

A NEW GENUS AND SPECIES OF EELPOUT (PISCES, ZOARCIDAE) FROM THE GULF OF MEXICO¹

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ABSTRACT

Exechodontes daidaleus n.gen. and n.sp., captured at lat. 27°01'N, long. 84°55'W at a depth of 503 m in the Gulf of Mexico, is described and figured. Its characteristics include the presence of pelvic fins, the absence of scales, teeth on the vomer but not on the palatines, the absence of enlarged canine teeth, teeth on the lateral margin of the dentary and directed outward, grooves behind the upper and lower lips interrupted at the symphyses, the absence of cephalic lateral-line pores, and a greatly reduced lateral line. The new genus appears to be most closely related to the Hadropareinae of the western North Pacific. A key to the genera of the Hadropareinae, including *Exechodontes*, is given.

During June of 1969 the Bureau of Commercial Fisheries (now the National Marine Fisheries Service) RV *Oregon II* was engaged in a survey of shrimp abundance in relatively deep water (360-900 m) in the eastern Gulf of Mexico. Among the fishes captured is one small specimen of a zoarcid which does not appear to belong in any of the currently recognized genera of the family. More surprising, it seems most similar to a group of genera known only from the western North Pacific Ocean.

Exechodontes n.gen.

Type-Species *Exechodontes daidaleus* n.sp.

Diagnosis.—A zoarcid with pelvic fins and lacking scales, with vomerine teeth (two in type-species), but without palatine teeth. No enlarged canine teeth although a few anterior teeth in upper jaw somewhat enlarged; teeth of lower jaw small, in two distinct rows, the outer on the lateral and anterior edge of the dentary such that the teeth are directed outward and are visible when the mouth is closed. Grooves behind upper and lower lips interrupted at symphyses; upper lips not greatly broadened posteriorly. Pores of lateral-line canals absent on head and body; lateral line of body greatly reduced, only a few neuromasts visible close behind head and base of pectoral fin.

Head small and without prominent bulging cheek musculature. Pelvic rays long, but only about distal one-fifth of their length bends to extend into the visible fins, the proximal four-fifths lying hidden beneath skin of ventrum. Branchiostegal rays six. Vertebrae with anterior and posterior halves of equal size.

Discussion.—Using various keys to the genera of Zoarcidae (Soldatov and Lindberg 1930; Norman 1966; Lindberg and Krasnyukova 1975), *Exechodontes* falls into a group of three genera known only from the western North Pacific Ocean: *Hadropareia* Schmidt (1904) and *Bilabria* Schmidt (1936), both monotypic, and *Davidijordania* Popov (1931) with five species. These three genera constitute the subfamily Hadropareinae (Schmidt 1950), characterized by the absence of spines in the posterior portion of the dorsal fin, the presence of pelvic fins and the absence of crests on the chin (Lindberg and Krasnyukova 1975). *Exechodontes* seems closest to *Hadropareia* in that it lacks scales and palatine teeth. *Hadropareia* has, however, distinct pores in the infraorbital lateral-line canal (other pores have not been described or illustrated) and a few pores in the anterior portion of the lateral line which extends posteriorly about three-fourths the length of the body. In addition, *Hadropareia* is described and figured as having the cheek musculature enlarged such that each cheek forms a prominent bulge (Soldatov and Lindberg 1930). *Davidijordania* differs from *Exechodontes* in having scales, palatine teeth and the groove behind the upper lip complete across the snout. *Bilabria* differs in having scales, pores

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in both the cephalic lateral-line system and the anterior part of the lateral line, and the lips of both jaws expanded (Soldatov 1922; Schmidt 1936; Shmidt 1950).

It is possible that the similarities described above are not of real phyletic significance. A. P. Andriyashev (pers. commun.) has pointed out that the Hadropareinae and some other genera (e.g., *Zoarces*) have vertebral centra with the anterior cone shorter than the posterior cone, i.e., the constriction of each amphicoelous centrum is shifted anteriorly. He adds that the Lycodinae, Lycogramminae, and Lycodapodidae have "symmetrical" centra with the constriction placed midway in the length of each centrum. The centra in *Exechodontes* are symmetrical, indicating that relationships may not be with the Hadropareinae (see Figure 3). I have, however, examined radiographs of *Macrozoarces americanus* and *Lycenchelys verrilli* and find that both have "asymmetrical" centra, at least anteriorly. Further analysis of vertebral characters seem indicated.

The following key should serve to separate the four hadroparein genera.

KEY TO THE HADROPAREINAE

- 1a. Cephalic lateral-line system without pores; outer teeth of lower jaw placed on anterior and lateral margins of dentary and directed outward; scales and palatine teeth absent
 *Exechodontes* n. gen.
- 1b. Pores of cephalic lateral-line system present on upper parts of head; no outwardly directed teeth on lower jaw; scales and palatine teeth present or absent 2
- 2a. Scales absent; musculature of cheek enlarged, forming a prominent bulge along margin of preopercle; palatine teeth absent *Hadropareia*
- 2b. Scales present; cheek musculature may be slightly swollen, but not forming a prominent bulge; palatine teeth present or absent 3
- 3a. Palatine teeth present; groove behind upper lip continuous across snout
 *Davidjordania*
- 3b. Palatine teeth absent; groove behind upper lip interrupted at tip of snout
 *Bilabria*

Discovery of a zoarcid in the Gulf of Mexico that has its closest apparent affinities with a small group of genera in the northwestern Pacific is of zoogeographic interest. It is consistent with current thoughts regarding the origin and relationships of several faunal groups of the cooler North Atlantic which also have affinities with the North Pacific. The boreal North Pacific is considered a dominant evolutionary center which provided significant numbers of migrants that invaded the Arctic and North Atlantic during the late Miocene and late Pliocene epochs (Briggs 1974).

Discovery of *Exechodontes* might suggest that there are a number of undescribed species of the family inhabiting the slope waters of the American warm-temperate and tropical Atlantic. The only previously known zoarcid from the Gulf of Mexico is *Lycenchelys bullisi* Cohen which appears to be related to species found in the northern Atlantic and Gulf of Panama (Cohen 1964). Otherwise, the southernmost record for the family in the western North Atlantic is that of *Lycodes brunneus* Fowler from off the east coast of Florida just north of the Bahama Islands (Fowler 1944). In the eastern Atlantic, the family is known south to about lat. 20°N, where two species, probably both misidentified, have been captured at depths between 1,000 and 1,500 m (Vaillant 1888). The pelagic species *Melanostigma atlanticum* has been recorded southward only to the waters off Virginia (McAllister and Rees 1964). It is significant in the present context that *M. atlanticum* is most closely related to the western North Pacific *M. orientale* rather than the eastern North Pacific *M. pamelas* (Tominaga 1971).

Name.—From the Greek *exeches*, projecting, and *odontos*, teeth. The compound is a masculine noun.

Exechodontes daidaleus n. sp.

Holotype.—96.3 mm SL (standard length), collected at *Oregon II* station 10632: 27°01'N, 84°55'W, about 120 n.mi. ESE of Tampa Bay, Fla., in 503 m (275 fm); 124-ft shrimp trawl, dragged on the bottom, 18 June 1969. The specimen (Figure 1) has been deposited in the National Museum of Natural History, Washington, D.C., USNM 211797.

Description.—All measurements are given as

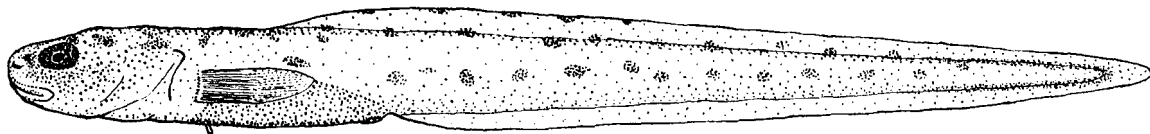


FIGURE 1.—Lateral view of holotype of *Exechodontes daidaleus* n.gen. and n.sp., USNM 211797, 96.3 mm SL.

thousandths of standard length unless otherwise indicated.

Head relatively short, 143 of SL, slightly compressed, its depth and width at cheeks, 78 and 69 of SL. Snout slightly greater than diameter of eye, 39 of SL, very bluntly rounded in both dorsal and lateral views. Nostrils 21 from tip of snout and eye, 36 apart, all of SL, placed at lateral edges of slightly bulbous median part of snout. Eyes placed high on head, but not bulging into dorsal profile, their diameter 34 of SL, placed 38 of SL apart (bony interorbit about 18 of SL). Postorbital part of head 76 of SL. Gill slit moderate, extending ventrally almost to lower edge of base of pectoral fin.

Gape of mouth relatively short, maxilla extending posteriorly to below anterior edge of pupil, length of upper jaw 57 of SL. Teeth all relatively small; those of upper jaw in a single, irregularly spaced row, a few teeth in anterior one third of jaw somewhat enlarged, especially adjacent to symphysis. Teeth of lower jaw in two distinct rows; inner row on dorsal edge of dentary, teeth somewhat irregularly spaced, none enlarged; outer row on lateral and anterior edge of dentary such that teeth are directed outward (most teeth in outer row are missing; cavities in dentary indicate probable tooth positions). Lower jaw included in upper, leaving anterior teeth of upper jaw and outer row of lower jaw visible when mouth is closed. Vomer with two teeth (one missing, but a large tooth cavity present); palatines edentulous. Gill rakers of anterior series of first arch 0 + 0 + 12; those of posterior series 0 + 0 + 11; all are short and blunt. About nine small nubbins present in posterior series of last arch. Pseudobranchiae absent.

Grooves behind lips of both jaws interrupted at symphyses; upper jaw appears to be nonprotractile. Lips narrow, not expanded. No fleshy protuberances or crests present on lower jaw; no cephalic lateral-line pores present anywhere on head (Figures 1, 2). Oral valves present in both jaws, that of lower jaw appearing double, one thin and membranous, lying somewhat anterior and overlying a more fleshy one. Tongue fleshy. Branchiostegal rays six on both sides.

Body slender and compressed, its depth and width 78 and 48 of SL; pectoral to pectoral distance 71 of SL. Lateral line not prominent; a single, prominent, raised neuromast present on each side just above and slightly anterior to upper end of gill slit; a few similar organs (appearing as pale spots) visible in a line curving downwards toward midline behind pectoral fin. Skin delicate but firm on the body. Scales absent. Vertebrae 19 + 78 = 97 (including urostylar vertebra). Vertebrae appear in radiographs to be amphicoelous with anterior and posterior cones of equal size (Figure 3).

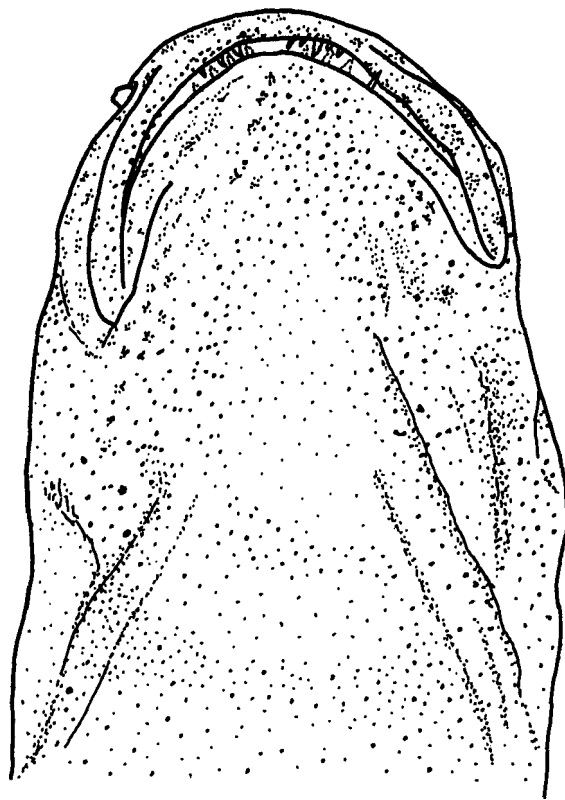


FIGURE 2.—Ventral view of head of holotype of *Exechodontes daidaleus* n.gen. and n.sp., USNM 211797, 96.3 mm SL. Missing teeth in outer row of lower jaw outlined in dots to show presumed position and size.

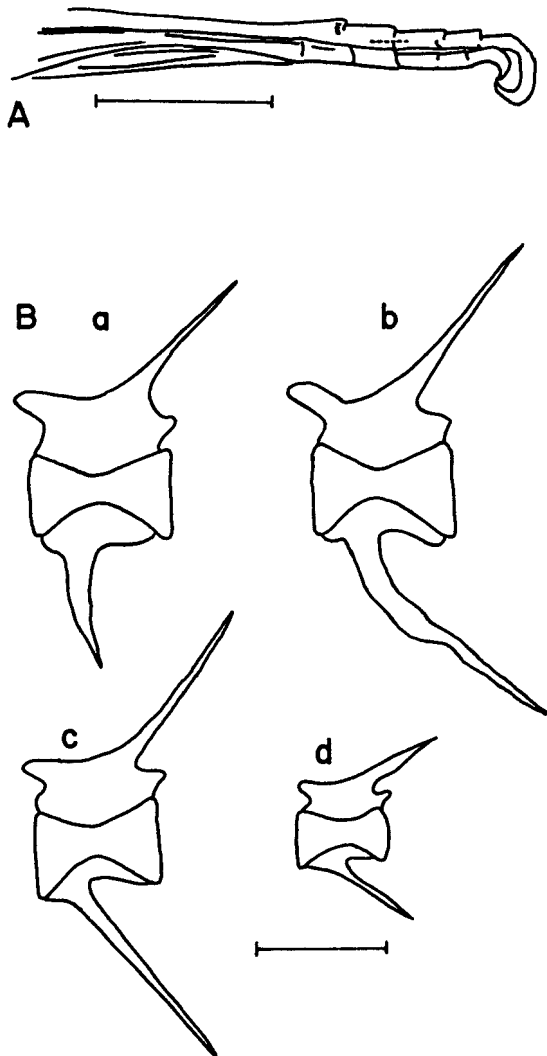


FIGURE 3.—Holotype of *Exechodontes daidaleus* n.gen. and n.sp., USNM 211797. A. Left pelvic rays; the tips originally were straight at about a right angle to main axis. B. Outlines of selected vertebrae traced from a radiograph with the aid of a camera lucida: a, vertebra no. 14; b, no. 20; c, no. 50; d, no. 80. The lines equal 1 mm.

Upper part of small intestine greatly enlarged, about equal in volume to empty stomach. Two very blunt, short and broad pyloric caeca just posterior to thick and muscular pylorus. Gallbladder large and transparent, lying between liver and enlarged upper intestine. A pair of thin gonad chords extending from midway in length of body cavity almost to anus indicate holotype is a male.

Pectoral fins with 15 rays, rounded in outline when rays spread, their length and width of base

104 and 27 of SL, not reaching to above anus. Pelvic fins with two rays, appearing as a pair of small nipples below and slightly behind bases of pectoral fins, their length about 6 of SL. The rays, however, are much longer, 31 of SL, originating anterior to the pectoral fins and lying for most of their length horizontally beneath the skin with only their distal ends bent sharply into the visible nubbins (Figure 3).

Dorsal fin originates behind bases of pectoral fins, above about middle of their length, 235 of SL from tip of snout and 786 from base of caudal fin, with 86 rays. Anal fin originates below base of 12th ray of dorsal fin 341 of SL from tip of snout, 683 of SL from base of caudal fin, and 215 of SL from nipples of pelvic fins, with 79 rays. Caudal fin 38 of SL, with a total of about eight rays.

Color (in alcohol) very pale yellow-brown, almost white, with large, scattered brown melanophores, especially over ventral two-thirds of body which is therefore slightly darker than upper one-third. Small to medium-sized (about 1-3 mm in diameter), irregularly shaped and placed brown spots on upper half of body, rather widely spaced (separated by at least their own diameter). Cheeks and snout darker than body, with more numerous melanophores; brown pigment present in an arc around front of eyes; tip of snout brown. Lower jaw with darker areas of larger and more numerous melanophores. Darker pigment present along bases of posterior parts of dorsal and anal fins, and base of caudal fin. Pelvic nipples brown; pectoral fins with brown pigment. Peritoneum very dark brown, showing through belly as dark blue-grey; viscera pale. Lining of mouth and pharynx pale. Anus ringed with black.

Name.—From the Greek *daidaleos*, dappled or spotted.

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LITERATURE CITED

- BRIGGS, J. C.
1974. Marine zoogeography. McGraw-Hill, N.Y., 475 p.
- COHEN, D. M.
1964. *Lycenchelys bullisi*, a new eelpout from the Gulf of Mexico. Proc. Biol. Soc. Wash. 77:113-118.
- FOWLER, H. W.
1944. A new eelpout from the Gulf Stream off east Florida. Fish Cult. 23:73-74.
- LINDBERG, G. U., AND Z. V. KRASYUKOVA.
1975. Fishes of the Sea of Japan and the adjacent areas of the Sea of Okhotsk and the Yellow Sea. [In Russ.] Akad. Nauk. SSSR, Zool. Inst., Keys to the Fauna of the USSR 108, 442 p.
- MCALLISTER, D. E., AND E. I. S. REES.
1964. A revision of the eelpout genus *Melanostigma* with a new genus and with comments on *Maynea*. Natl. Mus. Can. Bull. 199:85-110.
- NORMAN, J. R.
1966. A draft synopsis of the orders, families and genera of recent fishes and fish-like vertebrates. Br. Mus. (Nat. Hist.), Lond., 649 p.
- POPOV, A. M.
1931. On a new genus of fish *Davidjordania* (Zoarcidae, Pisces) in the Pacific Ocean. [In Russ.] Akad. Nauk. SSSR, Dokl. 1931:210-215.
- SCHMIDT, P. J.
1936. On the genera *Davidjordania* Popov and *Bilabria* n. (Pisces, Zoarcidae). C.R. Acad. Sci. URSS 1:97-100.
- SHMIDT, P. YU.
1904. Fishes of the eastern seas of the Russian Empire. [In Russ.] Izd. Russ. Geogr. Obshch, St.-Peterb., 466 p.
1950. Fishes of the Sea of Okhotsk. [In Russ.] Akad. Nauk. SSSR, Tr. Tikhookean. Kom. 6:1-392. (Translated by Israel Program Sci. Transl., Jerusalem, 1965.)
- SOLDATOV, V. K.
1922. On a new genus and three new species of Zoarcidae. Annu. Mus. Zool. Acad. Sci. Russ. 23:160-163.
- SOLDATOV, V. K., AND G. J. LINDBERG.
1930. A review of the fishes of the seas of the far east. [In Russ.] Izv. Tikhookean. Nauchn. Inst. Rybn. Khoz. 5, 576 p.
- TOMINAGA, Y.
1971. *Melanostigma orientale*, a new species of zoarcid fish from Sagami Bay and Suruga Bay, Japan. Jap. J. Ichthyol. 18:151-156.
- VAILLANT, L. L.
1888. Expéditions scientifiques du Travailleur et du Talisman pendant les années 1880, 1881, 1882, 1883. Poissons. G. Masson, Paris, 406 p.