DEEP WATER SKATES OF MADAGASCAR. PART 2. RAJIDAE. (PISCES, CHONDRICHTHYES, BATOIDEA) *GURGESIELLA (FENESTRAJA) MACEACHRANI* SP. N.

by

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ABSTRACT. - A new species of deep water skate is described from two females trawled off the north-western coast of Madagascar. This new species is compared to its congeners of the subgenus *Fenestraja* of the genus *Gurgesiella* and to some nominal species of *Breviraja* left without generic status in the taxonomic arrangement proposed by McEachran and Compagno (1982)

RÉSUMÉ. - Une nouvelle espèce de raie bathyale est décrite à partir de deux femelles chalutées sur la pente continentale de la côte nord-ouest de Madagascar. Cette nouvelle espèce est comparée à ses congenères du sous-genre *Fenestraja* du genre *Gurgesiella* ainsi qu'aux espèces nominales de *Breviraja* laissées sans statut générique dans l'arrangement des Rajoidei proposé par McEachran et Compagno (1982).

Key-words : Rajidae, *Gurgesiella (Fenestraja) maceachrani*, Malagasy Rep., Taxonomy, New species.

Seret (1986 a) mentions the record of two specimens of a new species of deep water skate, trawled off the north western coast of Madagascar between 600 and 765 m depths, during the shrimp surveying operated by ORSTOM (Institut Français de Recherche Scientifique pour le Developpement en Coopération). He briefly describes this new skate and assignes it to the subgenus *Fenestraja* of genus *Gurgesiella* as defined by McEachran (1984). This new species is herein described according to the modern taxonomic standards used for the Rajoidei. The two specimens constitute the types of the new species, and are deposited to Muséum National d'Histoire Naturelle, Paris (MNHN).

The present paper is the second of a series initiated by Seret (1986b) on the deep water skates of Madagascar.

Methods : External and skeletal measurements were taken according to the methods proposed by Hubbs and Ishiyama (1968) and McEachran and Compagno (1979, 1982). Anatomy of pelvic girdle and neurocranium was observed on radiographs of holotype. Measurements of pelvic girdle and neurocranium were made from radiographs of holotype and paratype. The paratype was dissected to reveal the structure of rostrum and left scapulocoracoid. Meristic counts of vertebrae, and pectoral radials were enumerated from radiographs. Tooth counts were taken from specimens listed below.

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GURGESIELLA (FENESTRAJA) MACEACHRANI SP. N.
(Figs 1,2,3)

Gurgesiella (Fenestraja) sp., Seret 1985 : 256-258.

Holotype : MNHN 1988.641, female 415 mm TL, R.V. "Vauban", station CH 23, 12°28'S, 48°11'E, 600-605 m depth, 19.01.1972, shrimp trawl, col. A. Crosnier-ORSTOM.

Paratype : MNHN 1988.642, female 233 mm TL, R.V. "Vauban", station CH 119, 12°50'S, 48°06'E, 750-765 m depth, 10.10.1974, shrimp trawl, col. A. Crosnier-ORSTOM.

Diagnosis : A deep water rajid skate with the combination of the following characters : Disc heart-shaped, with broadly rounded outer and inner pectoral corners. Snout short and blunty angled, with a small triangular process at tip. Tail long and slender, its length about 62-64 % of the TL. Pelvic fins deeply incised, the anterior lobe about as long as the posterior lobe. Two triangular dorsal fins posterior on tail, with separated bases. Caudal fin with a very short and low ventral fold. Nasal flaps

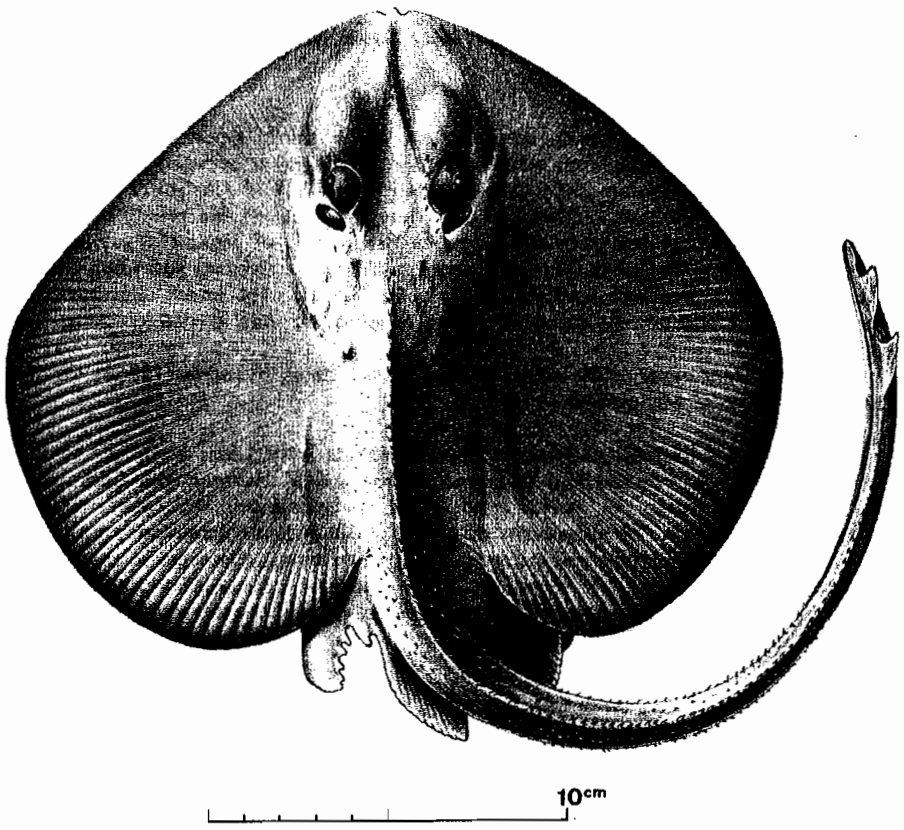


Fig. 1 : *Gurgesiella (Fenestraja) maceachrani* sp. n., holotype, MNHN 1988.641, female 415 mm TL, in dorsal view.

and rear margin of nasal curtain with a few lobelets. Oronasal pits present. Propterygia of pectoral girdle reaching rostral node.

Upper side of disc and tail entirely and densely set with coarse spinules. A few rostral thorns along the rostral ridges. A patch of 3-6 preorbital thorns, 5-8 small thorns above orbit and one above spiracle.

An irregular median row of 7-9 nuchal thorns, 2 thorns on each shoulder. A mediodorsal row of about 80 irregular thorns on trunk and tail, from scapula to first dorsal fin. At most one interdorsal thorn, and 3 post. D2 thorns. An irregular parallel row on trunk and tail, and a lateral row on tail. Lower side smooth.

Upper jaw with 39-40 tooth rows. Predorsal tail vertebrae (V prd) : 79-84. Pectoral radials : 78-80.

Colour after preservation, plain beige to pale fawn. Ventral side of disc plain whitish, lower side of tail mottled with faint brownish blotches.

Neurocranium : nasal capsules bulging into the precerebral space, and with basal fenestra. Rostral shaft slender. Rostral appendices separated from rostral shaft, and distally conical in cross section. Jugal arches present.

Scapulocoracoid : moderately horizontally elongated with dorsal margin slightly concave ; rear corner elevated ; a large anterior fenestra and a large postdorsal fenestra ; 5 postventral foramina.

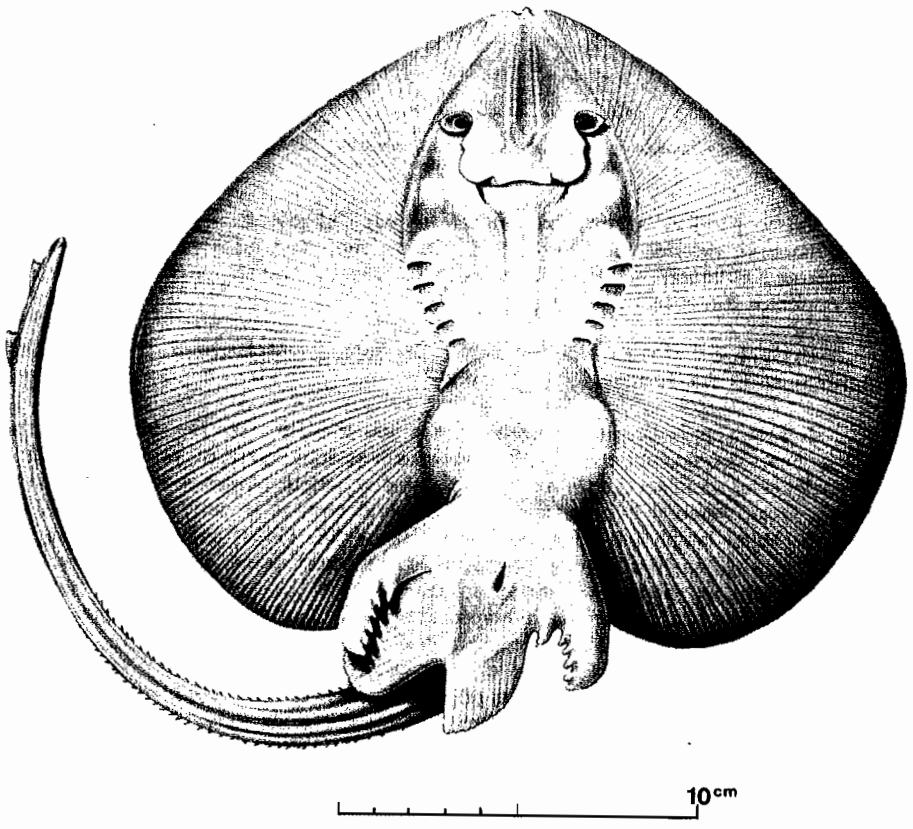


Fig. 2 : *Gurgesiella (Fenestraja) maceachrani* sp. n., holotype, MNHN 1988.641, female 415 mm TL, in ventral view.

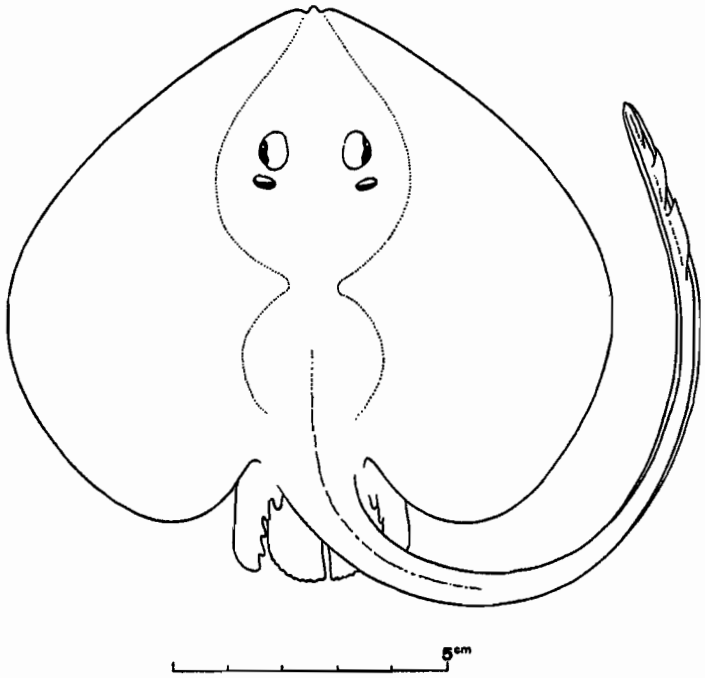


Fig. 3 : *Gurgesiella (Fenestraja) maceachrani* sp. n., paratype, MNHN 1988.642, female 233 mm TL, in dorsal view.

Pelvic girdle : a stout bar with front edge almost straight, and rear edge deeply concave rounded arc. Prepelvic processes short and massive, blunty pointed and oriented obliquely outward. Iliac processes greatly curved innard and forward. Two obturator foramina.

Etymology : Named in honour of Dr. John D. McEachran, for his major contributions to the Systematics of Rajoidei.

Description : Detailed morphometrics and meristics are presented in Table I. Disc heart-shaped, about 1-2 times as broad as long, axis of maximum width behind level of shoulder girdle at 58-61 % of disc length. Anterior margins evenly convex. Outer pectoral corners and inner pectoral corners broadly rounded. Snout short, preorbital length 2.1-2.3 times interorbital width. Tip of snout bluntly angled (125-133°) with small triangular projection. Orbits very large, horizontal diameter almost as long as interorbital distance, and 37-39 % of preorbital snout length. Spiracles half as long as orbits, interspace between them 1.5-1.6 times interorbital distance. Spiracles with 11-12 pseudobranchial folds. Pelvics large, deeply incised, with a slender anterior lobe almost as long as the posterior lobe (88-93 %). Tail long and slender, 62-64 % of total length, semicircular in cross-section (Fig. 4) with ventral side flat and dorsal side rounded. Lateral tail folds long, 47-48 % of total length and 75-76 % of tail length. Two dorsal fins at very end of the tail, their bases separated. First dorsal fin triangular. Second dorsal fin with a rounded dorsal margin, and somewhat smaller than first. Postdorsal section of tail relatively long, about as long as second dorsal base (holotype) and 1.6 times greater than D2 base in paratype. Caudal fin consisting of a low fold continued ventrally as a very short and low fold. Preoral snout length 1.8-2.1 times as long as width of mouth. Prenasal snout length equal or 1.2 times as long as internasal space. Distance between fifth

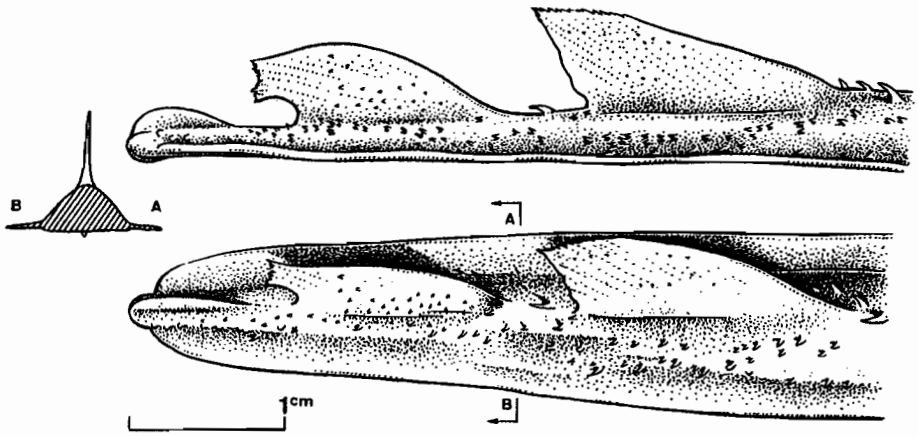


Fig. 4 : *Gurgesiella (Fenestraja) maceachrani* sp. n., holotype, MNHN 1988.641, female 415 mm TL, lateral and dorsal view of tip of tail, and interdorsal cross-section.

gill slits 56-60 % of distance between the first gill slits.

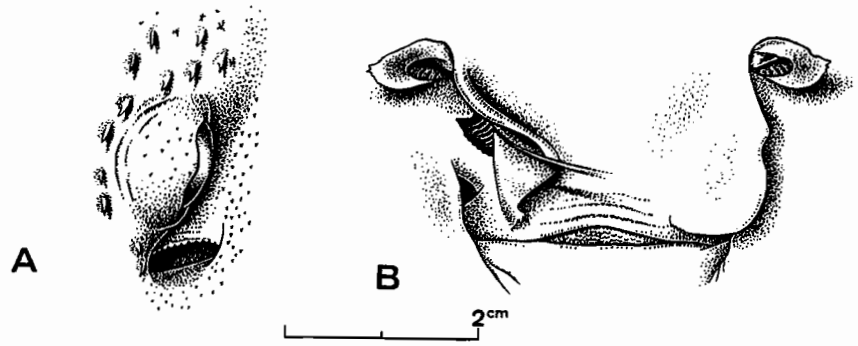
Nasal flaps with several short fringes. Nasal curtain subrectangular with rounded outer margins, rear margins set with short lobelets (Fig. 5B) Oronasal pits present. Upper jaw with 39-40 tooth rows in a quincunx arrangement (Fig. 5C). Tooth with an oval crown and a short, blunt central cusp. Anteriormost pectoral radials and propterygia extended to rostral node.

Upper surface of disc and tail entirely and densely set with coarse spinules, including orbits and dorsal fins. Anterior pelvic lobe smooth, posterior lobe with a few spinules. Lower side completely smooth. A few rostral thorns along the rostral ridges. A patch of 3-6 preorbital thorns (Fig. 5A), 2-4 supraorbital and 0-2 postorbital thorns ; 1-2 supraspiracular but no interspiracular thorns ; 7-8 median nuchal thorns in an irregular row ; lateral nuchal thorns hardly distinct from the general spination ; 1-2 suprascapular thorns and 2 on each scapula. An irregular mediodorsal row of 76-80 hooked thorns and thornlets on trunk (11-16) and on tail (60-69), 0-1 interdorsal thorn, and paratype with 3 small thorns between base of second dorsal and that of caudal fin. Thorns and thornlets irregulary arranged in a "parallel row" position on trunk and tail. Thornlets of the lateral row on tail more distinct and regulary spaced.

Colouration after preservation in formalin and storage in alcohol : Upper side of disc and tail beige to pale fawn, without any patterning. Posterior pelvic lobe and dorsal fins somewhat darker, anterior pelvic lobe pale. Ventral surface uniform pale whitish. Lower side of tail mottled with faint brownish blotches. Lateral tail folds whitish more or less translucent.

Pelvic girdle (Fig. 6, Table II) : The pelvic girdle of *G. maceachrani* consists of a thick transverse bar of cartilage with its anterior edge almost straight and its posterior edge a deep concave arc. Prepelvic processes moderately developed, massive and bluntly pointed, oriented obliquely outward. Iliac processes strongly recurved medially. Two obturator foramina.

Scapulocoracoid (Fig. 7, Table II) : In lateral view, scapulocoracoid shape subrectangular ; moderately antero-posteriorly elongated. Greatest length is 1.7 times greatest height. Dorsal margin slightly concave, gently sloping down to rear corner, which is somewhat elevated. Ventral margin almost straight. Anterior fenestra rounded, without anterior bridge. Postdorsal fenestra oval, its greatest axis horizontal. Five postventral foramina, which decrease in size posteriorly.



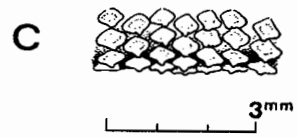
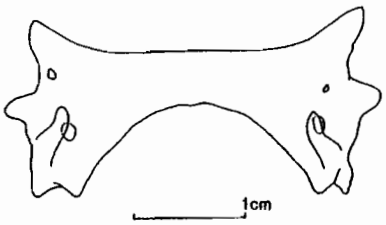


Fig. 5 : *Gurgesiella (Fenestraja) maceachrani* sp. n., holotype MNHN 1988.641, female 415 mm TL ; A : detail of the right orbital thorn pattern ; B : detail of mouth and nasal region ; C : detail of tooth arrangement in upper jaw.



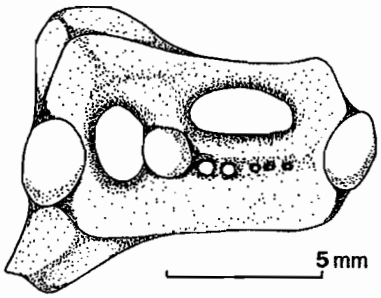


Fig. 6 : *Gurgesiella (Fenestraja) maceachrani* sp. n., holotype, MNHN 1988.641, female 415 mm TL, pelvic girdle (after radiograph).
Fig. 7 : *Gurgesiella (Fenestraja) maceachrani* sp. n., paratype, MNHN 1988.642, female 233 mm TL, lateral view of left scapulocoracoid (dissected).

Neurocranium (Fig. 8, Table II) : Relatively short, tapering, rostral shaft, falling short to rostral node. Rostral appendices anteriorly fused to rostral node.

Nasal capsules large, bulging into the precerebral space, and set at about 65° angle to the longitudinal axis of neurocranium. Basal fenestra present on roof of nasal capsules. Anterior fontanelle triangular, its base slightly concave. Posterior fontanelle an elongated oval, separated from the anterior fontanelle by a narrow bridge.

Interspecific comparisons : The subgenus *Fenestra* of *Gurgesiella* as defined by McEachran and Compagno (1982) and McEachran (1984) includes six nominal species : *G. plutonia* (type-species), *G. atripinna*, *G. cubensis*, *G. ishiyamai*, *G. sinusmexicanus* and *G. sibogae*. All are known from the western central Atlantic, except *G. sibogae* which is known only from the Bali sea.

G. maceachrani is distinct from all of the other species of the subgenus *Fenestraja* in number of Vprd (79-84 versus 64-75) and in number of pectoral radials (78-80 versus 56-66).

It is distinct from *G. plutonia* in the following character states : colouration, plain fawn versus variegated brown with dark spots and blotches, and tail with dark crossbars ; squamation, rostral thorns versus no rostral thorns ; squamation, 86-88 middorsal thorns from nape to first dorsal versus 45-70 middorsal thorns ; tooth rows, 38-40 versus 28-34 ; dorsal fins, separated versus confluent ; second dorsal fin and caudal fin, separated versus confluent.

Table I : Morphometric measurements, expressed as percentage of total length and meristics values of *Gurgesiella (Fenestraja) maceachrani* sp. n.

Gurgesiella maceachrani	MNHN 1988.641 Holotype	MNHN 1988.642 Paratype
Total length (mm)	415	233
Disc length	42.6	40.8
Disc width	52.5	48.1
Snout tip to max. disc width	24.8	24.9
Snout : preorbital length	10.5	9.4
Snout : prenasal length	7.5	7.6
Snout : preoral length	11.7	11.9
Snout to middle of cloaca	37.1	36.1
Head length ventrally	22.4	21.9
Middle of cloaca to D1	50.6	49.8
Middle of cloaca to D2	55.8	53.7
Middle of cloaca to tail tip	62.4	63.6
Orbit diameter	4.1	3.6
Spiracle	2.3	1.7
Orbit + spiracle	5.1	4.6
Interorbital width	4.1	4.0
Interspiracular width	6.3	6.3
Internasal width	7.0	6.1
Mouth width	6.4	5.6
Nasal curtain, length	4.7	3.9
Nasal curtain, width of each lobe	2.6	1.6
Nasal curtain, distance between lobes	4.0	4.1
1st gill slit length	1.3	1.2
3rd gill slit length	1.4	1.2
5th gill slit length	1.1	0.8
Interbranchial width, 1st	12.0	11.2
Interbranchial width, 5th	7.2	6.2
Pelvic fin : anterior lobe length		
- from axil	11.5	10.9
- from pelvic girdle	13.0	12.5
Pelvic fin : post. lobe from pelvic girdle	14.7	13.3
D1 : height	1.9	1.2
D2 : base length	4.1	3.7
Distance D1/D2	1.2	0.4
D2 : heigth	1.5	1.2
D2 : base length	3.3	3.8
Post-D2 length	3.0	6.1
Caudal : height	0.2	0.4
Caudal : base length	2.1	3.6
Tail : height at pelvic axils	2.8	2.8
Tail : width at pelvic axils	4.2	3.5
Tail : height in front of D1	0.9	0.9
Tail : width in front of D1	1.6	1.1
Lateral tail folds length	47.0	48.5
Angle of snout	133	125
Tooth rows upper jaw	39	40
Pseudobranchial folds left/right	12-12	11-10
Trunkal vertebrae (Vtr)	24	23
Predorsal vertebrae (Vprd)	79	82
Pectoral radials left/right	78-78	80-79

Table II : Pelvic girdle, scapulocoracoid and neurocranial proportional measurements respectively expressed as percentage of maximum pelvic width, greatest scapulocoracoid length and nasobasal length.

Gurgesiella maceachrani	MNHN 1988.641 Holotype	MNHN 1988.642 Paratype
Pelvic girdle (after radiograph)		
Maximum width (mm)	34.5	18.5
Total length	46.4	45.9
Length of prepelvic process	21.7	25.4
Length of iliac process	24.6	20.5
Median depth of anterior arc	7.5	7.0
Median depth of posterior arc	23.8	27.0
Tranverse length of central bar	13.6	12.4
Scapulocoracoid (dissected)		
Greatest length (mm)		11.2
Greatest height		59.9
Premesocondyle		40.2
Postmesocondyle		59.8
Postdorsal fenestra length		27.7
Postdorsal fenestra height		9.8
Anterior fenestra length		14.3
Anterior fenestra height		15.2
Height of rear corner		44.6
Neurocranium (after radiograph)		
Nasobasal length (mm)	43.0	21.5
Cranial length	165.1	167.4
Rostral cartilage length	65.1	67.4
Prefontanelle length	54.7	39.5
Cranial width	114.0	122.3
Interorbital width	41.9	44.2
Rostral base	19.8	23.3
Anterior fontanelle length	39.5	48.8
Anterior fontanelle width	14.0	23.3
Posterior fontanelle length	37.2	
Posterior fontanelle width	10.0	
Rostral appendices length	40.7	39.5
Rostral appendices width	3.7	3.3
Rostral cleft length	33.7	32.6
Width across otic capsules	64.0	69.8
Least width of basal plate	31.4	34.9
Greatest width of nasal capsules	52.3	51.2
Internarial width	12.6	17.2

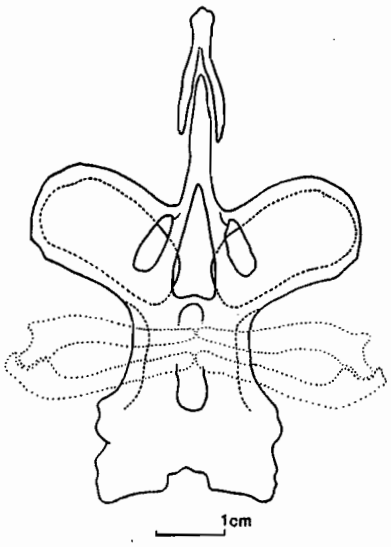


Fig. 8 : *Gurgesiella (Fenestraja) maceachrani* sp. n., neurocranium reconstructed from radiograph of the holotype, and rostral node schematized from partial snout dissection of the paratype.

G. maceachrani is distinct from *G. atripinna* in the following characters : snout blunt with a small process versus snout somewhat produced ; orbit diameter about equal to interorbital versus 1.5-1.8 times as long as the interorbital width ; interspace between dorsal fins short versus bases of dorsal greatly separated and increasing with growth ; 78-80 pectoral radials versus 62-65 ; 86-88 mediodorsal thorns versus 66 from nape to first dorsal ; ventral side plain whitish versus whitish, clouded with chocolate brown.

G. maceachrani is distinct from *G. cubensis* by its uniform colouration versus a upper side pale brown with darker spots and blotches, and tail with dark crossbars ; rostral thorn present versus no thorns on rostrum ; an interspace between D2 and caudal versus no such interspace ; orbit diameter about equal to interorbital versus 1.6-1.7 times as long as interorbital width ; 79-82 Vprd versus 64-70, and 78-80 pectoral radials versus 58-59.

G. maceachrani is distinct from *G. ishiyamai* by : upper side uniform pale versus purple brown with skin pigmented and blotches ; ventral side plain whitish versus white with dark margins ; 86-88 mediodorsal thorns versus 56-64 from nape to D1 ; orbit diameter about equal to interorbital versus 1.3 times as long as interorbital width ; large dorsal interspace versus base of dorsal adjacent but separated ; a postdorsal space versus no space between D2 and caudal ; 78-80 pectoral radials versus 57-61.

G. maceachrani is distinct from *G. sinusmexicanus* by : upper side uniform pale versus purple brown with skin pigmented and blotches ; ventral side plain whitish versus white with dark margins ; 86-88 mediodorsal thorns versus 56-64 from nape to D1 ; orbit diameter about equal to interorbital versus 1.3 times as long as interorbital width ; large dorsal interspace versus base of dorsal fins adjacent but separated ; a postdorsal space versus no space between D2 and caudal fin ; 78-80 pectoral radials versus 57-61.

G. maceachrani is distinct from *G. sibogae* by : disc uniform pale fawn versus brown with dark blotches ; mediodorsal thorns present on trunk versus no thorn on the back of trunk ; thorns around orbit, on nape and on shoulders versus extremely reduced thornlets around orbits and on the nape ; dorsal fins separated versus dorsal fins confluent ; a relatively large interspace between D2 and caudal fin versus virtually no interspace ; 78-82 Vprd versus 66-71 ; and 78-80 pectoral radials versus 62-66.

However as pointed out by Stehmann and Seret (1983) and Seret (1986), the new taxonomic arrangement of the Rajoidei proposed by McEachran and Compagno (1979, 1982) left open the generic status of some species assigned to *Breviraja*. The west African species *Breviraja africana* was assigned to *Neoraja* by McEachran and Miyake (1987) and Seret and McEachran (1986), but the status of the following species is still open : *Breviraja mamillidens* (Alcock, 1889) from the Gulf of Manaar (Sri Lanka) ; *Breviraja* sp. non-*mamillidens* from Ceram and Flores Seas (Stehmann, 1976) and *Breviraja* sp. non-*fullonica* from Bay of Biscay (Stehmann and Bürkel, 1984).

As far as the supposed accurate drawing of the original description by Alcock (1889, 1894) permits it, *Breviraja mamillidens* differs from *G. maceachrani* by a rhombic shape of disc ; snout without small projection at tip ; and by having only one preorbital thorn separated from one postorbital thorn by a supraorbital gap, no supraspiracular but one interspiracular thorn, a mediodorsal row of about 30 thorns from nape first dorsal ; the interdorsal space is "small" without thorn and the second dorsal base is virtually confluent with caudal fin base ; and according to Alcock, the dorsal surface of disc is uniform "jet black in life, and dark chocolate in spirit".

Breviraja sp. non-*mamillidens* as defined by Stehmann (1976) on the basis of three juveniles males, is closely related to *G. maceachrani*. The present author also examined these specimens and noted the following distinctive characters : the thorn pattern is reduced to one preorbital thornlet and an irregular mediodorsal row of at most 40 thorns, situated on a groove on the tail ; size and number of these thorns apparently decreasing with growth ; the ventral side of the tail is uniform without any marbling ; pectoral radials 59-65.

The specimen described by Vaillant (1888) as *Raja fullonica* is referable to *Breviraja* sp. (Stehmann and Bürkel, 1984). This specimen, an adult male of 262 mm TL, is in a very bad state of preservation. However, comparative observations with the original drawing and description revealed some differences with *G. maceachrani* : tip of snout without projection, no basal fenestra on roof of nasal capsules, about 45 irregular mediodorsal thorns from scapula to tail but thorns terminate well anterior to first dorsal, upper and lower side plain brownish, Vprd 72, about 60 pectoral radials.

Material examined :

Breviraja sibogae (Weber, 1913) : ZMA (Zoologisch Museum Amsterdam) 113-491, lectotype, adult male, 314 mm TL - ZMA 112-640, paralectotype, juvenile male, 259 mm LT, Siboga expedition, Bali Sea, St. 12, 7°15'S, 115°15'E, 189 m depth.

Breviraja sp. (= *Raja mamillidens* : Weber, 1913) : ZMA 112.796, 2 juveniles males, 116 and 254 mm TL, Siboga exped., Ceram Sea, St. 178, 2°40'S, 128°37'E, 835 m depth, 02-09-1899 - ZMA 112.797, 1 juvenile male 167 mm TL, Siboga exped., Flores Sea, St. 314, 7°36'S, 117°50'E, 694 m depth, 17-02-1900.

Breviraja sp. (= *Raja fullonica* : Vaillant, 1888) : MNHN 1883-149, adult male, 262 mm LT, Travailleur exped. dredging 1, 43°47'N, 6° W, 614 m depth, 1882.

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