Japanese Journal of Ichthyology
Vol. 37, No. 4 1991

魚類学雑誌
37巻4号 1991年

The Status of the Gobioid Genus *Paroxyurichthys*

Frank Pezold

Biology Department and Museum of Zoology, Northeast Louisiana University,
Monroe, Louisiana 71209, U.S.A.

Abstract Examination of the holotype and only known specimen of *Paroxyurichthys typus* Bleeker, 1876, from Indonesia revealed it to have distinctions of the cephalic lateralis, post-cranial axial osteology and pigmentation diagnostic of *Gobionellus oceanicus* (Pallas, 1770) of the western Atlantic. *Paroxyurichthys* Bleeker, 1876, is a junior synonym of *Gobionellus* Girard, 1859. The only other species commonly referred to *Paroxyurichthys, Oxyurichthys laterisquamatus* Weber, 1908, from New Guinea, has anterior nares medial to the oculoscapular canals of the snout. This feature is a synapomorphy of the genus *Stenogobius* Bleeker, 1874. The new combination, *Stenogobius laterisquamatus* is proposed.

Paroxyurichthys typus was described by Bleeker (1876) from a single specimen reported to have been taken from the sea at Ambon, Indonesia. The specimen was believed to represent a species related to *Oxyurichthys*, but was distinguished in having biserial teeth in the upper jaw, and by the presence of scales on the upper opercle. It was also stated that this species, representative of a new genus, was distinctive in lacking conical or molariform pharyngeal teeth. Bleeker suggested that *Euctenogobius sagittula* Günther, 1861, a species from the western coast of South America, which he had not seen, also belonged in *Paroxyurichthys*. He fitted the description of the new genus to accomodate both his specimen and *E. sagittula*; in particular, ranges were given for the lateral scale row number (58–80), the number of second dorsal fin rays (13–15) and the number of anal fin rays (14–16). Another species was later added to *Paroxyurichthys* by Koumans (1953). That species, originally described as *Oxyurichthys laterisquamatus* Weber, 1908, inhabits the fresh and estuarine waters of New Guinea.

An extensive search of museums across the world has yielded no additional specimens beyond the holotype identified as *Paroxyurichthys typus*. Examination of the specimen revealed it to be identical to *Gobionellus oceanicus* (Pallas, 1770) of the western Atlantic. *Euctenogobius sagittula* has been assigned to *Gobionellus* Girard, 1859, since 1904 (Gilbert and Starks, 1904) and will not be treated further in this work. Specimens of *O. laterisquamatus* were studied for key generic characters and found to belong to the genus *Stenogobius* Bleeker, 1874. This paper details the results of my findings.

Materials and methods

Osteological comparisons were made from radiographs and cleared/stained specimens supplied by lending institutions. These specimens are listed in Birdsong et al. (1988). Osteological formulas and terminology follow their methods. Oculoscapular canal and canal pore terminology follows Takagi (1957) and Prince Akihito et al. (1984). Standard length, caudal peduncle length, pectoral fin length (length of the longest pectoral ray), head width and interorbital width (least fleshy width) followed the methods described by Hubbs and Lagler (1958). Jaw length was measured as the distance from the symphysis of the upper jaw 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 horizontal diameter at the level of the anterior otic pore. 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 as described by Ginsburg (1932). Predorsal scales were the number of rows counted forward from the D_1 origin on the side of the nape along the groove paralleling the low midnape muscular ridge. Transverse forward scale rows were counted from the anal fin origin to the first dorsal fin base. Transverse rearward scale rows were

counted from the anal fin origin to the second dorsal fin base.

Specimens used for studies of external morphology are listed below and are arranged in geographical order for each species. Data for the specimens are given in the following order: catalogue number, number of individuals (in parentheses), standard length in mm, collection locality and collection date. Museum acronyms used are those of Leviton et al., (1985), unless otherwise noted.

Gobionellus oceanicus: RMNH 4679 (1), holotype of *Paroxyurichthys typus*, 85.5, Ambon, Indonesia; NLU 63758 (1), 73.4, Brunswick Cty., North Carolina (NC), 17 Nov 1982; NLU 63757 (2), 97.1–99.9, Brunswick Cty., NC, 16 Dec 1982; UNC 8100 (1), 121.3, Carteret Cty., NC, 9 July 1965; UNC 10363 (1), 103.5, Brunswick Cty., NC, July 1975; UNC 10419 (1), 95.2, Brunswick Cty., NC, 3 Nov 1975; UNC 10477 (1), 85.6, Brunswick Cty., NC, 28 Oct 1975; UNC 10587 (2), 92.3–124.0, Brunswick Cty., NC, 7 Jan 1976; UNC 11414 (1), 78.9, Brunswick Cty., NC, 15 Sept 1976; UNC 11594 (1), 99.2, New Hanover Cty., NC, 21 Oct 1976; UNC 13135 (1), 88.3, Brunswick Cty., NC, 17 Oct 1977; UNC 15376 (4), 60.3–85.0, Brunswick Cty., NC, 21 Aug 1978; UNC 15555 (1), 136.2, Carteret Cty., NC, 1 Sept 1979; USNM 123211 (1), 58.1, Beaufort, NC, 24 July 1914; USNM 123213 (1), 104.4, Beaufort, NC, 24 July 1914; ANSP 149615 (1), Charleston Cty, South Carolina (SC), 23 July 1974; ANSP 149724 (2), Charleston Cty., SC, 2 Dec 1971; GMBL 65-8 (10), 52.4–120.5, Charleston, SC, 28 June 1965; ANSP 79475 (1), Atlantic Ocean off Jacksonville, Florida (FL); IRCZM 107: 3515 (1), 106.1, Indian River, FL, 25 July 1974; IRCZM 107: 5422 (2), 25.6–26.5, Indian River Cty., FL, 7 June 1956; NLU 63759 (1), 70.8, Indian River Cty., FL, 21 May 1981; TNHC 10702 (1), 26.3, Matanzas River, FL, 19 May 1981; TNHC 10885 (8), 57.9–146.7, Hutchinson Island, FL, 23 May 1981; UF 30511 (4), 79.7–127.9, Hutchinson Island, FL, 13 Nov 1972; UF 31224 (1), 53.1, Hutchinson Island, FL, 26 March 1972; UF 100229 (3), 31.8–38.1, Hutchinson Island, FL, 28 March 1956; USNM 53340 (1), paratype of *Gobionellus gracillimus*, New Smyrna, FL, 29 Nov 1905; USNM 62702 (1), paratype of *G. gracillimus*, 127.6, New Smyrna, FL, 27 Nov 1908; USNM 123228 (2), paratypes of *G. gracillimus*, 109.5–113.5, St. John's River, FL, 8 May 1940; USNM 174954 (1), 95.1, St. Lucie estuary, FL, 29–30 Jan 1957; USNM 35155 (5), 64.4–79.7, Key West, FL; ANSP 73083 (1), 62.4, Escambia River, FL, 7 April 1953; ANSP 79026 (1), 76.9, Escambia River, FL, Dec 1955; ANSP 146432 (2), 55.0–67.5, Pensacola Bay, FL, 21 Nov 1971; ANSP 146435 (4), 32.9–45.4, Pensacola Bay, FL, 26 Nov 1971; ANSP 146437 (2), 90.9–106.8, Pensacola Bay, FL, 29 Aug 1971; ANSP 146441 (12), 31.3–104.4, Pensacola Bay, FL, 20 March 1972; UF/FSU 8954 (1), 142.6, Bay Cty., FL, 12 July 1961; UF/FSU 14222 (1), 137.9, Pensacola Bay, FL; UF 18980 (1), 140.4, Pensacola Bay, FL; UF 38040 (1), 139.2, Banana River, FL; USNM 307379 (1), 111.0, Pensacola Bay, FL, 22–26 February 1932; USNM 123225 (1), paratype of *G. graacillimus*, 105.0, Pensacola Bay, FL, 19 August 1930; USNM 123227 (1), holotype of *G. gracillimus*, Apalachicola Bay, FL, 16 June 1932; AMNH 52029 (1), Dauphin Island, Mobile Cty., Alabama, July–August, 1982; USNM 186172 (1), 141.0, Gulf Shores, Alabama, April 1959; USNM 197651 (1), Gulf of Mexico off Alabama, 30.07.30 N, 88.42.30 W, 22 June 1963; FMNH 31627 (1), 171.3, Mississippi (MS); USNM 265007 (1), Mississippi Sound, Jackson Cty., MS, 23 May 1960; USNM 265004 (3), Mississippi Sound, Jackson Cty., MS, 23 June 1960; USNM 265006 (3), Mississippi Sound, Jackson Cty., MS, 20 June 1960; USNM 263260 (1), Gulf of Mexico off Mississippi, 30.07.30 N, 88.43.00 W, 22 June 1963; FMNH 32998 (3), 125.8–158.2, Louisiana (LA); NLU 63754 (1), 39.3, Dennis Pass, Plaquemines Parish, LA, 29 July 1978; NLU 63755 (2), 15.4–35.1, Dennis Pass, Plaquemines Parish, LA, 24 June 1978; USNM 123224 (1), paratype of *G. gracillimus*, 153.8, Bayou St. Denis, LA; UNO (University of New Orleans) 3386 (1), 113.9, St. Bernard Parish, LA; ANSP 70903 (4), 120.6–156.3, Galveston, Texas (TX), 1943; ANSP 74060 (3), 96.4–111.4, Brazoria Cty., TX, 11 Oct 1954; ANSP 96787 (1), 137.4, Cameron Cty., TX, 2 April 1948; ANSP 99077 (1), 98.2, Sabine Pass, Orange Cty., TX, Aug 1962; ANSP 99136 (1), 92.4, Sabine River, Orange Cty., TX, 7 Aug 1962; ANSP 115784 (1), 75.7, Orange Cty., TX, July–Aug 1969; FMNH 38685 (2), 142.8–155.7, Pt. Aransas, TX; FMNH 40237 (2), 119.4–123.2, Port Aransas, TX, 4 Apr-15 May 1934; NLU 63756 (1), 72.1, Laguna Madre, Cameron Cty., TX, 22 Sept 1972; TCWC 0746.8 (1), 119.4, Brazos River, TX, 16 Oct 1951; TCWC 0921.3 (4), 43.6–137.1, Galveston, TX, 28 March 1976; TCWC 0929.8 (13), 30.1–153.9, Stedman Island, TX, 28 Feb 1976; TCWC 0936.6 (3), 113.2–133.6, Sabine Pass, TX, 28 March 1976; TCWC 1619.1 (1), 115.3, Trinity River, Chambers Cty., TX, 3 Dec 1976; TCWC 2049.2 (1), 131.6, San Bernard River, TX; TCWC 2194.1 (1), 113.5, Galveston Cty., TX, 1 Aug 1962; TNHC 10470 (3), 15.1–77.4, Rio Grande, Cameron Cty., TX, 2 May 1981; USNM 123226 (1), paratype of *G. gracillimus*, 137.1, Gulf of Mexico off south Texas, 27.24.30 N, 97.12.30 W, 28 April 1938; UTMSI (University of Texas Marine Science Institute) 371 (7), 84.2–106.6, 6 miles N of Rockport, TX, 31 May 1962; UTMSI 1336 (5), 59.8–89.8, Houston Ship Channel, 18 Feb 1969; UTMSI 2340 (2), 116.6–126.0, Cedar Bayou, TX, 6 June 1957; UTMSI 372 (17), 96.6–138.8, Tampico Market, Tamaulipas, Mexico, 30 April 1955; FMNH 45604 (1), 74.9, Gulf of Mexico, 19.16 N, 92.14 W, 23 Aug 1951; ANSP 55901 (1), 69.6, Havana, Cuba, Jan 1933; ANSP 70767-73 (7), 88.6–117.2, Cojimar, Cuba, 10 July 1940; ANSP 83497 (2), 69.1–74.3, Havana, Cuba, July 1934; AMNH 55464 (5), Havana Market,

Fig. 1. The holotype of *Paroxyurichthys typus*, RMNH 4679, 85.5 mm SL, Indonesia.

Cuba, July, 1924; FMNH 2629 (3), 56.3–68.7, Havana, Cuba, Jordan Coll.; USNM 164933 (1), Poey Coll., Cuba; ANSP 95631 (10), 39.5–65.8, Lucea, Jamaica, 3 Jan 1891; USNM BOC 3377 (9), 63.0–92.4, Jamaica, 1 Feb 1934; ANSP 81860 (1), 129.7, Port-au-Prince, Haiti, Nov 1949; ANSP 83498 (5), Port-au-Prince, Haiti, Feb 1936; USNM 132119 (1), 99.0, Haiti, 16 Dec 1944; USNM 178719 (2), 106.6–117.5, Haiti, 21 April 1927; ANSP 77296 (1), 118.6, Santo Domingo, Dominican Republic, 1928; ANSP 144493 (4), 38.9–117.8, Isla Grande, Puerto Rico (PR), 10 Aug 1964; AMNH 2069 (1), Palo Seco, PR, 13 Jan 1899; LACM 7725 (6), 32.5–46.6, PR; USNM 49365 (1), holotype of *Gobius bayomonensis*, San Juan, PR, 14 Jan 1899; USNM 205203 (1), Rio Anasco Beach, PR, 22 Aug 1956; USNM BOC 2746 (1), 115.1, PR, 16 Jan 1899; ANSP 142989 (1), Ilet a Fajou, Guadeloupe, 2 July 1976; USNM 265066 (12), Long Pond, St. Andrews Parish, Barbados, 10 Jan 1969; FMNH 32189 (1), 86.6, Panama; FMNH 32235 (2), 44.3–47.6, Toro Point, Canal Zone, Panama, 9 Jan 1911; FMNH 32237 (1), 92.3, Fox Bay, Colon, Panama, 25 March 1911; FMNH 32238 (2), 71.2–90.4, Fox Bay, Colon, Panama, 11 Jan 1911; USNM 81879 (1), 129.5, Mindi River, Mindi, Canal Zone, Panama, 16 Jan 1911; USNM 81880 (3), 54.0–89.1, Fox Bay, Colon, Panama, 11 Jan 1911; USNM 81882 (2), 34.4–57.5, Toro Point, Canal Zone, Panama, 9 Jan 1911; FMNH 3753 (1), 89.4, Ciudad Bolivar, Venezuela; MNHN A. 1262 (1), syntype of *Gobius bacalaus*, 86.4, Surinam; MNHN A. 1505 (1), 105.3, Cayenne, French Guiana, 1858; MNHN A. 8016 (5), 79.5–106.9, Cayenne, French Guiana; MNHN 2523 (6), 102.4–117.0, Cayenne, French Guiana, 1839; USNM 226246 (1), 65.3, French Guiana, 14 May 1980; ANSP 86872 (1), 158.3, Fortaleza, Brazil, 1936; ANSP 121230 (2), 74.9–93.7, Rio de Janeiro, Brazil, July 1963; ANSP 121231 (3), 88.4–95.4, Rio de Janeiro, Brazil, July 1963; ANSP 121243 (6), 89.9–122.8, Rio de Janeiro, Brazil, July 1963; AMNH 20722 (3), Ilha de Convivencia, Rio de Janeiro, Brazil, 19 March–9 April 1964; MNHN A. 1260 (2), syntypes of *Gobius bacalaus*, 118.0–149.2, Brazil; MNHN 1360 (2), syntypes of *G. bacalaus*, 89.8 (one specimen), Brazil; USNM 87751 (2), 129.8–148.8, Sao Francisco, Brazil, 25 Aug 1925; UF 19256 (3), 100.6–153.6, Rio de Janeiro, Brazil, 19 July 1963.

Stenogobius genivittatus: BPBM 26380 (2), 72.0–86.0, Oahu, Hawaii, 4 July 1980; BPBM 26373 (4), 77.0–87.0, Molokai, Hawaii, 28 March 1980; BPBM 12126 (24), 24.0–68.0, Marquesas, 25 April 1971; CAS 52011 (3), 56.9–71.2, Matac District, Guam, 6 Oct 1958; CAS 51056 (7), 38.2–78.2, Babelthuap Island, Palau, 23 Aug 1955.

S. gymnopomus: RMNH 4552 (4), syntypes, 65.6–75.6, Arch. Indien.

S. lachrymosus: LIAIP (Laboratory of Ichthyology, Akasaka Imperial Palace, Tokyo) 1967255 (2), 75.5–78.7, Taiwan, 30 Oct 1967; LIAIP 1974067 (1), 102.3, Viet Nam, 27 Sept 1974.

S. laterisquamatus: ZMA 116.477 (2), syntypes, 87.5–105.3, Mosso River, New Guinea; KFRS 3091 (1), 139.8, Kaporumbo Creek, Papua, New Guinea (PNG); WAM 28206-002 (1), 153.1, Sepik River, PNG, 1 Sept 1983; WAM 27847-007 (3), 43.8–75.6, Sepik River, PNG, 28 Oct 1982; WAM 28201-008 (20), 47.2–94.3, Laloki River, PNG, 10 Nov 1983; KFRS 1876 (2), 73.6–76.5, Laloki River, PNG; NLU 62766 (4), 64.1–104.2, Laloki River, PNG, 10 Nov 1983.

Results and discussion

Description of the holotype of *Paroxyurichthys typus* Bleeker, 1876 (RMNH 4679, 85.5 mm SL, Ambon, Indonesia; Fig. 1). First dorsal fin VI, second dorsal fin I-13; anal fin I-14; pectoral fin 19; scale rows in a longitudinal series 68 (estimated); transverse forward scale rows 21; transverse rearward scale rows 18; predorsal scale rows 31. Several cycloid (reduced ctenoid) scales on cheek near lower rear margin of preopercle; 5 rows cycloid scales on anterodorsal corner of opercle; pectoral fin axil and base naked; patch of cycloid scales present before base of pelvic fins. Most scales on trunk are lost. Cycloid (reduced ctenoid) scales on nape, on trunk beneath first dorsal fin, and on caudal fin base. Ctenoid scales on trunk from tips of appressed pectoral fins to base of caudal fin.

Head length 18.2%; head width 8.8%; interorbital width 1.4%; orbit length 3.7%; snout length 4.9%; jaw length 8.6%; caudal peduncle length 9.6%; pectoral fin length 16.4% of standard length. Pelvic

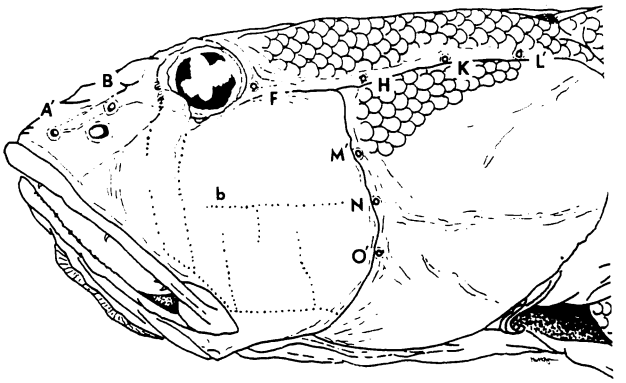

Fig. 2. Cephalic sensory papillae of the cheek region and lateralis canal pores on the holotype of *Paroxyurichthys typus*, 85.5 mm SL. Pore terminology as in Akihito et al. (1984). Pores C and D not shown. "b" indicates longitudinal papillae row b (Miller and Wongrat, 1979).

fins and caudal fin damaged. Teeth in lower jaw in a narrow band of about three rows; two rows in upper jaw, outermost large and conical, innermost row smaller. Pharyngeal plates not located. Tongue truncate. Six elongate gill rakers on the upper arm of the first gill arch, one at the angle, and nine triangular, leaf-like rakers on the lower arm with blades perpendicular to long axis of the ceratobranchial. No fleshy lobes on the anterior side of the upper arm of the first gill arch. No fleshy processes on eyes. No membranous crest on the nape. Pelvic fin interspinal membrane entire. Anterior nares not medial to oculoscapular canals. Oculoscapular canals with pores A′, B, C, D(S), F, H, K, L′. Preopercular canals with pores M′, N, O′. Cephalic sensory papillae (free neuromast) rows poorly preserved (Fig. 2). No fleshy processes on shoulder girdle.

Pigmentation is faded, specimen brown overall. Melanophores present beneath tips of upper rays of pectoral fins forming ovate blotch characteristic of *Gobionellus oceanicus*. No discernible melanophores in basicaudal region or on the opercle.

First dorsal fin pterygiophore insertion pattern 3-12210. Vertebrae: 10+16=26. Two epurals. Fourth neural spine spatulate.

Redescription of *Gobionellus oceanicus* (Pallas, 1770). Pallas's first binominal name based on Gronow's description (non-binominal name). Type lost, redescription based on non-type material and types of species placed in synonymy by Ginsburg (1932) and Pezold and Grady (1989).

First dorsal fin VI; second dorsal fin I-13; anal fin I-14; pectoral fins 18–20; scales in a longitudinal series 65–82, populations in the Gulf of Mexico

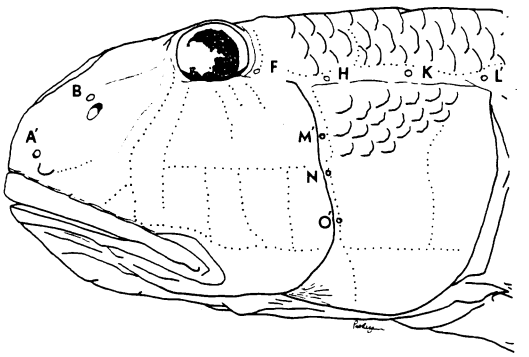

Fig. 3. Cephalic sensory papillae and lateralis canal pores of *Gobionellus oceanicus*, NLU 3201, 127.5 mm SL. Pore labels as in Fig. 2. Pores C and D not shown.

typically with 78–82 scales, specimens from the Caribbean and South America with 65–73 scales, intergradation of southern and northern forms occurs along the southeast Atlantic coast of the United States (Pezold and Grady, 1989); scales in a transverse forward series 17–29; scales in a transverse rearward series 14–23; predorsal scale rows 19–34. Cycloid (reduced ctenoid) scales scattered on cheek near lower margin of preopercle; in 3 to 5 rows in anterodorsal corner of opercle; in small patch anterior to base of pelvic fins; on trunk at base of first dorsal fin; and on the caudal fin base. Ctenoid scales on trunk from tip of appressed pectoral fins to base of caudal fin. Pectoral fin axil and base naked.

Head length 16.7–23.9%; head width 7.5–15.5%; interorbital width 0.8–2.8%; orbit length 3.0–5.4%;

Fig. 4. A syntype of *Oxyurichthys laterisquamatus*, ZMA 116.477, 105.3 mm SL, New Guinea.

snout length 4.1–6.8%; jaw length 7.5–10.5%; caudal peduncle length 7.2–10.9%; pectoral fin length 11.2–21.6%; pelvic fin length 8.4–21.2%; caudal fin length 28.9–60.1% of standard length. Teeth in two or three rows in lower jaw; two rows in upper jaw. Teeth in outermost row largest and conical. Tongue truncate to emarginate. Eight or nine triangulate flexible rakers on anterior side of lower limb of first gill arch with blades perpendicular to long axis of ceratobranchial, one elongate raker at angle and 6 or 7 elongate rakers on upper arch. No fleshy lobes on the anterior side of the upper arm of the first gill arch. No fleshy processes on the eyes. No membranous crest on the nape. Pelvic interspinal membrane entire, not fimbriate. Anterior nares not medial to oculoscapular canals on the snout. Oculoscapular canals with pores A′, B, C, D(S), F, H, K, L′. Preopercular canals with pores M′, N, O′. Free neuromast rows shown in Fig. 3. No fleshy processes on the shoulder girdle.

Pigmentation of preserved specimens as follows. No distinctive markings on the head. A large dark blotch, often ocellated, just beneath tips of appressed pectoral fins. Basicaudal spot present. Variable saddles and blotches on trunk of juveniles and some small adults. Midlateral series of closely set spots in juveniles, retained in some adults. Anal fin clear or dusky with clear margin. Pelvic fins in females with broad bilateral dusky stripes or centrally dusky with broad light margin; in males dark with clear margin. Caudal fin dusky.

First dorsal fin pterygiophore insertion pattern 3-12210 (Birdsong et al., 1988). Vertebrae: 10+16=26. Two epurals. Fourth neural spine spatulate.

Redescription of *Oxyurichthys laterisquamatus* Weber, 1908, based upon the syntypes (ZMA 116.477; Fig. 4) and non-type material. Counts and measurements for non-types are given in parentheses following values for syntypes.

First dorsal fin VI; second dorsal fin I-10 (I-10); anal fin I-10 (I-10); pectoral fin rays 16 (14–17); scales in a longitudinal series 50–53 (50–55); transverse forward scale rows 17–20 (15–20); transverse rearward scale rows 13–14 (12–15); predorsal scale rows 21–24 (18–26). Cheek with 5 rows of scales in lower rear corner in one syntype; scales covering most of the cheek in the other syntype, as far forward as 1st transverse suborbital row of free neuromasts. Scales on opercle in about five rows from anterodorsal corner in one syntype; some scales missing in the other, but may have extended to angle of preopercle along the margin. Eight or nine rows of scales anterior to base of pelvic fins. Base of pectoral fins completely scaled. Cycloid (reduced ctenoid) scales on head, nape, prepelvic trunk, abdomen and pectoral fin bases cycloid. Ctenoid scales on trunk posterior to line from posterodorsal corner of opercle to origin of D_1, including caudal fin base.

Head length 23.3% (23.3–27.6%); head width 11.0–11.5% (11.6–16.3%); interorbital width 4.0–5.0% (4.2–6.2%); orbit length 5.1–6.3% (4.5–7.0%); snout length 5.9–6.1% (5.5–8.1%); jaw length 8.0–8.8% (6.6–10.6%); caudal peduncle length 18.6–19.6% (17.6–21.9%); pectoral fin length 18.4–19.5% (19.1–23.5%); pelvic fin length 20.9–21.9% (17.4–23.9%); caudal fin length 38.7–40.4% (28.8–42.0%) of standard length. Two or more rows of teeth in upper jaw (usually two); band of teeth in lower jaw. Tongue truncate. First gill arch without gill rakers or lobes on upper arm, lower arm with several reduced rakers connected by low membrane. No membranous crest on the nape. No fleshy processes on eyes. Pelvic interspinal membrane finely fimbriate. Anterior nares medial to oculoscapular canals. Anterior oculoscapular canals with pores A′, B, C, D(S), F, H′. Posterior oculoscapular canals with pores K′, L′. Preopercular canals with pores M′, N, O′. Free neuromast rows in the cheek region not well-preserved, but longitudinal and transverse suborbital rows present; orientation of posterior opercular row not determinable. Fleshy processes present on the shoulder girdle.

Pigmentation of preserved specimens (FO 3091, NLU 62766, WAM 27847-007) as follows. Suborbital streak from lower margin of orbit to or nearly to the corner of the jaw. Dark blotch present on

upper pectoral fin base behind the operculum. Trunk with 4 to 8 dusky chevrons, not as dark as the vertical bars seen in *Stenogobius genivittatus*. No diamonds on scales of upper trunk. Faint lateral row of spots on midline, well-defined spots in one large female (152.7 mm SL). Upper third or two-thirds of caudal fin spotted, spots sometimes aligned to form a barred pattern; lower portion dusky. First dorsal with a clear band just above the base, bordered above and beneath by a dark band of about equal width. Second dorsal fin with oblique bands. Pelvic fins in males dusky with lightly scattered melanophores; clear in females. Pectoral fins clear. Anal fin dusky, but clear at tips of rays.

First dorsal fin pterygiophore insertion pattern 3-12210 (Birdsong et al., 1988). Vertebrae: 10+16=26. Two epurals. Fourth neural spine not spatulate.

Status of *Paroxyurichthys typus*. A radiograph of the holotype of *Paroxyurichthys typus* revealed the presence of an isolated flared and spatulate fourth neural spine (Fig. 5). The other spines are simple and not flared. I have observed this condition only in *Gobionellus daguae, G. oceanicus, G. microdon, G. occidentalis, G. liolepis*, and *G. stomatus*. Four of these species are members of the "fine-scaled" species group recognized by Gilbert and Randall (1979). E. Murdy (pers. comm.) reports a similar condition in *Oxuderces dentatus*. The occurrence of this feature in the latter species is recognized as convergent due to the distinctions that *O. dentatus* shares with other oxudercine gobies (Harrison, 1989; Hoese, 1984). The oculoscapular and preopercular canals of the cephalic lateralis in *P. typus* are also identical to that observed in those *Gobionellus* species listed above (Figs. 2, 3). Free neuromast rows are poorly preserved in the holotype, but the observable cheek rows correspond to those present in *G. oceanicus*. In particular, an extended longitudinal "b" row (Miller and Wongrat, 1979) is apparent. Miller and Won-

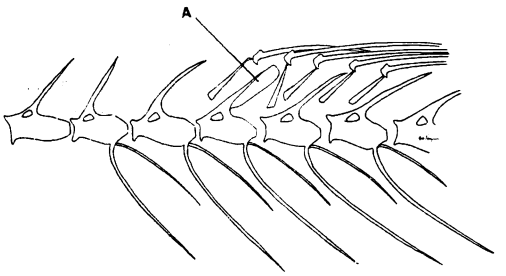

Fig. 5. Illustration of the first six vertebrae of the holotype of *Paroxyurichthys typus*, taken from a radiograph. A, the fourth neural spine.

Table 1. Meristic and morphometric summary for *Paroxyurichthys typus*, *Oxyurichthys laterisquamatus* and *Gobionellus oceanicus*. *Oxyurichthys laterisquamatus* syntype data is followed by non-type data in parentheses. Measurements are percentages of standard length.

	P. typus (holotype)	*O. laterisquamatus*	*G. oceanicus*
Second dorsal fin elements	14	11 (11)	14
Anal fin elements	15	11 (11)	15
Pectoral fin elements	19	16 (14–17)	18–20
Lateral scale rows	68	50–53 (50–55)	65–82
Transverse forward scale rows	21	17–20 (15–20)	17–29
Transverse rearward scale rows	18	13–14 (12–15)	14–23
Predorsal scale rows	31	21–24 (18–26)	19–34
Cheek scales	present	present	present
Opercle scales	present	present	present
Prepectoral scales	none	present	none
Prepelvic scales	present	present	present
Head length	18.2	23.3 (23.3–27.6)	16.7–23.9
Head width	8.8	11.0–11.5 (11.6–16.3)	7.5–15.5
Interorbital width	1.4	4.0–5.0 (4.2–6.2)	0.8–2.8
Orbit length	3.7	5.1–6.3 (4.5–7.0)	3.0–5.4
Snout length	4.9	5.9–6.1 (5.5–8.1)	4.1–6.8
Jaw length	8.6	8.0–8.8 (6.6–10.6)	7.5–10.5
Caudal peduncle length	9.6	18.6–19.6 (17.6–21.9)	7.2–10.9
Pectoral fin length	16.4	18.4–19.5 (19.1–23.5)	11.2–21.6
Pelvic fin length	—	20.9–21.9 (17.4–23.9)	8.4–21.2
Caudal fin length	—	38.7–40.4 (28.8–42.0)	28.9–60.1

grat (1979) noted the same condition for the "b" row in *Oxyurichthys, Gobioides, Cryptocentrus* and *Bollmannia*. Of these other four genera, only *Oxyurichthys* has a 3-12210 first dorsal pterygiophore pattern as seen in *P. typus* (Birdsong et al., 1988). The neuromast rows on the opercle of the holotype of *P. typus* have deteriorated beyond recognition.

The *P. typus* holotype has 14 total D_2 elements, 15 anal fin elements and 19 pectoral fin rays (Table 1). These meristic characteristics are shared by *Gobionellus oceanicus* and *G. occidentalis*. Bleeker was particularly impressed with the presence of scales on the upper opercle of his specimen of *P. typus*. This condition is also typical of both *G. occidentalis* and *G. oceanicus*. There are about 68 lateral scale rows on the holotype. This is probably an underestimate due to missing scales and the general poor condition of the specimen. *G. occidentalis* has 54–66 lateral scale rows, most typically 58 or 59 (unpubl. data). The lateral scale row counts of *G. oceanicus* range from 65–82 (Pezold and Grady, 1989).

Although the specimen is brown and faded, close examination of the *P. typus* holotype reveals an ovate patch of melanophores on the anterodorsal trunk behind the pectoral fins. This feature is seen only in *Gobionellus oceanicus* and *G. occidentalis*. It is most pronounced in specimens of *G. oceanicus*. *G. occidentalis* has a prominent basicaudal spot and triangular patch of pigment on the opercle. There is no evidence of this pigmentation on the *P. typus* holotype. In fact, the ovate patch on the trunk is very faded and only discernible with a microscope.

The *P. typus* holotype has a predorsal scale row count (31) within the range of values typical for *Gobionellus oceanicus*, but greater than that for *G. occidentalis* (0–23). *G. oceanicus* from the northwestern Atlantic and from Surinam and Brazil have more scales on the nape than those of Caribbean populations. The relatively low lateral scale row count suggests that the specimen originated in South American waters below the Caribbean.

G. oceanicus ranges the western Atlantic from North Carolina to southern Brazil. None of the other *Gobionellus* species with the modified fourth neural spine occurs outside of American or west African waters. *G. stomatus* is found only in Brazil. *G. occidentalis* occurs in estuaries of tropical west Africa. The other three species are limited to the west coast of North, Central and South America. *G. microdon* is the most ubiquitous, occurring from Mexico to Ecuador. *G. liolepis* has only been collected in Panama, while *G. daguae* is known solely from Columbian and Panamanian estuaries. Geographic distributions similar to the one observed for this group of *Gobionellus* species are found for the "coarse-scaled" *Gobionellus* species of Gilbert and Randall (1979) and Pezold and Gilbert (1987) (most of these species were reported as *Ctenogobius* sensu Robins and Lachner (1966) by Birdsong et al. (1988)), *Dormitator* and *Gobioides* (Birdsong et al., 1988).

Seven gobioid genera are known to inhabit the

Table 2. Diagnostic characters of *Paroxyurichthys typus*, *Oxyurichthys laterisquamatus*, *Gobionellus oceanicus* and the genera *Oxyurichthys* and *Stenogobius*.

	G. oceanicus	*P. typus*	*O. laterisquamatus*	*Stenogobius*	*Oxyurichthys*
Anterior margin of tongue	truncate	truncate	truncate	truncate	rounded
Membranous crest on nape	no	no	no	no	most
Preopercular canal	present	present	present	present	lost
Fleshy lobes first gill arch (anterior surface)	no	no	no	no	yes
Second dorsal fin elements /anal fin elements	14/15	14/15	11/11	11/11 or 12/12	13/14
Fourth neural spine	flared	flared	not flared	not flared	not flared
Posterior opercular papillae row	vertical	vertical	vertical	vertical	diagonal
Oculoscapular canal pores (D single in all)	A'BCDFHKL'	A'BCDFHKL'	A'BCDFH'K'L'	A'BCDFH'K'L'	A'BCDFH'
Single row teeth upper jaw	no	no	no	no	yes
Anterior nares medial to oculoscapular canals	no	no	yes	yes	no
Fleshy processes on shoulder girdle	no	no	yes	yes	no

Atlantic, Pacific and Indian Oceans: *Awaous, Bathygobius, Gnatholepis, Eleotris, Oxyurichthys, Priolepis* and *Ptereleotris* (Birdsong et al., 1988). Of these, only *Oxyurichthys* species might be confused with *Gobionellus oceanicus*. These taxa are very distinctive despite a superficial resemblance due to the general head and body form and proportions (Table 2). *Paroxyurichthys typus* shares none of the features diagnostic of *Oxyurichthys*.

Just how a specimen of *Gobionellus oceanicus* came to be described as a new species from Indonesian waters is unclear. Bleeker described *Paroxyurichthys typus* in 1876. This was 16 years after he had returned from the Indonesian Archipelago (M. J. P. van Oijen, in litt.). During that time it is possible that he acquired the specimen through an exchange with other museums and collectors. Bleeker regularly visited the Rijksmuseum van Natuurlijke Historie in Leiden which possessed collections of North American fishes, but Dr. van Oijen notes that the oldest identified specimens of *Gobionellus oceanicus* in the Leiden museum are from 1917.

On the basis of the evidence presented above, *Paroxyurichthys typus* is regarded as a junior synonym of *Gobionellus oceanicus*, type species of the genus *Gobionellus* Girard, 1859.

Status of *Oxyurichthys laterisquamatus*. *Oxyurichthys laterisquamatus* has commonly been placed in *Paroxyurichthys* since Koumans (1953). Weber (1908) originally placed it in *Oxyurichthys* because of the presence of scales on the cheeks, but he noted that it had scales on the opercle like *Paroxyurichthys typus*. The presence of scales on the cheeks is not diagnostic of *Oxyurichthys*. Species in that genus have 13 D_2 elements and 14 anal fin elements, a single row of teeth in the upper jaw, a rounded tongue and lack a preopercular lateralis canal (Table 2). With the exception of one Indian species, *Oxyurichthys* species also have a membra-nous crest on the nape. *O. laterisquamatus* has no crest on the nape, more than one row of teeth in the upper jaw and has a truncate tongue. This species also has a preopercular canal and has only 11 D_2 and anal fin elements.

The anterior nares of *O. laterisquamatus* are medial to the terminal pores of the cephalic lateralis on the snout (Fig. 6). This condition is peculiar to *Stenogobius* among gobioid fishes. *O. laterisquamatus* is also characterized by elongate, fleshy, papillate processes on the shoulder girdle, a disjunct portion of the oculoscapular canal above the opercle, an A′BCD(S)FH′K′L′ oculoscapular canal pore

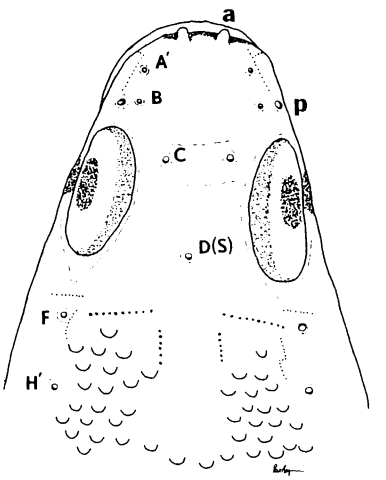

Fig. 6. A dorsal view of the snout of *Stenogobius laterisquamatus* showing the relative positions of the anterior nares (a) and the anterior oculoscapular canals. Pore labels as in Fig. 2. "A" and "P" indicate anterior and posterior nares, respectively.

pattern and a vertical row of sensory papillae on the posterior region of the opercle (Table 2). These characters, in combination with the synapomorphic position of the anterior nares relative to the cephalic lateralis canals on the snout, are recognized here as diagnostic for the genus *Stenogobius*, the type species of which is *Gobius gymnopomus* as originally designated.

The syntypes of *Oxyurichthys laterisquamatus* and other New Guinea specimens assignable to this species are similar in pigmentation to *Stenogobius lachrymosus* and *S. gymnopomus*. These three species lack the strongly barred pattern on the trunk found in *S. genivittatus*. They are close meristically as well (Tables 3 and 4). *Stenogobius* species lacking the dark trunk bars have 11 D_2 elements, 11 anal fin elements and usually have 16 pectoral fin rays. Specimens identifiable as *S. genivittatus* have 12 D_2 elements, 12 anal fin elements and usually have 15 pectoral fin rays.

The taxonomic status of *Stenogobius* species is uncertain. The genus is being revised by Ronald Watson and Dr. Ernest Lachner. Mr. Watson has informed me (in litt.) that specimens from New Guinea referred to *Paroxyurichthys laterisquamatus* have represented more than one species. I have identified all specimens from New Guinea lacking dark vertical bars as *Stenogobius laterisquamatus* in

this study, and have not observed any significant meristic or morphometric differences among them. The chevron patterns are not greatly pronounced; they are not nearly as intensely pigmented as the vertical bars in *S. genivittatus*. As most specimens were collected with rotenone, and there may also be variation in chevron expression due to sex and age and stream conditions, I am hesitant to attribute much significance to slight variations in that character. However, whether there are more than one species of unbarred *Stenogobius* in New Guinea or not, there is no question that the syntypes of *Oxyurichthys laterisquamatus* represent a valid species and are members of the monophyletic genus *Stenogobius*.

Acknowledgments

Many individuals at a number of museums have been helpful to this study. In particular, I thank Dr. J. E. Randall, BPBM; Drs. W. Eschmeyer, T. Iwamoto, P. Sonoda and M. Hearn, CAS; Mr. J. Lock,

Table 3. Ranges (in parentheses) and averages of squamation and fin ray counts for *Stenogobius* specimens. All scale counts are of rows except for cheek scales where the number of individual scales is given. Only specimens identified as *S. genivittatus* have dark vertical bars on the trunk. Specimens of the other three species have light chevrons of variable number. *Countable in one specimen only.

	Lateral	Predorsal	Trans. F.	Trans. R.	Prepelvic	Cheek	Opercle	D2	A
S. laterisquamatus									
Mosso R., syntypes (2)	(50–53) 52	(21–24) 22	(17–20) 18	(13–14) 14	(8–9) 8	5	5	11	11
Sepik R. (4)	(53–55) 54	(22–26) 24	(16–20) 18	(13–14) 14	(6–12) 10	10	(3–15) 10	11	11
Kaporumbo Creek (1)	53	21	20	14	8	4	9	11	11
Laloki R. (26)	(51–55) 53	(18–25) 21	(15–18) 16	(12–15) 14	(3–12) 5	(2–10) 4	(2–7) 4	11	11
S. lachrymosus									
Viet Nam (1)	49	19	16	15	3	5	3	11	11
Taiwan (2)	(48–50) 49	(18–20) 19	13*	(12–14) 13	(5–6) 6	0	0	11	11
S. gymnopomus									
Indonesia, types (4)	(47–49) 48	(15–17) 16	—	(12–13) 12	0	0	0	11	11
S. genivittatus									
Hawaii (6)	(47–50) 49	(14–18) 16	(13–16) 14	(11–14) 12	(5–9) 6	0	(0–2) 1	12	12
Guam (3)	(47–49) 48	(14–16) 15	(13–14) 13	(11–13) 12	0	0	0	12	12
Palau (7)	(45–50) 48	(14–17) 16	(14–15) 14	(11–15) 13	(1–6) 4	0	0	12	12
Marquesas (24)	(46–50) 48	(15–20) 17	(13–17) 14	(12–17) 13	(0–9) 4	0	0	12	12

Table 4. Left and right pectoral fin ray counts of *Stenogobius*. The number of left pectoral fin rays follows locality in parentheses.

	Left/right combination										
	14/15	15/11	15/14	15/15	15/16	16/14	16/15	16/16	16/17	17/16	17/17
S. laterisquamatus											
Mosso R. (16)								2			
Sepik R. (16)								4			
Kaporumbo Creek (16)						1					
Laloki R. (15–17)				1	1		1	19	2	1	1
S. lachrymosus											
Viet Nam (16)								1			
Taiwan (16)								2			
S. gymnopomus											
Indonesia (15–16)		not available									
S. genivittatus											
Hawaii (15–16)				4			1	1			
Guam (15–16)		1		1			1				
Palau (15–16)			1	3			1	2			
Marquesas (14–16)	3			20				1			

KFRS; Emperor Akihito, K. Meguro and A. Iwata, LIAIP; Dr. N. Douglas, NLU; Dr. M. J. P. van Oijen, RMNH; Dr. G. R. Allen, WAM; and Dr. H. Nijssen, ZMA. Ms. P. Kailola, Drs. T. Berra and G. R. Allen were especially helpful in locating specimens. Photographs were provided by W. Heckford. P. Regan drew the figures. This research was initiated at the University of Texas. I thank Dr. C. Hubbs for his comments and assistance.

Literature cited

Akihito, Prince, M. Hayashi and T. Yoshino. 1984. Suborder Gobioidei. Pages 236–289, pls. 235–258, 353–355 *in* H. Masuda, K. Amaoka, C. Araga, T. Uyeno and T. Yoshino, eds. The fishes of the Japanese Archipelago. English text and plates. Tokai Univ. Press, Tokyo. 2 vols., xii + 437 pp., 370 pls.

Birdsong, R., E. O. Murdy and F. L. Pezold. 1988. A study of the vertebral column and median fin osteology in gobioid fishes with comments on gobioid relationships. Bull. Mar. Sci., 42(2): 174–214.

Bleeker, P. 1876. Descriptions de quelques especes insul-indiennes inedites des genres *Oxyurichthys, Paroxyurichthys* et *Cryptocentrus*. Verh. Kon. Akad. Wet. Amsterdam., 2(9): 138–148.

Gilbert, C. and J. Randall. 1979. Two new western Atlantic species of the gobiid fish genus *Gobionellus*, with remarks on characteristics of the genus. Northeast Gulf Sci., 3(1): 27–47.

Gilbert, C. H. and E. Starks. 1904. The fishes of Panama Bay. Mem. Calif. Acad. Sci., 4, 304 pp., 33 pls.

Ginsburg, I. 1932. A revision of the genus *Gobionellus* (family Gobiidae). Bull. Bingham Oceanogr. Coll., 4(2): 1–51.

Günther, A. 1861. On a collection of fishes sent by Capt. Dow from the Pacific coast of Central America. Proc. Zool. Soc. Lond., 1861: 370–376.

Harrison, I. J. 1989. Specialization of the gobioid palatopterygoquadrate complex and its relevance to gobioid systematics. J. Nat. Hist., 23: 325–353.

Hoese, D. F. 1984. Gobioidei: relationships. Pages 588–591 *in* H. G. Moser, ed.-in-chief. Ontogeny and systematics of fishes. Amer. Soc. Ichthyol. Herpetol., Spec. Publ. No. 1.

Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Bull. Cranbrook Inst. Sci., 26: 1–213. (Revised edition.)

Koumans, F. P. 1953. The fishes of the Indo-Australian Archipelago. Vol. 10, Gobioidea. Brill, Leiden, 423 pp.

Leviton, A. E., R. H. Gibbs, Jr., E. Heal and C. E. Dawson. 1985. Standards in herpetology and ichthyology: Part 1, standard symbolic codes for institutional resource collections in herpetology and ichthyology. Copeia, 1985(3): 802–832.

Miller, P. and P. Wongrat. 1979. A new goby (Teleostei: Gobiidae) from the South China Sea and its significance for gobioid classification. Zool. J. Linn. Soc., 67: 239–257.

Pezold, F. and C. R. Gilbert. 1987. Two new species of the gobiid fish genus *Gobionellus* from the western Atlantic. Copeia, 1987(1): 169–175.

Pezold, F. and J. Grady. 1989. A morphological and allozymic analysis of species in the *Gobionellus oceanicus* complex (Pisces: Gobiidae). Bull. Mar. Sci., 45(3): 648–663.

Robins, C. R. and E. A. Lachner. 1966. The status of *Ctenogobius* Gill (Pisces: Gobiidae). Copeia, 1966(4): 867–869.

Takagi, K. 1957. Descriptions of some new gobioid fishes of Japan with a proposition on the sensory line system as a taxonomic character. J. Tokyo Univ. Fish., 43(1): 96–126.

Weber, M. 1908. Susswasserfische von Neu-Guinea. Nova Guinea, 5(2): 201–267.

(Received July 17, 1989; accepted September 12, 1990)

ハゼ科 *Paroxyurichthys* 属の分類学的位置

Frank Pezold

Paroxyurichthys typus Bleeker, 1876 はインドネシア産の完模式標本以外知られていない．その個体を調べた結果，頭部側線感覚管系，脊椎骨，および体側斑の特徴において，大西洋西岸の *Gobionellus oceanicus* (Pallas, 1770) と同じであることが判明した．*Paroxyurichthys* Bleeker, 1876 は *Gobionellus* Girard, 1859 のジュニア・シノニムである．今まで *Paroxyurichthys* とされていた残りの一種は，ニューギニアから知られる *Oxyurichthys lateri-squamatus* Weber, 1908 であるが，この種では吻部にある左右の眼上肩甲管末端開口よりも内側に前鼻孔が位置する．これはタネカワハゼ属 *Stenogobius* Bleeker, 1874 に特有な形質であるので，この種を新たにタネカワハゼ属に含めることを提唱する．