constricted at premaxillary symphysis; anterior narial tube with small dark black spot at base; distinct basicaudal spot; nape crest low, midline naked. 5
5. Distinct vertical dark bars present interspersed with five lateral blotches (in juveniles bars faint, blotches more pronounced); 60–80 lateral scales, modally 68, 66–72 in western Indian Ocean; most specimens with one to several short papillae rows present on cheek below row *d* *O. papuensis* (Valenciennes, 1837) (Indo-west Pacific)
- 5A. Lateral blotches on body without distinct vertical bars; 57–92 lateral scales, modally 80; never any extra papillae rows on cheek below row *d* *O. petersii* (Klunzinger, 1871) (Red Sea; Mediterranean)
6. Upper lip not constricted at premaxillary symphysis, or only slightly so; pectoral fin with spots. 7
- 6A. Upper lip constricted at premaxillary symphysis, one-third to one-half of greatest lip width; lower pectoral rays dusky with no spots. 8
7. Scales on dorsum with many distinct round dark spots at posterior margins; no pronounced saddle on caudal peduncle; first dorsal-fin spine elongate and much longer than head length; fin spines banded with rows of black spots; lower pectoral rays with rows of distinct dark spots. *O. cornutus* McCulloch & Waite, 1918 (western Pacific Ocean)
- 7A. Scales on dorsum with few indistinct to no dark round spots; dark saddle present on caudal peduncle; first dorsal-fin spines not greatly elongate; first dorsal-fin spines not banded with dark spots; lower half of pectoral fin may have indistinct diffuse dark spots. *O. ophthalmonema* (Bleeker, 1856) (Indo-west Pacific)
8. Pectoral rays 23–26, usually 24; lateral scale rows 50 or fewer; nape scaled across midline, without crest; first dorsal-fin spines elongate or low 9
- 8A. Pectoral rays less than 24, usually 19–22; 54–66 lateral scale rows; nape naked medially, crest present; first dorsal-fin spines low, not elongate *O. tentacularis* (Valenciennes, 1837) (India, Thailand, Indonesia, Philippines, New Caledonia)
9. D1 spines elongate, longest about 57% of SL; four narrow vertical bars along mid-side of body, bars may be indistinct or reduced to oval spots. *O. uronema* (Weber, 1909) (Hong Kong, Thailand, Malaysia, Indonesia, northern Australia)
- 9A. D1 spines short, 15% of SL; four broad vertical bars along mid-side of body *O. paulae* Pezold, 1998 (India)

10. All scales cycloid in adults 11
- 10A. Most scales ctenoid in adults, cycloid scales limited to nape, abdomen and anterior trunk 13
11. Scales of dorsum with dark spots present on posterior margins, dark spot present on dorsoposterior eye; 20–24 pectoral-fin rays, usually 22 *O. microlepis* (Bleeker, 1849) (Indo-west Pacific)
- 11A. No spots on posterior margins of scales of dorsum; no dark spot present on dorsoposterior eye, though brown diffuse spot may be observed 12
12. First dorsal fin dusky, especially posteriorly; anterior nares with dark spot; lateral scales 51–70; 18–21 pectoral-fin rays, usually 20 *O. takagi* Pezold, 1998 (Indo-west Pacific)
- 12A. First dorsal-fin with distinctive black blotch on posterior part of first dorsal fin; anterior nares without dark spot; 112 lateral scales; 22 pectoral-fin rays *O. zeta* new species (west Pacific)
13. Distinct black spot present on dorsoposterior eye; gular region may be dark brown or include two distinct dark spots (dark color or spots may be concealed by lower edge of preopercle); dark spots may be present on anal fin at base of rays. 14
- 13A. No dark spot present on dorsoposterior eye; no gular spots or dark gular region; dark spots never present at base of anal-fin rays 15
14. Two pairs of dark gular spots present (may be concealed by lower edge of preopercle); dark spots present on anal fin at base of rays; upper lip plain pale grey; first dorsal-fin spines moderately elongate, reaching fourth or fifth second dorsal element when appressed *O. lonchotus* (Jenkins, 1903) (Indo-west Pacific)
- 14A. No gular spots present but entire gular region with single dark brown to dusky blotch (may be concealed by lower edge of preopercle); no dark spots present at base of anal-fin rays; upper lip with dark brown to blackish edge; first dorsal-fin spines usually with long filaments, may reach beyond second dorsal-fin terminus in males *O. rapa* n. sp. (Rapa, south Pacific)
15. Prepelvic scales present; upper lip constricted at premaxillary symphysis; second transverse suborbital row distinctly reaching above longitudinal row *b* nearly to eye *O. auchenolepis* Bleeker, 1876 (China, Japan, Philippines, Thailand, Singapore, Indonesia, northern Australia)
- 15A. Prepelvic scales absent; upper lip not constricted at premaxillary symphysis; second transverse suborbital row usually not extending much above longitudinal row *b*, and may be entirely ventral to row *b* 16
16. Pelvic fins barred or mottled and spotted; lateral scale rows 67–92 17
- 16A. Pelvic fins plain dusky or with blackish streaks parallel to pelvic-fin rays; lateral scale rows 41–71 19
17. Prominent large black spot posteriorly on D1; whitish round spots and short broad vermiculate lines on nape and anterior part of dorsum; pelvic fins dusky with rows of small dark spots; upper jaw 45–53% HL, mean 50%; nape generally without scales, two scales observed lateral to first dorsal fin in one specimen; pectoral-fin length 17–22% SL, mean 19%; first four D1 spines gradually increasing from about 16–20% SL, fifth spine about equal to first *O. stigmatophius* (Mead & Böhlke, 1958) (western Atlantic)
- 17A. Small blackish to prominent large black spot posteriorly on D1 or entire fin dusky; two rows of small round brownish spots along upper side of nape and body; pelvic fins dusky crossed with dark spots or bars; upper jaw 52–64% HL; nape naked or scaled with naked median; pectoral-fin length 18–29%; first three to five dorsal-fin spines roughly equal in length 18
18. First five dorsal spines 16–21% SL, roughly the same size though fourth and fifth may be slightly longer; pelvic fins dusky, variably mottled or with ill-defined bars crossing rays, upper jaw 61–64% HL, mean 63%; nape scaled with naked median along low fleshy crest; pectoral-fin length 21–24% SL (mean 23%) *O. limophilus* n. sp. (Kenya)
- 18A. First four dorsal-fin spines 18–48% SL with first three averaging about one third SL, fourth spine slightly shorter, and decreasing significantly in size to fifth and sixth spines; pelvic fins with four or five distinct irregular dark bars and oval blotches completely crossing rays; upper jaw 52–64% HL, mean 59%; nape naked or variably scaled with naked median along low fleshy crest; pectoral-fin length 18–29% SL (mean 23%) .. *O. notonema* (Weber, 1909) (Mozambique, Indonesia, Philippines, Tahiti)
19. Lateral scale rows 50–71; vertical dark streak along membrane behind first dorsal spine, no dusky blotch at rear of first dorsal fin *O. heisei* Pezold, 1998 (Hawaii, Borneo, Philippines, eastern Australia)
- 19A. Lateral scale rows 41–52; no vertical streak behind first dorsal spine, dusky blotch at rear of first dorsal fin 20
20. Low membranous crest along nape midline or nape midline naked; upper lip unconstricted; body depth moderate, 16–22% of SL (mean 18%) *O. nuchalis* (Barnard, 1927) (East Africa, Madagascar)
- 20A. No crest or ridge along nape midline, scales cross nape midline; upper lip with constriction in centre; body slender, 15–16% of SL *O. chinensis* n. sp. (Hainan)

Ctenoxylepis new subgenus

Type species. *Gobius keiensis* Smith, 1938, by original designation.

Diagnosis. Distinguished from *O. (Oxyurichthys)* species by the following combination of character states: palatine forming elongate posterior splint; fleshy tongue truncate, not rounded; D VI + I, 11, A I, 12; more than one row of teeth in the upper jaw; 27–34 lateral scale rows; basihyal Y-shaped; neural arches incomplete over the caudal vertebrae, no foramen formed; no membranous crest on nape.

Etymology. *Ctenoxylepis* is derived from *Ctenogobius*, *Oxyurichthys* and *Oligolepis* in recognition of the phylogenetic link between those genera suggested by this taxon.

TABLE 2. Scale counts for *Oxyurichthys* species reported as mode, range (N).

	Lateral Scales	Predorsal Scales	Transverse Forward	Transverse Rear	Caudal Peduncle
<i>O. auchenolepis</i>	58, 52–72 (71)	21, 14–29 (72)	25, 20–28 (23)	22, 17–26 (66)	7, 7–9 (10)
<i>O. chinensis</i>	41–46 (3)	11, 10–11 (3)	17 (2)	13–17 (3)	NA
<i>O. cornutus</i>	48, 44–52 (48)	17, 13–24 (33)	17, 15–21 (15)	15, 13–19 (33)	8, 6–9 (10)
<i>O. heisei</i>	64, 50–71 (30)	15, 9–22 (28)	20, 15–21 (10)	17, 14–23 (28)	9, 8–10 (5)
<i>O. keiensis</i>	30, 27–34 (33)	0 (38)	12, 9–14 (22)	11, 8–13 (22)	7, 6–8 (16)
<i>O. limophilus</i>	61–79 (4)	9–17 (4)	19–27 (4)	15–22 (4)	9 (1)
<i>O. lonchotus</i>	62, 51–97 (126)	0, 0–21 (116)	25, 18–32 (57)	20, 15–32 (91)	8, 7–11 (32)
<i>O. microlepis</i>	49, 41–58 (143)	18, 0–25 (120)	19, 15–23 (65)	16, 13–21 (96)	6, 6–8 (4)
<i>O. notonema</i>	73, 66–80 (9)	0, 0–21 (12)	22, 22–27 (7)	22, 17–24 (7)	8, 8–10 (4)
<i>O. nuchalis</i>	47, 41–52 (31)	12, 0–17 (27)	15, 14–17 (19)	14, 12–17 (28)	8, 8–9 (6)
<i>O. ophthalmonema</i>	50, 45–63 (56)	18, 0–27 (52)	19, 15–25 (36)	15, 13–21 (43)	8, 7–10 (22)
<i>O. papuensis</i>	68, 60–80 (54)	22, 0–25 (55)	25, 19–28 (25)	21, 16–27 (46)	10, 9–10 (6)
<i>O. paulae</i>	43, 43–50 (7)	13, 12–15 (9)	17, 17–18 (3)	13, 11–16 (6)	7 (1)
<i>O. petersii</i>	80, 72–92 (17)	23, 19–36 (16)	29, 26–30 (6)	26, 21–29 (17)	10, 10–11 (8)
<i>O. rapa</i>	70, 60–81 (8)	0 (4)	22–29 (5)	18, 18–26 (8)	18, 18–21 (5)
<i>O. stigmalophius</i>	87, 70–92 (15)	0, 0–2 (14)	27, 21–34 (12)	26, 21–28 (12)	12, 11–12 (7)
<i>O. takagi</i>	55, 51–70 (39)	0 (39)	20, 19–25 (25)	17, 15–23 (39)	10, 9–10 (5)
<i>O. tentacularis</i>	59, 54–66 (33)	16, 13–21 (34)	21, 18–24 (12)	19, 16–22 (30)	8, 7–9 (14)
<i>O. uronema</i>	45, 37–49 (46)	12, 9–16 (52)	12, 12–16 (21)	13, 10–16 (48)	6, 5–7 (22)
<i>O. zeta</i>	100–112 (2)	0 (2)	30 (1)	26–27(2)	16 (1)

TABLE 3. Morphometric proportions for *Oxyurichthys* reported as percentages of HL. Format given is mean, range (N).

	Head depth	Head width	Snout length	Jaw length	Orbit length	Standard length
<i>O. auchenolepis</i>	67, 61–76 (24)	58, 41–66 (41)	32, 26–40 (40)	50, 43–59 (40)	26, 20–37 (40)	92, 42–130 (73)
<i>O. chinensis</i>	65, 64–66 (3)	59, 58–61 (3)	26, 25–26 (3)	45, 43–46 (3)	29, 29–30 (3)	39, 36–44 (3)
<i>O. cornutus</i>	67, 58–79 (41)	57, 40–70 (49)	32, 26–43 (55)	51, 45–58 (55)	26, 21–31 (55)	58, 17–96 (65)
<i>O. heisei</i>	63, 51–75 (30)	55, 45–68 (26)	32, 28–41 (32)	58, 50–66 (33)	31, 25–36 (33)	70, 44–127 (37)
<i>O. keiensis</i>	62, 55–70 (21)	52, 40–68 (21)	26, 17–31 (22)	67, 56–83 (22)	30, 25–35 (22)	33, 25–57 (38)
<i>O. limophilus</i>	70, 65–72 (4)	55, 43–73 (4)	30, 27–34 (4)	63, 61–64 (4)	26, 24–29 (4)	75, 55–95 (4)
<i>O. lonchotus</i>	66, 53–79 (88)	55, 38–75 (97)	28, 19–40 (99)	51, 38–61 (101)	28, 20–34 (100)	48, 13–102 (180)
<i>O. microlepis</i>	67, 57–78 (22)	63, 46–77 (56)	28, 17–37 (95)	51, 35–56 (85)	26, 20–35 (95)	64, 25–94 (179)
<i>O. notonema</i>	62, 54–69 (13)	48, 36–58 (12)	27, 23–31 (14)	59, 52–64 (14)	26, 24–30 (14)	58, 26–109 (15)
<i>O. nuchalis</i>	69, 64–75 (26)	61, 54–74 (27)	33 28–39 (27)	56, 50–63 (26)	28, 23–33 (27)	82, 40–111 (34)
<i>O. ophthalmonema</i>	68, 61–77 (10)	59, 51–69 (23)	29, 22–35 (47)	53, 46–58 (47)	27, 23–36 (47)	62, 18–123 (66)
<i>O. papuensis</i>	66, 59–73 (15)	56, 51–63 (15)	31, 26–35 (28)	55 49–61 (28)	25, 19–28 (28)	95, 27–164 (56)
<i>O. paulae</i>	64, 58–71 (7)	55, 50–62 (7)	30, 24–33 (9)	53, 50–57 (9)	29, 25–33 (9)	65, 57–69 (9)
<i>O. petersii</i>	66, 56–74 (17)	55, 47–59 (17)	30, 26–34 (17)	58, 45–63 (17)	26, 23–31 (17)	96, 35–121 (17)
<i>O. rapa</i>	67, 63–70 (7)	60, 52–66 (7)	33, 30–39 (8)	53, 48–56 (8)	24, 22–25 (8)	48, 39–66 (9)

.....continued on the next page

TABLE 3. (Continued)

	Head depth	Head width	Snout length	Jaw length	Orbit length	Standard length
<i>O. stigmalocephus</i>	64, 60–67 (6)	50, 39–62 (14)	29, 25–34 (14)	51, 45–59 (14)	27, 24–31 (14)	64, 22–100 (15)
<i>O. takagi</i>	61, 54–69 (35)	56, 47–67 (36)	27, 23–35 (36)	52, 45–63 (36)	27, 23–32 (36)	39, 31–49 (39)
<i>O. tentacularis</i>	69, 60–79 (30)	57, 51–90 (30)	28, 24–34 (42)	53, 47–59 (42)	30, 26–34 (42)	72, 56–88 (48)
<i>O. uronema</i>	63, 58–71 (36)	58, 48–66 (36)	31, 25–37 (37)	48, 43–56 (37)	31, 26–38 (37)	60, 28–76 (63)
<i>O. zeta</i>	63, 58–67 (2)	50, 45–55 (2)	33, 27–39 (2)	51, 50–52 (2)	26 (2)	49 (2)

TABLE 4. Morphometric body proportions and fin lengths for *Oxyurichthys* reported as percentages of SL. Format given is mean, range (N).

	Head length	Body depth	CPD length	CPD depth	Pectoral fin	Pelvic fin	Caudal fin	Standard length
<i>O. auchenolepis</i>	23, 21–28 (42)	18, 15–21 (24)	11, 9–17 (40)	11, 9–12 (23)	22, 19–25 (37)	20, 17–25 (36)	39, 33–59 (34)	92, 42–130 (73)
<i>O. chinensis</i>	23, 23–24 (3)	16, 15–16 (3)	10, 9–11 (3)	9, 8–10 (3)	23, 23–24 (3)	20, 19–21 (3)	55, 52–58 (2)	39, 36–44 (3)
<i>O. cornutus</i>	26, 23–28 (62)	19, 17–23 (55)	11, 9–15 (55)	11, 10–12 (41)	28, 25–31 (55)	23, 19–26 (55)	48, 38–58 (57)	58, 17–96 (65)
<i>O. heisei</i>	26, 22–29 (33)	15, 12–19 (33)	11, 9–12 (33)	9, 7–11 (30)	25, 22–28 (33)	24, 20–27 (33)	49, 33–64 (29)	70, 44–127 (37)
<i>O. keiensis</i>	28, 25–30 (22)	18, 13–20 (22)	14, 11–15 (22)	9, 8–12 (22)	27, 23–31 (24)	23, 17–28 (24)	43, 31–55 (24)	33, 25–57 (38)
<i>O. limophilus</i>	22, 22–23 (4)	15, 14–16 (4)	11, 10–12 (4)	9, 8–10 (4)	23, 21–24 (4)	21, 21–22 (4)	43, 40–46 (4)	75, 55–95 (4)
<i>O. lonchotus</i>	25, 21–30 (142)	18, 15–20 (100)	11, 9–14 (100)	9, 7–10 (88)	26, 22–31 (114)	25, 20–31 (116)	46, 32–65 (120)	48, 13–102 (180)
<i>O. microlepis</i>	23, 20–36 (141)	17, 13–20 (54)	11, 9–14 (55)	10, 8–12 (23)	25, 19–29 (129)	22, 17–26 (131)	47, 34–71 (131)	64, 25–94 (179)
<i>O. notonema</i>	24, 21–28 (14)	15, 13–17 (14)	11, 8–12 (14)	9, 8–10 (13)	23, 20–29 (14)	23, 18–27 (14)	40, 33–49 (13)	58, 26–109 (15)
<i>O. nuchalis</i>	26, 23–29 (29)	18, 16–22 (26)	11, 9–16 (26)	11, 8–12 (26)	24, 16–26 (28)	23, 20–26 (28)	49, 35–59 (26)	82, 40–111 (34)
<i>O. ophthalmonema</i>	24, 21–27 (48)	17, 15–21 (43)	11, 9–13 (39)	10, 9–12 (10)	28, 22–33 (49)	23, 20–27 (47)	50, 36–65 (45)	62, 18–123 (66)
<i>O. papuensis</i>	23, 22–26 (28)	17, 13–20 (28)	10, 9–12 (28)	11, 10–14 (15)	23, 11–28 (28)	21, 12–24 (28)	42, 37–49 (24)	95, 27–164 (56)
<i>O. paulae</i>	21, 21–22 (9)	15, 13–17 (8)	11, 10–13 (9)	10, 9–10 (7)	25, 24–28 (9)	22, 19–25 (8)	55, 39–68 (8)	65, 57–69 (9)
<i>O. petersii</i>	23, 21–27 (17)	17, 14–19 (17)	10, 8–12 (17)	10, 9–11 (17)	24, 21–26 (17)	23, 20–27 (17)	40, 34–44 (13)	48, 39–66 (9)
<i>O. rapa</i>	26, 24–27 (8)	16, 15–18 (8)	10, 9–11 (8)	9, 8–10 (8)	24, 21–25 (8)	24, 22–25 (8)	41, 35–47 (8)	96, 35–121 (17)
<i>O. stigmalocephus</i>	25, 23–27 (14)	15, 13–17 (14)	10, 9–13 (14)	10, 8–11 (6)	19, 17–22 (14)	24, 20–28 (14)	46, 38–62 (12)	64, 22–100 (15)
<i>O. takagi</i>	25, 23–28 (38)	16, 14–17 (36)	12, 10–13 (36)	8, 8–9 (36)	23, 19–26 (36)	23, 19–26 (36)	47, 37–68 (34)	39, 31–49 (39)
<i>O. tentacularis</i>	21, 19–24 (47)	17, 16–20 (42)	11, 9–13 (42)	11, 9–18 (30)	24, 16–28 (38)	22, 17–25 (39)	49, 40–58 (31)	72, 56–88 (48)
<i>O. uronema</i>	23, 20–25 (37)	16, 13–18 (37)	11, 8–15 (37)	10, 8–19 (36)	24, 21–27 (37)	21, 17–24 (37)	55, 35–75 (37)	60, 28–76 (63)
<i>O. zeta</i>	27, 25–28 (2)	15, 14–16 (2)	11, 8–13 (2)	9, 9–10 (2)	21, 21–22 (2)	27, 26–27 (2)	34, 32–36 (2)	49 (2)

TABLE 5. First dorsal-fin spine lengths for *Oxyurichthys* reported as percentages of SL. Species with asterisks have details of apparent sexual dimorphism given in text of species descriptions. Format given is mean, range (N). SL range as reported in Table 4.

	1st spine	2 nd spine	3 rd spine	4 th spine	5 th spine	6 th spine
<i>O. auchenolepis</i>	22, 15–29 (35)	17, 13–21 (5)	19, 13–28 (11)	20, 13–28 (13)	19, 12–28 (8)	13, 10–17 (11)
<i>O. chinensis</i>	13 (3)	16, 15–18 (3)	17, 16–18 (3)	18, 15–23 (3)	17, 15–20 (3)	10, 9–11 (3)
<i>O. cornutus</i>	45, 28–66 (36)	37, 24–58 (21)	30, 21–50 (20)	22, 14–32 (20)	17, 11–22 (20)	11, 8–16 (20)
<i>O. heisei</i> **	17, 12–25 (25)	16, 13–20 (24)	17, 14–21 (25)	18, 15–22 (24)	18, 15–22 (24)	12, 9–15 (24)
<i>O. keiensis</i> **	29, 19–42 (25)	34, 20–51 (25)	37, 21–61 (25)	38, 19–64 (25)	26, 14–51 (25)	9, 6–12 (25)
<i>O. limophilus</i>	17, 16–19 (4)	17, 15–19 (4)	17, 16–19 (4)	18, 17–21 (4)	18, 16–20 (4)	12, 9–14 (4)
<i>O. lonchotus</i> **	22, 10–47 (121)	19, 11–30 (86)	21, 13–35 (86)	21, 13–35 (98)	22, 13–35 (100)	16, 10–23 (94)
<i>O. microlepis</i> **	22, 14–42 (53)	21, 15–32 (39)	22, 16–33 (41)	21, 16–32 (49)	20, 13–28 (38)	13, 9–23 (38)
<i>O. notonema</i>	35, 18–47 (13)	33, 24–48 (12)	34, 21–46 (12)	31, 19–42 (12)	24, 14–34 (12)	12, 9–15 (12)
<i>O. nuchalis</i> **	18, 8–26 (24)	16, 13–20 (22)	18, 15–21 (22)	20, 16–27 (24)	21, 17–26 (22)	12, 8–17 (22)
<i>O. ophthalmonema</i>	23, 15–29 (23)	22, 13–27 (22)	20, 13–30 (23)	19, 13–25 (23)	16, 12–26 (23)	10, 5–12 (22)
<i>O. papuensis</i> **	17, 9–25 (18)	17, 11–22 (19)	17, 12–23 (19)	18, 13–23 (19)	18, 13–23 (20)	13, 10–16 (21)
<i>O. paulae</i>	15, 14–16 (9)	18, 16–20 (9)	19, 16–21 (9)	18, 16–23 (9)	17, 14–22 (9)	10, 8–11 (9)
<i>O. petersii</i>	23, 11–32 (14)	20, 11–28 (14)	20, 11–28 (15)	21, 12–28 (15)	20, 14–25 (14)	16, 9–20 (14)
<i>O. rapa</i> **	35, 24–46 (7)	36, 26–54 (5)	37, 29–42 (6)	42, 31–58 (6)	35, 29–44 (6)	26, 23–32 (6)
<i>O. stigmalophius</i>	17, 16–19 (8)	20, 18–23 (8)	21, 20–24 (8)	21, 20–24 (8)	17, 16–19 (8)	12, 11–13 (8)
<i>O. takagi</i> **	23, 16–40 (33)	20, 14–37 (24)	20, 14–38 (24)	20, 15–38 (24)	19, 15–30 (29)	13, 11–16 (24)
<i>O. tentacularis</i>	12, 9–14 (15)	19, 13–27 (15)	19, 14–31 (14)	20, 15–33 (15)	18, 13–23 (17)	13, 10–17 (15)
<i>O. uronema</i> **	15, 12–19 (23)	24, 16–38 (26)	29, 16–51 (25)	35, 14–57 (32)	27, 14–49 (22)	11, 8–17 (22)
<i>O. zeta</i>	12, 11–13 (2)	16, 14–17 (2)	17, 15–18 (2)	17, 17–18 (2)	16 (2)	11 (2)

Oxyurichthys keiensis (Smith, 1938)

(Figs 3–4; Tables 2–5)

Gobius keiensis Smith, 1938: 319, fig. 1 (mouth of Great Kei River, South Africa).

Ctenogobius acutipennis—Smith 1959: 196 (pl. 10H) (in part).

Ctenogobius keiensis—Smith 1960: 301; 1961: 570, no.928.

Gobius acutipennis—Winterbottom 1976: 67.

Gobionellus keiensis—Hoese & Winterbottom 1979: 4.

Oligolepis keiensis—Hoese 1986: 796.

Diagnosis. 12 second dorsal-fin elements, 13 anal-fin elements; upper jaw teeth in two to three rows; fleshy tongue truncate to bifurcate, not rounded; upper lip not constricted; no dark spot, cornification or tentacle on dorsoposterior surface of the eye; anterior nares not darkly pigmented; no spots on gular membrane beneath preopercle or anterior process of quadrate; no membranous crest on nape; scales mostly ctenoid; lateral scales 27–34; spines of first dorsal fin elongate in males, third and fourth spines of appressed fin reaching beyond second dorsal fin to near caudal-fin base; 20–23 pectoral-fin rays; pelvic fins dusky in males, centrally dusky in females; neural arches incomplete over caudal vertebrae.

Material Examined. SOUTH AFRICA: Holotype of *Gobius keiensis*, SAIAB 263, 44 mm SL female, Great Kei River. SAIAB 13697, 7(28–36), Mgeni, Natal, 2 August 1979; SAIAB 16786, 1(38), Umgababa Lagoon, Natal, G. Begg, 6 June 1981; SAIAB 13664, 3(30–36.5), Natal; SAIAB 11535, 10(25–34), Coffee Bay, Transkei, R. Stobbs, March 1980; SAIAB 13705, 1(39), Zinkwasi Lagoon, Natal, 20 August 1980; SAIAB 16999, 1(57), Boboyi Lagoon, Natal, G. Begg, 10 March 1982; SAIAB 17043, 8(27–43), Umtata River mouth, Transkei, P.C. Heemstra and party, 28 May 1982. MADAGASCAR: AMNH 97132, 13(13.5–46), mouth of River Mangoro

opposite camp by Salehy village, edge of river, Tamatave Province, M.L.J. Stiassny, P.N. Reinthal and G.J.P. Naylor, 15 September 1990; AMNH 97133, 9(17–34), same data as preceding. SEYCHELLES: SAIAB 5494, 1(34), Mahe, J.L.B. Smith and M.M. Smith, October, 1954.

Description. Based on 38 specimens, 25–57 mm SL. An asterisk indicates the counts of the holotype.

First dorsal VI*; second dorsal I,10*–12 (modally I,11); anal I,11*–12 (modally I,12); pectoral rays 20–23 (21–22 in holotype, 21 mode); segmented caudal rays 9/8*; branched caudal rays 6/7*–7/7; unsegmented (procurent) caudal rays 7/6–7/7; lateral scale count 27–34 (modally 30, 29 in holotype); TRB 8*–13 (11 mode); no predorsal scales.

Body compressed. Head moderately long, HL 25–30% SL (mean 28%), deeper than wide, depth at posterior preopercular margin 55–70% HL (mean 62%), width at posterior preopercular margin 40–68% HL (mean 52%). Mouth terminal, slightly oblique, forming an angle of about 25° with body axis; jaws generally reach to vertical through posterior margin of orbit or beyond, nearly reaching angle of preopercle. Upper jaw 56–83% HL (mean 67%). Upper lip equal thickness along entire length, no constriction at premaxillary symphysis or slightly wider at symphysis; Eyes lateral, high on head, top forming part of dorsal profile, orbit 25–35% HL (mean 30%). No tentacle, cornification or spot on eye. Snout rounded, 17–31% HL (mean 26%). Interorbital narrow, 3–13% HL (mean 8%). Nape naked, without fleshy raised crest along midline. Body depth at anal-fin origin 13–20% SL (mean 18%). Caudal peduncle compressed, length 11–15% SL (mean 14%). Caudal-peduncle depth 8–12% SL (mean 9%).

First dorsal fin moderate to elongate, tips of spines free, third and fourth spines longest or subequal; spines longer in males than females; spines in females reach fourth to ninth second dorsal-fin-element when appressed, spines in males may reach last second dorsal-fin-ray or beyond. First dorsal spine usually shorter than next three. Second dorsal-spine length 30–51% SL (mean 44%) males; 20–27% SL (mean 24%) females. Third dorsal-spine length 32–61% SL (mean 49%) males; 21–28 % SL (mean 25%) females. Fourth dorsal-spine length 26–64% SL (mean 53%) males; 19–28% SL (mean 24%) females. Second dorsal and anal fins low, posteriormost rays longest, rays reaching caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical through anus or anal-fin origin, 23–31 % SL (mean 27%). Pelvic fins rounded to oval, not reaching anus in females, reaching anus or anal-fin origin in males, 17–28% SL (mean 23%). Caudal fin lanceolate, 40–55% SL (mean 46%) in males; 31–42% SL (mean 38%) in females.

Anterior naris with slightly raised rim, placed close to upper lip. Posterior naris an oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch about three fleshy, finger-like lobes on upper limb and four triangulate on lower limb, two closest to angle long, other two greatly reduced; anterior third to quarter of arch bound to opercle by membrane, with two to three large curved flap-like appendages (first described by Winterbottom (1976)) at base; underside of upper limb of arch covered by fleshy papillose pad; six stubby rakers on inner face of first arch; inner rakers on other arches twice the length of first arch inner rakers. Tongue tip truncate to bifurcate. Upper jaw teeth in two to three rows, about 14 slightly larger canines along outer edge on each side of symphysis, no gap evident at symphysis. Lower jaw teeth in narrow band with a single recurved canine on either side of symphysis in innermost row. Teeth in both jaws similar in size.

No scales on head, nape, pectoral base, or prepelvic region. Abdomen naked or with naked median in larger specimens. Ctenoid scales on side of body, becoming cycloid anteriorly beneath midpoint of first dorsal fin.

Sensory papillae pattern illustrated in Fig. 3.

Coloration of fresh material. There is very little information as to the live color of this species. Hoese (1986: pl. 124, fig. 240.66) shows the head and body as yellowish, with an orange caudal fin, pink dorsal fins covered with small black spots and a dark brown and yellow barred anal fin, transparent pectoral fins with whitish bar at base, dusky yellowish pelvic fins; the dorsum is crossed by irregular oblique dark brown barring; scattered brown spots and blotches on the side of the head and pectoral-fin base and a distinct black bar from eye to middle of upper jaw; iris red-brown; lips pale.

Coloration of preserved material. Head and body light yellowish to yellowish brown, body paler ventrally. Scales on dorsum with margins narrowly outlined with dark brown; dorsum with diffuse light brownish mottling and spotting variably developed (Fig. 4). About 22 small brownish to brown chevron-shaped to elongate spots along mid-side of body, posteriormost spot (at caudal-fin base) variable, may be diffuse to blackish. Variably developed diffuse dusky to brownish chevrons, following myomeres of body, extending dorsally and ventrally

from mid-lateral spots. Nape midline crossed by four to seven brownish blotches or bars; usually a dark brown to blackish blotch just anterior to first dorsal spine. Pectoral base pale with rounded dusky to brownish blotch on upper half; ventral edge usually sharp-edged; bases of fin rays adjacent to blotch blackish. Interorbital and snout dusky brownish to dark greyish brown. Anterior narial tube with small mediad black spot. Opercle dusky to brownish, crossed by diffuse brownish streak, which may form one or two small triangular to square blotches. A distinctive irregular (approximately Y-shaped) dark brown to black blotch on cheek, extending obliquely from ventral edge of eye to upper jaw. Upper lip dark grey to brownish, lower lip pale but for dark tip. Underside of head yellowish to dusky, isthmus and breast darker, to dark brown. Belly whitish.

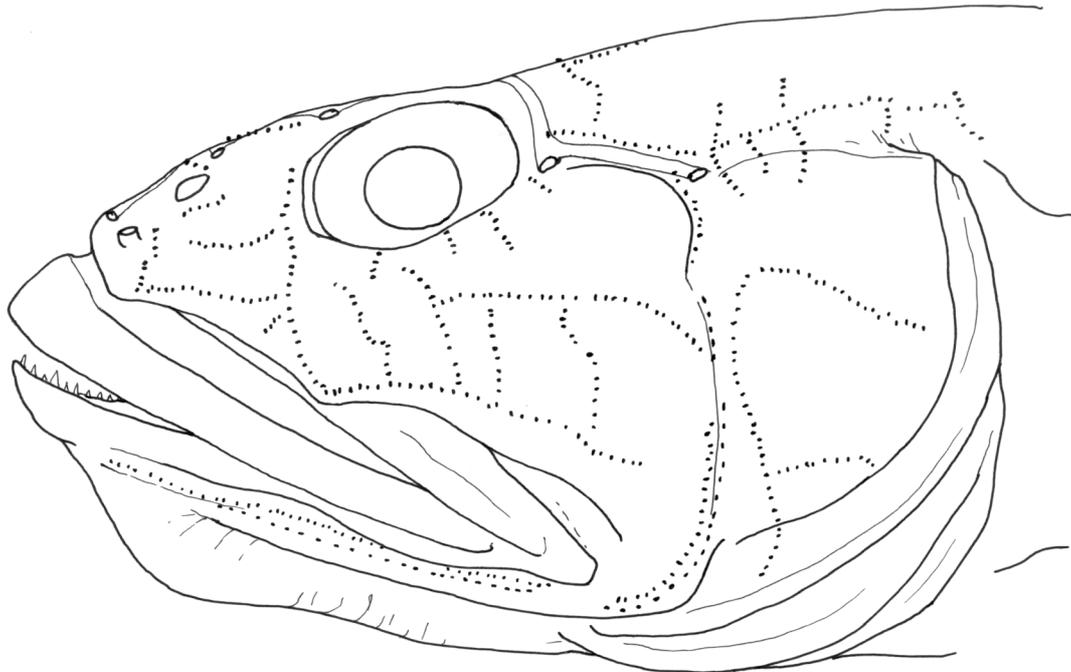


FIGURE 3. *Oxyurichthys keiensis*, sensory papillae pattern, SAIAB 16999, 59 mm male, South Africa.

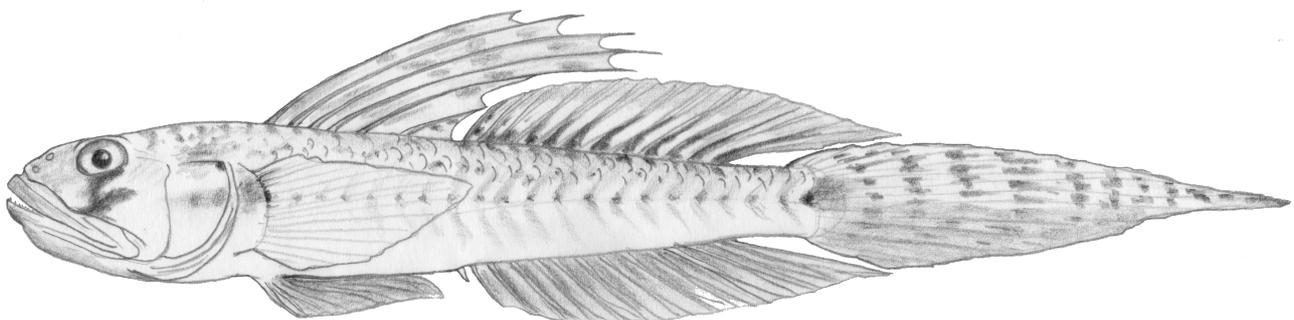


FIGURE 4. *Oxyurichthys keiensis*, color pattern, based on specimens from Madagascar and South Africa.

First dorsal fin translucent to dusky; proximally, dusky to blackish streaks running parallel to fin spines; distally, four to seven rows of dusky to blackish oval spots and streaks (which may be partly coalesced). Second dorsal fin transparent to faintly dusky, with broad dusky margin; elongate dark brown to blackish streak along posterior edge of each fin ray, beginning as dark spot at base of each ray, and becoming more elongate posteriorly, marking broken into two or three spots behind fin spine. Caudal fin plain dusky ventrally, translucent to dusky dorsally, with variable number of rows of brown to blackish spots and short streaks crossing dorsal half; diffuse oval to teardrop-shaped brownish blotch on upper fin base and extending onto rays. Pectoral fin translucent to dusky, darker ventrally. Pelvic fins plain dusky, may be slightly darker medially to posteriorly.

Comparisons. This species would be most easily confused with *Oligolepis acutipennis* with which it has sometimes been regarded as congeneric (e.g. Hoese 1986). It differs from that species in having no preopercular lateralis canal pores. It also has a dark suborbital bar that intercepts the middle of the upper jaw while in *O. acutipennis* it extends behind the end of the jaw. *Oxyurichthys keiensis* has prominent transverse rows of sensory papillae, while those rows in *Oligolepis acutipennis* are reduced or lacking so that only horizontal rows are developed.

Distribution. Southeastern Africa, from the Fish River, South Africa, northward to Ithaca, Mozambique, Madagascar and the Seychelles.

Ecology. Monthly collections in the Sundays estuary from April 1980 to March 1981 (Beckley 1984) produced only 18 individuals of this species out of a total of 3,863 gobies collected. All 18 were collected at one site (#4) in a channel-like section with narrow muddy banks (Beckley, pers. comm.). Maximum depth at the site was 4–5 m with a tidal range of 1 m. Water temperature in this turbid portion of the estuary ranges from 14–26 C. Mean surface and bottom salinities recorded at the site were 20 ppt (range: 7–22) and 26 ppt (22–31), respectively.

Remarks. The only member of this subgenus, *Oxyurichthys keiensis*, has been problematic to place because of its distinctive combination of characters, none of which alone would qualify as autapomorphic. Hoese & Winterbottom (1979) recognized the species as having characteristics typical of both *Gobionellus* (three rows of teeth in the upper jaw) and *Oxyurichthys* (no preopercular canal). Although not stated, it is likely that they placed the species in *Gobionellus* because the number of tooth rows was viewed as a more reliable character. Neural arches over the caudal vertebrae are incompletely developed and lack neural foramina. This condition is shared with *Evorthodus*, *Oligolepis*, and most species of *Ctenogobius stomatus* (Pezold 2004a, Fig. 8) and is regarded as a synapomorphy for *Oxyurichthys* and these other Stenogobius Group genera. This condition is reversed in the other *Oxyurichthys* species and appears as a likely homoplasy in *Gobionellus stomatus*. Hoese (1986) moved the species to *Oligolepis* that at the time was not diagnosed by synapomorphic characters, but shared some of the more generalized features found in *O. keiensis*. *Oligolepis* species may be distinguished by at least two synapomorphies: a preopercular canal with two pores (M'O') and a reduction of longitudinal suborbital neuromast rows, and possibly a single fleshy finger-like lobe on the first epibranchial (Pezold 2004a). These characteristics are not found in *O. keiensis*. *Oxyurichthys keiensis* also has the forward extending "b" row of free neuromasts on the cheek typical of other *Oxyurichthys* (as well as *Gobionellus*, *Gobioides*, *Cryptocentrus* and *Bollmannia*), but not found in *Oligolepis* (Miller & Wongrat 1979).

Subgenus *Oxyurichthys*

Diagnosis. Members of this subgenus have: a palatine lacking an elongate posterior strut; a rounded tongue; D VI + I, 12 and A I, 13; a single row of teeth in the upper jaw; 37–92 lateral scale rows; a triangular basihyal; and complete neural arches over caudal vertebrae. Membranous crest or low ridge present on nape midline (absent in three species, *O. chinensis*, *O. paulae* and *O. uronema*).

Remarks. Includes all other species of *Oxyurichthys*. Three of the states listed above are synapomorphic—the shortened palatine, the form of the tongue and the combination of 13 elements in the second dorsal fin and 14 elements in the anal fin. Although Harrison (1989) regarded the form of the palatine as an indication of close relationship of *Oxyurichthys* to the oxudercines and amblyopines, the articulation of the metapterygoid high on the hyomandibular in oxudercines and amblyopines, the articulation of a large symplectic in the amblyopines, as well as differences in the form of the ectopterygoids and palatines among those taxa and *Oxyurichthys* support our recognition of *O. keiensis* as the sister group to all other *Oxyurichthys* species and the shortened palatine seen in *Oxyurichthys* as convergent (Pezold 2004a). None of the other members of the *Stenogobius* Group of gobionellines (Larson 2001) possess a rounded tongue with an entire margin. It is common among gobionellines for the anal fin to have one more element than the second dorsal fin, but the combination of 14 and 13, respectively, is not. This condition is observed as a homoplasy in *Ctenogobius sagittula*, *Gobionellus microdon* and *G. stomatus* (Pezold 2004b).

As discussed in the introduction, a single row of teeth in the upper jaw has long been associated with *Oxyurichthys*. A single row of teeth in the upper jaw is also seen in *Oligolepis* and two species of *Gobionellus* (Pezold 2004a). The fan-shaped, even-edged basihyal is also present in *Ctenogobius stigmaturus*, *C. manglicola*,

C. fasciatus, *C. shufeldti*, *C. claytoni*, *Oligolepis acutipennis*, *O. stomias*, *Gobionellus daguae*, *Gobiosoma bosc* and *Bathygobius soporator*. A bifurcate basihyal similar to that observed in *Oxyurichthys keiensis* is also found in *C. smaragdus*, *C. saepepallens*, *C. boleosoma*, *C. sagittula*, *Gobionellus microdon*, *G. oceanicus*, and *Evorthodus lyricus*. Takagi (1950) observed these two basic forms of the basihyal in a wide range of gobioid fishes. It is apparent from his data set and that presented here that one form has given rise to the other on more than one occasion.

***Oxyurichthys auchenolepis* Bleeker, 1876**

(Figs 1, 5–6; Tables 2–5)

Oxyurichthys auchenolepis Bleeker, 1876: 138 (Singapore).—Koumans 1953: 40, 49–50 (Singapore, Japan?); Monkolprasit et al. 1997: 249 (Gulf of Thailand); Matsuura et al. 2001: 121, (Sanya Bay, Hainan Island), 123 (Sanya fish market, Hainan Island); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (western Pacific, Java); Hoese & Larson 2006: 1669 (Smith Point, NT, to off Cape Tribulation, Qld); Larson et al. 2008: 143 (Singapore); Larson et al. 2013: 203 (Buffalo Creek, Shoal Bay; N of Melville Island; Port Essington; N of Cape Wessel, Arafura Sea; Gove Harbour; Groote Eylandt).

Gobius petersenii Steindachner, 1893: 151 and 1893b: 234 (Swatow, China).

Oxyurichthys amabilis Seale, 1914: 76, pl. 2, fig. 1 (Hong Kong Market).—Zhong, in Wu & Zhong, 2008: 514–515, fig. 242 (China).

Oxyurichthys saru Tomiyama, 1936: 78–79, fig. 29 (Siduura, Siduoka-ken, Japan).—Wong 1982: 923–931 (Hong Kong Harbour); Akihito et al. 1984: 262–263, pl. 245F (Shizuoka and Wakayama Pref.); Akihito et al. 1988: 262–263, fig. 128, pl. 245F (Shizuoka Pref. and Wakayama Pref.); Nogawa et al. 2003: 40–42 (Tosa Bay).

Oxyurichthys sp. A—Senou et al. 2004: 187 (Japan).

Diagnosis. 13 second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip constricted; callus-like cornification usually present on dorsoposterior surface of orbit; anterior nares not darkly pigmented; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; no prominent blotches, vertical bars or basicaudal spot on trunk; membranous crest present on nape, may be covered with scales; scales ctenoid laterally on trunk posterior to middle of first dorsal fin, cycloid anteriorly; prepelvic region fully scaled; lateral scales 52–72; first dorsal fin low, spines of appressed fin not reaching posterior to 5th second dorsal-fin element; 21–25 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. CHINA: NMW 30609, holotype of *Gobius petersenii*, 60 mm SL female, Swatow. CAS 51053, 3(88–104), Hong Kong, Tolo Channel, R. Bolin, 28 August 1958; NTM S.12547-001, 14(65–93), Hong Kong, Plover Cove, June 1967; USNM 6574, 1(74), Hong Kong; USNM 131099, 1(99), Japan or China, Jouy and Dale, 1881; USNM 139395, 8(71–106), Hong Kong, Kowloon, China Sea vicinity, RV *Albatross*, 5 October 1908; USNM 56403, 3(80–90), Hong Kong, P.L. Jouy; USNM 238955, 1(88), Tolo Harbor, Chinese University of Hong Kong, 21 November 1968; ANSP 77034, 1(80), Hong Kong, G. Herklots, 1930; ANSP 76744, 1(76), Hong Kong, G. Herklots, 1930; MCZ 13030, 1(103), Hong Kong, Capt. Putnam, March 1861; MCZ 33219, 1(88), Hong Kong, P. Buitendijk, 1907; UMMZ 100634, 1(73), Canton, A.H. Herre, September 1931; RMNH.PISC 13039, 3(63–92), Hong Kong, P. Buitendijk, October 1917; CAS-SU 25737, 3(46–71), Canton, A. Herre, 1931. JAPAN: ZUMT 30522, holotype of *Oxyurichthys saru*, 74 mm SL female, Shizuoka, Shizuura, Dr Kuroda. ZUMT 30523, paratype of *Oxyurichthys saru*, 1(72), same data as holotype. BLIP 1976078, 2(86–103), Wakayama Prefecture, Shirahama, Tanabe Bay, 21 January 1976; BLIP 1990808, 1(70), beach wash-up, 2 February 1990; USNM 6292, 1(80), “probably collected in Japan by Stimpson”, 1863. SINGAPORE: RMNH.PISC 4506, 1(98.5), male, lectotype of *Oxyurichthys auchenolepis*; RMNH.PISC.35634, 1(93), paralectotype of *Oxyurichthys auchenolepis*; MCZ 13154, 1(62), Capt. Putnam, 1860; USNM 142942, 2(97–105), E. Deschamps, November 1901; RMNH.PISC 13744, 1(84), E. Jacobson, November 1912. RMNH.PISC 16365, 1(88), fish market, J.D.F. Hardenberg, 1 October 1934. THAILAND: BLIP 1974053, 2(99–106), Choburi Province, Pai Bay, April 1974; BLIP 1970194, 3(76–87), Bangkok market, January 1970; URM P.12203–12204, 2(83–102), Songkhla, shrimp trawl, 22 October 1983, H. Senou, C. Vidthayanon, Korn; URM P.12428, 1(89), Pattani fish market, H. Senou, 24 October 1983; URM P.12423, 1(90), Pattani fish market, H. Senou, 24 October 1983; URM P. 12426, 1(111), Pattani fish market, H. Senou, 24 October 1983; URM P.13638, 1(96), Angsira fish landing, 15 January 1984; URM P.13640–13641,

2(90–94), Angsira, shrimp trawl, 15 January 1984, coll. H. Senou; NTM S.14288-004, 2(70–71), Ta-Chalaab, National Inland Fisheries Institute, 2 June 1990; ROM 48994, 2(104), ex CMK 5319, M. Kottelat, 1985. PHILIPPINES: USNM 265076, 2(107–116), Carigara Bay, Samar Sea, 60–64 m, RV *U.P. Trawler* cruise 108, C. Ferraris, 24 April 1980; USNM 265077, 1(117), Samar Sea, Carigara Bay, 50–70 m, RV *U.P. Trawler*, Ferraris, February 1980. INDONESIA: CAS 36116, 1(80), Java, off Jakarta, mud bottom, 24 m, trawl, F.B. Steiner, 5 December 1975. AUSTRALIA, WESTERN AUSTRALIA: WAM unregistered, 1(101), Exmouth Gulf, prawn trawl, 11 m, CSIRO, 23 October 1955. AUSTRALIA, NORTHERN TERRITORY: NTM S.10031-152, 4(94–101), N of Smith Point, Cobourg Peninsula, 27 m, FV *Anson*, 18 October 1981; NTM S.10943-012, 1(106), Groote Eylandt, NT Fisheries, 26 February 1983; NTM S.13013-001, 1(91), Groote Eylandt area, 30 m, NT Fisheries, 22 November 1987; NTM S.14528-002, 1(94), E side of Groote Eylandt, 52 m, S. Blaber, 12 December 1990; NTM S.14751-001, 1(106), N of Cape Van Diemen, Melville Island, 56 m, RV *Southern Surveyor*, 10 March 1997; NTM S.10295-002, 1(42.5), Shoal Bay, trawl, NT Fisheries, 20 June 1973; NTM S.12916-001, 1(125), Arafura Sea, 51 m, R.S. Williams, 11 November 1990; QM I.31501, 1(99), SSE of Groote Eylandt, Northern Territory, 38 m, trawl, CSIRO, 13 September 1996. AUSTRALIA, QUEENSLAND: QM I.10759, 1(101), Cleveland Bay, G. Coates; QM I.10760, 1(105), Townsville, 10.8–27 m, G. Coates; QM I.18061, 1(101), NW of Cape Melville, 22.5 m, trawl, Queensland Fisheries Service, 19 September 1979; QM I.18125, 1(109), N of Cape Melville, 18 m, Queensland Fisheries Service, 20 September 1979; QM I.18140, 1(111), N of Cape Melville, 18.9 m, trawl, Queensland Fisheries Service, 22 September 1979; QM I.18243, 1(112), N of Cape Melville, 19 m, Queensland Fisheries Service, trawl, 25 September 1979; QM I.23209, 1(97), SE end of Hinchinbrook Island, trawl, 17 m, Queensland Fisheries Service, 7 January 1986; QM I.23943, 1(99), off Cairns, Queensland, 10.8 m, trawl, Queensland Fisheries Service, 26 January 1981; AMS I.20906-015, 1(127), off Cape Tribulation, mud and shell, 0–15 m, AMS and AIMS party, 6 February 1979; AMS I.20778-003, 2(77–83), off Decapolis Reef, 12–14 m, AMS and AIMS party, 25 February 1979; AMS I.20778-004, 1(33), off Decapolis Reef, 12–14 m, AMS and AIMS party, 25 February 1979; AMS I.15421048, 1(106), Townsville, 5 miles N of Magnetic Island, G. Coates, 1968; AMS I.B. 3986, 1(99), North Queensland, K. de Witte. NO LOCALITY: AMS unregistered, 1(108).

Other material examined. AUSTRALIA, WESTERN AUSTRALIA: CSIRO H.4027, 1, off Port Hedland, 124–132 m, 11 October 1983. AUSTRALIA, NORTHERN TERRITORY: NTM S.10079-001, 1(100), Van Diemen Gulf, NT Fisheries, 26 October 1977; NTM S.11592-001, 1(80), Port Essington, R. Ciesuk, October 1976; NTM S.12511-006, 1(106), Bombard Shoal, Groote Eylandt, 41 m, P. Pender, 22 November 1988; NTM S.12512-003, 1(104), Gulf of Carpentaria, 44 m, P. Pender, 25 November 1988; NTM S.12514-001, 1(107), Gulf of Carpentaria, 44 m, P. Pender, 27 November 1988; NTM S.14530-004, 1(145), Gulf of Carpentaria, 48 m, S. Blaber, 13 December 1990. AUSTRALIA, QUEENSLAND: AMS I.A-6747, 1(103), Shaw Island, Queensland, 5 September 1935; AMS I.18243, 1(62), Temple Bay, Queensland, 15.5 m, Queensland Fisheries Service, 25 September 1979; CSIRO C.3292, 1, Gulf of Carpentaria, Rama Station, Ian Munro prawn survey, 11 m, 9 August 1963; CSIRO H.3920-01, 1, W of Weipa, 23 m, 3 March 1995; CSIRO H.3634-01, 1, W of Weipa, 23 m, 24 November 1993. CHINA: ANSP 76868, 9(poor condition), Hong Kong, G. Herklots, 1930. JAPAN: URM P.5104, 1(105), Tanabe Bay, Wakayama Prefecture, Araga, 21 January 1970; URM P.5105, 1(102), Tanabe Bay, Wakayama Prefecture, Araga, 21 January 1970; URM P.5106, 1(99), Tanabe Bay, Wakayama Prefecture, Araga, 21 January 1970. INDONESIA: ZMK uncat. 1(99.5), between Java and Sumatra, 6° 22'S, 105° 44'E, St. 77, Th. Mortensen, 29 July 1922; CSIRO unregistered, 1, Banyuwangi, east Java, 8° 09'S, 114° 23'E, W. White, 27 October 2008; CSIRO unregistered, 2, Banyuwangi, east Java, 8° 09'S, 114° 23'E, W. White, 27 February 2009. PHILIPPINES: AMS I.23022-003, 1(131), Samar Sea, 50–70 m, C. Ferraris, February 1980.

Description. Based on 73 specimens, 42–130 mm SL. An asterisk indicates the counts of the lectotype of *Oxyurichthys auchenolepis*.

First dorsal VI*; second dorsal I,11–13(usually 12, 12*); anal I,12–13*(usually 13); pectoral rays 21–25(24/23*); segmented caudal rays 8/8–9/8; branched caudal rays 7/7–8/8; unsegmented (procurrent) caudal rays 6/5; lateral scale count 52–72 (modally 58; 61*); TRB 17–26(20*); predorsal scale count 14–29(18*).

Body compressed. Head deeper than wide, HL 21–28% SL (mean 23%). Depth at posterior preopercular margin 61–76% HL (mean 67%). Width at posterior preopercular margin 41–66% HL (mean 58%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through anterior margin or anterior third of orbit; upper jaw 43–59% HL (mean 50%). Upper lip constricted at premaxillary symphysis, 50–80% of greatest lip width. Eyes lateral, high on head, forming part of dorsal profile, 20–37% HL (mean 26%).

Fleshy callus variously expressed dorsoposteriorly on eye, in a few forms small teat-like bump, lacking or lost due to poor preservation in some. Snout rounded, 26–40% HL (mean 32%). Interorbital narrow, 6–13% HL (mean 9%). Body depth at anal origin 15–21% SL (mean 18%). Caudal peduncle compressed, length 9–17% SL (mean 11%). Caudal-peduncle depth 9–12% SL (mean 11%).

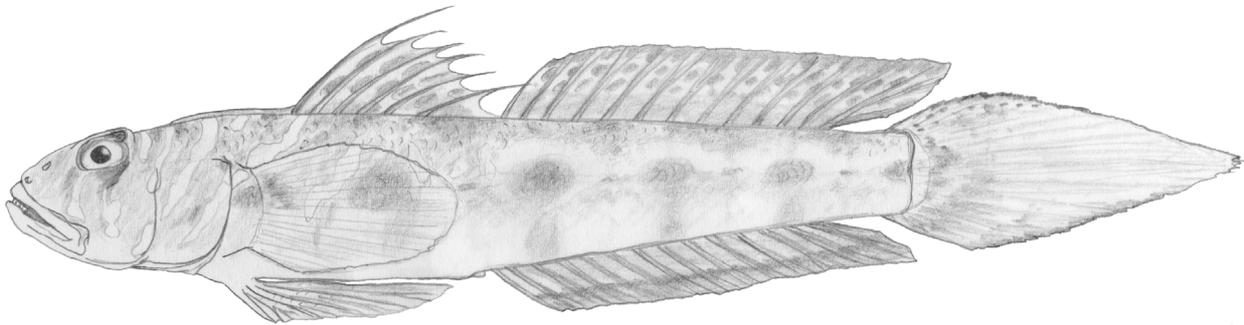


FIGURE 5. *Oxyurichthys auchenolepis*, color pattern, based on specimens from Thailand and Queensland.



FIGURE 6. *Oxyurichthys auchenolepis*, freshly dead, Gulf of Carpentaria, Queensland. Photograph by Phil Alderslade.

First dorsal fin low, tips of spines free, first spine usually longest. Posterior spines of appressed first dorsal fin reach to 3rd or 5th second dorsal element. Second dorsal and anal fins low, posteriormost rays longest, rays reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anus and third anal-fin element, 19–25 % SL (mean 22%). Pelvic fins rounded to oval, may reach base of urogenital papilla, but not reaching anal-fin origin, 17–25% SL (mean 20%). Caudal fin elongate, pointed, 33–59% SL (mean 39%).

Anterior naris with slightly raised rim, placed close to upper lip. Posterior naris an oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch 3* triangulate on lower ceratobranchial, 2*–3 fused finger-like rakers at angle and a fleshy tripartite lobe derived from gill rakers on the epibranchial; rakers on outer face of second arch about 10 reduced stubs. Inner rakers on other arches twice the length of first arch inner rakers. Tongue tip rounded. Upper jaw teeth in single row, about 20 (16–24) along outer edge of jaw on each side of symphysis; prominent gap at symphysis 60–75% of interorbital width. Lower jaw teeth in two rows, 30–40 each side of mandibular symphysis. Strong canine teeth in upper jaw, about twice size of lower jaw teeth.

Nape scaled to fleshy raised crest along midline, scales reaching forward to above preopercle. Opercle, cheek and pectoral base naked. Prepelvic area covered with 0–15 (modally 12) rows of small cycloid scales. Abdomen scaled, naked over infracarinalis muscle. Ctenoid scales on side of body, becoming cycloid anteriorly beneath middle of first dorsal fin.

Sensory papillae pattern illustrated in Fig. 1.

Coloration of fresh material. From color slides of freshly dead specimens from the Northern Territory and Queensland, Australia, Indonesia and Thailand. Color pattern as in “preserved” description and Figures 5–6; also see color illustrations in Akihito et al. (1988: pl. 245, fig. F) and Senou et al. (2004: 187). Head and body light yellowish brown dorsally, yellowish to whitish ventrally; scales along dorsum with edges darker than centres. Mid-lateral blotches yellow to brownish yellow (light brown in Indonesian specimen), usually joined together by mid-lateral yellow stripe. Indistinct dull yellowish dorsal blotches or saddles. On anterior half of body, areas immediately lateral and dorsal to mid-lateral blotches with whitish blue iridescent pigment, forming jagged oblique bars and indistinct blotches below first dorsal fin, anteriormost oblique bar reaching from first dorsal-fin origin to behind pectoral-fin base. Pectoral base whitish on ventral half, dorsal half yellowish with whitish blue blotch or stripe dorsally. Side of head brighter yellow than dorsal surface, and with five variably developed mostly oblique iridescent whitish blue stripes, two crossing opercle, one crossing nape and ending at dorsoposterior corner of preopercle, and two (mostly vertical) crossing cheek below eye (Indonesian specimen with head dull yellowish brown, not yellow). Small diffuse brown blotch on ventral margin of eye, blending with whitish blue cheek stripe. Interorbital, top of snout and tip of upper lip dusky brownish yellow. Flesh surrounding eyeball golden brown, iris reddish gold; callus on eye orange.

First and second dorsal fins translucent whitish to faintly dusky, with about three rows of oblique oval dusky orange spots, which may coalesce forming indistinct streaks; dull orange margin present on both fins. Caudal fin yellowish white to dusky, with narrow reddish to black margin to dorsal and ventral edges; indistinct brownish streaks and diffuse bars crossing ventral half of fin. Pectoral fin translucent, with dusky fin rays. Pelvic fins whitish ventrally, fins blackish posteriorly.

Coloration of preserved material. Head and body pale yellowish to yellowish brown with light brown markings. Five indistinct rounded brownish blotches along mid-side of body, posteriormost blotch smallest and often triangular (blotches not visible in all specimens). Dorsum usually with up to 11 evenly spaced indistinct light dusky to brownish saddles; first saddle or blotch crossing nape at level of opercle and last saddle over caudal peduncle (saddles not always discernible); scales on anterior half of body with narrow dusky margins. In some specimens, diffuse vertical brownish bars present on body, confluent with, and some interspersed with, mid-lateral brownish blotches. Head without distinct markings: diffuse brown “tear” mark ventral to eye usually present, generally darkest posteriorly, opercle with diffuse dusky patch in centre, callus on eye (if present) whitish, nares not darker than surrounding skin, underside of head, breast and belly plain whitish to yellowish, chin and isthmus brownish in some specimens (isthmus dark brown in specimens from the Northern Territory, Australia).

First dorsal fin translucent to dusky with indistinct dusky streaks parallel to fin spines, dusky blotch at posterior end of fin, on membrane posterior to fifth and sixth spines. Second dorsal fin translucent to dusky, with several indistinct rows of diffuse oval blotches. Anal fin with proximal half dusky to brownish, distal half dark brown to blackish; almost entire anal fin blackish in some specimens from the Northern Territory. Caudal fin translucent to blackish, with narrow black to brown dorsal and ventral margins, some indistinct dark streaks along fin ray membranes near posteroventral part of fin. Pectoral fin translucent to dusky, in some specimens, ventral third of fin dark brown to blackish. Pelvic fins with frenum and spines whitish, rest of fin plain to mottled dark brown to blackish.

Comparisons. This species is easily confused with *O. heisei*. It differs from the latter in having prepelvic scales, a constriction of the upper lip at the premaxillary symphysis and in the first gill arch structure. The lobe-like raker on the upper arch of *O. auchenolepis* is tripartite vs the single hook-like structure observed in *O. heisei*; there are also three fused rakers at the angle, one being very reduced, vs two elongate, but the lower arch is similar in having three or four triangulate rakers. In *Oxyurichthys auchenolepis* the first dorsal fin tends to have darkest pigment between the fifth and sixth spines, versus between the first and second spines in *O. heisei*. *Oxyurichthys nuchalis* has a more horizontal mouth and blunt, rounded snout than this species, lacks prepelvic scales, has no constriction of the upper lip and has a single hook-like lobe on the epibranchial similar to that found in *O. heisei*. *Oxyurichthys auchenolepis* differs from *O. papuensis* in having a constricted upper lip, but no vertical bars on the sides of the trunk interspersed with the large blotches, no black spot at the base of the anterior nares, and no distinct black spot at the base of the caudal fin. *Oxyurichthys petersi* has more lateral scales (numbering in the upper 70s to low 80s), a black spot on the base of the anterior nares and a basicaudal spot and an unconstricted upper lip. The median crest on the nape is sometimes reduced to a low scaled ridge in *O. auchenolepis*; although it may be low in *O. papuensis* and *O. petersii*, it is always naked.

Distribution. Recorded from China, Japan, Philippines, Indonesia, Thailand, Malaysia, Singapore and northern Australia. Photographic records appear to extend the range of the species west in the Indian Ocean to at least Pakistan. A. Murugan (in litt.) has collected this species from Pazhiyar, Coromandel coast of India (photograph seen). Peter N. Psomadakis and Hamid Badar Osmany have collected this species in bottom trawls off the coast of Pakistan near Karachi (photograph seen).

Ecology. This species is often trawled, to 50 m, possibly to 70 m, recorded from mud and shell bottom off northern Australia, and from mud bottom off Java. Wong (1982; as *O. saru*) described the food habits of *O. auchenolepis* (feeding almost exclusively on copepods) and its distribution within Hong Kong Harbour.

Remarks. *Oxyurichthys auchenolepis* Bleeker was described from two syntypes with damaged caudal fins from Singapore (RMNH.PISC 4506), 95–99 mm SL. Koumans (1953) refers to “types” seen in the Leiden Museum, giving a length of 120 mm (which included the caudal). We designate RMNH.PISC 4506, a 98.5 mm SL male, as lectotype of *Oxyurichthys auchenolepis* Bleeker, to prevent further confusion as to the identity of this species.

The holotype of *O. amabilis* Seale (BSM 6432) and three paratypes were destroyed in WWII. Koumans (1940) had examined these and gave their catalogue numbers and lengths, although his measurement of 115 mm for the holotype differs from Seale’s 130 mm total length (and the caudal fin was longer than 15 mm, judging from Seale’s figure (1914: p.II, fig.1)).

***Oxyurichthys chinensis* new species**

(Fig. 7; Tables 2–5)

Diagnosis. No tentacle on dorsoposterior surface of eye; upper lip constricted at premaxillary symphysis, less than half maximum lip width; first dorsal-fin spines elongate in male, reaching back to middle of second dorsal fin; anterior nares with low rim, not darkly pigmented; nape lacking membranous crest or ridge; no gular spots; scales on dorsum narrowly outlined with black, but without spots; nine oval to rounded dusky spots along mid-side of pale body, spots alternate in size between large and small; scales ctenoid laterally on trunk posterior to approximately below midpoint of second dorsal fin, cycloid anteriorly; prepelvic region naked; lateral scales 41–46; 21–23 pectoral-fin rays; pelvic fins dusky in male, whitish in females.

Material Examined. HOLOTYPE—NSMT-P 54835, 44 mm SL male, Sanya Bay, south coast Hainan Island, China, 18 m depth, trawl station 6, K. Matsuura, 3 March 1997. PARATYPES—NSMT-P 54835, 36 mm SL female, same data as holotype; NSMT-P 54834, 36.5 mm SL female, same data as holotype but trawl station 5, 27 February 1997.

Description. Based on three specimens, 36–44 mm SL. An asterisk indicates the counts of the holotype (Fig. 7).

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 21–23 (21 on left side, 22 on right in holotype); segmented caudal rays 9/8*; branched caudal rays 8/7*; lateral scale count 41*–46; TRB 13–17*; predorsal scale count 10–11*.

Body compressed, head length moderate, 23–24% SL. Head deeper than wide, depth at posterior preopercular margin, 64–66% HL, width at posterior preopercular margin 58–61% HL. Mouth terminal, oblique, forming an angle of about 45° with body axis; lower jaw prominent, jaws reaching to vertical through anterior third of eye. Upper lip constricted at premaxillary symphysis, less than one half greatest width. Upper jaw 43–46% HL. Large eyes lateral, high on head, top forming part of dorsal profile, 29–30% HL. No tentacle or thickening dorsoposteriorly on eye. Snout rounded, 25–26% HL. Interorbital narrow, 5% HL. Body depth at anal origin 15–16% SL. Caudal-peduncle compressed, usually slightly longer than deep or equally long as deep, length 9–11% SL. Caudal-peduncle depth 8–10% SL.

First dorsal fin elongate in males, fourth spine longest (22.7% SL), reaching back to anterior half of second dorsal fin; second or third spine longest in females, reaching back to first few elements of second dorsal fin. First dorsal spine always shorter than next four, 12.5–13.3% SL. Second dorsal and anal fins low, posteriormost rays longest, reaching beyond caudal-fin base when depressed. Pectoral fin oval, central rays longest, 23–24% SL. Pelvic fins oval, not reaching to anus, 19–21% SL. Caudal fin very elongate, pointed, 58% SL in male, 52% in one female (broken in other female).



FIGURE 7. *Oxyurichthys chinensis* n.sp., 44 mm SL male holotype, NSMT-P54835, Hainan Island, China. Photograph by Caroline Camilleri.

Anterior naris with low oval rim, placed close to upper lip. Posterior naris oval, placed midway between upper jaw and eye. Gill opening extending forward to just beneath opercle. Gill rakers (based on one paratype) on outer face of first arch: three short, triangulate rakers on lower ceratobranchial, one larger raker at the angle, and a single hook-like fleshy lobe on the epibranchial; six stubby fleshy rakers on inner face of first arch; rakers on outer face of second arch about 11 low rudiments; inner rakers on other arches more numerous than first arch inner rakers (about twice), finely blade-like. Tongue margin rounded. Upper jaw with single row of 14–16 large canine teeth each side of premaxillary symphysis, separated by wide gap about equal to bony interorbital width. Lower jaw with two rows of small straight teeth, about half size of upper jaw teeth.

Nape completely scaled to above rear preopercular margin, scales in 10–11 rows. No membranous crest or mid-dorsal ridge. Opercle and cheek naked. Pectoral base and prepelvic area without scales. Ctenoid scales present on side of body from about midpoint of second dorsal fin, cycloid anteriorly; abdomen, prepelvic area and nape with cycloid scales. Scales mostly abraded from body on specimens examined.

Head pores as in genus. Sensory papillae pattern similar to that in *O. paulae* and *O. uronema*.

Coloration of fresh material. No information available.

Coloration of preserved material. Head and body yellowish, with nine brownish rounded to oval spots along mid-side of body, spots alternate between large and small (Fig. 7), anteriormost spot below middle of first dorsal fin, posteriormost spot on caudal-fin base. Scales on nape and dorsum with margins narrowly outlined with dark brown. Indistinct greyish stripe from rear of eye running above opercle. Similar indistinct greyish stripe from middle of jaw running across cheek and opercle, ending in dusky blotch on posterior opercular membrane. Fine dusky speckling following papilla lines on side of head (mostly longitudinal). Small dusky blotch on posteroventral edge of eye. Snout and most of lips light brownish. Underside of head and breast pale yellowish to white, chin brown to dusky. Pectoral-fin base pale with brownish blotch on upper third, confluent with dusky stripe along side of head.

Dorsal and anal fins with damaged membranes; first dorsal fin with darker blackish blotch on posterior part of fin; remainder of fins transparent with dusky speckles and spots (pattern indiscernible); anal fin darkest. Caudal fin translucent dusky. Pectoral fin transparent to dusky; fin becoming dark grey to blackish posteriorly. Pelvic fins whitish in females, fin translucent brownish in male, almost blackish posteriorly.

Comparisons. This large-scaled species (44–46 LS) resembles *O. uronema* (37–49 LS) and *O. paulae* (43–40 LS) but lacks an eye tentacle, has no crest on nape midline and does not share the vertically elongation of midlateral spots on the trunk. Fresh specimens are needed to determine live color.

Distribution. Known only from off Hainan Island, China.

Ecology. Recorded from depth of 18 m; no habitat data available.

Etymology. The species epithet “chinensis” is derived from the type locality being located in China.

***Oxyurichthys cornutus* McCulloch & Waite, 1918**

(Figs 8–10; Tables 2–5)

?*Pselaphias ophthalmomemus*—Jordan & Seale 1906: 406 (Vaisigano River, Apia).

Oxyurichthys cornutus McCulloch & Waite, 1918: 80, pl. 8, fig. 2 (Cairns, Queensland).—Senou et al. 2004: 185 (Japan); Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (Sulawesi); Randall 2005: 543 (east to Fiji and Samoa Islands); Hoese & Larson 2006: 1669 (Cairns to Townsville, Qld); Motomura et al. 2010: 215–216 (mouth of Kurio River, Yaku-shima Island); Fricke et al. 2014: 169 (Madang).

Oxyurichthys rumbia Popta, 1922: 30 (Rumbia, Sunda Island, Celebes).

Oxyurichthys ophthalmomema (in part for some references)—Akihito 1972: 103–109 (Shimoyama River, Kanagawa); Kami 1975: 118 (Acfayan River, Guam); Collette 1983: 99 (New Guinea); Akihito et al. 1984: 262, pl. 245E (Shimoyama River, Kanagawa Pref. to Iriomotejima); Akihito et al. 1988: 262, fig. 127, pl. 245E (estuary of the Shimoyama River, Kanagawa Pref. to Iriomotejima and the Indo-Pacific); Myers 1988: 164 (Guam); Kawanabe & Mizuno 1989: 573 (Japan); Kottelat 1989: 19 (Malaysian archipelago); Kottelat et al. 1993: 147 (Indo-west Pacific); Donaldson et al. 1994: 330 (Marianas); Masuda & Kobayashi 1994: 345 (Japan); Pauly & Martosubroto 1996: 248 (Bali); Hayashi & Shiratori 2003: 71 (Japan).

Oxyurichthys tentacularis—Tomiya 1936: 79 (Japan (in part)); Koumans 1953:45 (in part).

Oxyurichthys sp.—Suzuki et al. 2000a: 5–6, figs 6–7 (Iriomote Island, Ryukyu Islands).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted, about equal in width at premaxillary symphysis as near posterior margin; tentacle on dorsoposterior surface of eye; anterior nares with dense black spot medially; spots sometimes present on gular membrane beneath preopercle or anterior process of quadrate; dark spots on dorsal scales of trunk; five round blotches along mid-side of body, blotch at caudal base smallest and often triangular; five rectangular saddles on dorsum (may be diffuse or well-defined), may extend ventrally toward mid-lateral blotches; narrow dusky to brownish vertical bars present across posterior half of body in some specimens, bars confluent with mid-lateral blotches or dorsal saddles; membranous crest with dark margin present on nape; scales ctenoid laterally on trunk posterior to middle of first dorsal fin, cycloid anteriorly; prepelvic region scaled; lateral scales 44–52; first dorsal fin with elongate filamentous spines, first spine of appressed fin may reach past second dorsal fin to procurvent rays of caudal fin; 21–23 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. AUSTRALIA: SAMA F592, 1(94), holotype of *Oxyurichthys cornutus*, Cairns, Queensland, J. Anderson, 11 November 1919. FIJI: NLU 72008, 9(62–86), Viti Levu, creek in mangroves 4 km E of Suva, just off main road opposite cemetery, A. Emery and R. Winterbottom, 5 March 1983; USNM 265086, 1(52), Kumbuna Creek, drainage into Naingalongalo Harbour, Suva, 1–2.5m, R. Bolin and party, RV *Te Vega* cruise 1, 26 August 1963. PHILIPPINES: CAS-SU 33137, 10(38–67), Nasugbu, A. Herre, December 1936; CAS-SU 38587, 7(37–57), Mindanao, Misamis Oriental, Cagayan River at Cagayan, A.W. Herre; NLU 71395, 1(73), Pangasinan, Bolinao market, E. Murdy, 16 April 1980; ROM 53356, 14(33–56), Tanon Strait, mangrove point on spit of land at Banlas Point on S tip of Daco Island, E of Bais, 0–0.5 m, R. Winterbottom, 21 May 1987; USNM 135702, 1(22), Luzon, above San Vicente Harbor, RV *Albatross*, 13 November 1908; USNM 243160, 371(17–82), Negros Oriental, tidal inlet at Sebanj, Siquijor Island, 0–1 m, L. Knapp and party, 16 May 1979; USNM 397841, 17, Negros Oriental, east side of Daco Island, North Bais Bay, 0–1 m, L. Knapp and party, 7 May 1979; USNM 243163, 58(14–85), Negros Oriental, Canauay River, about 75 m upstream from mouth, along W shore and in tidal mangrove pool, 0–1 m, L. Knapp and party, 9 May 1979. PAPUA NEW GUINEA: USNM 260497, 1(78), Pitilieu Island, Bismarck Archipelago, J. Rockwell, 18 February 1945; USNM 260518, 1(60), mangrove creek on Kiriwana Island, 1 mile E of Losvia, Trobriand Islands, 0–10 m, T. Roberts, 22 September 1975. INDONESIA: SMF 6578, holotype of *Oxyurichthys rumbia*, 74 mm SL male, Landschaft Rumbia, SE Celebes, J. Elbert, Sunda Expedition, 1909; USNM 297213, 3(17–47), S coast of Misool Island, Ceram Sea, West Irian, New Guinea, 0–1 m, RV *Alpha Helix*, 3 July 1979. JAPAN: NTM S.12731-020, 9(14–60), Yonada River, Iriomote-jima, H. Senou and Y. Aonuma, 19 August 1985.

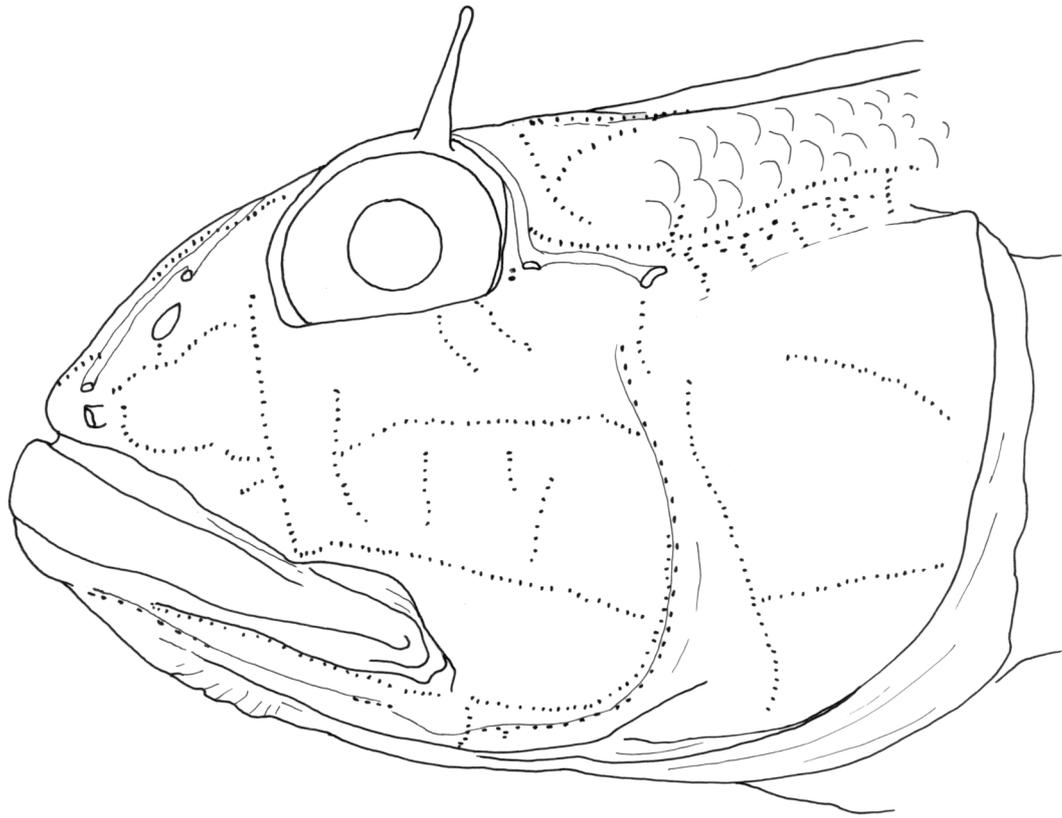


FIGURE 8. *Oxyurichthys cornutus*, sensory papillae pattern, USNM 243160, 79 mm female, Siquijor, Philippines.



FIGURE 9. *Oxyurichthys cornutus*, captive specimen from Yaeyama Islands, Japan. Photograph by Katsusuke Meguro.

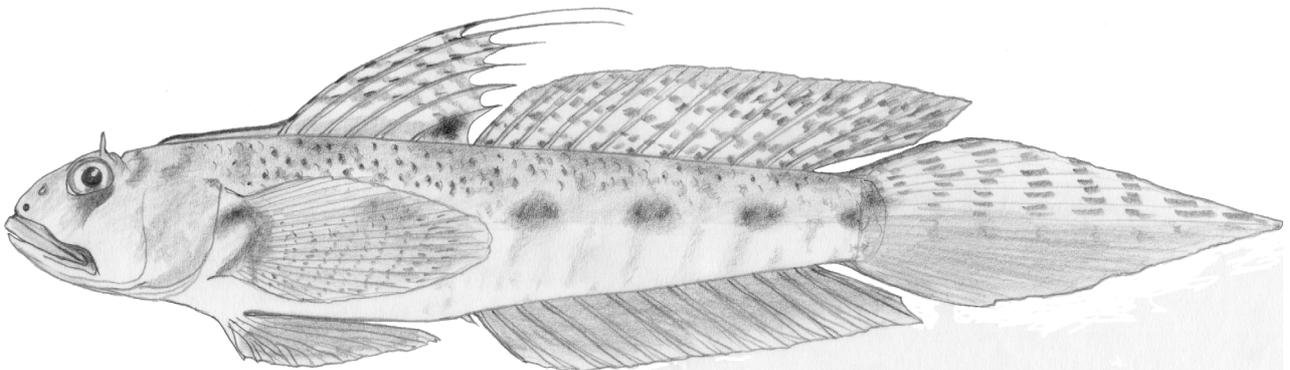


FIGURE 10. *Oxyurichthys cornutus*, color pattern, based on specimens from the Philippines.

Other material examined: FIJI: AMS I.19180-002, 2(30–49), mangrove at Veisari River mouth, 7 miles S of Suva, N. Ward, February 1976; AMS I.24179007, 20(27–73), tributary off river E of downtown Suva, Viti Levu, 1 m, R., F. and T. Emery and R. Winterbottom, 6 May 1983; MNHN A.1492, 1(102), Filhol, 1876; ROM 45418, 19(13–59), unnamed swamp creek about 15 km W of Lami, R. Winterbottom and J. McKinnon, 21 April 1983; ROM 45416, 236(56–82), unnamed creek, mangrove swamp 4 km E of downtown Suva just off main road, opposite cemetery, A. Emery and party, 5 March 1983; ROM 45417, 23(12–63), unnamed swamp creek 15 km W of Lami, A. Emery and party, 21 April 1983; USNM 238969, 34(12–71), Kumbuna Creek, W of Suva, 0–2 m, R. Bolin and party, RV *Te Vega* cruise 7, 10 May 1965; USNM 265086, 1(55), Suva, Naingalongalo Harbour, RV *Te Vega*, cruise 1, R. Bolin and party, 26 August 1963; USNM 372814, 126(10–60), Viti Levu, mud flat north of Naqara Island, V.G. Springer, 3 June 1982. PALAU: CAS 51851 11(45–74), Babelthuap Island, Arai Municipality, Arakitaoch Stream, mangrove zone ca. 1.1 mi SE of Ngarekeai Village, A. Fehlmann and party, 20 September 1957. PHILIPPINES: AMS I.23877-007, 4(66–70), Bolinao market, Pangasinan, E. Murdy, 9 February 1979; ROM 49513, 40(25–71), Tanon Strait, 5 km S of Bais, 45 km N of Dumaguete, channel in mangrove swamp, R. Winterbottom and party, 10 August 1985; CAS-SU 26341, 5(59–63), Sulu Province, Jolo Island, Jolo, A.W. Herre, 16 July 1931; CAS-SU 69856, 6(55–67), Dumaguete, Polo Plantation, Negros Island, Negros Oriental, A.W. Herre, 26 June 1931; CAS-SU 69854, 2(43–47), Cebu, Cebu Island, A.W. Herre, 27 August 1931; CAS-SU 69855, 2(46–58), Panay, F. Reveche, 2–26 January 1926; USNM 160924, 15(55–71), Mahinog River mouth, Camiguin Island, between Leyte and Mindanao, RV *Albatross*, 3 August 1909; USNM 160926, 2(31–49), Cebu, reef opposite, RV *Albatross*, 7 April 1908; USNM 160927, 1(38), tidepools, Bataan Island, RV *Albatross*, 22 July 1909; USNM 168235, 1(32), Nogas Point, Panay, RV *Albatross*, 4 February 1908; USNM 243162, 3(24–44), river near Dumaguete, Negros Oriental, 0–1 m, H.A. Fehlmann and party, 17 May 1979; USNM 268196, 6(23–68), tidal lagoon NE Siquijor Island, Negros Oriental, 0–1 m; L. Knapp and party, 14 May 1979; USNM 372803 1(61), Pagapas Bay, Santiago R., Luzon, Philippines, RV *Albatross*, 20 Feb 1909; USNM 372804, 3(62–64), Guimares Island near Buena Vista, Iloilo Strait, RV *Albatross*, 14 January 1909. TAIWAN: ASIZP 56341, 2, estuary, Danshuei River, Taipei, S.C. Lee, 1 September 1988; ASIZP 55557, 2, Donggang, Pingtung, S.C. Lee, 28 May 1980; ASIZP 64850, 1, Dapon Bay, Pingtung, P.-F. Lee, 15 August 2004. INDONESIA: AMNH 77109, 4(21–33), mangrove swamp along small river on mainland in lee of Semai Island, Irian Jaya, B.B. Collette and party, RV *Alpha Helix*, 4 July 1979; ex-BPBM 29795 1(61), Lombok, SE side, Tanjung Luar, fish landing, J.E. Randall and F.G. Wörner, 30 January 1984; ex-BPBM 29796 1(53), Lombok, SE side, J.E. Randall and F.G. Wörner, 30 January 1984. SOLOMON ISLANDS: AMS I.31087010, 4(30–51), Kolombengora Island, S. Blaber, 19 August 1988; AMS I. 31084003, 4(14–56), Kolombangara Island, S. Blaber, 17 August 1988; NTM S.11325-001, 1(18), Ha'a estuary, Tulagi, S. Blaber, 8 April 1987. JAPAN: AMS I.23501-006, 2(41–47), Nakama River mouth, Iriomote-Jima, Okinawa, 1 m, D. Hoese and M. Hayashi, 31 May 1980; AMS I.234950-002, 1(50), west side of Sesoko Island, Okinawa, D. Hoese, 25 May 1980; NTM S.12113-022, 1(24), Sakiyama Bay, Iriomote-jima, 1–1.5 m, H. Larson and party, 12 August 1985; NTM S.12732-008, 12(13–38), Nakama River, Iriomote-jima, H. Senou and Y. Aonuma, 19 August 1985; NTM S.12135-014, 8(12–53), Nakama River, Iriomote Island, Okinawa, H. Larson, 19 August 1985; NTM S.12127-006, 1(33), Udara River, Iriomote Island, Okinawa, 0–1 m, H. Larson and H. Senou, 16 August 1985; BLIP 1980045, 2(51–56), mouth of Nakama River, Iriomote-Jima, Okinawa, 31 May 1980; AMS I.23500-023, 6(19–42), Nakama River mouth, Iriomote-jima, D.F. Hoese, 21 May 1980; ex-YCM P8886, 9(11–56), Nakama River, Iriomote-Jima, Okinawa, 22 July 1979. WESTERN SAMOA: USNM 52409, 2(55–87), Apia, Bureau of Fisheries, D.S. Jordan and V.L. Kellogg. PAPUA NEW GUINEA: AMS I.16671-077, 7(46–55), Madang Harbour, opposite end of Sek Island, F. Talbot, 31 July 1969. AMS I.17093-014, 1(45), boat inlet behind Trobriand Hotel, Kiriwinna, Trobriand Islands, B.B. Collette and party, 25 May 1970; AMS I.16758006, 1(22), Bostrem Bay, Madang Harbour, Y. Haneda and party, 16 October 1969; USNM 238972, 3(45–51), mangroves behind Nui Island, Madang Harbour, 0–1 m, B.B. Collette and party, RV *Alpha Helix*, 28 May 1970; USNM 238974, 1(67), Kiriwina Inlet stream, Trobriand Islands, 0–1 m, B.B. Collette and party, RV *Alpha Helix*, 6 June 1970; USNM 260497, 1(78), Bismarck Archipelago, Pitilieu Island, Admiralty Group, J. Rockwell, 18 February 1945; USNM 260518, 1(61), Kiriwana Island, mangrove creek 1 mile east of Losvia, T. Roberts, 22 September 1975; USNM 261522, 1(14), mangrove behind Nui Island, Madang Harbour, 0–1 m, B.B. Collette and party, RV *Alpha Helix*, 28 May 1970; USNM 297099, 10(19–44), Kairiru swamp, Muschu Island, 0–2 m, B.B. Collette, RV *Alpha Helix*, 21 June 1979; USNM 372802, 6(17–43), mainland in lee of Samei Island, Irian Jaya, B.B. Collette, RV *Alpha Helix*, 4 July 1979; USNM 372805, 3(17–48), south coast of Misool Island, Irian Jaya, B.B. Collette, RV *Alpha Helix*, 3 July 1979; AMS I.17067-004, 1(54), Madang, B.B. Collette and party, 25 May 1970.

Description. Based on 65 specimens, 17–96 mm SL. An asterisk indicates the counts of the holotype of *Oxyurichthys cornutus*.

First dorsal VI*; second dorsal I,11–12*; anal I,13*; pectoral rays 21–23*; segmented caudal rays 9/8*; branched caudal rays 6/7–8/7 (7/7*); lateral scale count 44–52 (modally 48, 50*); TRB 13–19*; predorsal scale count 13–24 (15*).

Body compressed. Head deeper than wide, HL 23–28% SL (mean 26%). Depth at posterior preopercular margin 58–79% HL (mean 67%). Width at posterior preopercular margin 40–70% HL (mean 57%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through anterior margin or anterior third of orbit; upper jaw 45–58% HL (mean 51%). Eyes lateral, high on head, top forming part of dorsal profile, 21–31% HL (mean 26%). Elongate tentacle on dorsoposterior eye. Snout rounded, 26–43% HL (mean 32%). Interorbital narrow, 6–13% HL (mean 10%). Body depth at anal origin 17–23% SL (mean 19%). Caudal peduncle compressed, length 9–15% SL (mean 11%). Caudal-peduncle depth 10–12% SL (mean 11%).

First dorsal fin with elongate filamentous spines, first spine always longest, decreasing in size through 6th spine. First spine longer than head, often reaching between fifth second dorsal-fin element and caudal fin. Second dorsal-fin rays moderately long, greater than head depth, anal fin lower, posteriormost rays in both longest, reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anus and fourth anal-fin element, 25–31 % SL (mean 28%). Pelvic fins rounded to oval, may reach base of urogenital papilla but not reaching anal-fin origin, 19–26% SL (mean 23%). Caudal fin elongate, pointed, 38–58% SL (mean 48%).

Anterior naris with slightly raised rim, placed close to upper lip. Posterior naris an oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three or four triangulate on lower ceratobranchial, single broad triangulate raker or two fused rakers at angle and a fleshy bi- or tripartite lobe derived from gill rakers on the epibranchial; rakers on outer face of second arch about 15–18 reduced stubs. Inner rakers on other arches about equal length of first arch inner rakers. Tongue tip rounded. Upper lip not constricted at premaxillary symphysis. Upper jaw teeth in single row, about 20 on each side of symphysis; no prominent gap at symphysis. Lower jaw teeth in band with inner and outermost rows pronounced, about 30 in outer row each side of mandibular symphysis, innermost row with about 12 strong recurved canines on each mandible, largest near symphysis. Strong canine teeth in upper jaw, about twice size of lower jaw teeth in outer row.

Nape scaled along sides with naked median along membranous crest, scales reaching forward to above preopercle. Opercle, cheek and pectoral-fin base naked. Prepelvic area covered with 1–9 (usually 7 or 8) rows of small cycloid scales. Abdomen scaled. Ctenoid scales on side of body, becoming cycloid anteriorly beneath first dorsal fin.

Sensory papillae pattern illustrated in Fig. 8.

Coloration of fresh material. Color pattern as for preserved specimens (Fig. 9). The species is illustrated in color in Akihito et al. (1988) and Motomura et al. (2010). In live fish from Iriomote-jima, Japan, body translucent greyish brown, head darker greyish brown. Mid-lateral blotches, dorsal saddles and rounded blotches along nape dark brown, and small black spots on dorsal part of body. Nine vertical diffuse grey bars crossing body, posteriormost bar very short and placed on caudal peduncle just before mid-lateral spot. “Comma” mark on pectoral-fin base blackish, with “tail” of comma forked. Head with dark brown markings: crescent behind eye, rectangular “tear” mark along ventral edge of eye, mottling and triangular spot on opercle, and upper lip. Eye dark golden brown. Ocular tentacle dark brown. Belly bright white.

Dorsal fins folded, but membranes translucent with dark brown spots and streaks. Anal fin dusky grey with bright white margin. Pectoral fin translucent dusky, with rows of fin blackish spots alternating with rows of yellowish grey round spots (caudal and pelvic fins not visible).

Coloration of preserved material. Head and body light yellowish to yellowish brown, pale ventrally, with five diffuse rounded brown blotches along mid-side of body, darkest above midline; posteriormost blotch (at caudal base) smallest and often triangular (Fig. 10). Scales on dorsal part of body (especially on anterior half) with small dark brown to blackish spot on posterior part; spots round on anterior part of body, those on posterior part of body smaller and vertically elongate; few nape scales with dark spots. Dorsum with five variably developed rectangular saddles (may be diffuse or well-defined) which may extend ventrally toward mid-lateral blotches. In some specimens, narrow dusky to brownish vertical bars present across posterior half of body; bars confluent with mid-

lateral blotches or dorsal saddles. Nape with brown to brownish black crescent behind each eye, crescent may meet in dorsal midline (anterior to crest) in some specimens; diffuse pale band present on nape immediately behind crescent. Nape crest with distinct dark brown to black margin. Orbital tentacle dusky to greyish brown, may gradually darken toward tip. Pectoral base with brown to blackish brown curved comma-shaped mark, “spot” of comma on dorsal part of base, and part of “tail” covering most of pectoral-fin ray bases; “tail” forking ventrally in some specimens. Interorbital and snout greyish brown. Anterior narial tube with dense black spot medially; posterior naris with dusky to blackish rim. Dark brown rectangular to triangular “tear” blotch along ventral margin of eye, posterior edge of blotch sharply defined, anteroventral edge diffuse; blotch pointing ventrally toward posterior margin of mouth. Opercle plain or mottled dusky to brownish; in some specimens and indistinct oblique brownish streak visible. Upper lip grey to greyish brown, dark grey to black at corner, often with similarly colored stripe along edge of lip extending onto skin concealed by lip when mouth closed. Lower lip whitish, tip dusky. Isthmus and chin light brownish to greyish brown. Breast pale to dusky. Abdomen yellowish white to white; black peritoneum usually showing through body wall at midline.

First dorsal fin translucent, faintly dusky proximally, with round blackish spot on membrane behind sixth spine and 8–12 wavy dusky to blackish lines crossing fin; lines may break up into blotches or streaks posteriorly; first spine with dark brown to blackish spot present at origin of each line. Second dorsal fin translucent, with 6–10 slightly oblique rows of round to elongate dusky to blackish spots and streaks; markings becoming streakier posteriorly; dark spot present just above base of each fin ray. Caudal fin with ventral half plain dusky grey, dorsal half translucent to faintly dusky with about eight or nine rows of dark brown to blackish short streaks across fin, parallel to rays. Anal-fin dusky to dark greyish, with whitish to translucent margin. Pectoral fin whitish to dusky, always darker on ventral two-thirds, with many rows of small round spots or short streaks across membrane. Pelvic fin entirely dusky.

Comparisons. This species has been confused extensively in the literature with *O. ophthalmonema*. It differs from that species in having greatly elongate first dorsal-fin spines, a pronounced dark spot on individual scales of the dorsum, and while there is a saddle-shaped spot dorsally on the caudal peduncle, it is not distinctly darkened compared to other spots as seen in *O. ophthalmonema*. Conspicuous spotting of individual scales on the dorsum is also observed in *O. microlepis*, but the latter species has a black spot on the eye instead of a tentacle, and does not share the elongation of the first dorsal-fin spines. *Oxyurichthys tentacularis*, *O. uronema* and *O. paulae* all have a tentacle on the dorsoposterior surface of the eye, but differ in pigmentation of the trunk and in having a constriction of the upper lip at the premaxillary symphysis. The first dorsal-fin spines are not elongate in *O. paulae* and *O. tentacularis*. Other comments are given under *O. ophthalmonema*.

Distribution. Fiji, Queensland, Papua New Guinea, Irian Jaya, Sulawesi, Philippines, Japan, Palau, Solomon Islands, Western Samoa.

Ecology. Commonly taken in shallow waters in estuaries at mouths of rivers, in mangrove creeks and pools, tidal lagoons.

Remarks. Jordan & Seale’s (1906) Samoan record of *Pselaphias ophthalmonemus* “from a sluggish bayou of Vaisigano River” may possibly be *O. cornutus*, as they described the dorsal as “filamentous”; however, the fine black spots are not mentioned, only “back mottled” is given.

Kottelat (2013) regarded *Oxyurichthys rumbia* as a synonym of *O. tentacularis*. The holotype of *O. rumbia* has no constriction of the upper lip at the premaxillary symphysis as evident in *O. tentacularis*, the pectoral fin had rows of dark spots as in *O. cornutus* (when examined in 1988) and the first dorsal spine is 45% SL, which is well beyond the maximum observed for *O. tentacularis* (14% SL).

***Oxyurichthys heisei* Pezold, 1998**

(Figs 11–13; Tables 2–5)

Oxyurichthys heisei Pezold, 1998: 687–689 (northwest of Molokai, Hawaiian Islands).—Greenfield & Randall 2004: 532, fig. 69 (off the coast of Molokai).

Diagnosis. 13 second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip of equal thickness along entire length, no constriction at premaxillary symphysis; eye without spot, cornification or tentacle on dorsoposterior surface; anterior nares not darkly pigmented; no spots on gular

membrane beneath preopercle or anterior process of quadrate; low membranous crest on nape reaching from spinous dorsal origin to above preopercle; scales mostly ctenoid; lateral scales 50–71; spines of first dorsal fin not elongate, appressed fin not reaching beyond second or third, second dorsal-fin element; 21–23 pectoral-fin rays; pelvic fins not reaching beyond anus; pelvic fins pigmented most prominently between distal branches of rays.

Material Examined. HAWAII: Holotype, BPBM 15473, 64 mm SL male, NW of Molokai, 124 m, RV *Townsend Cromwell* cruise 40, 13 November 1968. Paratypes, NLU 64915, 2(44–56.5), same data as holotype; paratypes, BLIP 1968466, 1(54), same data as holotype; paratypes, BLIP 1968467, 1(62), same data as holotype; paratypes, BPBM 24151, 2(52–59), same data as holotype; CAS 74809, 2(54.5–58), same data as holotype. paratypes, BPBM 34513, 4(57–60; one broken in two), NW of Molokai, 124 m, RV *Townsend Cromwell* cruise 40, 13 November 1968; paratypes, BPBM 24145, 3(54–61), NW of Molokai, 124 m, RV *Townsend Cromwell* cruise 40, 12 November 1968; BPBM 24151, 2(51.5–59), NW of Molokai, 119 m, RV *Townsend Cromwell* cruise 40, 13 November 1968; BPBM 24140, 1(49), NW of Molokai, 124 m, RV *Townsend Cromwell* cruise 40, 12 November 1968; BPBM 24084, 1(59), NW of Molokai, 125 m, RV *Townsend Cromwell* cruise 40, 11 November 1968; USNM 342315, 4(50–60), NW of Molokai, 124 m, RV *Townsend Cromwell* cruise 40, 11 November 1968. SOUTH CHINA SEA: USNM 238958, 1(57), about 60 miles off Sarawak, 100 m, RV *Te Vega* cruise 1, 6 October 1963. PHILIPPINES: USNM 265009, 1(92), Carigara Bay, Samar Sea, 83–88 m, RV *U.P. Trawler*, C. Ferraris, 1 May 1980; USNM 238970, 1(125), Visayan Sea between northern Negros and Masbate Islands, SE of Tanguigui Island, 0–69.5 m, L. Alcala and party, 5 June 1978; USNM 238962, 1(96), Visayan Sea between northern Negros and Masbate Islands, SW of Caduruan Point, 0–80.5 m, L. Alcala and party, 5–6 June 1978. AUSTRALIA: AMS I.32200-002, 2(69–69.5), off Newcastle, New South Wales, 69–73 m, FRV *Kapala*, 5 September 1991; AMS I.32197-001, 1(67), same data as preceding; AMS I.33779-001, 1(77), off Newcastle, New South Wales, 71–77 m, FRV *Kapala*, 2 November 1991; AMS I.32124003, 1(68.5), off Newcastle, New South Wales, 71–79 m, FRV *Kapala*, 23 May 1990.

Description. Based on 37 specimens, 44–127 mm SL. An asterisk indicates the counts of the holotype.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 21–23*; segmented caudal rays 9/8*; branched caudal rays 7/7*–8/7; unsegmented (procurrent) caudal rays 4/4–6/6; lateral scale count 50–71 (modally 64*); TRB 14*–23; predorsal scale count 9–22 (14*).

Body compressed. Head deeper than wide, HL 22–29% SL (mean 26%). Depth at posterior preopercular margin 51–75% HL (mean 63%). Width at posterior preopercular margin 45–68% HL (mean 55%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through mideye; upper jaw 50–66% HL (mean 58%). Upper lip not constricted at premaxillary symphysis. Eyes lateral, high on head, top forming part of dorsal profile, 25–36% HL (mean 31%). No tentacle, callus, or black spot on dorsoposterior surface of eye. Snout rounded, 28–41% HL (mean 32%). Interorbital narrow, 4–11% HL (mean 7%). Body depth at anal origin 12–19% SL (mean 15%). Caudal peduncle compressed, length 9–12% SL (mean 11%). Caudal-peduncle depth 7–11% SL (mean 9%).

First dorsal fin low, tips of spines free, females with first spine usually longest (13–25% SL, mean 19%), next four spines about equal length (13–20% SL, mean 16%), sixth spine shortest (10–12% SL, mean 11%); spines generally gradually increasing in size through fourth or fifth spine in males (fifth spine 15–22% SL, mean 19%), sixth spine shortest (9–15%, mean 13%); appressed first dorsal fin reaching 4th second dorsal-fin element. Second dorsal and anal fins low, posteriormost rays longest, appressed rays reaching beyond caudal-fin base. Pectoral fin oval, central rays longest, 22–28% SL (mean 25%) reaching just beyond anal-fin origin. Pelvic fins rounded to oval, reaching anus or anal-fin origin, 20–27% SL (mean 24%) in SL. Caudal fin elongate, pointed, 33–64% SL (mean 49%).

Anterior naris in small narrow tube, placed close to upper lip. Posterior naris an oval, open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three triangulate on lower ceratobranchial, two fused finger-like rakers at angle and a fleshy hook-like lobe on the epibranchial; rakers on outer face of second arch about 14 reduced stubs. Inner rakers on other arches twice the length of first arch inner rakers. Tongue tip rounded. Upper jaw teeth in single row, usually about 20 (16–20) along outer edge of jaw on each side of symphysis; slight gap at symphysis that may be 50% of fleshy interorbital width. Lower jaw teeth in two rows, about 30 each side of mandibular symphysis. Strong canine teeth in upper jaw, about twice size of lower jaw teeth.

Nape scaled with naked median along fleshy raised crest on midline, scales reaching forward to above mid-opercle. Opercle, cheek, pectoral-fin base and prepelvic region naked. Abdomen scaled, naked over infracarinalis muscle. Ctenoid scales on side of body, becoming cycloid anteriorly beneath middle of first dorsal fin, cycloid scales on nape and abdomen.

Head pores as in genus.

Sensory papillae pattern illustrated in Fig. 11.

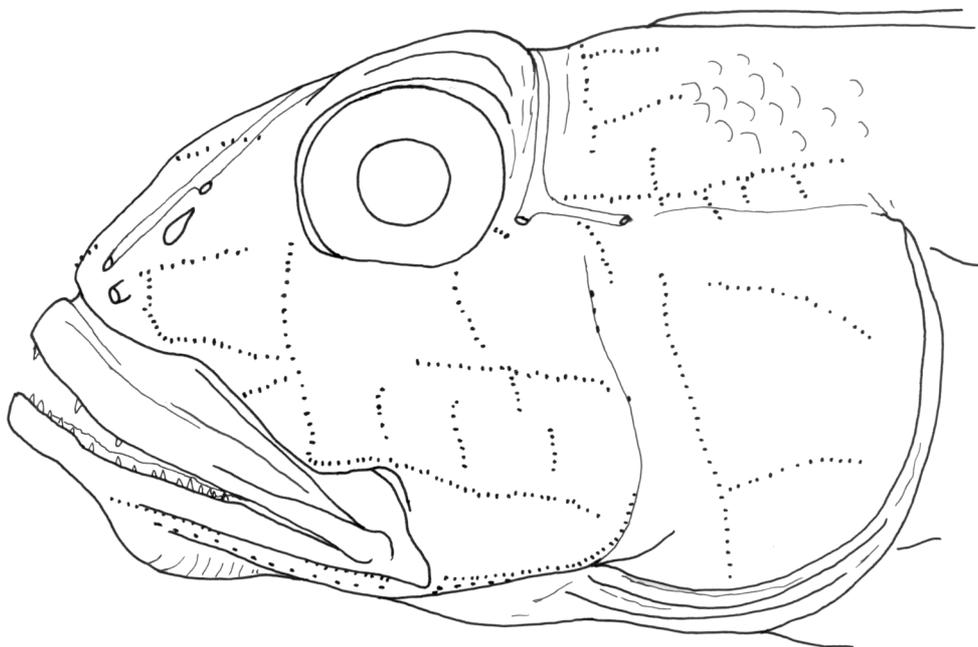


FIGURE 11. *Oxyurichthys heisei*, sensory papillae pattern, composite, mostly drawn from USNM 238958, 59.5 mm male, Sarawak, with some papillae details from AMS I.33779-001, Newcastle.

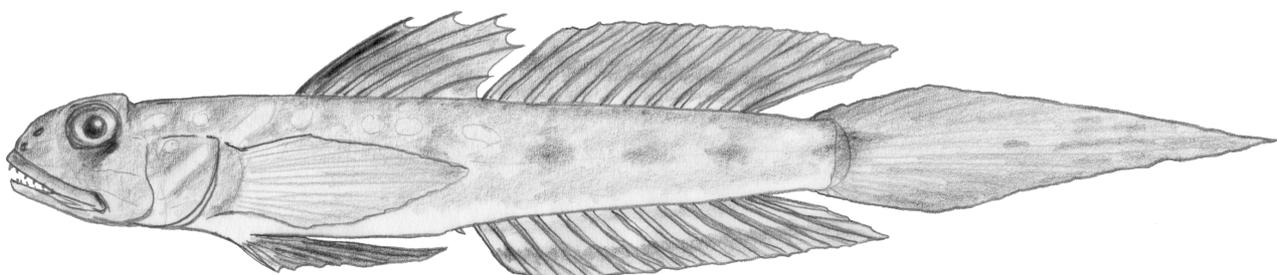


FIGURE 12. *Oxyurichthys heisei*, color pattern, based on specimens from Hawaii and New South Wales.

Coloration of preserved material. All available specimens in poor condition, with scales absent and most pigmentation gone (Fig. 12). Head and body light yellowish brown, dorsal midline with slightly darker pigment at fin ray bases, with remains of five indistinct brownish blotches along mid-side of body; belly whitish. Indistinct brownish blotch along ventral margin of eye (remnant of “tear” mark). In two more heavily pigmented specimens (from eastern Australia), indistinct whitish oblique streaks and blotches cross nape and opercle, with some whitish blotches on anterodorsal part of body.

First dorsal fin translucent to dusky, with brown to blackish vertical streak along membrane between first and second spines; brownish blotch on membrane posterior to sixth spine; and indistinct diffuse brownish streak across centre of fin. Second dorsal fin dusky, with remnants of short diffuse brownish streaks submarginally. Caudal fin mostly translucent, dusky near base, with some brownish streaks posteriorly. Anal fin dusky, some specimens with translucent streak along centre of fin. Pectoral fin translucent to faintly dusky. Pelvic fins translucent with whitish frenum and spine, rest of fin membrane faintly dusky, with elongate brown streaks along membrane between branches of third to fifth rays, and on membrane anterior to branch point of second ray.

Coloration of fresh material. The only known photograph of a fresh specimen of this species first appeared in Greenfield & Randall (2004: 532, fig. 69). This shows a fish with head and body bluish white with dull yellow irregular streaks and large blotches crossing head and nape, several dark-margined pale blue spots on side of head, five brown oval blotches along mid-side of body, joined by faint broad yellowish stripe; abdomen and underside of head whitish (Fig. 13). Unpaired fins (damaged) translucent blue, indistinctly banded with dull yellow.



FIGURE 13. *Oxyurichthys heisei*, 54.7 mm SL, fresh dead, offshore Hawaii. Photograph by Jack Randall.

Comparisons. Preserved specimens are most similar to *O. auchenolepis*, from which it differs in lacking prepelvic scales, not having the upper lip constricted at the premaxillary symphysis, and in having anteriormost vertical *c* row not reaching nearly to eye. See notes under *O. auchenolepis* for other details. *Oxyurichthys nuchalis* has 45–59 lateral scale rows vs. 59–70 in *O. heisei* and a dusky blotch at rear of first dorsal fin instead of the vertical dark streak along membrane behind the first dorsal spine observed in this species. *Oxyurichthys stigmalophius* has pelvic fins with rows of spots, a prominent large black spot posteriorly on D1, and 70–92 lateral scale rows.

The fish shown in Greenfield & Randall (2004) shows considerable resemblance in coloring to *O. auchenolepis* (Fig. 6), but as the specimen is lost, it is not possible to confirm its identity.

Distribution. Hawaii, Borneo, the Philippines and the eastern coast of Australia.

Ecology. A deepwater species taken in trawls to depths of 125 m.

Remarks. At least seven other specimens of this species have been reported from Hawaii, including Lanai (Struhsaker 1973), but their deposition is unknown. Pezold (1998) discusses the confusion surrounding these specimens and the original type material from Hawaii.

***Oxyurichthys limophilus*, new species**

(Figs 14–16; Tables 2–5)

Material examined. HOLOTYPE—BPBM 27321, female, 58.5 mm SL, Kenya, Mombasa Yacht Club, mud bottom, 6–12 m, spear, J. Randall, 27 March 1979. PARATYPES—BPBM 34515, 2 females (55.2–91.3), Kenya, Mombasa Yacht Club, mud bottom, 15 m, spear, J. Randall, 14 March 1979; USNM 300002, 1 male (95), Kilindini Harbour, Mombasa, 3.5–13 m, G.F. Losse, 29 June 1965.

Other material examined. ZUMT 60467, 1(35), Amitori Bay, Iriomote-jima, Japan, M. Aizawa, 14 July 1988.

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted; no tentacle, callus, knob or spot posterodorsally on eye; anterior nares without dark anteromedial spot; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; trunk with four large rounded to elongate blotches along mid-side of body, and small round to triangular blotch on caudal-fin base, in some specimens, diffuse small brownish blotches visible, forming irregular rows ventral to, or interspersed with, mid-lateral blotches; two irregular rows of spots on either side of dorsal midline, commencing on nape above opercle, upper row running along bases of fin rays, spots more distinct anteriorly; nape naked or scaled with naked median and low membranous crest; scales ctenoid on most of trunk

becoming cycloid anterior to second dorsal-fin origin; prepelvic area without scales; lateral scales 61–79; spines of first dorsal fin not produced, extending to about the third second dorsal-fin element; 22–23 pectoral-fin rays; pelvic fins dusky, with bars or mottled; dark blotch on first dorsal fin behind or on both sides of sixth spine.

Description. Based on 4 specimens, 55–95 mm SL. An asterisk indicates the counts of the holotype (Fig. 14).

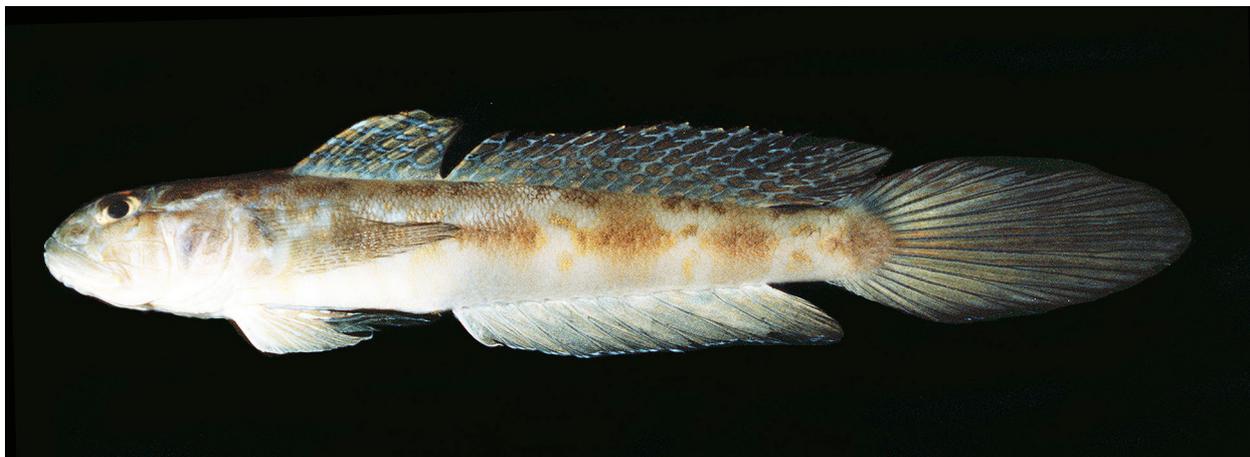


FIGURE 14. *Oxyurichthys limophilus* n.sp., 58.5 mm SL female holotype, BPBM 27321, off Mombasa Yacht Club, Kenya.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 22–23*; segmented caudal rays 8/8–9/8*; branched caudal rays 7/7–8/7*; lateral scale count 61*–79; TRB 15–22 (18*); TRF 19–27 (22*); predorsal scale count 9–17 (16*).

Body compressed, head length moderate, 22–23% SL (mean 22%). Head deeper than wide, depth at posterior preopercular margin 65–72% HL (mean 70%), width at posterior preopercular margin 43–73% HL (mean 55%). Mouth terminal, slightly oblique, forming an angle of about 30–35° with body axis; jaws reach to vertical beneath rear margin of orbit. Upper lip not constricted. Upper jaw 61–64% HL (mean 63%). Eyes lateral, high on head, forming part of dorsal profile, 24–29% HL (mean 26%). No black spot, tentacle, teat-like callus or fleshy knob posterodorsally on eye. Snout rounded, 27–34% HL (mean 30%). Interorbital narrow, 5–12% HL (mean 9%). Body depth at anal origin 14–16% SL (mean 15%). Caudal peduncle compressed, slightly longer than deep, length 10–12% SL (mean 11%). Caudal-peduncle depth 8–10% SL (mean 9%).

First dorsal fin low with no long filamentous spines in either sex, reaching to second or third element of second dorsal fin when appressed. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when appressed. Pectoral fin oval, central rays longest, 21–24% SL (mean 23%), extending beyond anal-fin origin. Pelvic fins rounded to oval, reaching to anus in larger specimens, 21–22% SL (mean 21%). Caudal fin elongate, pointed, 40–46% SL (mean 43%).

Anterior naris at end of very reduced short tube at margin of upper lip. Posterior naris oval pit midway between eye and upper jaw. Gill opening extends forward to under opercle. First gill arch with two or three broad bladelike gill rakers parallel to axis on lower ceratobranchial, two thin elongate rakers at angle, fused half their length, a large fleshy fingerlike lobe, tripartite in some, on the epibranchial; about 16 reduced rakers on outer face of second arch, eight rakers on inner face of first arch; inner rakers on other arches more numerous, elongate and bladelike than first arch inner rakers. Tongue rounded. Upper jaw with single row of 20–22 large caniniform teeth on either side of the premaxillary symphysis, much larger than lower jaw teeth, separated by large gap at symphysis in adults about equal in width to bony interorbital width. Lower jaw with narrow band of two to three rows of small teeth, innermost teeth strongly recurved canines and larger than outermost row teeth.

Nape scaled with naked median along low fleshy crest, cycloid scales reaching forward above anterior field of opercle or preopercular margin. Opercle, cheek, pectoral-fin base and prepelvic region naked. Ctenoid scales on side of body, becoming cycloid anterior to first dorsal fin, on abdomen, in row along anal fin, in row along second dorsal fin extending half the fin length, and on caudal-fin base; remaining scales all weakly ctenoid, extending farthest forward along midline of trunk. Abdomen not scaled over infracarinalis medius muscle.

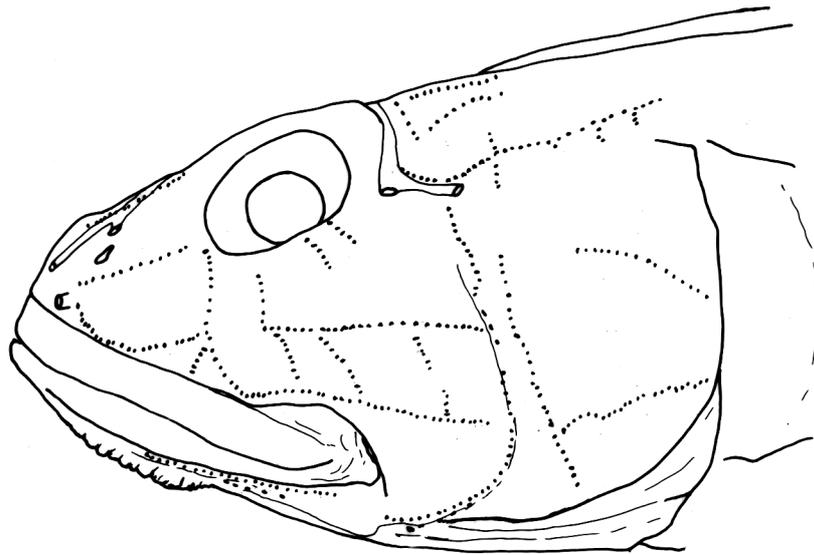


FIGURE 15. *Oxyurichthys limophilus* n.sp., sensory papillae pattern of holotype, BPBM 27321.

Sensory papillae pattern as in Figure 15.

Coloration of preserved material. Large diffuse spots midlaterally on trunk, one beneath first dorsal, three beneath second dorsal; another spot on caudal-fin base; background color yellowish-brown; spot present on upper pectoral-fin base; diffuse suborbital blotch beneath posterior margin of orbit on cheek; upper margin of upper lip dark edged; snout dusky; ascending process of premaxillary with dark spot at tip beneath translucent skin; no well-defined spots beneath mandible or anterior arm of quadrate; first dorsal evenly pigmented with no bars, a little darker around or behind sixth spine; no clearly defined bars on second dorsal; caudal dusky, evenly pigmented; anal fin dusky, darkly edged posteriorly only in male, submarginal bar in females; pectoral fins dusky over lower half, especially towards ray tips; pelvic fins dark with some darker blotches, but no clearly defined bars in two females, forming four to five poorly contrasted bars in largest female, with bars in male.

Coloration of fresh material. From color slides of dead specimens from Kenya by Jack Randall (Figs 14, 16). Color pattern as for preserved specimens. Dorsum greyish with scattered pale blue spots and short irregular lines, rest of head and body dull yellowish to pale greyish yellow; four diffuse brown to dusky orange oval mid-lateral blotches with three or four short vertical dark brown lines within each blotch, blotches surrounded with orange; small dusky orange blotches and tilde-shaped marks scattered above and below mid-lateral brownish blotches; posteriormost blotch on caudal peduncle small, surrounded by dull orange. Irregular row of brown to dark brown small blotchy spots or pairs of spots along dorsum, beginning at rear of nape. Nape with orange-red-edged crest and several dull orange and pale blue scattered spots and blotches. Eye pale gold to red-gold, darker orange-red dorsally; red spot dorsoposteriorly visible in one photo. Snout dusky greyish with scattered dull orange and pale blue spots and short streaks. Brownish or dull orange rectangular blotch along ventral margin of eye. Side of head with scattered blue spots and short streaks; one or two brownish or orange irregular oblique streaks crossing opercle. Pectoral-fin base with dull yellow to pale orange irregularly shaped blotch. Lower part of head and abdomen whitish.

First dorsal fin pale to bright blue with about eight wavy blue-bordered orange stripes crossing fin. Second dorsal fin pale blue with four to six rows of orange to reddish orange rounded spots. Caudal fin dull blue-grey with diffuse brownish roughly triangular blotch over scaly sheath on fin base and a dull orange line following each fin ray; indistinct short orange streaks and diffuse spots on upper part of fin. Anal fin whitish blue proximally, most of fin greyish orange, darkest submarginally, with thin blue margin. Pectoral fin translucent to dusky. Pelvic fins pale orange to yellowish, whitish near base, with bright blue streaks and spots crossing fin membrane along length of fin.

Distribution. Known only from Mombasa, Kenya and possibly southern Japan (a female ZUMT specimen resembles this species; more specimens are required to determine if it is conspecific or is yet another unrecognised species).

Ecology. From mud substrates in a protected harbor, to 15 m depth.

Comparisons. This species is most similar to *O. notonema*. *Oxyurichthys limophilus* differs in having shorter first dorsal-fin spines (averaging 17% SL vs. 35% SL), and the trunk pigmentation also differs from that seen in *O. notonema*. The markings between the midlateral blotches are small spots in *O. limophilus* instead of elongate tilde shapes, and the midlateral blotches are more medially elongate with faint vertical bars extending from each to the base of the second dorsal and anal fins. *Oxyurichthys limophilus* specimens lack a dark submarginal band or row of dark spots on the anal fin which is present in *O. notonema*. Photographs of freshly caught dead specimens exhibit a very slight blue margin on the anal and caudal fins which is more pronounced in *O. notonema*.

Etymology. The trivial name is from the Latin *limus*, silt, and *philus*, lover of, in reference to the habitat in which the species was found.



FIGURE 16. *Oxyurichthys limophilus* n.sp., female paratype, BPBM 34515, off Mombasa Yacht Club, Kenya.

Oxyurichthys lonchotus (Jenkins, 1903)

(Figs 17–19; Tables 2–5)

Gobionellus lonchotus Jenkins, 1903: 503, fig. 44 (Hawaii).

Gobiichthys lonchotus—Jordan & Evermann 1905: 485 (Honolulu, Waikiki and Hilo);—Jordan & Seale 1906: 407 (Hawaii).

Oxyurichthys lonchotus—Pezold 1998: 693 (Hawaii, Molokai, Oahu, Maui); Larson & Murdy 2001: 3601 (western central Pacific); Myers & Donaldson 2003: 638 (Guam; Saipan); Greenfield & Randall 2004: 533 (Kane’ohe Bay, Kahana Bay, Oahu); Allen & Erdmann 2012: 983 (Raja Ampat Islands, Indonesia).

Oxyurichthys visayanus Herre, 1927: 254 (Cebu, Philippines).—Akihito et al. 1988: 263, fig. 129, plate 245G (from Amamiōshima to Iriomotejima and the Philippines); Masuda & Kobayashi 1994: 345, figs 2–3 (Japan); Suzuki et al. 2000b: 5, figs 10–12 (Iriomote Island, Ryukyu Islands); Senou et al. 2004: 188 (Japan); Kottelat 2013: 416 (Cebu, Ryukyu Islands).

Oxyurichthys papuensis [in part]—Fowler 1928: 415–416 (Hawaii, Kingsmill Islands).

Oxyurichthys guibei Smith, 1959: 215, fig. 33A (Mauritius).—Kami 1975: 118 (Acfayan River, Guam); Myers 1988: 164 (Guam); Donaldson et al. 1994: 330 (Marianas).

Oxyurichthys sp.—Hayashi et al. 1981: 8, plate 4 (Ishigakijima and Iriomotejima).

Diagnosis. Thirteen second dorsal-fin and 14 anal-fin elements; single row of teeth in upper jaw; fleshy tongue rounded; upper lip not constricted at premaxillary symphysis; dark spot present on dorsoposterior surface of eye, but no cirrus or cornification; anterior nares with dark anteromedial spot; two concealed pairs of dark brown spots in gular region beneath preopercle and anterior process of quadrate; scales of dorsum without dark spots on posterior margin; four rectangular or square dark brown blotches along mid-side, fifth basicaudal blotch rounded to triangular; nape naked in most individuals, when scaled only along margins with broad naked median; membranous crest present on nape; scales ctenoid laterally on trunk posterior to middle of first dorsal fin, cycloid anteriorly; prepelvic area naked; lateral scales 51–97, modally 62; first dorsal-fin spines moderately elongate with filamentous tips, reaching fourth or fifth second dorsal element when appressed; 17–21 pectoral-fin rays; pelvic fins dusky; first dorsal fin dusky with one to three rows of whitish spots.

Material Examined. KENYA: USNM 402741, 6, 1(32), Gazi Bay, trawl, mud bottom, H. Coene and party, 6 August 1995. COMOROS: ROM 56573, 10(13–33), Mahali Island, mangrove just E of Nidumachoua, 0–0.5 m, R. Winterbottom, November 1988. MAURITIUS: BPBM unregistered, 6(24.5–51), brackish pond in Huitres Bay, just S of Trou d’Eau Douce, rock and mangrove shore, silty bottom, J. Randall, 1 November 1973. REUNION: MNHN 988, holotype of *Oxyurichthys guibei*, 103 mm SL male, Deyrolles, 1855; MNHN B.3027, 1(94), Deyrolles, 1855. JAPAN: BLIP 1978201, 2(37–40), Nakama River, Iriomote Island, 8 August 1978; BLIP 1981104, 4(34–38), Iriomote-jima, mouth of Nakama River, 3 August 1981; CAS 53842, 1(40), Okinawa, Saosoko Gawa, 200 m from mouth at low tide, 1 mile N of Nakama, R.B. Boomer, 12 July 1953; NTM S.12731-025, 7(15–44), Yonada River, Iriomote-jima, H. Senou and Aonuma, 19 August 1985; URM P3127, 1(42), Nagura River, Ishigaki Island, Okinawa, 27 May 1982; YCM P.8878, 11(30.5–39), Iriomote-jima, Nakama River, 22 July 1979; YCM P.4721, 16(14–43), Iriomote-jima, Nakama River, tributary of small stream, M. Hayashi and party, 5 August 1978. PHILIPPINES: USNM 342588, 4(45–52), mouth of Mahinog River, Camiguin Island, between Leyte and Mindanao, RV *Albatross*, 3 August 1909. FEDERATED STATES OF MICRONESIA: USNM 223010, 76(39–53), Ponape, shore W of Kolonia, 0–0.5 m, V. Springer and party, 22 September 1980; USNM 223478, 1(37), Ponape, NE coast just E of Tumu Point, 0–0.5 m, V. Springer and party, 2 September 1980. MARIANAS: AMNH 47988, 12(33–43), Guam; BPBM 4887, 1(68), Guam, H.G. Hornbostel, 1923; NLU 64914, 2(37.5–45), Guam, mudflat between SE section of Merizo village and Mamaon Channel, H.A. Fehlmann and party, 1 January 1959; UG 5827, 1(30.5), Guam, at mouth of Geus River, mud bottom reef flat, H. Larson, 20 January 1973; CAS 51062, 17(24–45), Guam, mudflat between SE section of Merizo Village and Mamoan Channel, H.A. Fehlmann and party, 12 January 1959. BELAU (PALAU): CAS 74811, 1(46), Koror Island, Madali District, H.A. Fehlmann and party, 7 September 1957; CAS 74813, 2(39), same data as preceding; CAS 74812, 1(48), Ngarbaged Village, Koror Island, mud flat, R. Gaines, 2 September 1956. SOCIETY ISLANDS (FRENCH POLYNESIA): MCZ 13048, 12(54–79), A. Garrett, 1861. KIRIBATI: MCZ 13053, 1(56), Kingsmill Island, A. Garrett, mid-1800s. CENTRAL PACIFIC (LINE ISLANDS): USNM 261525, 105(36–68), Fanning Island, small sand-bottomed inlet, RV *Te Vega* cruise 8, 26 July 1965; MCZ 59759, 1(47), Fanning Atoll, Green Trees estuary, in *Tilapia* area, P.S. Lobel, 27 September 1978. HAWAII: USNM 50698, holotype of *Gobionellus lonchotus*, 75 mm SL female, Honolulu, O.P. Jenkins, 1898, paratypes of *Gobionellus lonchotus*, CAS-SU 23328, 14(51–76), Honolulu, O.P. Jenkins, 1898; MNHN 8912, 2(68–76), Sandwich Islands, Ballieu; MCZ 13314, 3 of 6(78–88), Hawaii, A. Garrett, 1860; AMNH 2351, 4(58–87), U.S. Fish Commission, 1896; FMNH 73647, 1(48), Hawaiian Islands, D.S. Jordan; FMNH 4160–4162, 3(70–79), Hawaiian Islands, US Fish Commission Hawaiian Expedition, 1901; LACM 1035, 1(54), Honolulu, D.S. Jordan, August 1921; AMS I.35908-001, 14(20.5–46.5), Oahu, Kaneohe Bay; BLIP 1951012, 1(58), mouth of small stream, Kaneohe Bay, Oahu, 20 July 1951; BPBM 5521, 1(41.5), Oahu, Mauna Loa stream mouth, G.B. Mainland, 24 May 1938; BPBM 26372, 3(44–57), Molokai, Kaunakakai, over rubble and silty sand, 2 m, R.E. Watson, 28 March 1980; BPBM 15382, 13(23–37), Kaneohe Bay near Nuupia Pond, Oahu, W. Baldwin and party, 14 July 1967; UMMZ 196868, 3(53–62), Maui, outlet of Kealia Pond Reserve, 2.5 km NW of Kihei, R.M. Bailey and E.L. Cooper, 20 September 1974; UMMZ 56760, 1(59), Honolulu market, D.S. Jordan and F. Grinnell, no date; USNM 238953, 1(91), Honolulu, D.S. Jordan and B.W. Evermann, 1901; USNM 226901, 2(22–36), Molokai, silty reef flats on coast near Kaunakakai, 0–0.5 m, R. Watson, 28 March 1980; USNM 260560, 2(83–84), Kuape Pond, near Koko Head E of Oahu, V. Tanada and K. Bonham, 28 April 1945.

Other material examined: GUAM: ex-AMNH 27039, 2; HAWAII: BPBM 4888, 1(54), Palolo stream, Oahu, freshwater, O. Degeuer, 11 January 1927; BPBM 5520, 1(45), Niu stream, Oahu, brackish water, G.B. Mainland, 20 May 1938; MNHN 1975-1058, 1(54), Hawaii, M.L. and R. Bauchot, R. Platel; USNM 51163, 2(42–43), Waikiki Beach, Oahu, Hawaiian Investigations, 1901; USNM 92271, 2(45–51), Pearl and Hermes Reef, P.S. Galtsoff, U.S. Bureau of Fisheries, July–August 1930; USNM 148745, 4(16–25), Kaunakaki Harbor, south coast of Molokai, RV *Albatross*, 8 April 1902; USNM 160711, 4(20–68), W.H. Longley, 6–27 September 1926; USNM 320106, 9(14–19), Kahana estuary, Oahu, A.S. Timbol. INDONESIA: MNHN A.1893, 1(87), Makassar, *Zelée*. JAPAN: AMS I.27368-001, 3(26–32), Udara River, H. Kishimoto, 2 June 1977; AMS I.23500-024, 3(21–24), Nakama River mouth, Iriomote Island, D.F. Hoese, M. Hayashi, K. Meguro and K. Sakamoto, 31 May 1980; AMS I.23498004, 5(24–35), Fukido River, Ishigaki Island, D. Hoese and M. Hayashi, 30 May 1980; BPBM 34512, 4, no locality; CAS 51189, 4(26–37), Okinawa, Ginoza Gawa, about ½ mile from mouth at low tide, R.B. Boomer, 2 August 1953; NTM S.12113-009, 4(19–49), Sakiyama Bay, Iriomote-jima, 1–1.5 m, H. Larson and party, 12 August 1985; NTM S.12732-007, 1(25), Nakama River, Iriomote-jima, H. Senou and Y. Aonuma, 19 August 1985; URM P.8386,

1(41), Nakama River, Iriomote-jima, 9 August 1978; URM P.7652, 5(25–30), Fukidoh River, Ishigaki Island, 30 May 1980; URM P.9031, 1(44), Nakura River, Ishigaki-jima, Okinawa, 10 July 1980; YCM P.4001, 29(24–33), Shiu River, Ishigaki Island, 6 May 1977; YCM P.8872, 1(42). TAIWAN: ASIZP 57578, 3, estuary, Shuangsi, Taipei, S.C. Lee, 29 June 1992. KENYA: NTM S.13965-008, 1(35), Gazi Bay, H. Coene, August 1993. MAURITIUS: USNM 347778, 1(21), E coast, Bois des Amourettes, mouth of stream with mangrove shore, estuary and mangrove swamp, 0–1 m, P.C. Heemstra and party, 24 May 1995. FEDERATED STATES OF MICRONESIA: AMNH 254293, 6(30–47), Pohnpei, Ariou mangroves, Long Island Lagoon, 6°56.114 N, 158°19.271 E, F. Pezold et al., 2007; CAS 233681, 4(26–44), Pohnpei, entrance to Kolonia harbor, mangroves at Pwohmara Resort at end of airport runway, Pezold et al., 2007. USNM 224775, 1(20), Ponape, NE coast, 0–0.75 m, V.G. Springer and party, 4 September 1980.

Description. Based on 180 specimens, 13–103 mm SL. An asterisk indicates the counts of the holotype of *Gobionellus lonchotus*.

First dorsal VI*; second dorsal I, 12*–13; anal I, 13*–14; pectoral rays 17–21, modally 19, 18/19 in holotype; segmented caudal rays 8/8–9/8*; branched caudal rays 6/7–7/7*; lateral scale count 51–97 (modally 62, 82 in holotype); TRB 15–32; nape scaled in 15 of 116 specimens counted, (0*–21) when scales present they occur at the margins with the breadth of the nape unscaled, with fleshy raised crest along nape midline.

Body compressed (less so anteriorly). Head generally deeper than wide, HL 21–30% SL (mean 25%). Depth at posterior preopercular margin 53–79% HL (mean 66%). Width at posterior preopercular margin 38–75% HL (mean 55%). Mouth terminal, slightly oblique, forming an angle of about 35° with body axis; jaws generally reach to vertical through anterior third or midpoint of eye. Upper lip not constricted. Upper jaw 38–61% HL (mean 51%). Eyes lateral, high on head, top forming part of dorsal profile, 20–34% HL (mean 28%). Dark spot on dorsoposterior surface of eye, no tentacle. Snout rounded, 19–40% HL (mean 28%). Interorbital narrow, 1–13% HL (mean 7%). Body depth at anal origin 15–20% SL (mean 18%). Caudal peduncle compressed, length 9–14% SL (mean 11%). Caudal-peduncle depth 7–10% SL (mean 9%).

First dorsal-fin spines moderately elongate with filamentous tips, reaching fourth or fifth second dorsal element when appressed; spines generally slightly longer in males than females; first five spines subequal in males, sixth always shortest; in females spines gradually increasing in size to fourth or fifth spine, except first spine may be greatly elongate in some, first spine or sixth spine shortest. First dorsal-spine length 10–47% SL (mean 20%) in females, 17–33% SL (mean 24%) in males. Second dorsal-spine length 11–28% SL (mean 15%) in females, 16–30% SL (mean 24%) in males. Third dorsal-spine length 13–24% SL (mean 16%) in females, 18–35% SL (mean 25%) in males. Fourth dorsal-spine length 13–25% SL (mean 18%) in females, 17–35% SL (mean 25%) in males. Fifth dorsal spine 13–24% SL (mean 19%) in females, 17–35% SL (mean 24%) in males. Sixth dorsal spine 10–20% SL (mean 15%) in females, 11–23% SL (mean 17%) in males. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when appressed. Pectoral fin oval, central rays longest, 22–31% SL (mean 26%), reaching to vertical through 2nd or 3rd anal-fin element. Pelvic fins rounded to oval, reaching to anal-fin origin in males, reaching to urogenital papilla base or shorter in females, 20–31% SL (mean 25%). Caudal fin elongate, pointed, 32–65% SL (mean 46%).

Anterior naris short tube, placed close to upper lip. Posterior naris oval, placed midway between eye and upper lip. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three triangulate on ceratobranchial, two elongate fused rakers at angle and tripartite fleshy lobe on epibranchial formed from fused modified gill rakers; seven rakers on inner surface of first arch, inner rakers on other arches more numerous and bladelike than first arch inner rakers; 12–14 rudimentary stubby rakers on outer surface of second arch. Tongue tip with rounded margin. Upper jaw with a single row of large canine teeth in most, with second partial row in largest specimens (observed CAS-SU 23328 paratypes, both sexes), about 16–25 teeth each side of symphysis. Lower jaw with band of teeth, innermost and outermost rows most pronounced, innermost row highly recurved, two to three nearest to symphysis on each side much larger than others, outermost row with about 16–18 teeth on each premaxilla.

Opercle, cheek, pectoral base and prepelvic area naked. Nape usually naked. Finely ctenoid scales midlaterally on body behind vertical through second dorsal-fin origin, cycloid scales anteriorly on sides, abdomen, and nape (when scales present).

Sensory papillae pattern shown in Figure 17.

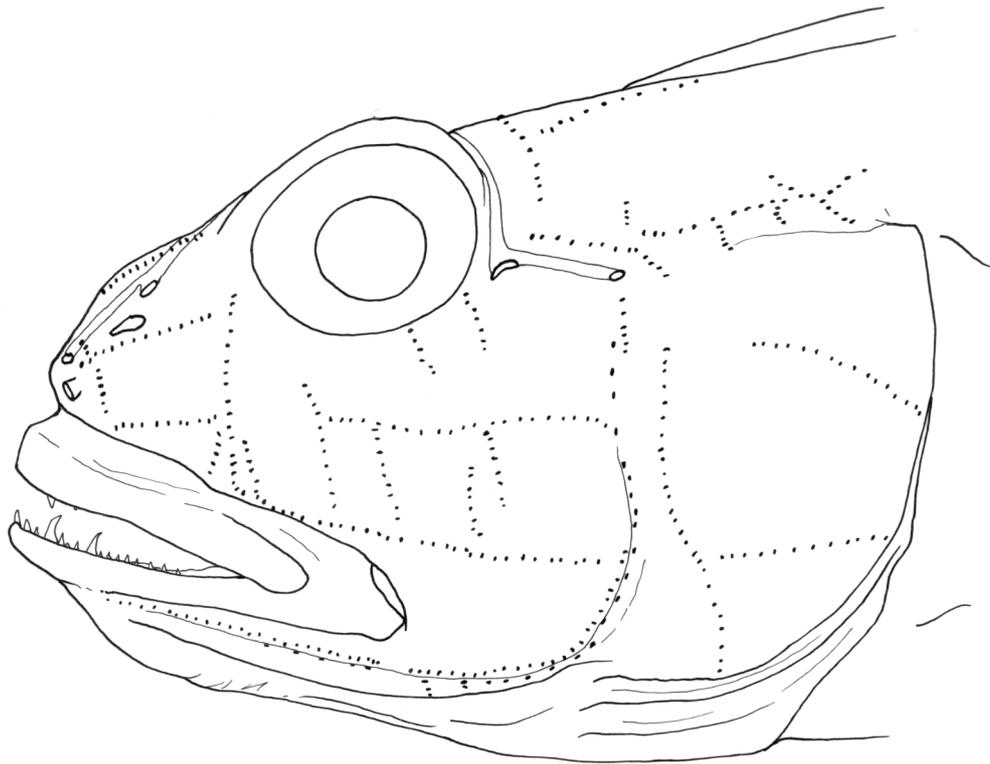


FIGURE 17. *Oxyurichthys lonchotus*, sensory papillae pattern, AMS I.35908-001, 45.2 mm male, Kaneohe Bay, Hawaii.

Coloration of fresh material. Color pattern as in Fig. 18. Live color from slides of captive Hawaiian male and female. Head and body soft dove-grey, becoming fawn ventrally, underside of head, breast and anterior portion of abdomen white. Square blotches on mid-side of body, vertical bars and most markings on head brown to greyish brown. Crescent across nape behind eyes, dark spot on pectoral base, and dark mark from ventral margin of eye black to blackish, contrasting with other head markings. Iris golden-orange with darker rim. Small blackish slender triangular mark above rear margin of the jaws. Posterior gular spot partly visible, black. Small pale blue spot on upper pectoral-fin base, anterodorsal to the large black spot. Small pale blue triangular mark just posterior to dark brown crescent behind eyes; pale blue mark more pronounced in male specimen. Small bluish white line along posteroventral edge of blackish “tear” blotch under eye.



FIGURE 18. *Oxyurichthys lonchotus*, captive specimen from Hawaii. Photograph by Ron Watson.

First dorsal fin with proximal third plain fawn to soft grey, with diffuse curved whitish streak separating unpatterned portion of fin from distal half. Immediately dorsal to whitish streak, three to four greyish brown to brown irregular oblique streaks on whitish to greyish white background; ventralmost streak broadest, blackish posteriorly; distal portions of fin spines brown. Second dorsal fin fawn to soft grey, becoming whitish proximally, with 7–12 oblique greyish-brown to brown stripes, anterior stripes tending to coalesce posteriorly, forming one or

two brown stripes oriented parallel to base of fin; stripes may be broken up into rows of elongate brown streaks or oval spots. Anal fin with proximal third whitish grey with distinctive curved brown “claw” marks at base of each fin element, distal two-thirds of fin dusky to dark grey, fin membranes darker in male; margin of fin narrowly whitish grey (more distinct in male). Caudal fin dove grey to whitish grey with dark grey to blackish rows of spots and bars, these markings becoming brown to yellowish brown as they cross mid-lateral portion of fin. Pectoral fin translucent to faintly dusky. Pelvic fins whitish, becoming dusky to grey dorsally.

In live (captive) specimen from the Yaeyama Islands, and freshly dead specimens from the Comoros and Mauritius, the oblong mid-lateral blotches and vertical bars on the body appear blackish, whereas the dorsal saddles and spots are reddish brown. In the Mauritius specimen, the stripes and rows of spots on the dorsal fins are surrounded by white pigment so that the spots (especially in the first dorsal fin) appear ocellate.

Specimens (UG 5827) observed underwater by the junior author at the mouth of the Geus River, Guam, were noted as having:

Light sandy background, patches on sides red-brown. When undisturbed, two dark brown lines run close to each other along midside of body, enclosing five oblong redbrown blotches. Nostrils and knob on eye black. Pectoral base with black blotch turning dark brown ventrally, and an iridescent blue rounded blotch above it. Markings on head brown, outlined lightly in iridescent blue. Vertical fins are pink with light brown markings. Caudal fin light with pink bar and edges. Pelvics pink and light brown streaked.

Coloration of preserved material. Head and body light yellowish brown, with brown to dark brown or blackish markings (Fig. 19). Interorbital area and head darker than rest of head. Dark brown irregularly shaped broad “tear” blotch extending from ventral edge of eye, usually reaching down to above rear margin of the jaws; often a small dark brown to blackish short streak or triangular blotch just above rear margin of the jaws. Dark brown narrow crescent-shaped mark crossing nape directly behind eyes; smaller oval to irregularly rounded brown blotches regularly spaced along nape, occasionally blotches paired. Opercle with irregular brownish mottling, or one or two oblique dark brown streaks present. Fleshy tissue dorsal to eyeball dusky to brown; distinct round black to blackish (occasionally diffuse) spot on dorsoposterior edge of eye. Distinct black spot or blotch on medial half of anterior narial tube; posterior naris may have narrow dark rim. Crest on nape plain dusky brownish with narrow brown to black edge. Underside of head generally paler, chin and branchiostegal membranes often dusky brown. Two concealed dark brown rounded spots on gular region: anterior spot medial to rear margin of the jaws, concealed by quadrate; posterior spot larger, covering insertion of first two branchiostegal rays. Breast and (usually) lowermost portion of pectoral base lighter than underside of head. Pectoral base with large dark brown oval to comma-shaped spot, skin immediately surrounding dark spot usually pale (one specimen from Kenya with entire pectoral base dark brown with pale oblique line bisecting fin base).

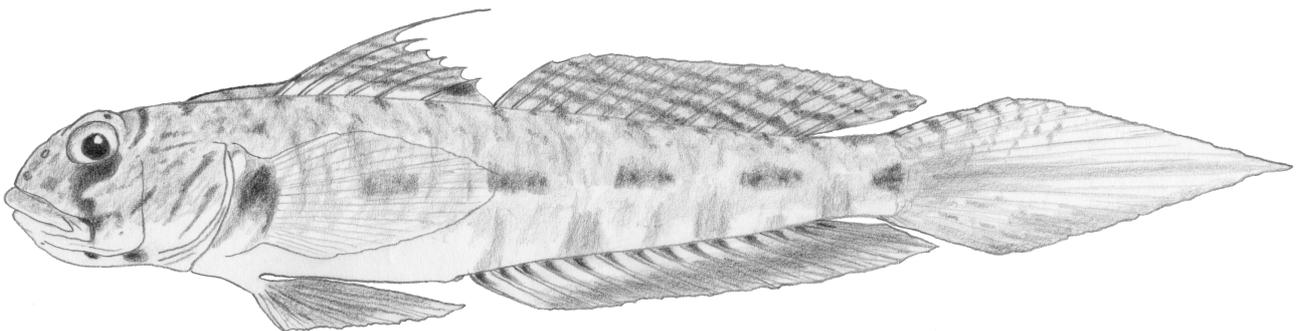


FIGURE 19. *Oxyurichthys lonchotus*, color pattern, based on specimens from Hawaii and Japan.

Side of body with five dark brown blotches along mid-side; anterior four blotches rectangular to square, posteriormost blotch (at caudal-fin base) rounded to triangular. Additional narrow vertical brown lines or fine spots may be present in between lateral blotches. Along dorsal midline, 12–20 paired brown blotches, spots or oblique narrow saddles present. From midline of anal fin may extend 8–10 narrow to broad light broad bars, often diffuse or indistinct; occasionally bars reaching dorsally past mid-lateral blotches to meet dorsal midline saddles and blotches. Sides of abdomen pale; ventral midline black (peritoneum dense black).

First dorsal fin dusky with one to three rows of whitish spots; rows of spots may be short, only present anteriorly and usually on distal half of fin; first dorsal spine may have dark brown marking by base of each whitish spot, giving faintly banded appearance to spine. Second dorsal fin with three to five oblique rows of oval to rounded diffuse brown and whitish spots; spots may coalesce forming reticulate pattern, or fuse forming indistinct rows of brown markings. Anal fin mostly translucent with broad diffuse dusky to dark brown margin; elongate curved (claw-shaped) dark brown streak at base of each fin ray. Caudal fin translucent to dusky, usually darkest toward base and centre line of fin; three or four diffuse dusky spots or lines may be present along dorsal margin of fin, if spots present then dorsal half of caudal fin with five or six diffuse oblique irregular dusky streaks crossing fin. Pectoral fin with plain dusky membranes; bases of rays may be pale if pectoral spot quite dark. Pelvic fins brownish to blackish, color may be darkest medially; frenum and spine paler.

Comparisons. The distinctive dark gular markings observed in this species distinguish it from other *Oxyurichthys* species. *Oxyurichthys lonchotus* may be encountered in parts of its range with several other species of similar size and/or pigmentation. It differs from *O. takagi* in having ctenoid scales on the trunk and a dark black spot on the dorsoposterior surface of the eye. From *O. microlepis* it is distinguished in having ctenoid scales on the trunk, and in lacking dark spots on the dorsal scales. *Oxyurichthys ophthalmoneuma* and *O. cornutus* have a tentacle on the eye and dark spots on their dorsal scales.

Distribution. Western and central Pacific, to Japan and Hawaii, and Mauritius, Reunion and east Africa in the western Indian Ocean.

Ecology. Found in shallow coastal waters, primarily estuaries and river mouths over silt, mud or sand substrates. Recorded from freshwater (BPBM 4888) in Hawaii. The specimens in UG 5827 were observed by the junior author to live in short shallow U-shaped burrows, with an entrance and exit hole. Greenfield & Randall (2004) found *O. lonchotus* together with the alpheid shrimp *Alpheus malabaricus* in Kahana Bay, Oahu, but it is not known that they consistently share burrows.

***Oxyurichthys microlepis* (Bleeker, 1849)**

(Figs 20–22; Tables 2–5)

Gobius microlepis Bleeker, 1849: 35 (Freto Madurae prope Surabaya et Sumanap).—Bleeker 1854b: 436 (Batavia, Surabaya, Java, Sumanap, Madura); Weber 1893: 449 (Java, Madura).

Gobius acutipennis—Cantor 1850: 1166 (Sea of Pinang).

Eucenogobius cristatus Day, 1873: 109 (Bombay, India).—Whitehead & Talwar 1976: 161 (Bombay); Bauchot et al. 1991: 23 (Bombay); Ferraris et al. 2000: 296 (Bombay and Madras).

Apocryptes maculatus Oshima, 1926: 21 (Haiho, China).

Oxyurichthys microlepis—Bleeker 1857: 464; Smith 1945: 525 (Chantabun estuary); Koumans 1953: 40–44 (Singapore, Indonesia, India, Sri Lanka, Malaysia, Thailand, China, Japan, Philippines); Aoyagi 1957: 232–233 (Japan, freshwater); Menon & Devi 1978: 263–266 (Ennore estuary, Madras); Hoese & Winterbottom 1979: 4 (South Africa); Hoda 1980: 470, fig. 2 (Karachi, Pakistan); Suvatti 1981: 203, fig. 124 (Thailand); Geevarghese 1983: 733 (south-west coast of India); Wu & Ni 1986: 280–283; Venkateswarlu 1988: 16–17 (Kakinada Bay, Andhra Pradesh); Kottelat 1989: 19 (Malay Archipelago, SE Thailand and Kampuchea); Talwar & Jhingran 1991: 941 (Indian region); Rema Devi 1993: 176 (Ennore estuary, about 28 km north of Madras); Kottelat et al. 1993: 147 (Sundaland, Sulawesi, lesser Sundas, India, Thailand, Philippines, China, Japan, South Africa); Rainboth 1996: 206 (Mekong delta, ?Cambodia); Monkolprasit et al. 1997: 249 (Chanthaburi, Lem Sing, Si Racha, Thailand); Pezold 1998: 694 (Iran; India; Thailand; Viet Nam; Taiwan; Indonesia; Malaysia; Philippines; New Guinea); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Nakabo 2002: 1259 (Japan); Allen and Adrim 2003: 59 (Flores, Sulawesi, Java); Larson & Lim 2005: 125 (eastern Johor Straits, Singapore); Hoese & Larson 2006: 1669 (Cairns to Murray River, Queensland); Larson et al. 2008: 143 (Johor Straits off Yishun); Kimura et al. 2009: 281 (Andaman Sea).

Oxyurichthys microlepis [*lapsus*]—Geevarghese 1983: 732 (south-west coast of India).

Oxyurichthys macrolepis [*lapsus*]—Bleeker 1884: pl.436, fig. 1.

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip slightly indented but not deeply constricted at premaxillary symphysis; dark spot present on dorsoposterior surface of eye, no ocular cirrus or cornification; anterior nares with dark anteromedial spot; no spots on gular membrane beneath preopercle or anterior process of quadrate; scales of dorsum with individual spots on posterior margin; five round blotches along mid-side of body; nape fully scaled to membranous crest; all scales

including trunk cycloid; prepelvic area scaled; lateral scales 41–58, modally 49; first dorsal-fin spines not elongate, reaching to second to fourth second dorsal-fin element; 20–24 pectoral-fin rays; pelvic fins dusky; first dorsal fin with black spot on membrane behind sixth spine.

Material Examined. PAKISTAN: BMNH 1899.1.24.14, 1(89), Kurrachee, F.W. Townsend. INDIA: Syntype of *Euctenogobius cristatus*, MNHN A.14, 1(94), Bombay, F. Day. Syntype of *Euctenogobius cristatus*, AMS B.8198, 1(90), Bombay, F. Day. Syntypes of *Euctenogobius cristatus*, BMNH 1892.2.1.3398-407, 11(65–90), Bombay, F. Day. RMNH.PISC 1910, 1(85), Sind, F. Day, 1875; ANSP 122436, 3(82–84), Baudia, F. Hallberg, 1924?. USNM 276542, 3(65–70), Ennore estuary, A.G.K. Menon and party, 3 September 1977; ZSI uncat., 3(64–72), Ennore estuary, A.G.K. Menon and party, 3 September 1977. SRI LANKA: RMNH.PISC 13254, 3(55–64), Colombo Harbour, May 1928. BANGLADESH: NTM S.14782-002, 8(22–73), Cox's Bazaar, fish market, T. Roberts, 3–5 June 1996. INDONESIA: RMNH.PISC 6179, probable syntypes of *Gobius microlepis*, 41(35–77), “East Indies”, P. Bleeker, 1847–1860. RMNH.PISC 12104, 6(57–75), Surabaya, F. Buitendijk, August–September 1929; RMNH.PISC 16767, 3(74–80), near Batavia, July 1938; BMNH 1932.6.20.16–17, 2(53–64), Tandjong Priok, Java; RMNH.PISC 1889, 2(75), Java, Kuhl and van Hasselt; RMNH.PISC 12443, 2(44–68), Java; RMNH.PISC 14380, 6(54–74), Java Sea, 1922; RMNH.PISC 12105, 4(67–72), Tandjong Priok, November 1929; RMNH.PISC 12447, 17(46–60), Tandjong Priok, September 1930; RMNH.PISC 17040, 1(72), Tandjoeng Petjinan, Java, November 1938; BPBM 29795, 2(60–62), Lombok, SE side, Tanjung Luar, fish landing, J.E. Randall and F.G. Wörner, 30 January 1984; USNM 346923, 2(70–71), Sandakan Bay, Borneo, RV *Albatross*, 21 March 1908; ZMA 116.670, 1(42), Java; ZMA 116673, 2(61–76). SINGAPORE: MCZ 62339, 1(63), 1° 20'N, 103° 50'E, Capt. Putnam, July 1859; RMNH.PISC 17390, 1(74), fish market, 1934 [tag on fish: Puluh Weh, T. Buitendijk, 1914–1920]. MALAYSIA: FMNH 51800, 2(63–72), Sabah, Sandakan District, Sandakan Fish Market, R.F. Inger, 1950. THAILAND: CAS 51051, 10(52–74), at anchorage in Mae Nam Chantaburi River at Tha Chalaep Harbor, Chantaburi Province, R.R. Harry (Rofen) and party, 24 December 1957; USNM 119620, 2(74–75), SE Chantabun estuary, H.M. Smith, 14 June 1928; USNM 238968, 2(73–74), Songkhla fish landing, T. Roberts, 18–26 June 1970. PHILIPPINES: FMNH 47503, 5(68–80), Luzon, Manila, A.W. Herre, 11 April 1931; BLIP 1981001, 2(58–60), Manila, February 1981; USNM 139398, 15(31–63), Panay, shore above Iloilo River, RV *Albatross*, 2 June 1908; USNM 139399, 2(77–81), Cavite and San Roque markets, RV *Albatross*, 27 June 1908; USNM 160931, 7(52–86), Manila market, RV *Albatross*, 12 March 1908; USNM 160932, 1(61), Manila Harbor, Luzon, RV *Albatross*, 16 March 1908; USNM 265078, 7(38–64), Malolos, Bulacan, N shore Manila Bay, fish trap, Luzon, W. Burgess, February 1982; USNM 372808, 9(39–58), Panay, shore above Iloilo River, RV *Albatross*, 2 June 1908; NTM S.14220-011, 3(69.5–78.5), Luzon, Manila, B. Russell, 1 October 1995; UMMML 14353, 4(70–77); UMMZ 100268, 4 of 5(65–74) Manila, A.W. Herre, 11 April 1931. PAPUA NEW GUINEA: USNM 260522, 21(26–75), Daru, west side of Daru wharf and creek mouth, 0–10 m, T. Roberts, 10 October 1975; USNM 260943, 2(25–26), east side Daru wharf, 0–10 m, T. Roberts, 10 October 1975. AUSTRALIA, QUEENSLAND: AMS I.22040-010, 4(20.5–76.5), Cairns, Kewarra Beach, mangrove creek, 0–1 m, D.F. Hoese and H.K. Larson, 11 September 1980; ex AMS IB.8288, 1(90), Townsville, Ross River, G. Coates, 1966.

Other material examined. PERSIAN GULF: ZMK CN.1, 1(42), Station 99, E of Jask, 11m, H. Blegvad, 30 March 1938. PAKISTAN: AMS I.21217003, 1(61), S. Hoda. INDIA: BPBM 27610,1(53), Vizhinjam fishing harbor, seine, local fishermen via J.E. Randall, 8 February 1980; CAS-SU 40073, 5(26–52), Bay of Bengal, Vishakhapatnam, Andhra Pradesh State, A.W. Herre, 24 December 1940; USNM 238956, 1(69), Ennore Creek, Madras State, from fishermen, 0–1.3 m, 14 September 1966; USNM 238964, 1(25), Porto Novo, Madras State, US Bureau Commercial Fisheries, 10 January 1966. THAILAND: CAS 51190, 35(50–90), Songkhla Fish Market, from Songkhla Channel (=Roads) next to city, murky, brackish water, Swarnng, H.A. Fehlmann, Harry (Rofen), 2 November 1957; NCSM 44873, 1(20), mouth of Mae Nam Kra Buri estuary just W of Ranong, 0.5 m, W.C. Starnes and party, 6 March 2001. MALAYSIA: USNM 139401, 6(49–66), Sandakan Bay, RV *Albatross*, 24 March 1908; USNM 160922, 4(68–79), Sandakan Bay, Sabah, RV *Albatross*, 2 March 1908; ZMK CN.1, 1(89), Malacca Peninsula, M. Jensen, 1901. SINGAPORE: CAS-SU 39484, 1(74), Singapore, Siglap, A.W. Herre, 19 October 1940. INDONESIA: AMNH 17517, 8(52–68), Java/Sumatra, J.D.F. Hardenberg, 1941; CSIRO unregistered, 1, Banyuwangi, east Java, 8° 09'S, 114° 23'E, W. White, 27 October 2008; CSIRO unregistered, 1, Banyuwangi, east Java, 8° 09'S, 114° 23'E, W. White, 27 February 2009. VIET NAM: ZMK P781388, 1(49), Nhatrang fishmarket, J. Knudsen, 1 December 1957. PHILIPPINES: AMS I.23878-001, 8(35–57), Cabao Market, Manila, E. Murdy, 9 April 1979; CAS-SU 20249, 1(64), Sulu Sea, Cagayancillo, CagayanIsland, Palawan Province, R.C. McGregor; ex

CAS-SU 26340, 10(66–75), Manila Bay, Manila, Luzon, A.W. Herre, 11 April 1931; CAS-SU 26335, 1(77), Cebu, Cebu Province, A.W. Herre, 27 August 1931; CAS-SU 26333, 2(57–60), Corimao, Ilocos Norte Province, A.W. Herre, 1931; CAS-SU 38583, 1(68), Luzon, Manila Bay, 7 June 1940; USNM 99831, 1(78), Cavite market, Manila Bay, Luzon, RV *Albatross*, 14 June 1908; USNM 99873, 1(76), Sorsogon market, southern Luzon, RV *Albatross*, 12 March 1909; USNM 135701, 1(72), Manila, Lt. H.C. Kellers, 24 February 1929; USNM 135703, 1(34), shore above Iloilo River, Lt. H.C. Kellers, 2 June 1908; USNM 139358, 5(47–70), Manila market, Luzon, RV *Albatross*, 14 April 1909; USNM 139390, 1(63), Iloilo market, Panay, RV *Albatross*, 1 June 1908; USNM 139704, 1(63), Manila?, RV *Albatross*, 12 March 1908; USNM 130799, 1(95), no data; USNM 160743, 6(42–58), Manila market, RV *Albatross*, 12–18 December 1907; USNM 160745, 1(62), Iloilo, shore seine, RV *Albatross*, 2 June 1908; USNM 160746, 3(49–61), Luzon, Manila Market, RV *Albatross*, 12–18 December 1907; USNM 160925, 1(60), Cebu market, N Mindanao, RV *Albatross*, 20 March 1909; USNM 160928, 21(34–58), Manila market, Luzon, RV *Albatross*, 11 July 1908; USNM 160929, 13(53–92), Manila market, Luzon, RV *Albatross*, 11 June 1908; USNM 160930, 1(70), Manila market, Luzon, RV *Albatross*, 11 June 1908; USNM 372807, 1(67), Bacoor Beach, Manila Bay, Luzon, RV *Albatross*, 15 June 1908. TAIWAN: USNM 381131, 1(69), estuary, mud, Yen Shui stream west of Tainan City, W. Chen and L. Parenti, 22–23 March 1999. AUSTRALIA: AMS I.22037-033, 4(16–71), Kewarra Beach mangrove, N of Cairns, Queensland, D. Hoese and H. Larson, 9 August 1980; AMS I.22722-028, 1(57), Daintree River mouth, Queensland, G. Hardy and A. Ayling, 26 June 1981; AMS I.23261-018, 1(26), Kewarra Beach, 100 m from mouth inside Taylor Point, Queensland, D. Hoese and D. Rennis, 30 August 1982; QM I.10992, 1(69), Trinity Bay, Cairns, Queensland, H. Fleeter; AMS I. 12737-001, 1(27), Murray River, N Queensland, A. Robertson, 6 August 1987.

Description. Based on 179 specimens, 25–94 mm SL. An asterisk indicates the counts of 67 mm SL syntype of *Gobius microlepis*.

First dorsal VI; second dorsal I,11–13 (12*); anal I,12–13*; pectoral rays 20–24 (23*); segmented caudal rays 7/7–9/8; branched caudal rays 6/7–9/8; lateral scale count 41*–58 (modally 49); TRB 13–21 (17*); predorsal scale count 0 (observed in two juveniles, 25 and 26 mm SL)–25 (23*) (modally 18).

Body compressed. Head deeper than wide, HL 20%–36% SL (mean 23%). Depth at posterior preopercular margin 57–78% HL (mean 67%). Head width at posterior preopercular margin 46–77% HL (mean 63%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through anterior third or midpoint of orbit; upper jaw 35–56% HL (mean 51%). Eyes lateral, high on head, top forming part of dorsal profile, 20–35% HL (mean 26%). Dark spot on dorsoposterior eye, no cirrus or cornification. Snout rounded, 17–37% HL (mean 28%). Interorbital narrow, 6–16% HL (mean 11%). Body depth at anal origin 13–20% SL (mean 17%). Caudal peduncle compressed, length 9–14% SL (mean 11%). Caudal-peduncle depth 8–12% SL (mean 10%).

First dorsal-fin spines usually not greatly elongate in either sex, appressed first dorsal fin usually reaching base of second to fourth second dorsal-fin element. First spine often longest in females, gradually decreasing in size through fifth spine, sixth spine about half length of first spine. First spine in females usually as long, but sometimes longer than head. In males first spine generally shorter than next four spines, longer than but not twice the length of sixth spine. First dorsal-spine length 15–42% SL (mean 24%) in females, 14–29% SL (mean 19%) in males. Second dorsal-spine length 15–26% SL (mean 21%) in females, 16–32% SL (mean 22%) in males. Third dorsal-spine length 16–27% SL (mean 20%) in females, 19–33% SL (mean 23%) in males. Fourth dorsal-spine length 16–25% SL (mean 20%) in females, 17–32% SL (mean 23%) in males. Fifth dorsal-spine length 13–23% (mean 18%) in females, 16–28% SL (mean 22%) in males. Sixth spine length 9–13% SL (mean 12%) in females, 10–23% SL (mean 14%) in males. Second dorsal-fin rays moderately long, from about equal to head depth anteriorly to greater than head depth posteriorly, anal fin lower, posteriormost rays in both longest, reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anus and second anal-fin element, 19–29 % SL (mean 25%). Pelvic fins rounded to oval, short, not reaching anus, 17–26% SL (mean 22%). Specimens from New Guinea have longer pelvic fins than those to the west, most notable in females. Caudal fin elongate, pointed, 34–71% SL (mean 47%).

Anterior naris at end of short tube, placed close to upper lip. Posterior naris an oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three or four triangulate on lower ceratobranchial, two fused rakers with third smaller process at angle and a fleshy multipartite lobe derived from gill rakers on the epibranchial; rakers on outer face of second arch about 14

reduced stubs; nine rakers on inner surface of first arch; inner rakers on other arches more numerous and bladelike than first arch inner rakers. Tongue tip rounded. Upper lip not constricted at premaxillary symphysis, may be slightly indented, but always greater than half the greatest lip width. Upper jaw teeth in single row, about 16–22 on each side of symphysis; gap at symphysis not pronounced, not approaching width of bony interorbital. Lower jaw teeth in band with inner and outermost rows pronounced, about 30 in outer row each side of mandibular symphysis, innermost row with about six to nine strong recurved canine teeth on each mandible, largest near symphysis. Strong canine teeth in upper jaw, about twice size of lower jaw teeth in outer row.

Nape fully scaled to membranous crest (or appearing as naked median if crest is fallen in old specimens), scales reaching forward to above preopercle. Opercle and cheek naked. Pectoral-fin base usually naked, sometimes with a few scales. Prepelvic area covered with 8–14 (usually 9 or 10) rows of small scales. Abdomen scaled. All scales, including trunk, cycloid.

Sensory papillae pattern illustrated in Figure 20.

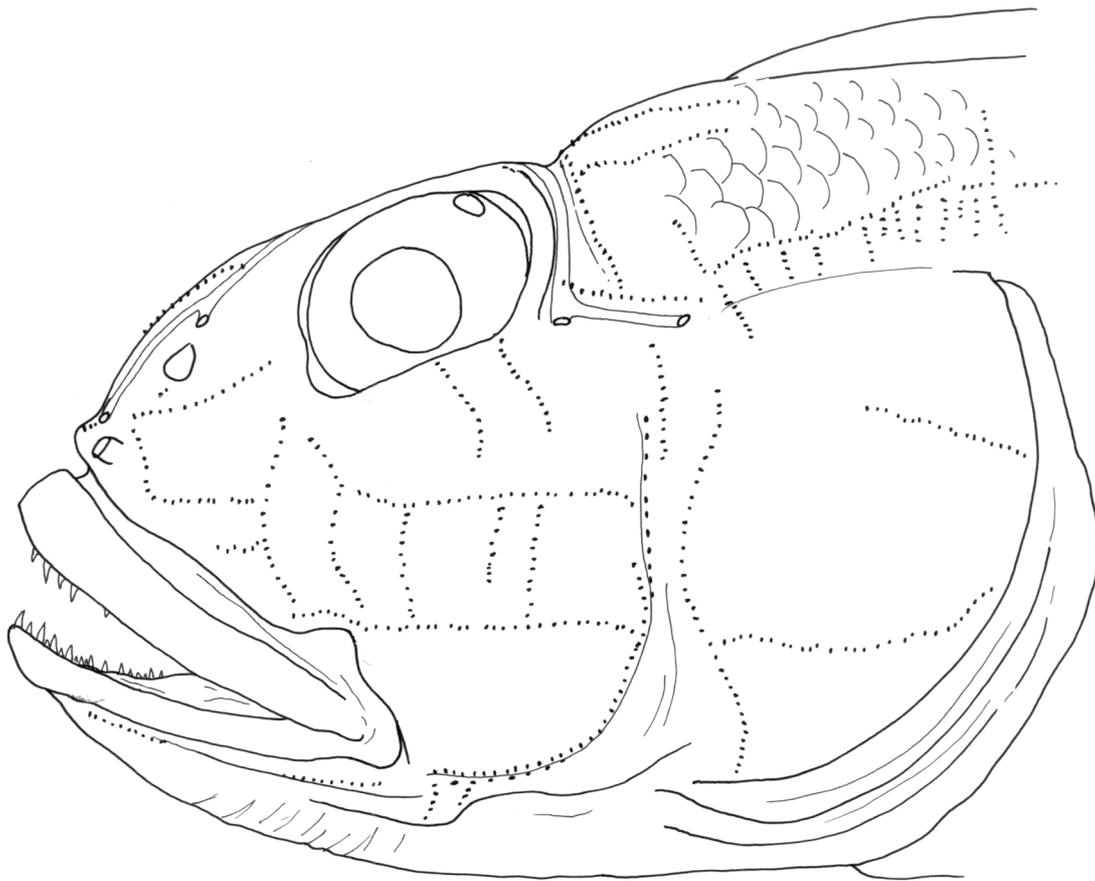


FIGURE 20. *Oxyurichthys microlepis*, sensory papillae pattern, RMNH.PISC 12104-05, 75 mm male, Surabaya, Indonesia.

Coloration of fresh material. From slide of freshly dead specimen from Kewarra Beach, Queensland. Color pattern as in Figure 21. Head and ventral half of body soft dove grey. Nape and dorsal half of body yellowish grey, scale margins narrowly outlined in black, spots on scales black. Lateral blotches, spots and oblique bars diffuse grey, mid-dorsal saddles brownish (darkest saddle on caudal peduncle); posteriormost mid-lateral blotch with dark central triangular spot. Snout dark grey. Iris golden orange, dark brown spot above and below iris. Dark brown “tear” blotch below eye, with two opalescent whitish spots along rear margin of blotch. Opercle dull iridescent greenish grey; iridescent light greenish line running along posteroventral margin. Underside of head and breast whitish grey; branchiostegal rays edged in white. Pectoral base with greyish brown curved blotch enclosing paler grey central oblique mark dark brown crescent covering bases of fin rays.

First dorsal fin slightly pinkish grey with black spots and streaks. Second dorsal fin similar, becoming paler posteriorly. Caudal fin dark pinkish grey on ventral half, whitish grey dorsally, with blackish streaks and spots. Anal fin dark dusky grey, with broad opalescent whitish margin. Pectoral fin dusky grey with narrow white margin

posteriorly, few indistinct rows of dusky spots near ray bases toward centre of fin. Pelvic fins soft dusky grey with bright white spine, posterior edge of fin white.



FIGURE. 21. *Oxyurichthys microlepis*, freshly dead specimen from Kewarra Beach, Queensland. Photograph by Doug Hoese.

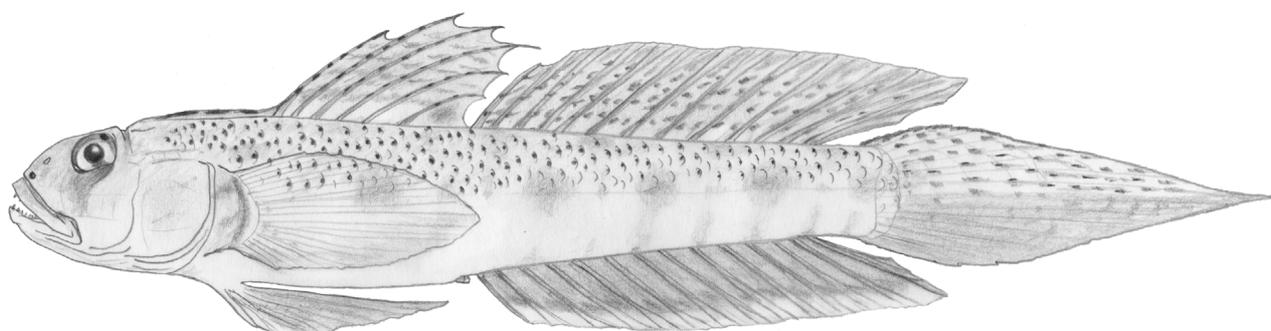


FIGURE. 22. *Oxyurichthys microlepis*, color pattern, based on specimens from Philippines, Indonesia and Queensland.

Coloration of preserved material. Head and body pale yellowish to light brownish; scales of dorsal half of body narrowly outlined with dark brown to blackish, with small dark brown to black spot on posterior part of each scale, spots becoming smaller toward caudal peduncle (Fig. 22). Five diffuse rounded brownish blotches, placed mostly above lateral midline, first blotch below sixth dorsal spine and fifth on caudal-fin base, with one or two small brownish spots interspersed along midline. In some specimens, up to seven indistinct oblique brownish bars extend to ventral midline from mid-lateral blotches, more pronounced on posterior half of body. Dorsal midline with variably developed brownish blotches which may form irregular saddles or short oblique bars (in two specimens from the Ennore Estuary, Madras, seven distinct oblique dorsal bars present, with the five mid-lateral blotches almost indistinguishable). Crest on nape with dark brown to black margin, or with one to three dark brown to black blotches. Interorbital and snout greyish brown, side of head dusky, with only distinguishing mark being dark brown irregularly shaped “tear” blotch along ventral edge of eye, mark with sharply defined posterior margin and diffuse anteroventrally, not quite reaching to jaw. Distinct round black spot on dorsoposterior part of eye. Anterior narial tube with dense black spot medially; in some specimens, most of tube black. Lips and underside of head dusky, chin usually darker. Breast and belly pale, black peritoneum usually showing through abdominal wall on belly midline. Pectoral base dusky or with one or two diffuse brownish bars on either side of paler central blotch; narrow dusky to dark brown crescent-shaped mark covering bases of fin rays; slightly wider whitish crescent immediately posterior to dark brown crescent.

First dorsal fin translucent to dusky, with usually pale (occasionally dusky) area on proximal quarter of fin, blackish spot on membrane behind sixth spine, and four to six irregular rows of brownish to black elongate spots and streaks crossing fin, tips of spines blackish. Second dorsal fin translucent to light dusky with about six or seven irregular rows of brown to black elongate spots and streaks (streak becoming more pronounced posteriorly); rows running parallel to dorsum or somewhat obliquely; spots along distal edge of fin diffuse and streaky. Caudal fin with translucent to dusky dorsal half and dusky to grey ventral half; dorsal half of fin with rows of elongate blackish spots and anterodorsal fin margin blackish; brownish blotch on scaly sheath across fin ray bases. Pectoral

fin translucent to dusky, darker posteriorly and toward bases of rays; some specimens with indistinct dark mottling on membranes near fin base. Pelvic fins dusky to dark grey, frenum usually paler.

Comparisons. Most similar in color to *O. cornutus* in having small dark spots on the posterior margin of scales of the dorsum, but differing in having a black spot on the dorsoposterior eye instead of a cirrus. The dorsal spines are not elongate as those in *O. cornutus*. *Oxyurichthys ophthalmonema* has a cirrus on the eye, few or no spotted scales on the dorsum, and a prominent saddle mark on top of the caudal peduncle.

Oxyurichthys microlepis may be distinguished from all other species except for *O. takagi* and *O. zeta* in having all cycloid scales. *Oxyurichthys takagi* and *O. zeta* do not have individually spotted scales on the dorsum and do not have a black spot on the dorsoposterior surface of the eye. *Oxyurichthys zeta* has a large black spot on the posterior basal field of the first dorsal fin and small scales numbering 100–112 in a lateral series. *Oxyurichthys takagi* also has 51–70 lateral scale rows, modally 57, and a naked nape and prepelvic region.

Distribution. Persian Gulf. Pakistan, India, Sri Lanka, Bangladesh, Thailand, Malaysia, Singapore, Viet Nam, Indonesia, Philippines, Papua New Guinea, Queensland, Australia.

Ecology. An estuarine species taken in bays and mangroves. Day (1873) records that in Bombay, the species was "... breeding in March".

Remarks. Possible syntypes of *Gobius microlepis* Bleeker are included in RMNH.PISC 6197, 41(35–77). The whereabouts of Oshima's type specimens of *Apocryptes maculatus* are not known (K. Matsuura pers. comm.). Cantor's (1850) record of *Gobius acutipennis* may be of *O. microlepis*, not an *Oligolepis*, based on fin ray counts, color pattern information and his description of a single row of teeth in both jaws. Figure 244 in Wu and Zhong (2008) does not resemble *O. microlepis* and the synonymy they present may apply to more than one species.

***Oxyurichthys notonema* (Weber, 1909)**

(Figs 23–25; Tables 2–5)

Gobius (Oxyurichthys) notonema Weber, 1909: 154 (Menado, off Indonesia, (2° 28' S 131° 03.3' E).—Nijssen *et al.* 1993: 233 (type catalogue).

Parapocryptes (Paenapocryptes) mindanensis Herre, 1927: 262, pl. 20, fig. 4 (south coast of Cotabato Province, Mindanao, Philippines).

Gobiichthys lemayi Smith, 1947: 811 (Delagoa Bay, Mozambique).—Smith 1949: 331 pl. 69, fig. 913 (Delagoa Bay).

Oxyurichthys papuensis—Koumans 1935: 128 (in part); Koumans 1953:48 (in part).

Oxyurichthys lemayi—Smith 1959: 204 (pl. 12J); Hoese & Winterbottom 1979: 4 (South Africa).

Oxyurichthys mindanensis—Masuda & Kobayashi 1994: 345, fig. 5; Suzuki *et al.* 2000a: 2–3, figs 1–3 (Ryukyu Islands); Senou *et al.* 2004: 190 (Japan).

Oxyurichthys notonema—Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (Timor, Bali, Lombok); Randall 2005: 544 (Mozambique, Sulawesi, Philippines, Japan, Tahiti); Allen & Erdmann 2012: 984 (Bali, Sulawesi, Flores and West Papua).

?*Oxyurichthys* sp.—Nogawa *et al.* 2003: 42 (Tosa Bay).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted; no tentacle, callus, knob or spot posterodorsally on eye; anterior nares without dark anteromedial spot; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; trunk with four large rounded to elongate blotches along mid-side of body, and small round to triangular blotch on caudal-fin base, in some specimens, diffuse small brownish blotches visible, forming irregular rows ventral to, or interspersed with, mid-lateral blotches; two irregular rows of spots on either side of dorsal midline, commencing on nape above opercle, upper row running along bases of fin rays, spots more distinct anteriorly; nape naked or scaled with naked median and low membranous crest; scales ctenoid on most of trunk becoming cycloid anterior to second dorsal-fin origin; prepelvic area without scales; lateral scales 66–80, modally 73; first dorsal-fin spines elongate, appressed fin reaching posterior to fifth second dorsal-fin element or beyond; 20–23 pectoral-fin rays; pelvic fins dusky, with bars or mottled; dark blotch on first dorsal fin behind or on both sides of sixth spine.

Material Examined. MOZAMBIQUE: Syntypes of *Gobiichthys lemayi*, SAIAB 77, 2(112–127), Machangalo Flats, Delagoa Bay, 1946. INDONESIA: ZMA 112.905, holotype of *Gobius (Oxyurichthys) notonema*, 76 mm SL female, Menado anchorage, shore exploration, *Siboga* Expedition station 121, 55 m, M. Weber, 14 and 16 July

1899. RMNH.PISC 21026, 1(30), near Koepang [Timor], 2 December 1929; RMNH.PISC 13195, 1(82), Sabang Baai, P. Buitendyk, 1923; BPBM 29770, 1(74), Lombok, Teluk Sira, beach seine, J.E. Randall and F.G. Wörner, 28 January 1984; BPBM 34188, 4(26–43), Moluccas, Ambon Bay, entrance on NW side near Cape Batu Badiri, silty sand and mud, 17–20 m, spear, J.E. Randall, 26 September 1988; ex-BPBM 29796, 1(60.5), Lombok, SE side, J.E. Randall and F.G. Wörner, 30 January 1984. PHILIPPINES: CAS 29380, 1(46), Mindanao Island, Agusan Province off Buena Vista, F.B. Steiner, 14 April 1973; USNM 388005, 2(51–59), Cebu market, Cebu, *Albatross*, 20 and 22 March 1909. JAPAN: BSKU 7612, 1(57), Susaki, 15 August 1950; BLIP 1996173, 1(69), Amitori Bay, Iriomote-jima, 1996. PAPUA NEW GUINEA: BPBM 32497, 1(29) Madang Province, Pig Island (Tab Island), silty sand next to coral patch, 23 m, J.E. Randall and P. L. Colin, 2 November 1987. FRENCH POLYNESIA: BPBM 8290, 3(55–81), Tahiti, Atimaona, Papara, 40–50 ft, directly off lab on silty sand bottom, lives in diagonal burrows with large opening, chemfish, J.E. Randall, 8 March 1969.

Description. Based on 15 specimens, 26–109 mm SL. An asterisk indicates the counts of the holotype of *Gobius notonema*.

First dorsal VI*; second dorsal I, 12*; anal I, 13*; pectoral rays 20–23 (21 mode, 21*); segmented caudal rays 9/8*; branched caudal rays 7/7–8/7*; unsegmented (procurrent) caudal rays 4/7–6/7*; lateral scale count 66–80 (modally 73, 74*); TRB 17–24* (22 mode); TRF 22–27 (mode 22); predorsal scale count 0–21 (mode 0, 2*).

Body compressed, head length moderate, 21–28% SL (mean 24%). Head deeper than wide, depth at posterior preopercular margin 54–69% HL (mean 62%), width at posterior preopercular margin 36–58% HL (mean 48%). Mouth terminal, slightly oblique, forming an angle of about 30–35° with body axis; lower jaw slightly prominent, jaws reach to vertical beneath rear margin of orbit. Upper lip not constricted. Upper jaw 52–64% HL (mean 59%). Eyes lateral, high on head, top forming part of dorsal profile, 24–30% HL (mean 26%). No spot, tentacle, teat-like callus or fleshy knob posterodorsally on eye. Snout rounded, 23–31% HL (mean 27%). Interorbital narrow, 4–13% HL (mean 8%). Body depth at anal origin 13–17% SL (mean 15%). Caudal peduncle compressed, slightly longer than deep, length 8–12% SL (mean 11%). Caudal-peduncle depth 8–10% SL (mean 9%).

First dorsal-fin spines with free tips, first four with long filamentous spines in both sexes; longest spines reach to fifth to ninth element of second dorsal fin when appressed. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when appressed. Pectoral fin oval, central rays longest, 20–29% SL (mean 23%), extending to about anal-fin origin. Pelvic fins rounded to oval, reaching to anus or urogenital papilla, 18–27% SL (mean 23%). Caudal fin elongate, pointed, 33–49% SL (mean 40%).

Anterior naris at end of short tube at margin of upper lip. Posterior naris an oval pit midway between eye and upper jaw. Gill opening extends forward to under opercle. Gill rakers on outer face of first arch: three triangulate on lower ceratobranchial, two fused finger-like rakers at angle and a fleshy lobe with two or three processes derived from gill rakers on the epibranchial; about 9–14 rudimentary rakers on outer face of second arch, six to eight rakers on inner face of first arch; inner rakers on other arches more numerous and elongate than first arch inner rakers. Tongue rounded. Upper jaw with single row of 13–19 large canine teeth each side of premaxillary symphysis, separated by large gap at symphysis in most about equal in width to bony interorbital width. Lower jaw with narrow band of two rows of small teeth, with six to nine strongly recurved canines in inner row each side of dentary symphysis.

Nape naked or variably scaled with naked median along low fleshy crest. Opercle, cheek, pectoral-fin base and prepelvic region naked. Most specimens with ctenoid scales on side of body, becoming cycloid anterior to second dorsal-fin origin; cycloid scales on nape, abdomen and prepelvic region. Juvenile specimens with all cycloid scales.

Sensory papillae pattern illustrated in Fig. 23.

Coloration of fresh material. Based on color slides of living fish from Sulawesi, Bali and Flores (Indonesia), and color print of freshly dead fish from Iriomote-jima, Japan (Fig. 24). Color pattern as for preserved specimens. Dorsum and snout greyish blue, rest of head and body pale yellowish white; four dark brown oval mid-lateral blotches with two or three short vertical orange lines within each blotch; mid-lateral markings partly bordered above and below with blue-grey margined orange irregular lines and blotches; blue-grey margined bluish white streaks and blotches on midline between oval brown blotches. Posteriormost small blotch on caudal peduncle blackish, with pinkish orange area immediately posterior to it. Two irregular rows of brown to dark brown small blotchy spots, often elongate, on dorsum, commencing on nape; spot directly above pectoral base may be elongate and darker than other spots and blotches. Nape with bright orange line on crest (crest in this species is low, so probably entire crest orange), and several orange to bright pale blue scattered spots on nape immediately behind

eye. Eye pale gold to red-gold with bright orange spot dorsoposteriorly. Snout dusky greyish blue, with scattered orange and bright pale blue spots and short streaks. Dark brown rectangular blotch along ventral margin of eye, bordered ventrally by pale blue streak. Side of head with scattered blue spots and short streaks; opercle pinkish brown to greyish pink; brownish broken streak crossing opercle, with orange-bordered brown triangular spot in centre. Upper lip greyish, skin posterior to protruded lip (concealed when jaws closed) dusky orange with blue streaks and spots extending onto snout. Pectoral base with black irregularly shaped blotch in centre, bordered with orange, with bright blue blotch on dorsal edge of fin base. Lower part of head and side of abdomen whitish.

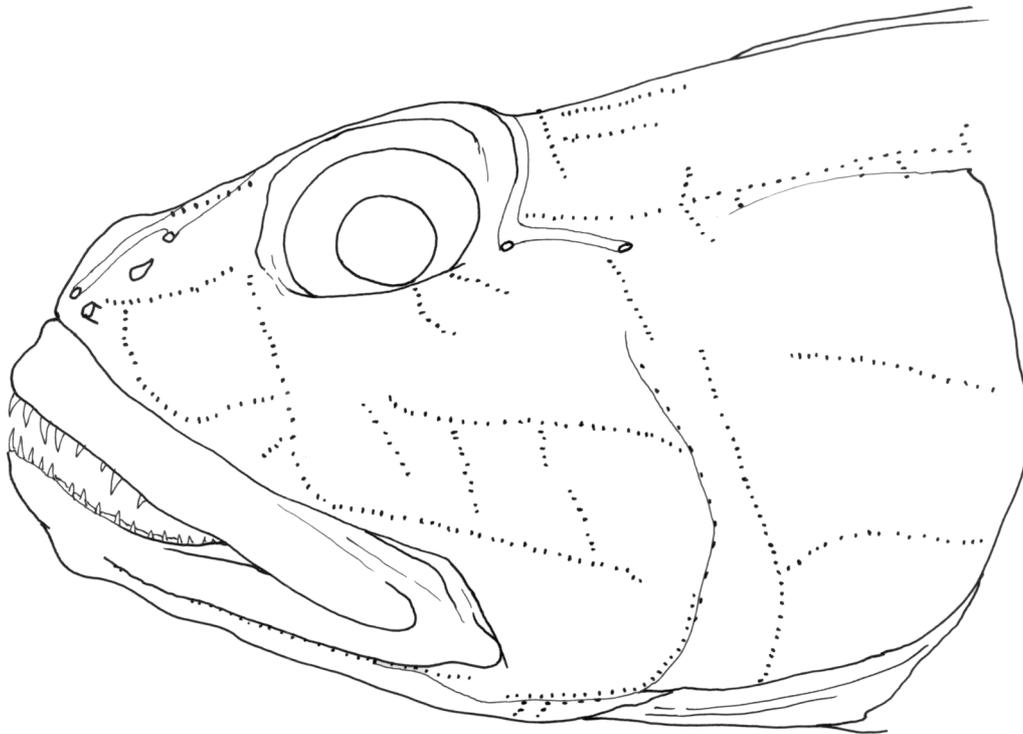


FIGURE 23. *Oxyurichthys notonema*, sensory papillae pattern, BPBM 29770, 75 mm male, Lombok, Indonesia.

First dorsal fin translucent bluish grey, with about five to eight wavy blue-bordered bright orange to reddish orange stripes and short wavy streaks crossing fin; orange most intense on first spine, giving spotted appearance; membrane around, and posterior to, sixth spine, blackish. Second dorsal fin (only partly visible in one photo) translucent bluish grey, with about four rows of bright orange to reddish orange spots and streaks. Caudal fin (folded in all photos) bluish grey with diffuse blackish brown triangular blotch over scaly sheath on fin base, indistinct orange and blackish streaks, and ventral margin bright light blue; specimen from Tahiti with orange spots on upper half and orange lines following fin rays. Anal fin greyish blue proximally, with diffuse orange blotch by base of each ray; broad submarginal blackish stripe, narrow anteriorly and widening posteriorly; fin margin bright whitish blue. Pectoral fin translucent. Pelvic fins whitish near first one or two fin elements, rest of fin translucent to opaque orange to honey brown, with several bright blue streaks laterally along fin rays and at least three oval blue blotches or streaks crossing fin membrane on posterior half of fin.

A freshly dead specimen from Lombok (color slide of BPBM 29770) has the head and body mostly orange, with bright blue to whitish blue irregular streaks surrounding large brownish mid-lateral blotches; underside of head and breast bright white. Two rows of orange-bordered brown dorsal spots visible. Small mid-lateral caudal brown blotch separated from brownish blotch on caudal scale sheath by short white vertical bar. Most of pectoral-fin base brownish orange, with bluish white irregular streaks crossing just below centre of base. Side of head orange to dusky brownish, with scattered dark-bordered blue spots and streaks. Fins similar to those in living specimen. Blackish spot in first dorsal fin not visible in (rather dark) slide (but present in preserved specimen). Caudal fin with submarginal whitish blue-bordered black streak ventrally, and about four irregular rows of orange streaks and blotches interspersed with bluish white short streaks. Pelvic fin dorsal surface dull orange, with dark-margined bluish white curved lines, blotches and short streaks crossing fin.



FIGURE 24. *Oxyurichthys notonema*, Secret Bay, Gilimanuk, Bali. Photograph by the late Tono Tonozuka.

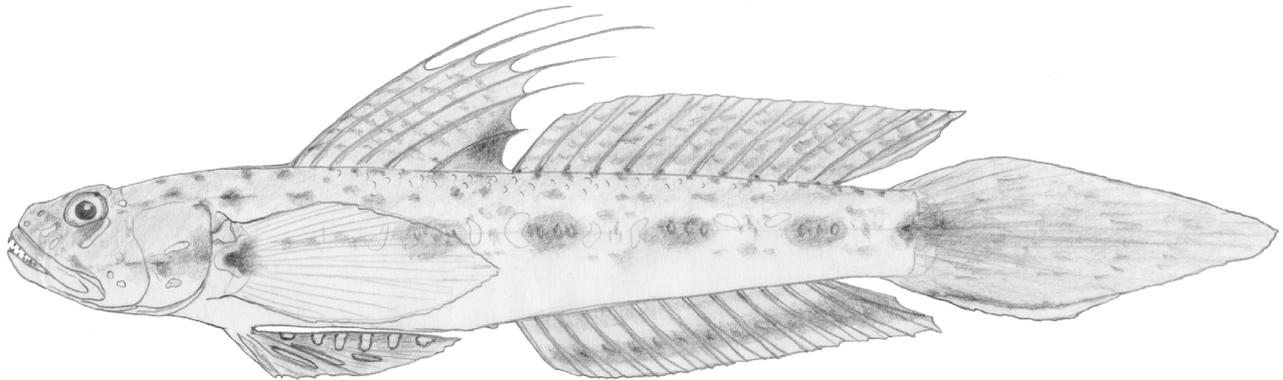


FIGURE 25. *Oxyurichthys notonema*, color pattern, based on specimens from Tahiti, Kenya and Philippines.

Coloration of preserved material. Head and body light yellowish to yellowish brown, several rows of scales below dorsal fins with margins narrowly outlined with brown (Fig. 25). Two somewhat irregular rows of rounded brownish spots on either side of dorsal midline, commencing on nape above opercle; upper row running along bases of fin rays; spots more distinct anteriorly. Four relatively large oval brownish rounded to elongate blotches along mid-side of body, and small round to triangular brown blotch on caudal-fin base; in some specimens, diffuse small brownish blotches visible, forming irregular rows ventral to, or interspersed with, mid-lateral blotches. Opercle with diffuse broad horizontal streak crossing centre; may be slightly oblique, broken-up, or indiscernible. Rectangular to irregular diffuse brownish blotch along ventral margin of eye, not reaching down to jaw; occasionally with opalescent whitish streak along ventral edge of blotch. In some specimens, small diffuse elongate to rounded brownish blotch on cheek, above rear margin of the jaws, at same level as opercular streak. Anterior narial tube usually pale, occasionally brownish; in two recently collected specimens, narial tube white, base of tube with indistinct dusky blotch. Lips, underside of head, breast and belly whitish yellow to white. Pectoral base with diffuse brownish blotch or broad horizontal diffuse brownish streak across centre (confluent with streak across opercle).

First dorsal fin dusky to translucent with about six faint irregular to vermiculate streaks crossing fin; streaks may be more distinct posteriorly, or broken up; brown to blackish blotch or slightly darker area on fin posteriorly. Second dorsal fin translucent dusky to faintly mottled with brownish. Caudal fin translucent to dusky brownish, with rounded to oval brownish blotch on scale sheath on ray bases; fin usually darker posteriorly and/or along ventral margin. Anal fin translucent dusky to brownish, with darker margin, or margin opalescent white with submarginal dark brown stripe; one specimen with proximal quarter of fin mostly transparent, remainder of fin dusky brownish with submarginal row of dense dark brown short horizontal streaks. Pectoral fin translucent to dusky brownish. Pelvic fins with whitish frenum and spine, fin membrane whitish to dusky brown with five to seven broad brown to blackish wavy or blotchy bars crossing fin; bars darkest medially, may become diffuse and streaky laterally; anteriormost one or two bars may be broken into series of ocellated blotches.

Comparisons. See *O. limophilus* and *O. papuensis*.

Distribution. Mozambique; Cebu, Philippines; Manado, Lombok, Indonesia; Tahiti.

Ecology. Found over silty sand or sands to at least 23 m depth. Living specimens were photographed on dark (volcanic?) fine silty sand substrate. Several photos available to us show individuals of this species associated with a burrow (e.g. Fig. 24); it is not known if the fish occupied or had dug the burrow. Jack Randall's notes of living specimens in Tahiti indicate that the fish "lives in diagonal burrow with large opening" on a silty sand substrate.

Remarks. *Oxyurichthys limophilus* is characterized by reduced dorsal-fin spines and young females lack the distinct barring seen in *O. notonema*. Juvenile *O. notonema* from Indonesia show the produced spines in specimens as small as 26 mm SL and the barred pelvic fins are distinct in a specimen 37 mm SL.

The holotype and only specimen of *Parapocryptes mindanensis* (BSM 13226) was destroyed in WWII. Koumans (1940: 191) listed the catalogue number and TL of the type. Based on the description and illustration, we consider this species mostly likely to be a juvenile *O. notonema*.

The color illustrations of Smith's syntypes of *Gobiichthys lemayi* (Smith 1949) do not quite agree with *O. notonema* (nor *O. limophilus*) due to the profuse red spotting shown on the dorsal, anal and caudal fins. Both fish are male, and the largest specimen (127 mm SL) has what appear to be damaged (regrown) and short first dorsal-fin spines.

The identity of the *Oxyurichthys* sp. in Nogawa et al. (2003) is uncertain, as the BSKU specimens could not be examined, but it appears to be *O. notonema*. The figures of *Oxyurichthys mindanensis* in Masuda & Kobayashi (1994) and Senou et al. (2004) are of *O. notonema*.

***Oxyurichthys nuchalis* (Barnard, 1927)**

(Figs 26–28; Tables 2–5)

Gobius (Oxyurichthys) nuchalis Barnard, 1927a: 72 (Zululand coast, South Africa).

Gobius (Oxyurichthys) nuchalis Barnard, 1927b: 824 (Zululand coast, South Africa).

Gobius cristatus—Smith 1949: 336 (Durban down to 40 fathoms).

Oxyurichthys microlepis (in part)—Smith 1959: 203 (Natal); Maugé 1986: 378 (Natal northwards); Hoese 1986: 797 (south to Xora River mouth, Transkei).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row, with occasional partial second row in males; fleshy tongue rounded; upper lip not constricted; no callus, tentacle or black spot on the eye; anterior nares not darkly pigmented; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; no prominent blotches, vertical bars or basicaudal spot on trunk; nape scaled with naked median and low membranous crest; scales ctenoid on most of trunk and abdomen with a few cycloid rows anteriorly beneath pectoral fins and on nape, nape with ctenoid scales in some; no prepelvic scales; lateral scales 41–52; first dorsal fin low, spines of appressed fin not reaching posterior to fifth second dorsal-fin element; 21–25 pectoral-fin rays; pelvic fins streaked or dusky, not barred; first dorsal fin with spot behind or on both sides of sixth spine.

Material Examined. SOUTH AFRICA: Syntypes of *Gobius (Oxyurichthys) nuchalis*, BMNH 1927.12.6.52–53, 2(41–72), Zululand, 36 fathoms, from South African Museum; BMNH 1930.1.14.8 2(71–78), Zululand, 36–42 fathoms, from South African Museum; SAM 17360, 11(42–74), Tugela River, NW by N 15.5 miles, 36–42 fathoms, shrimp trawl, SS *Pieter Faure*, 6 February 1901. MADAGASCAR: USNM 238967, 9(59–107), 62 m, RV

Anton Bruun Cruise 8, L. Knapp, 18 October 1964; USNM 238966, 6(72–95), 25 m, RV *Anton Bruun* Cruise 8, L. Knapp, 19 October 1964; MNHN 1988-1594, 1(66), 80–85 m, RV *Vauban*, A. Crosnier and A. Maugé, 3 March 1973; MNHN 1988-1595, 1(82), 65–70 m, RV *Vauban*, A. Crosnier and A. Maugé, 4 March 1973; MNHN 1988-1596, 1(93), 65–70 m, RV *Vauban*, A. Crosnier and A. Maugé, 4 March 1973; MNHN 1988-1597, 1(97), 80–85 m, RV *Vauban*, A. Crosnier and A. Maugé, 3 March 1973; MNHN 1988-1599, 1(94), 65–70 m, RV *Vauban*, A. Crosnier and A. Maugé, 4 March 1973; MNHN 1988-1600, 1(107), 65–70 m, RV *Vauban*, A. Crosnier and A. Maugé, 4 March 1973; MNHN 1988-1601, 1(102), 80–85 m, RV *Vauban*, A. Crosnier and A. Maugé, 3 March 1973; MNHN 1988-1602, 1(102), 65 m, RV *Vauban*, A. Crosnier and A. Maugé, 2 March 1973; MNHN 1988-1603, 1(85), 65 m, RV *Vauban*, A. Crosnier and A. Maugé, 2 March 1973; MNHN 1988-1604, 1(89), 80–85 m, RV *Vauban*, A. Crosnier and A. Maugé, 3 March 1973; MNHN 1988-1606, 1(97), 65 m, RV *Vauban*, A. Crosnier and A. Maugé, 2 March 1973; MNHN 1988-1607, 1(91), 65–70 m, RV *Vauban*, A. Crosnier and A. Maugé, 4 March 1973.

Description. Based on 34 specimens, 40–111 mm SL. An asterisk indicates the counts of the 72 mm SL syntype.

First dorsal VI*; second dorsal I,12*; anal I,11–13 (12*); pectoral rays 21–25 (23*); segmented caudal rays 8/8–8/9*; branched caudal rays 6/7–7/8*; unsegmented (procurrent) caudal rays 4/6; lateral scale count 41–52 (51*, modally 47); TRB 12–17 (13*); predorsal scale count 0–17 (modally 12*).

Body compressed. Head deeper than wide, HL 23–29% SL (mean 26%). Depth at posterior preopercular margin 64–75% HL (mean 69%). Width at posterior preopercular margin 54–74% HL (mean 61%). Mouth terminal, slightly oblique, forming an angle of about 20° with body axis, lower jaw not protrusible. Jaws reach to vertical through mideye or posterior margin of orbit; upper jaw 50–58% HL (mean 53%) in females, 54–63% HL (mean 58%) in males. Upper lip not constricted at premaxillary symphysis or with very slight indentation. Large eyes lateral, high on head, top forming part of dorsal profile, 23–33% HL (mean 28%). No callus, tentacle or dark spot on eye. Snout bluntly rounded, 28–39% HL (mean 33%). Interorbital narrow, 5–9% HL (mean 7%). Body depth at anal origin 16–22% SL (mean 18%). Caudal peduncle compressed, length 9–16% SL (mean 11%). Caudal-peduncle depth 8–12% SL (mean 11%).

First dorsal fin low, tips of spines free, females with first spine longest (21–26% SL, mean 24%), second spine 3/5–2/3 length of first spine, spines gradually increasing in size through fifth spine (17–19% SL, mean 18%), sixth spine shortest (10–12% SL, mean 11%); spines gradually increasing in size through fourth or fifth spine in males (fifth spine 20–26% SL, mean 23%), sixth spine shortest (8–17%, mean 12%); appressed first dorsal fin reaching fourth second dorsal-fin element. Second dorsal and anal fins low, posteriormost rays longest, appressed rays reaching beyond caudal-fin base. Pectoral fin oval, central rays longest, 16–26% SL (mean 24%) reaching just beyond anal-fin origin. Pelvic fins rounded to oval, reaching anus or anal-fin origin, 20–26% SL (mean 23%) in SL. Caudal fin elongate, pointed, 35–59% SL (mean 49%).

Anterior naris small with slightly raised rim, near upper lip. Posterior naris an oval open pit, midway between eye and upper jaw; anterior naris midway between posterior naris and upper jaw. Gill opening extends forward to under midopercle. Gill rakers on outer face of first arch: three triangulate on lower ceratobranchial, two thin, elongate, fused rakers at angle and a fleshy hook-like lobe on the epibranchial; rakers on outer face of second arch about 10–12 reduced stubs. Inner rakers on other arches twice the length of first arch inner rakers. Tongue tip rounded. Upper jaw teeth in single row, about 20 (17–24) along outer edge of jaw on each side of symphysis, a partial inner row of five to six teeth at symphysis in some males; prominent gap at symphysis 50–75% of interorbital width. Lower jaw teeth in two rows, about 20 each side of mandibular symphysis. Teeth in upper jaw strongly caninoid, two to three times size of lower jaw teeth, several larger recurved canines in inside row of lower jaw each side of symphysis.

Nape scaled in most to above preopercle, with naked median along fleshy ridge and membranous crest. Opercle, cheek and prepelvic region naked. Pectoral base usually naked, but occasional specimen with a few cycloid scales. Abdomen scaled, naked over *infracarinalis* muscle. Ctenoid scales over most of body; cycloid scales on abdomen and a few cycloid rows beneath pectoral fins near base and on nape immediately behind eyes; some specimens may have cycloid scales over most of nape (most scales were lost on specimens available).

Head pores as in genus except some individuals with partially open supraorbital or postorbital canals, paired pores C, D and F may be replaced by large gaping hole or open canals in supraorbital or postorbital segments. Sensory papillae pattern illustrated in Figure 26.

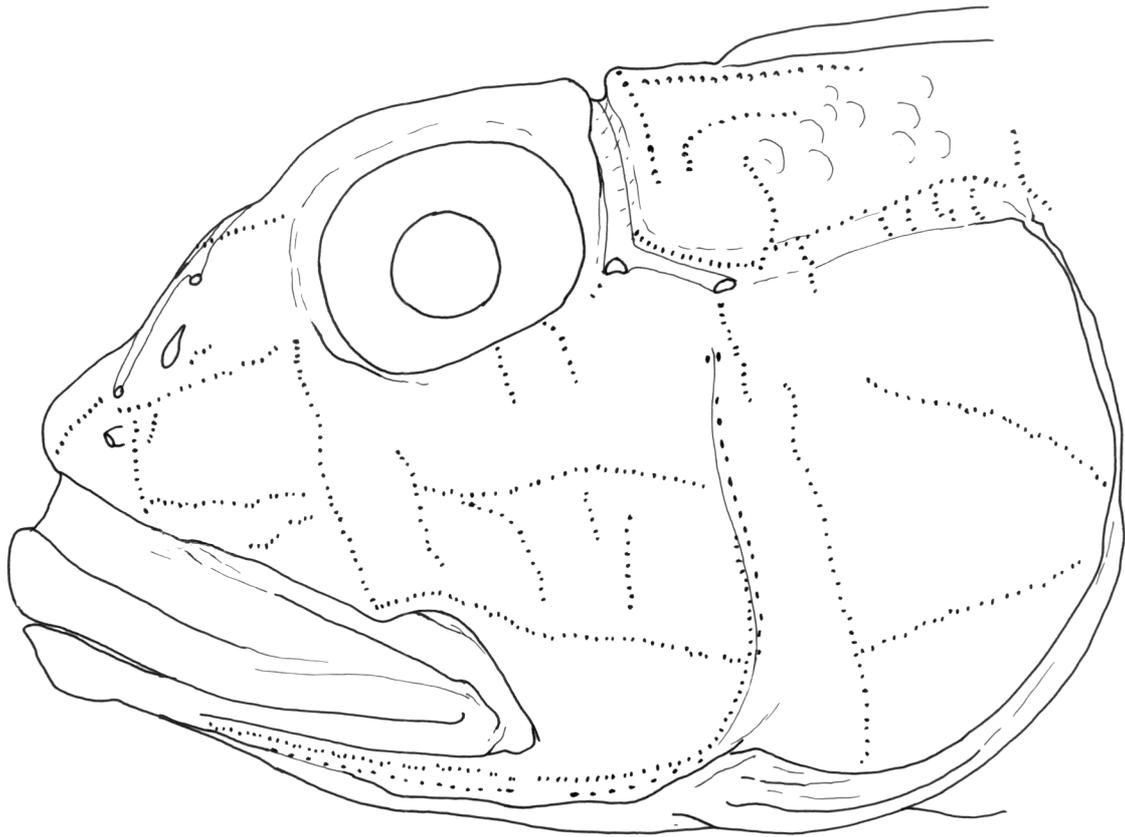


FIGURE. 26. *Oxyurichthys nuchalis*, sensory papillae pattern, USNM 238966, 97 mm female, Madagascar.



FIGURE. 27. *Oxyurichthys nuchalis*, 111 mm TL, trawled off northern Mozambique. Photograph by Oddgeir Alvheim.

Coloration of fresh material. From color slides of trawled specimens from off South Africa and Madagascar (Fig. 27). Head and body pale blue-grey, whitish ventrally, four large round diffuse brownish to yellowish brown mid-lateral blotches, posteriormost blotch on caudal-fin base, four blotches joined by mid-lateral yellow stripe, dorsal half of body with scattered round to blotchy dull blue-margined pale yellow spots. Anterior part of body (immediately lateral and dorsal to first mid-lateral brown blotch) with rounded dull blue-margined yellow blotches, spots and wavy oblique broad bars. Pectoral-fin base bluish white to whitish, crossed by one or two blue-margined yellow oblique stripes or large blotches. Side of head with three to five variably developed, mostly oblique, blue-margined irregular-shaped yellow stripes (which may coalesce), similar markings appear to be present on top of head, snout and nape.

First dorsal fin damaged in all available images; remaining membrane transparent to faintly dusky. Second dorsal fin faintly dusky with irregular rows of yellow to dull orange spots. Anal fin pale orange to dull yellow proximally, fin becoming dusky grey to blackish from mid-fin to broad blackish margin. Caudal dusky grey, becoming blackish posteriorly, with distinct yellow upper margin (unclear if yellow margin complete or partial), central yellow streak extending posteriorly from brown blotch at fin base. Pectoral fin translucent yellowish grey. Pelvic fins whitish basally, frenum white, with yellow line following each fin ray; fins becoming dusky posteriorly.

Coloration of preserved material. Head and body light brownish; belly and underside of head paler (Fig. 28). Four indistinct rounded brownish blotches along mid-side of body (visible in relatively undamaged specimens). Scales on nape and dorsum with narrow dark brown posterior edge. On nape and upper half of opercle, scattered faint whitish round spots and vermiform broad lines may be visible. Small brownish blotch along ventral edge of eye; blotch variably developed but not reaching ventrally to jaw. Nares whitish or same color as surrounding skin. Upper lip dusky or with narrow dusky line along its dorsal margin. Pectoral-fin base with indistinct light and dark patches; in several specimens these areas appear to be remnants of pale blotches and vermiform lines (as seen on nape).

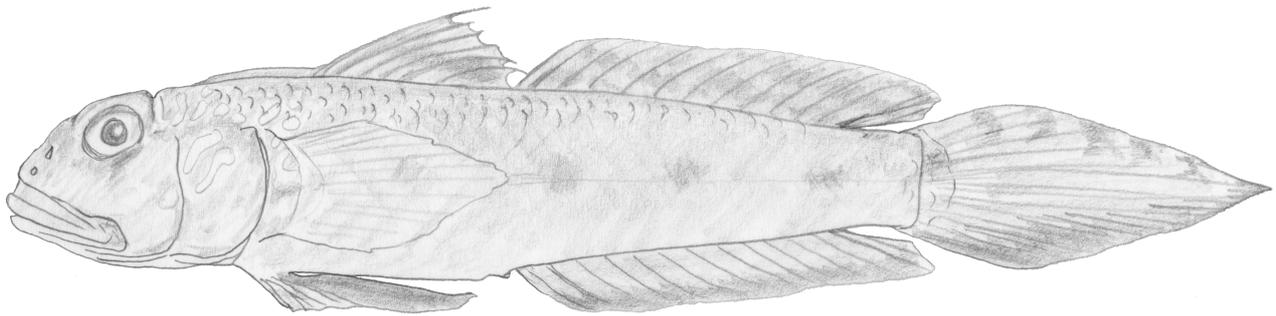


FIGURE 28. *Oxyurichthys nuchalis*, color pattern, based on specimens from Madagascar.

First dorsal fin dusky to brownish, with darker diffuse blotch between fifth and sixth spines; in several specimens (fin membranes relatively intact) this blotch extends anteriorly along centre of fin as indistinct streak. Second dorsal fin dusky to brownish; three to four indistinct oblique rows of brown blotches or vertical streaks may be discernible. Anal fin plain dark brownish, with broad darker margin. Caudal fin light brown to brownish, darker posteroventrally, with indistinct diffuse brown blotch on base of upper rays; five short broad oblique brownish bars along dorsal margin of fin may be visible. In some specimens, margin of anal fin, posteroventral margin and oblique dark bars dorsally on caudal fin distinctly blackish. Pectoral fin hyaline to light brown, ventral edge darker in some specimens. Pelvic fins light brown to brown, with dark brown to blackish membrane between branches of (at least) fourth and fifth rays; fin pigmentation usually darker medially.

Comparisons. This species is most similar to *O. heisei* and *O. auchenolepis*. It differs from *O. heisei* in having 41–52 lateral scales and a dusky blotch at the rear of the first dorsal fin, while *O. heisei* has 50–71 lateral scale rows and the first dorsal-fin pigmentation consists of a dark vertical streak behind the first dorsal spine. The caudal-peduncle depth generally is about equal to the caudal-peduncle length in *O. nuchalis* (mean 11% for both measures), whereas the depth is a little less than the length in *O. heisei* (9% vs. 11%). Unlike *O. auchenolepis*, *O. nuchalis* lacks prepelvic scales and the upper lip is not constricted at the premaxillary symphysis, and it also has fewer lateral scale rows.

Distribution. Known only from South Africa and Madagascar.

Ecology. A deepwater species, taken in trawls of 25–85 m depth.

***Oxyurichthys ophthalmonema* (Bleeker, 1856)**

(Figs 29–31; Tables 2–5)

Gobius ophthalmonema Bleeker, 1856: 208 (Ternate).

Euctenogobius andamanensis Day 1871: 693 (Andaman Islands).

?*Pselaphias ophthalmonemus*—Jordan & Seale 1906: 406 (Vaisigano River, Apia).

Oxyurichthys viridis Herre, 1927: 260 (Manila market, Navalas, Guimaras Island, and Capiz, Philippines)—Kottelat 2013: 416.

Oxyurichthys ophthalmonema (in part for some references)—Akihito 1972: 103–109 (Shimoyama River, Kanagawa); Kami 1975: 118 (Acfayan River, Guam); Collette 1983: 99 (New Guinea); Hoese 1986: 797 (south to Xora River, Transkei); Akihito et al. 1988: 262, fig. 127, pl. 245E (estuary of the Shimoyama River, Kanagawa Pref. to Iriomotejima and the Indo-Pacific); Myers 1988: 164 (Guam); Kawanabe & Mizuno 1989: 573 (Japan); Kottelat 1989: 19 (Malaysian archipelago); Kottelat et al. 1993: 147 (Indo-west Pacific); Donaldson et al. 1994: 330 (Marianas); Masuda & Kobayashi 1994: 345 (Japan); Pauly & Martosubroto 1996: 248 (Bali); Pezold 1998: 694 (Réunion; India; Malaysia; Hong Kong; Taiwan; Guam; Philippines; Indonesia; Micronesia; Trobriand Islands); Suzuki et al. 2000a: 3–5, figs 4–5 (Iriomote Island, Ryukyu Islands); Nakabo 2002: 1191 (Japan); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (Ternate, Java); Myers & Donaldson 2003: 638 (Guam); Senou et al. 2004: 184 (Japan); Hoese & Larson 2006: 1669–1670 (Darwin, NT, to Townsville, Qld); Kimura et al. 2009: 281 (Andaman Sea); Larson et al. 2013: 203 (Darwin); Fricke et al. 2011: 434 (New Caledonia); Fricke et al. 2014: 169 (Madang).

Oxyurichthys talwari Mehta, Devi & Mehta, 1989: 23–25 (mangrove zone, Port Mout, South Andaman).

Oxyurichthys tentacularis—Koumans 1935: 126 (in part); Tomiyama 1936: 79 (Japan) (in part); Koumans 1953:44 (in part); Rema Devi 1993: 177 (Ennore estuary, about 28 km north of Madras); Talwar & Jhingran 1991: 942 (Chilka Lake (Orissa)); Shen 1993: 537, 791, pl. 180 (Taiwan).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted, about equal in width at premaxillary symphysis as near rear margin of the jaws; elongate tentacle on dorsoposterior surface of eye; anterior nares with dense black spot medially; no spots evident on gular membrane; small diffuse greyish brown to blackish spot sometimes present on posterior part of dorsal scales, mainly anterodorsally, spots may be absent, indistinct or present in patches; margins of dorsal scales with narrow dark margins; usually five diffuse oval blotches along mid-side of body, blotch at caudal base smallest and often triangular; five or six brownish to greyish short saddles on dorsum, posteriormost over caudal peduncle always most prominent; in some specimens, dorsal saddles composed of pairs of greyish brown blotches at bases of fin rays; indistinct narrow dusky to greyish bars present on body posterior to anal-fin origin confluent with mid-lateral blotches and dorsal saddles; membranous crest with dark margin present on nape; scales ctenoid laterally on trunk posterior to middle of first dorsal fin, cycloid anteriorly; prepelvic region scaled; lateral scales 45–63, modally 50; first dorsal-fin spines not greatly elongate, first spine longest, just reaching past third or fifth second dorsal-fin element; 20–23 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. SOUTH AFRICA: NTM S.14696-005, 2(32–38), Kwazulu Natal, Richard's Bay Reserve, Mhlatuze Lagoon, 0–2 m, H. Larson and party, 10 February 1998; SAIAB 57300, 1(41), Kwazulu, Natal, Richard's Bay Sanctuary, H. Larson and party, 10 February, 1998. MOZAMBIQUE: SAIAB 55759, 3(83–87), Zambesia Molocue, lower reaches creek, R. Bills, 7 July 1997. KENYA: USNM 402742, 1(34), Gazi Bay, muddy sandflat, station M4R5, H. Coene and party, 28 July 1994; USNM 402743, 3(27–47), Gazi Bay, sand flat, station S3R1, H. Coene and party, 20 August 1994; CAS 233682, 3(32–41), Gazi Bay, sand flat, station S3R5, H. Coene and party, 20 August 1994; CAS 233684, 1(32), Gazi Bay, muddy creek, station M3R3, H. Coene and party, 30 July 1994; CAS 233683, 1(43), Gazi Bay, beach seine over mud, station M1D9, H. Coene and party, 30 September 1995; AMNH 254294, 4(29–92), Gazi Bay, mud flat, station M5R4, H. Coene and party, 21 August 1994; AMNH 254295, 1(35), Gazi Bay, sand flat, station S3R6, H. Coene and party, 20 August 1994; AMNH 254296, 1(57), Gazi Bay, beach seine over mud, station M3R9, H. Coene and party, 29 September, 1995; AMNH 254297, 1(35), Gazi Bay, muddy creek, station M3R10, H. Coene and party, 29 September 1995; AMNH 254298, 1(50), Gazi Bay, beach seine over mud bottom, station M5R14, H. Coene and party, 30 September 1995; USNM 402746, 1(49), Gazi Bay, muddy creek, station M3R4, H. Coene and party, 23 July 1994; USNM 402744, 1(25), Gazi Bay, mudflat, station M5R2, H. Coene and party, 21 August 1994; USNM 402745, 3(37–54), Gazi Bay, beach seine over mud, station M5R5, H. Coene and party, 30 September 1995. MADAGASCAR: LACM 44724-3, 1(103.8), 12° 42.2'S, 48° 43.1'E to 12° 32.4'S, 48° 43.5'E, VITIAZ 2588, 11 November 1988; MNHN 1966-803, 4(117–123), Nossi Be 13° 30' S, 48° 0' E, Frontier and M. Pichon, December 1963; UMMZ 185474, 1(32), Tulear, J. Bardach, 5 June 1964. INDIA: Syntypes of *Euctenogobius andamanensis*, BMNH 1870.5.18.85, 2(79–83), Andaman Islands, F. Day. ZSI unregistered, 2(86–88.5), Ennore estuary, A.G.K. Menon and party, 31 March 1977; CAS-SU 40074, 2(49–58), Madras Residency, Vizagatapam, A.W. Herre, 20 December 1940; USNM 149709, 3(83–91), Travancore, Kerala, L. Schultz; USNM 238973, 1(74), Ennore area and other localities, purchased, FHB 66–62, 14 September 1966; USNM 276544, 2(88–95), Ennore estuary, A.G.K. Menon and party, 31 March 1977. RMNH.PISC 16975, 1(55), Madras Residency, Chilka Lake, channel off Berhampur Island, Chilka Survey; RMNH.PISC 16979, 1(44), Madras Residency, Chilka Lake, S of Patschanipur, Serua Nadi, going NE from

Barikuda, Chilka Survey; RMNH.PISC 16973, 1(41.5), Madras Residency, Chilka Lake, channel between Satpara and Berhampur Islands, Chilka Survey; RMNH.PISC 16974, 1(52.5), Madras Residency, Chilka Lake, channel between Satpara and Berhampur Islands, Chilka Survey; RMNH.PISC 16978, 1(32.5), Madras Residency, Chilka Lake, main channel, W of Satpara Island, Chilka Survey; RMNH.PISC 16977, 1(25), Madras Residency, Chilka Lake, main channel between Satpara and Barikuda, Chilka Survey; RMNH.PISC 16976, 1(62), Kyankulam Kayal, Travancore State Studies, H.J. Rao and M. Sharif, February 1928. SRI LANKA: USNM 238971, 5(78–91), Negombo, C. Koenig, 14 January 1970. MYANMAR: USNM 360785, 4(55–66), mangrove, Minyar Chaung, a tributary on Settwa River, Gwa Township, Sandoway District, Rakhine State, C. Wemmer, U. Lay and U. Naing, 30 April 1999. INDONESIA: Holotype of *Gobius ophthalmoneuma*, RMNH.PISC 4542, 74 mm SL female, East Indies Archipelago, P. Bleeker, 1879. RMNH.PISC 35635, 3(72–80), East Indies Archipelago, P. Bleeker, 1879; RMNH.PISC 12436, 1(70), Belawan Deli, eastern Sumatra, October 1930; RMNH.PISC 13179-80, 2(79–84.5), Madura, T. Buitendijk, September 1926; NTM S.10688-021, 2(19–28), Bali, Sanur Beach mangroves, H. Larson and T. Gloerfeldt-Tarp, 1982; NTM S.10733-002, 1(83), Bali, Jimbaran market, T. Gloerfeldt-Tarp, 1981; NTM S.10990-005, 3(48–64), Java, Banyuwangi fish market, H. Larson, 5 July 1983; BLIP 1976061, 6(63–83), Sumatra, Lampung Bay, Batai, 6 March 1976; BLIP 1982128, 16(25–79), West Java, Anyer mangrove swamp, Serang, 2 February 1982; BPBM 29796, 4(61–80), Lombok, SE side, J.E. Randall and F.G. Wörner, 30 January 1984; BPBM 29969, 3(47–78), Lombok, Lembar harbor from fishermen, F.G. Wörner and J.E. Randall, 13 February 1984; USNM 87966, 2(80–83), Java, Batavia, Lt. H.C. Kellers, October 1925; NTM S.12193-001, 7(66–72), Sumbawa, Bima Pasas baru, B.C. Russell, 25 July 1987; USNM 297090, 9(16–50), Irian Jaya, mainland along SW corner in lee of Samei Island, RV *Alpha Helix*, B.B. Collette, 4 July, 1979; USNM 297213, 2(18–50), West Irian, New Guinea, S coast of Misool Island, Ceram Sea, 0–1 m, RV *Alpha Helix*, cruise Moro, B.B. Collette and party, 3 July 1979. BRUNEI: S.G. Brunei, Sungai Mambangan, H.K. Larson and party, 15 August 1997. MALAYSIA: CAS-SU 27785, 2(83–86), Sandakan, Borneo, A.W. Herre, 29 June 1929; FMNH 24741, 1(92), Sabah, Sandakan, Crane Pacific Expedition, 29 June 1929; FMNH 51739, 2(39–41), Sabah, East Coast Residency, R.F. Inger, 9 May 1950; USNM 99830, 1(81), Sandakan Bay, Borneo, RV *Albatross*, 21 March 1908. THAILAND: NTM S.13954-018, 40(19–74), mangrove at Ao Nam Bor, Phuket, 0–1 m, H. Larson and party, 9 December 1993. PHILIPPINES: AMS 21904-002, 1(56), fish market, Balingasay Estuary, Bolinao, D.F. Hoese, 18 April 1980; BLIP 1963163, 2(88–96), Aparri, Cagayan, Luzon, September, 1963; CAS 51055, 19(16–50), Negros Oriental, Albija and Siator, GVF Reg. 1615, D. Empeso, 16 August 1958; CAS 51732, 1(88), Luzon, Batangas market, Batangas, A.W. Herre, 17 May 1948; CAS-SU 26336, 3(59–72), Dumaguete, Polo Plantation, Negros Oriental, A.W. Herre, 26 June 1931; CAS-SU 26337, 2(56–61), San Jose, Panay Island, Antique, F. Reveche; CAS-SU 26340, 4(76–78), Manila, Luzon, A.W. Herre, 11 April 1931; ex-CAS-SU 33137, 14(33–59), Nasugbu, Batangas, A.W. Herre, 11 December 1936; FMNH 100603, 1(71), Luzon, Manila, A.W. Herre, 11 April 1931; LACM 42475-34, 1(83.3), Lingayen Gulf, Pangasinan, entrance to Tambac Bay, T. Adamson and J. Seigel, 26 June 1981; ex-LACM 35964-15, 1(82.7), Lingayen Gulf, Pangasinan, Lucap Bay, 16° 13'N, 120° 01' E, T. Adamson, 21 September 1976; NLU 71394, 1(53), Pangasinan, Bolinao market, E. Murdy, 16 April 1980; NTM S.14220-009, 2(105–107), Luzon, Manila, B.C. Russell, 10 October 1995; NTM S.14226-009, 1(91), Luzon, Manila, B.C. Russell, 7 October 1995; UMMZ 100533, 1(71), Dumaguete, Polo Plantation, A.H. Herre, 26 June 1931; USNM 72181, 1(65), Aparri, R.C. McGregor, no date; USNM 99925, 1(86), Panay, shore above Iloilo, RV *Albatross*, 2 June 1908; USNM 102496, 2(75–91), Iloilo, US Navy Eclipse Expedition, Lt. H.C. Kellers, 29 March 1929; USNM 139377, 3(63–72), Manila Market, Luzon, RV *Albatross*, 12–18 December 1907; USNM 139378, 1(95), Manila Market, Luzon, Philippines, RV *Albatross*, 12 March 1908; USNM 139379, 1(67), Manila Market, Luzon, Philippines, RV *Albatross*, 13 June 1908; USNM 139380, 1(97), Manila Market, Luzon, Philippines, RV *Albatross*, 22 April 1909; USNM 139382, 1(53) Batangas River, Batangas, Luzon, RV *Albatross*, 7 June 1908; USNM 139383, 2(28–69), Pagapas Bay, Santiago R., Luzon, RV *Albatross*, 20 February 1909; USNM 139386, 2(76–88), Cebu, Cebu market, 20 March 1909, RV *Albatross*; USNM 139388, 1(79), Cebu Market, Cebu, Philippines, RV *Albatross*, 4 September 1909; USNM 139389, 1(91), Iloilo Market, Iloilo, Philippines, RV *Albatross*, 31 May 1908; USNM 139392, 5(83–96), Manila Market, Luzon, RV *Albatross*, 17 June 1908; USNM 139393, 5(94–98), Manila Market, Luzon, Philippines, RV *Albatross*, 16 April 1909; USNM 139394, 10(77–87), Guimaras Island, Iloilo Strait, vicinity of Buena Vista, seine in mouth of river, RV *Albatross*, 14 January 1909; USNM 243161, 2(25–40), Negros Oriental, North Bais Bay, east side of Daco Island, L. Knapp, 7 May 1979; USNM 372809, 1(95), Manila Market, Luzon, RV *Albatross*, 12 March 1908; USNM 372811, 2(76–77), Cavite and San Roque markets, RV *Albatross*, 27 June 1908; ZMK uncat., 9(40.9–69.6), Negros Oriental, bought off Tanjay River mouth, 24

November 1982. MARIANAS: AMNH 27029, 40(11–54), Guam, first stream south of Inarajan, near mouth, C.L. Smith and party, 23 April 1963; AMNH 27088, 19(17–79), Guam, first stream south of Inarajan at mouth, C.L. Smith and party, 2 July 1961; UG 5729, 45(14.5–30), Guam, Acfayan Bay, seine, H. Kami, 19 January 1971. JAPAN: AMS 23500-009, 4(15–45), Ryukyu Islands, Iriomote Island, Nakama River mouth, D. Hoese and M. Hayashi, 31 May 1980; ex-NTM S.12135-014, 10(18–32), Iriomote-jima, Nakama River, 19 August 1985, H. Larson and party; NTM 12632-006, 10(7–44), Nakama River, Iriomote-jima, H. Senou and Y. Aonuma, 19 August 1985; NTM 12732-006, 10(16–43), Nakama River, Iriomote-jima, H. Senou and Y. Aonuma, 19 August 1985; YCM P.8886, 12(14–48), Iriomote-jima, Nakama River, 22 July 1974. TAIWAN: FMNH 91547, 10(82–104), A. Owston, 10 June 1905. CAROLINE ISLANDS: ex-CAS 51036, 1(64), Palau, Ngarbaged Village; mud flat off former Palao Tropical Biological station, Gaines, Scott and H.A. Fehlmann, 2 September 1956; USNM 222977, 3(24–32), Ponape, shore W of Kolonia, V.G. Springer and party, 22 September 1980. INDONESIA: USNM 372812, 1(22), mainland in lee of Samei Island, West Papua, B. Collette, 4 July 1979. PAPUA NEW GUINEA: AMS I.16671-058, 9(30–62), Sek Island, Madang Harbour, 31 July 1969; QM I.17897, 1(57), estuary at Lae, N. Quinn, 1 October 1980; unregistered specimen (held by Freeport Mining), 1(95), Timika River, Station EM 272/1, 15 March 2000; USNM 372813, 1(46), Madang Harbour, mangroves behind Nui Island, PNG, BBC 1492, B.B. Collette, 28 May 1970. AUSTRALIA, QUEENSLAND: AMS IB.8288, 3(85–87), Townsville, Ross River, G. Coates, 1966; AMS IB 42, 1(72), Cairns, pres. A.K. Carter, 1939. FIJI: USNM 241799, 150+(10–57), Nangara, mudflat north of island, V.G. Springer, 3 June 1982; USNM 259752, 1(25), Nangara Island, Viti Levu, mudflat N of island, mangrove shore, V.G. Springer and party, 3 June 1982; USNM 265086, 1(52), Suva, Kumbuna Creek, drainage into Niangalongalo Harbour, RV *Te Vega*, 26 August 1963.

Other material examined. REUNION: MNHN 993, 1(76), Desrolles coll. (no other data). TAIWAN: ASIZP 56580, 1, estuary, Danshuei River, Taipei, W.N. Tzeng, 10 August 1984; ASIZP 56801, 2, Donggang, Pingtung, S.C. Lee, 1 May 1980. INDONESIA: MZB 5402, 3, Lhok. Seumawe, Aceh Utara, Java, D. Wowor, 31 January 1984.

Description. Based on 66 specimens, 18–123 mm SL. An asterisk indicates the counts of the holotype of *Gobius ophthalmonema*.

First dorsal VI*; second dorsal I,12*–13; anal I,12–13*; pectoral rays 20–23 (22*); segmented caudal rays 8/8–9/8; branched caudal rays 7/7–8/7; lateral scale count 45–63 (modally 50, 55*); TRB 13–21 (16*); predorsal scale count 0–27 (17*).

Body compressed. Head deeper than wide, HL 21–27% SL (mean 24%). Depth at posterior preopercular margin 61–77% HL (mean 68%). Width at posterior preopercular margin 51–69% HL (mean 59%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through mid-orbit; upper jaw 46–58% HL (mean 53%). Eyes lateral, high on head, top forming part of dorsal profile, 23–36% HL (mean 27%). Elongate tentacle on dorsoposterior eye. Snout rounded, 22–35% HL (mean 29%). Interorbital narrow, 6–15% HL (mean 10%). Body depth at anal origin 15–21% SL (mean 17%). Caudal peduncle compressed, length 9–13% SL (mean 11%). Caudal-peduncle depth 9–12% SL (mean 10%).

First dorsal fin with filamentous spines, first spine longest, decreasing in size through sixth spine. First spine usually as long as head or shorter, reaching just beyond third to fifth second dorsal-fin element. Second dorsal-fin and anal-fin rays moderately long, anal fins slightly lower, posteriormost rays in both longest about equal to head depth, reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anus and fourth or fifth anal-fin element, 22–33 % SL (mean 28%). Pelvic fins rounded to oval, reaching base of urogenital papilla, but usually not to anal-fin origin, 20–27% SL (mean 23%). Caudal fin elongate, pointed, 36–65% SL (mean 50%).

Anterior naris tubular, placed close to upper lip. Posterior naris an oval open pit with slightly raised rim, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three or four triangulate on lower ceratobranchial, single broad triangulate raker or two rakers at angle and a fleshy three or four-fingered lobe derived from gill rakers on the epibranchial; rakers on outer face of second arch about 15–18 reduced stubs. Inner rakers blade-like and about equal length on all arches. Tongue tip rounded. Upper lip not constricted at premaxillary symphysis. Upper jaw teeth in single row, about 20 on each side of symphysis; small gap at symphysis. Lower jaw teeth in two rows, about 30 in outer row each side of mandibular symphysis, innermost row with about 12 strong recurved canines on each mandible. Teeth in upper jaw strongly caninoid, about twice size of lower jaw teeth in outer row.

Nape scaled along sides with naked median along membranous crest, scales reaching forward to above anterior opercle, not reaching preopercle. Opercle, cheek and pectoral base naked. Prepelvic area covered with patch of small cycloid scales in 4–14 rows (few to 0 in juveniles). Abdomen scaled. Ctenoid scales on side of body, becoming cycloid anteriorly beneath first dorsal fin.

Head pores as in genus. Sensory papillae pattern illustrated in Figure 29.

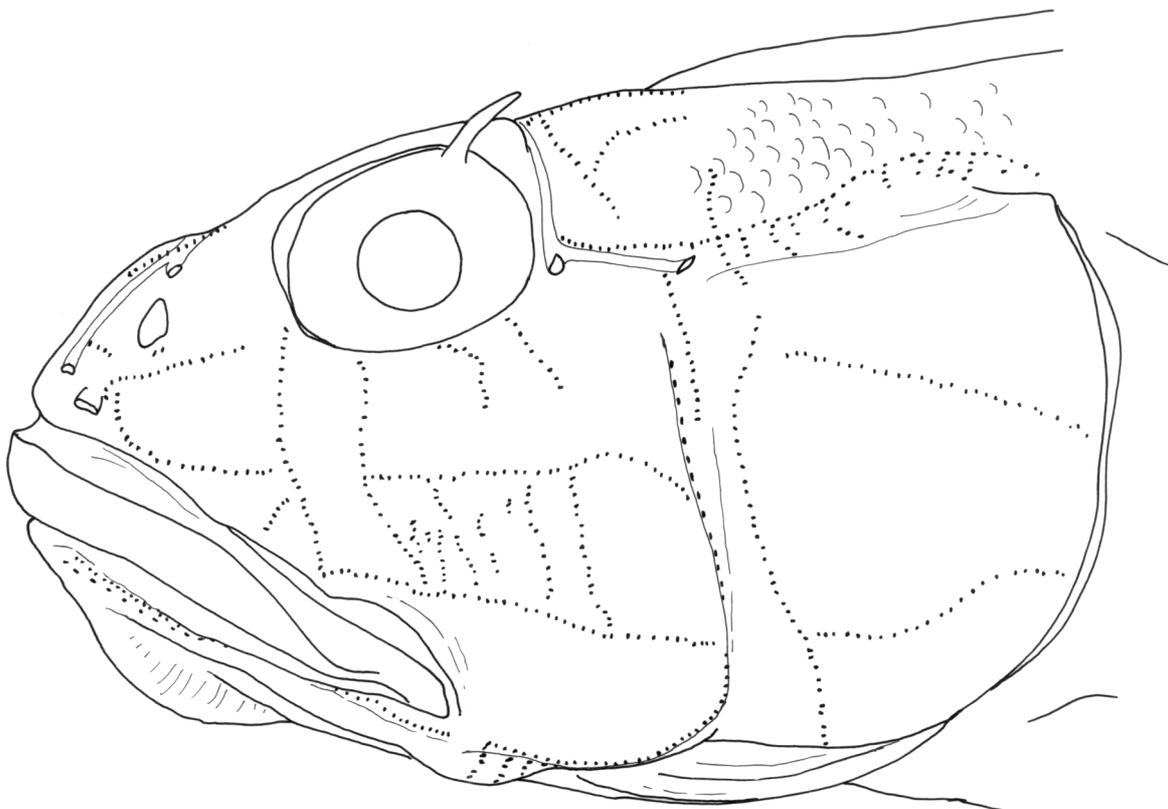


FIGURE 29. *Oxyurichthys ophthalmonema*, sensory papillae pattern, NTM S.14783-014, 87 mm male, Brunei.



FIGURE 30. *Oxyurichthys ophthalmonema*, freshly dead specimen from Japan. Photograph by Tetsuo Yoshino.

Coloration of fresh material. Based on slide of freshly dead specimens from Japan and Phuket, Thailand. Pattern as for preserved specimens (Fig. 30). Head and body soft yellowish grey, underside of head and breast whitish. Mid-lateral blotches and dorsal saddles brown, posteriormost (triangular) mid-lateral blotch blackish. Vertical bars on body of variable width, soft grey; vertical bars on anterior half of body slightly oblique, dark grey. Comma-shaped mark on pectoral-fin base black, with bluish spot dorsally on fin base; pale area on centre of base appears bluish grey. “Tear” blotch on ventral edge of eye dark brown, with pale opalescent line along posteroventral edge of blotch. Dark brown, slightly oblique streak crossing centre of opercle; ventral half of opercle mottled with faint coppery orange.

Dorsal fins dusky pinkish grey, with brownish spots and streaks. Caudal fin dusky with yellowish grey rays and blackish dorsal margin. Anal fin dark grey to pinkish grey anteriorly, with blackish spot on membrane by base

of (each?) ray; fin margin white. Pectoral fin translucent dusky, with many rows of blackish spots; posteroventral fin margin abruptly bright white. Pelvic fins (mostly concealed) whitish with dark grey on membrane by fin rays.

A slide of a dead specimen from KwaZulu Natal, South Africa, has greyish pink dorsal fins with dusky grey markings, the caudal fin is greyish pink with rows of short dusky grey streaks, the anal fin is dark grey with some indistinct darker mottling, and the pelvics dark grey anteriorly, lighter grey posteriorly.

Coloration of preserved material. Head and body light yellowish to greyish brown, paler ventrally, usually with five diffuse oval brown blotches along midside of body, blotches darkest above midline; posteriormost blotch, on caudal-fin base, small and triangular, rounded in some specimens; mid-lateral blotches diffuse or indistinguishable in some specimens (for example, some from Mozambique, eastern Africa and Sumatra) (Fig. 31). Scales on dorsum usually with margins narrowly outlined with dark brown to blackish; small diffuse greyish brown to blackish spot on posterior part of scales, mainly on anterodorsal part of body; spots may be absent, indistinct or present in patches on dorsum. Dorsal midline with five or six brownish to greyish short saddles, posteriormost (over caudal peduncle) always darkest (and usually visible in faded specimens); in some specimens, dorsal saddles composed of pairs of greyish brown blotches at bases of fin rays. In most specimens, indistinct narrow dusky to greyish bars present on body posterior to anal-fin origin; bars confluent with mid-lateral blotches and dorsal saddles. Nape with brown to greyish brown crescent behind each eye; crescents may meet in dorsal midline (before crest); some specimens with pale area before and after dark crescent. Nape crest dusky with distinct narrow black margin. Orbital tentacle dusky to blackish, slightly darker at tip. Interorbital and snout greyish brown. Anterior narial tube with dense black spot medially; posterior naris with dusky to blackish rim. Opercle plain or mottled dusky to brownish. Dark brown rectangular to triangular “tear” blotch along ventral margin of eye, posterior edge of blotch sharply defined, anteroventral edge diffuse; blotch extending ventrally halfway to toward rear margin of the jaws. Upper lip grey to greyish brown, dark grey to black at corner, often with similarly colored stripe along edge of lip extending onto skin concealed by lip when mouth closed. Lower lip whitish, tip dusky. Isthmus and chin light brownish to greyish brown. Pectoral base with brown to blackish brown curved comma-shaped mark, “spot” of comma on dorsal part of base, and part of “tail” covering most of pectoral ray bases; “tail” forking ventrally in some specimens. Breast pale to dusky. Abdomen yellowish white to white; black peritoneum usually showing through body wall at midline.

First dorsal fin translucent to dusky, with dusky to greyish basal stripe and four or five wavy dusky to dark grey lines crossing fin; lines may break up into short streaks, especially posteriorly; leading edge of first spine plain greyish or with indistinct spot at commencement of each wavy line. Second dorsal fin translucent to dusky, with four to eight slightly oblique rows of short dusky to grey streaks, which may be interspersed with transparent oval blotches. Caudal fin with ventral half plain dusky to dark grey, occasionally with dark streaks posteriorly; dorsal half translucent to dusky, with 4–12 rows of brownish to dark grey short streaks across fin, rows of whitish to transparent short streaks may alternate with dark streaks; dorsal edge of fin narrowly edged with blackish. Anal fin plain dusky to blackish, distal quarter may be darker. Pectoral fin faintly dusky to greyish, usually with many rows of diffuse dusky to dark grey spots crossing ventral half of fin. Pelvic fins dusky with broad dark grey to brown streaks along membrane beside each ray; streaks may be short and restricted to base of rays, or may extend length of ray.

Comparisons. One of the gobies with eye tentacles, this species is most like *O. cornutus*. Neither species has a constricted upper lip, which distinguishes them from the other tentacled species. This species differs from *O. cornutus* in lacking the elongate first dorsal-fin elements, having less pronounced spotting on the scales of the dorsum (if any) and in having a saddle-shaped spot on the caudal peduncle that is darker than other trunk markings on preserved specimens. Individuals of *O. cornutus* in which the first dorsal-fin spines have been damaged generally exhibit curled spines. They may still be distinguished from *O. ophthalmonema* by the relative length of the first spine. The first spine in *O. cornutus* reaches as far as the second dorsal fin and is the longest spine of the first dorsal fin. Individuals as small as 17–18 mm SL exhibit filamentous elongate spines though easily broken. The first four spines are nearly equal in length in *O. ophthalmonema* and do not grow in length as early in this species as in the *O. cornutus*. *Oxyurichthys cornutus* also develops the eye tentacle at a smaller size than sympatric *O. ophthalmonema*.

Distribution. Southwestern Pacific Ocean from Guam to Indonesia and Viet Nam, and the Indian Ocean India to East and South Africa and Madagascar.

Ecology. This species is found in mangroves, estuaries, river mouths and muddy sand flats of bays. Jordan & Seale's (1906) Samoan record of *Pselaphias ophthalmonemus* "from a sluggish bayou of Vaisigano River" may possibly be of *O. cornutus*, as they described the dorsal as "filamentous"; however, the fine black spots are not mentioned, only "back mottled".

Remarks. The holotype of *Gobius ophthalmonema* is one of six specimens in RMNH.PISC 4542 (72–80 mm SL). Bleeker's description was based on a single female specimen 83 mm TL. One of the smallest specimens in RMNH.PISC 4542 is a female, about 100 mm TL. It has pencil markings on the left side of the body and its pigmentation is close to that in Bleeker's description. We have taken this specimen to be the holotype.

Herre only recognized two species of tentacled goby from the Philippines (Herre, 1927), *O. ophthalmonema* and *O. viridis*. He regarded *O. tentacularis* as a synonym of *O. ophthalmonema*. The syntypes of *Oxyurichthys viridis* Herre, 1927 (BSM 12011 and BSM 26111–26113) were destroyed in World War II, but the species described here fits Herre's (1927) description. We have found mixed lots identified by Herre as *O. viridis* containing *O. ophthalmonema* and *O. cornutus*, but Herre also identified a pair of specimens from Sandakan (CAS 27785) as *O. viridis* that are clearly *O. ophthalmonema* as redescribed here. David Catania (CAS) informed us that CAS/SU 27785 are specimens identified by Herre (probably in 1929) as *O. viridis*. Koumans reidentified this lot as *O. tentacularis*, but he lumped many species under this name (Koumans 1935, 1953). Akihito (1972) distinguished *O. ophthalmonema* and *O. tentacularis* in redetermining specimens described from Japan by Tomiyama (1936) as belonging to *O. ophthalmonema*. We have not seen type specimens of Mehta, Devi & Mehta's *O. talwari*, but have synonymised it here with *O. ophthalmonema* based on information contained within the original description.

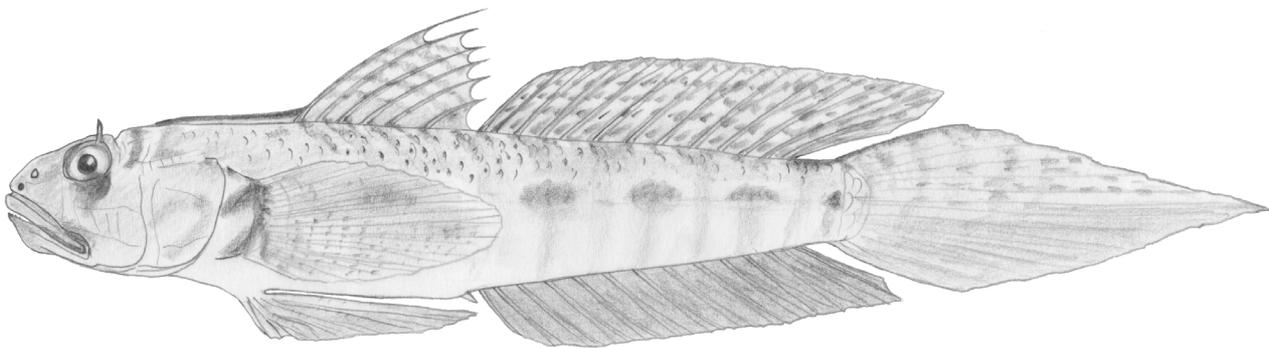


FIGURE 31. *Oxyurichthys ophthalmonema*, color pattern, based on specimens from Brunei, Indonesia and Mozambique.

***Oxyurichthys papuensis* (Valenciennes, 1837)**

(Figs 32–34; Tables 2–5)

Gobius papuensis Valenciennes, 1837: 106 (New Guinea).

Gobius belosso Bleeker, 1854a: 316 (Tjiringin, Banten, Indonesia).—Weber 1893: 449 (Nias, Java).

Oxyurichthys belosso—Bleeker 1857: 464.

Gobiichthys papuensis—Jordan & Seale 1906: 407 (New Guinea; East Indies).

Oxyurichthys oculomirus Herre, 1927: 256 (Cebu market, Philippines).

Oxyurichthys papuensis—Fowler 1925: 17 (Guam); [in part] Fowler 1928: 415–416 (Guam); Koumans in Blegvad 1944: 164 (Gulf of Oman); Koumans 1953: 40, 46–49 (Singapore, Indonesia, New Guinea, Persian Gulf, Hong Kong, Philippines, Ponape, Hawaiian Islands); Kami et al. 1968: 124 (Guam); Hoese & Winterbottom 1979: 4 (South Africa); Myers 1988: 164 (Guam); Talwar & Jhingran 1991: 940 (Indian region); Kottelat et al. 1993: 147 (Indo-west Pacific); ?Shen 1993: 537, fig. 180-2 (Taiwan); Donaldson et al. 1994: 330 (Marianas); Masuda & Kobayashi 1994: 345 (Japan); Randall 1995: 339 (Red Sea to Natal); Myers 1999: 243, pl.156G (Palau to Pohnpei and Marianas); Suzuki et al. 2000b: 2–3, figs 1–4 (Iriomote Island, Ryukyu Islands); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Nakabo 2002: 1192 (Japan); Allen & Adrim 2003: 59 (Papua, Flores, Sulawesi); Myers & Donaldson 2003: 638 (Guam); Senou et al. 2004: 186 (Japan); Randall 2005: 544 (east coast of Africa to Indo-Malayan region); Larson et al. 2008: 143 (Singapore); Kimura et al. 2009: 282 (Andaman Sea); Fricke et al. 2011: 434 (New Caledonia); Allen & Erdmann 2012: 984 (Raja Ampat Islands).

Oxyurichthys sp.—Senou & Yoneyama 2003: 1 (Japan).

Diagnosis. 13 second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted; teat-like callus or fleshy knob posterodorsally on eye; dark anteromedial spot on anterior nares; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; trunk with eight or nine vertical bars and prominent basicaudal spot; nape scaled with naked median and low membranous crest; scales ctenoid on most of trunk becoming cycloid anterior to second dorsal-fin origin; prepelvic area nearly always with scales; lateral scales 60–80; first dorsal-fin spines not elongate, appressed fin not reaching posterior beyond 3rd second dorsal-fin element; 21–24 pectoral-fin rays; pelvic fins dusky, not barred or mottled. No distinct dark blotch on first dorsal fin behind or on both sides of sixth spine.

Material Examined. PAPUA NEW GUINEA: MNHN 1174, holotype of *Gobius papuensis*, 100 mm SL male, New Guinea, Quoy and Gaimard. INDONESIA: RMNH.PISC 4543, syntypes of *Gobius belosso*, 5(68–101), Tjiringin, Banten Province. ex-BPBM 29796, 1(85), Lombok, SE side, J.E. Randall and F.G. Wörner, 30 January 1984. RMNH.PISC 16768, 1(98), Batavia, July 1938; RMNH.PISC 1903, 3(101–138), Makassar; NTM S.13166-012, 2(91–97), Maumere Bay, Flores, 1–2 m, B.C. Russell, 4 November 1991. PHILIPPINES: AMS I.23026-001, 1(110), Batangas Province, Calatagan, 1 m, 30 March 1979; CAS-SU 38584, 1(121), Murcielagos bay, Misamis Occidental, Mindanao Island, A.W. Herre; CAS-SU 68875, 2(104–113), Port Sual, station 27, Lingayen Gulf, Pangasinan Prov., Luzon Island, O.B. Cope (commercial fishermen); LACM 37382-2, 1(108), Lingayen Gulf, Pangasinan, Lucap Bay, T. Adamson, 21 February 1978; LACM 37417-3, 1(97.8), Lingayen Gulf, Pangasinan, between Hundred Island and Cabarruyan Island, T. Adamson, 28 February 1978; LACM 42475-35, 2(111–133), Lingayen Gulf, Pangasinan, entrance to Tambac Bay, T. Adamson and J. Seigel, 26 June 1981; USNM 56140, 1(106), San Fabian, Philippine Commission; USNM 139396, 9(59–102), Cebu market, Cebu, RV *Albatross*, 20, 22 March 1909; USNM 139397, 2(72–116), Cebu, Cebu market, RV *Albatross*, 4 September 1909; USNM 139386, 2(65–75), Cebu, Cebu market, RV *Albatross*, 20 March 1909; ex-USNM 243160, 1(37), tidal inlet at Sebanj, Siquijor Island, 0–1 m, Negros Oriental, L. Knapp and party, 16 May 1979; USNM 382209, 1(51), mangroves at Pandaraonan, mud and eelgrass flats, near Tiniguiban Island, Guimaras, 0–1 m, J. Williams, 28 September 1995; USNM 382210, 1(133), Iloilo Fish Market, Panay, J. Williams, 30 September 1995; AMS I.23877-008, 2(105–119), Bolinao market, 9 February 1979; NTM S.14226-005, 1(130), Luzon, Bolinao, B.C. Russell, 7 October 1995. PALAU: BPBM 7354, 2(128–135), Babelthuap Island, bay N of Ngetbang Bay on W coast, mud bottom, 4 m, J. Randall, R. Owen and T. Boisek, 1 October 1966; CAS 51046, 1(32), Babelthuap Island, Arai District, mud flat, Sumang, 16 October 1959; CAS 51035, 1(150), Toagel Passage, near Ghimil River and W of Ngeream Island, H.A. Fehlmann, 22 April 1959. NEW CALEDONIA: NTM S.13977-001, 1(118), St Vincent Bay, 15 m, ORSTOM, 22 November 1989. JAPAN: NTM S.12733-002, mouth of Ayanda River, Iriomote-jima, 20 m, H. Kohno, August 1985; BLIP 1999004, 1(52), Amitori Bay, Iriomote-jima, 6–7 m, 1999. TAIWAN: CAS-SU 20992, 1(77), Kaohsiung (Takao), H. Sauter. MADAGASCAR: MNHN 1992-958, 2(143–167), A. Maugé; SAIAB 52812, 3(122–133), Tsimipaika Bay, E of Nosy Kombe, NW Coast, P.C. Heemstra, 2 September 1995. PERSIAN GULF: ZMK uncatalogued, 1(82), Station 106, Gulf of Oman, H. Blegvad, 1 April, 1938. KENYA: BPBM 27211, 1(103), off Mombasa Yacht Club, mud bottom, 15 m, spear, J.E. Randall, 14 March 1979; AMNH 254299, 1(68), Gazi Bay, station RUG (BT10)95, J. Mees; AMNH 254300, 3(29–31), Gazi Bay, beach seine, sandflat, station S3R5, H. Coene and party, 20 August 1994; AMNH 254301, 1(23), Gazi Bay, sandflat, station S3R4, H. Coene and party, 20 August 1994; USNM 402747, 3(25–37), Gazi Bay, beach seine over mud, station M5R5, H. Coene and party, 21 August 1994; USNM 402748, 2(30–32), Gazi Bay, beach seine over mud, station M5R5, H. Coene and party, 30 September 1995; USNM 402749, 1(31), Gazi Bay, mudflat, station M5R1, H. Coene and party, 21 August 1994; USNM 402750, 1(40), Gazi Bay, beach seine over mud, station M5R4, H. Coene and party, 21 August 1994. MOZAMBIQUE: SAIAB 27745, 2(126–133), Inhaca, 1948. COMORES ISLANDS: ROM 56574, 2(146–148), Anjouan Island, harbor at Matsumudu, R. Winterbottom, November 1988. SEYCHELLES: SAIAB 27746, 1(86), Nacala, 25 August 1950.

Description. Based on 56 specimens, 27–164 mm SL. An asterisk indicates the counts of the holotype of *Gobius papuensis*.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 21–24 (22–23*); segmented caudal rays 9/8*; branched caudal rays 8/7; unsegmented (procurrent) caudal rays 7/6–8/5; lateral scale count 60–80 (modally 68, 73*); TRB 16–27 (25*); predorsal scale count 0–25 (18*; modally 22, smaller specimens sometimes lacking predorsal scales).

Body compressed, head length moderate, 22–26% SL (mean 23%). Head deeper than wide, depth at posterior preopercular margin 59–73% HL (mean 66%), width at posterior preopercular margin 51–63% HL (mean 56%). Mouth terminal, slightly oblique, forming an angle of about 30–35° with body axis; lower jaw slightly prominent, jaws generally reach to mideye or rear margin of orbit. Upper lip not constricted. Upper jaw 49–61% HL (mean 55%). Eyes lateral, high on head, top forming part of dorsal profile, 19–28% HL (mean 25%). Teat-like callus or fleshy knob posterodorsally on eye. Snout rounded, 26–35% HL (mean 31%). Interorbital narrow, 4–15% HL (mean 11%). Body depth at anal origin 13–20% SL (mean 17%). Caudal peduncle compressed, equally deep as long or slightly deeper than long, length 9–12% SL (mean 10%). Caudal-peduncle depth 10–14% SL (mean 11%).

First dorsal fin low, tips of spines free, spines slightly longer in males than females; spines reach second or third element of second dorsal fin when appressed. In males, first five spines about same length with first spine often slightly longer than others; first dorsal-spine length 13–25% SL (mean 20%), second dorsal-spine length 13–22% SL (mean 19%). First dorsal spines usually increasing slightly in length from first to fifth spine in females, first spine in most not much larger than sixth spine. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when appressed. Pectoral fin oval, central rays longest, 11–28% SL (mean 23%), extending beyond anal-fin origin. Pelvic fins rounded to oval, reaching to anus or urogenital papilla, 12–24% SL (mean 21%). Caudal fin elongate, pointed, 37–49% SL (mean 42%).

Anterior naris in very reduced short tube at margin of upper lip. Posterior naris an oval pit midway between eye and upper jaw. Gill opening extends forward to under opercle. Gill rakers on outer face of first arch: three to four (usually three) triangulate on lower ceratobranchial, two to three fused finger-like rakers at angle and a fleshy lobe with two or three processes derived from gill rakers on the epibranchial; about 12 reduced rakers on outer face of second arch, 10 rakers on inner face of first arch; inner rakers on other arches more numerous and elongate than first arch inner rakers. Tongue rounded. Upper jaw with single row of 18–24 large canine teeth each side of premaxillary symphysis, separated by large gap at symphysis in adults about equal in width to bony interorbital width. Lower jaw with narrow band of two to three rows of small teeth, with four to eight strongly recurved canines in innermost row each side of dentary symphysis twice the size of teeth in outermost row in some specimens.

Nape scaled with naked median along low fleshy crest, scales reaching forward above anterior field of opercle or preopercular margin. Opercle, cheek and prepectoral base naked. Prepelvic region with patch of scales in 10–12 rows. Ctenoid scales on side of body, becoming cycloid anteriorly beneath pectoral fins; cycloid scales on nape, abdomen and prepelvic region.

Head pores as in genus.

Sensory papillae pattern illustrated in Figure 32. Accessory horizontal rows of papillae below the *d* row observed in all specimens from the Indian Ocean and most from the western Pacific (lacking in most specimens from Japan).

Coloration of fresh material. Based on slides of fish from Flores, Palau, New Britain and the Comores (Fig. 33). Color pattern as for preserved specimens.

Live fish with head and dorsal half of body soft greenish grey to yellowish grey, becoming whitish to bright white ventrally; scales on dorsum with pale bluish white spot in centre. Mid-lateral large oval blotches and smaller body spots yellowish brown, darker dorsally. Indistinct broad to narrow yellowish brown to greyish brown vertical bars present (almost indistinguishable in fish from Maumere Bay, Flores); dense black triangular spot at caudal-fin base. Head with rounded to irregular brownish blotch on centre of opercle; indistinct brownish line or irregular blotch may be present on posterior part of cheek, partly joined to opercular blotch. Opercle with scattered dusky-margined small light orange spots. Cheek and dorsal part of opercle with one to several small dark-margined iridescent pale blue spots. Interorbital area, snout, upper lip and anterior half of lower lip greyish, rest of lower lip whitish. Iris pale golden with blackish rim. Fleshy knob on eye orange red. Crest on nape with orange red to pale orange margin. Dusky “tear” mark under eye indistinct. Pectoral-fin base greenish grey to whitish, with distinct blackish comma-shaped mark across bases of fin rays (in some photographs the “dot” of the comma is black, the remainder reddish orange); a curved blue line variably present along anteroventral margin of comma-shaped mark.

Fins mostly folded in live specimens, but color partly visible. First dorsal fin translucent bluish grey with reddish orange stripes. Second dorsal fin translucent bluish grey, becoming paler and bluer posteriorly, with reddish orange stripes and spots; fin margin narrowly reddish orange. Anal fin bluish grey with an elongate dusky orange red streak beside each fin ray, streaks becoming ocellate posteriorly in one fish. Caudal-fin membranes reddish, fin

rays blue to bluish grey; dorsal half of fin with oblique rows of small pale bluish spots. Pectoral fin translucent to dusky, at least ventral half of fin with many rows of fine whitish spots. Dorsal surface of pelvic fins pale bluish white to whitish, with several rows of oval yellowish brown to dull orange spots.

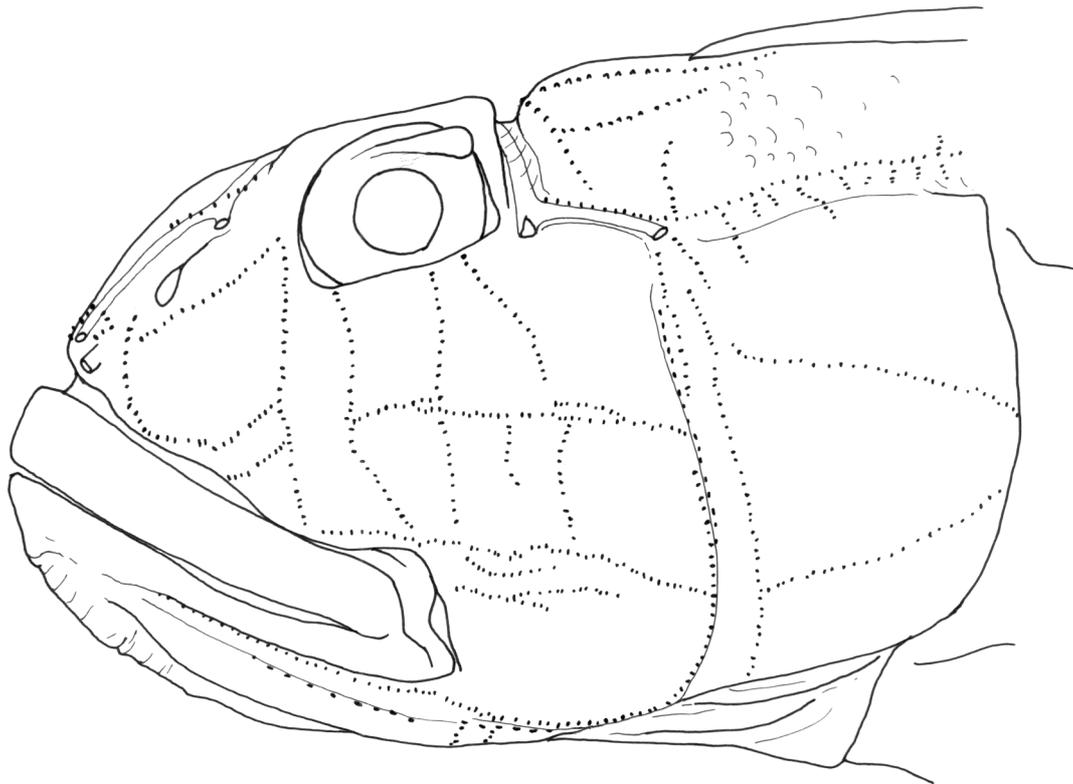


FIGURE 32. *Oxyurichthys papuensis*, sensory papillae pattern, NTM S.13166-012, 97 mm male, Flores, Indonesia.

In freshly dead specimens, the orange red pigment is more clearly defined and the sensory papillae on the head are dark orange red.

Coloration of preserved material. Head and body light yellowish to brownish, with grey-brown to dark brown markings (Fig. 34). Four rounded to oval brown blotches along mid-side of body, and distinct black to blackish triangular (rounded in some specimens) blotch at caudal-fin base; smaller mid-lateral brown blotches or spots interspersed with large blotches. Eight or nine vertical diffuse brown to greyish brown bars (anteriormost bar usually fairly indistinct) placed evenly along side of body, broadest bars confluent with the large oval mid-lateral blotches, bars may narrow ventrally, become diffuse or become dark, obscuring mid-lateral blotches. Scales of dorsum with margins narrowly outlined with dusky pigment; on anterior half of body these scales with whitish centres. Interorbital and snout area slightly darker than rest of head. Small, approximately rectangular, dusky grey-brown blotch on cheek immediately ventral to eye, forming short “tear” mark that does not extend to jaw. Triangular grey-brown to blackish blotch above rear margin of the jaws, color may extend diffusely to eye, but does not reach “tear” mark. Upper lip grey-brown to brownish, lower lip mostly whitish, tip dusky. Chin dusky to brownish. Small black spot anteriorly on anterior narial tube, posterior narial rim same color as surrounding skin. Fleshy nape crest with dusky to dark brown margin. Fleshy knob on eye white. Opercle may have rectangular to triangular dusky patch in centre; most of opercle (and cheek in some specimens, depending upon preservation) covered with small dusky-margined whitish spots and a few short vermiculate lines. Underside of head, breast and belly whitish; black peritoneum may show through body wall at belly midline. Pectoral base light brown to yellowish brown, with dark brown comma-shaped (crescent-shaped in some specimens) extending from just below dorsal edge of fin base across bases of fin rays.

First dorsal fin light to dark dusky, with three to seven narrow dark-margined translucent to faintly dusky stripes running obliquely and irregularly across fin; fin membrane darkest around sixth spine, but no distinct blotch formed. Second dorsal fin dusky with about seven to many dark-margined translucent to light dusky stripes or rows

of oval spots; stripes or spots may be oriented approximately parallel to dorsum or somewhat obliquely. Anal fin dusky to light brownish, distal third darker greyish brown. Caudal fin with ventral half darkest, with greyish brown streaks along membranes; submarginal narrow dusky-edged whitish streak along ventral edge in some specimens; dorsal half of fin with about 7–12 oblique rows of dusky-margined oval spots which may coalesce, forming irregular rows; mid-lateral portion of fin relatively plain. Pectoral fin faintly to dark dusky, with posteroventral portion darkest; in some specimens, many rows of small indistinct dusky-margined round whitish spots present, not distinct on ventral half of fin. Pelvic fins with frenum and spines whitish, remainder of fin membrane dusky to blackish; dorsal side of fins faintly mottled in some specimens.



FIGURE. 33. *Oxyurichthys papuensis*, live fish in Guam. Photograph by the late Tim Allen.

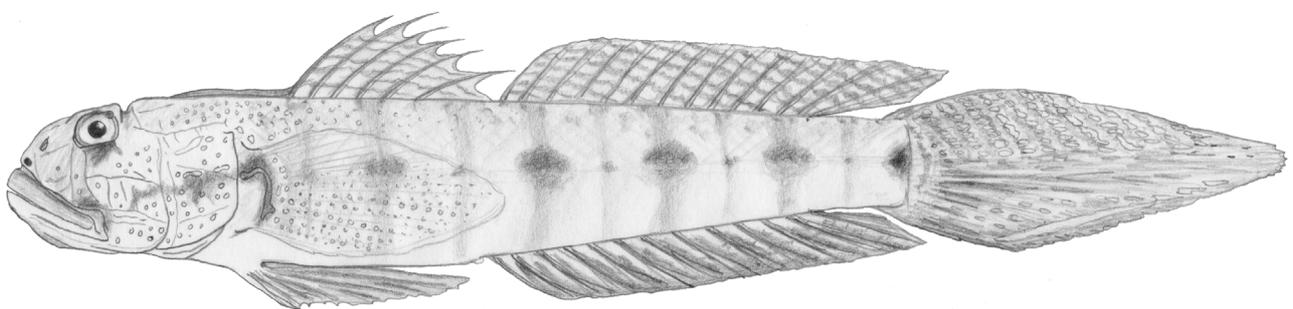


FIGURE. 34. *Oxyurichthys papuensis*, color pattern, based on specimens from Comoros Islands and Indonesia.

Comparisons. Most similar to *O. petersii* from which it is distinguished by lower lateral scale counts (62–79, usually upper 60s to low 70s, in *O. papuensis* compared to 72–92, usually upper 70s to low 80s in *O. petersii*), the presence of eight or nine vertical bars on the sides of preserved specimens of *O. papuensis* compared to four faint blotches on *O. petersii*, and the presence of an accessory longitudinal row of neuromasts below the *d* row in *O. papuensis* from the Indian Ocean that is absent in *O. petersii*. *Oxyurichthys nuchalis* is distinguished from *O.*

papuensis in lacking prepelvic scales, having 46–53 lateral scales, no bars on the side of the trunk, a dark spot on the posterior portion of the first dorsal fin, and no callus on the eye. This species differs from *O. auchenolepis* in having vertical bars on the sides of the trunk interspersed with the large blotches, a black spot at the base of the anterior nares, and a distinct black spot at the base of the caudal fin. In *O. auchenolepis* the low median crest on the nape has scales, but it is always naked in *O. papuensis*. Also similar to *O. notonema* from which it is distinguished by pigmentation of the pelvic fins, which are barred or mottled in *O. notonema*, but dusky in *O. papuensis*, lacking a dark spot on the posterior first dorsal fin (present in *O. notonema*), pigmentation of the trunk (bars in *O. papuensis* vs large blotches in *O. notonema*), the elongation of the first dorsal spines in *O. notonema* and in possessing a callus on the eye which *O. notonema* lacks. *Oxyurichthys limophilus* also lacks the callus on the eye, has no vertical bars on the trunk, and has mottled or barred pelvic fins over a dusky background. None of the other *Oxyurichthys* species possesses the accessory papillae row beneath the *d* row seen in most *O. papuensis*.

Distribution. New Caledonia, Papua New Guinea, Palau, Japan, Taiwan, Indonesia, Philippines, Seychelles, east Africa, Persian Gulf.

Ecology. Jack Randall (*in litt.*) noted that specimens in Palau “will dart into mud bottom head first where there is no apparent permanent burrow”. Koumans (in Blegvad 1944) described a single specimen from the Gulf of Oman being taken from the stomach of a sea snake, *Hydrophis lapemoides* Gray.

Remarks. The syntypes of *Oxyurichthys oculomirus* Herre were destroyed in WWII, but Herre’s color pattern description is consistent with that of *O. papuensis*. We have seen no recent material of this species from Papua New Guinea.

***Oxyurichthys paulae* Pezold, 1998**

(Figs 35–37; Tables 2–5)

Oxyurichthys paulae Pezold, 1998: 689–691 (off Cochin, India).

Diagnosis. Tentacle on dorsoposterior of eye; upper lip constricted at premaxillary symphysis, less than half maximum lip width; first dorsal-fin spines not elongate, not reaching beyond second or third second dorsal-fin element when appressed; anterior nares with low rim, not darkly pigmented; nape lacking well-developed membranous crest, represented by short piece of membrane at base of first dorsal spine; no gular spots; scales on dorsum lightly outlined in black, but no spots; four broad lightly contrasted bars on side of trunk, variably reaching dorsal or anal fins; large basicaudal spot; no saddle present on caudal peduncle; scales ctenoid laterally on trunk posterior to origin of second dorsal fin, cycloid anteriorly; prepelvic region scaled; lateral scales 43–50, modally 43; 24–26 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. INDIA: Holotype, BPBM 27556, 66.1 mm SL male, off Cochin, substrate mud and some shell, 34–38 m, trawled, J.E. Randall and B.B. Collette, 2 February 1980. Paratypes, BPBM 34516, 3(67–69), same data as holotype; USNM 346922, 2(64–66), same data as holotype; CAS 74810, 2(62–66), same data as holotype; AMS B.8351, 1(57), Bombay, F. Day, October 1885.

Description. Based on nine specimens, 57–69 mm SL. An asterisk indicates the counts of the holotype.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 24–26*; segmented caudal rays 9/8*; branched caudal rays 8/7*; lateral scale count 43–50 (modally 43, 46*); TRB 11–16 (13*); predorsal scale count 12–15 (14*).

Body compressed. Head deeper than wide, HL 21–22% SL (mean 21%). Depth at posterior preopercular margin 58–71% HL (mean 64%). Width at posterior preopercular margin 50–62% HL (mean 55%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through midpoint of orbit; upper jaw 50–57% HL (mean 53%). Eyes lateral, high on head, top forming part of dorsal profile, 25–33% HL (mean 29%). Tentacle on dorsoposterior eye short and flat, sometimes triangulate in type series; in specimen collected by Day in 1885 an elongate tentacle on left side, none present on right. Snout rounded, 24–33% HL (mean 30%). Interorbital narrow, 4–10% HL (mean 6%). No membranous crest on nape midline, short membrane joining first dorsal-fin spine to nape. Body depth at anal origin 13–17% SL (mean 15%). Caudal peduncle compressed, length 10–13% SL (mean 11%). Caudal-peduncle depth 9–10% SL (mean 10%).

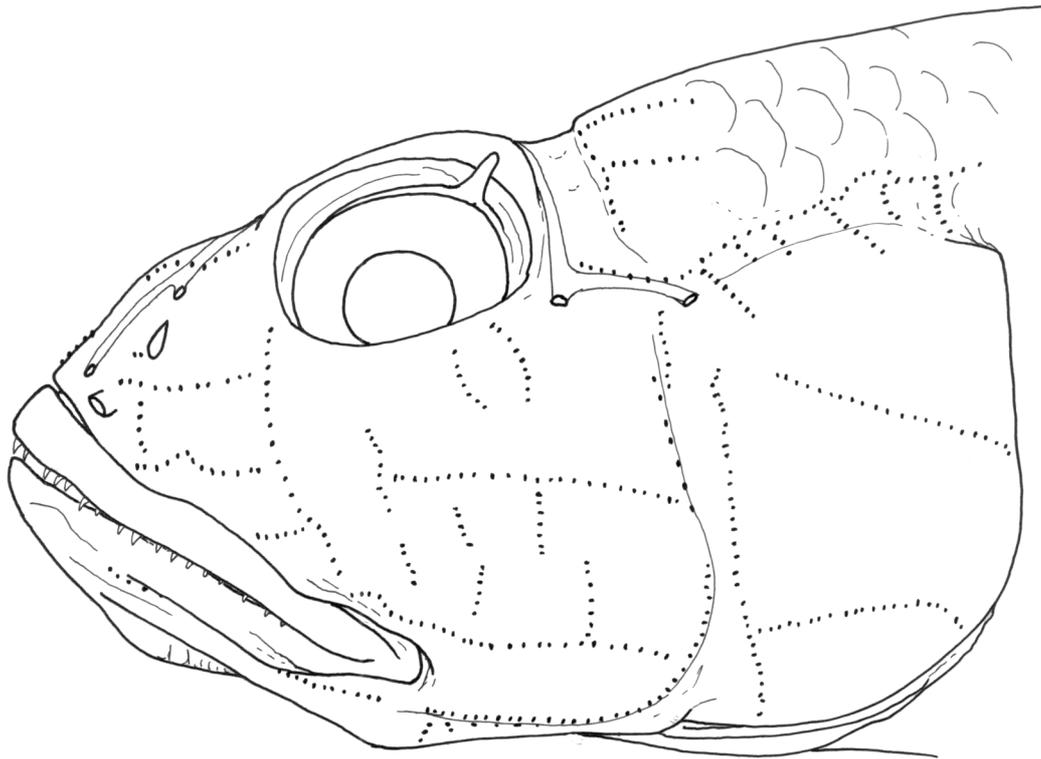


FIGURE. 35. *Oxyurichthys paulae*, sensory papillae pattern, composite, mostly drawn from BPBM 27556, 67 mm male, with few details from USNM 346922, Cochin, India.



FIGURE. 36. *Oxyurichthys paulae*, dead specimen from Cochin, India. Photograph by A. Murugan.

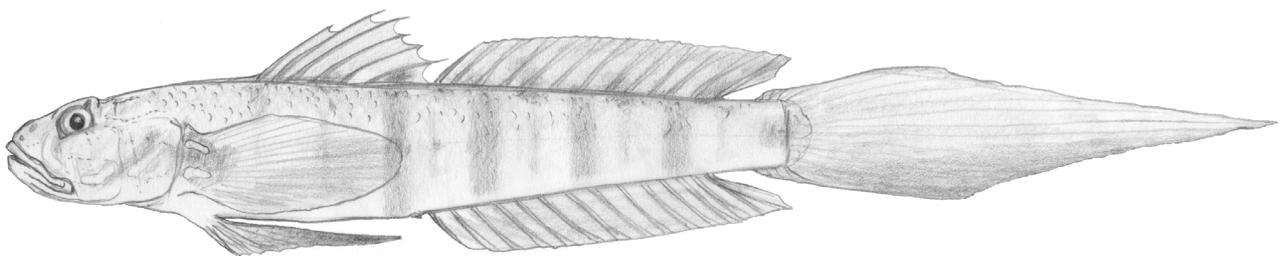


FIGURE. 37. *Oxyurichthys paulae*, color pattern, based on specimens from India and color slide.

First dorsal fin with filamentous spines, first five spines nearly equal in height, third or fourth spine longest, increasing slightly in size through third or fourth spine with first and sixth spines shortest. Appressed spines not reaching past second or third second dorsal-fin element. Second dorsal-fin rays moderately long, ranging from anterior rays about equal to head length to posteriormost rays greater than head depth, anal fin slightly lower, posteriormost rays in both longest, reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anal-fin origin and second anal-fin element, 24–28 % SL (mean 25%). Pelvic fins rounded to oval, reaching anus in females, reaching anal-fin origin in males, 19–25% SL (mean 22%). Caudal fin elongate, pointed, 39–68% SL (mean 55%).

Anterior naris with slightly raised rim, placed close to upper lip. Posterior naris oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: two or three triangulate on lower ceratobranchial, two elongate fused rakers with a third smaller process at the angle, and a single fleshy lobe derived from gill rakers on the epibranchial; rakers on outer face of second arch about 15–18 reduced stubs. Blade-like inner rakers on other arches about equal length of first arch inner rakers. Tongue tip rounded. Upper lip constricted at premaxillary symphysis, one third to one half of maximum lip width. Upper jaw teeth in single row, about 20–27 on each premaxilla separated by prominent gap at symphysis. Lower jaw teeth in band with inner and outermost rows pronounced, about 30 in outer row each side of mandibular symphysis, innermost row with about 12 strong recurved canines on each mandible, largest near symphysis. Teeth in upper jaw strong canines, about twice size of lower jaw teeth in outer row.

Nape fully scaled to above preopercle. Opercle, cheek and pectoral base naked. Prepelvic area covered with about six rows of small cycloid scales. Abdomen scaled forward from anus to infracarinalis medius muscle. Ctenoid scales on side of body posteriorly, with cycloid scales along bases of anal and second dorsal fins, becoming completely cycloid anteriorly beneath second dorsal-fin origin.

Sensory papillae pattern illustrated in Figure 35.

Coloration of fresh material. From slides of recently dead specimens from southern India, specimens trawl-damaged; color pattern as shown (Fig. 36). Head and body whitish to whitish grey, dorsum duskier, scales on dorsum with narrow blackish margins. Four soft grey broad vertical bands on side of body and soft grey rounded blotch on caudal-fin base. Papillae lines on nape and cheek grey. Interorbital and top of snout dusky grey mottled with pale fleshy orange, skin around posterior edge of eye fleshy orange. Iris pale golden orange, blackish dorsally and ventrally. Ocular tentacle light orange. Cheek by ventral margin of eye blackish (not forming “tear” blotch); short indistinct bluish white irregular horizontal stripe on mid-cheek. Opercle dusky with diffuse yellowish brown blotch in centre. Tip of upper jaw dusky grey, rest of jaws whitish. Short broad vermiculate dusky-margined whitish line crossing ventral half of preopercle, oriented toward dusky blotch on opercle. Pectoral base with large dark yellow blotch in centre, bordered above and below by short dusky-margined pale blue stripes.

First dorsal fin with nearly all membranes missing; remnants of dark grey spot present, posterior to sixth spine; rest of fin may have been whitish with reddish and dusky markings. Second dorsal fin similarly damaged, colors on spines indicate that fin may have been dusky with central row of white spots or white stripe, with dusky grey and reddish markings above and below stripe. Caudal fin whitish, dusky grey posteroventrally. Anal fin whitish. Pectoral fin translucent, dusky posteroventrally. Pelvic fins bright white, blackish on posterior half to two-thirds of fin.

Coloration of preserved material. Head and body light yellowish to brownish, scales on dorsum narrowly outlined in dark brown to blackish (Fig. 37). Four broad vertical dusky brownish bars on side of body, reaching from dorsal to ventral midline; in some specimens, small brownish blotch or dusky bar present on mid-side interspersed with broad bars. Indistinct round brownish spot on caudal-fin base. Interorbital area and top of snout dusky. Ventral edge of eye faintly dusky posteriorly. Ocular tentacle whitish with dusky tip. Anterior narial tube with small brown spot medially. Sensory papillae on head dusky. Pectoral base brownish, darker toward centre of fin base. Chin, isthmus, breast and belly midline whitish.

First dorsal fin dusky grey, with indistinct blackish blotch on membrane posterior to sixth spine. Second dorsal and anal fins dusky to greyish. Caudal fin dusky to brownish, darkest posteroventrally. Pectoral fin translucent to faintly dusky, becoming darker posteroventrally. Pelvic fins dusky, becoming mottled blackish to black on posterior half of fin.

Comparisons. This species is very similar in appearance to *O. uronema* and *O. tentacularis*. It differs from *O. uronema* by first dorsal-fin spine lengths (no spines elongate in *O. paulae*, while second through fifth spines

elongate in *O. uronema*), color pattern (*O. paulae* has only bars on the side of the body, not alternating spots and bars) and pelvic-fin length (slightly longer in *O. paulae*). In both these species, the scales on the posterior part of the body have their rear edges scalloped or gently indented. It is also close to *O. tentacularis* from which it is distinguished by the absence of a membranous crest and naked median on the nape (present in *O. tentacularis*), a greater number of pectoral-fin rays (modally 26 vs. 21), larger scales on the trunk (43–50 vs. 54–66 in a lateral series and 17–18 vs 18–24 transverse forward rows), and color pattern (*O. tentacularis* has oblong blotches on the side of the trunk instead of vertical bars, although blotches may be connected to dorsum by indistinct oblique bars).

Distribution. Known only from the type specimens, trawled off Cochin, India, a specimen collected at Bombay by Day in 1885, and a recent specimen from Cochin.

Ecology. The types were trawled from a mud bottom with some shell present, at a depth of 34–38 m.

Remarks. The fused gillrakers observed at the angle of the first gill arch were omitted from the original description (Pezold, 1993). All specimens we have examined show this feature.

***Oxyurichthys petersii* (Klunzinger, 1871)**

(Figs 38–40; Tables 2–5)

Apocryptes (Gobiichthys) petersii Klunzinger, 1871: 480 (Kosseir, Egypt, Red Sea).—Fricke 1992: 10 (“Kosseir” (Al-Qusayr), Egypt, Red Sea).

Apocryptes papuensis—Borsieri 1904: 207 (Isole Daalac; Isola Mandola e golfo di Amfila [Red Sea]).

Oxyurichthys papuensis—Goren 1979: 45, fig. 33 (Mt Guba (Ethiopia); Massawa; Harkiku Bay); Ben-Tuvia 1983: 37–43 (Mediterranean coast of Israel); Goren 1986: 651 (Red Sea); Maugé 1986: 379 (in part; Goren & Dor 1994: 65 (Red Sea).

Oxyurichthys petersi—Akyol et al. 2006: 389 (Govoka Bay, Aegean Sea).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted; teat-like callus or fleshy knob posterodorsally on eye; dark anteromedial spot on anterior nares; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; trunk with four faint elongate to oval mid-lateral blotches and distinct triangular spot on caudal-fin base; nape scaled with naked median and membranous crest; scales ctenoid on most of trunk, becoming cycloid anterior to vertical through middle of first dorsal fin; prepelvic region with scales in larger specimens; lateral scales 72–92, modally 80; first dorsal fin low, spines of appressed fin not reaching posterior to third second dorsal-fin element; 21–24 pectoral-fin rays, modally 23; pelvic fins dusky, not barred or mottled; no dark spot present on posterior field of first dorsal fin; no accessory row of neuromasts beneath *d* row on cheek.

Material Examined. RED SEA: Syntype of *Apocryptes (Gobiichthys) petersii*, SMNS 1753, 97 mm male, Kosseir [Al-Qusayr]. SMF 14106, 1(48), Massaua, A. Ben-Tuvia, 16 April 1962; USNM 261523, 1(113), Ethiopia, off Isle Taunanich, 33 m, FV *Menelik*, L. Knapp, 19 September 1971; USNM 261524, 2(111–115), Ethiopia, off Isle Umm es Sahrigh Lighthouse, 35 m, FV *Menelik*, L. Knapp, 19 September 1971; HUJ 8240, 1(81), Mt Guba, Eritrea, A. Ben-Tuvia, 31 December 1957; HUJ 17679, 1(63), Elat, D. Golani, 22 April 1994. MEDITERRANEAN SEA: HUJ 10956, 3 of 7(100.5–106), Ashdod, M. Tom, 4 November 1982; HUJ 15066, 3 of 5(110–121), Ashdod, D. Golani, 11 May 1991; HUJ 13802, 1(33), Haifa, D. Golani, 1 February 1988; HUJ 11327, 3(100–104), Ashdod, M. Tom, 4 November 1982.

Description. Based on 17 specimens, 35–121 mm SL. An asterisk indicates the counts of the syntype.

First dorsal VI*; second dorsal I, 12*; anal I, 13*; pectoral rays 21–24 (mode 23*); segmented caudal rays 8/8*; branched caudal rays 7/7*; unsegmented (procurrent) caudal rays 7/6; lateral scale count 72–92 (mode 80, 87*); TRB 21–29* (mode 26); predorsal scale count 19–36 (mode 23, 29*).

Body compressed, head length moderate, 21–27% SL (mean 23%). Head deeper than wide, depth at posterior preopercular margin 56–74% HL (mean 66%), width at posterior preopercular margin 47–59% HL (mean 55%). Mouth terminal, slightly oblique, forming an angle of about 30–35° with body axis; lower jaw slightly prominent, jaws generally reach to mid-eye or rear margin of orbit. Upper lip not constricted. Upper jaw 45–63% HL (mean 58%). Large eyes lateral, high on head, top forming part of dorsal profile, 23–31% HL (mean 26%). Teat-like callus or fleshy knob posterodorsally on eye. Snout rounded, 26–34% HL (mean 30%). Interorbital narrow, 4–14% HL (mean 10%). Body depth at anal origin 14–19% SL (mean 17%). Caudal peduncle compressed, equally deep as long or slightly deeper than long, length 8–12% SL (mean 10%). Caudal-peduncle depth 9–11% SL (mean 10%).

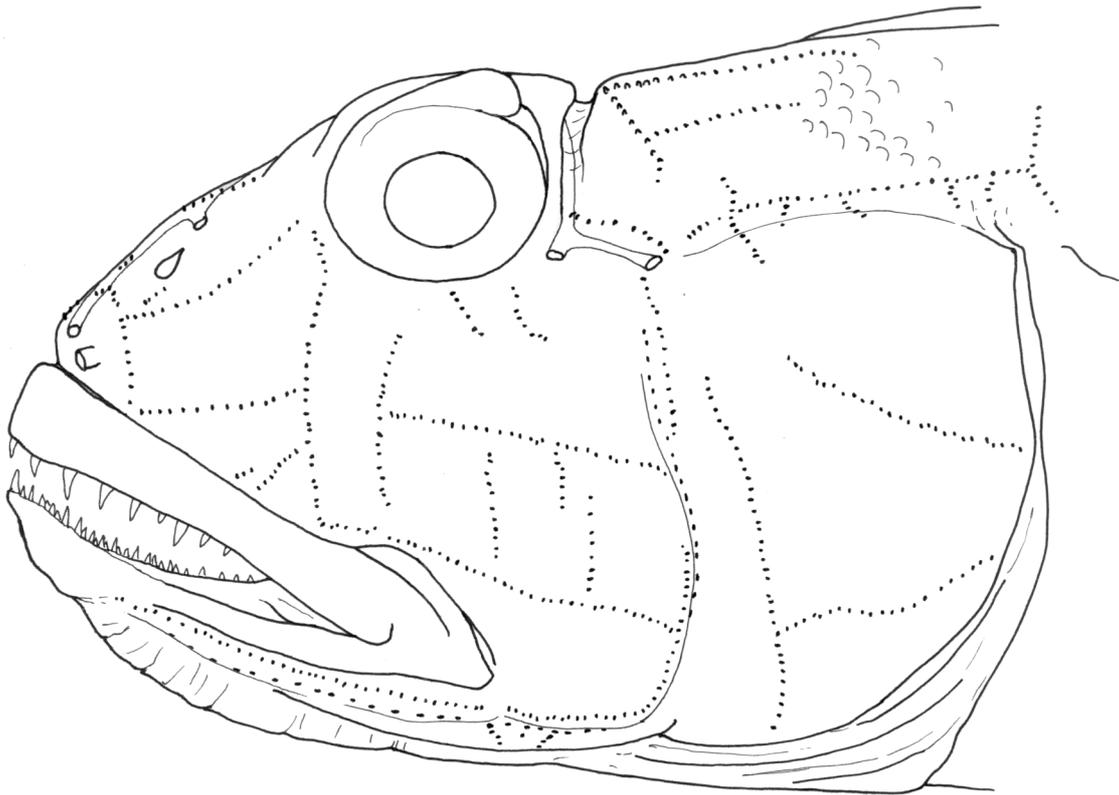


FIGURE 38. *Oxyurichthys petersii*, sensory papillae pattern, HUIJ 11327, 107 mm female, Ashdod, Mediterranean.



FIGURE 39. *Oxyurichthys petersii*, live fish at Port Sudan, Red Sea. Photograph by Sergey Bogorodsky.

First dorsal fin low, tips of spines free, spines may be slightly longer in males than females; spines reach second or third element of second dorsal fin when appressed. First five spines similar in length, but first spine often slightly longer than others; in some females fourth or fifth spines longer than preceding spines, all longer than sixth. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when appressed. Pectoral fin oval, central rays longest, 21–26% SL (mean 24%), extending to or just beyond anal-fin

origin. Pelvic fins rounded to oval, reaching to anus or urogenital papilla, 20–27% SL (mean 23%). Caudal fin elongate, pointed, 34–44% SL (mean 40%).

Anterior naris in very reduced short tube at margin of upper lip. Posterior naris an oval pit midway between eye and upper jaw. Gill opening extends forward to under opercle. Gill rakers on outer face of first arch: three to four (usually three) triangulate on lower ceratobranchial, two to three fused finger-like rakers at angle and a fleshy lobe with two or three (usually three) processes derived from gill rakers on the epibranchial; about 12 nub-like rakers on outer face of second arch. Nine rakers on inner face of first arch, inner rakers on other arches more numerous and elongate than first arch inner rakers. Tongue rounded. Upper jaw with single row of 16–20 large canine teeth each side of premaxillary symphysis, separated by large gap at symphysis in adults about equal in width to bony interorbital width. Lower jaw with narrow band of two to three rows of small teeth, with four to eight strongly recurved canines in innermost row each side of dentary symphysis twice the size of teeth in outermost row in specimens from Ethiopia (as seen in *O. papuensis*), no significant difference in size noted in others.

Nape scaled with naked median along low fleshy crest, scales reaching forward above anterior field of opercle or preopercular margin. Opercle, cheek and prepectoral base naked. Prepelvic region naked or with small patch of scales in 7–10 rows. Ctenoid scales on side of body, becoming cycloid anteriorly beneath pectoral fins; cycloid scales on nape, abdomen and prepelvic region (if present).

Head pores as in genus.

Sensory papillae pattern illustrated in Figure 38. No accessory horizontal rows of papillae below *d* row.

Coloration of fresh material. From slides of live fish from Port Sudan, Red Sea. Color pattern as in Figure 39. Head and body dull yellowish to yellowish brown, whitish ventrally, head becoming greyish anteriorly, with pale blue oblique lines and streaks on side of head and abdomen; body with broad pale blue wavy lines dorsal and ventral to four elongate mid-lateral brown blotches; three smaller brown blotches in between mid-lateral elongate blotches. Blackish fifth (posteriormost) triangular blotch on caudal-fin base. Pectoral-fin base with large brown spot just above centre, with pale blue blotch just below; small blue triangular spot at anterodorsal margin of fin base. Dusky brownish triangular mark on opercle, diffusely connected to brown pectoral base spot by indistinct brownish streak. Crest on nape, knob on eye and spot on eye just ventral to pupil (and partly covering pupil), orange. Iris pale golden orange. Upper lip greyish, lower lip whitish. First dorsal fin bluish white with three broad wavy dull yellowish stripes; fin margin brownish orange. Second dorsal fin irregularly banded with dull yellowish brown and pale blue. Anal fin whitish, dusky distally. Caudal fin translucent to bluish or yellow, dusky ventrally, scattered with indistinct blue spots. Pectoral-fin membranes translucent with rows of small dark-margined light orange and whitish spots. Pelvic fins white with yellowish brown and blue markings (pattern not discernible from slides). A presumed female (not collected) has much more subdued color, with much less yellowish brown and blue coloring on head and body and the lateral blotches are diffuse dark grey.

Ben-Tuvia (1983) describes fresh specimens as having “4–5 longitudinal yellow bands” in the first dorsal fin, the caudal fin “mostly yellow with some grey-blue stripes towards tips and marks of similar color in upper part”, and the dorsal part of the pelvic fins with “yellow blotches on blue background” and ventral part of pelvic fins “with dark tint on membranes”.

Coloration of preserved material. Head and body light brownish, lower abdomen and underside of head paler (Fig. 40). Four elongate to oval dusky blotches usually faintly visible on mid-side of body; distinct brown triangular spot on caudal-fin base. Head with interorbital and snout slightly darker than rest of head. Broad irregular crescent-shaped whitish band right behind eyes, crossing nape just above rear edge of preopercle, several similar indistinct short broad whitish streaks and spots on side of nape; in some specimens pale markings cross the fleshy crest, giving it a faintly banded appearance. Crest without dark margin. Fleshy knob on eye whitish. Opercle with one to three faint broad oblique whitish streaks (streaks may have dusky margins); round whitish spot on anterodorsal part of opercle (is ventral end of oblique nape streak). Small dusky blotch on cheek commencing at lower edge of eye; blotch rectangular to triangular in shape. Dense black spot anteromedially on anterior narial tube. Posterior narial rim same color as surrounding skin. Underside of head and breast light brownish to whitish, isthmus brownish, always somewhat darker than surrounding area. Pectoral base usually plain dusky; in some specimens, small whitish area by dorsal edge of fin base.

First dorsal fin translucent to whitish, with about seven irregular oblique dusky lines crossing membrane; lines vermiculate and coalesced in some specimens. Second dorsal fin whitish to dusky, with about nine irregular narrow dusky lines or rows of partly coalesced oblique dusky streaks. Caudal fin dusky, with darker ventral half; dorsal

half of fin with at least six oblique rows of short dark streaks or oval spots, oblique rows beginning close to fin base. Anal fin brown to blackish with broad darker brown to black margin. Pectoral fin hyaline to dusky brownish, posteroventral part of fin darkest; in some specimens, rows of small dark-margined white to bluish white spots on lower three-quarters of fin. Pelvic fins with spines and frenum whitish, ventral side of membrane between rays dark brown to blackish, dorsal side whitish to dusky, with about four rows of indistinct dusky to blackish curved streaks across fin membranes.

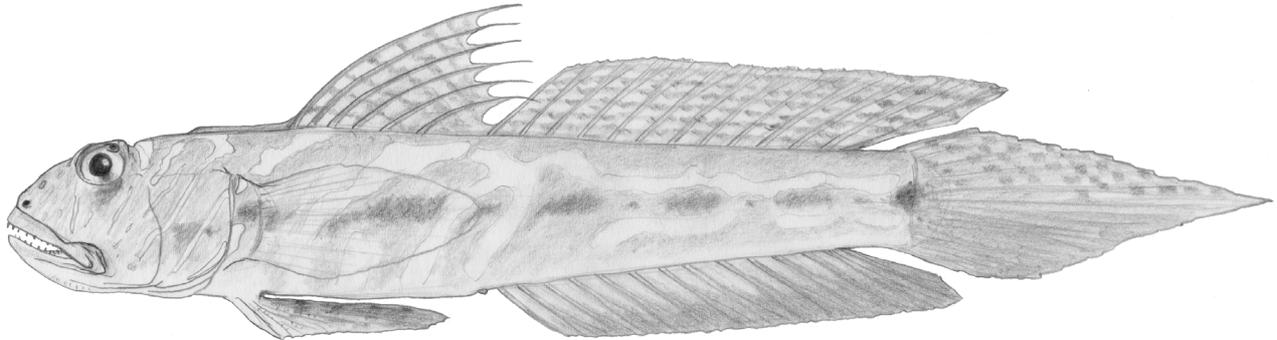


FIGURE 40. *Oxyurichthys petersii*, color pattern, based on specimens from the Mediterranean.

Comparisons. See *O. papuensis* for comparisons.

Distribution. This is a Red Sea endemic, which has colonized the Mediterranean through the Suez Canal (Akyol et al. 2006).

Ecology. Ben-Tuvia (1983) found that the guts of four specimens were filled with mud and fine sand, with the remains of foraminifera, harpacticoid copepods, tanaidaceans, amphipods, isopods, ostracods, molluscs and echinoderms present. Well developed gonads were found in specimens collected in August and November.

***Oxyurichthys rapa* new species**

(Figs 41–43; Tables 2–5)

Diagnosis. Thirteen second dorsal-fin and 14 anal-fin elements; single row of teeth in upper jaw; fleshy tongue rounded; upper lip not constricted at premaxillary symphysis; black spot present on dorsoposterior surface of eye, but no cirrus or cornification; anterior nares with dark anteromedial spot; broad dusky to dark brown area covering gular region beneath preopercle and anterior process of quadrate; scales of dorsum without dark spots on posterior margin; four oval to rounded dusky to brown blotches along mid-side interspersed with dusky spots and indistinct oblique bars, fifth basicaudal blotch rounded to triangular; nape naked; low membranous crest present on nape; weak ctenoid scales laterally on trunk and reaching anterior to second dorsal-fin origin, scales cycloid anteriorly; prepelvic area naked; lateral scales 60–81, modally 70; first dorsal-fin spines elongate with filamentous tips, reaching fourth to eighth second dorsal-fin element when appressed in females, beyond second dorsal-fin terminus in males; 19–20 pectoral-fin rays; pelvic fins blackish with pale frenum; first dorsal fin dusky with three blackish lines crossing fin, leading edge of first spine black.

Material Examined. HOLOTYPE: USNM 378364, 66 mm SL, mouth of River Eke, upper end of Haurei Bay, Rapa, French Polynesia, J.T. Williams and party, 11 August 2004. PARATYPES: USNM 378363, 8 (7, 39–56 mm SL, in ethanol, 1, 57 mm SL, C&S), same as holotype; MNHN 2014-0158, 1 (male, 41 mm SL), same as holotype; MNHN 2014-0159, 1 (female, 49 mm SL), same as holotype; USNM 378364, 1(20), probably vicinity of Haurei Bay, Rapa, French Polynesia, J.T. Williams and party, 18 November 2002.

Description. Based on nine specimens, 39–66 mm SL. An asterisk indicates the counts of the holotype (Fig. 41).

First dorsal VI*; second dorsal I,12–13*; anal I,13*; pectoral rays 19–20, modally 20*; segmented caudal rays 9/8; branched caudal rays 7/7* or 8/7; lateral scale count 60–81 (modally 70, 66*); TRB 18–26 (22*); nape naked, with low fleshy crest along midline.



FIGURE 41. *Oxyurichthys rapa* n. sp. holotype, USNM 378363, 66 mm female, Haurei Bay, Rapa. Photo by Jeff Williams.

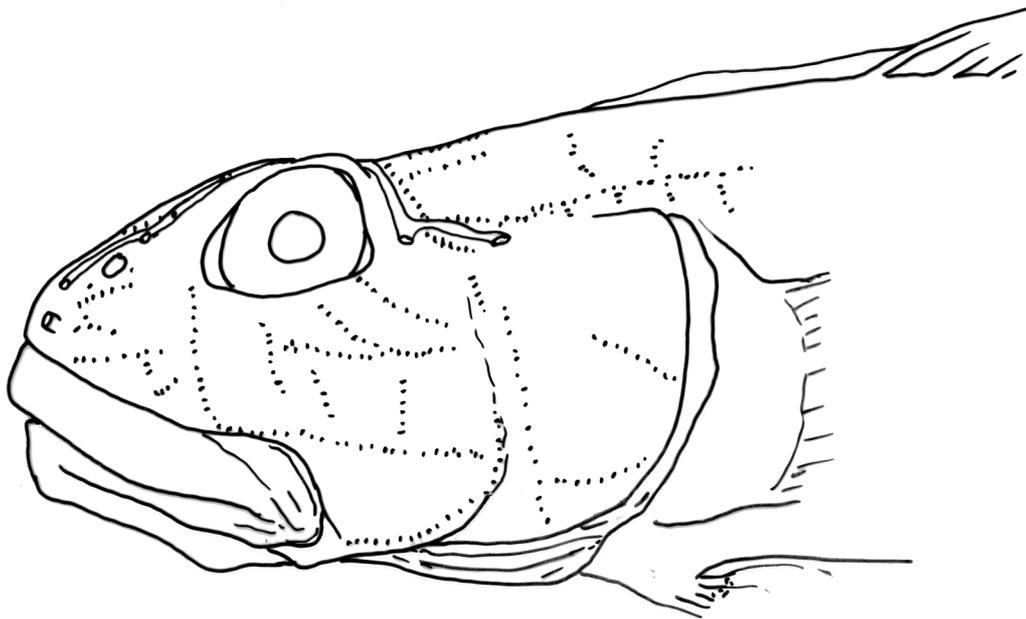


FIGURE 42. *Oxyurichthys rapa* n. sp., sketch of sensory papilla row pattern (incomplete).

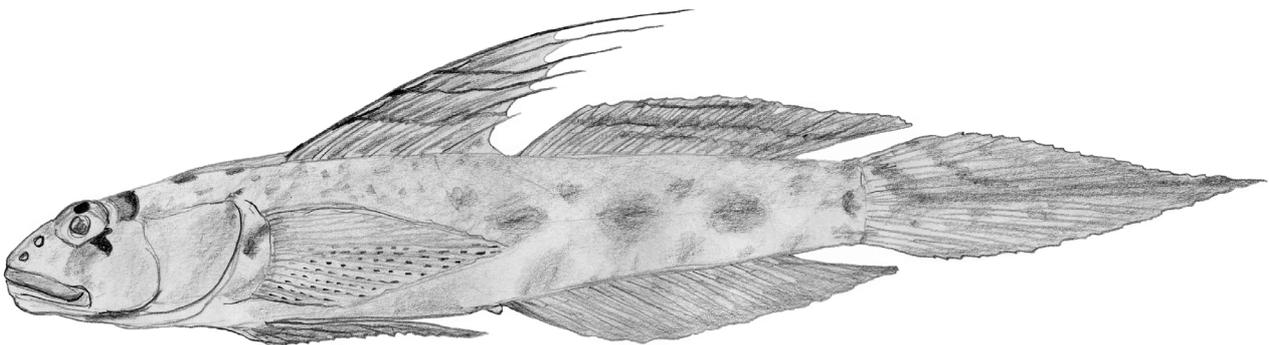


FIGURE 43. *Oxyurichthys rapa* n. sp., preserved color pattern, composite of three largest specimens in USNM 378363.

Body compressed (less so anteriorly). Head usually deeper than wide, HL 24–27% SL (mean 26%). Depth at posterior preopercular margin 63–70% HL (mean 67%). Width at posterior preopercular margin 52–66% HL (mean 60%). Mouth terminal, slightly oblique, forming an angle of about 25–30° with body axis; jaws reaching to vertical through midpoint of eye or more posteriorly, but not to rear margin of eye. Upper lip not constricted. Upper jaw 48–56% HL (mean 53%). Eyes lateral, high on head, top forming part of dorsal profile, 22–25% HL (mean

24%). Black spot on dorsoposterior surface of eye, no tentacle. Snout rounded, 30–39% HL (mean 33%). Interorbital narrow, 8–10% HL (mean 9%). Body depth at anal origin 15–18% SL (mean 16%). Caudal peduncle compressed, length 9–11% SL (mean 10%). Caudal-peduncle depth 8–10% SL (mean 9%).

First dorsal-fin spines elongate with filamentous tips, reaching fourth to eighth second dorsal element when appressed in females, beyond second dorsal-fin terminus in males. Second dorsal and anal fins low, pointed posteriorly, posteriormost rays longest, rays reaching well beyond caudal-fin base onto fin when appressed. Pectoral fin oval, central rays longest, 21–25% SL (mean 24%), reaching to vertical above second or third anal-fin element. Pelvic fins oval, reaching to anal-fin origin or urogenital papilla, 22–25% SL (mean 24%); frenum fimbriate, with finely-lobed appearance. Caudal fin elongate, pointed, 35–47% SL (mean 41%).

Anterior naris in short tube, placed close to upper lip. Posterior naris rounded, placed midway between eye and upper lip. Gill opening extending forward to lower edge of pectoral-fin base. Gill rakers on outer face of first arch: three triangulate on ceratobranchial, two elongate fused rakers at angle and tripartite fleshy lobe on epibranchial formed from fused modified gill rakers; five rakers on inner surface of first arch, inner rakers on other arches more numerous and bladelike than first arch inner rakers; 12–14 rudimentary stubby rakers on outer surface of second arch. Tongue tip with rounded margin. Teeth light honey brown to dark brown; upper jaw with single row of curved canine teeth. Lower jaw with three to four rows of teeth; innermost and outermost rows most pronounced, innermost row highly recurved, two to three nearest symphysis on each side much larger than others, outermost row with evenly sized teeth on each side of premaxilla.

Opercle, cheek, pectoral base and prepelvic area naked. Nape usually naked. Weak ctenoid scales midlaterally on body to gap between dorsal fins or to below second dorsal-fin origin, cycloid scales anteriorly on sides, abdomen, and nape.

Sensory papillae pattern shown in Figure 42.

Coloration of fresh material. Color pattern as in Figs 41 and 43. Fresh-dead color from photographs by Jeff Williams. Head greenish grey, becoming paler ventrally, underside of head, breast and anterior portion of abdomen white. Body greyish yellow, covered with dull red to purplish blotches, short oblique bars and spots arranged in loose irregular rows along length, including about five midline blotches of which the posteriormost (at caudal base) is darkest. Black crescent across nape behind eyes, curved black blotch on pectoral base that diffuses onto pectoral-fin ray bases, and blackish rounded blotch on ventral margin of eye, contrasting with other head markings. Iris golden-orange, with dark grey area above and below pupil. Upper lip blackish on posterior half, blackish area narrowing anteriorly to become thin blackish margin to entire lip. Blackish area above rear margin of the jaws on cheek. Upper part of cheek and anterior part of opercle with few rounded iridescent green spots (similar color to pectoral-fin base). Dark gular spot partly visible. Most of pectoral-fin base iridescent green to blue-green, wrapping around the rounded black blotch.

First dorsal fin dull yellowish with dull reddish band at base, crossed by about seven dull red irregular lines, lines darkest at commencement of lines on first spine. Second dorsal fin dull yellow with faint grey patches, crossed by about six dull red to greyish red irregular slightly oblique lines, dull red blotches along base of fin. Anal fin purplish to dull reddish grey basally, becoming greyer toward fin margin. Caudal fin translucent greyish with rows of dull yellow and reddish spots alternating along fin rays mostly on upper half of fin. Pectoral fin translucent pale yellow, with rows of small red-brown spots on rays on ventral half of fin. Pelvic fins white anteriorly, most of fins yellow with pinkish ray bases.

Coloration of preserved material. Head and body light yellowish brown to fawn, with brown to greyish brown or black markings (Figs 41, 43). Interorbital area and behind eyes darker than rest of head. Short brown, irregularly shaped broad “tear” blotch extending from ventral edge of eye, becoming diffuse near eye and not reaching rear margin of the jaws; upper rear corner of “tear” blotch black. Dark brown narrow crescent-shaped mark, darkest posteriorly, crossing nape directly behind eyes; indistinct irregular light brown blotches and narrow lines crossing nape. Opercle mostly plain, light dusky. Fleshy tissue dorsal to eyeball dusky; distinct round black spot on dorsoposterior edge of eye. Distinct dark brown spot on mediad half of anterior narial tube; posterior naris with very narrow dark brown rim. Crest on nape dusky brownish with narrow dark brown to black edge, darker where two nape blotches coincide with crest. Lips dusky; upper lip with distinctive dark brown edging mostly on posterior part of lip, lower lip becoming paler to whitish posteriorly. Underside of head, chin and branchiostegal membranes dusky to light brown. Gular region with broad diffuse brown blotch, mostly concealed by quadrate; posteriorly blotch covering basal part of first two branchiostegal rays. Breast lighter than underside of head; very

few melanophores present. Pectoral-fin base with large brown comma-shaped spot, skin immediately surrounding “comma” usually pale.

Side of body with five diffuse brown blotches along mid-side; anterior four blotches rectangular to oval, posteriormost blotch (at caudal-fin base) rounded to triangular. Additional diffuse brownish blotches and indistinct ventral bars present in between lateral blotches. Along dorsal midline and upper quarter of body, indistinct paired light brown blotches, spots or oblique narrow lines present. Abdomen blackish ventrally (peritoneum dense black, showing through body wall).

First dorsal fin translucent to dusky with three blackish lines crossing fin; first dorsal spine with black leading edge and usually pale area below each blackish line on membrane; diffuse curved grey streak on membrane at base of each fin element. Second dorsal fin translucent to dusky grey, with three to five oblique darker grey to blackish lines crossing fin; lines may be broken into series of short oblique dark lines following fin rays. Anal fin plain dark grey, becoming darker toward margin. Caudal fin dusky, usually darkest toward base and centre line of fin; three or four diffuse dusky spots or lines may be present along dorsal margin of fin, dorsal half of caudal fin may have four or five diffuse oblique irregular dusky streaks or series of oval spots crossing fin. Pectoral fin with dusky membrane, darker grey on ventral half of fin; at least lower half of fin speckled with series of many fine dark grey to blackish spots. Pelvic fins dark grey to blackish with pale frenum.

Comparisons. The distinctive dense black spot on each eye, the dusky to dark brown gular area, and dark-edged upper lip observed in this species distinguish it from other *Oxyurichthys* species. It appears to be most similar to *Oxyurichthys lonchotus* but differs in that the two dark brown gular spots in that species are replaced by a large dusky to brown gular region and the anal fin is plain dark grey without the claw-shaped dark marks at the base of each anal-fin ray in *O. lonchotus*. It also differs from that species in having longer first dorsal-fin spines, most pronounced in males for which appressed spines may extend beyond the second dorsal-fin terminus in *O. rapa*.

Distribution. Known only from Haurei Bay, Rapa, French Polynesia.

Ecology. The only known specimens were collected over a mud and rock substrate, at 0–0.5 m depth.

Etymology. The species is named for the island of Rapa in French Polynesia, the species epithet being a noun in apposition.

***Oxyurichthys stigmalocephus* (Mead & Böhlke, 1958)**

(Figs 44–46; Tables 2–5)

Gobionellus stigmalocephus Mead & Böhlke, 1958: 286, fig. 1 (Grand Bahama Bank).—Robins & Ray 1986: 247, pl.46 (Florida; Bahamas; S Gulf of Mexico to Suriname).

Oxyurichthys stigmalocephus—Pezold 1998: 684 (Gulf of Mexico; Bahamas; British West Indies; Puerto Rico; Martinique; South America); Murdy & Hoese 2003: 1795 (Florida, Bahamas, and S Gulf of Mexico to Suriname); Smith et al. 2003: 64 (Belize); Pezold 2004a: 273; Nelson et al. 2004: 173; McEachran & Fechtelm 2005: 723 (Gulf of Mexico).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted; no callus, tentacle or black spot on the eye; anterior nares not darkly pigmented; no spots on gular membrane beneath preopercle or anterior process of quadrate; no dark spots on scales of trunk; no prominent blotches, vertical bars or basicaudal spot on trunk; nape naked or with one or two scales posteriorly, membranous crest present; scales ctenoid on trunk, becoming cycloid anteriorly beneath first dorsal fin; abdomen with cycloid scales, naked over *infracarinalis* muscle; no prepelvic scales; lateral scales 70–92, modally 87; first dorsal fin low, spines of appressed fin reaching third second dorsal-fin element; 22–23 pectoral-fin rays; pelvic fins light brownish, with many rows of small round dusky-edged translucent and brown spots; more translucent spots than brown spots anteriorly. First gill arch with three triangulate rakers on the lower ceratobranchial, a pair of fused elongate and thin rakers on the upper ceratobranchial near its connection to the epibranchial and a fleshy lobular raker with three processes (one very small) on the epibranchial. First dorsal fin with spot behind or on both sides of sixth spine.

Material Examined. ANTIGUA: ANSP 144382, 1(53), S side of Green Island, eastern Antigua, 9 m, J.E. Randall, 25 April 1964; UF 11306, 1(73), off Green Island, about 60 m from shore, E coast, C.R. Gilbert and J.E. Randall, 25–30 April 1964. BAHAMAS: ANSP 81233, holotype of *Gobionellus stigmalocephus*, 47.1 mm SL male,

Green Cay, N side of point forming W tip of island, to 1.5 m, J.E. Böhlke and party, 15 July 1957. ANSP 144295, 2(75–78), Cat Island, Hawknest Point, 15 m, P. Colin, 6 July 1974; USNM 264988, 1(72), N of Bahamas, 4938 m, RV *Oregon*, V. Springer, 14 December 1964; GCRL 3852, 1(51), same data as preceding. BELIZE: FMNH 86619, 1(53), Glover's Reef, Long Cay, channel between Long and Little Cay, D.W. Greenfield, J. Thomerson, 27 July 1971. GUYANA: UMML 3992, 2(96–100), N of Georgetown, 54–60 m, RV *Oregon*, 1 September 1958. GULF OF MEXICO: ANSP 81855, paratype of *Gobionellus stigmalocephus*, 55.1 SL male, Gulf of Campeche, Gulf of Mexico, USFWS RV *Oregon* Stn. 1058, 22 fms, 16 May 1954. FMNH 65953, 1(100), 07° 12' 00" N 056° 47' 00" W, Oregon Stn. 2263, 51 m, USFWS RV *Oregon*, 1 September 1958; USNM 159590, paratype of *Gobionellus stigmalocephus*, 72.4 mm SL male, Gulf of Campeche, Gulf of Mexico, USFWS RV *Oregon*, 35 fms, 16 May 1954. MARTINIQUE: ANSP 106060, 1(22), harbor W of Caracoli, inner side of reef coming from W edge of harbor (H.O. Chart 1009), 10.5–15 m, J. Tyler and W. Eschmeyer, 7 July 1965. PUERTO RICO: ANSP 144495, 1(56), Aquadilla, Crashboat Basin, 12 m, J.E. Randall *et al.*, 24 July 1965; ANSP 144379, 2(51–56), El Negro, 12 m, P.L. Colin, 5 February 1976.

Description Based on 15 specimens, 22–100 mm SL. An asterisk indicates the counts of the holotype.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 22–23*; segmented caudal rays 9/8*; branched caudal rays 7/7*–8/7; lateral scale count 70–92* (modally 87); TRB 21–28 (modally 26*); predorsal scale count 0*–2, modally 0. Gill rakers on outer face of first arch 6; rakers on outer face of second arch 12.

Body compressed (less so anteriorly). Head deeper than wide, HL 23–27% SL (mean 25%). Depth at posterior preopercular margin 60–67% HL (mean 64%). Width at posterior preopercular margin 39–62% HL (mean 50%). Mouth terminal, slightly oblique, forming an angle of about 20° with body axis; jaws generally reach to vertical between midpoint and posterior third of eye. Upper lip not constricted at premaxillary symphysis. Upper jaw 45–59% HL (mean 51%). Eyes lateral, high on head, top forming part of dorsal profile, 24–31% (mean 27%). No callus or tentacle dorsoposteriorly on eye. Snout rounded, 25–34% HL (mean 29%). Interorbital narrow, 7–13% HL (mean 9%). Nape completely naked or with a few scales along margins, with fleshy raised crest along midline. Body depth at anal-fin origin 13–17% SL (mean 15%). Caudal peduncle compressed, length 9–13% SL (mean 10%). Caudal-peduncle depth 8–11% SL (mean 10%).

First dorsal fin low, spines with filamentous tips; spines reaching to third element of second dorsal fin when appressed. Spines three and four longest, subequal. Second dorsal and anal fins low, posteriormost rays longest, rays reaching beyond caudal-fin base when depressed. Pectoral fin oval, central rays longest, reaching vertical through anus, 17–22% SL (mean 19%). Pelvic fins rounded to oval, reaching to anus or anal-fin origin, 20–28% SL (mean 24%). Caudal fin elongate, pointed, 38–62% SL (mean 46%).

Anterior naris in short tube, placed close to upper lip. Posterior naris oval pit, placed midway between snout and eye. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: three triangulate on ceratobranchial, two fused elongate rakers at angle and fleshy bilobed process on epibranchial; outer surface of second arch with 12 rudimentary nubs; seven stubby rakers on inner face of first arch; inner rakers on other arches more numerous and bladelike. Tongue tip with rounded margin. Upper jaw with 15–18 large canines in single row, may have a single tooth behind row on each side near symphysis in large specimens. Lower jaw with band of teeth, innermost highly recurved. Upper jaw teeth larger than lower jaw teeth.

Opercle, cheek, nape, pectoral base and prepelvic region naked. Scales weakly ctenoid, with few teeth on posterior margin, on body above midline from fifth dorsal spine rearward, cycloid anteriorly, below midline and on abdomen. Midline of abdomen may be naked.

Head pores as in genus. Sensory papillae pattern illustrated in Figure 44.

Coloration of fresh material. Jim Van Tassell's photograph shows a blue-white fish with four large square blotches along mid-side of body and pairs of broad irregular yellow bars and blotches in space between square blotches; head with broad oblique yellow lines, blotches and spots (Fig. 45).

In Lieske & Myers (1994), the painting on p. 172 shows a whitish fish, pale greyish dorsally, with pale brownish spots on head and body; fins all white, with dense black rounded spot at rear of the first dorsal fin.

Coloration of preserved material. Head and body light brownish to yellowish, usually without discernible mid-lateral dark blotches (as is typical for the genus) (Fig. 46). Nape and anterodorsal part of body with indistinct whitish spots, blotches and short broad irregular bands, one of the latter extends partly onto opercle. Side of head light brownish, with several indistinct whitish spots along ventral margin of eye. Opercle with whitish round spot on dorsal half. Lips, underside of head, breast and belly mostly whitish, isthmus dusky brown to faintly brownish.

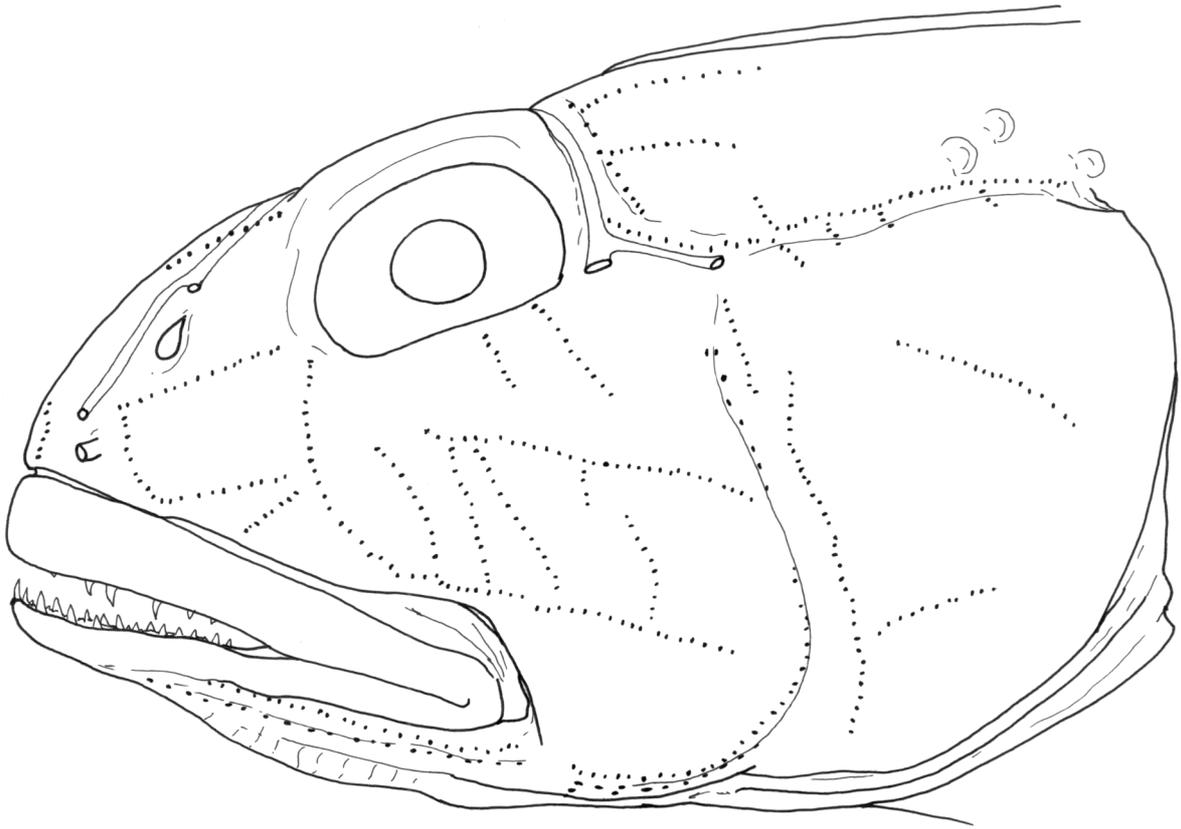


FIGURE. 44. *Oxyurichthys stigmatophius*, sensory papillae pattern, UMML 3992, 97 mm male, Guyana.



FIGURE. 45. *Oxyurichthys stigmatophius*, fresh dead specimen from Florida Keys. Photograph by Jim Van Tassell.

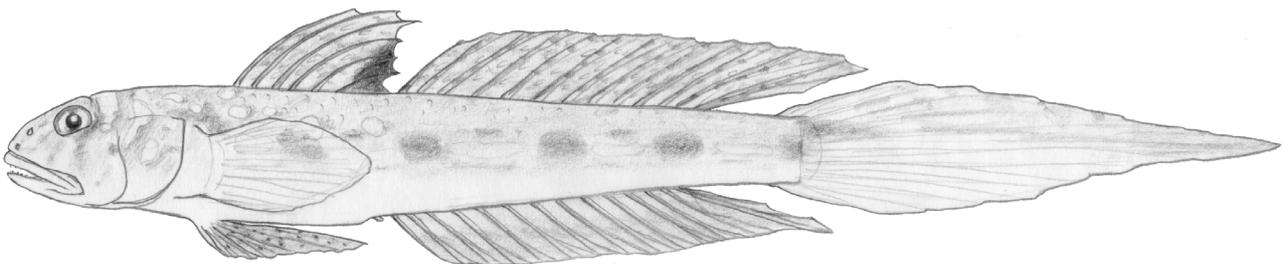


FIGURE. 46. *Oxyurichthys stigmatophius*, color pattern, based on color slide and specimens from Guyana and Antigua.

First dorsal fin with distinctive black blotch covering posterior portion of membrane between fourth spine and dorsum; most of fin dusky with about six irregular rows of transparent oval to elongate spots and streaks, and indistinct dusky elongate streaks interspersed with transparent spots. Second dorsal fin similar, dusky elongate streaks more distinct on fin rays; fin margin darker than rest of fin. Caudal fin translucent to dusky, with oval to teardrop shaped brownish blotch on upper base, extending from hypural crease onto caudal rays; indistinct brownish streaks present on membrane on dorsal half of fin and several rows of faint brownish blotches; posterior third of fin brownish. Anal fin translucent to dusky, with translucent proximal part and dusky distal part in some specimens; several rows elongate transparent streaks and dusky oblique streaks in some specimens. Pectoral fin transparent. Pelvic fins light brownish, with many rows of small round dusky-edged translucent and brown spots; more translucent spots than brown spots anteriorly.

A color slide of a preserved specimen (ANSP 144295) from the Bahamas shows four distinct brown mid-lateral blotches, with small elongate brown blotches between them above the midline (as in Fig. 1 in Mead & Böhlke 1958). Mead & Böhlke state that the holotype when fresh showed mid-lateral blotches but the paratypes (in poor condition) did not.

Comparisons. This species is distinguished from all other *Oxyurichthys* except for *O. zeta* by the large blackish spot on the posterior part of the first dorsal fin. The latter species differs from *O. stigmalocephus* in being generally browner to honey-colored, with darker square blotches, more oblique patterning on the upper side of the body, especially posteriorly, and in having distinct oblique markings on the caudal fin. *O. stigmalocephus* also has larger scales on the trunk than *O. zeta* (70–92 vs. 100–112 in lateral series) and a longer caudal fin (38–62% SL vs. 32–36% SL). Comparing only female *O. stigmalocephus* for the latter feature to account for biases of sexual dimorphism in fin lengths (the only specimens available for *O. zeta* are female), a range of 38–49% SL is still observed for this species.

Distribution. Florida, USA; Bahamas, southern Gulf of Mexico to Suriname, and Barra Grande de Camamu, Marauá, Brazil. The Brazilian record is from a photograph available on Fishbase taken 16.01.2008 by Claudio S. L. Sampaio.

Ecology. This species is found over sand and mud bottoms, in 2–60 m; it shares its burrow with alpheid shrimp (Robins & Ray 1986). No other *Oxyurichthys* have been observed sharing a burrow with a shrimp. Jim Van Tassell notes (in litt.) that *O. stigmalocephus* is not a common species in the Florida Keys where he collected it off the edge of the reef in Marathon (60–75 feet). The species was found in “soft mud with some fine sand.” He indicates that the habitat has to contain “at least 50% muddy silt or they will not be there.” Community associates were *Opistognathus lonchopisthus*, *Nes* spp., *Microgobius* spp. (except *M. carri*) and *Bollmannia* spp.

Remarks. This is the only Atlantic species of the genus and is commonly known as the Spotfin Goby.

***Oxyurichthys takagi* Pezold, 1998**

(Figs 47–48; Tables 2–5)

Oxyurichthys takagi Pezold, 1998: 691–693 (Madali district, Koror Island, Belau).—Larson & Murdy 2001: 3601 (western central Pacific).

Diagnosis. Thirteen second dorsal-fin elements, 14 anal-fin elements; upper jaw teeth in single row; fleshy tongue rounded; upper lip not constricted at premaxillary symphysis; no dark spot, ocular cirrus or cornification present on dorsoposterior surface of eye; anterior nares with dark anteromedial spot; no spots on gular membrane beneath preopercle or anterior process of quadrate; scales of dorsum not individually spotted; five oblong to round blotches along mid-side of body; nape naked with low median membranous crest extending to above preopercle; all scales including trunk cycloid; prepelvic region naked; lateral scales 51–70, modally 55; first dorsal-fin spines not elongate, reaching to third element of second dorsal fin; 18–21 pectoral-fin rays; pelvic fins dusky; first dorsal fin dusky with darker membrane along first and sixth spines.

Material Examined. FEDERATED STATES OF MICRONESIA, BELAU: CAS 74814, holotype, 44 mm SL male, Koror Island, Madali District, H.A. Fehlmann, 7 September 1957. USNM 346921, paratypes, 10(31-48), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; CAS 51047, paratypes, 13(37-48), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; BPBM 34511, paratypes, 4(39-46), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; NLU 64913, paratypes, 4(34-

47), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; BLIP 1957008, paratype, 1(39), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; BLIP 1957007, paratype, 1(49), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; BLIP 1957009, paratype, 1(42), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; BLIP 1957010, paratype, 1(37), Koror Island, Ngarbaged village, mud flat, GVF Expedition, 2 September 1956; CAS 51059, paratypes, 4(37-46), Koror Island, Madali District, H.A. Fehlmann, GVF Expedition, 7 September 1957; CAS 51050, paratypes, 7(32-45), Koror Island, mud flat off SE tip, H.A. Fehlmann, GVF Expedition, 25 July 1956. FIJI: AMS I.25058-007, 3(15-19), Suva, tidal flats between Travelodge and Government House, 0.3 m, H. and J. Larson, 6 September 1979; AMS I.25059-004, 5(15-21), Suva, tidal flats directly off Travelodge Hotel, 0.3 m, H. and J. Larson, 5 September 1979. PAPUA, NEW GUINEA: USNM 258133, 1(21), mangrove on Basilaki Island near southern Fortescue Straits, Milne Bay District, 0-10 m, T. Roberts, 4 September 1975. INDONESIA: USNM 261521, 3(21-30), mainland along SW corner in lee of Samei Island, West Papua, 0.6-0.9 m, B.B. Collette and party, RV *Alpha Helix* Moro cruise, 4 July 1979. MAURITIUS: BPBM 57178, 1(29), brackish pond in Huitres Bay, just S of Trou d'Eau Douce, rock and mangrove shore, silty bottom, J. Randall, 1 November 1973. MADAGASCAR: ex-UMMZ 185474, 1(28), Tulear, J. Bardach and A.L. Maugé, 5 June 1964. COMOROS: ex-ROM 56573, 11(12-38), Mahali Island, mangrove just E of Nidumachoua, 0-0.5 m, R. Winterbottom, November 1988. KENYA: AMNH 254302, 3(31-36), Gazi Bay, beach seine over mud, station M5R6, H. Coene and party, 21 August 1994; AMNH 254303, 1(38), Gazi Bay, beach seine over mud, station M5R5, H. Coene and party, 30 September 1995; USNM 402751, 1(32), Gazi Bay, hand trawl, sand, station S1C13, H. Coene and party, 9 August 1994; USNM 402752, 1(40), Gazi Bay, hand trawl over mud, station MID23, H. Coene and party, 14 August 1994.

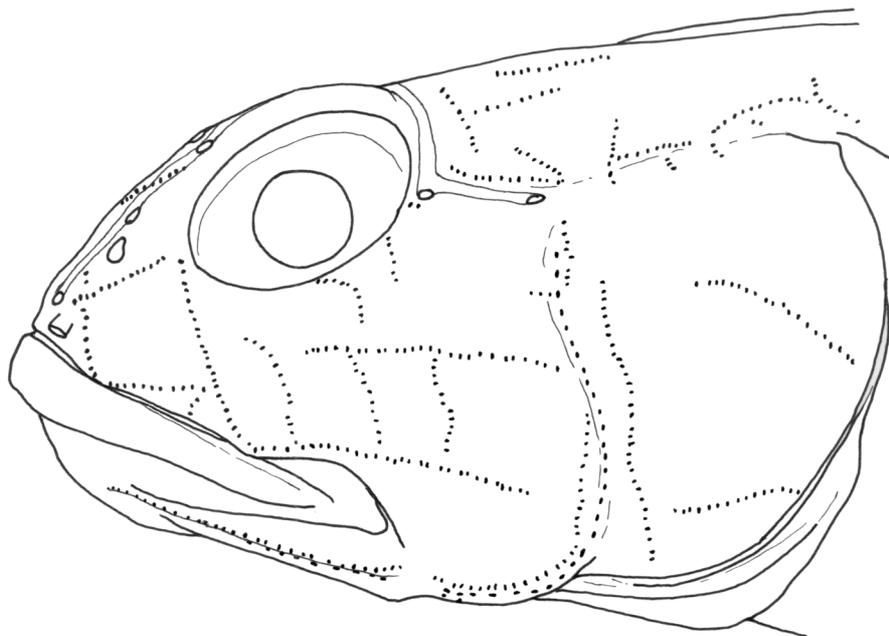


FIGURE 47. *Oxyurichthys takagi*, sensory papillae pattern, CAS 951059, 40.5 mm female, Palau.

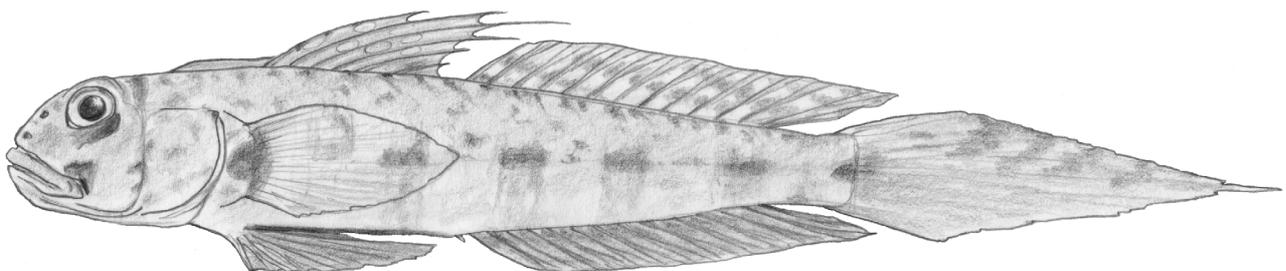


FIGURE 48. *Oxyurichthys takagi*, color pattern, based on specimens from Palau.

Description. Based on 39 specimens, 31–49 mm SL. An asterisk indicates the counts of the holotype.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 18–21 (modally 20*); segmented caudal rays 9/8*; branched caudal rays 6/7–8/7, usually 7/7*; lateral scale count 51–70 (modally 55, 56*); TRB 15–23 (17*); nape naked.

Body compressed (less so anteriorly). HL 23–28% SL (mean 25%). Head deeper than wide, depth at posterior preopercular margin 54–69% HL (mean 61% HL), width at posterior preopercular margin 47–67% HL (mean 56% HL). Mouth terminal, slightly oblique, forming an angle of about 30° with body axis; jaws generally reach to vertical between midpoint and rear margin of eye. Upper lip not constricted. Upper jaw 45–63% HL (mean 52%). Eyes lateral, high on head, top forming part of dorsal profile, 23–32% HL (mean 27%). No tentacle or callus or distinct dark spot on eye, small diffuse brown spot sometimes visible. Snout rounded, 23–35% HL (mean 27%). Interorbital narrow, 5–9% HL (mean 7%). Nape naked with fleshy raised crest along nape midline. Body depth at anal origin 14–17% SL (mean 16%). Caudal peduncle compressed, length 10–13% SL (mean 12%). Caudal-peduncle depth 8–9% SL (mean 8%).

First dorsal fin low, spines with filamentous tips, first spine generally slightly longer than others, next four spines subequal, spines slightly longer in males than females, but spines in female specimens from Kenya twice as long as those from western Pacific; appressed first dorsal-fin spines reaching beyond second or third second dorsal-fin element, but spines in females from Gazi Bay extend beyond seventh second dorsal-fin element. Second dorsal and anal fins low, posteriormost rays longest, rays reaching caudal-fin base when appressed. Pectoral fin oval, central rays longest, reaching to vertical between anal-fin origin and second or third second dorsal-fin element, 19–26% SL (mean 23%). Pelvic fins rounded to oval, not reaching to anus in females, reaching to urogenital papilla base or anal-fin origin in males, 19–26% SL (mean 23%). Caudal fin elongate, pointed, 37–68% SL (mean 47%).

Anterior naris in short tube, placed close to upper lip. Posterior naris an oval pit, placed midway between snout and eye. Gill opening extends forward to under midopercle. Gill rakers on outer face of first arch: three triangulate on ceratobranchial, two elongate fused rakers at angle and single to multifurcate fleshy lobe on epibranchial; 10–12 stubby rakers on outer face of second arch; three or four rakers on inner surface of first arch, inner rakers on other arches more numerous. Tongue tip with rounded margin. Upper jaw with single row of large canines, 15–18 either side of premaxillary symphysis, six largest teeth on each side with recurved tips. Lower jaw teeth in two to three rows, teeth of innermost row largest and strongly recurved, prominent canines at symphysis.

Opercle, cheek, nape pectoral base and prepelvic area naked. All scales cycloid.

Head pores as in genus. Sensory papillae pattern illustrated in Figure 47.

Coloration of fresh material. No information available as to live color.

Coloration of preserved material. Head and body yellowish brownish with darker brown markings; head may be slightly darker than body (Fig. 48). Side of body with five dark brown blotches along mid-side; anterior four blotches rectangular, posteriormost blotch (at caudal-fin base) smaller and triangular. Indistinct thin vertical brownish lines and fine brown spots interspersed between rectangular blotches, and similar lines may extend dorsally and ventrally from each blotch. In some specimens, area between the lines extending from mid-lateral blotches with faint brown, giving barred appearance. Dorsal midline with 12–20 paired dark brown spots, small saddles or short oblique streak; some saddles more intense than others (no pattern to intensity). Head with small irregularly shaped brown spots and blotches, which may be diffuse or coalesced, forming dusky patches. Dark brown irregularly shaped “tear” blotch present on cheek beginning at ventral margin of eye, “tear” mark often rectangular but occasionally extending anteroventrally toward jaw. A square to triangular dark brown blotch above rear margin of the jaws; ventralmost edge of this blotch often more intensely pigmented, forming nearly blackish line above cheek fold by premaxilla. Dark brown narrow crescent-shaped mark crossing nape behind eyes; up to four similar (usually lighter brown) irregular lines cross nape midline; these lines may be broken up into pairs of elongate to irregular blotches; small scattered dark spots and blotches may be interspersed with these. Fleshy crest on nape plain dusky; margin may be darker. Opercle with irregular indistinct brown blotches. Diffuse, indistinct brownish spot may be visible on dorsoposterior portion of eye; spot may be indistinguishable from dusky pigment surrounding eyeball. Small black spot on medial half of anterior narial tube; posterior naris usually with narrow dark rim. Underside of head plain light to darker brownish, chin and anterior tip of lower jaw darkest. In a few specimens, an indistinct brownish gular spot may be discernible from the background pigment (spot concealed by quadrate). Breast light brown to dusky. Pectoral base with dark brown rounded spot in centre, posterior edge of spot overlapping pectoral ray bases; broad dark brown curved line covering pectoral ray bases usually present.

Abdomen pale to brown; ventral midline black (peritoneum dense black).

First dorsal fin brownish to dark brown, usually with distinctly darker area posteriorly, around sixth dorsal spine; distal margin occasionally darker than rest of fin; in some specimens, several whitish oval spots along length of first spine, pigment intensified along leading edge of spine at base of each whitish spot, giving faintly banded appearance. Second dorsal fin translucent to dusky brownish, with five to seven obliquely oriented rows of oval to elongate diffuse brownish spots; translucent to dusky areas interspersed with rows of spots. Anal fin plain dusky to brownish, distal margin may be darker than rest of fin. Caudal fin dusky to brownish, darkest toward base and centre of fin; in males, three to five broken-up oblique rows of short dark streaks on dorsal half of fin, streaks most pronounced toward posterior margin of fin. Pectoral fin translucent to dusky, posteroventral portion of fin darker than rest. Pelvic fins dusky to dark brown, frenum and spines may be slightly paler.

Comparisons. Preserved color pattern is very similar to that of *O. lonchotus*, but *O. takagi* lacks the posterior gular spot, and the anterior gular spot is indistinct, the small dark eye spot is diffuse brown or absent, the anal fin is plain dusky, without the “claw” marks along the bases of the anal-fin rays, and the pectoral base spot is more diffuse and rounded. It differs from *O. cornutus* and *O. ophthalmonema* in lacking a cirrus on the eye. It differs from other *Oxyurichthys* species, except for *O. microlepis*, in having all cycloid scales. It differs from *O. microlepis* in lacking individually spotted scales on the dorsum and the dark spot on the eye, and in having fewer pectoral-fin rays (18–21, usually 20, vs. 20–24, usually 22) and more lateral scale rows (51–70, usually 55 vs. 41–58, usually 49).

Distribution. Belau, Fiji, Papua New Guinea, West Papua, Mauritius, Madagascar, Comoros, east Africa.

Ecology. An estuarine species known from mangroves and mud flats.

***Oxyurichthys tentacularis* (Valenciennes, 1837)**

(Figs 49–51; Tables 2–5)

Gobius tentacularis Valenciennes, 1837: 128 (Java).—Weber 1893: 449 (Sumatra, Madura, Java).

Gobius macrurus Bleeker, 1849: 35 (prope Batavia et in Freto Madurae prope Surabaya et Kamal).

Oxyurichthys tentacularis (in part for some references)—Bleeker 1857: 464; Koumans 1953: 40, 44–46 (Indonesia, Oman, India, Sri Lanka, Andaman Islands, Hong Kong, Korea, Philippines, Samoa, Tonga, Fiji Islands, Society Islands, Australia); Menon & Devi 1978: 263–266 (Ennore estuary, Madras); Haines 1979: 10 (coastal Purari River); Hoese & Winterbottom 1979: 4 (South Africa); Geevarghese 1983: 732–733 (south-west coast of India); Wass 1984: 28 (Samoa); Venkateswarlu 1988: 17 (Kakinada Bay, Andhra Pradesh); Blaber & Milton 1990: 262 (Papua New Guinea, North Borneo); Blaber et al. 1991: 11 (Tulagi, Solomon Islands); Kottelat et al. 1993: 147 (Indo-west Pacific); Monkolprasit et al. 1997: 249 (Thai waters; Si Racha, Chon Buri); Pezold 1998: 694 (Philippines; Indonesia); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (Lombok, Java).

Oxyurichthys tentacularis andamanensis Metha [sic] in Mehta et al. 1990: 668, figs 1f, 2f (coastal areas of Andaman).

Diagnosis. Tentacle on dorsoposterior of eye, usually elongate; upper lip constricted at premaxillary symphysis, less than half maximum lip width; first dorsal-fin spines not elongate, generally reaching to base of second or third second dorsal-fin element when appressed; anterior nares with low rim, darkly pigmented; nape with naked median membranous crest; no gular spots; scales on dorsum lightly outlined in black, but no spots; four indistinct oblong dusky blotches laterally slightly above mid-side of body, in some specimens, blotches connected to dusky dorsum by broad diffuse oblique bars and a diffuse dusky blotch present on caudal-fin base; no saddle present on caudal peduncle; scales ctenoid laterally on trunk posterior to vertical through origin of second dorsal fin, cycloid anteriorly; prepelvic region scaled; lateral scales 54–66, modally 59; 19–21 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. INDONESIA: Syntypes of *Gobius tentacularis*, RMNH.PISC 1916, 4(70–78), Java, Kuhl and van Hasselt, circa 1821; syntypes of *Gobius tentacularis*, MNHN A.1136, 2(75–77), Java, Kuhl and van Hasselt, circa 1821. RMNH.PISC 6178, syntypes of *Gobius macrurus*, 173(57–87), in sea, Batavia, Freto Madurae, near Surabaya and Kammal, East Indies Archipelago, 1879. RMNH.PISC 16769, 37(57–85), Java, near Batavia, July 1938; BPBM 29968, 1(65), Lombok, Lembar, harbor area, obtained from seine-fishermen, J.E. Randall and F.G. Wörner, 13 February 1984; ZMK uncat, 3(59.0–66.8), Bantam Bay, Java Sea, Stn 105 or 110?, trawl, T. Mortensen, Den Ganske Expedition til Key-Øerne 1922, 5 August 1922. PHILIPPINES: LACM 35964-15,

1(78.9), Lingayen Gulf, Pangasinan, Lucap Bay, T. Adamson, 21 September 1976; ROM 48529, 1(65), Bolinao fish market, D.F. Hoese, 16 April 1980; CAS 51054, 2(75–83), Manila Bay, R.H. Harry, 8 December 1953; NLU 71393, 9(56–77), Pangasinan, Bolinao market. E.O. Murdy, 16 April 1980; ZMK P781391, 1(40.4), Manila Bay, off Cavite, ca. 10 fathoms, dredgings, T. Mortensen, 13 February 1914. THAILAND: MNHN 1987-146, 1(73), Gulf of Siam, A. Krempf, 1921. NEW CALEDONIA: NTM S.14752-001, 5(70–87), north, St Vincent Bay, 5 m, ORSTOM, 18 October 1989.

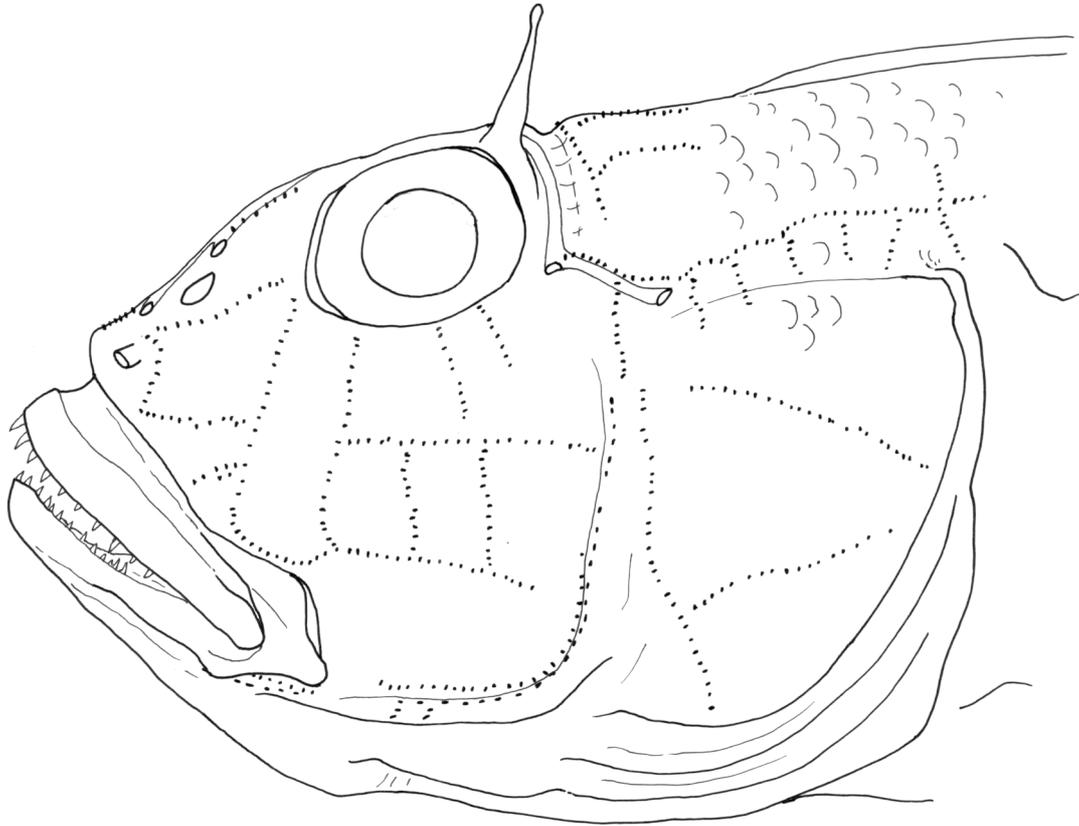


FIGURE 49. *Oxyurichthys tentacularis*, sensory papillae pattern, RMNH.PISC 16769, 68.5 mm male, Batavia, Indonesia.



FIGURE 50. *Oxyurichthys tentacularis*, dead specimen from Muthupet mangrove, Tamil Nadu, India. Photograph by A. Murugan.

Other material examined. INDONESIA: Syntypes of *Gobius tentacularis*, MNHN A.1123, 2(78–79), Java, Kuhl and van Hasselt, circa 1821. MNHN A.1409, 4(75–82), Batavia, Bleeker. PHILIPPINES: AMS I.21901-003, 23(65–78), Bolinao fishmarket, D.F. Hoese, 16 April 1980; BLIP 1963161, 2(76–78), Manila Bay, Pamponga side, November, 1963; CAS 46085, 9, Manila Bay, Luzon, A.W. Herre, 25 May 1948; CAS-SU 26338, 8(64–82), Cebu,

A.W. Herre, 27 August 1931; CAS-SU 26348, 1, Capiz, Panay Island, A.W. Herre, 1931; USNM 52018, 1(57), southern Negros, B. Dean, 1901; USNM 160744, 1(73), Manila Bay, Cavite, RV *Albatross*, 10 June 1908; USNM 238963, 1(82), between northern Negros and Masbate Island, SE of Sicogan Island, 0–38.4 m, L. Alcala and party, 9 June 1978; USNM 99829, 1(80), San Fernando, Luzon, RV *Albatross*, 17 March 1908; USNM 139381, 1(62), Malampaya Sound, Palawan Island, Cliff Island, RV *Albatross*, 26 December 1908; USNM 139384, 11(58–70), Bacoor Beach, Manila Bay, Luzon, RV *Albatross*, 15 June 1908; USNM 139385, 1(62), Cavite Market, Luzon, RV *Albatross*, 26 June 1908; USNM 372806, 1(64), Iloilo market, Panay, Philippines, RV *Albatross*, 1 June 1908. THAILAND: BLIP 1974054, 2(81,82), Pai Bay, Choburi Province, April 1974. INDIA: USNM 238975, 2(45), Kerala, Neendakarai, 6 miles N of Quilon, purchased at fish landing, caught within 10 miles of landing, 6 October 1966.

Description. Based on 48 specimens, 56–88 mm SL. An asterisk indicates the counts of the lectotype of *O. tentacularis*.

First dorsal VI*; second dorsal I, 11–12*; anal I, 13*; pectoral rays 19–21*; segmented caudal rays 8/8–9/8*; branched caudal rays 7/7–8/7; lateral scale count 54–66* (modally 59); TRB 16–22 (18*); predorsal scale count 13–21 (16*).

Body compressed, head length moderate, 19–24% SL (mean 21%). Head generally deeper than wide, depth at posterior preopercular margin 60–79% HL (mean 69%), width at posterior preopercular margin 51–90% HL (mean 57%). Mouth oblique, forming an angle of about 45° with body axis, lower jaw prominent. Jaws reach to vertical through anterior margin or anterior third of orbit. Upper jaw 47–59% HL (mean 53%). Upper lip constricted. Eyes lateral, high on head, top forming part of dorsal profile, 26–34% HL (mean 30%). Elongate tentacle on dorsoposterior eye. Snout rounded, 24–34% HL (mean 28%). Interorbital narrow, 5–13% HL (mean 9%). Body depth at anal-fin origin 16–20% SL (mean 17%). Caudal peduncle compressed, about equally long as deep, length 9–13% SL (mean 11%), depth 9–18% SL (mean 11%).

First dorsal fin with filamentous spines, increasing in size through fourth spine, first and sixth spines shorter, with first often shortest; appressed fin not reaching past second or third second dorsal-fin element. Second dorsal-fin rays moderately long, from about equal to jaw length anteriorly to greater than head depth posteriormost, anal fin lower, posteriormost rays in both longest, reaching past caudal-fin base when appressed. Pectoral fin oval, central rays longest, extending to vertical between anus and third anal-fin element, 16–28% SL (mean 24%). Pelvic fins rounded to oval, reaching from just shy of anus to anal-fin origin, 17–25% SL (mean 22%). Caudal fin elongate, pointed, 40–58% SL (mean 49%).

Anterior naris in short tube, placed close to upper lip. Posterior naris oval open pit, midway between eye and anterior naris. Gill opening usually extends forward to under midopercle. Gill rakers on outer face of first arch: two to three triangulate on lower ceratobranchial, two fused rakers with a small third process at angle and a fleshy tripartite lobe on the epibranchial; rakers on outer face of second arch about 10 reduced stubs. About seven bladelike rakers on inner face of first arch, inner rakers on other arches about three to four times as numerous and grading from reduced to twice the size of those on first arch. Tongue tip rounded. Upper lip constricted at premaxillary symphysis, half or less of maximum width. Upper jaw teeth in single row, about 20–24 on each side of symphysis, separated by prominent gap at symphysis approaching interorbital width in size. Lower jaw teeth in band with inner and outermost rows pronounced, about 40 in outer row each side of mandibular symphysis, innermost row with about 10–15 strong recurved canines on each mandible, largest near symphysis. Teeth in upper jaw strong canines, about twice size of lower jaw teeth in outer row.

Nape scaled along sides with naked median along membranous crest, scales reaching forward to above preopercle. Cheek naked. Opercle with two rows of scales along upper rear margin. Pectoral base usually with scales (may be lost). Prepelvic area covered with 8–10 rows of small scales. Abdomen scaled. Scales on abdomen, nape, opercle, prepelvic area and pectoral base cycloid. Ctenoid scales on side of body, becoming cycloid anteriorly beneath first dorsal fin.

Head pores as in genus. Sensory papillae pattern illustrated in Figure 49.

Coloration of fresh material. Both Valenciennes (1837) and Bleeker (1849) refer to the reddish markings in this species, but give no details. Two photographs (by A. Murugan and Ravi Velayudham; specimens not retained), of southern Indian specimens, are known that may be of this species (Fig. 50), due to the head shape and relatively plain color pattern. Unfortunately the dorsal and anal fins and any eye tentacle are flattened against the body in both photographs. The fish are a dull pinkish, whitish under the head, on pectoral-fin base and belly, with some

yellow on the caudal fin and no distinctive markings visible; the fish in Figure 50 has a few small round sky-blue spots and short streaks on the side of the head.

Coloration of preserved material. Head and body pale yellowish to pinkish brown, darker on dorsum, slightly lighter ventrally. Scales on dorsum with margins thinly outlined with dusky to blackish (Fig. 51). Four indistinct oblong dusky blotches placed slightly above mid-side of body; in some specimens, blotches indistinctly connected to dusky dorsum by broad diffuse oblique bars and an indistinct diffuse dusky blotch present on caudal-fin base. Pectoral-fin base with large diffuse dusky to brownish blotch on upper half, confluent with diffuse brownish area on posterior part of opercle. Interorbital area and tip of snout slightly darker than rest of head. Ocular tentacle whitish to grey, evenly pigmented. Small diffuse brown “tear” blotch along ventral margin of eye. Dense black spot mediad on anterior narial tube; posterior narial rim same color as surrounding skin. Area dorsal to rear margin of the jaws with diffuse brownish pigment in some specimens. Chin and isthmus dusky to light brownish; breast and belly pale.

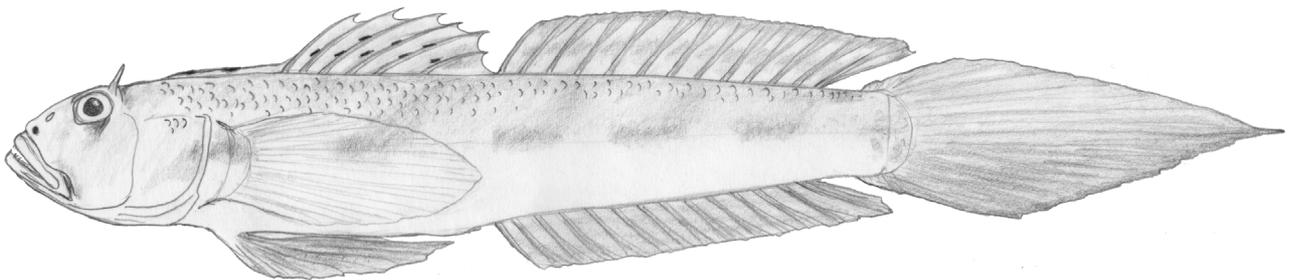


FIGURE 51. *Oxyurichthys tentacularis*, color pattern, based on specimens from Indonesia and New Caledonia.

First dorsal fin translucent to dusky, plain in some specimens, or with few oblique blackish streaks; in some specimens, one or two rows of oblique black spots or short streaks present. Second dorsal fin dusky greyish, with darker margin; in some specimens an indistinct central dusky stripe present. Anal fin plain dark grey to blackish. Caudal fin whitish to dusky grey, darker to blackish posteroventrally. Pectoral fin translucent, dusky on ventral half. Pelvic fins with pale frenum and spines, rest of fin dusky grey to blackish.

Comparisons. This species shares a tentacle on the eye with *O. ophthalmonema*, *O. cornutus*, *O. paulae* and *O. uronema*. It differs from *O. ophthalmonema* and *O. cornutus* in having a constriction of the upper lip at the premaxillary symphysis. It lacks the saddle present on the caudal peduncle in *O. ophthalmonema* and the spotted dorsal scales of *O. cornutus*. The dorsal-fin spines are not long as seen in *O. cornutus* or *O. uronema*. It also differs from *O. uronema* and *O. paulae* in having smaller scales on the trunk (there are 54–66 in a lateral series vs. 43–50 in *O. paulae* and 37–49 in *O. uronema*), and fewer pectoral-fin rays (modally 21 vs. 26 in *O. paulae* and 24 in *O. uronema*). It is also distinguished from *O. paulae* and *O. uronema* in having a membranous crest and naked median on the nape (absent in the other two species), and in color pattern (*O. paulae* and *O. uronema* have vertical bars on the side of the trunk instead of indistinct oblong blotches).

Distribution. New Caledonia, Indonesia, Philippines, Thailand, India. The one record from India includes two specimens from a fish market in very poor condition. All scales are lost and pigmentation is not discernable. They have eye tentacles and the terete body form of this species. One specimen has 22 pectoral-fin rays on one side and for that reason they are not placed under *O. paulae*.

Ecology. Probably an inshore species trawled at depths to 38.4 m. It is difficult to say anything about its ecology as it has been confused with the other tentacled species of *Oxyurichthys*, but it does not appear to be taken in mangrove estuaries inhabited by *O. cornutus* and *O. ophthalmonema*. It is highly doubtful that this is the species recorded from the Mekong River by Rainboth (1996).

Remarks. *Gobius tentacularis* Valenciennes is based on on Kuhl and van Hasselt material, now in three lots of syntypes RMNH.PISC 1916, 4(69–78); MNHN A.1136, 2(75–77); MNHN A.1123, 2(78–80, 100–110 mm TL (after Akihito & Meguro (1972) and syntypes examined). Due to ongoing confusion as to the identification of this species, a 75 mm SL male syntype in MNHN A.1136 has been chosen as lectotype.

The syntypes of *Gobius macrurus* Bleeker are among 173 specimens included in RMNH.PISC 6178; the largest specimen has pencil marks on the body and is probably a genuine syntype, but how many of the others are syntypes is unknown as Bleeker did not provide numbers of specimens.

***Oxyurichthys uronema* (Weber, 1909)**

(Figs 52–54; Tables 2–5)

Gobius (Oxyurichthys) uronema Weber, 1909: 153 (Bay of Bima, Sumbawa, Indonesia).—Nijssen et al. 1993: 233 (type catalogue).

Gobius longicauda Steindachner, 1893: 151 (Swatow, China) and 1893b: 232.

Oxyurichthys ophthalmonema—Wu & Ni 1986: 280–281 (Hainan Island).

Oxyurichthys uronema—Pezold 1998: 694 (Bay of Bima, Indonesia); Larson in Randall & Lim 2000: 639 (South China Sea); Larson & Murdy 2001: 3601 (western central Pacific); Allen & Adrim 2003: 59 (Sumbawa); Larson & Lim 2005: 124 (Singapore); Hoese & Larson 2006: 1670 (north of Smith Point, NT; north of Orontes Reef, NT); Larson et al. 2008: 143 (Bedok, Singapore River, Punggol, Singapore); Larson et al. 2013: 203 (north of Smith Point, Cobourg Peninsula and north of Orontes Reef).

Oxyurichthys tentacularis—Koumans 1935: 126 (in part); Koumans 1953: 45 (in part); Wu & Zhong 2008: 524–526, fig. 248 (China).

Diagnosis. Tentacle on dorsoposterior of eye, usually elongate; upper lip constricted at premaxillary symphysis, less than half maximum lip width; first dorsal-fin spines elongate, may reach beyond second dorsal fin when appressed; anterior nares with low rim, not darkly pigmented; nape lacking membranous crest; no gular spots; scales on dorsum lightly outlined in black, but no spots; 5–10 spots along mid-side of body, four short vertical bars or elongate oval blotches overlie and obscure four of the lateral spots, vertical bars usually narrowing dorsally and ventrally, occasionally second or third bars reaching ventral midline, anteriormost one or two spots and spot on caudal-fin base usually indistinct; no saddle present on caudal peduncle; scales ctenoid laterally on trunk posterior to below midpoint of first dorsal fin, cycloid anteriorly; prepelvic region scaled; lateral scales 37–49, modally 45; 22–26 pectoral-fin rays, modally 24; pelvic fins dusky, not barred or mottled.

Material Examined. THAILAND: ROM 48971 (ex-CMK 5318), 1(68.5), M. Kottelat, 1985; URM P.13218, 1(76), Angsira, fish landing, H. Senou and party, 2 December 1983; URM P.12433, 1(74), Pattani fish market, H. Senou, 24 October 1983; URM P.13890, 8(28–76), fish market (no other data). MALAYSIA: USNM 238954, 34(59–68), off SW coast of Penang Island, S of Pu Kendi Island, 18 m, F.J. Schwartz and party, 6 May 1969; USNM 238960, 5(60–68), off SW coast of Penang Island, S of Pu Kendi Island, 4 m, F.J. Schwartz and party, 6 May 1969. INDONESIA: Syntypes of *Gobius (Oxyurichthys) uronema*, ZMA 111.336, 2(41–61), Sumbawa, Bay of Bima, near south fort, Bima anchorage, mud bottom with patches of fine coral sand, trawl, 55 m, Siboga Expedition, M. Weber, 8–12 April 1899. CHINA: Syntypes of *Gobius longicauda*, NMW 29504, 3(40–56), Swatow, Petersen, 1892. USNM 238961, 1(75), Hong Kong, Tolo Harbour, MSL Chinese University of Hong Kong, 21 September 1968; NTM S.12548-001, 10(57–66), Plover Cove, Hong Kong, May 1967; CAS 74815, 1(66), Hong Kong, Tolo Channel, R. Bolin, 28 August 1958. AUSTRALIA: NTM S.10031-021, 20(55–62), Northern Territory, N of Smith Point, Cobourg Peninsula, 27 m, trawl, NR Anson, 18 October 1981; NTM S. 12445-014, 1(56), Northern Territory, S of Orontes Reef, Cobourg Peninsula, 20 m, R. Williams, 10 August 1986.

Other material examined. THAILAND: URM P8934 1(65); URM-P13637, 3(40–58); URM P12432, 1(67); URM P13921, 1(47). PHILIPPINES: USNM 148518, 1(33), off W Samar, Taratara Island, 26 fm, RV *Albatross*, 14 April 1908; ex-USNM 139382, 1(44), Batangas River, Batangas, Luzon, RV *Albatross*, 7 June 1908. CHINA: BLIP 1975128, 1(42), Peng Chau Island, Hong Kong, 5 September 1975; SU 60998, 1(51), Hong Kong, AMS I.18552-003, 1(68), E Lamma Channel, Hong Kong, 18–20 fm, W. Ponder, and B. Morton, FRV *Cape St. Mary*, 12 November 1973; NTM S 12547-002, 37(55–71), Plover Cove, Hong Kong, June 1967; NTM S.16385-001, 2(45–52), Mirs Bay near Chek Chau, Hong Kong, 7 April 1986; NTM S. 12547-004, 1(67), Hong Kong, June 1967; NLU uncat., 10(56–75), northern Lantan, Hong Kong, 23 July 1999.

Description. Based on 63 specimens, 28–76 mm SL. An asterisk indicates the counts of a 59 mm SL syntype of *Gobius uronema* (ZMA 111.336).

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 22–26 (24*); segmented caudal rays 9/8*; branched caudal rays 8/7*; lateral scale count 37–49 (modally 45*); TRB 10*–16; predorsal scale count 9–16 (14*).

Body compressed, head length moderate, 20–25% SL (mean 23%). Head deeper than wide, depth at posterior preopercular margin, 58–71% HL (mean 63%), width at posterior preopercular margin 48–66% HL (mean 58%). Mouth terminal, oblique, forming an angle of about 45° with body axis; lower jaw prominent, jaws reaching to vertical through anterior third of eye. Upper lip constricted at premaxillary symphysis, less than one half greatest

width. Upper jaw 43–56% HL (mean 48%). Large eyes lateral, high on head, top forming part of dorsal profile, 26–38% HL (mean 31%). Elongate to relatively short flattened tentacle dorsoposteriorly on eye. Snout rounded, 25–37% HL (mean 31%). Interorbital narrow, 6–11% HL (mean 8%). Body depth at anal origin 13–18% SL (mean 16%). Caudal peduncle compressed, usually slightly longer than deep or equally long as deep, length 8–15% SL (mean 11%). Caudal-peduncle depth 8–19% SL (mean 10%).

First dorsal fin elongate, filamentous tips of second to fifth spines free; third and fourth spines longest in males, second usually longest with third and fourth spines subequal, in females; third to fifth spines may be twice as long in males than females of comparable sizes; longest spine may reach beyond entire second dorsal fin when appressed. First dorsal spine always shorter than next four, 12–16% SL (mean 14%) in females, 13–19% SL (mean 16%) in males. Second dorsal-spine length 17–28% SL (mean 22%) in females, 16–38% SL (mean 27%) in males. Third dorsal-spine length 16–25% SL (mean 21%) in females, 17–51% SL (mean 37%) in males. Fourth dorsal-spine length 14–27% SL (mean 20%) in females, 17–57% SL (mean 45%) in males. Fifth dorsal-spine length 14–22% SL (mean 17%) in females, 17–49% SL (mean 36%) in males. Second dorsal and anal fins low, posteriormost rays longest, reaching beyond caudal-fin base when depressed. Pectoral fin oval, central rays longest, 21–27% SL (mean 24%). Pelvic fins rounded to oval, not reaching to anus in most, just to anus in large males, 17–24% SL (mean 21%). Caudal fin elongate, pointed, 35–65% SL (mean 52%) in females, 46–75% SL (mean 58%) in males.

Anterior naris with low rim, placed close to upper lip. Posterior naris oval pit, placed midway between upper jaw and eye. Gill opening usually extends forward to beneath midopercle. Gill rakers on outer face of first arch: two or three triangulate on lower ceratobranchial, two elongate fused rakers with a third smaller process at the angle, and a single hook-like fleshy lobe on the epibranchial; about seven stubby rakers on inner face of first arch; rakers on outer face of second arch about 12 rudiments; inner rakers on other arches more numerous than first arch inner rakers (about three times), blade-like and largest double the size. Tongue margin rounded. Upper jaw with single row of 16–20 large canine teeth each side of premaxillary symphysis, separated by wide gap about equal to bony interorbital width. Lower jaw with 2 rows of small teeth, about half size of upper jaw teeth.

Nape completely scaled to above preopercle, scales in 9–16 (modally 12) rows. No membranous crest or mid-dorsal ridge. Opercle and cheek naked in all specimens examined, but single row of scales observed on upper opercle in lectotype. Pectoral base without scales in most, completely covered with about 10 large scales in lectotype and paralectotype. Prepelvic area with patch of scales in five or six rows. Ctenoid scales posteriorly on side of body from beneath origin or midpoint of second dorsal fin, becoming cycloid anteriorly; cycloid scales on abdomen, prepelvic area and nape with cycloid scales. Scales exfoliated on most specimens examined.

Head pores as in genus. Sensory papillae pattern illustrated in Figure 52.

Coloration of fresh material. Based on photographs of a fresh-dead specimen from Guangdong, China (Fig. 53). Head and body pale pinkish white, head darker than body, with four indistinct soft pinkish grey vertical bars on side; dorsum with dusky scale margins (only scale pockets visible); chest and pectoral-fin base bright pearly white. Side of head with three oblique golden yellow stripes, anteriormost from mid-jaw to below eye, second from rear margin of the jaws to upper rear edge of preopercle, third (the least distinct) crossing opercle; several round yellow blotches on lower part of cheek. Iris pale gold; ocular tentacle reddish with black tip. Pectoral-fin base crossed by broad dusky yellow bar and yellowish spot on base of lowermost rays. Pectoral fin translucent dusky. Pelvic fins white (folded). Dorsal and anal fins dusky (folded against body). Caudal fin with diffuse dark grey round blotch over upper half of fin base; fin translucent pale dusky pinkish with diffuse blackish lines along fin rays, centre of fin faintly yellow.

Coloration of preserved material. Head and body whitish to light yellowish brown, with 5–10 brown to greyish brown rounded to oval spots along mid-side of body; four short vertical bars or elongate oval brown to greyish brown blotches overlies and obscures four of these lateral spots; vertical bars usually narrowing dorsally and ventrally, occasionally second or third bars reaching ventral midline (Fig. 54). Anteriormost one or two spots, as well as posteriormost (on centre of caudal-fin base), often quite indistinct. Scales on nape and dorsum with margins narrowly outlined with dark brown to black. Posteriorly from first dorsal-fin origin, dorsal midline with up to 12 indistinct dusky to brownish blotches, placed directly dorsal to mid-lateral spots and bars. Indistinct greyish brown band crossing nape just behind eyes; interorbital and especially snout pale dusky to grey. Anterior naris with blackish spot medially on tube, more distinct on intensely pigmented specimens. Ocular tentacle whitish with dark brown tip. Dusky patches on side of nape above preopercle and opercle. Side of head dusky to mottled with grey; square to triangular brown to brownish blotch along ventral edge of eye; indistinct dusky curved blotch along upper

jaw on preorbital; and diffuse brownish blotch or streak across centre of opercle; opercular streak confluent with diffuse dusky streak crossing cheek. Lips whitish, anteriormost tips dusky; entire upper lip dusky in some specimens. Underside of head and breast pale yellowish to white, chin slightly dusky. Pectoral-fin base pale with brownish blotch on upper third; in some specimens, fin base entirely dusky or brownish blotch enlarged, with paler central stripe (curved or straight) through blotch at same level as opercular streak.

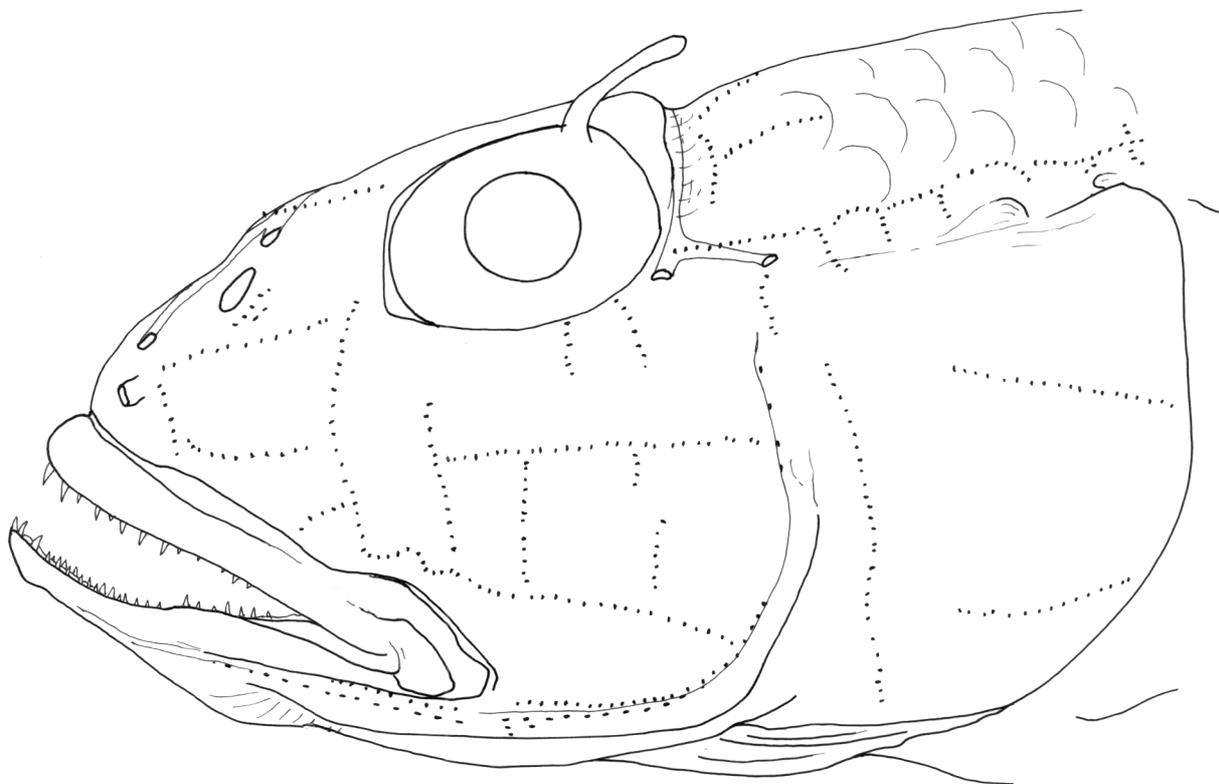


FIGURE. 52. *Oxyurichthys uronema*, sensory papillae pattern, NTM S.12548-001, 66 mm male, Hong Kong, China.



FIGURE. 53. *Oxyurichthys uronema*, dead specimen from market at Guangdong, China. Photograph by Yashu Pan.

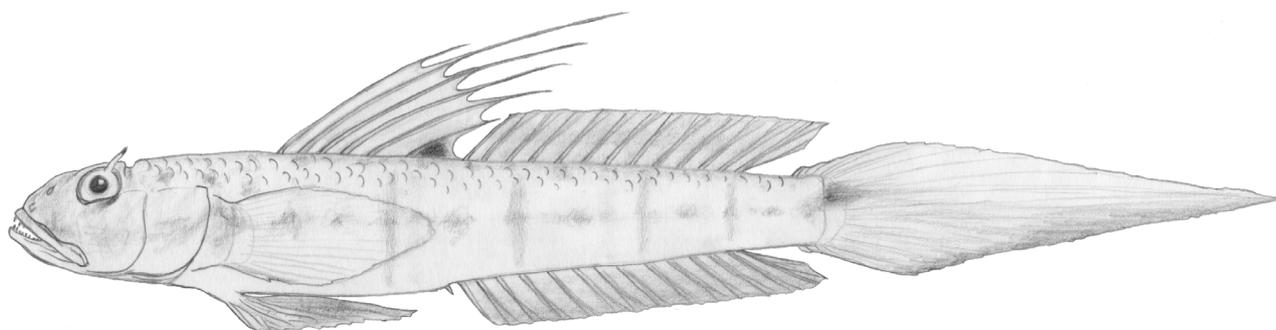


FIGURE. 54. *Oxyurichthys uronema*, color pattern, based on specimens from Thailand, China and the Northern Territory.

First dorsal fin translucent to slightly dusky, tips of rays brownish to blackish, with distinct black to blackish

spot covering most of membrane posterior to sixth spine. Second dorsal fin usually translucent to dusky proximally, with one or two darker dusky bands covering distal two-thirds of fin; entire fin may be dusky. Caudal fin translucent whitish to dusky, with oval to teardrop shaped spot on basal sheath of scales, above midline of fin; spot brownish to blackish (darkest and densest in specimens from the Arafura Sea); posteriormost part of fin dusky grey to blackish, especially pronounced along fin margin. Anal fin translucent to dusky, or translucent with faintly dusky edge. Pectoral fin translucent to dusky; in some specimens, fin dark grey to blackish posteriorly. Pelvic fins translucent to whitish, with at least posterior half of fin mottled blackish.

Comparisons. See *O. paulae* and *O. tentacularis*.

Distribution. Penang, Malaysia; Singapore; Pattani, Thailand; Arafura Sea, Northern Territory; Hong Kong, China; Indonesia; Philippines.

Ecology. This species appears to be taken most often in channels and has been recorded to depths of 4–68 m over mud with patches of fine coral sand.

Remarks. A syntype is figured in Weber (1913: 477, fig. 95) and subsequently reproduced in Koumans (1953: 45, fig. 11) as *Oxyurichthys tentacularis*. Figure 160 in Anon. (1986) shows the color pattern of *O. uronema*, not *O. ophthalmonema*.

Wu (1991) and Kottelat (2013) considered *Gobius longicauda* a junior synonym of *Oxyurichthys microlepis*. Examination of the syntypes revealed ocular tentacles on the larger two of the three specimens, both female, and no tentacles but a slight callus on the eye of the smallest, a male. Faint vertical bars were observed on the trunk of the two smaller specimens. All three syntypes had weak ctenoid scales on the trunk extending forward to below the origin of the second dorsal fin. *Oxyurichthys microlepis* does not have ocular tentacles, bars on the trunk or ctenoid scales. These and other features are consistent with *O. uronema*.

***Oxyurichthys zeta* new species**

(Figs 55–57; Tables 2–5)

Oxyurichthys sp. 1—Kuitert & Tonozuka 2001: 661 (Menjangan Island, Bali; Maumere, Flores); Senou et al. 2004: 192 (Japan).
Oxyurichthys sp.—Allen & Erdmann 2012: 984 (Kimbe Bay, New Britain; Bali and Flores; Santa Ysabel, Solomon Islands).

Diagnosis. No tentacle, cornification or spot on dorsoposterior of eye; upper lip without constriction at premaxillary symphysis; first dorsal-fin spines short, posteriormost spines reaching just beyond second element of second dorsal fin when appressed; anterior nares in small tube, not darkly pigmented; nape with low membranous crest; no gular spots; scales on dorsum without spots; in life large blackish blotch on posterior part of first dorsal fin and four large diffuse spots along mid-side of body and one spot on caudal-fin base, also indistinct; no saddle present on caudal peduncle; scales cycloid (reduced ctenoid); prepelvic region naked; lateral scales 100–112; 22 pectoral-fin rays; pelvic fins dusky, not barred or mottled.

Material Examined. HOLOTYPE: NSMT-P 120172, (49), female, Shikoku, Ehime Prefecture, Morode, Japan, muddy bottom, 7 m, M. Dozaki, 24 November 1992. PARATYPE: WAM P.32537-003, 49 SL female, Palunukura Bay, Santa Ysabel Island, Solomon Islands, 10–20 m, G.R. Allen, 16 May 2004.

Description. Based on two female specimens, both 49 mm SL. Shared counts and morphometrics indicated by asterisk; if those of paratype differ they are in parentheses.

First dorsal VI*; second dorsal I,12*; anal I,13*; pectoral rays 22*; segmented caudal rays 9/8*; branched caudal rays 7/7 (7/6); lateral scale count 112 (100); TRB 26 (27); no predorsal scales.

Body compressed, head length moderate, 25 (28; n.b. upper jaw extended)% SL. Head deeper than wide, depth at posterior preopercular margin, 58 (67)% HL, width at posterior preopercular margin 45 (55)% HL. Mouth terminal, oblique, forming an angle of about 45° with body axis; lower jaw prominent, jaws reaching to vertical through middle of eye. Upper lip not constricted at premaxillary symphysis. Upper jaw 52 (50)% HL. Large eyes lateral, high on head, top forming part of dorsal profile, 26% HL. No tentacle, cornification or dark spot on eye. Snout rounded, 27 (39%; n.b. upper jaw extended)% HL. Interorbital narrow, 10 (6)% HL. Body depth at anal origin 14 (16)% SL. Caudal peduncle compressed, slightly longer than deep (deeper than long in paratype), length 13 (8)% SL. Caudal-peduncle depth 10 (9)% SL.

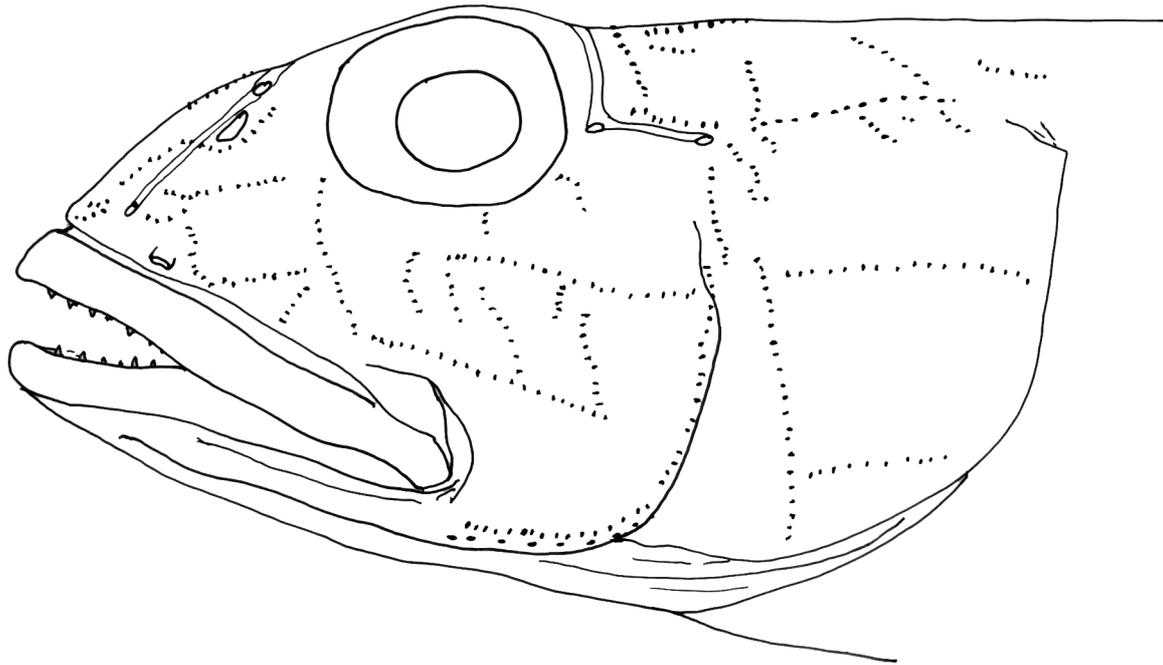


FIGURE. 55. *Oxyurichthys zeta*, sensory papillae pattern, composite drawing based mostly on holotype, with details from paratype, both 49 mm SL females.



FIGURE. 56. *Oxyurichthys zeta*, live specimen at Lovina Beach, Bali, Indonesia. Photograph by Ole Brett.

First dorsal fin not elongate, tips of spines free; fourth and fifth spines longest; spines reaching just beyond second element of second dorsal fin when appressed. First dorsal spine shorter than next four. Second dorsal and anal fins low, posteriormost rays longest, reaching beyond caudal-fin base when depressed. Pectoral fin oval,

central rays longest, 22 (21)% SL. Pelvic-fin disc oval, reaching beyond anal-fin origin, 27 (26)% SL. Caudal fin elongate, pointed, 32 (36)% SL.

Anterior naris in small tube, placed close to upper lip. Posterior naris an oval pit, placed two-thirds distance from upper jaw to eye. Gill opening extends forward to beneath mid-opercle (closer to preopercular rear margin in paratype). Gill rakers on outer face of first arch: three triangulate on lower ceratobranchial, two elongate fused rakers at the angle, and a bifurcate hook-like fleshy lobe on the epibranchial; about seven stubby rakers on inner face of first arch; rakers on outer face of second arch about 12 rudiments; inner rakers on other arches more numerous than first arch inner rakers (about twice as many), blade-like and largest double the size. Tongue margin rounded. Upper jaw with single row of 14–18 large canine teeth each side of premaxillary symphysis, separated by wide gap about equal to bony interorbital width (gap narrower in paratype). Lower jaw with two rows of small teeth, innermost row teeth about half size of upper jaw teeth, outermost row teeth subequal to upper jaw teeth (in paratype, lower jaw teeth in single row, occasionally staggered, but not forming two rows).

Nape naked with low membranous crest. Opercle and cheek naked. Pectoral-fin base and pre-pelvic region without scales. Scales mostly cycloid, a few scattered scales with one or two small teeth (paratype with several rows weakly ctenoid scales dorsally below second dorsal fin anteriorly to below fifth first dorsal-fin spine).

Head pores as in genus. Sensory papillae pattern illustrated in Figure 55.

Coloration of fresh material. Based on photographs by Ole Brett, Rob Myers and Roger Steene (see Fig. 56). The only published photos of this species are in Kuitert & Tono-zuka (2001) and Senou et al. (2004), as *Oxyurichthys* sp.1; several other photos exist on various divers' weblogs (in Japanese).

Dorsum and snout greyish blue, remainder of head and body yellowish to pale blue, side of body pale blue with five rounded brownish yellow mid-lateral blotches, which overlie mid-lateral yellow stripe (that breaks up posteriorly), an irregular row of small round to oval brownish yellow spots and blotches along dorsum, with jagged oblique bar extending anteriorly from each mid-lateral blotch (but for anteriormost behind pectoral fin); above and below (Fig. 56). One photograph (from Bali) shows thin dull greyish yellow line along very low nape crest, and similarly colored blotch dorsally on eye. Pectoral-fin base white to pale blue on ventral half, dorsal half yellowish brown with small blue blotch dorsally and dark grey to brownish yellow curved bar along bases of rays on dorsal half of fin base. Side of head with three to five variably developed oblique to almost vertical iridescent pale blue stripes, two crossing opercle and two or three crossing cheek. Small brown blotch on ventral margin of eye, often indistinct in available photos, and blending with pale blue cheek stripe. Iris pale gold to pale silvery blue.

First dorsal fin translucent bluish to greenish yellow, may be speckled with pale iridescent blue marbling and spotting, fin always with dense black blotch on rear part of fin, between fourth or fifth spine and fin insertion. Second dorsal fin translucent to opaque yellow, with narrow bright yellow margin and variable number of oblique rows of vermiculate broken blue lines. Anal fin dull pale blue (with central stripe of dull yellow in Bali specimen) with broad greenish blue margin, widening posteriorly, tips of posteriormost rays dull orange to yellow. Caudal fin shaded with dull orange, yellow and pale blue, with narrow blue margin to dorsal and ventral edges and broad oblique pale blue oblique blotch or streak crossing ventral half of fin toward tip of fin. Pectoral fin transparent, with dusky fin rays. Pelvic fins opaque pale yellow with narrow pale blue margin to fin disc, darker blue along posterior margin and three or four distinctive pale blue narrow bars or blotches crossing fin membrane on most of fin, markings becoming more irregular and broken-up on anterior part of fin.

Coloration of preserved material. Head and body pale yellow-brown, with five diffuse rounded brown blotches along mid-side of body, fifth blotch smallest and placed at caudal-fin base; indistinct pale brownish saddles along dorsum interspersed with placement of mid-lateral blotches (Fig. 57). Head with small indistinct pale brown blotch below eye on cheek; lips slightly darker than cheek. First dorsal fin translucent with brown margin and dark brown vertical blotch from fifth spine tip to insertion of fin, blotch black on membrane between fifth and sixth spines. Second dorsal fin, anal fin (anal fin of paratype dusky, darker along fin margin), caudal fin and pectoral fins translucent. Pelvic-fin membranes dusky grey, darkening proximally.

Comparisons. This species shares features with *O. notonema*, *O. limophilus* and *O. stigmaphius*. All four species have small scales and dark pigment on the posterior field of the first dorsal fin, but dark pigment is most prominent in this species and *O. stigmaphius*. This species differs from *O. stigmaphius* and the others in having all cycloid scales and in color (see “comparisons” under *O. stigmaphius*). *Oxyurichthys notonema* juveniles also have cycloid scales, but the scales are weakly ctenoid in specimens as large as the holotype for *O. zeta*.

Distribution. Known only from Japan, Palau, Bali, Flores, Papua New Guinea and the Solomon Islands.



FIGURE. 57. *Oxyurichthys zeta*, holotype, NSMT-P120172, 49 mm SL female, Morode, Japan. Photograph by Ryan Chabarría.

Ecology. Individuals from Japan have been observed at 33–38 m depth, Palauan fish at 12 m and fish have been photographed at Bali and Flores at 12–15 m. Photographed specimens are all shown hovering over a dark soft substrate. One fish at Lovina Beach, Bali, appears to be at the entrance of a large burrow (made by another organism).

Etymology. From the Greek ζήτα (zeta) which gave rise to the last letter of the Roman alphabet upon which the English language is based. This elusive species is known from only two specimens and several photographs. It is the last species in this revision, although it is unlikely to be the last species described for this genus.

Invalid and Dubious Names

Gobius erythrinus Kuhl & van Hasselt in Cuvier, 1837:128.

Remarks. This is an unavailable name referenced without a genus in the description of *Gobius tentacularis* by Valenciennes (1837) but recognized as a synonym of *Gobius tentacularis* by Bleeker (1854b).

Synechogobius heterolepidotus Koumans, 1940: 133 (Japan?).

Remarks. It is a museum name; used only by Koumans (1940): “This specimen does not belong to *Synechogobius*, but is an *Oxyurichthys*, as it has D1 VI and the teeth in upper jaw in one row. It agrees fully with *auchenolepis* Blkr. I do not know who described *Synechogobius heterolepidotus*”. The putative holotype is USNM 6292, an 80 mm SL female *O. auchenolepis* from Japan. Eschmeyer (2015) does not accept this as a valid name, because it was not treated as valid when mentioned by Koumans, therefore not available from Koumans (1940).

Oxyurichthys macrolepis Chu and Wu, in Chu, Chan and Chen, 1963: 425, fig. 321 (Ta Chen Island, Zhejiang Province, China).

Remarks. The holotype of this species was lost in 1973 when Shanghai Fisheries University moved to Xiamen (pers.comm. H.W. Wu and C. Li). From examination of the figure and text translated by K. Ting, this is not an *Oxyurichthys* species, but could be *Arcygobius baliurus*.

Oxyurichthys ornatus Fourmanoir and Crosnier, 1964: 21 (Nosy Bé, Madagascar).

Remarks. Based on the description, this could be an *Amblyeleotris* or an *Oxyurichthys*. The location of the holotype is unknown and is considered to be lost (Bauchot et al. 1991); it is possible that Fourmanoir did not send it to MNHN.

Discussion

Relationships with other genera. *Oxyurichthys* are gobionelline species within the *Stenogobius* Group (Larson, 2001, Pezold 2011, Gill and Mooi, 2012, Tornabene et al 2013). Their relationships to other taxa have been primarily addressed through several major surveys of gobioid fish morphology. Based upon features of the postcranial axial osteology, Birdsong et al. (1988) phenetically placed *Oxyurichthys* in what they termed the Gobionellus Group, which also included *Calamiana*, *Ctenogobius*, *Gnatholepis*, *Gobionellus*, *Mugilogobius*, *Oligolepis*, *Pseudogobiopsis*, *Stenogobius* and *Tamanka*. Harrison (1989) postulated a relationship between *Oxyurichthys* and the Oxudercinae because of a truncate palatine and termed it the *Oxyurichthys* lineage, which was in turn proposed as a sister group to a *Ctenogobius* lineage comprising *Ctenogobius*, *Evorthodus*, *Gnatholepis*, *Gobionellus* (which included *Oxyurichthys keiensis*), *Oligolepis*, and *Stenogobius*. The *Ctenogobius* lineage was characterized by a long palatine extending towards and, in some species, meeting the quadrate. The sister relationship to the *Oxyurichthys* lineage was proposed due to a shared pattern of neuromast configuration on the cheek.

Larson (2001) regarded *Oxyurichthys* as a member of a *Stenogobius* Group of gobies which were united by the possession of an anterior nasal pore (A) in the lateralis on the snout, no villi on the head, the lack of a pore in the lateralis above and behind the orbit (modally) (E) and a transverse pattern of neuromasts (sensory papillae) on the cheek. The latter two conditions were regarded as derived. *Oxyurichthys* was returned as a sister group to *Oligolepis* in a phylogenetic analysis of 42 morphological characters using *Rhyacichthys* as the outgroup. It was not clear what features produced that result—the intent of the phylogeny was to determine the composition of larger clades within the Gobionellinae, e.g. the *Stenogobius* Group. The analysis also did not include all presumed members of the *Stenogobius* Group. Pezold (2004a) examined relationships of *Gobionellus* species with genera of the *Stenogobius* Group historically postulated as close relatives of the genus. The analysis included the genera *Awaous*, *Stenogobius*, *Gobioides*, *Gobionellus*, *Oxyurichthys*, *Gnatholepis*, *Ctenogobius*, *Evorthodus* and *Oligolepis*. *Oxyurichthys*, *Ctenogobius*, *Oligolepis* and *Evorthodus* were part of a clade recovered that was characterized by two synapomorphies—the presence of a fleshy lobe on the anterior surface of the epibranchial and incomplete neural arches over the caudal vertebrae. Both characters were reversed in at least one group of species—the presence of a lobe in *Ctenogobius* and the incomplete neural arches in most *Oxyurichthys* species and *Ctenogobius stigmaturus*. *Ctenogobius* and *Oxyurichthys* were proposed as sister groups based upon the shared condition of the oculoscapular canal.

The only molecular study to include multiple genera of the *Stenogobius* Group (Tornabene et al 2013) is consistent with phylogenetic results obtained by Larson (2001) and Pezold (2004a). Using a concatenated dataset of two nuclear genes, RAG 1 and rhodopsin, Tornabene et al (2013) recovered *Oxyurichthys* in a polytomy with *Ctenogobius* and *Oligolepis* which was sister to a clade containing the genera *Evorthodus*, *Gobioides* and *Gobionellus*. *Oxyurichthys* and *Ctenogobius* were sister taxa in a strongly supported clade which was in turn sister to *Oligolepis* in their RAG 1 phylogeny.

Relationships within the genus. *Oxyurichthys keiensis* shares with other species of *Oxyurichthys* the unique oculoscapular canal pore configuration and the transversely bifid and spatulate third neural spine not observed in other *Stenogobius* Group species. Members of the subgenus *Oxyurichthys* are distinguished from *O. keiensis* by a number of synapomorphies: a rounded tongue (vs. bifurcate or truncate), a shortened palatine, D VI + I, 12 and A I, 13, one row of teeth in the upper jaw, a triangular basihyal, and complete neural arches over caudal vertebrae. All but three species share a membranous crest or low ridge on nape midline.

Relationships among the nineteen species within the subgenus *Oxyurichthys* are not clear although there are several groups of species recognizable that share different combinations of features. Five species are characterized by ocular cirri: *Oxyurichthys cornutus*, *O. ophthalmonema*, *O. paulae*, *O. tentacularis* and *O. uronema*. *Oxyurichthys cornutus* and *O. ophthalmonema* are so similar in pigmentation and body form that they have historically been confused as a single species (Figs. 9, 10, 30, 31). The other four species form an *O. tentacularis* group and share a constriction of the upper lip at the symphysis of the premaxillae in addition to the ocular cirri. This constriction is also observed in *O. auchenolepis* however. *Oxyurichthys tentacularis* and *O. chinensis* are virtually indistinguishable except for the lack of a tentacle in *O. chinensis*. *Oxyurichthys paulae* and *O. uronema* share apomorphic bars along the sides.

Another group of five species has cycloid scales midlaterally on the trunk at least anterior to the second dorsal-fin origin: *O. lonchotus*, *O. microlepis*, *O. rapa*, *O. takagi* and *O. zeta*. The first three of those species have a dark spot on the eye; it is diffuse or absent in *O. takagi* and absent in *O. zeta*. All of these five except *O. zeta* are estuarine species. The occurrence of cycloid scales in *O. zeta* is believed to be convergent as the species is more similar in pigmentation to *O. notonema* and *O. limophilus*.

There are four species characterized by large heads and eyes and no spots, cirri or calluses on the eyes: *Oxyurichthys auchenolepis*, *O. heisei*, *O. nuchalis* and *O. stigmalocephus*. A weak callus appears in some specimens of *O. auchenolepis*. *Oxyurichthys heisei*, *O. nuchalis* and *O. stigmalocephus* are all deepwater species. *Oxyurichthys papuensis* and *O. petersii* appear to be sister species sharing a strong callus on the eye and a prominent basicaudal spot. *Oxyurichthys limophilus* and *O. notonema* also form a pair of sister species being distinguished primarily by the length of their dorsal-fin spines. These two species may be closely related to *O. zeta* as well, a species with which they share small scales and a large dark spot on the posterior field of the first dorsal fin.

Biogeography. This is an Indo-Pacific genus with one representative in the western Atlantic: six species span the Indo-Pacific, eight species are only found in the Pacific Ocean and five species are limited to the Indian Ocean. There are no species of *Oxyurichthys* present in the eastern Atlantic or the eastern Pacific oceans. Historical records from the eastern Atlantic are of *Gobionellus occidentalis* (Pezold, 2004b). A single species is present in the western Atlantic, the deepwater *O. stigmalocephus*.

Three of the six Indo-Pacific species belong to the group of four estuarine species with midlateral cycloid scales and a spot (variably present in *O. takagi*) on the eye—*Oxyurichthys lonchotus*, *O. microlepis* and *O. takagi*. Another estuarine species, *O. ophthalmoneura*, also has an Indo-Pacific distribution. The other two Indo-Pacific species, *O. notonema* and *O. papuensis*, are larger-bodied species found over silty sand or mud bottoms, respectively. *Oxyurichthys papuensis* is frequently captured at depths less than a meter but occurs at least to 15 m, while *O. notonema* has also been taken in a beach seine, although it is generally found in deeper waters, having been observed to depths of 23 m.

Five species are known only from the Indian Ocean, including *O. keiensis*, which is found in river mouths and lagoons. Two of the species are from deeper waters—*O. nuchalis* from the western Indian Ocean taken in trawls from 25–85 m off South Africa and Madagascar, and *O. paulae* known only from depths of 34–38 m off southwestern India. These two deepwater species do not appear to be closely related. *Oxyurichthys paulae* is a member of the tentacled group and is likely to be sister to *O. uronema* from the western Pacific. The other two species, *O. petersii* and *O. limophilus*, appear to be western Indian Ocean endemics sister to the Indo-Pacific species *O. papuensis* and *O. notonema*, respectively. *Oxyurichthys petersii* is a Red Sea endemic that has spread to the Mediterranean Sea via the Suez Canal. Additional sampling from east African estuaries is needed to understand the distribution of *O. limophilus*.

The majority of *Oxyurichthys* species are known only from the central and western Pacific Ocean. Three of the eight species have tentacled eyes. *Oxyurichthys cornutus*, *O. uronema* and *O. tentacularis* are widely distributed in the southwestern Pacific. *Oxyurichthys chinensis*, which may be sister to *O. tentacularis*, is known only from the Chinese coast off southern Hainan. The latter three species are all found in inshore deepwater, while *O. cornutus* inhabits shallow estuaries. *Oxyurichthys zeta* is a widely photographed but seldom captured species occurring in depths and habitats similar to that for its close relative *O. notonema*. *Oxyurichthys auchenolepis* and *O. heisei* are deepwater species known from trawls in the region. *Oxyurichthys heisei* is one of only two species reaching Hawaii, the other being the shallow water *O. lonchotus*. *Oxyurichthys rapa* is sister to *O. lonchotus* and to our knowledge is endemic to Rapa in the south-central Pacific.

Acknowledgements

Our great thanks to all the very patient curators, collection managers and others who provided us with long-term loans of specimens and provided us with information. Some affiliations have changed, some people are retired and some are deceased. We thank: Barbara Brown, Norma Feinberg, Donn Rosen [deceased], and John Sparks (AMNH), Doug Hoese, Mark McGrouther and Sally Reader (AMS), Mark Sabaj Perez, Bill Saul, and Bill Smith-Vaniz (ANSP), Yuji Ikeda and Katsusuke Meguro (BLIP), Patrick Campbell, James Chambers, Mandy Holloway, James Maclaine, Alwynne Wheeler [deceased], and Anne-Marie Woolger (BMNH), Jack Randall and Arnold

Suzumoto (BPBM), Dave Catania, Bill Eschmeyer, Tomio Iwamoto, Stuart Poss, and Pearl Sonoda (CAS), Al Graham and Will White (CSIRO), C. E. Dawson [deceased], Stuart Poss and Sarah Lecroy (GCRL), Barry Chernoff, John Fitzpatrick, Terry Grande, Dave Greenfield, Robert K. Johnson [deceased], Mary Anne Rogers, Don Stewart and Mark Westneat (FMNH), James Van Tassell (Hofstra University), Dani Golani (HUJ), Tom Adamson, Bob Lavenberg, Jeff Seigel and Chris Thacker (LACM), Karsten Hartel (MCZ), Marie-Louise Bauchot, Guy Duhamel, Philippe Keith and Patrice Pruvost (MNHN), Wayne Starnes (NCSM), Neil Douglas (NLU), Harald Ahnelt (Universität Wien), Gento Shinohara (NSMT), Rex Williams and Gavin Dally (NTM), Jeff Johnson (QM), Martien van Oijen (RMNH.PISC), Rick Winterbottom (ROM), Eric Anderson, Phil Heemstra, Vusi Mthombeni, and Paul Skelton (SAIAB), Terry Sim (SAMA), Len Compagno (SAM), Friedhelm Krupp (SMF), Ron Fricke (SMNS), Carter Gilbert and Rob Robins (UF), Dick Robins (UMML), Bob Miller [deceased], Doug Nelson, and Lex Snyder (UMMZ), Chuck Birkeland and Terry Donaldson (UGM), Tetsuo Yoshino (URM), Janet Gomon, Bill Hoffman, Jeffrey Howe, Susan Jewett, Ed Murdy, Lisa Palmer, Lynne Parenti, Victor Springer and Jeff Williams (USNM), Gerry Allen and Barry Hutchins (WAM), Masayoshi Hayashi (YCM), Isaac Isbrucker, Han Nijssen and H. Praagman (ZMA), Jorgen Nielsen (ZMK), Masahiro Aizawa (ZUMT). Heidi Coene, Laboratory of Ecology and Aquaculture, Leuven, Belgium supplied many specimens from Kenya. Many thanks to those who kindly provided photographs and slides, some of them a long time ago: Phil Alderslade (NTM), Tim Allen (deceased), Oddgeir Alvheim (SAIAB), Sergey Bogorodsky (Omsk), Caroline Camilleri (formerly Office of the Supervising Scientist, Darwin); Ryan Chabarría (Texas A&M University—Corpus Christi), Ray Cui (Sun Yat-sen University, Guangzhou); Phil Heemstra (SAIAB), Doug Hoese (AMS), Yuji Ikeda (BLIP), Maurice Kottelat (CMK), Rudie Kuiter (Seaford, Victoria), Katsusuke Meguro (BLIP), Richard Mleczko (Geoscience Australia), A. Murugan (National Institute of Oceanography, Goa); Jack Randall (BPBM), Tono Tonozuka (deceased), Ron Watson (SMF), Jeff Williams (USNM), Rick Winterbottom (ROM), and Tetsuo Yoshino (URM). FP also acknowledges the many requests for specimens signed by his major advisor Clark Hubbs [deceased] on his behalf for this project. Collections in Micronesia were supported by US National Science Foundation grant OISE-0553910 to FP.

References

- Akihito, Prince (1972) On a specimen of “matsugehaze”, *Oxyurichthys ophthalmonema*, collected in Kanagawa Prefecture, Japan. *Japanese Journal of Ichthyology*, 19 (2), 103–110.
- Akihito, Prince, Hayashi, M. & Yoshino, T. (1984) Suborder Gobioidi. In: Masuda, H., Amaoka, K., Araga, C., Uyeno, T. & Yoshino, T. (Eds.), *The Fishes of the Japanese Archipelago*. Tokai University Press, Tokyo, pp. 236–289, pls 235–355.
- Akihito, Prince, Hayashi, M. & Yoshino, T. (1988) Suborder Gobioidi. In: Masuda, H., Amaoka, K., Araga, C., Uyeno, T. & Yoshino, T. (Eds.), *The Fishes of the Japanese Archipelago, Second Edition*. Tokai University Press, Tokyo, pp. 236–289, pls 235–355.
- Akyol, O., Ünal, V. & Ceyhan, T. (2006) Occurrence of two Lessepsian migrant fish, *Oxyurichthys petersi* (Gobiidae) and *Upeneus pori* (Mullidae), from the Aegean Sea. *Cybium*, 30 (4), 389–390.
- Allen, G.R. & Adrim, M. (2003) Coral reef fishes of Indonesia. *Zoological Studies*, 42 (1), 1–72.
- Allen, G.R. & Erdmann, M.V. (2012) *Reef fishes of the East Indies. Vols. I–III*. Tropical Reef Research, Perth, 1260 pp.
- Barnard, K.H. (1927a) Diagnoses of new genera and species of South African marine fishes. *The Annals and Magazine of Natural History*, Series 9, 20 (8), 66–79.
- Barnard, K.H. (1927b) A monograph of the marine fishes of South Africa. Part 2. *Annals of the South African Museum*, 21, 419–1065.
- Bauchot, M.-L., Desoutter, M., Hoese, D.F. & Larson, H.K. (1991) Catalogue critique des types de Poissons du Muséum national d'Histoire naturelle. (Suite) Sous-ordre des Gobioidi. *Bulletin du Muséum National d'Histoire Naturelle Ser. 4: Section A: Zoologie Biologie et Ecologie Animales*, 13 (1–2, supplement), 1–82.
- Ben-Tuvia, A. (1983) An Indo-Pacific goby *Oxyurichthys papuensis* in the eastern Mediterranean. *Israel Journal of Zoology*, 32, 37–43.
- Birdsong, R.S., Murdy, E.O. & Pezold, F.L. (1988) A study of the vertebral column and median fin osteology in gobioid fishes with comments on gobioid relationships. *Bulletin of Marine Science*, 42 (2), 174–214.
- Blaber, S.J.M. & Milton, D.A. (1990) Species composition, community structure and zoogeography of fishes of mangrove communities in the Solomon Islands. *Marine Biology*, 105, 259–267.
- Blaber, S.J.M., Milton, D.A. & Rawlinson, N.J.F. (1991) Checklist of fishes recorded by the baitfish research project in Solomon Islands from 1986 to 1990. *CSIRO Marine Laboratories Report*, 212, 1–21.
<http://dx.doi.org/10.1007/BF01344295>
- Bleeker, P. (1849) Bijdrage tot de kennis der Blennioïden en Gobioiden van den Soenda-Molukschen Archipel, met

- beschrijving van 42 nieuwe soorten. *Verhandelingen van het Bataviaasch Genootschap van kunsten en wetenschappen*, 22 (6), 1–40.
- Bleeker, P. (1854a) Ichthyologische waaremingen gedaan op verschillende reizen in de residentie Bantam. *Natuurkundig Tijdschrift voor Nederlandsch-Indie*, 7, 309–326.
- Bleeker, P. (1854b) Specierum piscium javanensium novarum vel minus cognitarum diagnoses adumbratae. *Natuurkundig Tijdschrift voor Nederlandsch-Indie*, 7, 415–448.
- Bleeker, P. (1856) Achtste bijdrage tot de kennis der ichthyologische fauna van Ternate. *Natuurkundig Tijdschrift voor Nederlandsch-Indie*, 12, 191–210.
- Bleeker, P. (1857) Index: Descriptionum specierum piscium Bleekerianarum in voluminibus I ad XIV diarii Societatis Scientiarum Indo-Batavae. *Natuurkundig Tijdschrift voor Nederlandsch-Indie*, 14, 447–486.
- Bleeker, P. (1874) Esquisse d'un système naturel des Gobioides. *Archives néerlandaises des sciences exactes et naturelles*, 9, 289–331.
- Bleeker, P. (1876) Description de quelques espèces insulindiennes inédites des genre *Oxyurichthys*, *Paroxyurichthys* et *Cryptocentrus*. *Verlagen en Mededeelingen der Koninklijke Akademie van Wetenschappen, Letterkunde, en Schoone Kunsten te Amsterdam*, 2 (9), 138–148.
- Bleeker, P. (1984) *Atlas Ichthyologique des indes Orientales Néélandaises. Vol. 11–14. (Plates for Vol XI–XIV)*. Smithsonian Institution Press, Washington, DC, 186 pp.
- Borsieri, C. (1904) Contribuzione alla conoscenza della fauna ittologica della colonia Eritrea. *Annali del Museo Civico di Storia Naturale "Giacomo Doria"*, 3, 187–220.
- Boulenger, G.A. (1909) Descriptions of three new fishes from Portuguese Guinea. *Annals and Magazine of Natural History*, 8 (4), 429–431.
<http://dx.doi.org/10.1080/00222930908692692>
- Cantor, T.E. (1850) [1849] Catalogue of Malayan fishes. *Journal of the Asiatic Society of Bengal*, 18 (2), 983–1443.
- Chu, Y.-T., Chan, C.-L. & Chen, C.-T. (1963) *Ichthyofauna of East China Sea*. Magazine Scientific Publication Press, Beijing, 642 pp. [In Chinese]
- Collette, B.B. (1983) Mangrove fishes of New Guinea. In: Teas, H.J. (Ed.), *Tasks for vegetation science. Vol.8*. Dr.W. Junk, The Hague, pp. 91–102.
http://dx.doi.org/10.1007/978-94-017-0914-9_10
- Day, F. (1871) On the fishes of the Andaman Islands. *Proceedings of the Zoological Society of London*, 1870, 677–705.
- Day, F. (1873) On some new or imperfectly known fishes of India and Burma. *Proceedings of the Zoological Society of London*, 1873 (Part 1), 107–112.
- Donaldson, T.J., Myers, R.F., Moyer, J.T. & Schupp, P.J. (1994) Zoogeography of fishes of the Mariana, Ogasawara and Izu Islands: a preliminary assessment. *Natural History Research, Special Issue*, 1, 303–332.
- Eschmeyer, W.N. (Ed.) (2015) *Catalog Of Fishes: Genera, Species, References*. Available from: <http://research.calacademy.org/research/ichthyology/catalog/fishcatmain.asp> (accessed 28 February 2015)
- Ferraris, C.J. Jr., McGrouther, M.A. & Parkinson, K.L. (2000) A critical review of the types and putative types of southern Asian marine and freshwater fish species in the Australian Museum named by Francis Day. *Records of the Australian Museum*, 52, 289–306.
<http://dx.doi.org/10.3853/j.0067-1975.52.2000.1317>
- Fourmanoir, P. & Crosnier, A. (1964) Deuxième liste complémentaire des poissons du Canal de Mozambique. Diagnoses préliminaires de 11 espèces nouvelle. *Cahiers ORSTOM—Oceanographie Série Nosy-Bé II*, 6, 2–32.
- Fowler, H.W. (1925) Fishes of Guam, Hawaii, Samoa, and Tahiti. *Bernice P. Bishop Museum Bulletin*, 22, 1–38.
- Fowler, H.W. (1928) *The Fishes of Oceania. Memoirs of the Bernice P. Bishop Museum*, X, 540 pp. [Honolulu, Hawaii]
- Fricke, R. (1992) Types in the fish collection of the Staatliches Museum für Naturkunde in Stuttgart. Part 2. The Klunzinger collection. *Stuttgarter Beiträge zur Naturkunde, Serie A (Biologie)*, 473, 1–25.
- Fricke, R., Kulbicki, M. & Wantiez, L. (2011) Checklist of the fishes of New Caledonia, and their distribution in the Southwest Pacific Ocean (Pisces). *Stuttgarter Beiträge zur Naturkunde A, Neue Serie*, 4, 341–463.
- Fricke, R., Allen, G.R., Andréfouët, S., Chen, W.-J., Hamel, M.A., Laboute, P., Mana, R., Tan, H.H. & Uyeno, D. (2014) Checklist of the marine and estuarine fishes of Madang District, Papua New Guinea, western Pacific Ocean, with 820 new records. *Zootaxa*, 3832 (1), 1–247.
<http://dx.doi.org/10.11646/zootaxa.3832.1.1>
- Gierl, C., Reichenbacher, B., Gaudant, J., Erpenbeck, D. & Pharissat, A. (2013) An extraordinary gobioid fish fossil from Southern France. *PLoS ONE*, 8 (5), e64117.
<http://dx.doi.org/10.1371/journal.pone.0064117>
- Gilbert, C.R. & Randall, J.E. (1979) Two new western Atlantic species of the gobiid fish genus *Gobionellus*, with remarks on characteristics of the genus. *Northeast Gulf Science*, 3, 27–47.
- Ginsburg, I. (1932) A revision of the genus *Gobionellus* (family Gobiidae). *Bulletin of the Bingham Oceanographic Collection*, 4, 1–51.
- Ginsburg, I. (1953) Ten new American gobiid fishes in the United States National Museum, including additions to a revision of *Gobionellus*. *Journal of the Washington Academy of Sciences*, 43, 18–26.
- Goren, M. (1979) Gobiinae of the Red Sea. *Senckenbergiana Biologica*, 60 (1/2), 13–64.

- Goren, M. (1986) A suggested model for the recolonization process of the Red Sea at the post glacial period. In: Uyeno, T., Arai, R., Taniuchi, T. & Matsuura, K. (Eds.), *Indo-Pacific Fish Biology, Proceedings of the 2nd International Conference on Indo-Pacific Fishes*, Ichthyology Society of Japan, Tokyo, pp. 648–654.
- Goren, M. & Dor, M. (1994) *An updated checklist of the fishes of the Red Sea. CLOFRES II*. The Israel Academy of Sciences and Humanities, Eilat, 120 pp.
- Greenfield, D.W. & Randall, J.E. (2004) The marine gobies of the Hawaiian Islands. *Proceedings of the California Academy of Sciences*, 55 (27), 498–549.
- Haines, A.K. (1979) An ecological survey of fish of the lower Purari River system, Papua New Guinea. *Purari River (Wabo) Hydroelectric Scheme Environmental Studies Vol. 6*. Office of Environment and Conservation, Waigani, 102 pp.
- Harrison, I.J. (1989) Specialization of the gobioid palatopterygoquadrate complex and its relevance to gobioid systematics. *Journal of Natural History*, 23, 325–353.
<http://dx.doi.org/10.1080/00222938900770211>
- Hayashi, M. & Shiratori, T. (2003) *Gobies of Japanese Waters*. TBS Encyclopaedia Britannica/Hankyu, Tokyo, 223 pp.
- Hayashi, M., Suzuki, T., Itoh, T. & Senou, H. (1981) Gobiid fishes of the Rykyu Islands, southern Japan (III)—Suborder Gobioidae. *Science Report of the Yokosuka City Museum*, 28, 1–14.
- Herre, A.W.C.T. (1927) *Gobies of the Philippines and the China Sea, Monograph 23*. Philippine Bureau of Science, Manila, 352 pp.
- Hoda, S.M. (1980) A contribution to the gobioid fishes of Pakistan. *Proceedings of the 1st Pakistan Congress of Zoology, B*, 469–482.
- Hoese, D.F. (1986) Family 240: Gobiidae. In: Smith, M.M. & Heemstra, P.C. (Eds.), *Smith's Sea Fishes*. Springer-Verlag, New York, pp. 774–807.
- Hoese, D.F. & Larson, H.K. (2006) Gobiidae. Gobies. In: Hoese, D.F., Bray, D.J., Paxton, J.R. & Allen, G.R. Fishes. In: Beesley, P.L. & Wells, A. (Eds.), *Zoological Catalogue of Australia. Vol. 35. Parts 1–3*. ABRS and CSIRO Publishing, Canberra, pp. 1612–1697.
- Hoese, D.F. & Larson, H.K. (2015) Gobiidae. *Australian Faunal Directory*. Australian Biological Resources Study, Canberra. Available from: <http://www.biodiversity.org.au/afd/taxa/GOBIIDAE> (accessed 10 April 2015)
- Hoese, D.F. & Winterbottom, R. (1979) A new species of *Lioteres* (Pisces: Gobiidae), from Kwazulu, with a revised checklist of South African gobies and comments on the generic relationships and endemism of Indian Ocean gobioids. *Life Sciences Occasional Paper*, 31, 1–13.
- Jenkins, O.P. (1903) Report on collections of fishes made in the Hawaiian Islands, with descriptions of new species. *Bulletin of the United States Fish Commission*, 22, 417–511.
- Jordan, D.S. & Evermann, B.W. (1905) The aquatic resources of the Hawaiian Islands. Part 1.—The shore fishes. *Bulletin of the United States Fish Commission*, 23, 1–574. [Government Printing Office, Washington, DC]
- Jordan, D.S. & Seale, A. (1906) The fishes of Samoa. Description of the species found in the archipelago, with a provisional checklist of the fishes of Oceania. *Bulletin of the U.S. Bureau of Fisheries*, 25, 173–455. [1905]
- Kami, H.T., Ikehara, I. & DeLeon, F. (1968) Check-list of Guam fishes. *Micronesica*, 4 (1), 95–131.
- Kami, H.T. (1975) Check-list of Guam fishes, Supplement II. *Micronesica*, 11 (1), 115–121.
- Kawanabe, H. & Mizuno, N. (1989) *Freshwater Fishes of Japan*. Yama-Kei Publishers, Tokyo, 719 pp. [in Japanese]
- Kimura, S., Satapoomin, U. & Matsuura, K. (Eds.) (2009) *Fishes of Andaman Sea. West Coast of Southern Thailand*. National Museum of Nature and Science, Tokyo, 346 pp.
- Klunzinger, C.B. (1871) Synopsis der Fische des rothen Meeres, II. *Verhandlungen der Kaiserlich-Königlichen Zoologisch-botanischen Gesellschaft in Wien*, 21, 441–668.
- Kobayasi, H. & Kondo, I. (1959) On the cycloid scales derived from the degeneration of ctenii of ctenoid scales found in a gobiid fish *Chasmichthys dolichognathus dolichognathus* (Hilgendorf). *Bulletin of the Japanese Society of Scientific Fisheries*, 25, 351–355.
<http://dx.doi.org/10.2331/suisan.25.351>
- Kornerup, A. & Wanscher, J.H. (1978) *Methuen Handbook of Colour*. Methuen, London, 252 pp.
- Kottelat, M. (1989) Zoogeography of the fishes from Indochinese inland waters with an annotated checklist. *Bulletin Zoologisch Museum*, 12, 1–56.
- Kottelat, M. (2013) The Fishes of the Inland Waters of Southeast Asia: A catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *The Raffles Bulletin Of Zoology*, No. 27 (Supplement), 1–663.
- Kottelat, M., Whitten, A.J., Kartikasari, S.N. & Wirjoatmodjo, S. (1993) *Freshwater Fishes of Western Indonesia and Sulawesi*. Periplus Editions Ltd, Indonesia, 221 pp.
- Koumans, F.P. (1931) *A preliminary revision of the genera of the gobioid fishes with united ventral fins*. Proefschrift Drukkerij Imperator N.V. Lisse, Netherlands, 174 pp.
- Koumans, F.P. (1935) Notes on gobioid fishes. 6. On the synonymy of some species from the Indo-Australian Archipelago. *Zoologische Mededeelingen*, 18, 121–150.
- Koumans, F.P. (1940) Results of a reexamination of types and specimens of gobioid fishes, with notes on the fishfauna of the surroundings of Batavia. *Zoologische Mededeelingen*, 22, 121–210.
- Koumans, F.P. (1941) Gobioid fishes of India. *Memoirs of the Indian Museum*, 13, 205–329.
- Koumans, F.P. (1953) X. Gobioidae. In: Weber, M. & de Beaufort, L.F. (Eds.), *The Fishes of the Indo-Australian Archipelago*.

- E.J. Brill, Leiden, 423 pp.
- Kuiter, R.H. & Tonzuka, T. (2001) *Pictorial guide to Indonesian reef fishes*. Zoonetics, Seaford, 865 pp.
- Larson, H.K. (2001) A revision of the gobiid fish genus *Mugilogobius* (Teleostei: Gobioidi), with discussion of its systematic placement. *Records of the Western Australian Museum*, 62 (Supplement), 1–233.
- Larson, H.K. & Murdy, E.O. (2001) Gobiidae. Gobies. In: Carpenter, K.E. & Niem, V.H. (Eds.), *FAO species identification guide for fishery purposes. The living marine resources of the western Central Pacific. Volume 6. Bony fishes part 4 (Labridae to Latimeriidae)*. FAO, Rome, pp. 3578–3603.
- Larson, H.K. & Lim, K.P. (2005) *A guide to gobies of Singapore*. National Science Centre, Singapore, 164 pp.
- Larson, H.K., Jafaar, Z. & Lim, K.P. (2008) An annotated checklist of the gobioid fishes of Singapore. *Raffles Bulletin of Zoology*, 56 (1), 135–155.
- Larson, H.K., Williams, R.S. & Hammer, M.P. (2013) The fish fauna of the Northern Territory: an annotated checklist. *Zootaxa*, 3696, 1–293.
<http://dx.doi.org/10.11646/zootaxa.3696.1.1>
- Lieske, E. & Myers, R. (1994) *Coral reef fishes. Caribbean, Indian Ocean and Pacific Ocean including the Red Sea*. Harper Collins Publishers, London, 400 pp.
- McCulloch, A.R. & Waite, E.R. (1918) Some new and little-known fishes from South Australia. *Records of the South Australian Museum*, 1 (1), 39–78.
- McEachran, J.D. & Fechhelm, J.D. (2005) *Fishes of the Gulf of Mexico. Volume 2: Scorpaeniformes to Tetraodontiformes*. University of Texas Press, Austin, 1004 pp.
- Masuda, H. & Kobayashi, Y. (1994) *Grand atlas of fish life modes. Color variation in Japanese fish*. Tokai University Press, Tokyo, 465 pp.
- Matsuura, K., Shibukawa, K., Shinohara, G. & Liu, J. (2001) Fishes collected from the shallow waters of Hainan Island, South China Sea. In: Matsuura, K. (Ed.), *Marine fauna of the shallow waters around Hainan Island, South China Sea. National Science Museum Monographs*, Number 21, pp. 101–126.
- Maugé, A.L. (1986) Gobiidae. In: Daget, J., Gosse, J.-P. & Thys van den Audenaerde, D.F.E. (Eds.), *Checklist of the freshwater fishes of Africa. CLOFFA 2*. ISNB, Brussels, MRAC, Tervuren, and ORSTOM, Paris, pp. 358–388.
- Mead, G.W. & Böhlke, J.E. (1958) *Gobionellus stigmatophius*, a new goby from the Gulf of Campeche and the Great Bahama Bank. *Copeia*, 1958, 285–289.
<http://dx.doi.org/10.2307/1439961>
- Mehta, R., Devi, K. & Mehta, H.S. (1989) *Oxyurichthys talwari*, a new species of gobiid fish from Andaman Islands. *Journal of the Andaman Science Association*, 5 (1), 23–26.
- Mehta, R., Mehta, H.S. & Devi, K. (1990) Structure and shape of mouth in some gobioid fishes. *Environment and Ecology*, 8 (2), 668–671.
- Menon, A.G.K. & Devi, K.R. (1978) The comparative ecology of two sympatric species of *Oxyurichthys* Bleeker (Pisces: Gobiidae) from the Ennore estuary, Madras. 1. Length-weight relationship of *O. microlepis* (Bleeker) and *O. tentacularis* (Cuv. & Val.). *Bulletin of the Zoological Survey of India*, 1 (3), 263–266.
- Menon, A.G.K. & Govindan, N. (1977) *Oxyurichthys nijsseni*, a new gobioid fish from Ennore estuary, east coast of India, with a key to the identification of the Indo-West Pacific species of the genus *Oxyurichthys*. *Matsya*, 2, 13–15.
- Monkolprasit, S., Sontirat, S., Vimollohakarn, S. & Songsirikul, T. (1997) *Checklist of fishes in Thailand*. Office of Environmental Policy and Planning, Bangkok, 353 pp.
- Motomura, H., Kuriwa, K., Katayama E., Senou, H., Ogihara, G., Meguro, M., Matsunuma, M., Takata, Y., Yoshida, T., Yamashita, M., Kimura, S., Endo, H., Murase, A., Iwatsuki, Y., Sakurai, Y., Harazaki, S., Hidaka, K., Izumi, H. & Matsuura, K. (2010) Annotated checklist of marine and estuarine fishes of Yaku-shima Island, Kagoshima, southern Japan. In: Motomura, H. & Matsuura, K. (Eds.), *Fishes of Yaku-shima Island. A World Heritage Island in the Osumi Group, Kagoshima Prefecture, Southern Japan*. National Museum of Nature and Science, Tokyo, pp. 65–248.
- Murdy, E.O. & Hoese, D.F. (2003) Gobiidae. In: Carpenter, K.E. (Ed.), *The living marine resources of the western central Atlantic. Vol. 3. Bony fishes part 2 (Opistognathidae to Molidae)*. FAO, Rome, pp. 1778–1798.
- Myers, R.F. (1988) An annotated checklist of the fishes of the Mariana Islands. *Micronesica*, 12, 115–180.
- Myers, R.F. (1999) *Micronesian reef fishes. A comprehensive guide to the coral reef fishes of Micronesia, 3rd Revised Edition*. Coral Graphics, Guam, 330 pp.
- Myers, R.F. & Donaldson, T.J. (2003) The fishes of the Mariana Islands. *Micronesica*, 35/36, 594–648.
- Nakabo, T. (Ed.) (2002) *Fishes of Japan with pictorial keys to the species. II. 2nd Edition*. Tokai University Press, Tokyo, 1748 pp.
- Nelson, J.S., Crossman, E.J., Espinosa-Pérez, H., Findley, L.T., Gilbert, C.R., Lea, R.N. & Williams, J.D. (2004) *Common and scientific names of fishes from the United States, Canada, and Mexico, Sixth Edition, Special Publication 29*. American Fisheries Society, Bethesda, Maryland, 386 pp.
- Nichols, J.T. (1958) A new goby and other fishes from Formosa. *American Museum Novitates*, 1876, 1–7.
- Nogawa, Y., Endo, H. & Machida, Y. (2003) Notes on newly recorded gobies (Gobiidae, Perciformes) from Tosa Bay, southern Japan. *Bulletin of Marine Science, Kochi University*, 22, 37–51.
- Oshima, M. (1926) Notes on a collection of fishes from Hainan, obtained by S.F. Light. *Annotationes Zoologicae Japonenses*, 11, 1–25.

- Pauly, D. & Martosubroto, P. (1996) *Baseline studies of biodiversity: the fish resources of Indonesia*. ICLARM, Makati City, Philippines, 327 pp.
- Pezold, F. (1991) The status of the gobioid genus *Paroxyurichthys*. *Japanese Journal of Ichthyology*, 37, 344–353.
- Pezold, F. (1993) Evidence for a monophyletic Gobiinae. *Copeia*, 3, 634–643.
<http://dx.doi.org/10.2307/1447224>
- Pezold, F. (1998) Three new species of *Oxyurichthys* (Teleostei: Gobiidae) from the Indian and Pacific Oceans. *Copeia*, 3, 687–695.
<http://dx.doi.org/10.2307/1447798>
- Pezold, F. (2004a) Phylogenetic analysis of the genus *Gobionellus*. *Copeia*, 2, 260–280.
<http://dx.doi.org/10.1643/CI-02-218R3>
- Pezold, F. (2004b) Redescriptions and synonymies of species of the American–West African genus *Gobionellus* (Teleostei, Gobiidae) with a key to species. *Copeia*, 2, 281–297.
<http://dx.doi.org/10.1643/CI-02-219R1>
- Pezold, F. (2011) Systematics of Gobionellidae. In: Patzner, R.A., Van Tassell, J.L., Kovacic, M. & Kapoor, B.G. (Eds.), *The Biology of Gobies*. Science Publishers, Jersey, Channel Islands, pp. 87–97.
<http://dx.doi.org/10.1201/b11397-8>
- Pezold, F.L. & Larson, H.K. (1986) Systematics of the gobiid genus *Oxyurichthys*. In: Uyeno, T., Arai, R., Taniuchi, T. & Matsuura, K. (Eds.), *Indo-Pacific Fish Biology, Proceedings of the 2nd International Conference on Indo-Pacific Fishes*. Ichthyology Society, Tokyo, pp. 954. [abstract only]
- Popta, C.M.L. (1922) II. Vierte und letzte Fortsetzung der beschreibung von neuen fischarten der Sunda-Expedition. *Zoologische Mededelingen*, 7 (1/2), 27–39.
- Rainboth, W.J. (1996) *Fishes of the Cambodian Mekong. FAO Species Identification Field Guide for Fishery Purposes*. FAO, Rome, 265 pp.
- Randall, J.E. (1995) *Coastal fishes of Oman*. Crawford House Publishing Pty Ltd, Bathurst, Australia, 438 pp.
- Randall, J.E. (2005) *Reef and shore fishes of the South Pacific. New Caledonia to Tahiti and the Pitcairn Islands*. University of Hawai'i Press, Honolulu, 707 pp.
- Randall, J.E. & Lim, K.K.P. (2000) A checklist of the fishes of the South China Sea. *Raffles Bulletin of Zoology Supplement* 8, 569–667.
- Rema Devi, K. (1993) Gobioids of Ennore Estuary and its vicinity. *Records of the Zoological Survey of India*, 90 (1/4), 161–189.
- Robins, C.R. & Ray, G.C. (1986) *A field guide to Atlantic coast fishes. North America*. Houghton Mifflin Company, Boston, 354 pp.
- Sabaj-Perez, M.H. (Ed.) (2014) Standard symbolic codes for institutional resource collections in herpetology and ichthyology: an Online Reference. Version 5.0. American Society of Ichthyologists and Herpetologists. Available from: <http://www.asih.org/> (accessed 22 September 2014)
- Sanzo, L. (1911) Distribuzione delle papille cutanee (organi ciatiformi) e suo valore sistematico nei Gobi. *Mitteilungen aus der Zoologischen Station zu Neapel*, 20, 249–328.
- Sauvage, H.E. (1880) Description des Gobioïdes nouveaux ou peu connus de la collection du Muséum d'histoire naturelle. *Bulletin de la Société philomathique de Paris, Série 7*, 4, 40–58.
- Seale, A. (1914) Fishes of Hong Kong. *Philippine Journal of Science*, 9 (1), 59–81.
- Senou, H. & Yoneyama, N. (2003) *Oxyurichthys* sp. *I.O.P. Diving News*, 14 (2), 1–8.
- Senou, H., Suzuki, T., Shibukawa, K. & Yano, K. (2004) *A photographic guide to the gobioid fishes of Japan*. Heibonsha, Tokyo, 534 pp.
- Shen, S.-C., Shao, K.T., Lee, S.C., Mok, H.K., Chen, C.T. & Chen, C.H. (1993) *Fishes of Taiwan*. National Taiwan University Press, Taipei, 960 pp.
- Smith, C.L., Tyler, J.C., Davis, W.P., Jones, R.S., Smith, D.G. & Baldwin, C.C. (2003) Fishes of the Pelican Cays, Belize. *Atoll Research Bulletin*, 497, 1–88.
<http://dx.doi.org/10.5479/si.00775630.497.1>
- Smith, H.M. (1945) The fresh-water fishes of Siam, or Thailand. *Bulletin of the United State National Museum*, 188, 1–622.
<http://dx.doi.org/10.5479/si.03629236.188.1>
- Smith, J.L.B. (1938) A new gobioid fish from South Africa. *Transactions of the Royal Society of South Africa*, 26 (4), 319–320.
<http://dx.doi.org/10.1080/00359193809519776>
- Smith, J.L.B. (1947) LXVII. New species and records of fishes from South Africa. *Annals and Magazine of Natural History*, Series 11, 13 (108), 793–821.
- Smith, J.L.B. (1949) *The sea fishes of southern Africa. 1st Edition*. Central News Agency Ltd, Cape Town, 580 pp.
- Smith, J.L.B. (1959) Gobioid fishes of the families Gobiidae, Periophthalmidae, Trypauchenidae, Taenioididae and Kraemeriidae of the western Indian Ocean. *Department of Ichthyology, Rhodes University, Grahamstown, Ichthyological Bulletin*, 13, 185–225.
- Smith, J.L.B. (1960) Fishes of the family Gobiidae in South Africa. *Department of Ichthyology, Rhodes University, Grahamstown, Ichthyological Bulletin*, 18, 299–314.
- Smith, J.L.B. (1961) *The sea fishes of southern Africa. 4th Edition*. Central News Agency, Ltd, Cape Town, 580 pp.

- Steindachner, F. (1893a) Ichthyologische Beiträge (XVI). *Anzeiger der Akademie der Wissenschaften in Wien*, 30, 150–152.
- Steindachner, F. (1893b) Ichthyologische Beiträge. XVI. *Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften Wien*, 102, 215–243.
- Suvatti, C. (1981) *Fishes of Thailand*. Royal Institute of Thailand, Bangkok, 379 pp. [in Thai]
- Suzuki, T., Senou, H., Sakamoto, K., Iwata, A. & Aizawa, M. (2000a) Record of a gobioid *Oxyurichthys mindanensis* from Japan, and taxonomic notes on *O. ophthalmoneuma*. *I.O.P. Diving News*, 11 (6), 2–6.
- Suzuki, T., Senou, H., Sakamoto, K., Iwata, A. & Aizawa, M. (2000b) Notes on four species of *Oxyurichthys* (Perciformes, Gobiidae) collected in Iriomote Island, Ryukyu Islands. *I.O.P. Diving News*, 11 (7), 2–7.
- Takagi, K. (1950) On the glossohyal bone of the gobioid fishes of Japan, with some phylogenetic considerations. *Japanese Journal of Ichthyology*, 1 (1), 37–52. [in Japanese with English summary]
- Takagi, K. (1989) Cephalic sensory canal system of the gobioid fishes of Japan: comparative morphology with special reference to phylogenetic significance. *Journal of the Tokyo University of Fisheries*, 75 (2), 499–568.
- Talwar, P.K. & Jhingram, A.G. (1991) *Inland fishes of India and adjacent countries*. Oxford & IBH Publishing Co., Calcutta, 1158 pp.
- Talwar, P.K., Chatterjee, T.K. & Dev Roy, M.K. (1982) *Oxyurichthys dasi*, a new gobioid (Pisces: Gobiidae) from the Andaman Islands. *Records of the Zoological Survey of India*, 79, 483–487.
- Tomiya, I. (1936) 5. Gobiidae of Japan. *Japanese Journal of Zoology*, 7 (1), 37–112.
- Tornabene, L., Chen, Y. & Pezold, F. (2013) Gobies are deeply divided: phylogenetic evidence from nuclear DNA (Teleostei: Gobioidae: Gobiidae). *Systematics and Biodiversity*, 2013, 1–7.
<http://dx.doi.org/10.1080/14772000.2013.818589>
- Valenciennes, A. (1837) In: Cuvier, G.L. & Valenciennes, A. (Eds.), *Histoire Naturelle des Poissons. Vol. 12*. Levrault, Paris, 507 pp.
- Wass, R.C. (1984) An annotated checklist of the fishes of Samoa. *NOAA Technical Report, National Marine Fisheries Service, Special Scientific Report—Fisheries*, 781, 1–43.
- Weber, M. (1893) Die süß-wasser fische des Indischen Archipels, nebst bemerkungen den unsprung der fauna von Celebes. *Zoologische Ergebnisse einer Reise Niederländisch Ost-Indien*, 3, 405–476.
- Weber, M. (1907) Süßwasserfische von Neu-Guinea; ein Beitrag zur Frage nach dem früheren Zusammenhang von Neu-Guinea und Australien. *Nova Guinea. Resultats de l'expédition scientifique Néerlandaise a la Nouvelle-Guinée en 1903. Zoologie*, 5 (2), 201–267.
- Weber, M. (1909) Note IV. Diagnosen neuer Fische der Siboga-Expedition. *Notes from the Leyden Museum*, 31 (2), 143–169.
- Weber, M. (1913) Süßwasserfische aus Niederländisch Süd- und Nord-Neu-Guinea. *Nova Guinea. Resultats de l'Expédition scientifique Néerlandaise a la Nouvelle-Guinée en 1903. Zoologie*, 9 (4), 513–613.
- Whitehead, P.J.P. & Talwar, P.K. (1976) Francis Day (1829–1889) and his collections of Indian fishes. *Bulletin of the British Museum (Natural History) Historical Series*, 5 (1), 1–189.
- Winterbottom, R. (1976) Additions to, and range extensions of, the South African marine ichthyofauna. *Zoologica Africana*, 11 (1), 59–73.
- Wong, K.C. (1982) A preliminary survey of the benthic fishes of Tolo Harbour. In: Morton, B.S. & Tseng, C.K. (Eds.), *Proceedings of the First Marine Biological Workshop: The Marine Flora and Fauna of Hong Kong and southern China, Hong Kong*. Hong Kong University Press, Hong Kong, pp. 921–933.
- Wu, H.-L. (1991) Gobioidae. In: Pan, J.-H., Zhong, L., Zheng, C.-Y., Wu, H.-L. & Liu, J.-H. (Eds.), *The Freshwater Fishes of Guangdong Province*. Guangdong Science and Technology Press, Guangzhou, pp. 422–504.
- Wu, H.-L. & Ni, Y. (1986) Gobiidae. In: Anonymous (Ed.), *The freshwater and estuarine fishes of Hainan Island*. Guangdong Science and Technology Press, Guangzhou, China, pp. 259–314. [in Chinese]
- Wu, H.-L. & Zhong, J. (Eds.) (2008) *Fauna Sinica. Osteichthyes, Perciformes (V), Gobioidae*. Science Press, Beijing, 951 pp. [in Chinese]