

**FIRST RECORD OF A SINGLE-CLASPER SPECIMEN OF *PSEUDOBATOS PERCELLENS*  
(ELASMOBRANCHII: RHINOPRISTIFORMES: RHINOBATIDAE)  
FROM THE CARIBBEAN SEA, VENEZUELA**

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Ehemann N., González-González L. 2018. First record of a single-clasper specimen of *Pseudobatos percellens* (Elasmobranchii: Rhinopristiformes: Rhinobatidae) from the Caribbean Sea, Venezuela. Acta Ichthyol. Piscat. 48 (3): 235–240.

**Abstract.** Documented cases of abnormalities in elasmobranchs worldwide are more often reported for sharks than their close relatives, the skates and rays. This report confirms the occurrence of a chola guitarfish, *Pseudobatos percellens* (Walbaum, 1792), caught off Margarita Island, Venezuela, showing morphological abnormalities on the right side of the body, including the absence of one clasper. This is the first record of an anomalous single-clasper case in the Caribbean Sea region.

**Keywords:** batoid fish, Chondrichthyes, deformity, guitarfish, reproduction

## INTRODUCTION

Documented cases of abnormalities in elasmobranchs worldwide are most often reported for sharks (Atz 1964, Heupel et al. 1999, Teixeira and Góes de Araújo 2002, Jones et al. 2005, Saïdi et al. 2006, Bottaro et al. 2009, Delpiani et al. 2011, Galván-Magaña et al. 2011, Muñoz-Osorio et al. 2013, Wagner et al. 2013, Ehemann et al. 2016, Becerril-García et al. 2017, Lamarca et al. 2017, Capapé and Ali 2017) and rarely for skates and rays. Nevertheless, the number of records of anomalous defects in batoid fish specimens have increased over the past decade, including morphological anomalies (Escobar-Sánchez et al. 2009, Mejía-Falla et al. 2011, Ramírez-Hernández et al. 2011, Torres-Huerta et al. 2015), albinism (Sandoval-Castillo et al. 2006, Ben-Souissi et al. 2007, Ball et al. 2013), and dicephalic embryos (Castro-Aguirre and Torres-Villegas 1979, Bornatowski and Abilhoa 2009, Guida et al. 2014). Cases of hermaphroditism (Gianeti and Vooren 2007, Scenna et al. 2007, Haas and Ebert 2008, Ribeiro-Prado et al. 2009, Capapé et al. 2012, Rafrati-Nouira et al. 2017) and more recently, cases of parthenogenesis birth (Fields et al. 2015, Harmon et al. 2015) were also reported.

Cases documenting the presence of a single clasper in batoid fishes specimens are scarce, with only five known worldwide: a Tunisian *Raja miraletus* Linnaeus, 1758; two Brazilian specimens, a *Pteroplatytrygon violacea* (Bonaparte, 1832); an *Urotrygon microphthalmum* Delsman, 1941; and other two distinct individuals captured in the west coast of

Mexico, *Urotrygon chilensis* (Günther, 1872) and a *Zapteryx exasperata* (Jordan et Gilbert, 1880) (see Quignard and Capapé 1972, Ribeiro-Prado et al. 2009, Santander-Neto and Lessa 2013, Torres-Huerta et al. 2015, González-González et al. 2016).

An anomalous embryo of *Pseudobatos percellens* (Walbaum, 1792) was recorded in southern Brazil (Bornatowski and Abilhoa 2009) documenting the first occurrence of a malformation for this species. The specimen was a two-headed embryo with pectoral fins separated from the head. It was suggested that this individual was potentially associated with poor nutrition during the gestation period, however, genetic and environmental causes remain an alternative hypothesis. *Pseudobatos percellens*, is a shallow-water species with a distribution range stretching from Panamá to Brazil, including the Lesser Antilles (Cervigón and Alcalá 1999, Last et al. 2016). The aim of the presently reported study was to record and describe the first case of a chola guitarfish (*P. percellens*) from the Caribbean Sea with single clasper and morphological abnormalities.

## MATERIAL AND METHODS

On 5 November 2013, a chola guitarfish individual (Fig. 1A, B) was captured by a local fisherman using a bottom trawling net in La Pared beach (landing coordinates 11°03'33"N 64°18'46"W), Margarita Island, Venezuela

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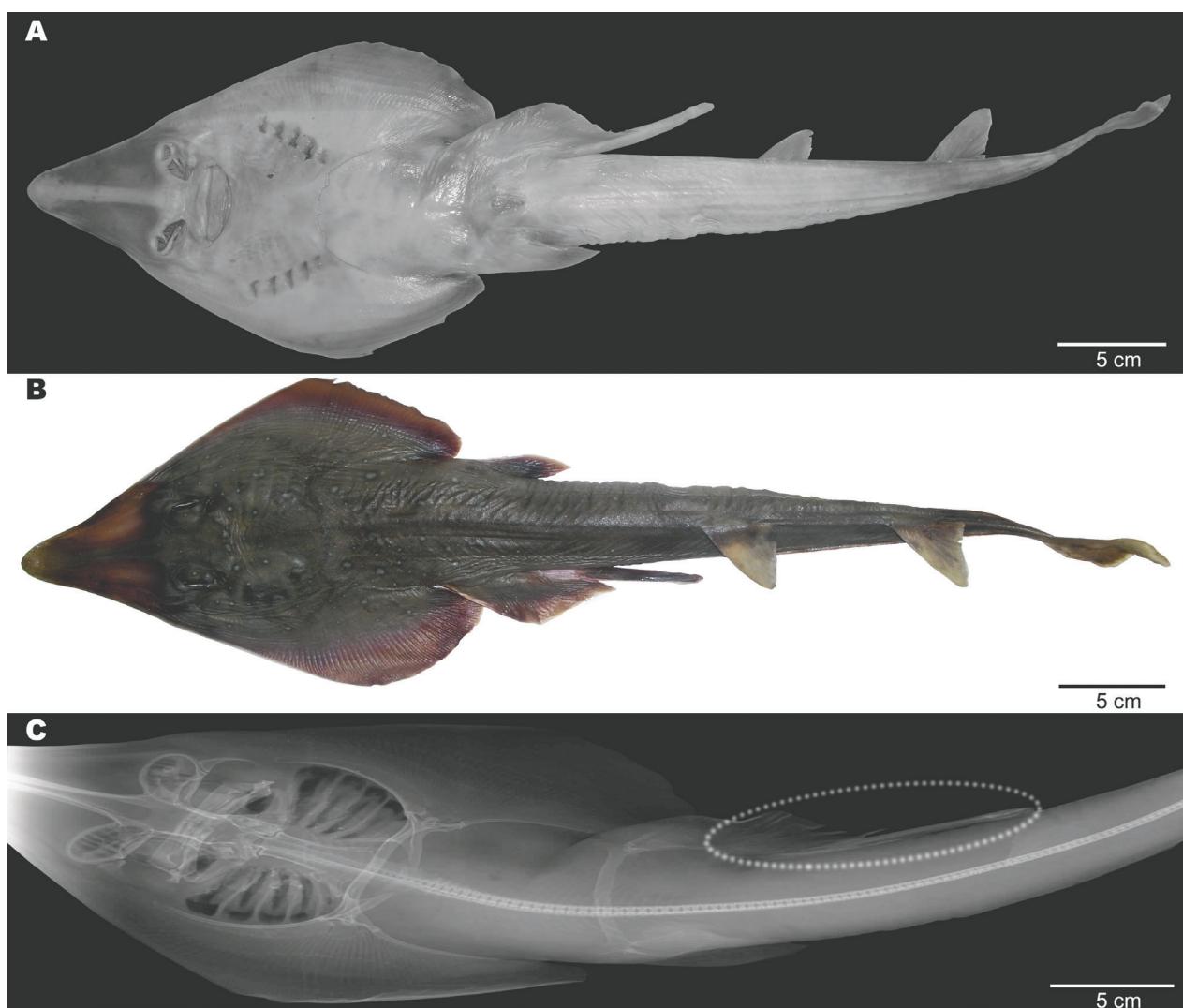
located in the south-eastern part of the Caribbean Sea. The identification of the specimen to species level was made based on Cervigón and Alcalá (1999), McEachran and Carvalho (2002), and Last et al. (2016). Morphological measurements (i.e., disc width, total length (TL), clasper length, pelvic fin length and width) of the specimen were recorded using a digital calliper to the nearest 0.01 mm according to Last et al. (2008). The calcification state and the degree of rotation of the clasper were used to determine sexual maturity (immature or mature) according to Conrath (2004). An X-ray plate (Fig. 1C) and a ventral dissection of the specimen (Fig. 2) were performed, to examine the presence of a vestigial internal structure of the missing clasper and also for the meristic information of both pelvic fins.

A morphometric comparison was made between this specimen and a normal male caught at the same locality with similar measures (TL = 557 mm weighing 530 g) (Table 1). The single-clasper specimen was donated, deposited and exhibited at the Museo Marino de Margarita, Venezuela (catalogue number MMM 1929).

## RESULTS

The specimen was differentiated from the other western Atlantic *Pseudobatos* species—i.e., *Pseudobatos lentiginosus* (Garman, 1880) and *Pseudobatos horkelii* (Müller et Henle, 1841)—by its striking pattern of white spots on the dorsal (Fig. 1B), much less numerous and larger than those of the freckled guitarfish, *Pseudobatos lentiginosus*. Meanwhile the Brazilian guitarfish (*P. horkelii*) is thought to be the only plain-coloured *Pseudobatos* in the western Atlantic. According to Last et al. (2016) the geographic distribution data of the three species were also valuable because those guitarfish species are not sympatric. *Pseudobatos lentiginosus* is restricted to the Gulf of Mexico, *P. percellens* is only present in the waters stretching from the Caribbean Sea to northern Brazil and *P. horkelii* inhabits the coastal shelf from southern Brazil to Argentina.

The total length (TL) of the anomalous specimen was 558 mm and its weight 500 g. Overall, the individual appeared to be a normal guitarfish, based on an external examination (Fig. 1A, B), and classified as a mature



**Fig. 1.** External view of the *Pseudobatos percellens* caught off the Margarita Island, Venezuela (No. MMM 1929); ventral view (A), dorsal view (B), and the X ray plate (C); the elliptic zone describe the location of the single clasper

male based on the stage of the development of the single clasper, and the mean size of sexual maturity for males ( $L_{50} = 520$  mm TL) estimated by Tagliafico et al. (2013) for *P. percellens* at the same locality (La Pared Beach). The length of the single clasper was 94.65 mm representing 17% of the total length. An abnormality on the right pelvic fin was recorded to be smaller than the left side. The difference of approximately 30 percentage points (pp) resulted from the left side (13.25 mm) to be longer and by 46.4 pp (14.46 mm) wider than the right side (Table 1).

## DISCUSSION

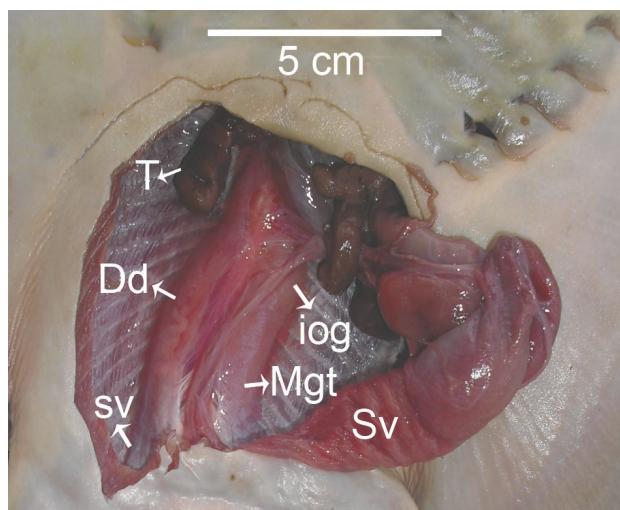
The results obtained from an external examination (Fig 1A), via X-ray plate (Fig. 1C), combined with a ventral dissection (Fig. 2) revealed the lack of scars, the absence of vestigial or residual development of this anatomical structure on the out and the inner side of the

chola guitarfish, refuting the hypothesis of predation or amputation, as has been previously reported for *Leucoraja circularis* (Couch, 1838) and *Bathyraja richardsoni* (Garrick, 1961) (see Mnasri et al. 2009, Orlov 2011).

The absence of one clasper has repercussions during reproduction, even though when an elasmobranch male must insert one of the clasps during copulation (Carrier et al. 1994, Chapman et al. 2003). The lack of a clasper potentially reduces the success of the reproduction process of the single-clasper specimens (Torres-Huerta et al. 2015). The missing clasper of the six cases (including this study) reported with this anomaly, seems to be random, given that, three cases correspond to the absence of the left clasper (two of them belongs to Myliobatiformes species). However, the other three remaining cases (opposite clasper) two of them correspond to Rhinopristiformes species and one to the Myliobatiformes. This “fortuity”, may represent the possibility of consistency on the missing clasper side at higher taxonomy levels such as Order (at least for Rhinopristiformes and Rajiformes). Nevertheless, more cases and studies must be done to support this hypothesis.

According to Atz (1964) and Irvine et al. (2002), elasmobranchs may have two types of hermaphroditism referred to as “true or normal” and/or “pseudo or abnormal”. The main characteristic of the first group is the internal presence of organs of both sexes, and the external presence of clasps. In this case, a mature individual could function as both male and female. In comparison, the other group possesses the internal sex organs of one gender and externally the sex organs of the other gender (Irvine et al. 2002). Both cases of hermaphroditism have been previously recorded for different batoid species (Capapé et al. 2012, Rafrafi-Nouira et al. 2017). The anatomical dissection of this chola guitarfish, showed one side with macroscopic male organs (i.e., testis, ductus deferens, and seminal vesicle) and the other side, with what appears to be an inconspicuous oviductal gland and a membranous genital tract (Fig. 2).

The confirmation using a histological technique for the “female organs” could not be done, due to the conditions



**Fig. 2.** Internal organs and reproductive system of the single-clasper *Pseudobatos percellens* specimen caught on the Margarita Island, Venezuela (No. MMM 1929); Dd = ductus deferens, iov = inconspicuous oviductal gland, Mgt = membranous genital tract, S = stomach, Sv = seminal vesicle, T = testis

Weight and morphometric information of the single-clasper specimen and a normal male of *Pseudobatos percellens* caught off the Margarita Island, Venezuela (No. MMM 1929);

Character	Single-clasper specimen				Normal male specimen			
	Right		Left		Right		Left	
	AV	%TL	AV	%TL	AV	%TL	AV	%TL
Total weight [g]			500				530	
Total length [mm]			558				557	
Disc width [mm]			178				179	
Casper length [mm]	94.65	17.0	—	—	93.50	16.8	93.75	16.8
Pelvic fin length [mm]	44.40	8.0	31.15	5.6	43.80	7.9	43.95	7.9
Pelvic fin length [mm]	31.15	5.6	16.70	3.0	30.95	5.5	31.00	5.6
No of soft-ray pelvic fin	22		14		—		—	

AV = absolute value [mm], %TL = relative value expressed in percent of the total length.

**Table 1**

of the specimen as a result of poor preservation. The possibility to be in the presence of a true hermaphroditism specimen are not rejected, if this inference were true, it would be the second case (among the six single-clasper individuals cases), with a true hermaphroditism, along with *Raja miraletus* Linnaeus, 1758 (see Quignard and Capapé 1972) which may be considered as true hermaphroditism due to the presence of both sex organs.

The causes of these reproductive abnormalities (with a single clasper) remain uncertain and inconclusive, however, the most probable hypothesis is related to the embryonic development from an endogenous origin (e.g., genetic, hormonal), among others as in other vertebrates (Ribeiro-Prado et al. 2009). Causes such as consanguinity within the population (Santander-Neto and Lessa 2013), radioactive contamination (Yano and Tanaka 1989), environmental degradation, pollution, and chemical particulates such as those from the use of dichlorodiphenyltrichloroethane (DDT) (Torres-Huerta et al. 2015) cannot be denied. However, there is no conclusive evidence that may corroborate these hypotheses in the study area, even though these contaminants can be accumulated in the marine substrate, and benthic species such as *Pseudobatos percellens* are susceptible. Further investigation must be done to clarify the causes of this kind of abnormalities in this group of fishes.

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