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Short Communication

First confirmed record of the occurrence of the lesser devil ray, *Mobula hypostoma* (Elasmobranchii, Mobulidae), in the southwestern Gulf of Mexico

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ABSTRACT. Nine specimens (one female and eight males, all juveniles) of lesser devil ray, *Mobula hypostoma* (Bancroft, 1831), were caught in the southwest Gulf of Mexico. These specimens represent the first record of the species in the Mexican waters. The disk width ranged between 552 and 773 mm. Morphometrics data are consistent with previously published records. Because of the number of specimens captured, we suggest that it is not a rare species in the southwest Gulf of Mexico.

Keywords: *Mobula hypostoma*; Chondrichthyes; devil ray; distribution; morphometry; western Atlantic

The family Mobulidae is a group of planktivorous and piscivorous elasmobranchs. They were commonly known as mantas or devil rays that are widely distributed in temperate, tropical, and subtropical waters of all oceans (Couturier *et al.*, 2012). They are large chondrichthyans with a lobe on each side of the head, pectoral fins as wings, terminal mouth and a tail without a stinger, ranging in disc width from 100 to 700 cm (Notarbartolo-di-Sciara, 1987; McClain *et al*., 2015). Devil rays have peculiar patterns in their life histories; their reproductive aspects, and coupled with inadequate fisheries management, make them prone to some state of risk (Couturier *et al*., 2012). Therefore, it is necessary, despite having charismatic representatives, to implement strategies that will help their conservation (Lawson *et al*., 2017).

Nowadays, the family Mobulidae is represented by nine valid species grouped in a single genus, *Mobula* Rafinesque, 1810 (White *et al*., 2018). However, the taxonomic situation of this family has been complex; previously, the genus *Manta* Bancroft, 1829, was recognized as valid based on the terminal position of the mouth (Marshall *et al*., 2009). Moreover, recent studies suggest a cryptic species distributed in the Caribbean region (Marshall *et al*., 2009; Hinojosa-Alvarez *et al*., 2016), sympatric with three other valid species (*Mobula* sp., *M. birostris* and *M. mobular*).

Mobula hypostoma (Bancroft, 1831), locally known as "maroma", is distributed on both coasts of the Atlantic Ocean. In the western Atlantic, its estimated distribution includes tropical and subtropical coastal waters. From Mar del Plata in Argentina to Cape Lookout, North Carolina in the USA, including the Caribbean Sea and the Gulf of Mexico (Notarbartolo-di-Sciara, 1987). However, the details of its biology are scarce as well as its distribution; in fact, records of this species in the Gulf of Mexico are sporadic, and there are no valid records of their presence in Mexican waters (Del Moral-Flores *et al*., 2015). This contribution aims to provide evidence of the presence of *M. hypostoma* in the southwest portion of the Gulf of Mexico, based on five records and nine specimens collected in these waters, representing the first verified physical record of the species for the country.

During a study on the composition of the chondrichthyans associated with the state of Veracruz's artisanal fisheries, southwestern coast of the Gulf of Mexico, nine individuals of the genus *Mobula* were captured in May, June, August, September, and October of 2018. The catches were made through beach nets of 700 m and mesh openings of 2 and 3 inches, on the beach, in Las Barrancas (18°59'58.4"N, 95°57'55.8"W), Alvarado, Veracruz. The specimens were frozen and transferred to the Ichthyology Collection of the Zoology Laboratory

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of the Facultad de Estudios Superiores Iztacala (CIFI), Universidad Nacional Autónoma de México (UNAM) for its correct determination using specialized keys (McEachran & Carvalho, 2002; White & Last, 2016). Body measurements were taken accor-ding to the Notarbartolo-di-Sciara (1987) protocol, and a series of photographs and a sample of muscle tissue were taken. Subsequently, they were processed curatorially (fixed in 10% formaldehyde, preserved in 70% ethyl alcohol) and deposited in CIFI 1411, 1412, and 1413.

The nine specimens, one female and eight males, ranging from 552-773 mm in disk width were identified as *Mobula hypostoma* (Atlantic devil ray or "maroma" in Spanish) (Fig. 1) based on the following combination characters (*sensu* Notarbartolo-di-Sciara, 1987): absen-ce of caudal spine; base of tail depressed laterally; length of the upper and lower dental bands less than 55 and 52% of the width of the mouth, respectively; small, sub-circular spiracle, ventral to the plane of the pectoral fins; imbricated teeth, with sexual dental dimorphism in adults; first interbranchial distance greater than 13.2% of disc width (DW); distance from the distal end of the cephalic fin to the spiracle greater than 13.4% of the DW; preoral distance less than 40% of DW; and maximum DW of *ca*. 125 cm. However, large specimens with an DW of 107 to 230 cm have been recorded in the vicinity of Isla Margarita in Venezuela, these differences in size, as suggested by Ehemann *et al*. (2017), could indicate that these organisms are members of a subspecies of *M. hypostoma* or even an undescribed species restricted to the Caribbean.

Table 1 presents the specimens' morphometric measurements, which agree with those mentioned by Notabartolo-di-Sciara (1987) in their review of the genus *Mobula* Rafinesque, 1810.

The determination at the species level within *Mobula* is problematic, due to the morphological similarity and the overlapping distribution of their species (Couturier *et al*., 2012); moreover, the lack, loss, and destruction suffered by some type specimens have caused some nomenclatural and taxonomic problems and confusions (White *et al*., 2018). Notarbartolo-di-Sciara (1987) synonymized the nominal species *Ceratobatis robertsii* with *M. hypostoma*, and does not consider necessary to designate a neotype for *M. hypostoma* since it is the only known "small" *mobula* of the western Atlantic; moreover, the same author validated *M. rochebrunei* as proper to the eastern Atlantic. Recently, some gaps in their phylogenetic tree of the genus and family were clarified with the help of molecular data, finding that *M. roche-brunei* is a junior synonym of *M. hypostoma*, which is restricted to the Atlantic Ocean (White *et al*., 2018).

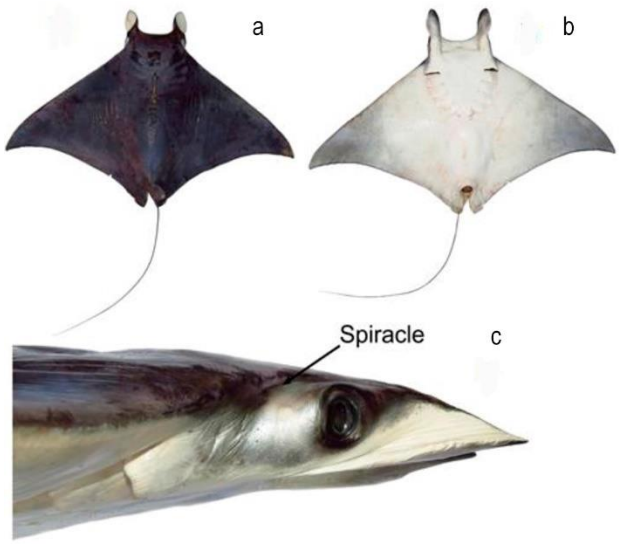

Figure 1. *Mobula hypostoma* from the southwest Gulf of Mexico (CIFI): a) Dorsal view, b) ventral view, c) the right side of the head region showing that spiracle's openings.

The records of *M. hypostoma* in the western Atlantic have been deficient and sporadic; there is a summary of its occurrences in Bigelow & Shroeder (1953) and Notarbartolo-di-Sciara (1987). The Gulf of Mexico records are restricted to the north, being those of the present contribution the first record confirming its presence in the southwest of the Gulf of Mexico. In Mexico there are informal records of the species and its presence has been indicated based on regional faunal lists (Del Moral-Flores *et al*., 2015; Ehemann *et al*., 2018); this is the first record of the species in Mexican waters based on and supported by museum material.

The specimens registered in the northern Gulf of Mexico, have been juveniles: Alabama (USNM 197409, a juvenile male with 666 mm disk width) and Louisiana (USNM 205397, a juvenile male with 717 mm DW), USA (Notarbartolo-di-Sciara, 1987). The sizes are similar to the interval observed in the captured specimens (552-773 mm DW) in the southeast of the Gulf of Mexico, and they did not present developed or calcified claspers, which could indicate the possibility that in the Gulf of Mexico, there are areas with favorable conditions to serve as areas of birth or aging. Although for the majority of the mobulids, their ecological and distribution patterns in the juvenile state are unknown, the biology of *M. hypostoma* is practically unknown (Couturier *et al*., 2012). There is evidence in the northeastern part of the Gulf of Mexico, in the National Marine Sanctuary of Flower Garden Banks, and surrounding areas, which mark it as a bree-ding area for both the giant stingray (*Mobula birostris*) and the reef stingray (*Mobula cf. birostris*) (Childs, 2001; Stewart *et al*., 2018). The delimitation of the

Table 1. Morphometrics, expressed in percentage of the disk width, of the nine specimens of *Mobula hypostoma*. Annotations. Sex M: males; F: females. DW: disc width, DL: disc length, AP: anterior projection, MRMp: from the midpoint of rostral margin to free rear tip of the pelvic fin, PD: predorsal distance, DB: dorsal fin base length, DH: dorsal fin height, PrD: precloacal distance, TL: tail length, 1GL: 1st-gill opening length; 2GL: 2nd-gill opening length; 3GL: 3rd-gill opening length; 4GL: 4th-gill opening length; 5GL: 5th-gill opening length,1ID: first interbranchial distance; 2ID: fifth interbranchial distance, R1G: from the midpoint of rostral margin to transverse line of 1st-gill openings; R5G: from the midpoint of rostral margin to the transverse line of 5th-gill openings, PFL: pelvic fin length, CFL: cephalic fin length, CFW: cephalic fin width, DE: diameter of the eyeball: CW: cranial width, PL: preoral length, HL: head length, MW: mouth width, ID: internarial distance, UTL: upper tooth band length, LTL: lower tooth band length.

Measurement/Sex	F	M	M	M	M	M	M	M	M	Range % AD
DW	578	707	605	607	610	613	594	773	552	
DL	312	357	304	311	319	323	325	380	287	49.2-54.7
AP	236	242	254	228	258	243	254	250	230	32.3-42.8
MRMp	324	363	308	316	323	328	327	385	293	49.8-56.1
PD	270	307	273	270	282	284	286	327	251	42.3-48.1
DB	31.9	48	30.3	33.4	33.9	35.3	34.8	46.4	28	5.0-6.8
DH	31	36	23.9	27	24.5	23	24.6	30.2	19	3.4-5.4
PrD	247	301	256	250	271	274	262	306	242	39.6-44.7
TL	433	521	448	427	449	436	398	s/c	400	67.0-74.9
1GL	41	49	29.9	30.9	33.5	32.2	35.3	39.2	30	4.9-7.1
2GL	29.5	51	32	35	32.9	34.7	36	41.9	31	5.1-7.2
3GL	30.7	52	33.1	34.5	34.6	36.4	36.1	42.2	32	5.3-7.4
4GL	39	52	31.7	32.4	31.9	33.6	33.7	40	29	5.2-7.4
5GL	22.7	42	23.1	22.5	23.8	24.8	20.6	29.7	21	3.5-5.9
1ID	87	106	92	93	92.4	96	93	97.9	73	12.7-15.7
2ID	20.1	35	32	31	30	32	32	25.1	21	3.2-5.4
R1G	74	80	78	78	80	82	79	83	62	10.7-13.4
R5G	132	156	138	139	147	148	138	177	126	22.1-24.1
PFL	70	77	69	71	70	72	65	76.6	47	8.5-12.1
CFL	72	111	72.6	71.6	75.1	75.6	74.4	90.8	63	11.4-15.7
CFW	24.6	38	22	24.8	25.9	30.8	23.5	31.1	22	3.6-5.4
DE	10.1	14	10.9	12.6	13	11	12.8	13.6	12	1.7-2.2
CW	111	146	132	131	126	114	144	138	106	17.9-24.2
PL	20.5	36	22.7	21.8	22.2	22.8	21.8	26.5	22	3.4-5.1
HL	70.6	107	78.9	80.5	82.4	83.1	81.9	99.7	61	11.1-15.1
MW	68.1	95	75.6	72.8	71.4	74.8	73.4	91.1	62	11.2-13.4
ID	67	88	65.4	63.4	65.5	66.6	65.6	77.2	57	10.0-12.4
UTL	38.7	38.17	36.6	33.6	35.4	36.2	32.8	42.8	29	5.3-6.7
LTL	33.5	38.68	37.4	36.1	36.5	37.1	34.9	43.5	27	4.9-6.2

breeding areas requires criteria to be met; it is important for future studies of their life cycles and considers management strategies and the correct conservation of shark and ray species (Heupel *et al*., 2007).

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