

## Resurrection of the name *Carcharhinus cerdale*, a species different from *Carcharhinus porosus*

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### Abstract

The smalltail shark, *Carcharhinus porosus* Ranzani, 1840, is a small shark that inhabits the western North Atlantic Ocean from the Gulf of Mexico to Brazil. *Carcharhinus cerdale* Gilbert, in Jordan and Evermann, 1898, is a small shark that inhabits the eastern Pacific from the Gulf of California to the tropics. Through a series of mistakes these two allopatric species were synonymized. Meek & Hildebrand (1923) probably committed the first error when they misidentified or assumed the origin of market specimens in Colón, Panama, and stated that *C. cerdale* was found in both sides of the Isthmus of Panama. Meek & Hildebrand did not compare *C. cerdale* with *C. porosus*, and they did not synonymize the two species. Bigelow & Schroeder (1948) made the second error by stating that Meek & Hildebrand had synonymized *C. cerdale* and *C. porosus*. Their publication was so authoritative that the synonymy would not be challenged by most workers for more than 60 years, although Kato et al. (1967) were aware that *C. cerdale* was different from the Atlantic *C. porosus*. The name *Carcharhinus cerdale* Gilbert, in Jordan & Evermann, 1898, is resurrected here for the Pacific species.

### Zusammenfassung

Der Atlantische Zwerghai *Carcharhinus porosus*, 1840, ist ein kleiner Hai, der den westlichen Nordatlantik vom Golf von Mexiko bis Brasilien bewohnt. *Carcharhinus cerdale*, Gilbert in Jordan und Evermann, 1898, ist ebenfalls ein Zwerghai, der den Ostpazifik vom Golf von Kalifornien bis zum Wendekreis bewohnt. Durch eine Reihe von Fehlurteilen wurden diese beiden allopatrischen Arten als Synonyme eingestuft. Meek & Hildebrand (1923) begingen wahrscheinlich den ersten Fehler, als sie Exemplare vom Markt in Colón, Panama, falsch bestimmten oder deren Herkunft falsch einschätzten und den Schluss zogen, *C. cerdale* würde auf beiden Seiten der Landenge von Panama vorkommen. Meek & Hildebrand haben aber *C. cerdale* gar nicht mit *C. porosus* verglichen und haben auch keine Synonymisierung der beiden Arten vorgeschlagen. Den zweiten Fehler machten wahrscheinlich Bigelow & Schroeder (1948), als sie behaupteten, Meek & Hildebrand hätten *C.*

*cerdale* als synonym von *C. porosus* eingestuft. Über 60 Jahre galt die Veröffentlichung von Bigelow und Schroeder als so maßgeblich, dass die Synonymisierung gar nicht in Frage gestellt wurde, obwohl Kato et al. (1967) bemerkt hatten, dass *C. cerdale* sich vom atlantischen *C. porosus* unterscheidet. Der Name *Carcharhinus cerdale* Gilbert in Jordan & Evermann, 1898, wird hier für die pazifische Art wiederbelebt.

### Résumé

*Carcharhinus porosus* Ranzani, 1840, est un petit requin qui habite la partie ouest de l'Atlantique nord, du golfe du Mexique jusqu'au Brésil. *Carcharhinus cerdale* Gilbert, in Jordan et Evermann, 1898, est un petit requin qui habite le Pacifique est, du golfe de Californie jusqu'aux Tropiques. A cause d'une série d'erreurs, les deux espèces allopatriques ont été placées en synonymie. Meek & Hildebrand (1923) ont probablement commis la première erreur quand ils ont mal identifié ou supposé l'origine de spécimens du marché à Colón, Panama et ont déclaré que *C. cerdale* se trouvait des deux côtés de l'isthme de Panama. Meek & Hildebrand n'ont pas comparé *C. cerdale* et *C. porosus* et n'ont pas mis les deux espèces en synonymie. Bigelow & Schroeder (1948) ont fait la seconde erreur en déclarant que Meek & Hildebrand avaient placé *C. cerdale* et *C. porosus* en synonymie. Leur publication a fait autorité au point que la synonymie n'a jamais été mise en doute par la plupart des spécialistes pendant plus de 60 ans, bien que Kato et al. (1967) aient remarqué que *C. cerdale* était différent de *C. porosus* de l'Atlantique. Le nom *Carcharhinus cerdale* Gilbert, in Jordan & Evermann, 1898, est réhabilité ici pour l'espèce du Pacifique.

### Sommario

Lo squalo codapiccola, *Carcharhinus porosus* Ranzani, 1840, è un piccolo squalo che abita il nord Atlantico occidentale dal Golfo del Messico al Brasile. *Carcharhinus cerdale* Gilbert, in Jordan and Evermann, 1898, è un piccolo squalo che abita il Pacifico orientale dal Golfo di California ai tropici. Per una serie di errori queste due specie allopatriche sono state messe in sinonimia. Probabilmente furono Meek & Hildebrand (1923) a commettere il primo errore quando identificarono in modo erroneo le specie o assun-

sero che gli esemplari raccolti al mercato fossero stati pescati a Colón, Panama, concludendo che *C. cerdale* dovesse essere presente ad entrambi i lati dell'istmo di Panama. Meek & Hildebrand non confrontarono *C. cerdale* con *C. porosus* e non posero in sinonimia le due specie. Bigelow & Schroeder (1948) compirono il secondo errore affermando che Meek & Hildebrand avevano stabilito che *C. cerdale* e *C. porosus* fossero sinonimi. La loro pubblicazione fu così autorevole che questa decisione non fu messa in discussione per oltre 60 anni, sebbene Kato et al. (1967) fossero consapevoli che *C. cerdale* dovesse essere una specie distinta dall'atlantica *C. porosus*. La combinazione *Carcharhinus cerdale* Gilbert, in Jordan & Evermann, 1898, è qui elevata a nome valido per la specie presente sul versante Pacifico.

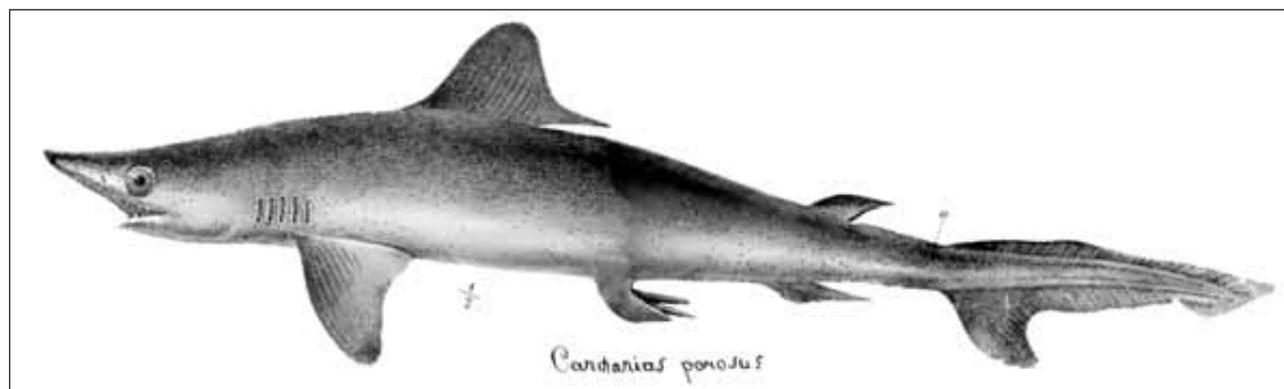
## INTRODUCTION

In 1840, Camilli Ranzani described an abundant small shark of the Brazilian coast as *Carcharias porosus*. The description, in Latin, appeared in an article titled *De Novis Speciebus Piscium* published in *Novi Commentarii, Academiae Scientiarum, Instituti Bononiensis*, Vol. 4: 65-83. The date of the publication is given as 1839 or 1840 by different authorities; here I follow American Fisheries Society (A.F.S.) usage. The description was accompanied by illustrations of the species (Fig. 1), revealing its key characteristics. Bigelow & Schroeder (1948: 398) wrote that specimens "can be referred to *porosus* without hesitation, so clearly diagnostic are the original account and illustration of that species." Müller & Henle (1841) described the same species as *Carcharias (Prionodon) henlei*. As with the Ranzani publication, there are doubts of the actual publication date, and the date of Müller & Henle's work is variously given dates of 1839 and 1841. I use the 1841 date, again following current A.F.S. usage.

In 1898 C. H. Gilbert described *Carcharhinus*

*cerdale* in Jordan & Evermann's (1898) monumental work, *Fishes of North and Middle America* (Vol. 3: 2746-2747), based on a specimen from Pacific Panama. The specimen was not illustrated. Later, Gilbert & Starks (1904: 11-12; pl. 2, Fig. 4) expanded the description and illustrated the type specimen (Fig. 2).

Meek & Hildebrand (1923), in their *Marine Fishes of Panama*, enumerated the species they encountered and listed *C. cerdale* and *C. porosus* separately (numbers 14 and 15 respectively in their list). These authors recorded *C. cerdale* specimens from Panama Bay (in the Pacific Ocean), and "Atlantic specimens" from the Colón fish market (on the Atlantic side of the Isthmus). Meek & Hildebrand (1923: 49) also stated that: "Careful comparison of specimens, as well as a large series of measurements based on every specimen at hand, have revealed no differences between the representatives from the opposite coasts. We, therefore, also refer these Atlantic specimens to *C. cerdale*." Meek & Hildebrand (1923: 50) stated that they did not encounter *C. porosus* and wrote "This species was not seen by us and is not recorded from the Isthmus, but its distribution brings it within the scope of this work," and mentioned that the species was known from the West Indies to Brazil. The "Atlantic specimens" examined by Meek & Hildebrand and identified as *C. cerdale* are problematic. I have not been able to authenticate any Atlantic specimens of *C. cerdale* and it appears that *C. cerdale* is a distinct Pacific species (see below) that is not found in the Atlantic. Because Meek & Hildebrand's specimens were from the market, there are two possibilities. If the specimens were indeed from the Atlantic, it is likely that they were *C. porosus*. The proportional measurements of both



**Fig. 1.** Ranzani's (1840) original illustration of *Carcharhinus porosus*. Note the nearly equilateral, triangular first dorsal fin originating over the rear tip of the pectoral fins.

species are very similar, and juveniles would be particularly difficult to separate by proportions alone. A second possibility is that the origin of the specimens was in error. The provenance of market specimens is often doubtful because in many cases fish

dealers are not certain of the origin of the fishes they sell; in other cases they possibly falsify the origin of some fishes to promote sales. The Isthmus of Panama is only some 40 km wide at Colón, so Pacific specimens could have been transported to

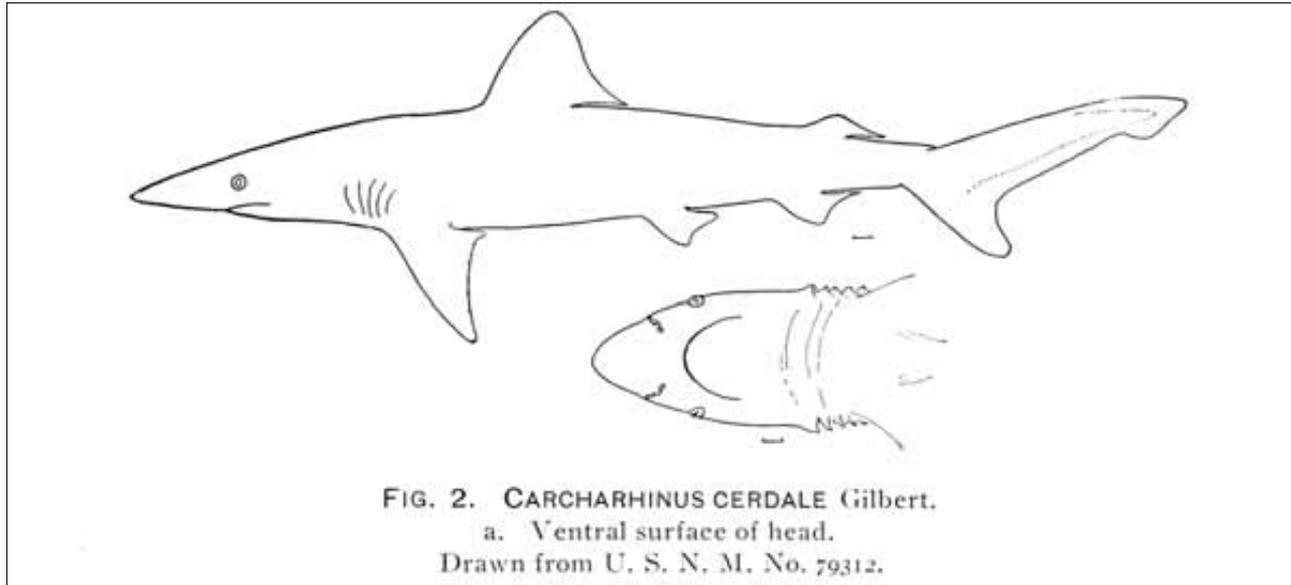


Fig. 2. Gilbert and Starks' (1904) illustration of the *Carcharhinus cerdale* holotype.

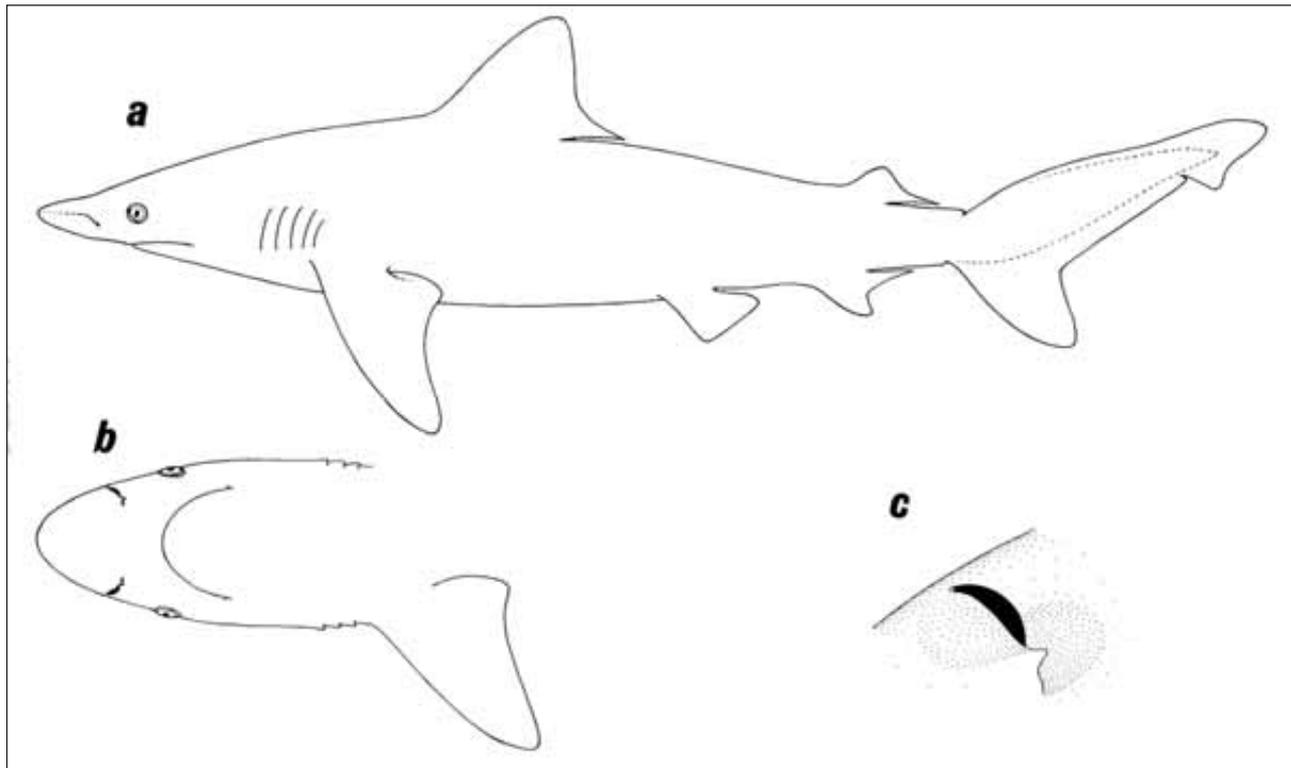


Fig. 3. Garrick's (1982) illustration of a specimen of *Carcharhinus porosus* from Pacific Panama, actually a specimen of *C. cerdale*.

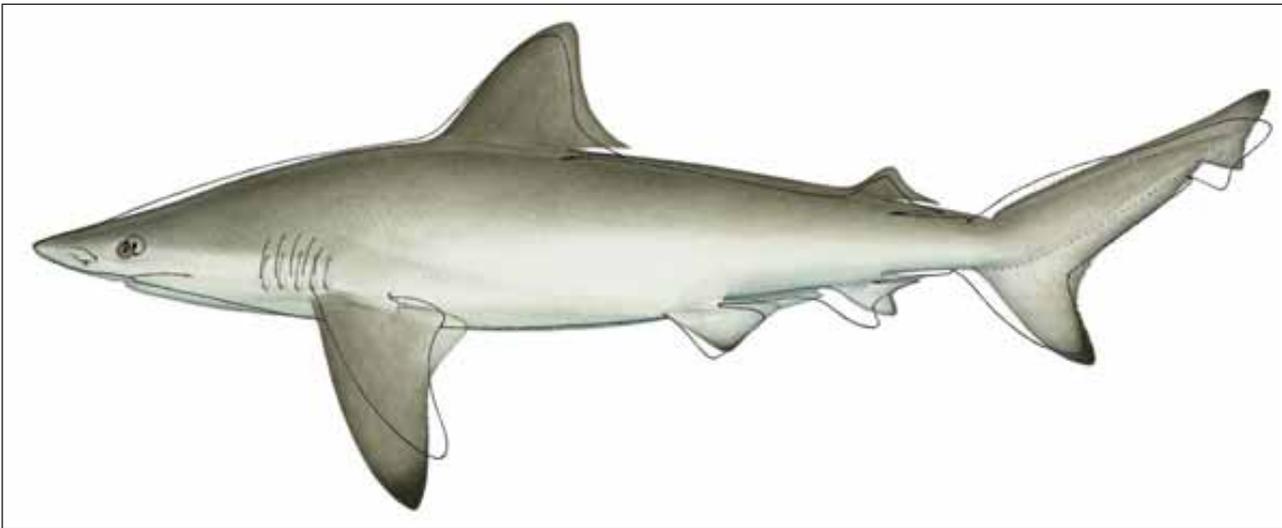


Fig. 4. Garrick's (1982) outline figure superimposed on the *C. cerdale* illustration.

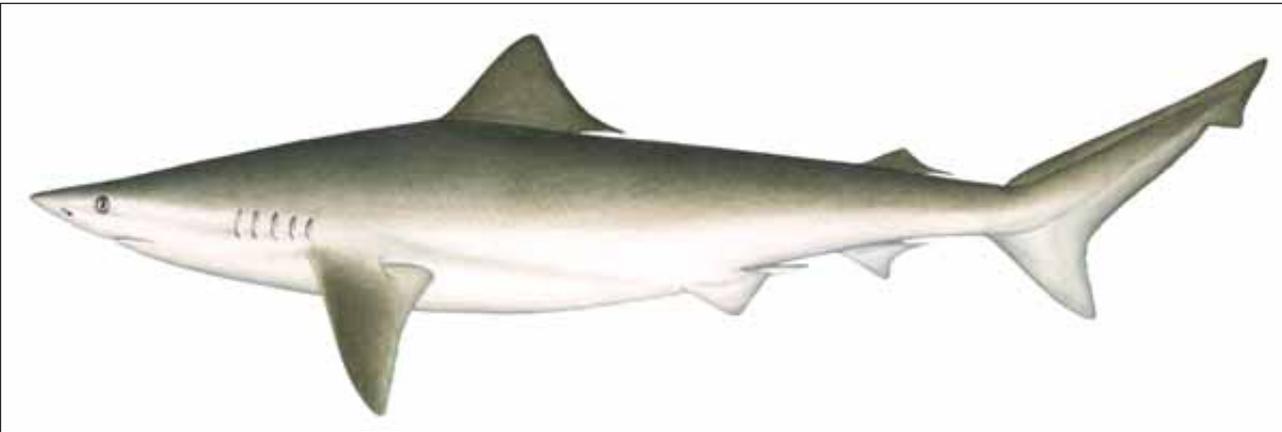


Fig. 5. *Carcharhinus porosus*, 86.3 cm TL adult male from Trinidad (from Castro, in press, used with permission).

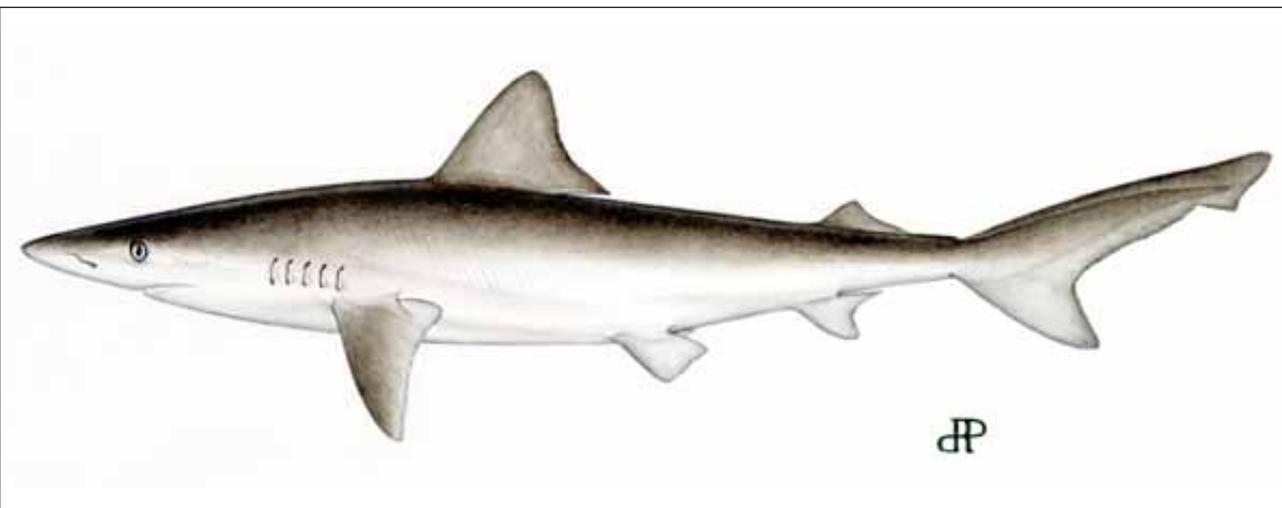


Fig. 6. *Carcharhinus porosus* neonate, 33.0 cm, 0.2 kg; from Bayou Goreau, Terrebonne Parish, Louisiana (TU 1896) (from Castro, in press used with permission).

Table I. Proportional measurements in percent of total length of *Carcharhinus cerdale* and *C. porosus*.

Species Proportions	<i>C. cerdale</i> holotype	<i>C. cerdale</i> term embryo	<i>C. cerdale</i> immature	<i>C. porosus</i> neonate	<i>C. porosus</i> juvenile
Total length cm	55.7	27.7	101.0	33.0	62.6
<b>Tip of snout to</b>					
1st Dorsal origin	34.4	35.0	30.7	31.2	33.5
2nd Dorsal origin	65.5	63.9	64.6	62.4	66.6
Upper caudal origin	75.4	74.4	75.8	75.1	74.8
Lower caudal origin	73.4	72.9	75.4	74.2	73.6
Anal fin origin	60.7	61.4	64.6	61.5	61.5
Pelvic fin origin	48.5	48.7	50.1	47.8	46.6
Pectoral fin origin	24.2	27.4	23.2	23.0	21.6
Gill slit #1 (top)	29.7	23.5	19.0	20.6	17.9
Gill slit #5 (top)	25.6	28.5	24.2	26.0	22.2
Eye origin	8.0	10.5	7.0	9.6	6.9
Mouth origin	8.6	11.2	8.2	9.6	8.8
External naris (lateral end)	4.8	6.5	3.3	5.4	5.4
<b>First dorsal fin</b>					
Anterior margin	11.3	11.6	14.7	12.4	11.3
Height	8.6	7.6	10.4	8.1	8.9
Base length	9.0	8.3	10.7	10.6	9.9
Free inner margin	4.7	4.7	5.6	3.9	5.1
Dist. between dorsal fin bases	27.1	24.5	23.6	22.4	24.8
<b>Second dorsal fin</b>					
Anterior margin	3.1	4.0	3.8	3.6	2.9
Height	3.4	2.5	2.2	2.4	1.8
Base length	3.8	4.0	3.3	3.6	2.9
Free inner margin	3.6	3.6	4.5	4.2	4.2
Dist. from tip to caudal pit	3.8	3.6	3.3	3.9	2.4
<b>Caudal fin</b>					
Upper caudal pit to upper tip	24.8	27.1	26.1	26.0	25.2
Upper caudal tip to notch	7.0	6.9	7.6	4.8	6.5
Caudal notch length	3.8	2.9	3.8	4.2	3.7
Lower caudal pit to lower tip	11.3	10.5	12.9	13.0	12.0
Lower caudal tip to fork	6.5	5.4	6.4	4.2	4.8
<b>Anal fin</b>					
Anterior margin	5.6	5.4	5.7	6.6	5.8
Height	3.4	3.2	4.0	2.4	2.7
Base length	3.9	4.7	4.4	3.9	4.5
Free inner margin	3.8	3.6	4.2	5.4	4.0
Dist. from free tip to caudal pit	3.8	2.2	3.4	5.4	3.8
<b>Pelvic fin</b>					
Anterior margin	4.7	4.3	5.7	5.4	4.8
Height	2.5	2.5	4.3	3.6	2.6
Base length	3.9	3.6	4.9	4.2	5.0
Free inner margin	3.2	2.9	4.4	3.3	3.4
<b>Claspers</b>					
Outside length	2.9	1.8	8.2	2.1	3.0
Inside length	5.4	4.7	11.4	4.2	5.0
Condition (calcified/uncalcified)	Uncalcified	Uncalcified	Uncalcified	Uncalcified	Uncalcified
<b>Pectoral fin</b>					
Anterior margin	14.5	14.8	19.0	13.3	14.9
Height	12.9	14.4	17.8	11.5	12.6
Base length	6.1	5.4	6.7	5.7	5.9
Free inner margin	5.2	5.8	5.9	3.9	5.4
<b>Other</b>					
Vertical eye diameter	1.8	2.9	1.3	2.1	2.1
Horizontal eye diameter	1.8	2.9	1.6	2.1	1.9
Height of 1st gill slit	2.9	2.9	3.3	2.1	3.2
Height of 5th/7th gill slit	2.0	2.2	3.3	1.8	2.1
Distance between 1/5th gill slits	5.2	6.5	5.0	5.4	5.9
Mouth width	8.4	9.0	8.6	8.4	8.9
Internarial width	5.7	6.5	5.4	5.7	5.9

Colón from Panama City markets or the Pacific coast, even in those days. Whether Meek & Hildebrand misidentified the specimens or whether their origin was mis-stated makes no difference, Meek & Hildebrand did not synonymize the two species.

In time, Meek & Hildebrand's statements on the presence of *C. cerdale* in the Atlantic would cause significant confusion. Although they had clearly considered *C. cerdale* and *C. porosus* as two separate species, Bigelow & Schroeder (1948), in their description of *C. porosus*, considered *C. cerdale* a junior synonym of *Carcharhinus porosus* (Ranzani, 1840). They wrote: "Our comparison of specimens from Payta, Peru and Panama with others from the Atlantic corroborates Meek and Hildebrand's (1923: 49) conclusion that examples from the sides

of the Isthmus represent only a single species, which they recorded and described as *cerdale* Gilbert, 1898" (Bigelow & Schroeder 1948: 398, footnote 143). The work by Bigelow & Schroeder was so authoritative that subsequent authors generally accepted that *C. cerdale* was a synonym of *C. porosus*, when in reality these species are morphologically different. Baughman (1943) had reported a 362 mm specimen of *C. cerdale* taken off Galveston, Texas. Later, Baughman & Springer (1950) reported the same specimen as *C. porosus*. In their field guide to the sharks of the eastern Pacific and Hawaii, Kato et al. (1967: 40) illustrated a *C. cerdale* specimen from Pacific Panama as *C. porosus*. Kato et al (1967) were obviously aware that *C. cerdale* was different from the Atlantic *C. porosus*,

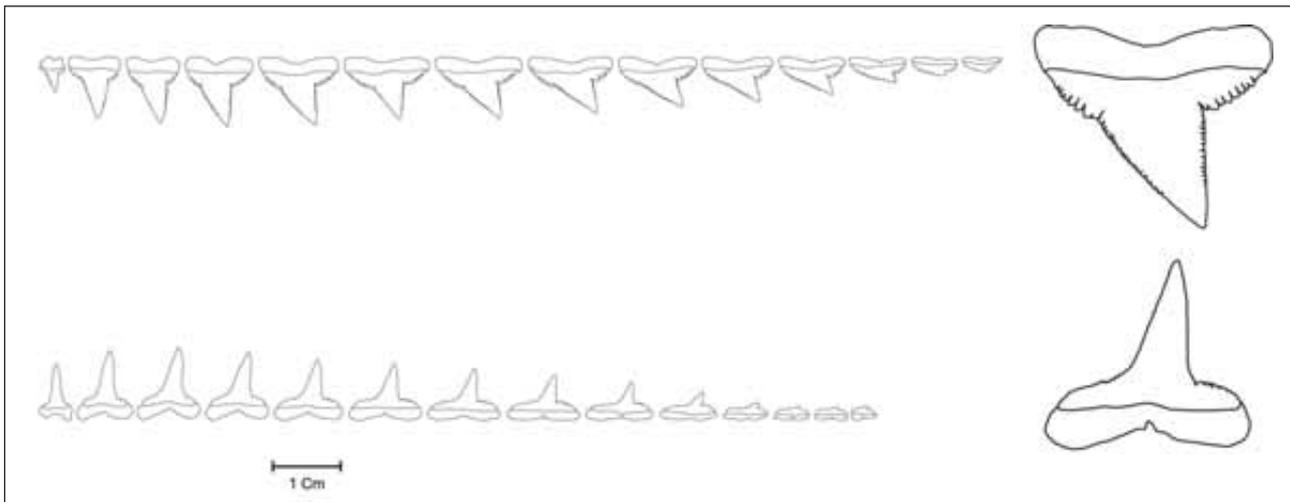


Fig. 7. *Carcharhinus porosus* teeth from the adult specimen illustrated in Fig. 4 (from Castro, in press used with permission).

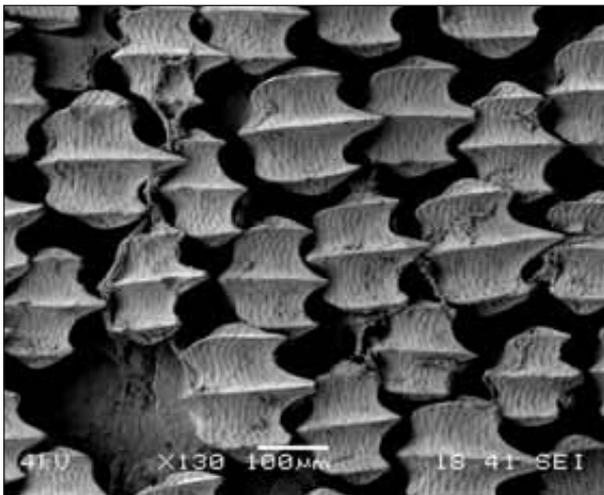


Fig. 8. *Carcharhinus porosus* skin adult denticles (from Castro, in press used with permission).

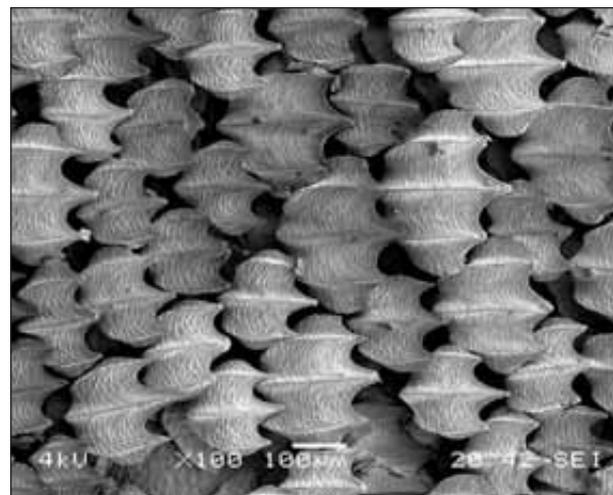
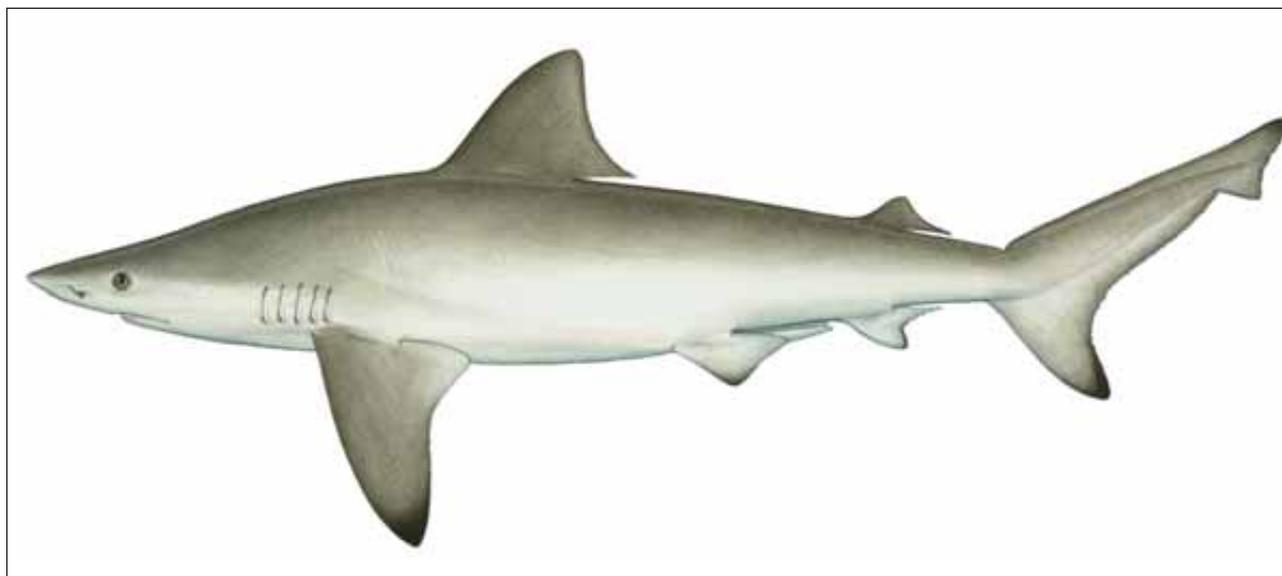
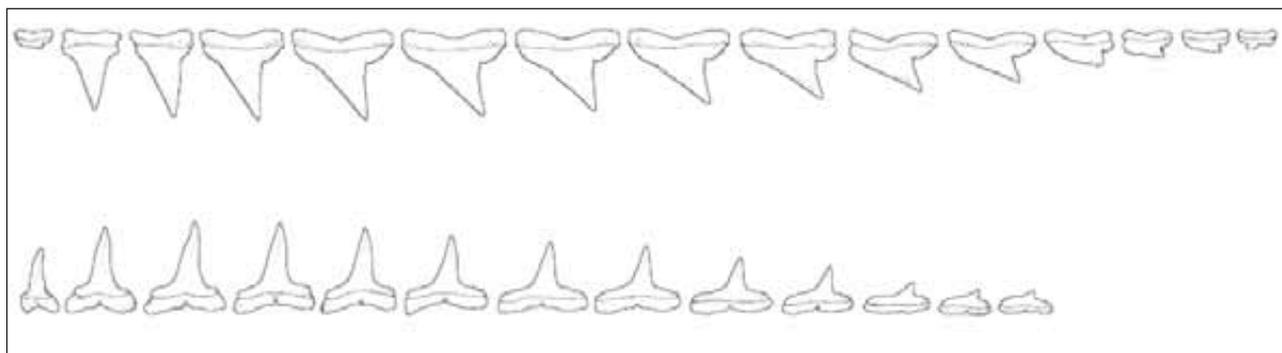


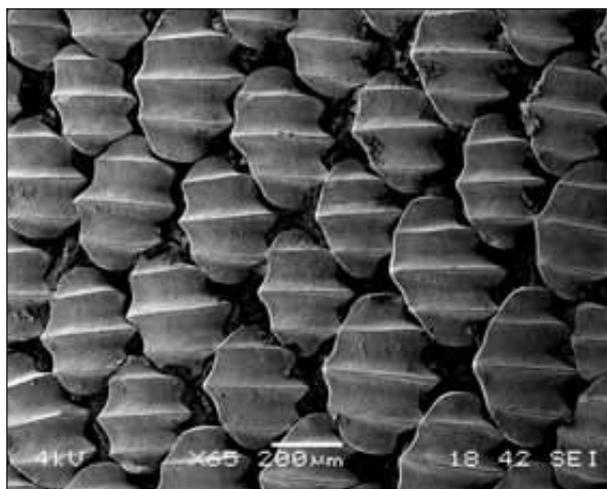
Fig. 9. *C. porosus* neonate skin denticles (from Castro, in press used with permission).



**Fig. 10.** *Carcharhinus cerdale*, immature male, 103 cm, 6.9 kg (#UF 177395), from upper Gulf of California (from Castro, in press, used with permission).



**Fig. 11.** *Carcharhinus cerdale* teeth (from Castro, in press used with permission)..



**Fig. 12.** *Carcharhinus cerdale* skin denticles (from Castro, in press used with permission).

because they stated that the species had been first described from Panama as *C. cerdale* and expressed “There is some doubt that this species is identical with *C. porosus* from the western Atlantic” and “Preserved or dried specimens often appear to have a dorsal ridge.” Garrick (1982: 69) considered *C. cerdale* synonymous with the Atlantic *C. porosus*, probably based on the authority of Bigelow and Schroeder’s (1948) conclusion, although he cited differences in vertebral numbers. His illustration of *C. porosus* (Fig. 3) is actually a specimen of *C. cerdale* from Pacific Panama. Garrick’s illustration of the *C. cerdale* specimen is easily superimposed on my illustration of a *C. cerdale* specimen from the Gulf of California (Fig. 4). According to Garrick (1982) the species is also found off Asia, Borneo, Thailand and Vietnam. Compagno (1984)

copied Bigelow & Schroeder's illustration of a Brazilian *C. porosus* and accepted the conclusion that *C. cerdale* was a synonym of *C. porosus*, but mentioned that Asian specimens referred by Garrick could represent an undescribed species of *Carcharhinus*. In this paper I compare the two species and describe the major differences between them, and resurrect the name *Carcharhinus cerdale* Gilbert, in Jordan & Evermann 1898, for the Pacific species.

## MATERIALS AND METHODS

The holotype of *Carcharhinus cerdale* (SU 11884) was obtained from the California Academy of Sciences through the courtesy of Tomio Iwamoto. Fresh specimens of *C. cerdale* were obtained from the upper Gulf of California, through the courtesy of Juan Carlos Pérez Jiménez. A 101 cm, 6.9 kg, immature male of *Carcharhinus cerdale* (UF 177395), and a 30-cm term embryo (UF 177396) were selected for this analysis. A tissue sample of the 103-cm male was sent to the laboratory of Dr. Gavin Naylor at Florida State University for DNA analysis (GN4663). Specimens of adult *C. porosus* were obtained from the coastal waters of Trinidad. Specimens of neonate *C. porosus* were obtained from the Tulane University Museum (No. 1896: 33-cm TL male, Terrabonne Parish, Bayou Gareau, Louisiana, 9 May 1952), courtesy of Henry L. Bart. Scanning electron microscope illustrations of the denticles were obtained using the JEOL-JSM-5910LV electron microscope at Florida International University. The dermal denticle samples were all taken from the flanks just below the first dorsal fin. Specimens of *C. cerdale* were deposited at the Florida Museum of Natural History (immature male 103.4 cm TL, UF 177395; term embryo ~30 cm UF 177396). A specimen of *C. porosus* was also deposited at that institution (UF 177397).

## RESULTS AND CONCLUSIONS

*Carcharhinus porosus* and *C. cerdale* are two related but different, allopatric species. *Carcharhinus porosus* (Ranzani, 1840) inhabits the western North Atlantic, and *C. cerdale* Gilbert, in Jordan & Evermann, 1898, inhabits the eastern Pacific. Adults of these two species are easy to separate morphologically, and a comparison of fresh specimens clearly reveals the differences. Juveniles of both species have similar proportional measurements, and preserved specimens may be difficult to separate. The two species have somewhat similar

oblique teeth and these could be another source of confusion when working with small specimens. DNA analysis of NADH2 genes by Gavin Naylor et al. (in preparation) demonstrates that the 103.4-cm specimen of *C. cerdale* illustrated here (UF 177397 and GN4663) along other eastern Pacific specimens referred as *Carcharhinus porosus* are separable and distinct from Atlantic specimens of *C. porosus*.

*Diagnosis.* *Carcharhinus porosus* (Figs 5 and 6): *Carcharhinus porosus* is a smooth-backed (lacking an interdorsal ridge) shark, with a low first dorsal fin originating over or behind the pectoral fin free rear tip. In adults the first dorsal fin anterior margin (from the origin of the fin to its apex) is as long as the distance from the apex to the free rear tip, so that apex makes an equilateral triangle with its origin and free rear tip. The height of the first dorsal fin is about 8-9% of the total length. The second dorsal fin originates over the midpoint of the anal fin base. The caudal fin measures about one fourth of the total length. There is a series of conspicuous pores (hyomandibular pores) located behind the eye. Although Ranzani only illustrated one tooth, these together are sufficient to clearly differentiate the species from *C. cerdale*. The upper teeth (Fig. 7) have long triangular cusps that become increasingly oblique towards the corners of the mouth. They have a weak notch or lack a notch on their medial edges, and a strong notch on the outer edges. The first four teeth have edges with coarse serrations from the bases up to the notch and finer serrations from the notch to the tip. These coarse serrations disappear by the fifth or sixth tooth. Subsequent teeth have inner edges with uniform fine serrations from base to tip. The five or six outermost upper teeth have strongly oblique cusps with nearly straight inner margins and a strong notch on the outer margin. The lower teeth are erect and have cusps with a few coarse serrations at their bases and finer serrations towards the tips. The teeth number U:14-1-14; L:13-13. The dermal denticles (Figs 8 and 9) are characteristic; they have a central strong ridge terminating in a long point, and two shorter ridges on wing-like sides. The dorsal surface of the denticles has a characteristic coarse microsculpture. Body coloration is gray above and dirty white below. The fins are unmarked. This is a small shark, with the largest females reaching 110 cm and 7.6 kg (Castro, in press). The species ranges from the upper Gulf of Mexico, where it is now rare, to southern Brazil. I

found it to be the most abundant species off Trinidad, where it is known as the puppy shark and is a popular shark with consumers. Despite its abundance there are no works dedicated to the species.

*Carcharhinus cerdale* (Fig. 10): *Carcharhinus cerdale* is a smooth-backed species, although some specimens may have a very weak interdorsal ridge. The ridge is evident in embryos and neonates that I have examined, but was not noticeable in the holotype or on the 103.4-cm male. The first dorsal fin originates about the middle of the pectoral fin inner margin; its anterior margin is much longer than the distance from the apex to the free rear tip. The height of the first dorsal fin is about 9–10.5% of the total length. The second dorsal fin originates over or behind middle of anal base. The caudal fin measures about one-fourth of the total length. It has minute, inconspicuous hyomandibular pores behind the eye. The upper teeth (Fig. 11), from the first tooth to the fifth tooth have broadly triangular, increasingly oblique cusps with serrated edges, with a notch on both edges at about a third of length from the base to the cusp. The serrations from the notch to the base are much larger than those on the rest of the cusp. The lower teeth have narrow, erect to slightly oblique, triangular cusps with more finely serrated edges. Teeth number U:13 to 15-1 or 2-13 to 15, L:12 to 15-0 to 2-12 to 15. The denticles (Fig. 12) are roughly oblong and have minimal overlapping, with three central ridges, the central ridge being only slightly longer than the side ridges and terminating in a slightly longer point. The dorsal surface of the denticles has a fine microsculpture. Of the species coloration, Gilbert (in Jordan & Evermann 1898; Gilbert & Starks 1904: 11) stated that the species is from light to dark gray above, with a whitish belly and lower parts of sides, and “caudal often with a blackish border” and “pectorals with or without a black tip.” In most specimens I have seen, the first and second dorsal fins, the pelvic fins and the anal fin had dark or dusky edges, and the pectoral fins usually had dusky or black tips on their dorsal sides, and the lower caudal lobe was dusky or black-tipped. Neonates have caudal fins with a black border, and their pectoral fins have a wide, white rear margin. The species reaches about 140 cm (Castro, in press). The 103.4-cm specimen illustrated herein has developed but uncalcified claspers, indicating that it was approaching maturity. *Carcharhinus cerdale* inhabits the eastern Pacific from the Gulf of California to Peru (Kato et al. 1967).

The most significant differences between the two species are as follows: *C. porosus* has a first dorsal fin originating over or behind the pectoral fin free rear tips. In adults, the shape of the first dorsal fin is diagnostic; its apex, origin and free rear tip make an equilateral triangle. Its fins are unmarked. By contrast, *C. cerdale* has a more anterior first dorsal fin origin, originating at about the middle of the pectoral fin inner margin. Its pectoral fins often have black tips and the caudal fin often has a black border.

These two different, allopatric species have been confused and synonymized for decades because they have similar body proportions (Table I) and somewhat similar teeth, and because few workers have apparently actually examined specimens. In this case, the first error is probably attributable to Meek & Hildebrand (1923); their statement that *C. cerdale* was found in both sides of the Isthmus of Panama engendered the errors that followed. Bigelow & Schroeder (1948) made the second error by stating that Meek & Hildebrand had synonymized *C. cerdale* and *C. porosus*. Their publication was so authoritative that the synonymy was accepted by most of the subsequent authors for more than sixty years. The accurate comments by Kato et al. (1967), published in a modest publication, were simply ignored. Current DNA analysis by Naylor et al. (in press) further demonstrates that these two allopatric forms are different and separate species.

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