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NOTES ON GEOGRAPHIC DISTRIBUTION

Petromyzontidae, *Entosphenus tridentatus*: Southern distribution record, Isla Clarión, Revillagigedo Archipelago, Mexico.

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The purpose of this note is to document the southernmost record of Pacific lamprey, *Entosphenus tridentatus*, off the coast of Mexico. The scientific name of this species is in a state of flux. The American Fisheries Society names list (Nelson et al. 2004) gives *Lampetra tridentata*; however, Nelson (2006) subsequently accepted *Entosphenus tridentatus* based on the phylogenetic study of Gill et al. (2003), which was not available to the AFS Names Committee in time for it to make an evaluation prior to publication. The AFS Names Committee is currently evaluating this new evidence for its next list scheduled for publication in 2010 (J. S. Nelson, personal communication, 2007).

There are relatively few reported occurrences of Pacific lamprey south of Point Conception (34°26'55" N, 120°28'14" W) in southern California. Swift et al. (1993) and Chase (2001) reported the presence of Pacific lamprey in only a few southern Californian watercourses, namely: Ventura River, Santa Clara River and its tributary Sespe Creek, and Malibu Creek, with the southernmost being the Santa Ana River to the south of Los Angeles (about 33°44'27" N, 117°52'53" W). Miller et al. (2005) gave only three records of this species occurring in Mexico; a 170 mm TL recently metamorphosed male reported by Hubbs (1967) from marine waters off Baja California, 55 km southwest of Punta Canoas (28°58'36" N, 115°25'36" W), a 126.5 mm TL ammocoete reported by Ruiz-Campos and González-Guzmán (1996) from the lower Río Santo Domingo, 600 m upstream from its confluence with the Pacific Ocean (30°43' N, 116°02' W), and a 92.5 mm TL ammocoete reported by Ruiz-Campos et al. (2000) from Arroyo San Antonio, about 45 km upstream from the mouth of Río Santo Domingo (30°49'09" N, 115°37'45" W).

A hitherto forgotten specimen collected in 1889 by the United States Fish Commission Steamer *Albatross* (USNM 160613, National Museum of Natural History, Smithsonian Institution, Washington, D.C.), extends the southern range of this species by more than 10° latitude to Clarion Island, Revillagigedo Islands, Mexico. Revillagigedo Archipelago is about 386 km southwest of Cabo San Lucas, the southern tip of Baja California Peninsula. It consists of four volcanic islands, Clarion being the westernmost, about 700 km off the mainland. I believe that there are three reasons this record remained unreported for so long. Firstly, it was mistakenly catalogued as coming from Clarion Island, Revillagigedo Island, Alaska. While a Revillagigedo Island (part of the Alexander Archipelago consisting of about 1,100 islands in the Alaskan panhandle) also occurs in Alaska, Clarion Island does not. The association of the two names in the locality field strongly suggests that the record comes from Mexico. Secondly, the preceding USNM catalog number, 160612, is also a Pacific lamprey from the Albatross collection, but it is apparently a bona fide Alaskan record from Port Etches, Prince William Sound, and possibly the cataloguer assumed Alaska when cataloguing the next lot. No Albatross station number was given in the catalog but in a letter to me dated 28 October 1987, Susan L. Jewett, then Co-Collections Manager, Division of Fishes, stated that the catalog provided the date March 1889 and that the only Albatross stations associated with Revillagigedo Islands during that month were stations 2991 to 2995 inclusively, made on 6 March 1889 in Mexican waters. It is important to add that during the entire month of March 1889, the Albatross was operating in waters south of 32° N (Townsend 1901) and is another indication that the record reported on here could not have been made in Alaskan waters. Thirdly, following my visit to the Smithsonian in April

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1983 when I made this discovery, I waited 25 years for an appropriate venue for publication. Townsend (1901) provides additional collection data related to those stations. Although it would be tempting to select the station that is closest to Isla Clarión, one needs to be more conservative and compile the information for all five stations. The geographical coordinates vary between latitudes 18°17'15" N and 18°19'00" N and longitudes 114°43'15" W and 116°44'15" W. The instrument of capture was either a large beam trawl or a ship dredge. The surface water temperature was 22.2 °C and the bottom water temperature varied between 5.4 and 20.2 °C. The depth either trawled or dredged varied between 57 and 841 meters. However, because these nets were open, it is possible that the specimen was collected anywhere in the water column from those maximum depths up to the surface.

In order to establish identity and because a southerly marine occurrence such as this is so rare, a description of the specimen using the methodology of Vladykov and Follett (1958) follows: prespawning female, 420.0 mm TL; disc length, 30.0 mm; prebranchial length, 55.5 mm; branchial length, 47.5 mm; trunk length, 201.0 mm; cloacal slit length, 4.0 mm; tail length, 112.0 mm; eye diameter, 6.0 mm; urogenital papilla length, 2.0 mm; intestinal width taken at the level of the origin of the first dorsal fin, 2.0 mm. The edges of the two dorsal fins finely serrated. Interdorsal distance, 9.0 mm; first dorsal fin height, 19.5 mm (fleshy base included), 13.5 mm (fleshy base excluded); second dorsal fin height, 28.0 mm (fleshy base included), 23.0 mm (fleshy base excluded). Well-developed pre- and post-cloacal fin-like folds. Trunk myomeres, 78. Supraoral lamina: 3 cusps; infraoral lamina, 5 cusps; endolateral formula, 2-3-3-2 (on both sides); first anterial row, 4 unicuspid teeth; total number of anterials, 7 unicuspid teeth; first and only posterial row, 18 teeth (arrangement: 2 bicuspid, 15 unicuspid, 1 bicuspid); transverse lingual lamina, 16 cusps (arrangement: 7 lateral cusps on the left, 1 slightly enlarged median cusp relative to the lateral cusps, 8 lateral cusps on the right); longitudinal lingual laminae, too worn to give an accurate count; 54 marginals. The buccal epithelium is orangish-brown except for the outermost marginal row area which is light brown. This differential pigmentation points to a natural cause rather than being due to a prolonged period in a preservative solution, where one would expect a uniform discoloration, if any, to occur.

The high count of trunk myomeres recorded (78) warrants comment. Hubbs (1967) gave a count of 68 for his metamorphosed specimen from off Baja California while Ruiz-Campos and Gongález-Guzmán (1996) gave a count of 67 for their ammocoete from Baja California. However, Hubbs (1924) gave counts of 67-76 for a sample of ammocoetes of Pacific lamprey from the considerably further north Coyote Creek, San Jose, California. Note, however, that these counts were based on over 100 extremely small individuals, 9-21 mm TL, a testimony to Carl L. Hubbs' extraordinary skill and diligence, and also, at the time, he was counting myomeres up to the end of the cloacal slit contrary to the others above, including Hubbs (1967), who made their counts only till the beginning of the cloacal slit. Notwithstanding this veritable tour de force and the slight change in method of counting, it would appear that wide variation is to be expected for such a wide-ranging and perhaps non-homing anadromous species. The darkly pigmented buccal epithelium may be evidence of relatively recent feeding activity, noting nonetheless that the 2.0 mm intestinal width has undoubtedly considerably shrunken in size since the onset of sexual maturation. Vladykov and Kott (1979) indicated that in actively feeding *E. tridentatus* the buccal epithelium was yellow-brown which they suggested may be due to its saturation by fats from the prey. The specimen is a prespawning individual according to the terminology of Vladykov and Follett (1958). While it possesses a number of secondary sexual characters (reduced intestinal width, finely serrated dorsal fin edges, well-developed pre- and post-cloacal fin-like folds, externally visible urogenital papilla), its dorsal fins are still far apart (9.0 mm), and it may therefore be a month or more before it would have been ready to spawn. Despite having been collected about 700 km away from the mainland, it is not unreasonable to believe that this 420 mm individual could have covered this distance prior to spawning either by swimming or attaching to a fish or marine mammal. Any further speculation would seem un-warranted based on the little information available.

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The anadromous Pacific lamprey now has the greatest recorded latitudinal range (> 50°) of any lamprey of the world, extending from the Chukchi Sea, off Cape Lisburne, Alaska (69°15' N, 165° 55' W; Mecklenburg et al. 2002) and Norton Sound, in the Bering Sea, 11.2 km southwest of Nome, Alaska (64°30' N, 165°25' W; Vogt 1988) down to Isla Clarión, Mexico (about 18°18' N, 115°01' W, based on the average of the coordinates for the five Albatross stations; this study). The southern latitude at 18°18' N is even lower than records for the Mexican freshwater endemic lampreys *Tetrapleurodon spadiceus* and *T. geminis*, which are restricted to highland habitat (> 1,500 m elevation) at about 20° N (Miller et al. 2005) and, until now held the distinction of being the Northern Hemisphere lamprey species with the most southerly distribution. We know very little about the behavior of Pacific lamprey while in the ocean, since very few such studies (e.g. Beamish 1980) have been conducted. It is important to continue to document these marine occurrences, especially those at the edges of the range, like this one, as they may reflect a continuous distribution, rather than cases of vagrancy. It is difficult to evaluate at this time whether the record documented here falls in the former or latter category.

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