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*NOTURUS MUNITUS*, A NEW SPECIES OF MADTOM,  
FAMILY ICTALURIDAE, FROM SOUTHERN  
UNITED STATES

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The first known collection of the new madtom was obtained from the Pearl River in 1950. Extensive collecting during subsequent years suggested to us that it was the sole endemic fish species in this system, but more recent collections show that it is more widely distributed. A total of 1,979 specimens was available for this study, of which seven are from the Cahaba River in Alabama, two from the Tombigbee River and the remainder from the Pearl River system in Louisiana and Mississippi.

The most recent description of a madtom was by Bailey and Taylor (1950). Several other undescribed forms are known to Taylor, descriptions of which are planned soon after publication of this paper.

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FIG. 1. *Noturus munitus*, USNM 197708, paratype, male, 46.1 mm in standard length. Photographed by University of Michigan Photographic Services.



FIG. 2. Left pectoral spine of a female *Noturus munitus*, 44 mm in standard length, USNM 197708. Drawn by W. L. Brudon.

We recognize the new species as a member of the subgenus *Rabida* Jordan and Evermann. The characters of the subgenus are a mottled or blotched pattern, often forming prominent saddles on the back, and serrations along both the anterior and posterior edges of the pectoral spine (Fig. 2). The anterior spine serrae are small. The posterior serrae are larger and uniformly curved toward the body except one, or sometimes two, near the spine base. Other species in the subgenus *Rabida* are *Noturus eleutherus* Jordan, *Noturus furiosus* Jordan and Meek, *Noturus hildebrandi* (Bailey and Taylor) and *Noturus miurus* Jordan. *Schilbeodes gallowayi* Fowler is a synonym of *Noturus eleutherus*, as noted by Bailey and Taylor (1950: 31).

***Noturus munitus***, new species  
Frecklebelly Madtom.

(Figs. 1-3)

*Holotype*: Tulane University no. 26250, a male 50.5 mm in standard length, collected from the Pearl River, 2.6 miles east of Sandy Hook, Marion County, Mississippi, November 14, 1955, by Royal D. Suttkus and Kristin T. Nielsen.

*Paratopotypes*: Tulane University no. 11311, totaling 326 specimens, 26 to 53 mm in standard length, bearing same data as the holotype, now distributed as follows: Academy of Natural Sciences, Philadelphia, no. 102047, 10 specimens; British Museum of Natural History, no. 1964.12.24.1-10, 10 specimens; Chicago Natural History Museum, no. 72742, 10 specimens; Cornell University, no. 47676, 25 specimens; Museum of Comparative Zoology, no. 43090, 10 specimens; Museum National d'histoire Naturelle, Paris, no. 1964-584, 5 specimens; Senckenbergische Naturforschende Gesellschaft, Frankfurt am Main, no. SMF 7580-7584, 5 specimens; Stanford University, no. 62400, 5 specimens; Tulane University, 196 specimens; University of Michigan, Museum of Zoology, no.

181771, 25 specimens; United States National Museum, no. 198208, 25 specimens.

*Other paratopotypes:* Pearl R., 2.6 mi E Sandy Hook, Marion Co., Mississippi, USNM 197708, formerly TU 1844 (23 specimens, 22-46 mm) 24-25 Nov. 1951; TU 3557 (8, 25-51) 16 Feb. 1952; TU 13954 (213, 23-51) 5 Oct. 1956; TU 14930 (82, 23-54) 12-13 Jan. 1957; TU 14938 (82, 22-48) 6 Jan. 1957; TU 15171 (92, 25-52) 22-23 Jan. 1957; TU 18963 (60, 23-51) 3 Nov. 1957; TU 22824 (38, 26-55) 26 Oct. 1959; TU 23127 (1, 40) 24 Mar. 1960; TU 26657 (87, 20-55) 20 Oct. 1961; TU 28403 (16, 22-49) 19 Oct. 1962; TU 28719 (30, 23-53) **21 Oct. 1961; TU 28768 (129, 23-57)** 28 Dec. 1962.

*Other paratypes:* Pearl River system.-Pearl R., 4 mi NE Sandy Hook, Marion Co., Mississippi, TU 3627 (68, 24-48) 13 Jan. 1952. Upper Little Cr., Hwy. 13, 5 mi SE Columbia, Marion Co., Mississippi, TU 3951 (11, 32-52) 23 May 1952; TU 9709 (3, 41-50) 30 June 1954. Ten Mile Cr., Hwy. 35, 4.3 mi S Foxworth or 9.7 mi N Sandy Hook, Marion Co., Mississippi, TU 4872 (1, 55) 19 Aug. 1951; TU 16148 (6, 42-59) 7 Aug. 1957; TU 17951 (1, 49) 3 May 1958. Pushepatapa Cr., Hwy. 21, 0.2 mi S Varnado or 7.0 mi N Bogalusa, Washington Parish, Louisiana, TU 7369 (1, 67) 19 Jan. 1952; TU 10462 (3, 39-52) 29 June 1955; TU 11588 (1, 54) 7 May 1956; TU 15073 (2, 61-78) 13 Jan. 1957; TU 15465 (2, 38-48) 21 Apr. 1957; TU 17472 (1, 67) 20 Mar. 1958. Trib. to Pearl R., 0.5 mi S Hub, Marion Co., Mississippi, TU 8886 (4, 33-60) 28 Oct. 1950. Strong R., Hwy. 26, formerly Hwy. 20, 2.3 mi W Pinola, Simpson Co., Mississippi, TU 17721 (4, 34-44) 3 Apr. 1958; TU 18739 (2, both 54) 3 July 1958; TU 19781 (9, 24-67) 8 May 1959; TU 28820 (14, 31-75) 29 Dec. 1962; TU 30149 (32, 22-77) 6 Nov. 1963. Bogue Chitto R., Hwy. 438, 1 mi W Warnerton, Washington Parish, Louisiana, TU 19825 (52, 25-75) 2 May 1959; TU 19880 (3, 44-73) 3 May 1959; TU 23351 (1, 41) 3 July 1960. Bogue Chitto R., Hwy. 437, 1 mi S Enon, Washington Parish, Louisiana, TU 23310 (1, 26) 3 July 1960. Copiah Cr., Hwy. 27, 2.4 mi S Georgetown, Copiah Co., Mississippi, TU 23518 (24, 24-54) 22 July 1960; TU 23869 (3, 53-55) 25 Nov. 1960. Trib. to Pearl R., Hwy. 35, 0.5 mi N Marion Co. line, Marion Co., Mississippi, TU 23701 (1, 40) 21 July 1960. Holidays Cr., Hwy. 13, 0.5 mi S Coss, Marion Co., Mississippi, TU 26695 (1, 53) 21 Oct. 1961. Fair R., Hwy. 27, 4.5 mi N Monticello, Lawrence Co., Mississippi, TU 26759 (11, 40-62) 3 Nov. 1961. Silver Cr., Hwy. 587, northern limit Morgantown, Marion Co., Miss., TU 26878 (1, 75) 9 Dec. 1961. Pearl R., 2.5 mi S Oakville, Lawrence Co., Mississippi, TU 27137 (5, 16-32) 29 Aug. 1962. Pearl R., 1.5 mi SE Morgantown, Marion Co., Mississippi, TU 27172 (18, 20-39) 30 Aug. 1962. Bahala Cr., Hwy. 27, 6 mi S Rockport, Lawrence Co., Mississippi, TU 27299 (12, 31-49) 28 Oct. 1961. Pearl R., 1.5 mi SE Foxworth, Marion Co., Mississippi, TU 28034 (87, 26-54) 1 Dec. 1962; TU 28272 (47, 27-48) 17 Oct. 1962; TU 28534 (240, 22-58) 19-20 Dec. 1962. Pearl R., 3 mi SE Foxworth, Marion Co., Mississippi, TU 28303 (4, 29-46)

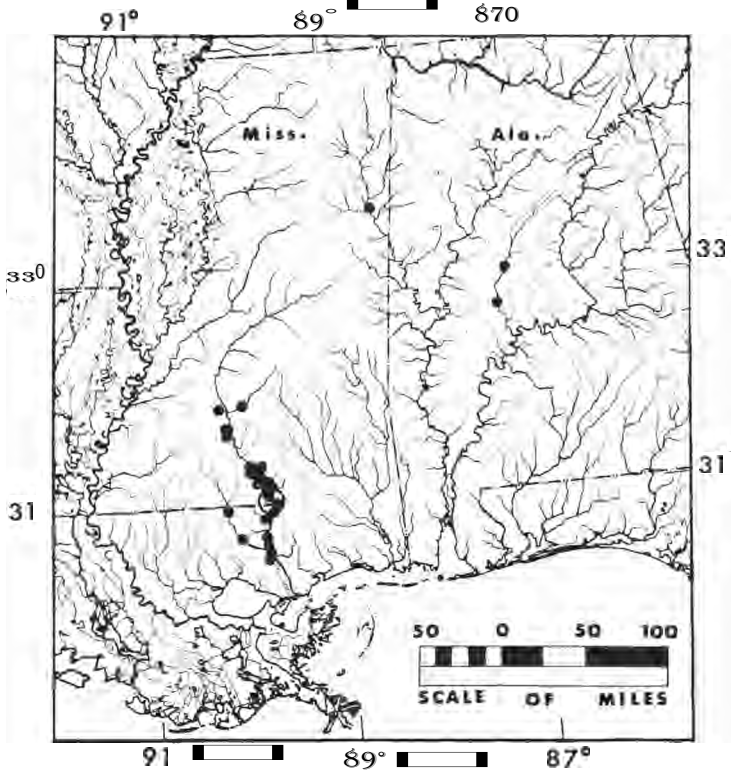


FIG. 3. Collection sites of *Noturus munitus*. The large circle indicates the type locality.

18 Oct. 1962. Pearl R., just above mouth of Ten Mile Cr., 6 mi SE Foxworth, Marion Co., Mississippi, TU 28316 (13, 28-52) 18 Oct. 1962. Pearl R., 0.5 mi upstream from Hurricane Cr. or 4 mi NNE Sandy Hook, Marion Co., Mississippi, TU 28345 (10, 24-46) 18 Oct. 1962. Pearl R., 2 mi NE Sandy Hook, Marion Co., Mississippi, TU 28373 (7, 26-45) 18 Oct. 1962. Pearl R., 1.5 mi NE Sandy Hook, Marion Co., Mississippi, TU 28391 (23, 33-47) 19 Oct. 1962. Pearl R., 4 mi E Angie, Washington Parish, Louisiana, TU 28429 (24, 25-45) 19 Oct. 1962. Pearl R., just below Pools Bluff Sill, 4 mi S Bogalusa, Washington Parish, Louisiana, TU 29942 (5, 17-37) 30-31 Aug. 1963; TU 30010 (17, 22-41) 29 Sept. 1963; TU 30040 (2, both 38) 25 Oct. 1963. Pearl R., river mile 52, 0.3 mi below mouth McGehee Cr., St. Tammany Parish, Louisiana, TU 29962 (1, 25) 10 Sept. 1963; TU 30025 (2, 29-32) 10 Oct. 1963. Pearl R., river mile 46, St. Tammany Parish, Louisiana, TU 29975 (1,

TABLE 1. Measurements' of *Noturus munitus* expressed as thousandths of the standard length

Sex	Holotype	Paratopotypes					Mean
	TU 26250	TU 11311			TU 11311		
	♂	♂	♀	♂	♀	♀	
Standard length (mm)	50.5	51.7	49.7	53.4	36.0	38.0	46.5
Body depth	211	216	209	222	236	223	219
Caudal peduncle depth	106	114	104	101	102	105	105
Snout to dorsal origin	447	448	432	432	433	439	438
Snout to pelvic origin	546	541	539	541	536	534	539
Snout to anal origin	685	686	669	683	680	686	681
Dorsal origin to adipose origin	295	297	299	280	308	276	292
Dorsal origin to adipose tip <sup>2</sup>	498	491	494	494	555	505	506
Adipose notch to tip of caudal	318	330	331	314	324	328	324
Anal origin to caudal base	310	311	317	299	325	294	309
Caudal peduncle length	162	164	162	170	174	165	166
Highest dorsal ray	172	199	189	170	197	223	191
Dorsal spine length	178	183	187	155	177	205	180
Adipose length	227	224	221	239	258	231	233
Adipose height	43	46	48	46	55	52	48
Caudal length	235	224	227	220	247	244	232
Anal base	140	141	140	127	169	157	145
Pectoral length	287	297	291	254	299	313	290
Pectoral spine length	225	245	245	202	241	244	233
Pelvic length	178	175	160	166	174	199	175
Posteroacleithral process length	122	123	124	112	127	131	123
Head length	366	380	360	346	347	360	359
Head width	285	282	259	280	261	265	272
Head depth at occiput	178	179	177	196	186	178	182
Snout length	142	150	144	144	147	139	144
Orbit length	73	71	72	73	69	65	70
Mouth width	194	191	169	179	152	176	176
Nasal barbel length	93	90	94	99	97	89	93
Maxillary barbel length	269	241	251	228	249	270	251
Outer mental barbel length	229	205	223	202	219	199	212
Inner mental barbel length	166	148	160	147	144	134	149

As described in Bailey and Taylor (1950:33).

The tip of the adipose fin is posterior to the notch or narrow attachment of the adipose and caudal fins.

25) 10 Sept. 1963. West Pearl R., 5 mi SE Talisheek, St. Tammany Parish, Louisiana, TU 29989 (1, 21) 11 Sept. 1963.

*Other specimens:* Cahaba R., just off Hwy. 5, 2.2 mi N Centerville, Bibb Co., Alabama, TU 15294 (1, 45) 17 Mar. 1957. Cahaba R., Hwy.

14, 1 mi W Sprott or 5 mi E Marion, Perry Co., Alabama, TU 29906 (5, 43-48) 15 Apr. 1963; TU 30101 (1, 52) 2 Nov. 1963. Tombigbee R., 7.5 mi S confluence with Buttahatchie R., Lowndes and Clay counties, Mississippi, from Mr. C. A. Schultz (2, 28-53).

**Diagnosis:** Posterior margin of adipose fin nearly free from caudal fin; anal fin short, with 12 to 14 rays; caudal fin abbreviated, with 45 to 52 rays; normally 9 pelvic rays, 1,8 pectoral rays, 11 preoperculo-mandibular pores and the infraorbital and supraorbital canals separate anteriorly; body short and chunky, with 30 to 32, seldom 33, vertebrae; caudal peduncle slender; head and spines proportionately large; abdomen, and often bases of pelvic fins, freckled with widely spaced brown chromatophores.

The posterior process of the cleithrum (humeral process) is long as in *Noturus miurus* and *Noturus furiosus*. The dark bar on the adipose fin typically extends to the fin margin, similar to *N. miurus* but unlike *N. eleutherus*. In contrast to both *N. miurus* and *N. furiosus*, there are fewer anal and caudal rays. *Noturus bildebrandi* differs in having fewer pelvic rays, a very short to obscure posterior process of the cleithrum and the bar on the adipose fin confined to the fin base.

**Data from holotype:** The holotype has 1,6 dorsal rays and iv,9 (equals 13) anal rays. On each side there are i,8 (equals 9) pelvic rays, 1,8 pectoral rays, 11 preoperculo-mandibular pores, 8 posterior serrae on the pectoral spine and 2 pores between the nares indicating that the supraorbital and infraorbital canals are separate anteriorly. The caudal fin has 17 upper simple rays, 7 upper branched rays, 9 lower branched rays and 14 lower simple rays, totaling 47 rays. The head length is stepped 2.9 times in the standard length. Further measurements are given in Table 1.

**Description:** Body short and heavy, deepest near dorsal fin; caudal peduncle relatively narrow, somewhat constricted below posterior part of adipose fin; head moderately depressed; lower jaw included; eye large, its diameter stepped 1.6 to 2.4 times in snout length; premaxillary tooth patch rectangular, about three times as broad as long, with posterior corners rounded or obtusely angulate; distance from base to tip of posterior process of cleithrum longer than diameter of pectoral spine including its serrae; pectoral spine (Fig. 2) very long and curved; anterior serrae of spine prominent; posterior serrae well developed, relatively few, their number increasing with size of fish, four to eight in specimens 22 to 46 mm in standard length, all except proximal one or two curved toward spine base; dorsal spine long and stiff; adipose fin short and high, its upper margin convex, its posterior end a free rounded to pointed flap, the base narrowly connected to the short pro-current caudal fin membrane; posterior end of caudal fin truncate to slightly rounded.

Excluding the holotype, combined fin-ray counts of 73 specimens from the Pearl River system and one specimen from the Cahaba River

are as follows: caudal fin rays 45(in 4), 46(17), 47(21), 48(23), 49(7), 50(1) and 52(1); of which the upper half of the fins contains 23(8), 24(37), 25(25) or 26(4) rays and the lower half 21(1), 22(23), 23(32), 24(17) or 26(1); 16 to 19, mean 17.5, are upper simple rays; 13, usually 14 to 16, mean 15.0, are branched rays, of which 6, usually 7, mean 6.8, are in the upper caudal lobe and 7 to 9, usually 8, mean 8.2, in the lower; 13 to 17, mean 14.7, are lower simple rays. The dorsal rays are I,5(in 5) or 1,6(69); anal rays 12(17), 13(49) or 14(8); pelvic rays 8(1) or 9(73) in left fins and 9(74) in right fins; pectoral rays 1,7(4), 1,8(69) or I,9(1) in left fins and 1,7(8) or 1,8(66) in right fins; branchiostegal rays 8 on left and 9 on right in one specimen; preoperculo- and mandibular pores 9(1), 10(5), 11(62) or 12(3) entering left canals and 10(7), 11(62) or 12(2) entering right canals; infra-orbital and supra-orbital canals separate anteriorly on both sides of 74 specimens, except on the left side of one. Vertebrae, excluding the anterior fused vertebrae but counting the urostyle as one: Pearl River, 30(in 4), 31(45), 32(15) or 33(1), Cahaba River, 30(4), 31(1) and 32(2). In 39 specimens, 22 to 78 mm in standard length, the head length is stepped into the standard length 2.7 to 3.3 times and the distance from the rear tip of the adipose fin to the tip of the caudal fin into the distance from origin of the dorsal fin to the rear tip of the adipose fin 1.4 to 2.1 times.

Color in preservation: Heavily mottled with dark brown; side light to medium brown; head dark brown above; a dark bar across back of head extending downward through operculum and branchiostegal membrane to lower surface of head; another band passing backward from snout through eye to posterior cephalic band on operculum; postorbital area light; cheek lightly pigmented; upper barbels heavily pigmented; lower barbels, lower lip and side of lower surface of head with scattered pigment; midline of lower surface of head usually immaculate; abdomen and base of pelvic fin with numerous, round brownish chromatophores; a faint brown band crossing abdomen just anterior to pelvic fins; blotches of brown pigment sometimes present on pelvic fin in addition to the brown chromatophores; pectoral fin rather heavily mottled, some blotches present, margin of rays pale yellowish to whitish; anal fin pigmented at base and sometimes with distal and medial dark brown bands, its edge whitish; basal saddle of dorsal fin extending posteriorly to third ray; lower one-half of fin dusted with small chromatophores, followed distally by a relatively clear area, a broad dark brown distal band extending from spine to last dorsal ray and finally with white tips to dorsal spine and soft rays; spine dark brown; caudal fin with two broad dark crescents, one subterminal and one medial, both somewhat connected across upper and lower procurvent rays and tending to form a basicaudal bar; adipose fin dusky anteriorly, with a clear free flap; adipose blotch almost always extending to fin margin; base of dark blotch or saddle at adipose fin not, or but weakly, connected with



other blotches; a rectangular dark saddle, nearly confined to dorsal surface, between dorsal and adipose fins; anterior saddle extending to below lateral line, anteriorly to about midway between dorsal spine and head and posteriorly to third dorsal ray; saddle enclosing or tending to enclose a pair of rather large, light predorsal spots; side adjacent to airbladder dark gray.

**Color in life:** Color notes were recorded in the field immediately after collecting for two series, taken 29 June 1954 (TU 10462) and 6 November 1963 (TU 30149). The specimens of the former typically had a large sulphur yellow blotch on side of head behind angle of mouth; small dull yellow spot behind each eye; bright yellow area above pectoral base; variously shaped golden yellow blotch just anterior to base of dorsal fin; bright yellow saddle at posterior base of dorsal fin; dull yellow areas behind and extending ventrally on side posterior to yellow saddle; base, anterior part and posterior tip of adipose fin bright yellow; bright yellow oval shaped saddle on dorsal part of caudal peduncle; distal margins of all rayed fins translucent; dorsal fin light yellow basally; caudal fin yellowish, its central portion brightest; anal fin cream colored at base; pectoral fin yellowish basally; pelvic fin light cream color at base grading to translucent distally; ventral surface of head and body whitish, without yellow.

The specimens in the November series were more extensively colored with shades of golden and yellow. The entire dorsal surface and sides were golden; underside of head, inclusive of gill membranes, golden or yellowish; belly whitish; bases of dorsal, caudal and pectoral fins golden, their distal margins translucent or with a faint yellowish tinge in a few individuals; distal part of maxillary barbel white.

**Etymology:** The name *munitus* (Latin), means armed or protected, and alludes to the large spines and serrae.

**Ecology:** *Noturus munitus* is an inhabitant of the riffles and rapids of the Pearl River and its larger tributaries. None of the nearly two thousand specimens was taken in still water. Smaller individuals are found in the shallower riffles as well as in the deeper ones with large individuals. Many of the collecting sites in the Pearl River system and the Cahaba have an abundance of river weed, *Podostemum*, especially on exposed bedrock at the Fall Line.

*Noturus munitus* has been taken with several other species of *Noturus*. *Noturus munitus* Jordan, *N. leptacanthus* Jordan and *N. nocturnus* Jordan and Gilbert are coinhabitants in the Pearl River. *Noturus funebris* Gilbert and Swain is occasionally taken with *N. munitus* in the moderate size tributaries but seldom in the main river. *Noturus gyrinus* (Mitchill), which lives in adjacent still waters in the Pearl River system, usually over silted bottoms, has not been collected with *N. munitus*. *Noturus miurus*, although often found with *N. munitus*, is usually more abundant in the slower flowing parts of the riffle and rapid areas. Moreover, it seems to prefer the silt covered sandbars and detritus covered areas im-

mediately below the rapids of the Strong River, west of Pinola, Mississippi.

**Relationship:** *Noturus munitus* appears to be most closely related to *Noturus furiosus* which is confined to the distant Tar and Neuse rivers of North Carolina. The two exhibit similarities in body shape, general color pattern and in the structure of the pectoral spine and cleithrum. Together they and some undescribed species form the *furiosus* species group.

**Distribution:** *Noturus munitus* has been collected from many localities along the central portion of the Pearl River system, from one locality in the Tombigbee River, and from two in the Cahaba River (Fig. 3). We postulate that its actual range is from the Pearl River eastward to the Alabama River system. Its apparent spotty distribution, combined with its preference for the larger rivers, have contributed to its scarcity in collections.

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