Additional morphometric data on *Harriotta raleighana* (Holocephali: Rhinochimaeridae) and description of copulation marks*

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Resumen: Datos morfométricos de una hembra de *Harriotta raleighana* capturada en el Golfo de California respaldan la idea de que la especie –para especímenes dentro de cierto ámbito de longitud de cuerpo– representa dimorfismo sexual y alometría negativa en la longitud del hocico. Se describen las marcas presentes en el cuerpo del especimen que se supone fueron causadas durante la copulación.

Garrick (1971) and Garrick and Inada (1975) provided measurements and proportional dimensions of a large quantity of specimens of *Harriotta raleighana* Goode and Bean, 1895, mainly from New Zealand; the latter authors suggested that the species–restricted to specimens falling within the body size range (279 mm-448 mm) of the New Zealand material–presents sexual dimorphism and negative allometry in snout length throughout its geographical range.

Since no morphometric data on adult specimens from the eastern Pacific exist, ours (Table 1) of a female caught in the Gulf of California acquires special importance.

Garrick and Inada (1975) mention the snout region of the males, on average, to be proportionally much longer than that of the females. With regard to this sexual dimorphism, the proportional dimensions (in percent of body lenghth) from snout tip to eye, to mouth, to gill-opening, and to pectoral origin obtained from our specimen fall within the range of the dimensions of the female specimens from New Zealand and are close to their means, except for the one of snout tip to eye (Table 2). The latter value (38%) is somewhat smaller than the minimum proportional dimension (38.7%) of the New Zealand females and is indicative of a proportionally very short snout. Although our measurements were obtained from only one specimen they at least do not question Garrick and Inada's (1975) statement on sexual dimorphism and negative allometry in snout lenght.

The capture of the specimen was accidental: apparently the fish was floating on the surface of the water still alive, and was hooked on a line baited with mullet (*Mugil* spp.) during trolling operations for marlin. Evidently the fish did not grab the bait since the hook entered the axil of the right pectoral fin. No shrimpboats trawl in the area, and thus the fish was not thrown overboard as is usually done with the by-catch.

The ascending of this benthic fish might be related to the scars it shows all over and which we assume to be copulation marks (Fig. 1). They are especially pronounced on the ventral side of the body between the urogenital orifice and the anterior base of the anal fin. Here at about six places the skin and some flesh is torn away; the wounds are more or less circular, about 8 mm in diameter and 2 mm deep. Also ventrally, in front of the anal opening, on the pelvic fins, especially on the lower side and on the right lateral side between the anterior margin of the second dorsal fin and the base of the pelvic fin, the scars which in general remain quite superficial here, are clearly visible. Many marks are annular in appearance, formed

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TABLE 1

Measurements (in mm) and proportional dimensions in percent of body length (from the gill-opening to the origin of the upper caudal fin) of the female from the Gulf of California.

		(mm)	(%)
Total length		840	
Length snout tip to upper caudal origin		615	
Body length		395	
Snout tip to:	nostrils	144	36.5
	eye (= snout lenght)	150	38
	mouth	165	41.8
	gill-opening	220	55.7
	pectoral origin	240	60.8
Gill-opening to:	1st dorsal origin	17	4.3
	2nd dorsal origin	107	27
	pelvic origin	181	45.8
	lower caudal origin	350	88.6
Distance between nostrils		11	2.8
Mouth-width		34	8.6
Length of gill-opening		33	8.4
Horizontal diameter of eye		25	6.3
1st dorsal:	length base	72	18.2
	length spine	122	30.9
2nd dorsal:	length base	220	55.7
	vertical height	22	5.6
Pectoral: length anterior margin		165	41.8
Pelvic: length anterior margin		85	21.5
Caudal:	Length upper lobe	195	49.4
	vertical height upper lobe	8	2
	Length lower lobe	240	60.8
	vertical height lower lobe	20	5.1
Trunk at pectoral origin: height		103	26.1
Distance origin to origin: pectoral and pelvic			

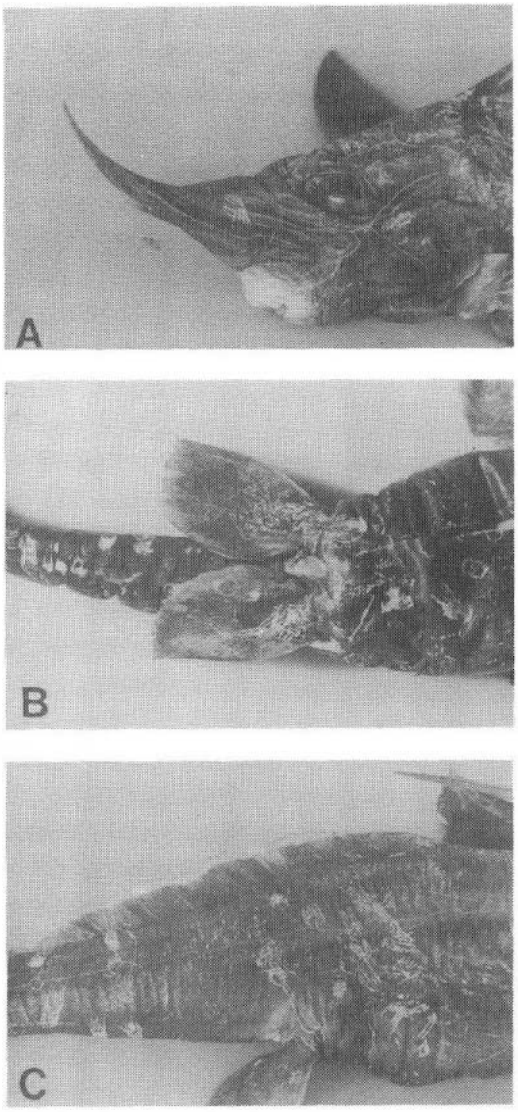
* The caudal filament is very short and probably part of it is lost; its length measured from the posterior end of the upper caudal lobe is only 3 mm which is about one fifth the distance from snout tip to posterior of the eye.

TABLE 2

Comparison of selected proportional dimensions in percent of body length (measured from the gill-opening to the origin of the upper caudal fin) between New Zealand male and female specimens of Harriotta raleighana *(taken from Garrick and Inada, 1975) and the Gulf of California female specimen.*

	New Zealand specimens				
	Males (n = 33)		Females (n = 29)		Gulf of California female
	Range	Mean	Range	Mean	
Snout tip to:					
eye	47.7–62.3	56.4	39.7–47.2	43.6	38.0
mouth	43.5–60.7	54.8	36.8–49.0	41.9	41.8
gill-opening	59.8–79.2	71.6	52.7–62.8	57.7	55.7
pectoral origin	61.9–82.2	74.2	54.8–66.7	60.6	60.8

by about 16 small scratches orientated towards the center; often from these marks, on one side, a set of about eight parallel scratches some 2 cm long originate; presumably the male copulatory device lost its holdfast there. Supposedly, the circular marks and wounds are caused by the frontal tenaculum; some other scratches might have been inflicted by the prepelvic tenacula. Dean (1906) described the copulation marks on the bodies of female *Chimaera colliei*



Harriotta raleighana, Gulf of California female (body lenght 395 mm) A. Head B. Ventral view of posterior part of the body C. Right lateral view of posterior part of the body. Copulation marks are clearly visible in all three pictures.

Lay and Bennett, 1839, caused by the frontal tenaculum of the males. In general, his observations correspond very well to ours for *H. raleighana* although in the species examined by Dean, the marks, with few exceptions, were confined to the region of the first dorsal fin.

The specimen is deposited in the Reference Collection of the Marine Station at Mazatlan, Sinaloa, of the Instituto de Ciencias del Mar y Limnología, Universidad Nacional Autónoma de México (No. 1981-1): 24 March 1982, 60.8 km off Mazatlan, Sinaloa (the exact co-ordinates of the place of capture are not known but depth must be between 300 and 700 meters).

Apart from a single juvenile specimen (152 mm total lenght), caught in deep water (1180 meters) about 26° N. lat., off Lower California, Mexico and described under the name *Harriotta curtissjamesi* by Townsend and Nichols (1925), the only other report of *H. raleighana* for the eastern north Pacific is from deep water off southern California, U.S.A. (Eschmeyer *et al.,* 1983). The same authors mention that *H. raleighana* was also photographed in the Gulf of California.

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