

Bathyraja cousseauae sp.n.: A New Softnose Skate from the Southwestern Atlantic (Rajiformes, Rajidae)

JUAN MARTÍN DÍAZ DE ASTARLOA AND EZEQUIEL MABRAGAÑA

A new species of softnose skate, *Bathyraja cousseauae*, is described from two adult and 19 juvenile specimens collected from different localities of the southwestern Atlantic. *Bathyraja cousseauae* is distinguished from all other southwestern Atlantic softnose skate species by its color pattern, squamation pattern of dorsal surface, lack of interspace between dorsal fins, and clasper morphology. The new species has a round pale area ocellus-like, margined with dark brown on posterior part of each pectoral base of dorsal surface, paler and dark spots over the disk, a continuous row of 21–27 median thorns from nuchal region to first dorsal fin and upper side of disc densely covered with dermal denticles. Males have rod-shaped claspers not expanded at proximal section of glans as it does in *Bathyraja brachyurops*. Besides the external morphological features, skeletal characteristics (neurocranium, scapulocoracoids, and claspers) are also described and illustrated here.

Una nueva especie de raya de hocico blando, *Bathyraja cousseauae*, es descrita sobre la base de dos ejemplares adultos y 19 ejemplares juveniles capturados en diferentes localidades del Atlántico suroccidental. *Bathyraja cousseauae* se distingue de otras especies de rayas de hocico blando del Atlántico suroccidental por su patrón de coloración, patrón de espinulación de la superficie dorsal, ausencia de espacio entre las aletas dorsales y por la morfología del cláspers. La nueva especie presenta una mancha pálida ocelar rodeada de un anillo marrón oscuro en la parte posterior de la base de cada aleta pectoral en la superficie dorsal, manchas pálidas y oscuras dispersas sobre el disco, una hilera continua de 21 a 27 espinas mediales desde la región nuchal a la primera aleta dorsal y el lado superior del disco densamente cubierto de denticulos dérmicos. Los machos presentan cláspers en forma de vara no expandidos en la región proximal como sí ocurre en *Bathyraja brachyurops*. Además de los aspectos morfológicos, también se describen e ilustran las características osteológicas (neurocráneo, escápulocoracoides y cláspers).

THE rajid genus *Bathyraja* Ishiyama is circumglobal and the most diverse among all genera of skates (Ishihara and Ishiyama, 1986). Species of this genus occur mainly in shelf waters at temperate and cold temperate latitudes and on continental slopes down to the deep-sea plains. More than 40 nominal species are known (Ishihara and Ishiyama, 1986; Stehmann, 1986). Compagno (1999) recognized 41 valid species and at least two undescribed species worldwide. However, he assigned some species, previously situated in the genus *Bathyraja* by several authors (Menni et al., 1984; Stehmann, 1986; McEachran and Dunn, 1998) to *Rhinoraja* Ishiyama. The genus is represented in the southwestern Atlantic by 10 species (Stehmann, 1986), seven of which are endemic on the Argentinean continental shelf (Menni and Stehmann, 2000). Species of *Bathyraja* have been a dominant proportion of the by-catch in target fisheries for bony fishes on the southwestern Atlantic shelf and at present are increasingly exploited as target species, since tra-

ditional bony fish stocks for the commercial fisheries became drastically depleted. Herein we describe a new species of *Bathyraja* from the southwestern Atlantic.

MATERIALS AND METHODS

Specimens examined were collected by the R/Vs CAPITÁN OCA BALDA and DR. EDUARDO HOLMBERG of the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP), and by the F/V FEIXE of Uruguay, from different localities of the southwest Atlantic. Methods for making measurements and counts follow Hubbs and Ishiyama (1968) and Ishihara and Ishiyama (1985). Two specimens of the new species (a male and a female) were dissected to examine the skeletal structures (neurocranium, scapulocoracoids, and clasper). Measurements of the neurocranium and scapulocoracoids were made according to Hubbs and Ishiyama (1968), and McEachran and Compagno (1979). Clasper terminology follows Stehmann (1970), Hulley

(1972) and Ishihara and Ishiyama (1985), and cranium terminology follows Hulley (1972). The holotype and one of the paratypes were radiographed to verify skeletal observations based on dissections and to count vertebrae and both pectoral and pelvic radials. The holotype and 19 paratypes are deposited in the fish collection of the Instituto Nacional de Investigación y Desarrollo Pesquero, Mar del Plata, Argentina (INI-DEP). One paratype is housed in the fish collection of the Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay (ZVC-P).

Bathyraja cousseauae, sp. nov.

Figure 1, Appendix 1

Holotype.—INIDEP 719, 617 mm TL, juvenile male, off northern Patagonian continental shelf, 41°21'S, 57°25'W, 141 m, 2. x. 2001, R/V DR. EDUARDO HOLMBERG, cruise H-08/01, sta. 31.

Paratypes.—INIDEP 720, 550 mm TL, juvenile male, 720 mm disc width (tail broken), mature female, 750 mm TL, immature female, south Malvinas Islands, 52°52'S, 60°15'W, 277 m, R/V CAPITÁN OCA BALDA, cruise OB-11/00, sta. 4, 13. x. 2000; INIDEP 721, 695 mm disc width (tail broken), mature male, 575 mm TL, 610 mm TL, 515 mm TL, 650 mm TL, 860 mm TL, juvenile males, 563 mm TL, 748 mm TL, 622 mm TL, 647 mm TL, 598 mm TL, 575 mm TL, 612 mm TL, 412 mm TL, juvenile females, south Isla de los Estados, 54°56'S, 64°20'W, 397 m, R/V CAPITÁN OCA BALDA, cruise OB-04/02, sta. 4, 19. x. 2002; INIDEP 722, 535 mm TL, 540 mm TL, juvenile males, off northern Patagonian continental shelf, 41°30'S, 57°35'W, 119 m, 10. x. 2002, R/V DR. EDUARDO HOLMBERG, cruise H-06/02, sta. 30; ZVC-P 4796, 502 mm TL, juvenile male, off Mar del Plata, 38°11'S, 55°18'W, 284 m, 25.vi.2003, F/V FEIXE, sta. 171.

Diagnosis.—*Bathyraja cousseauae* is characterized by the combination of the following characters: A large and more distinct round pale area ocellus-like, margined with dark brown on posterior part of each pectoral base of the upper side of disc. Upper surface of disc completely covered with numerous small spinules, also placed on interorbital area, tail, dorsal fins and posterior pelvic lobes. In larger specimens the spinules are scattered distributed in central parts of disc. No ocular thorns. A continuous row of 21–27 median thorns from nuchal region to first dorsal fin. Males with elongated, slender rod-shaped claspers. Dorsal fins densely spinulose

close to the end of tail and with no space between them.

Description.—Measurements and counts are given in Appendix 1. Differing values of the paratypes following those for the holotype are in parentheses. Disc broadly rhombic, 1.26 times as broad as long (1.15–1.40); margin of disc nearly concave at sides of tip of snout, slightly convex to level of spiracles, nearly concave to outer corners that are abruptly rounded. Posterior margins of disc weakly convex with a rounded inner corner to level of pelvic fins. Anterior margins of disc 1.46 times longer than the posterior ones (1.21–1.54). Preorbital length 2.52 times (2.28–3.04) interorbital width. Orbits moderately large, their lengths 0.90 times (0.62–1.00) of the interorbital width. Orbit length 1.37 times spiracle length (0.94–1.91). Distance between spiracles 1.69 times that between orbits (1.30–1.78). Snout short, 8.45 times in total length (6.83–8.62). Pelvic fins deeply incised. Anterior lobe 0.89 times posterior lobe (0.75–1.05). Tail slender and moderately depressed with narrow lateral folds along ventrolateral surface originating at level of axil of pelvic fins, widening in posterior two thirds of tail and extending to near tail tip. Length of tail from center of cloaca to tip 0.96 times that from tip of snout to center of cloaca (0.90–1.20). Postdorsal fin tail length approximately one-third length base of second dorsal fin. No space between dorsal fins, neither between second dorsal fin and caudal fin. Height of dorsal fins approximately one-half of their bases' lengths. Preoral length 1.33 times mouth width (1.34–1.97). Preorbital length 2.80 times orbit length (2.81–4.15). Nostril flaps are short, thick and tube-like. Anterior nasal flap (nasal curtain) well developed and fringed along distal margin. Posterior nasal poorly developed and smooth. Mouth transversally straight. Upper and lower jaws slightly arched, with 31 and 29 (30–33, and 30–32) tooth rows, respectively. Distance between first gill slits 2.23 times distance between nares (2.00–2.70). Distance between fifth gill slits 1.69 times internarial distance (1.40–2.07). Length of first gill slits 0.88 times length of fifth gill slits (1.00–1.60). First dorsal fin about equal in size and shape to second dorsal fin. Vertebrae 38–39 (trunk) + 78–80 (predorsal caudal). Pectoral radials 86, pelvic radials 18. Dorsal side of disc and tail densely covered with dermal denticles, with erect crowns and stellate bases. Posterior lobe of pelvic fin sparsely covered with dermal denticles. Ventral side of disc, pelvics, claspers and tail without dermal denticles. Alar thorns well developed in one ma-

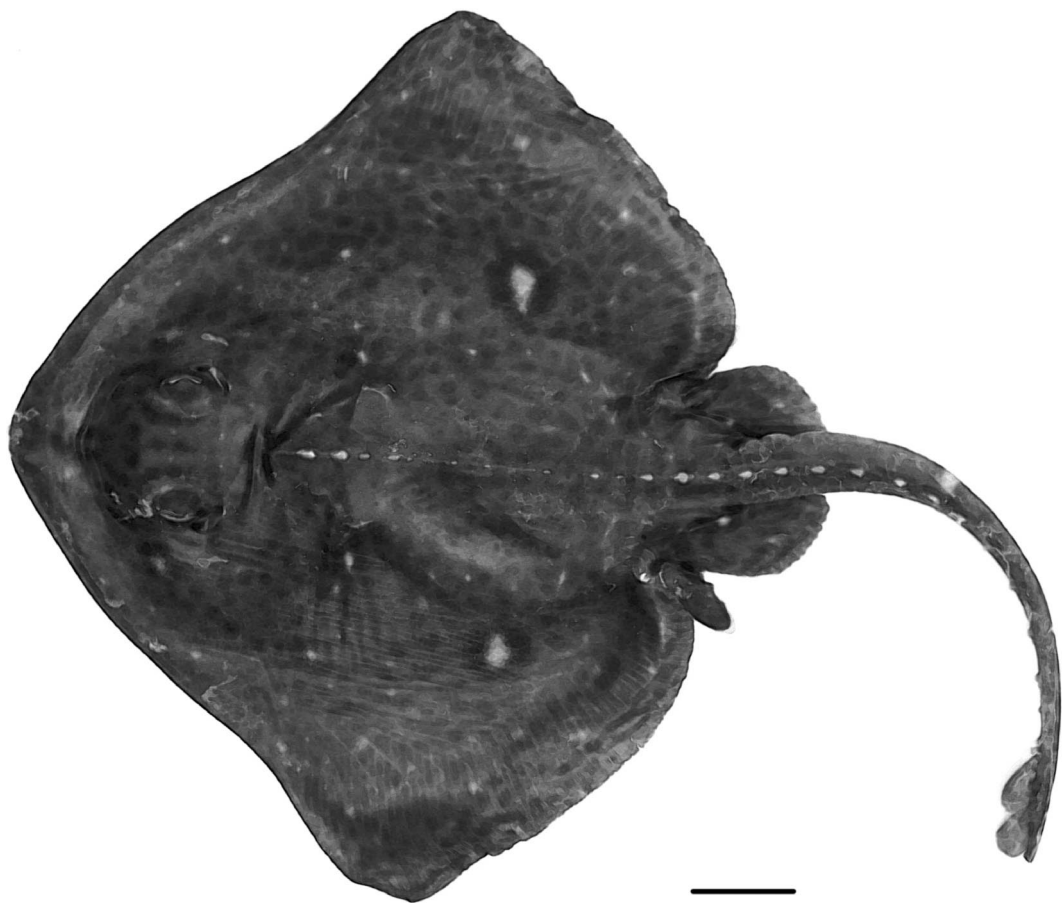


Fig. 1. *Bathyraja cousseauae* new species, holotype, INIDEP 719, 617 mm TL, juvenile male, off northern Patagonian continental shelf, Argentina. Scale bar = 5 mm.

ture male of 695 mm DW and arranged in 4 rows. Alar thorns of other males not yet developed. Midrow thorns are continuous and widely spaced on mid disc, with two thorns on nape, two on shoulder girdle, and four to six widely thorns between shoulder girdle and axil of pectoral fins. Midline of tail with 14–19 strong thorns, with oval bases and backwardly directed crowns.

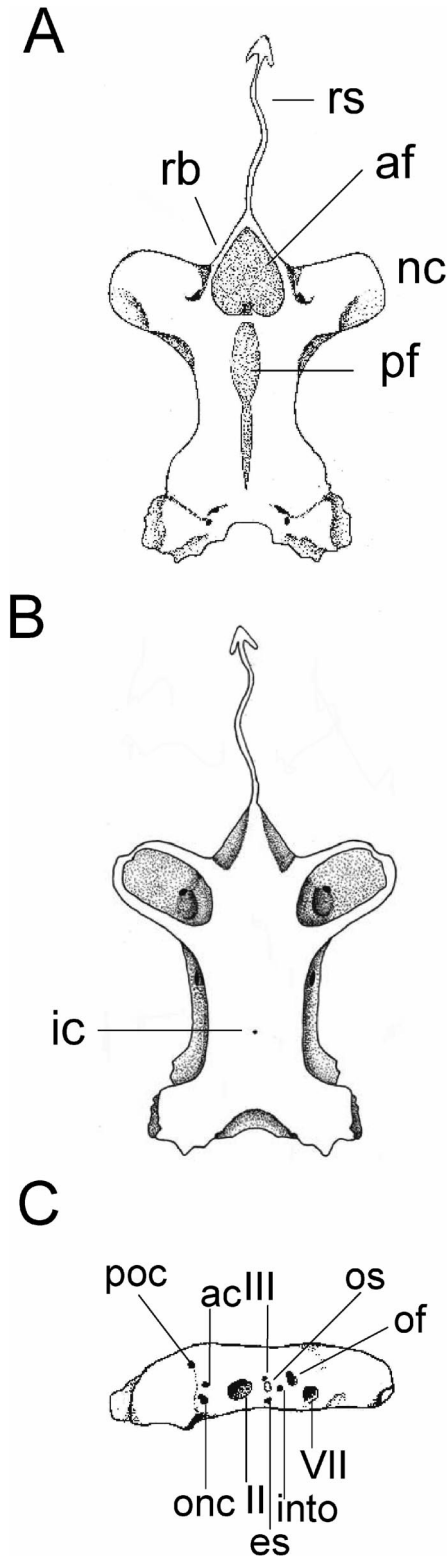
Color when fresh.—A conspicuous white or pale ocellus margined with brown on the hinder part of the base of each pectoral. Indistinct paler and dark spots of various sizes scattered over a dark brownish colored disc. Darker spots more numerous and rounded, some margined with dark brown. Thorns marked off pale milky-white. Rostral area and orbits as brown as ground color of upper side, except side areas of rostrum that are somewhat lighter, and one pale mark on anterior inner side of each orbit. Anterior pelvic lobe edged whitish. Claspers dark

brown with lightened second half outer edge creamy-white. Lateral tail folds brown. Two to three incomplete pale cross-bands on the tail. Dorsal fins uniformly brown. Lower surface of the disc largely creamy-white, with posterior margins of pectoral fins, and edges of posterior lobes of pelvic fins narrowly edged dusky brown. Underside of tail from level of tips of pelvic's posterior lobes to the tip of tail varies from a few dark brown spots to uniformly brown pigmented pattern.

Etymology.—The new species is dedicated to Prof. Dr. María Berta Cousseau (Departamento de Ciencias Marinas, Universidad Nacional de Mar del Plata, Argentina) in recognition of her contribution to the marine fishes of Argentina.

Common name.—New English name: Joined-fins Skate; new Spanish name: Raya Aletas Juntas.

Neurocranium.—Neurocrania measurements of a juvenile male (550 mm TL) and a juvenile fe-



male (750 mm TL) are given as percentage of nasobasal length. Cranial length 172.9–177.3; cranial width 103.0–105.9; cranial height 22.7–23.5; rostral shaft uncalcified, its length 72.7–76.5; rostral base 34.8–35.3; nasal capsules rhomboid shaped, with straight anterior margins, set at about 10° angle to transverse axis of neurocranium; foramen for profundus nerve on leading edge of nasal capsule; internasal width 20.0–21.2; interorbital width 34.8–38.8; anterior fontanelle heart-shaped with a little peduncle in its base, its length 27.3–32.9, its width 6.1–14.1; width across otic capsules 53.0–56.5; least width of basal plate 27.3–29.4; greatest width of nasal aperture 37.9–41.2; foramen for anterior cerebral vein on a vertical with dorsal rim of optic nerve foramen, posterior to line connecting foramina of preorbital and orbitonasal canals; foramen for oculomotor nerve dorsal to optic stalk; foramen for interorbital vein anterior to orbital fissure and posterior to efferent spiracular artery foramen; basal and internasal plates relatively narrow (Fig. 2).

Scapulocoracoids.—Scapulocoracoid elongated, expanded between mesocondyle and metacondyle; anterior fenestra divided by an anterior bridge into an anterodorsal and anteroventral fenestra; four postdorsal foramina: first, second and fourth of about the same size, and third minute (males); six postdorsal foramina: first, second and sixth are big and the third, fourth and fifth minute and form an inverted triangle (females); seven small postventral foramina (males), eight postventral foramina (females), all of which are of about equal in size and shape; dorsal margin relatively straight. Posterior margin with a pronounced concavity in its dorsal side (males), rounded in females (Fig. 3).

Clasper.—Clasper fully developed, its length 37% of disc width. Large pseudosiphon (ps) present near outer lateral edge of dorsal lobe, its length

←

Fig. 2. Neurocranium of *Bathyraja cousseauae*, n. sp. (paratype, INIDEP 720, juvenile male, 550 mm TL) in dorsal (A), ventral (B), and lateral (C) views. Figure abbreviations: ac = anterior cerebral vein foramen; af = anterior fontanelle; es = efferent spiracular artery foramen; ic = internal carotid artery foramen; into = interorbital vein foramen; nc = nasal capsule; of = orbital fissure; onc = orbitonasal canal foramen; os = optic stalk; pf = posterior fontanelle; poc = preorbital canal foramen; rb = rostral base; rs = rostral shaft; II = optic nerve foramen; III = oculomotor nerve foramen; VII = hyomandibular branch of facial nerve foramen. Scale bar = 10 mm.

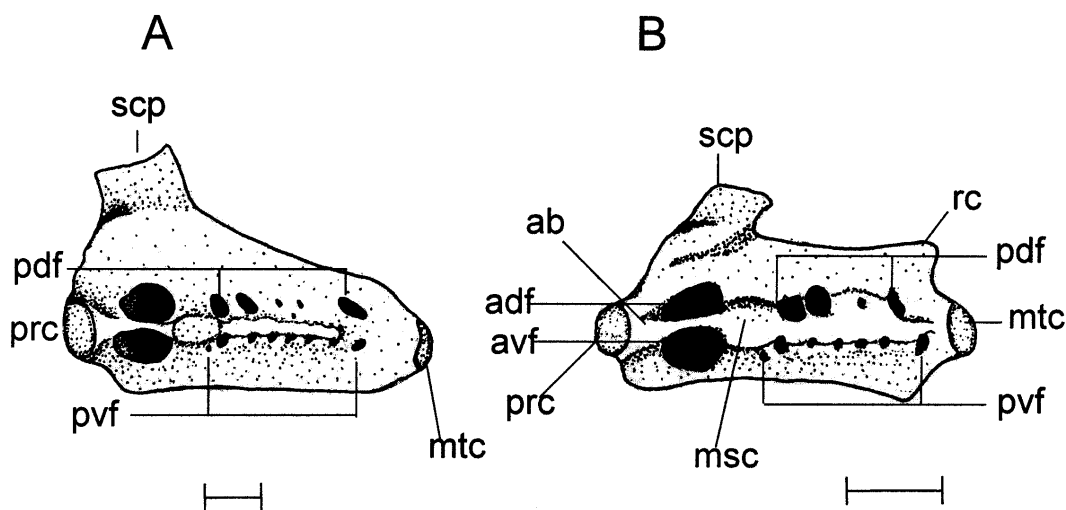


Fig. 3. Lateral view of left scapulocoracoids of a female (A) and a male (B) specimens of *Bathyraja cousseauae* n. sp. (paratypes, INIDEP 720, juvenile female, 750 mm TL, and juvenile male, 550 mm TL, respectively). Figure abbreviations: ab = anterior bridge; adf = anterodorsal fenestra; avf = anteroventral fenestra; msc = mesocondyle; mtc = metacondyle; pdf = postdorsal foramina; prc = precondyle; pvf = postventral foramina; rc = rear corner; scp = scapular process. Scale bar = 10 mm.

25% of clasper length; inner surface of dorsal lobe with pseudorhipidion (pr) and cleft (cf); inner surface of ventral lobe with projection (pj), sentina (se) and spike (sp). Dorsal marginal (dM) with pointed distal elongation, forming pseudorhipidion externally; ventral marginal (vM) with pointed distal elongation, extending to the tip of the clasper and forming projection externally; dorsal terminal 1 (dT1) shield-like, with notch along proximal and distal margins, curved around the axial onto ventral side and connected with ventral terminal forming pseudosiphon at its outer edge; dorsal terminal 2 (dT2) rectangular, its length half of the length of dT3, dT2 and dT3 firmly connected; dorsal terminal 3 (dT3) long and slender, extending to tip of clasper; accessory terminal 2 (aT2) small, j-shaped, lying beneath tip of ventral marginal and forming spike externally; ventral terminal (vT) spoonlike overlying tip of ventral marginal and accessory terminal; axial cartilage (Ax) spatulate distally (Fig. 4).

DISCUSSION

Comparisons.—Ten species of *Bathyraja* occur in the southwestern Atlantic (Stehmann, 1986). Of these, seven are known from the Argentinean and Uruguayan continental shelves (Cousseau et al., 2000). *Bathyraja cousseauae* is most similar to the Broadnose Skate *Bathyraja brachyurops* (Fowler). *Bathyraja brachyurops* has light spots and blotches on the light brown colored dorsal

surface, has midrow thorns same color as disc, and ventral side of tail is largely white. *Bathyraja cousseauae* has light and dark colored spots over a dark brownish colored disc, midrow thorns milky white, and underside of tail partly or entirely brown. *Bathyraja brachyurops* has a discontinuous row of mid row thorns on disc. Those of the new species are continuous but smaller and more widely spaced along the mid disc. *Bathyraja brachyurops* has an interspace and thorn between dorsal fin bases and lacks denticles on dorsal fins. *Bathyraja cousseauae* lacks a space between dorsal fins which are densely covered with denticles. The claspers of *B. brachyurops* are greatly expanded laterally along proximal aspect of glans. Those of the new species are rod-shaped and little expanded distally (Fig. 5).

Ventral coloration distinguishes the new species from the Butterfly Skate *Bathyraja papilionifera* Stehmann, the Whitemouth Skate *Bathyraja schroederi* Kreft and the Dark-belly Skate *Bathyraja meridionalis* Stehmann. *Bathyraja papilionifera* has outer corners and posterior margins of underside of disc broadly edged dark and a characteristically butterfly-shaped pale brown blotch around anterior anus. *Bathyraja schroederi* and *B. meridionalis* have plain coloration on underside of disc. That of the new species is creamy-white. Lack of ocular and scapular thorns, absence of an interdorsal space distinguishes the new species from the Patagonian Skate *Bathyraja macloviana* (Norman), the Ma-

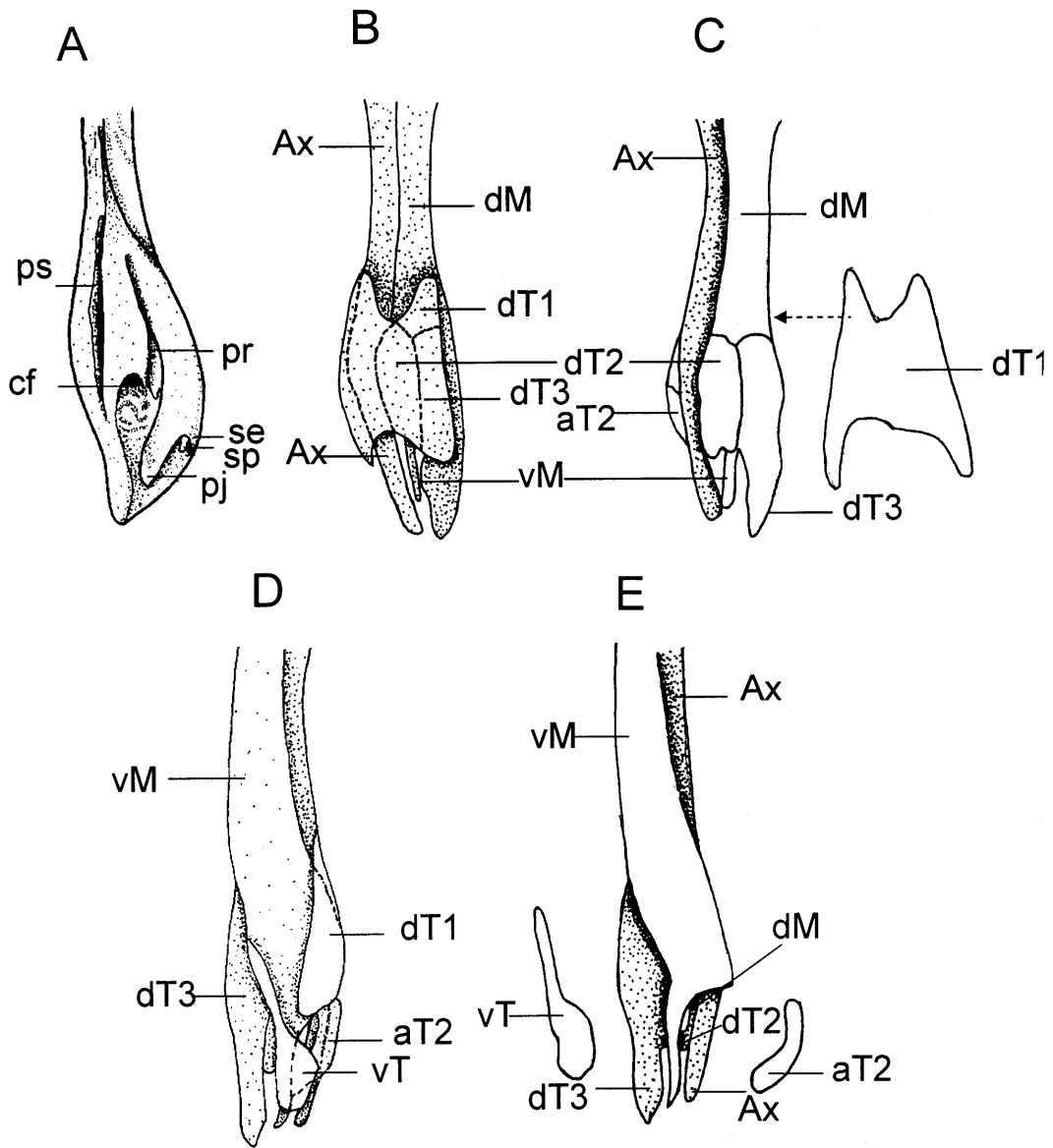


Fig. 4. Right clasper cartilages of *Bathyraja cousseauae*, n. sp. (paratype, INIDEP 720, adult male, 695 mm DW) in external (A), dorsal (B and C) and ventral views (D and E). Figure abbreviations: aT2 = accessory terminal 2; Ax = axial; dM = dorsal marginal; cf = cleft; dT1 = dorsal terminal 1; dT2 = dorsal terminal 2; dT3 = dorsal terminal 3; pj = projection; pr = pseudorhipidion; ps = pseudosiphon; se = sentina; sp = spike; vM = ventral marginal; vT = ventral terminal. Scale bar = 10 mm.

gellan Skate *Bathyraja magellanica* (Philippi) and the Multispine Skate *Bathyraja multispinis* (Norman).

Snout length distinguishes the Cuphead Skate *Bathyraja scaphiops* (Norman) from the new species. The former has a longer (25% of width disc) translucid pointed snout, whereas

the latter has a shorter (17 to 18% width disc) obtuse, triangular-shaped and not translucid snout. Presence of thorns along the midline of the disc distinguishes the new species from the Graytail Skate *Bathyraja griseocauda* (Norman). A continuous midrow of thorns and wider inter-orbital width distinguishes the new species from

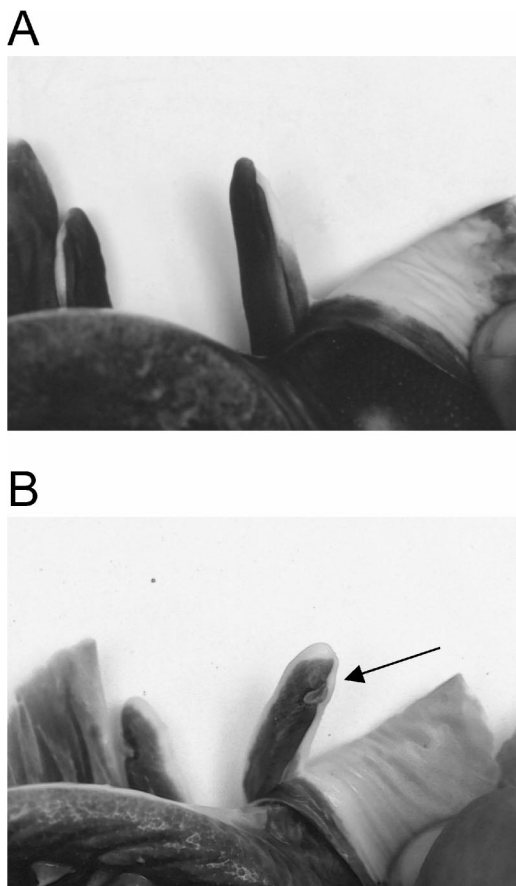


Fig. 5. Dorsal view of left claspers of *Bathyraja cousseauae*, n. sp. (A) (holotype, INIDEP 719, 617 mm TL, juvenile male) and *Bathyraja brachyurops* (B). Arrow indicates lateral process. Scale bar = 10 mm.

the White-Dotted Skate *Bathyraja albomaculata* (Norman).

Distribution.—Type specimens of *B. cousseauae* were collected off Mar del Plata at 284 m depth, off northern Patagonian continental shelf at 119–141 m depth, southern Malvinas Islands at 277 m depth and in the southernmost tip of the southwest Atlantic, off southern Isla de los Estados, at 397 m depth (Fig. 6). According to the capture localities of the type specimens, the new species appears to have a wide distribution, at least on the upper slope of the southwest Atlantic. Similar distributional pattern was observed in other *Bathyraja* species such as *B. griseocauda*, *B. multispinis*, and *B. scaphiops* (Cousseau et al., 2000). These species have a restricted range distributions and show a strict-stenothermous-

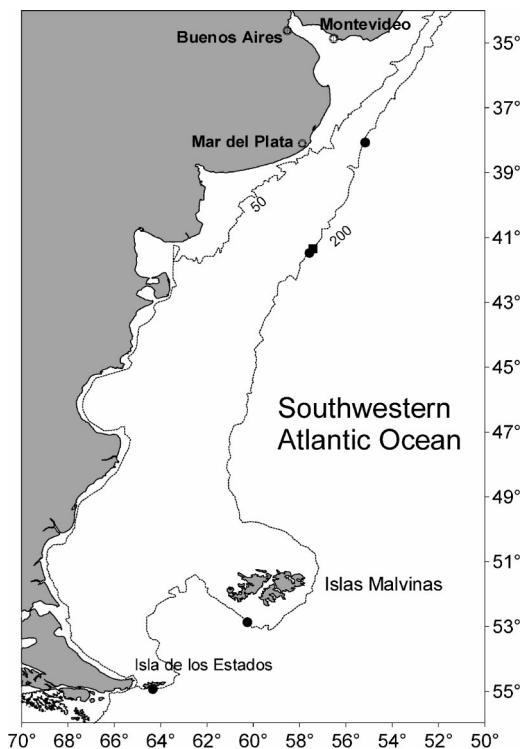


Fig. 6. Geographic distribution of *Bathyraja cousseauae* based on material collected. Symbols represent more than one capture. Square indicates original locality of holotype.

stenohaline behavior, in relation to water masses (Figuerola et al., 1999). *Bathyraja cousseauae* seems to occur sympatrically with those softnose skates primarily inhabiting the upper slope of the southwest Atlantic. In contrast, *B. magellanica* is more eurythermic as well as euryhaline, feature also shared with *B. albomaculata*, *B. brachyurops*, and *B. macloviana* (Figuerola et al., 1999), although the former is more restricted to southern Patagonia between latitudes 47° and 55°S, whereas the others are widely distributed throughout the southwest Atlantic continental shelf (Cousseau et al., 2000). *Bathyraja papilionifera* and *B. schroederi* are regarded deep-water skates occurring in the midcontinental slope off northern Argentina (Stehmann, 1987; Stehmann and Shulze, 1996). *Bathyraja meridionalis*, although described as a new deep-water skate from the eastern slope of subantarctic South Georgias (Stehmann, 1987) was also reported as a common rajid species in the deep-water, long-line fishery for the Patagonian toothfish *Dissostichus eleginoides*, from the southern part of the Falklands Outer Conservation Zone (Agnew et al., 1999). *Bathyraja cousseauae* can be included within the morphotype group of transitional

species defined by Stehmann (1986) and characterized by small to medium-sized skates that reach a total length to about 100 cm, with a reduced dorsal thorn pattern lacking orbital and scapular thorns.

Comparative material examined.—*Bathyrāja albo-maculata*: INIDEP 303, 625 mm TL, male, 452 mm TL, female, 38°50'S, 55°33'W, 16. vii. 1981, R/V CAPITÁN CÁNEPA, cruise C-09/81. INIDEP 439, 500 mm DW, male, 48°20'S, 61°05'W, 13. ii. 1992, R/V DR. EDUARDO HOLMBERG, cruise H-01/92, sta. 75. INIDEP 491, 350 mm TL, male, 54°01'S, 62°54'W, 20. xi. 1995, R/V CAPITÁN OCA BALDA, cruise OB-13/95, sta. 14. *Bathyrāja brachyurops*: INIDEP 302, 750 mm TL, male, 38°50'S, 55°33'W, 16. vii. 1981, R/V CAPITÁN CÁNEPA, cruise C-09/81, sta. 15. INIDEP 552, 530 mm TL, female, 50°43'S, 65°42'W, 113 m, 20. iii. 1997, R/V CAPITÁN OCA BALDA, cruise OB-04/97, sta. 16. *Bathyrāja griseocauda*: INIDEP 437, 348 mm DW, female, 48°20'S, 61°05'W, 13. ii. 1992, R/V DR. EDUARDO HOLMBERG, cruise H-01/92, sta. 75. INIDEP 613, 401 mm TL, male, 37°34'S, 54°48'W, 400 m, 14. ii. 1998, R/V CAPITÁN OCA BALDA, cruise OB-01/98. *Bathyrāja macloviana*: INIDEP 304, 540 mm TL, female, 38°50'S, 55°33'W, 16. vii. 1981, R/V CAPITÁN CÁNEPA, cruise C-09/81, sta. 15. INIDEP 438, 417 mm DW, female, 48°20'S, 61°05'W, 13. ii. 1992, R/V DR. EDUARDO HOLMBERG, cruise H-01/92, sta. 75. INIDEP 493, 305 mm TL, female, 52°26'S, 63°32'W, 244 m, 26. xi. 1995, R/V CAPITÁN OCA BALDA, cruise OB-13/95, sta. 37. INIDEP 497, 570 mm TL, male, 54°30'S, 61°24'W, 140 m, 19. xi. 1995, R/V CAPITÁN OCA BALDA, cruise OB-13/95, sta. 11. INIDEP 554, 285 mm TL, female, 430 mm TL, male, 50°07'S, 66°27'W, 92 m, 20. iii. 1997, R/V CAPITÁN OCA BALDA, cruise OB-04/97, sta. 12. *Bathyrāja magellanica*: INIDEP 553, 510 mm TL, female, 49°54'S, 64°40'W, 115 m, 19. iii. 1997, R/V CAPITÁN OCA BALDA, cruise OB-04/97, sta. 7. INIDEP 556, 265, 333 mm TL, females, 50°03'S, 66°01'W, 98 m, 19. iii. 1997, R/V CAPITÁN OCA BALDA, cruise OB-04/97, sta. 9. *Bathyrāja multispinis*: INIDEP 495, 480 mm TL, female, 54°03'S, 61°28'W, 150 m, 19. xi. 1995, R/V CAPITÁN OCA BALDA, cruise OB-13/95, sta. 12. INIDEP 498, 640 mm TL, female, 53°15'S, 62°04'W, 485 m, 23. xi. 1995, R/V CAPITÁN OCA BALDA, cruise OB-13/95, sta. 31. *Bathyrāja scaphiops*: INIDEP 588, 718 mm TL, male, 39°04'S, 55°39'W, 187 m, 22. x. 1997, R/V DR. EDUARDO HOLMBERG, cruise H-10/97, sta. 105. INIDEP 589, 624 mm TL, male, 40°42'S, 56°47'W, 135 m, 21. x. 1997, R/V DR. EDUARDO HOLMBERG, cruise H-10/97, sta. 66.

ACKNOWLEDGMENTS

We express our sincere thanks to P. Ibáñez for collecting numerous paratype specimens, A. Loureiro for providing one of paratypes from off Mar del Plata, L. Paesch for providing detailed information on one of the paratypes and taking photographs, V. Segura for drawing the figures, M. Tobío for taking the photographs, D. Figueroa and L. Lucifora for suggestions that improved the manuscript, and the captains, crew, and colleagues of the R/Vs DR. EDUARDO HOLMBERG and CAPITÁN OCA BALDA of the INIDEP for logistical and field assistance. Helpful comments of anonymous reviewers that improved earlier versions of this manuscript are gratefully acknowledged. This project was supported from grants of the Universidad Nacional de Mar del Plata.

LITERATURE CITED

- AGNEW, D. J., C. P. NOLAN, AND J. POMPERT. 1999. Management of the Falkland Islands skate and ray fishery. *In*: Case studies of the management of elasmobranch fisheries. R. Shotton (ed.). FAO Fish. Tech. Pap. 378/1:268–284.
- COMPAGNO, L. J. V. 1999. Checklist of living elasmobranchs, p. 471–498. *In*: Sharks, skates, and rays. The biology of the elasmobranch fishes. W. C. Hamlett (ed.). Johns Hopkins Univ. Press, Baltimore, MD.
- COUSSEAU, M. B., D. E. FIGUEROA, AND J. M. DÍAZ DE ASTARLOA. 2000. Clave de identificación de las rayas del litoral marítimo de Argentina y Uruguay (Chondrichthyes, Familia Rajidae). Publ. Esp. Instituto Nacional de Investigación y Desarrollo Pesquero, Mar del Plata, Argentina.
- FIGUEROA, D. E., P. MARTOS, R. RETA, M. B. COUSSEAU, AND J. M. DÍAZ DE ASTARLOA. 1999. Distribución de las rayas de Argentina y Uruguay, su relación con las masas de agua, p. 148–149. *In*: Libro de resúmenes ampliados, tomo I. VIII Congreso latinoamericano sobre ciencias del mar. A. E. Tresierra Aguilar, and Z. G. Culquichicón. Empresa editora Nuevo Norte S.A., Trujillo, Perú.
- HUBBS, C. L., AND R. ISHIYAMA. 1968. Methods for the taxonomic study and description of skates (Rajidae). *Copeia* 1968:483–491.
- HULLEY, P. A. 1972. The origin, interrelationships and distribution of southern African Rajidae (Chondrichthyes, Batoidei). *Ann. S. Afr. Mus.* 60:1–103.
- ISHIHARA, H., AND R. ISHIYAMA. 1985. Two new north Pacific skates (Rajidae) and a revised key to *Bathyrāja* in the area. *Jpn. J. Ichthyol.* 32:143–179.
- , AND ———. 1986. Systematics and distribution of the skates of the North Pacific (Chondrichthyes, Rajoidei), p. 269–280. *In*: Indo-Pacific fish biology: proceedings of the second international conference on Indo-Pacific fishes. T. Uyeno, R. Arai, T. Taniuchi, and K. Matsuura (eds.). Ichthyological Society of Japan, Tokyo.

- MCEACHRAN, J. D., AND K. A. DUNN. 1998. Phylogenetic analysis of skates, a morphologically conservative clade of elasmobranchs (Chondrichthyes: Rajidae). *Copeia* 1998:271–290.
- , AND L. J. V. COMPAGNO. 1979. A further description of *Gurgestella furvescens* with comments on the interrelationships of Gurgesiellidae and Pseudorajidae (Pisces, Rajoidei). *Bull. Mar. Sci.* 29:530–553.
- MENNI, R. C., AND M. F. W. STEHMANN. 2000. Distribution, environment and biology of batoid fishes off Argentina, Uruguay and Brazil. A review. *Rev. Mus. Arg. Cienc. Nat.*, n.s. 2:69–109.
- , R. A. RINGUELET, AND R. H. ARÁMBURU. 1984. Peces marinos de la Argentina y Uruguay. Reseña histórica. Clave de familias, géneros y especies. Catálogo crítico. Ed. Hemisferio Sur, Buenos Aires, Argentina.
- STEHMANN, M. 1970. Vergleichend morphologische und anatomische untersuchungen zur neuordnung der systematik der nordostatlantischen Rajidae (Chondrichthyes, Batoidei). *Arch. Fisch. Wiss.* 21: 73–164.
- . 1986. Notes on the systematics of the Rajid genus *Bathyraja* and its distribution in the world oceans, p. 261–268. *In*: Indo-Pacific fish biology: proceedings of the second international conference on Indo-Pacific fishes. T. Uyeno, R. Arai, T. Taniuchi, and K. Matsuura (eds.). Ichthyological Society of Japan, Tokyo.
- . 1987. *Bathyraja meridionalis* sp. n. (Pisces, Elasmobranchii, Rajidae), a new deepwater skate from the eastern slope of subantarctic South Georgia Island. *Arch. Fisch. Wiss.* 38:35–56.
- , AND G. SCHULZE. 1996. Results of the research cruises of FRV “Walther Herwig” to South America. LXXIII. Fourth record of *Bathyraja papilionifera* Stehmann, 1985 from the continental slope off northern Argentina (Pisces, Rajiformes, Rajidae). *Arch. Fish. Mar. Res.* 44:267–278.
- (JMDA) DEPARTAMENTO DE CIENCIAS MARINAS, FACULTAD DE CIENCIAS EXACTAS Y NATURALES, UNIVERSIDAD NACIONAL DE MAR DEL PLATA. FUNES 3350, B7602AYL MAR DEL PLATA, ARGENTINA. CONSEJO NACIONAL DE INVESTIGACIONES CIENTÍFICAS Y TÉCNICAS (CONICET); AND (EM) MUSEO DEL MAR, AV. COLÓN 1114, MAR DEL PLATA, ARGENTINA. E-mail: (JMDA) astar-loa@mdp.edu.ar. Send reprint requests to JMDA. Submitted: 11 May 2003. Accepted: 22 Dec. 2003. Section editor: D. G. Buth.

APPENDIX 1. MORPHOMETRICS (IN MILLIMETERS) AND MERISTICS OF THE HOLOTYPE (INIDEP 719) AND 20 PARATYPES OF *Bathyrāja cousseauae*. Range and mean values expressed in % of disc width (DW), except total length and DW in mm. SD = standard deviation.

	Holotype	Paratypes		
		Range	Mean	SD
Total length	617	412–860		
Disc width	417	282–720		
Disc length	330	71.1–86.7	77.6	3.0
Snout length (preorbital)	73	17.1–20.8	18.6	1.1
Snout length (preoral)	73	16.9–22.1	19.6	1.5
Snout to maximum width	194	41.6–49.1	45.3	1.8
Prenasal length	59	11.8–16.7	14.2	1.3
Orbit diameter	26	4.4–6.3	5.5	0.5
Distance between orbits	29	5.3–7.7	6.8	0.6
Orbit and spiracle length	33	6.7–7.8	7.3	0.4
Spiracle length	19	2.8–5.1	4.1	0.6
Distance between spiracles	49	6.8–12.2	11.0	1.1
Mouth width	55	10.9–12.8	11.8	0.5
Distance: nare to mouth	20	2.9–6.8	4.5	0.7
Distance between nostrils	48	10.5–12.6	11.6	0.6
Width: first gill openings	7	1.6–2.5	1.9	0.3
Width: third gill openings	10	1.8–2.5	2.1	0.2
Width: fifth gill openings	8	1.3–2.1	1.6	0.2
Distance: first gill openings	107	22.5–31.4	24.9	1.8
Distance: fifth gill openings	81	16.5–22.0	19.4	1.2
Length: anterior pelvic lobe	53	11.5–14.9	12.9	0.9
Length: posterior pelvic lobe	59	12.9–17.6	13.9	1.0
Tail width at axil of pelvic fin	29	6.1–8.5	7.1	0.7
Distance: snout to cloaca	315	67.0–75.7	71.9	2.7
Distance: cloaca to caudal tip	302	67.2–80.7	73.9	4.1
Distance: snout to 1st dorsal fin	567	123.1–138.1	131.2	3.2
Distance: snout to 2nd dorsal fin	589	128.2–144.1	137.0	3.6
Length: anterior margin of pectoral fin	290	60.5–72.4	66.6	3.1
Length: posterior margin of pectoral fin	198	44.2–56.2	49.5	2.4
Length: 1st dorsal fin base	24	5.1–7.3	6.2	0.6
Length: 2nd dorsal fin base	22	4.7–7.3	5.8	0.6
Length: caudal fin base	7	1.9–4.1	2.9	0.7
Clasper length	32	6.3–37.1	8.4	9.5
Number of trunk vertebrae	39	38–39		
Number of predorsal caudal vertebrae	78	78–80		
Number of pectoral rays		86	86	
Number of pelvic rays		18	18	
Upper jaw tooth rows	31	30–33	31.7	1.1
Lower jaw tooth rows	29	30–32	30.7	1.5