

Biometric characters of cobia *Rachycentron canadum* (Linnaeus, 1766) from the Iraqi marine waters

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Abstract

The first biometric data on cobia, *R. canadum*, are reported from Iraqi marine waters. The samples were collected incidentally in March 2026, as cobia are rare in the region. The total length of the specimens collected ranged from 662 to 715 mm. The samples of cobia are distinguished by an elongate, subcylindrical body (body depth 16.94 - 18.56% SL), a broad, flattened head (head width 12.64 - 15.59% SL) and unique separate 8 -9 dorsal spines. The specimens were dark brown on the upper body, with paler brown on the sides and underside. One individual exhibits a very distinct black lateral band, which tends to fade in the others.

Keywords: Morphometric, meristic characters, *Rachycentron canadum*, Iraq.

Introduction

Cobia, *R. canadum* is the only species in the family Rachycentridae. Cobia are distributed worldwide in warm marine waters, except for the central and eastern Pacific (Froese and Pauly, 2026). First record from Arabian Gulf by Blegvad and Løppenthin (1944) as *Rhachycentrum canadus*, subsequently reported by Khalaf (1961) in Iraq. They occupy various depths in the water column and are caught in both coastal and continental shelf waters, though they are generally regarded as an offshore species. Wild-caught cobia do not form a significant commercial fishery, they are rare across their range and usually caught incidentally (FAO, 2009). Cobia is a fish species with high commercial potential, especially due to its fast growth rate. They can reach a total length of up to 200 cm and have a maximum recorded lifespan of roughly 14 years (Sajeevan and Kurup, 2017).



There is sexual size dimorphism, which favors female, indicating the possibility of a monosex culture (Shen *et al.*, 2023). Cobia is an important species in global aquaculture. Its production methods were developed in the early 1990s (Chang *et al.*, 1997). The species shows remarkable growth potential, reaching 4 to 8 kg within a year. Despite ongoing advances in aquaculture techniques, the overall global cobia aquaculture production has remained relatively slow (Benetti *et al.*, 2021).

Cobia exhibits sexual size dimorphism in adults. Female cobia display sexual shape dimorphism through an elongated body and increased space between the pectoral and anal fins, indicating morphological features linked to fecundity (Molina *et al.*, 2018). Cobia usually features 26 to 33 dorsal-fin rays. However, Cabebe-Barnuevo *et al.* (2023) discovered greater variation, with some specimens having 35 to 36 rays. They also typically possess 7 to 9 separate dorsal spines, and the anal fin contains 1 to 3 spines (Shaffer and Nakamura, 1989). The present study provides, for the first time, data on the morphometric and meristic characteristics of Cobia, *R. canadum* collected from Iraqi marine waters.

Materials and Methods

The Iraqi marine waters are situated at the northern end of the Arabian Gulf, stretching westward to Khor Abdullah and the Kuwaiti border. Their coastline measures 60 km and features trenches of varying depths, ranging from 10 to 26 m (Muttashar *et al.*, 2024). Cobia are rare in the northern Gulf region and are usually caught incidentally. Three specimens (males) of cobia, *R. canadum*, were caught in March 2026 by local fishermen using trawl nets in Iraqi marine waters (29° 46' 50" N 48° 39' 74" E). The specimens were preserved by freezing. Fish were brought to the laboratory for morphometric and meristic characterization, following Hubbs and Lagler (1958). Measurements and counts were performed on the left side of each specimen. Meristic characters included dorsal fin spines and rays, anal fin spines and rays, pelvic fin spines and rays, pectoral fin rays, and gill rakers, which were counted employing a dissecting microscope. Morphometric characters used in the analysis comprised 18 measurements to the nearest mm using a digital caliper and a fish measuring board. All measurements were expressed as percentages of the standard length.

Results

The morphometric and meristic data are reported in Tables 1 and 2, providing the first information on the biometric characters of cobia *R. canadum* from the Iraqi marine waters. The total length of the specimens ranged from 662 to 715 mm, and the standard length from 532 to 588 mm. The collected *R. canadum* specimens (Fig. 1) were characterised by an elongate, subcylindrical body (body depth 16.94 - 18.56% in standard length, body width 12.90 - 15.52%), head long, broad, depressed (head length 25.30 - 26.26%, head width 12.64 - 15.59%), a large, terminal mouth with a projecting lower jaw, and villiform teeth in the jaws. Eye small (3.03 - 3.20% SL), interorbital wide (10.56 - 11.41% SL), snout broad (10.60 - 11.25% SL). Caudal peduncle length ranged from 8.85 to

11.05% SL, and caudal peduncle depth from 5.13 - 5.55% SL. The first dorsal fin comprises 8 to 9 separate spines which are not joined by a membrane. Long second dorsal fin (45.11 - 49.32% SL), with 32 -33 rays where the anterior rays are elevated. Pectoral fin, pointed and falcate-shaped. Anal fin resembles dorsal fin but is smaller with 2 - 3 spines and 23 - 25 rays. Caudal fin lunate, with the upper lobe larger than the lower. Gill rakers short, 7-9 on lower limb of first arch. Scales small, lateral line slightly wavy anteriorly.

The colouration features a dark brown on the upper body, with paler brown on the sides and underside. A prominent lateral band runs from the snout to the base of the tail, bordered above and below by lighter bands. Beneath this, a narrower dark band is present. One specimen (662 mm TL) exhibits a very distinct black lateral band, which tends to fade in the others. Most fins are a deep or dusky brown, while the anal and pelvic fins are pale with gray or dusky markings. The ventral surface ranges from grayish white to silvery.



Figure 1: Two specimens of cobia *R. canadum* collected from Iraqi marine waters.

Table 1: Morphometric characters of cobia *R. canadum* from Iraqi marine waters.

Morphometric characters	Range	Mean $\pm$ SD
Total length (mm)	662.00 - 715.00	682.33 $\pm$ 23.33
Fork length (mm)	600.00 - 645.00	615.67 $\pm$ 20.76

Standard length (mm)	532.00 - 588.00	554.00 ± 24.39
Body depth % in SL	16.94 - 18.56	17.63 ± 0.68
Body width % in SL	12.90 - 15.52	14.02 ± 1.10
Head length % in SL	25.30 - 26.26	25.84 ± 0.40
Head depth % in SL	9.99 - 11.78	11.10 ± 0.79
Head width % in SL	12.64 - 15.59	14.03 ± 1.21
Snout length % in SL	10.60 - 11.25	10.92 ± 0.27
Eye diameter % in SL	3.03 - 3.20	3.09 ± 0.08
Interorbital distance % in SL	10.56 - 11.41	10.90 ± 0.37
Predorsal length % in SL	26.07 - 27.75	26.68 ± 0.76
Postdorsal length % in SL	8.55 - 10.83	10.02 ± 1.03
2nd Dorsal fin length % in SL	45.11 - 49.32	46.67 ± 1.88
Anal fin length % in SL	34.86 - 35.71	35.21 ± 0.36
Pectoral fin length % in SL	20.64 - 21.13	20.81 ± 0.22
Pelvic fin length % in SL	9.23 - 10.64	10.01 ± 0.58
Caudal peduncle length % in SL	8.85 - 11.05	9.91 ± 0.90
Caudal peduncle depth % in SL	5.13 - 5.55	5.38 ± 0.18

Table 2: Meristic characters of cobia *R. canadum* from Iraqi marine waters.

Meristic characters		Range
1 st Dorsal fin spine		8 - 9
2 nd Dorsal fin rays		32 - 33
Anal fin	Spine	2 - 3
	rays	23 - 25
Pelvic fin	Spine	1
	rays	5
Pectoral fin rays		18 - 20
Gill rakers on lower limb		9 - 10

Discussion

Cobia, *R. canadum* is marked by some biometric features, which include an elongated sub-cylindrical body, a broad head, and distinct lateral striping. According to morphometric and meristic analysis, there is phenotypic variability, reflecting their adaptability to diverse marine environments and importance in global fisheries (González *et al.*, 2021). The cobia's biometric profile is unique within the monotypic family Rachycentridae. Typically, counts include 7 to 9 isolated short spines on the first dorsal fin (8 - 9 in present study) and 26 to 33 soft dorsal rays (32 - 33 in present study). Cabebe-Barnuevo *et al.* (2023), however, have shown phenotypic plasticity, cobia from the Western Visayas in the Philippines exhibited variations with up to 35 to 36 dorsal-fin rays. Despite these differences, mitochondrial genetic analyses, COI sequences revealed no significant genetic divergence between these morphs. This indicates that the biometric variations are likely due to environmental adaptation or phenotypic plasticity rather than separate species. Such morphometric features are very important for distinguishing among stocks to manage fisheries sustainably (Fry and Griffiths, 2010).

Cobia exhibit noticeable colour changes throughout their life stages, influenced by environmental factors and behavioural states (Brizio *et al.*, 2015). One of the Cobia specimens collected exhibited a very distinctive black side band, which tends to fade in the other specimens. Live cobia can quickly alter the intensity of their background colouration and stripe intensity based on mood, excitement, or stress (Estrada *et al.*, 2016). According to FAO (2009), Juvenile cobia are markedly different from adults, they have bold, alternating black and white horizontal stripes from head to tail, with additional bronze, orange, and green splotches. A prominent black lateral band, as wide as the eye, runs from the snout to the caudal fin base, sharply bordered by lighter lines. Juveniles also have a rounded tail fin with long central rays. As they grow, their bright juvenile stripes and contrasting splotches diminish. The black lateral stripe becomes less distinct, blending into the uniformly dark brown back and sides. The tail fin also shifts from rounded to a concave, lunate shape.

The morphology of Cobia, *R. canadum* reflects its active, pelagic, and predatory habits. Its streamlined yet powerfully built sub-cylindrical frame, wide hydrodynamic head, and specialized fins enable it to cruise swiftly and feed opportunistically in marine ecosystems. The change in appearance and the fading of lateral stripes in mature individuals highlight an evolutionary shift from sheltered nursery areas to open-water pelagic migration (Estrada *et al.*, 2016).

Conclusions

Cobia, *R. canadum*, in Iraqi marine waters exhibits typical morphological features consistent with global populations of the species, along with specific regional growth and ecological adaptations.

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الصفات المظهرية لأسماك السكن *Rachycentron canadum* (Linnaeus, 1766) في المياه البحرية العراقية

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المستخلص

تم الإبلاغ عن أولى البيانات المظهرية لأسماك السكن *R. canadum*، من المياه البحرية العراقية. جُمعت العينات عرضيًا في آذار 2026، نظرًا لندرة أسماك السكن في المنطقة. تراوح الطول الكلي للعينات المجمعة بين 662 و715 ملم. تميزت عينات السكن بجسمها المستطيل شبه الأسطواني (عمق الجسم 16.94 - 18.56% من الطول القياسي)، ورأسها العريض المسطح (عرض الرأس 12.64 - 15.59% من الطول القياسي)، ووجود 8-9 أشواك ظهرية منفصلة وفريدة من نوعها. كان لون العينات بنيًا داكنًا في الجزء العلوي من الجسم، مع لون بني أفتح على الجانبين والبطن. يظهر على أحد الأفراد شريط جانبي أسود واضح جدًا، يميل إلى التلاشي في الأفراد الأخرى.

الكلمات المفتاحية: الصفات المظهرية، الصفات العددية، *Rachycentron canadum*، العراق.