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Corresponding author:
C. Bouguerche;
Email: chahinezbouguerche@gmail.com

New insights into two poorly known monogeneans (Platyhelminthes), gill parasites of the European barracuda *Sphyraena sphyraena* (Teleostei, Sphyraenidae) with notes on *Chauhanea* Ramalingam, 1953 and closely related genera

C. Bouguerche[1,2]

[1]Department of Zoology, Swedish Museum of Natural History, Box 50007, SE-104 05, Stockholm, Sweden and [2]Institut Systématique Évolution Biodiversité (ISYEB), Muséum National d'Histoire Naturelle, 43 rue Cuvier, CP 51, 75231 Paris Cedex 05, France

Abstract

Two poorly known parasitic Platyhelminthes were collected from the gills of the European barracuda *Sphyraena sphyraena* in the western Mediterranean. Specimens of *Chauhanea mediterranea* Euzet & Trilles, 1960 and *Rhinecotyle crepitacula* Euzet & Trilles, 1960 (Polyopisthocotyla) are redescribed based on newly collected material. A careful examination of *Ch. mediterranea* revealed inaccuracies in previous interpretations of the female openings. The midventral opening, previously referred to as the 'vaginal opening' in *Pseudochauhanea* Yamaguti, 1965 and used to distinguish this genus from *Chauhanea Ramalingam, 1953*, is demonstrated to be the uterus, as confirmed by the presence of eggs in the thin-walled duct associated with this opening. The lateral position of the cirrus and vagina is also confirmed. Consequently, *Pseudochauhanea* is synonymized with *Chauhanea*, resulting in the following new combinations: *Ch. elegans* Fuentes-Zambrano, 1997 n. comb.; *Ch. elongata* Kritsky, Bilqees & Leiby, 1972 n. comb.; *Ch. macrorchis* Lin, Liu & Zhang in Zhang, Yang & Liu, 2001 n. comb.; *Ch. mexicana* Lamothe, 1967 n. comb.; *Ch. sphyraenae* Yamaguti, 1965 n. comb. A detailed investigation of the clamp sclerites of *Ch. mediterranea* indicates that both *Chauhanea* and *Cotyloatlantica* Bravo-Hollis, 1984 share the subdivision of the basal oblique sclerite, which is a continuation of the marginal sclerite in the anterior jaw, a key feature used to distinguish these genera. As a result, *Cotyloatlantica* is also synonymized with *Chauhanea*, and its species are transferred as follows: *Ch. pretiosa* (Bravo-Hollis, 1984) n. comb. The reinstatement of *Ch. mediterranea* Euzet & Trilles, 1960 as a valid name is supported, and an amended diagnosis of *Chauhanea* is provided. Additionally, *R. crepitacula* is accurately redescribed, with a new geographical locality record and an assessment of morphometrical and anatomical variations between Mediterranean and oceanic specimens.

Introduction

Currently, the genus *Sphyraena* (barracudas) comprises 29 species worldwide (Froese and Pauly 2025), with a global distribution traversing temperate and tropical regions. In Mediterranean waters, the genus *Sphyraena* encompasses four species: the lessepsian *S. chrysotaenia* (Klunzinger, 1884) and *S. flavicauda* Rüppell, 1838, and the Atlantic–Mediterranean species *S. sphyraena* (Linnaeus, 1758) and *S. viridensis* (Cuvier & Valenciennes, 1829) (Pastore 2009). The European barracuda, *S. sphyraena*, is a widespread species, occurring in the eastern Atlantic (Bay of Biscay to Angola), including the Mediterranean and Black Sea, Canary Islands, and Azores (Ferri and Brzica 2022). In the western Mediterranean, different parasitic taxa had been reported on this fish: Nematoda, Cestoda, Isopoda, Copepoda (Boussellaa *et al.* 2018), Digenea (Boussellaa *et al.* 2018; Looss 1899), and Monogenea (Bouguerche 2019; Boussellaa *et al.* 2018; Euzet and Trilles 1960; Ktari 1971; Neifar, 1995; Radujkovic and Euzet 1989).

To date, two polyopisthocotylan Monogenea have been reported from *S. sphyraena* in the western Mediterranean: the chauhaneid '*Chauhanea mediterranea*' Euzet & Trilles, 1960 (Chauhaneidae) (Bouguerche 2019; Euzet and Trilles 1960; Ulmer and James 1981) (currently accepted as *Cotyloatlantica mediterranea* (Euzet & Trilles, 1960) (Bravo-Hollis, 1984); and the rhinecotylid *Rhinecotyle crepitacula* Euzet & Trilles, 1960 (Bouguerche 2019; Euzet and Trilles 1960). These two species had been scarily mentioned or investigated since their original description. *Chauhanea mediterranea* remains an intriguing species due to its reclassification across multiple genera (Bravo-Hollis 1984; Euzet and Trilles 1960; Lebedev 1969), underscoring the challenges and

complexities associated with defining its taxonomic boundaries. Initially described from *S. sphyraena* in the Mediterranean and assigned to *Chauhanea* (Euzet and Trilles 1960), it was later reclassified into *Pseudochauhanea* (Yamaguti, 1965) based on the position of the vagina (Lebedev 1969). However, Ulmer and James (1981) corrected previous misinterpretations of the female openings, showing that the median transverse opening, referred to as the vagina (Euzet and Trilles 1960), contained eggs within the associated duct, positioned in a way that suggests their emergence through this opening, indicating that it functions as a uterine opening. This reinterpretation of the position of the vagina blurred the distinctions between these genera. The creation of *Cotyloatlantica* (Bravo-Hollis 1984) further complicated the taxonomy, highlighting the difficulties in using morphological traits to clearly define genus boundaries (Bravo-Hollis 1984). The second conspecific species occurring on *S. sphyraena*, *R. crepitacula* described off Sète, France, Western Mediterranean (Euzet and Trilles 1960) is only known from a redescription from specimens from a distinct host, *S. piscatorum* Cadenat, 1964 and from a distinct locality, Ivory Coast, Eastern Central Atlantic Ocean (Euzet and Wahl 1970).

During a parasitological study of polyopisthocotylans from *S. sphyraena* in the western Mediterranean, representatives of *Ch. mediterranea* and *R. crepitacula* were collected. Both species are redescribed and illustrated based on newly collected specimens, with novel morphometrical and anatomical data provided. An examination of the internal anatomy and of the organization of clamp sclerites led to a revision of the systematic status of the genera *Chauhanea* Ramalingam, 1953; *Pseudochauhanea* Yamaguti, 1965 and *Cotyloatlantica* Bravo-Hollis, 1984.

Materials and methods

A total of 35 specimens of *S. sphyraena* were examined for gill parasites. Fish were collected by local fishermen from off the coast of Tamentfoust, Algeria (Division 37.1.1, Western Mediterranean Sea). Fish were stored on ice and transferred to the laboratory shortly after capture. Fish were identified using keys (Fischer *et al.* 1987). Fish were dissected fresh on the day of purchase, and the gills were investigated for parasites. Gill arches were removed, separated by incision, placed in petri dishes filled with sea water, and thoroughly examined for the presence of parasites under a dissecting stereomicroscope. Specimens of Polyopisthocotyla were fixed in near-boiling saline and preserved immediately in 70% ethanol. Polyopisthocotylans were stained with acetic carmine, dehydrated using a graded ethanol series (70, 96, and 100% for 15 min each), cleared in clove oil, and mounted in Canada balsam (Bouguerche 2019). Polyopisthocotylans were identified on stained whole mounts. Drawings were made through a Nikon Eclipse i80 microscope (Nikon Eclipse Ni, Nikon, Tokyo, Japan) with DIC (differential interference contrast) and a drawing tube. Drawings were scanned and redrawn on a computer with Adobe Illustrator (Adobe Inc., San Jose, CA, USA). Measurements of whole mounts are in micrometers and indicated as the range followed by the mean. For high-level terminology of parasites, the systematics of Brabec *et al.* (2023) who elevated the former subclasses of 'Monogenea' to the level of classes is followed herein.

Results

Class Polyopisthocotyla Brabec, Salomaki, Kolísko, Scholz, Kuchta and 2023

Family Chauhaneidae Euzet & Trilles, 1960

Genus *Chauhanea* Ramalingam, 1953

Chauhanea mediterranea Euzet & Trilles, 1960 (Figures 1–4)

Synonyms: *Cotyloatlantica mediterranea* (Euzet & Trilles, 1960) (Bravo-Hollis, 1984). *Pseudochauhanea mediterranea* (Euzet & Trilles, 1960) (Lebedev, 1969).

Type-host: *Sphyraena sphyraena* (Linnaeus, 1758), the European barracuda (Sphyraenidae) (Euzet & Trilles, 1960).

Type locality: Sète, France, Western Mediterranean (Euzet and Trilles 1960).

Other localities: Central Mediterranean: Montenegro (Radujkovic and Euzet 1989). Western Mediterranean: France (Euzet and Trilles 1960); Tunisia (Boussellaa *et al.* 2018; Ktari 1971; Neifar 1995). Tamenfoust, Algeria, present study.

Redescription

Based on 20 mature whole mounts. Morphometric data is presented in Table 1. Body elongated, with a visible constriction at a short distance from anterior end (Figure 1a). Haptor leaf-shaped, triangular, slightly asymmetrical, bearing 28 to 32 pedunculated clamps (Figure 1b): 17 to 19 on the right side and 11 to 15 on the left. Clamps *Gastrocotyle* type (Figure 1c).

Clamps formed by two jaws, anterior (Figure 2a) and posterior jaw (Figure 3b), supported by sub-peripheral marginal sclerites *S.m.* Proximally, marginal sclerites *S.m.* fold back and continued by basal oblique piece *P.o.* and an intermediate piece *P.i.* Anterior jaw with several ventral sclerosed costiform structures *E.c.* Costiform structures *E.c.* less numerous in posterior jaw (Figure 1c). Jaws connected by a central U-shaped piece, sagittal sclerite *S.s.* Ventral arm of sagittal sclerite *S.s.* longer. Proximally, sclerite *S.s.* widening

Table 1. Comparative morphometric data for *Cotyloatlantica mediterranea* (Euzet & Trilles, 1960)

Host	*Sphyraena sphyraena*		
Locality	Sète, France, WM	Montenegro, Adriatic, CM	Tamentfoust, Algeria, WM
Sources	Euzet & Trilles (1960)	Radujkovic & Euzet (1989)	Present study
Body proper length	4000–5000	4000–5000	5000–6500 (315)
Haptor length		1500–2000	1350–1990 (1855)
Total length		5500–7000	5900–7405 (7100)
Body width	1500–2000	800–1000	730–990 (950)
Clamps number	28–34	28–34	27–35 (32)
Clamps	90 ×100		75–90 (88) × 98–112 (100)
Oral suckers	50 × 30	50 × 30	42–50 (48) × 28–35 (30)
Pharynx	75×50		50–72 (70) × 40–54 (52)
Testes number	45–50	45–50	47–52 (48)

Abbreviations: CM, Central Mediterranean. WM, Western Mediterranean

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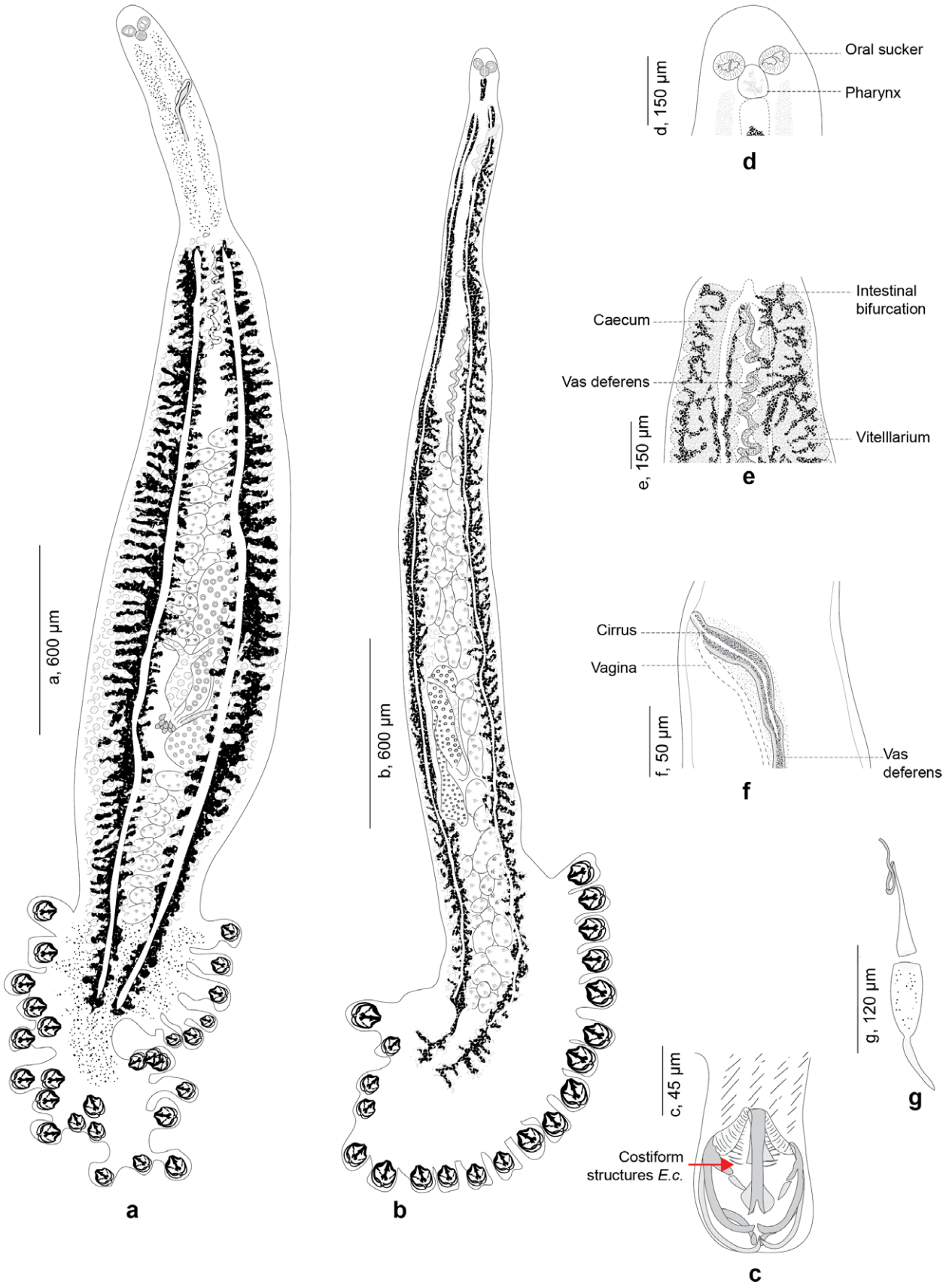

Figure 1. *Chauhanea mediterranea* Euzet & Trilles, 1960 ex *Sphyraena sphyraena.* (a), whole body; (b), whole body showing the possible slender appearance; (c), clamp, ventral view; (d), anterior end showing septate oral suckers; (e), anterior part showing intestinal bifurcation; (f), cirrus and vagina; (g), egg.

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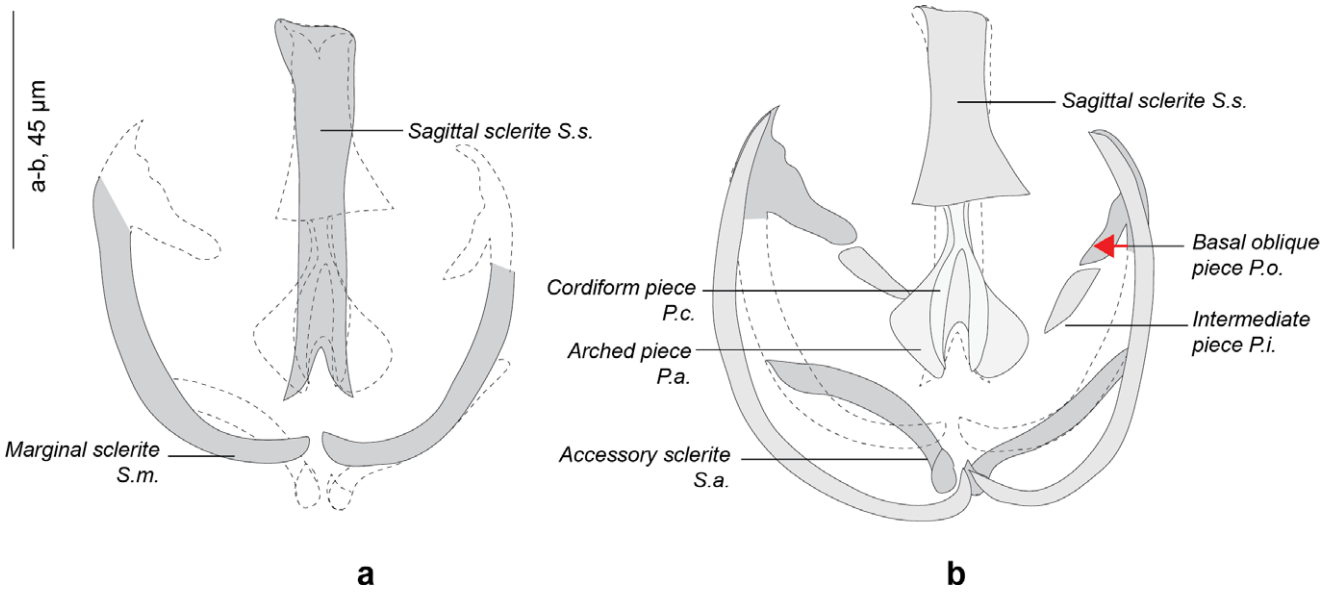

Figure 2. *Chauhanea mediterranea* Euzet & Trilles, 1960 ex *Sphyraena sphyraena*, disposition of clamp sclerites. (a), ventral jaw; (b), dorsal jaw.

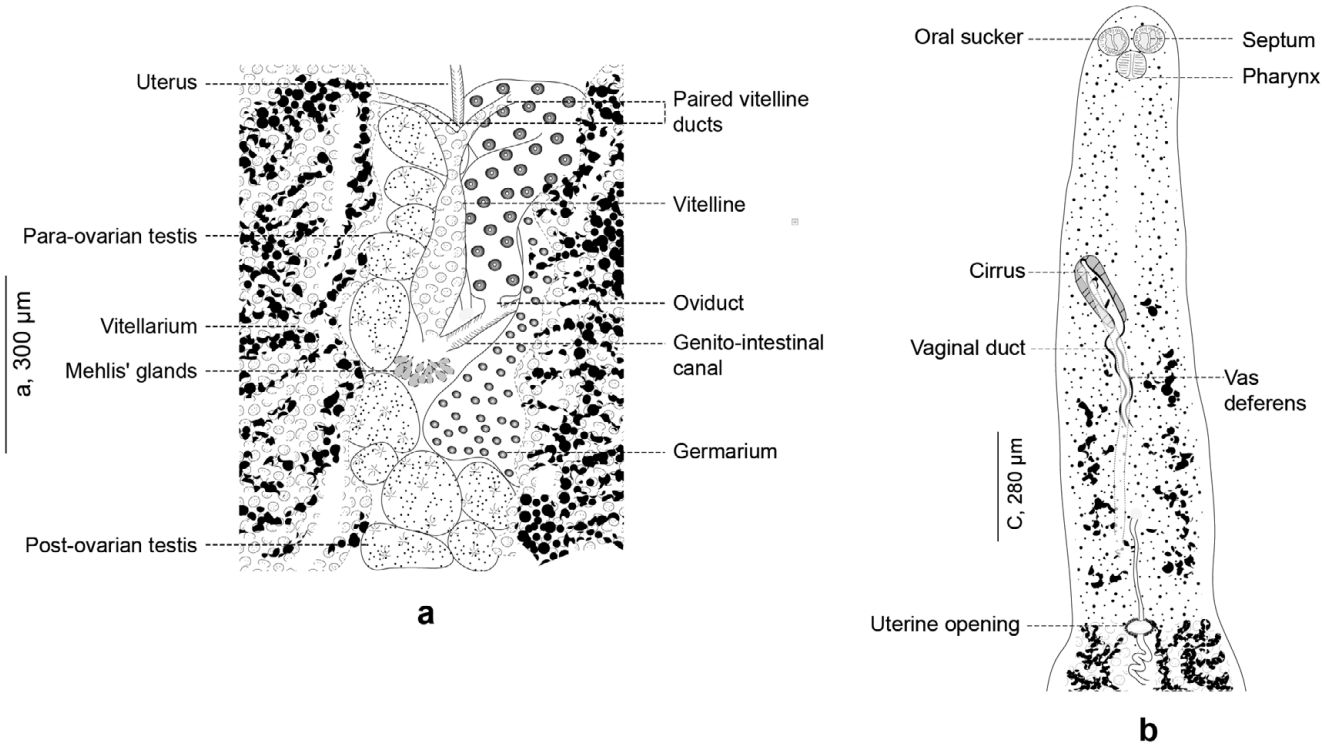

Figure 3. *Chauhanea mediterranea* Euzet & Trilles, 1960 ex *Sphyraena sphyraena.* (a), detail of the reproductive organs in the region of ovary, ventral view; (b), anterior end showing genital openings.

and passing into posterior jaw. Dorsal arm of sagittal sclerite *S.s.* short and wide. Posterior jaw with two accessory sclerites *S.a.*; and articulating two superimposed pieces, a cordiform piece *P.c.* and an arched piece *P.a.* articulated on the base of dorsal arm of sagittal sclerite *S.s.*

Mouth ventral, opening anteriorly. Oral suckers paired, opening on either side of oral cavity, elongated (Figure 1d). Pharynx muscular, median, followed by esophagus, which bifurcates into two caeca (Figure 1e). Caeca extending on either side of body to posterior part of haptor; with numerous transverse diverticula and not confluent posteriorly.

Testes numerous, 47–52 (48) in number, arranged in 3 groups: first group anterior to ovary, made up of testes arranged on either side of midline; second made up of para-ovarian testes, located on right side of midline and descending parallel to ovary; 3rd group represented by a batch of post-ovarian testes extending to anterior third of haptor. Vas deferens sinuous, continuing anteriorly to emerge, on left side of body, into a fusiform unarmed muscular

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cirrus (Figure 1f); cirrus asymmetrical, muscular, enclosed in a cirrus pouch.

Germarium voluminous, located on left side of the body, originating in a posterior mass, then ascending to form an anterior loop (Figure 3a). It descends and narrows into an oviduct in median region. Oviduct receiving genito-intestinal canal, which passes beneath the germarium and terminates in the left branch of the digestive tract. Oviduct then receiving vitelline reservoir. Uterus almost rectilinear, extending anteriorly, opening ventrally at anterior constriction of body through an oval pore (Figure 3b). Vitelline follicles highly developed, extending from genital pore and penetrating the haptor. Vitelline ducts Y-shaped, paired vitelline ducts long, joining in midline. Vagina opening into genital atrium lateral to cirrus. Eggs fusiform, with 2 filaments: anterior one and a shorter posterior one (Figure 1g).

Remarks

The organization of the clamps sclerites was investigated herein. *Cotyloatlantica mediterranea* shares with *Co. pretiosa* Bravo-Hollis, 1984 the subdivision of the basal oblique sclerite (*P.o.*), which is a continuation of the marginal sclerite (*S.m.*) in the anterior jaw of the clamps. Proximally, the marginal sclerites (*S.m.*) fold back and continue as a basal oblique piece (*P.o.*) and an intermediate piece (*P.i.*) (Figure 4). As this feature was previously used to distinguish *Cotyloatlantica* from *Chauhanea* and *Pseudochauhanea*, and since this sclerite organization was confirmed in *Ch. mediterranea*, *Cotyloatlantica* is synonymized with *Chauhanea*. Given that *Chauhanea* has priority over *Cotyloatlantica* (1953 vs. 1984), species of *Cotyloatlantica* are transferred to *Chauhanea* (see Discussion for the resulting new combinations). Therefore, *Ch. mediterranea* is used from this point onwards.

Inaccuracies in previous interpretations of the female openings of *Ch. mediterranea* are also highlighted herein. The anterior median transverse opening at the level of the body constriction, previously referred to as the vagina, is associated with a thin-walled duct containing eggs, indicating that it corresponds to the uterine aperture. A lateral position of both the cirrus and the vaginal opening is confirmed. Since the primary character used to distinguish *Chauhanea* from *Pseudochauhanea* – the midventral opening previously misidentified as the vagina – was actually a misinterpretation of the uterine opening, the distinction between these two genera is no longer valid. Consequently, synonymization of *Chauhanea* and *Pseudochauhanea* is proposed. Given that *Chauhanea* has priority over *Pseudochauhanea* (1953 vs. 1965), species of *Pseudochauhanea* are transferred to *Chauhanea* (see Discussion for the resulting new combinations).

The differences between the previous description and our observations justify the need to amend the diagnosis of the genus: uterine opening median, vaginal opening lateral, and clamps with subdivision of the basal oblique sclerite as a continuation of the marginal sclerite of the anterior jaw.

Chauhanea Ramalingam, 1953

Amended generic diagnosis

Chauhaneidae. Body lanceolate, without stalk for haptor. Haptor asymmetrical, not delineated from body proper, with numerous clamps of *Gastrocotyle* type; terminal lappet and terminal anchors absent. Oral suckers paired, muscular, septate or aseptate. Ceca with numerous diverticula, occasionally extending into haptor, and terminating separately at or near posterior end of haptor. Testes numerous, pre-, para-, and post-ovarian. Cirrus pouch present; cirrus unarmed, may or may not protrude into genital atrium;

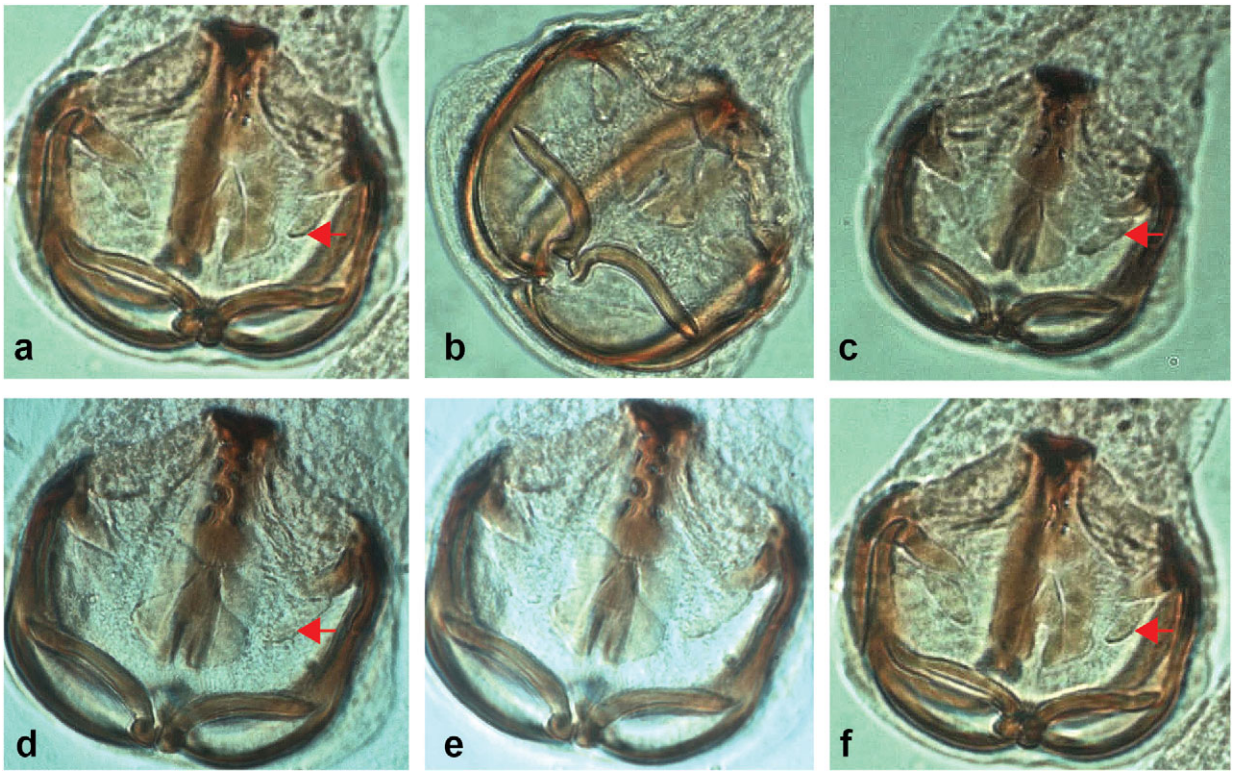

Figure 4. Micrographs of clamps of *Chauhanea mediterranea* Euzet & Trilles, 1960 ex *Sphyraena sphyraena*, showing the clear subdivision of the basal oblique piece *P.o.* (arrows).

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genital pore submarginal. Germarium complex, in mid-region of body. Vagina unarmed, opening laterally. Uterine opening post-bifurcal opening, mid-ventrally. Eggs elongate, filamented at both ends. Vitellaria co-extensive with caeca except for their posterior-most portion. Gill parasites of marine teleosts.
Type species: *Chauhanea madrasensis* Ramalingam, 1953, on *Sphyraena acutipinnis* off Chennai, India, Eastern Indian Ocean (Ramalingam 1953).

Family Rhinecotylidae Lebedev, 1979

Genus *Rhinecotyle* Euzet & Trilles, 1960

Rhinecotyle crepitacula *Euzet & Trilles, 1960* (*Figures 5–6*)

Type-host: *Sphyraena sphyraena* (Linnaeus, 1758), the European barracuda (Sphyraenidae) (Euzet and Trilles 1960).

Type locality: Sète, France, Western Mediterranean (Euzet and Trilles 1960).

Other hosts: *Sphyraena piscatorum* Cadenat, 1964, the Guinean barracuda (Sphyraenidae) (Euzet and Wahl 1970).

Other localities: Lagune Ebrié, Ivory Coast, Eastern Central Atlantic Ocean (Euzet and Wahl 1970). Tamenfoust, Algeria, Western Mediterranean, present study.

Redescription

Based on 14 mature whole mounts. Morphometric data is presented in Table 2. Body elongated, terminating posteriorly by a broad haptor (Figure 5a). Body flattened dorso-ventrally. Haptor separated from body proper by a slight constriction, oblong, with a characteristic shape of a 'spoon' as defined by Euzet and Trilles (1960); its ventral concavity divided by a longitudinal septum and a series of transverse muscular septa, giving the appearance of two parallel rows of loculi. Haptor marked by two rows of loculi, bearing numerous clamps arranged in two series: anterior (Figure 5b) and posterior clamps (Figure 5c) highly dissimilar.

Clamps of anterior series relatively small, consisting of two jaws: anterior jaw and posterior jaw. Anterior jaw (Figure 5d) with a median piece *a1*. On proximal side, *a1* terminating in T-shape. Distally, median piece *a1* curving into *a2*, which passes into posterior jaw. Anterior jaw supported by two blade-like lateral sclerites *b1*. Proximally, sclerites *b1* curving and forming a short extension into posterior jaw. In posterior jaw (Figure 5e), sclerite *a2* continuing into a lateral expansion *a3* which ends in two lobed expansions forming a shallow V. Below *a3*, a relatively long posterior median piece *f* is articulated. Posterior jaw supported by two lateral sclerites *c*.

Clamps of posterior series larger. Anterior jaw (Figure 5f) with a long median sclerite *a*. On distal side, median sclerite *a* ending in a pronounced T-shape. Anterior jaw supported by two lateral sclerites *b*, forming a semicircle in anterior and posterior halves of clamps. The two semicircles separated by a shallow curvature. A slight asymmetry is due to the degree of curvature and length of these sclerites. On proximal side, sclerites *b* curving into posterior jaw. Posterior jaw (Figure 5g) narrower than anterior jaw. On proximal side and the midline, a long sclerite *f* articulating on median sclerite *a*. Posterior jaw supported by two lateral sclerites *c*. In anterior half of clamp, sclerites *c* more or less parallel to median sclerite *a*; in posterior half of clamp, lateral sclerites *c* forming a semicircle.

Mouth ventral, sub-terminal mouth. Oral suckers paired, muscular, opening laterally, transversely elongated; ventrally, each sucker subdivided by three septa into four subequal chambers; edges of oral suckers lined with tiny papillae (Figure 6a). Pharynx muscular, globular, opening mid-ventrally. Oesophagus short. Intestinal bifurcation pre-atrial. Caeca with numerous lateral and axial diverticula; extending on either side of body reaching the haptor; caeca not confluence posteriorly.

Testes distributed in intercaecal space of posterior quarter of body, irregular in shape, superposed and often obscured by vitelline follicles. Vas deferens paired, wide and sinuous, extending up the midline to anterior end, opening at base of genital atrium. Genital atrium spherical, with muscular walls, opening dorsally. Genital atrium armed with small hooks (Figure 5h), arranged in three groups: an anterior semicircle of 9 to 11 small tight spines; a second group of 9 to 10 large spines. Male opening in the atrial lumen by a seedling of few slightly curved pointed spines.

Germarium dorsal, complex, folded on itself, located in intercaecal space of posterior third of body (Figure 6b). Oviduct crossing part of germarium and receiving vitelline reservoir on midline. Genito-intestinal canal projecting right caecum. Uterus dorsal, rising medio-longitudinally and opening in genital atrium. Vitelline follicles well-developed delimiting caeca laterally and terminating at posterior end of the body. Vitelline ducts Y-shaped, paired vitelline ducts long. Vagina absent. Eggs Spindle-shaped with two unequal polar filaments (Figure 5i).

Discussion

Chauhanea mediterranea *Euzet & Trilles, 1960*

The newly collected specimens of *Chauhanea* correspond morphometrically to the data on *Ch. mediterranea* reported in the literature off Sète, France (Euzet and Trilles 1960), and off Naples, Italy (Ulmer and James 1981). Comparative measurements revealed no significant differences between our material and that described by the previously mentioned authors, suggesting the presence of a single species in the western Mediterranean.

Chauhanea mediterranea was first described from the gills of *S. sphyraena* from the French coast, western Mediterranean by Euzet and Trilles (1960), who assigned it to the genus *Chauhanea.* The latter was created by Ramalingam (1953) to accommodate *Ch. madrasensis* Ramalingam, 1953 from the Sharpfin barracuda *S. acutipinnis* off Chennai (referred to as 'Madras'), India, Eastern Indian Ocean. It was subsequently placed in the genus *Pseudochauhanea* (Lebedev 1969), created to accommodate *P. sphyraenae* Yamaguti, 1965 from the great barracuda *S. barracuda* off Hawaii, Eastern Central Pacific (Yamaguti 1965); then in the genus *Cotyloatlantica*, created to accommodate *C. pretiosa* from *S. barracuda* and the Guachanche barracuda *S. guachancho*, off Mexico, Western Central Atlantic (Bravo-Hollis 1984).

Pseudochauhanea was distinguished from *Chauhanea* based on the position of the vagina, considered median and transverse at the level of the body constriction in *Pseudochauhanea* vs. lateral in *Chauhanea* (Yamaguti 1965). However, Ulmer and James (1981) highlighted inaccuracies in previous interpretations of the female openings of *Ch. mediterranea*, as the individual median transverse opening at the level of the body constriction was referred to as the vagina (Euzet and Trilles 1960), while eggs were seen within the duct associated with this median opening and were in such a position to indicate their emergence through (Ulmer and James 1981). This observation is herein deep-rooted, as the thin-walled duct leading to the aforementioned median aperture indeed contained eggs, and thus, it is confirmed that the uterus opens medio-ventrally. Hence, the median aperture considered by Yamaguti

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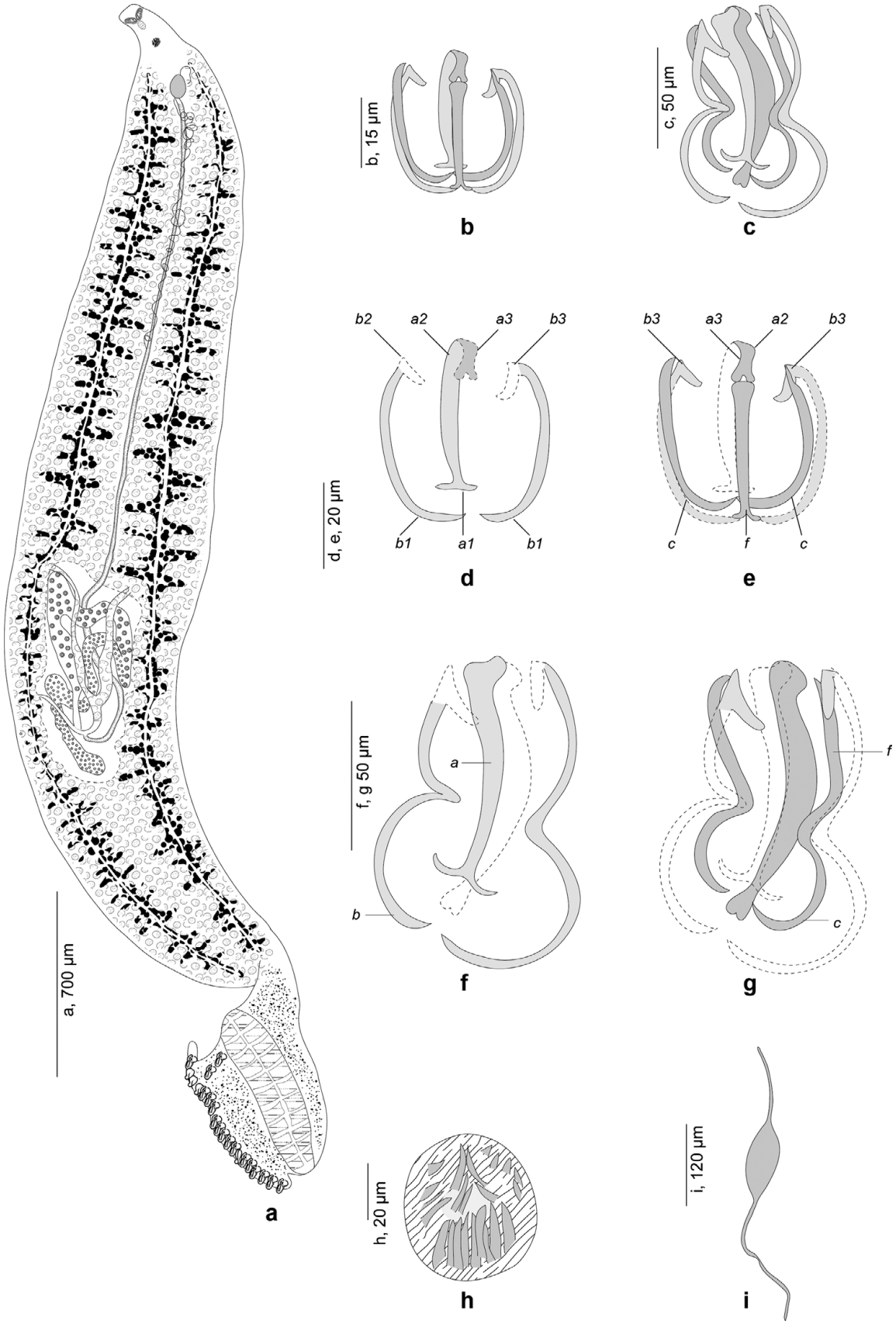

Figure 5. *Rhinecotyle crepitacula* Euzet et Trilles, 1960 ex *Sphyraena sphyraena.* (a), whole body; (b), anterior small clamp; (c), posterior large clamp; (d, e), disposition of sclerites in ventral (d) and dorsal (d) jaw in anterior small clamps; (f, g), disposition of sclerites in ventral (f) and dorsal (g) jaw in posterior large clamps; (h), genital atrium; (i), egg.

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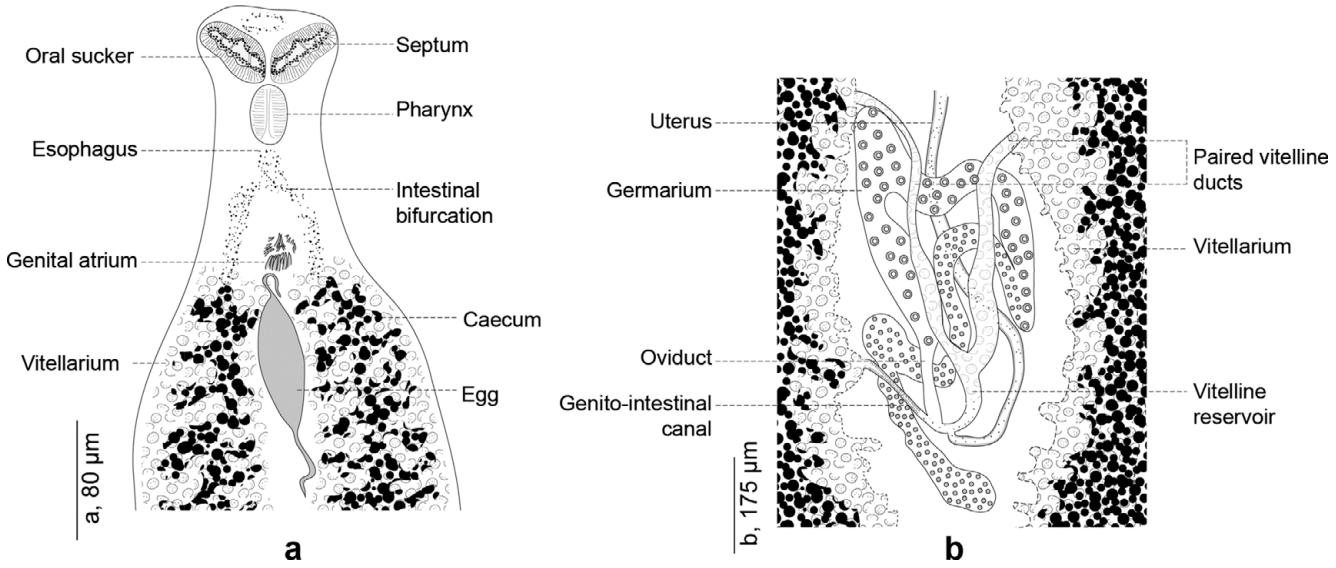

Figure 6. *Rhinecotyle crepitacula* Euzet et Trilles, 1960 ex *Sphyraena sphyraena.* (a), anterior end showing genital atrium; (b), detail of the reproductive organs in the region of the ovary.

Table 2. Comparative morphometric data for *Rhinecotyle crepitacula* Euzet & Trilles, 1960

Host	*Sphyraena sphyraena*	*S. piscatorum*
Locality	Alegria, WM.	Ivory Coast, ECA.
Sources	Present study	Euzet & Wahl (1970)
Total length	2800–5500	2500–5000
Body width	620–1150	500–1000
Front-series clamps number	20–32	18–22
Front-series clamps	34–48 × 55–65	30–45 × 50–60
Posterior series clamps number	14–26	12–20
Posterior series clamps	115–145× 55–90	110–130 × 50–80
Oral suckers	55–75 × 33–48	50–80 × 30–50
Pharynx	42–58	45–60

Abbreviations: ECA, Eastern Central Atlantic. WM, Western Mediterranean

(1965) to be a vaginal opening is, in fact, a uterine opening. Additionally, the lateral position of the cirrus and the opening of the vagina of the examined specimens herein agree with those described by Ulmer and James (1981) for *Ch. mediterranea* and especially with those by Ramalingam (1953) for *Ch. madrasensis*. The midventral opening referred to as the vagina by Yamaguti (1965) in *Pseudochauhanea* is, in fact, the uterus. Since the primary character used to distinguish *Chauhanea* from *Pseudochauhanea* was based on a misinterpretation of the uterine opening, the distinction between these two genera is no longer valid. Consequently, *Chauhanea* and *Pseudochauhanea* are considered synonyms. Given that *Chauhanea* has priority over *Pseudochauhanea* (1953 vs. 1965), *Pseudochauhanea* species are transferred to *Chauhanea*, with the following new combinations: *Ch. elegans* Fuentes-Zambrano, 1997 n. comb.; *Ch. elongata* Kritsky, Bilqees & Leiby, 1972 n. comb.; *Ch. macrorchis* Lin, Liu & Zhang in Zhang, Yang & Liu, 2001 n. comb.; *Ch. mexicana* Lamothe, 1967 n. comb.; *Ch. sphyraenae* Yamaguti, 1965 n. comb.

In this study, the organization of the clamps of *Ch. Mediterranea* was investigated for the first time, and the latter species shares with *Co. pretiosa* Bravo-Hollis, 1984 the subdivision of the basal oblique sclerite *P.o.*, which is the continuation of the marginal sclerite *S.m.* of the anterior jaw of the clamps, along a cordiform piece *P.c.* and an arched piece *P.a.*, articulated on the distal end of the sagittal sclerite *S. s.* of the posterior jaw of the clamps. The previously mentioned criteria were used to distinguish the genus *Cotyloatlantica* from *Pseudochauhanea* and from *Chauhanea* sensu Euzet and Trilles (1960). This sclerites organization has been confirmed herein in *Ch. mediterranea*, leading to the synonymization of *Cotyloatlantica* and *Chauhanea*. Similarly, since *Chauhanea* has priority over *Cotyloatlantica* (1953 vs. 1984), *Cotyloatlantica* species are transferred to *Chauhanea*, with the following new combinations: *Ch. mediterranea* Euzet & Trilles, 1960 n. comb. and *Ch. pretiosa* (Bravo-Hollis, 1984) n. comb.

Rhinecotyle crepitacula *Euzet & Trilles, 1960*

Herein, a simultaneous occurrence of *Ch. mediterranea*, found coexisting on the gills of its host *S. sphyarena* alongside another polyopisthocotylan species *R. crepitacula*, is reported. The attribution of the newly collected specimen to the genus *Rhinecotyle* Euzet & Trilles, 1960 was straightforward due to distinctive morphological features of the haptor examined herein. The possession of an oblong haptor with a ventral concavity divided by a longitudinal septum and an additional series of transverse muscular septa, creating the appearance of two parallel rows of loculi, are unique features for the genus *Rhinecotyle* (Euzet and Trilles 1960; Euzet and Wahl 1960).

This dual parasitic occurrence is not unusual within Polyopisthocotyla. In previous studies in the western Mediterranean, up to four species were encountered on the sparid host, the bogue *Boops boops* (Linnaeus, 1758): the microcotylid *Microcotyle isyebi* Bouguerche, Gey, Justine & Tazerouti, 2019; the gastrocotylid *Pseudaxine trachuri* Parona & Perugia, 1890; and the diclidophorids *Cyclocotyla bellones* Otto, 1823 occurring simultaneously on their sparid host *B. boops*

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(Bouguerche *et al.* 2019b, 2019c; Bouguerche *et al.* 2020; Bouguerche *et al.* 2021a; Bouguerche *et al.* 2022), along with an undescribed species of *Choricotyle* (Diclidophoridae). Similarly, the Atlantic horse mackerel *Trachurus trachurus* (Linnaeus, 1758) hosts three gastrocotylids, *P. trachuri*, *Gastrocotyle trachuri* van Beneden & Hesse, 1863; *Allogastrocotyle bivaginalis* Nasir & Fuentes Zambrano, 1984; and the heteraxinids *Cemocotyle trachuri* Dillon & Hargis, 1965 (Bouguerche *et al.* 2019; Bouguerche *et al.* 2021b). Hence, despite their small size sometimes, fish hosts still accomplish their role as a shared ecological niche.

The genus *Rhinecotyle* was created by Euzet and Trilles (1960) with the type species *R. crepitacula* collected from the gills of *S. sphyraena* off Sète, France, Western Mediterranean. At present, this genus is bispecific and exclusively related to the Sphyraenidae with *R. crepitacula* (see below for hosts) and *R. deloyai* Bravo-Hollis, 1980 from *S. barracuda* (Edwards, 1771) (Bravo-Hollis 1980). *Rhinecotyle crepitacula* was redescribed based on specimens from a distinct host, *S. piscatorum* Cadenat, 1964 in the Ivory Coast, Eastern Central Atlantic Ocean. The Mediterranean specimens (off Algeria) examined herein differed from the Atlantic specimens (off Ivory Coast) by the front-series clamps number (16–32 vs. 18–22), the posterior series clamps number (14–26 vs. 12–20), by having smaller front-series clamps (34–48 × 55–65 vs. 30–45 × 50–60), and smaller posterior series clamps (115–145× 55–90 vs. 110–130 × 50–80). Most importantly, the Mediterranean specimens of *R. crepitacula* examined herein differed from the Atlantic populations from a different host by having fewer spines in the genital atrium. Hence, although *R. crepitacula* was previously considered to be a transatlantic species (Euzet and Wahl 1970), the conspecificity of the Mediterranean and Atlantic populations should be investigated further. Herein, as our *Rhinecotyle* specimens were collected from the type-host *S. sphyraena* and given the proximity of the geographic location (Algeria, Western Mediterranean, 775 km from the type locality Sète, France), a conservative position was taken in ascribing the specimens to *R. crepitacula*. Algeria and North Africa represent new locality records for this parasite. Future studies will likely reveal that the Atlantic *R. crepitacula* population, described on a distinct host (*S. piscatorum*) and from a different locality (Ivory Coast, Eastern Central Atlantic Ocean) (Euzet and Wahl 1970), corresponds to a different species.

Authors' contribution. CB conducted experiments, collected and analysed data, prepared figures, wrote and edited the manuscript.

Availability of data and materials. All data and materials are freely available.

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Ethical standard. All applicable institutional, national, and international guidelines for the care and use of animals were followed.

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