Japanese Journal of Ichthyology
Vol. 34, No. 3 1987

魚類学雑誌
34巻3号 1987年

Revision of the Western North Pacific Species of the Genus *Raja*

Hajime Ishihara

(Received December 15, 1986)

Abstract Comparison of a sizable material of the genus *Raja* from the western North Pacific with the type specimens of almost all the nominal species in the area revealed a new species, *Raja* (*Okamejei*) *boesemani*. Among the western North Pacific *Raja* (*Okamejei*), the new species shows the closest resemblance to *R.* (*O.*) *hollandi* Jordan et Richardson. The new species, however, differs from *R.* (*O.*) *hollandi* mainly in having a relatively narrow interdorsal distance, rosette-like color patches of the disc and a pair of dark rings at the pectoral axils. The comparison also revealed that there were a total of five *Raja* (*Dipturus*) and six *Raja* (*Okamejei*) species in the western North Pacific. A revised key is given to the species also including the eastern North Pacific *Raja* (*Dipturus*) species, *R. binoculata* Girard and *R. rhina* Jordan et Gilbert.

Although it has been assumed that the systematics of the western North Pacific skates was carefully dealt with by Ishiyama (1958b, 1967), some confusion and problems still remain with regard to their systematics, especially for that of the genus *Raja* (Boeseman, 1978, 1979; Ishihara and Ishiyama, 1986). The systematics of the *Raja* subgenera *Dipturus* and *Okamejei* from the western North Pacific is reviewed here on the basis of material recently obtained from the region, as well as on that used in previous studies. Type specimens of all nominal species from the region were re-examined, except for those of *R. chinensis* Basilewsky, 1855, *R. pulchra* Liu, 1932, *R. tobae* Tanaka, 1916 and *R. fusca* Garman, 1885. Type specimens of the first three species were lost (pers. comm., 1985, Z. V. Krasyukova, ZIL; Li Sizhong, ASIZB; M. Aizawa, ZUMT, respectively) and that of the last species is now in bad condition (pers. comm., 1985, Susan Jewett, SOSC). *Raja chinensis* was described so briefly, without a figure, that this species merits hardly any scientific qualification, although some subsequent authors still used the scientific name. It is most likely that the species is synonymous with *Raja* (*Okamejei*) *kenojei* Müller et Henle, 1841.

As a result, *R.* (*O.*) *boesemani*, a new species which shows the closest resemblance to *R.* (*O.*) *hollandi* Jordan et Richardson, 1909, was found. Both species have been mixed up since Ui (1929) misidentified a specimen of the new species as *R.* (*O.*) *hollandi*. *Raja* (*O.*) *kenojei* is a valid species and considered to be a senior synonym of *R. porosa* Günther, 1874, *R. fusca* Garman, 1885, *R. japonica* Nyström, 1887, *R. tobae* Tanaka, *R. katsukii* Tanaka, 1927 and *R. meerdervoortii* sensu Jordan and Fowler (1903). *Raja meerdervoortii* Bleeker, 1860 is a valid species, and a senior synonym of *R. macrophthalma* Ishiyama, 1958. *Raja kenojei* sensu Okada et al. (1935) and other subsequent Japanese authors proved to be a junior synonym of a valid species, *R.* (*Dipturus*) *kwangtungensis* Zhu, 1960. Descriptions of those five species, viz. *R.* (*O.*) *boesemani*, *R.* (*O.*) *hollandi*, *R.* (*O.*) *kenojei*, *R.* (*O.*) *meerdervoortii* and *R.* (*D.*) *kwangtungensis* are made and their relationships are discussed in detail. Based on a morphological comparison of the material from the region, a revised key to the species of *Raja* (*Dipturus*) and *R.* (*Okamejei*) is presented, including the eastern North Pacific *R. binoculata* Girard, 1856 and *R. rhina* Jordan et Gilbert, 1881 of *R.* (*Dipturus*). In this paper, western North Pacific refers to the area from northern Japan off Hokkaido to the South China Sea as far south as Borneo.

Methods

Counts and measurements were done in accordance with those proposed by Hubbs and Ishiyama (1968) and Ishiyama and Ishihara (1977), with the exception of the length of the pelvic lobes which followed the method proposed by Stehmann (1985). There have been two methods of the measurement for the head length, i.e., that proposed by Ishiyama (1958b) and that by Hubbs

and Ishiyama (1968). The first measurement is termed the ventral head length and the second the dorsal head length. The procaudal length means the distance from the first dorsal origin to the tail tip (cf. Ishiyama, 1958b: 196). The tail length is measured from the skin above the first haemal spine (slightly behind the cloaca) to the tail tip unless otherwise stated. The definitions of thorns and prickles follow Stehmann and Bürkel (1984). Clasper terminology follows Stehmann (1970), Hulley (1972) and Ishihara and Ishiyama (1986). Terminology and measurements of the scapulocoracoid and egg-capsule follow McEachran and Compagno (1979) and Ishiyama and Ishihara (1977), respectively. Aloncle (1966), Miller and Lea (1972) and Raschi (1978) emphasized that the ventral sensory pore patterns are an important character for the classification of skates. Investigation of such patterns by the present author corroborated that this statement is acceptable at least for the classification of the western North Pacific *Raja* species.

Vertebral counts were made based on radiographs. Coloration was observed mostly on fresh-caught specimens, and formalin preserved specimens were used supplementarily. English names of the species are mainly those of the ISJ (Ichthyological Society of Japan) (1981). The abbreviations for the institutions follow the list of abbreviations as published by Leviton et al. (1985). The abbreviation NA means the southern South China Sea subexpedition of the Stanford University Naga expedition and the abbreviation HK means the Hong Kong subexpedition of the same expedition.

Raja (*Dipturus*) *kwangtungensis* Zhu, 1960
(Japanese name: Gangi-ei;
new English name: Kwangtung skate)
(Fig. 1)

Raja kwangtungensis Zhu, 1960: 148, figs. 137–139 (descr. in Chinese; type locality: Chapo, Hailing Tao, May 3, 1957, nos. 57-0676, 57-0674, 57-0675).

Raja kwangtungensis: ASIZB et al., 1962: 59, fig. 47 (redescr. in Chinese).

Raja kwantungensis: Ishiyama, 1967: 28 (copied from ASIZB et al., 1962).

Raja fusca (not of Garman, 1885): Liu, 1932: 163, fig. 11 (misident.).

Raja fusca (not of Garman, 1885): FNU, 1973: 396, pls. 7 and 8 (misident.).

Raja kenojei (not of Müller and Henle, 1841): Okada et al., 1935: 59, pl. 10-3 (misident.); Matsubara, 1935: 20 (in key); Matsubara, 1936: 29, fig. 20 (descr. in Japanese); Okada and Matsubara, 1938; 25 (in key); Ishiyama, 1950: 35, fig. 1 (egg-capsule); Kamohara, 1950: 64, fig. 15 (descr. in Japanese); Ishiyama, 1952: 4, fig. 2 (radiograph); Matsubara, 1955: 137 (in key); Ishiyama, 1958a: 14 (egg-capsule); Lindberg and Legeza, 1959: 118 (in part); Teng, 1962: 211 (in key; descr. in Japanese); Ueno, 1965: 6, fig. 3-A (in key); Chen and Chung, 1971: 20, fig. 14 (descr.); Shiogaki, 1982: 5 (listed, Aomori Pref.); Dolganov, 1983: 54, fig. 78 (in key); ISJ, 1981: 460 (listed); Shen, 1984a: 74, fig. (in key); Shen, 1984b: 6, pls. 10-1, a and b (descr.); Masuda et al., 1984: 13, pl. 14-A (descr.); Nakaya, 1984: 63, fig. 30 (descr.); Kamohara and Okamura, 1985: 8, pl. 7-35 (descr. in Japanese); Yamada, 1986: 32, pl. (diagnosis; related species; range).

Raja (*Okamejei*) *kenojei* (not of Müller and Henle, 1841): Ishiyama, 1958b: 356, fig. 73, pl. 2 (descr.; in key; range; notes); Ishiyama, 1967: 7, figs. 1. pls. 1 and 2 (descr.; range; notes).

Raja (*Dipturus*) sp.: Ishihara and Ishiyama, 1986: 278, fig. 7 (listed).

Material examined. Holotype, Dr. Zhu's personal number 57-0676, immature male, 336 mm TL, Chapo, Hailing Tao, East China Sea, March, 1957; 2 paratypes, Dr. Zhu's personal number 57-0675, immature male, 405 mm TL; 57-0674, immature female, 499 mm TL, both collected with the holotype; 3 adult males: HUMZ 35014, 721 mm TL, off Miyako, Iwate Pref., May 18, 1972; HUMZ 94973, 515.5 mm TL, East China Sea, 31°40′N, 127°08′E, 116 m depth, Apr. 7, 1982; MTUF 25072, 485 mm TL, off Maizuru, Kyoto Pref., 1952; 1 adult female, HUMZ 35066, 757 mm TL, collected with HUMZ 35014; 3 young males: FAKU 111539, 450 mm TL, Wakasa Bay, Kyoto Pref., March 12, 1981; MTUF 25047, 526.5 mm TL, off Shiogama, Miyagi Pref., Dec., 1966; MTUF 25898, 181 mm TL, East China Sea, 1953; 12 young females: FAKU 111538, 421 mm TL, off Kyogasaki Pen., Kyoto Pref., 50–230 m depth, June, 1979; MTUF 25048, 501.5 mm TL, collected with MTUF 25047; MTUF 25057, 492 mm TL, no data; MTUF 25165, 243 mm TL, off Yawatahama, Ehime Pref., May, 1954; MTUF 25166, 238 mm TL, collected with MTUF 25165; MTUF 25894, 234 mm TL, off Kanaiwa, Ishikawa Pref., Oct., 1948; MTUF 25895, 202 mm TL, collected with MTUF 25894; MTUF 25896, 216.5 mm TL, East China Sea, 1953; MTUF 25897, 193 mm TL, East China Sea, 1953; MTUF 25907, 486.5 mm TL, off Funakawa, Akita Pref., 1953; MTUF 25908, 428.5 mm TL, Wakasa Bay, Kyoto Pref., 1953; MTUF 25985, 214 mm TL, East China Sea, Feb., 1985.

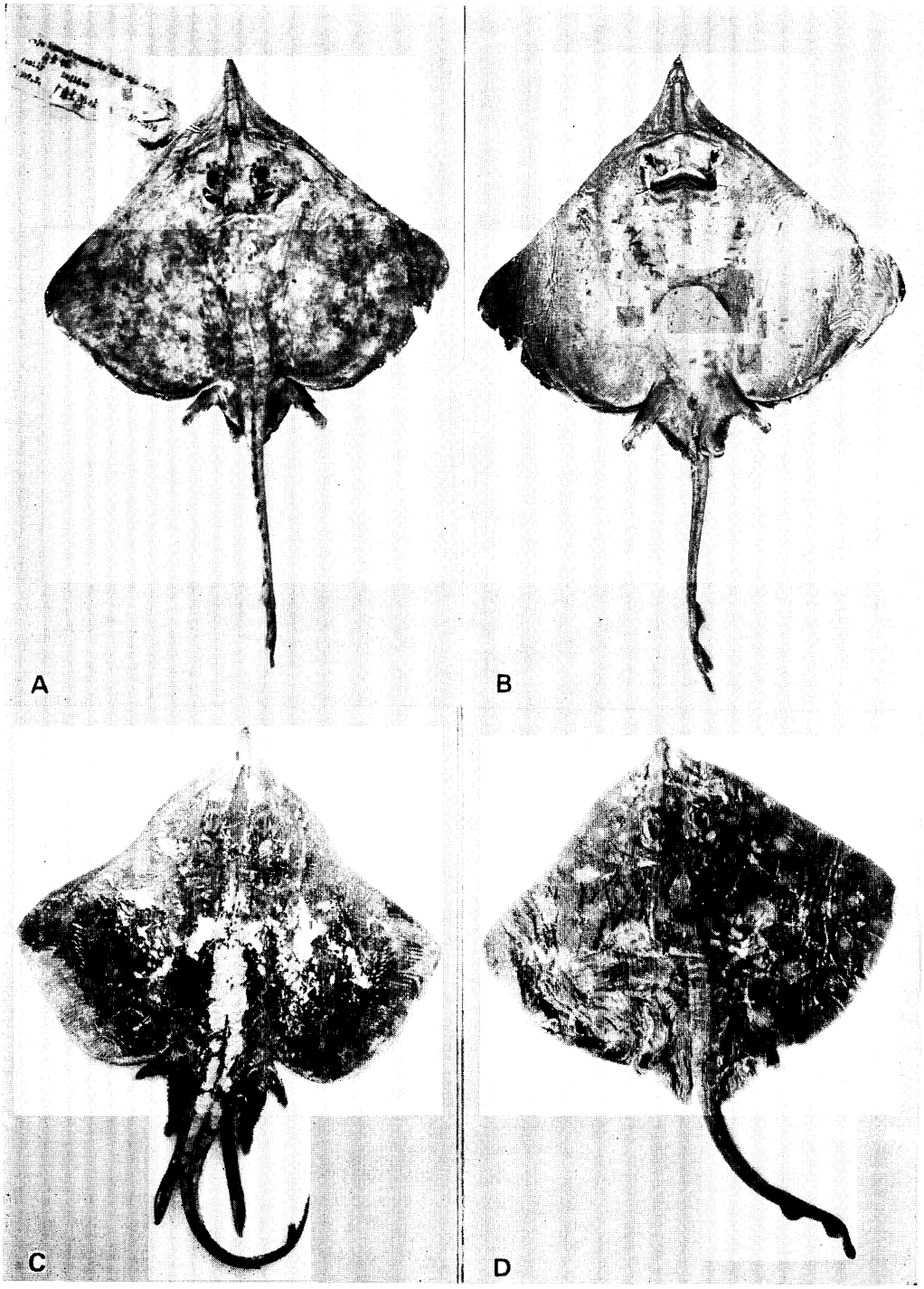

Fig. 1. *Raja* (*Dipturus*) *kwangtungensis*. A, B, holotype, Dr. Zhu's personal number 57-0676, young male, 336 mm TL; C, HUMZ 94973, adult male, 515.5 mm TL; D, MTUF 25985, young female, 214 mm TL.

Fig. 2. Ventral side of *Raja* (*Dipturus*) *kwangtungensis*, MTUF 25057, showing ventral sensory pore patterns.

Diagnosis. A medium-sized *Raja* (*Dipturus*) species with a maximum total length of about 500–700 mm in males and 550–750 mm in females. Precaudal body length longer than tail length. Dorsal head length 4.05–5.65 times the interorbital width. Procaudal tail length 33.1–40.3% of tail length, and postdorsal tail length 8.5–11.5% of tail length. Caudal fin only developed dorsally, but underside of tail tip with a keel. Caudal fin rather high, usually more than one-third the height of dorsals. Lateral tail folds only slightly developed. 0–2 nuchal thorns. One row of tail thorns in adult males and three in adult females. Dorsal side of disc smooth except for prickly snout tip and anterior margins of disc. Ventral side of disc only prickly on areas lateral to nostrils. Both dorsals and caudal fin usually prickly. Dorsal side of disc mottled with many light markings of various sizes, and a pair of such on center of pectorals being the largest. Ventral sensory pores usually distributed only anterior to pelvic girdle. Dorsal lobe of clasper with pseudorhipidion, and two clefts separated by terminal bridge, ventral lobe of clasper with rhipidion, shield, sentinel, spike and dike. Length of egg-capsule 65–70 mm, excluding horns. Tooth rows in upper jaw 31–42. Vtr, 30–32; Vprd, 41–49.

Description. Meristic counts and morphometric measurements of the holotype, paratypes and new material are given in Table 1.

External features: Disc rhombic, its greatest width in posterior half, at 53.9–68.6% of disc length. Snout hard, and pointed to moderately produced, dorsal head length 4.05–5.65 times the interorbital width; preorbital snout length 64.6–78.5% of dorsal head length; interorbital width longer than orbit length, and shorter than distance from anterior margin of orbit to spiracle end. Tail short and stout, its length 80.0–90.1% of precaudal body length; tail gradually tapering rearwards; two dorsals equal in size, separated by a distance of 56.6–100% of D_1 base length; postdorsal tail length 8.5–11.5% of tail length and almost equal to D_2 base length; caudal fin rather high, its height 28.5–69.9% of height of each dorsal; caudal fin fold only developed dorsally, but under side of tail tip with a keel; lateral tail folds narrow, only poorly developed, though originating at origin to midlength of tail. Mouth weakly arched, with 31–37 parallel rows of pointed teeth in upper jaw in males and 34–42 rows of flattened teeth in quincunx in females; mouth width 45.0–64.4% of preoral length; internarial width 54.1–84.3% of prenarial length; distance between first gill slits (outer rims) 70.1–99.1% of dorsal head length.

Squamation: Dorsal side of disc with thorns and prickles; orbital thorns 6–15; nuchal thorns 0–2; interdorsal thorns 2–6; a median row of tail thorns in adult males and three rows in adult females; alar and malar thorns well developed in adult males; prickles present on snout tip and anterior margin of disc; dorsal and caudal fins usually with prickles. Underside smooth, except for lateral narrow areas aside nostrils.

Coloration: Dorsal ground color dark brown and sometimes pale-brown; dorsal side of disc mottled with many oval light markings of various sizes, a pair on center of pectorals being the largest; ventral side dusky white.

Ventral sensory pores: Tiny and darkly pigmented; pores densely distributed on disc, but absent on posterior margin of disc, abdominal region and pelvic lobes; sometimes present on skin covering pelvic girdle (Fig. 2).

Clasper: Slender with pointed tip, its length 50.0–52.4% of tail length; dorsal lobe of clasper with two clefts (cf) separated by a terminal bridge (tb) and pseudorhipidion (pr); ventral lobe with monolobed rhipidion (rh), shield (sh), sentinel (st), spike (sk) and dike (dk); sh covered with lamellar integument and dk present at its distal

Table 1. Counts and measurements (mm) of *Raja* (*Dipturus*) *kwangtungensis*.

	Holotype	Paratypes								
	♂ No. 57-0676	♂ No. 57-0675	♀ No. 57-0674	♂ MTUF 25047	♂ MTUF 25072	♂ HUMZ 35014	♂ HUMZ 94973	♀ MTUF 25048	♀ HUMZ 35066	% of TL
Total length	336	405	499	526.5	485	721	515.5	501.5	757	
Disc length	191.5	218.5	276.5	315.5	278	426.5	283	289	438	54.0–59.9
Disc width	228	283	332	382	325	518.5	330	363.5	536	64.0–72.6
Snout to maximum disc width	126	150	176.5	180	168	262	174	161.5	236	31.2–37.5
Dorsal head length	87	100	130	119.5	111	162	110.6	115.5	170.5	21.5–26.1
Preorbital snout length	64.5	72.5	102	78	74	116.5	71.5	78.3	119	13.9–20.4
Orbit length	8.8	10	14	21.5	20.4	26.5	19.5	17	24.4	2.6– 4.2
Interorbital width	16	19.5	23	26.5	23.4	36.5	23.5	28.5	39.5	4.6– 5.7
Spiracle length	10.5	14	17	17.5	14.5	26	18.7	17.3	26.5	3.0– 3.6
Interspiracular width	24	27.5	34	39	32.5	51	32.7	40	52	6.3– 8.0
Ant. orbit rim to spiracle end	—	—	—	32	29	43	31.5	31	40.1	5.3– 6.2
Procaudal length	52.6	76.5	77	85.2	71.2	122.5	96.2	80.2	119	14.7–18.8
D_1 base length	15	19.5	17	21.2	21.3	32.7	23.5	23.5	32.5	3.4– 4.8
D_1 vertical height	8	10.5	9	15	14.4	24.3	10.6	11	17.5	1.8– 3.4
D_2 base length	14	20.5	22	21.5	21	34.5	25.5	23	32.5	4.1– 5.1
D_2 vertical height	8	10.5	9	13.5	14.2	26.3	15.8	10.3	16.5	1.9– 3.6
Interdorsal distance	8.5	16	17	17.7	11.3	20.8	21.2	13.5	24.5	2.3– 4.1
Postdorsal length	16	22	21	23	15.6	33.1	24	20	29.2	3.2– 5.4
Caudal fin vertical height	2.5	3	—	6.3	5	10.3	4.6	7.2	9.8	0.7– 1.4
Lateral tail fold length	47	70	—	110	147	200	99	90	190	15.2–30.3
Precaudal body length	182.5	213	266.5	290	266	398	273	269	421	52.6–55.6
Tail length	152.5	192	232.5	236.5	219	324	239	234.5	337	44.5–47.4
Ventral head length	115	34.3	175	162	153	217.5	154.5	154	233	30.0–35.2
Preoral snout length	65.5	74.5	101	83	74	107	70	81.5	123.4	13.6–20.2
Mouth width	33	37.5	45.5	49.8	44.9	69	43.5	46.2	67	8.4– 9.8
Prenarial snout length	54.5	60.5	83.5	65.3	58.3	85	57.1	60.8	95.5	11.1–16.7
Internarial width	29.5	37	44	44	39.4	60	39.3	43	64	7.6– 9.1
Nasal curtain length	12.5	17	19	29	28.3	41	25.8	29	37	3.7– 5.8
Over first gill slits (outer rims)	61	79.5	96	118.5	90	141	82.6	98	153	16.0–22.5
Ant. pelvic lobe length	46	51.5	—	64.6	58	68.5	53.4	53	79.5	9.5–13.7
Post. pelvic lobe length	29	33	—	84.6	86	120	78.1	66.8	108.5	8.1–17.7
Clasper length	—	—	—	—	—	169.5	119.4	—	—	23.2–23.5
Tooth rows in upper jaw	35	35	34	35	36	31	36	38	34	
Vtr	31	30	30	—	31	—	30	—	—	
Vprd	48	43	46	—	—	—	43	—	—	
Cranium length	94	111.5	—	—	110	—	112	—	—	
Rostral cartilage length	55	64	—	—	54	—	53	—	—	
Prefontanelle length	43	47	—	—	36	—	37	—	—	
Cranium width	47	58.5	—	—	61	—	60	—	—	
Interorbital width	15	19	—	—	24	—	22	—	—	
Ant. fontanelle length	19	25	—	—	29	—	30	—	—	
Post. fontanelle length	17	—	—	—	25	—	—	—	—	

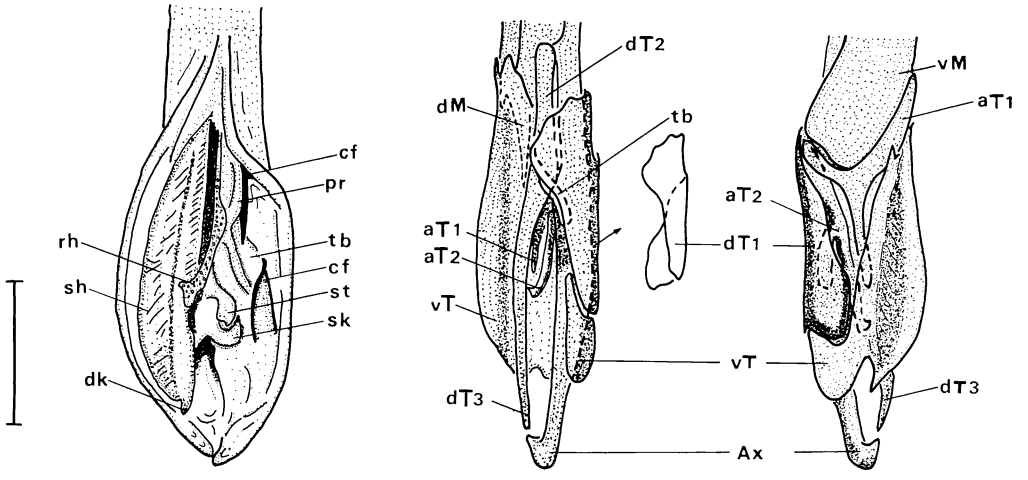

Fig. 3. Left clasper of *Raja (Dipturus) kwangtungensis*, MTUF 25072. A, clasper components (clasper glans opened); B, clasper skeleton in dorsal view; C, clasper skeleton in ventral view. aT1 and aT2, accessory terminals 1 and 2; Ax, axial cartilage; cf, cleft; dk, dike; dM, dorsal marginal; dT1-dT3, dorsal terminals 1 to 3; pr, pseudorhipidion; rh, rhipidion; sh, shield; sk, spike; st, sentinel; tb, terminal bridge; vM, ventral marginal; vT, ventral terminal. Scale indicates 20 mm.

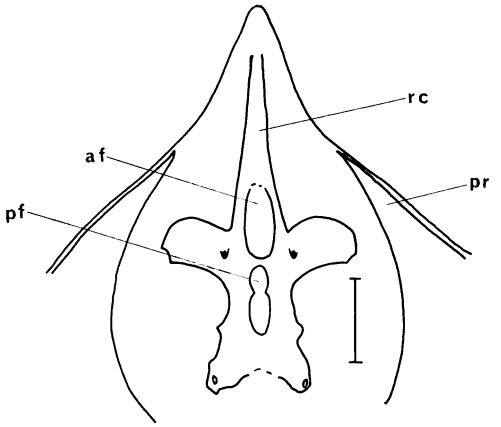

Fig. 4. Cranium of *Raja (Dipturus) kwangtungensis*, holotype, Dr. Zhu's personal number 57-0676, 336 mm TL. af, anterior fontanelle; pf, posterior fontanelle; pr, pectoral radials; rc, rostral cartilage. Scale indicates 20 mm.

tip; tip of sk hooked and located just distal to tip of st (Fig. 3A).

Clasper skeleton: Consists of 3 dorsal terminal (dT1-3), 2 accessory terminal (aT1 and 2), terminal bridge (tb), ventral terminal (vT), dorsal and ventral marginal (dM and vM), and axial (Ax) cartilages: distal end of dM bifurcated and lateral longer tip forming pr externally; dT1 almost parallelogram-shaped, rotated onto ventral side and united with vT; dT2 short, slender and rod-like, distally united with Ax by tb and with dT3; dT3 slender and long, united to Ax at distal tip; tb apparent externally; longer tip of dM and tb forming proximal cf and tb and dT1 forming distal cf externally; vT J-shaped, lateral convex ridge running along entire length of cartilage and forming sh externally; medial ridge of vT extending over two-thirds of cartilage and bifurcated at tip; larger spatulate tip of ridge forming dk externally, but another smaller tip only slightly developed and never forming fn externally; anterior notch of vT shallow; aT1 Y-shaped with two proximal and one distal arms; lateral proximal arm of cartilage the longer one; distal arm of cartilage forming st externally; aT2 inverse Y-shaped with two distal arms; lateral distal arm of cartilage longer one, tip of which is hooked and forming sk externally; another distal arm of cartilage firmly united to Ax; aT3 absent (Fig. 3B, C).

Cranium: Measurements are given in Table 1. Length of rostral cartilage 47.3–58.5% of cranium length; prefontanele length 32.7–45.7%; cranium width 50.0–55.5%; interorbital width 16.0–21.8%;

Table 2. Measurements (mm) of the left scapulocoracoid of *Raja* (*Dipturus*) *kwangtungensis*, MTUF 25047.

Character		% of greatest length
Greatest length	44.3	100
Greatest height	32.8	74.0
Premesocondyle length	20.2	45.6
Postmesocondyle length	24.1	54.4
Anterior fenestra length	11.9	26.9
Anterior fenestra height	13.0	29.3
Postdorsal foramen length	14.1	31.8
Postdorsal foramen height	9.7	21.9
Postventral foramen length	10.5	23.7
Postventral foramen height	5.0	11.3
Height of rear corner	21.9	49.4

Table 3. Measurements (mm) of the egg-capsule of *Raja* (*Dipturus*) *kwangtungensis* collected off Maizuru, Kyoto Pref.

Character	
Length (without horns)	73.0
Width: maximum	39.5
minimum	32.5
Ant. horn length	27.8
Post. horn length	36.5
Ant. apron width	10.6
Post. apron width	17.5
Keel width	—

Fig. 5. Egg-capsule of *Raja* (*Dipturus*) *kwangtungensis*, collected off Maizuru, Kyoto Pref., 73 mm in length excluding horns.

length of anterior fontanellel 20.2–26.8%; length of posterior fontanelle 18.7–22.7%. Anterior fontanelle oval without distinct anterior margin; posterior fontanelle gourd-shaped; both fontanelles almost equal in length (Fig. 4).

Scapulocoracoid: Measurements are given in Table 2. Almost rectangular with anterior fenestra, postdorsal foramen and postventral foramen; anterior fenestra almost circular; postdorsal and postventral foramina horizontally elliptical; postdorsal foramen larger than postventral foramen; posterodorsal margin highly elevated, angled at about 90 degrees (see Ishihara and Ishiyama, 1986: fig. 7A).

Egg-capsule: Measurements are given in Table 3. Rather small among the western North Pacific *Raja* (*Dipturus*) species; almost rectangular with a horn at each corner; lateral edges nearly straight; anterior margin concave and posterior margin almost flat; lateral keel indistinct; posterior apron wider than anterior one; posterior horns longer than anterior ones; bases of the horns stout and tips terminating as respiratory fissure; transverse section of horns roundish; silky fibres densely covering entire surface; color greyish-brown (Fig. 5).

Remarks. Based on the detailed comparison of the type specimens of *R. kenojei* Müller et Henle, 1841 with the description of "*R. kenojei*" by Ishiyama (1958b, 1967), Boeseman (1978, 1979) pointed out that *R. kenojei* sensu Ishiyama could not be identical with *R. kenojei* Müller et Henle. Therefore, he suggested that *R. kenojei* sensu Ishiyama may either be synonymous with another species or represent an undescribed species. Examination of the type specimens of *R. kenojei* by the present author supports his hypothesis:

R. kenojei proved to be a distinct species and a senior synonym of *R. porosa* Günther, 1874. In 1985, the present author examined the type specimens of *R. kwangtungensis* Zhu, 1960 at the Shanghai Fisheries College and found that it was conspecific with *R. kenojei* sensu Ishiyama. Both agree well with each other in the dorsal color markings of the disc, well developed caudal fin, indistinct lateral tail folds, squamation patterns and in the vertebral counts.

Raja (*D.*) *kwangtungensis* has been confused with *R. kenojei* by many Japanese authors including Ishiyama (1958b, 1967) since Okada et al. (1935) misidentified their specimen of the present species as *R. kenojei*. Ishiyama (1958b, 1967) assigned his *R. kenojei* (=*R. kwangtungensis*) to the subgenus *Okamejei*. Later, Ishihara and Ishiyama (1986) re-allocated the present species to the subgenus *Dipturus* as *R.* (*D.*) sp. due to its dorsal squamation and structures of the neurocranium and the clasper. Although *R.* (*D.*) *kwangtungensis* and *R. kenojei* belong to different subgenera, both species show similarity in the dorsal light color markings of the disc. However, *R.* (*D.*) *kwangtungensis* possesses numerous light color markings of various sizes on the disc, whereas *R. kenojei* possesses two symmetrical pairs of light or dark color markings on the disc at most (compare Fig. 1 with Fig. 18). Moreover, in their young stages, they are more easily distinguished by the presence of a pair of dark rings at the center of pectorals in *R. kenojei* and by their absence in *R.* (*D.*) *kwangtungensis* (see Fig. 18A).

Raja (*D.*) *kwangtungensis* differs from *R.* (*D.*) *binoculata*, *R.* (*D.*) *pulchra* and *R.* (*D.*) *rhina* in the following respects: 1) caudal fin high, its height more than the maximum width of lateral tail folds (low, equal to the maximum width in the above three species); 2) ventral keel present near tail tip (absent); 3) tip of accessory terminal 2 clasper cartilage hooked (spoon-shaped); 4) posterodorsal margin of scapulocoracoid highly elevated, angled at about 90 degrees (not so highly elevated, angled at more than 90 degrees). Furthermore, *R.* (*D.*) *kwangtungensis* differs from *R.* (*D.*) *gigas* and *R.* (*D.*) *macrocauda* in: 1) dorsal side of disc with numerous light color markings (without any markings); 2) lateral tail folds indistinct (apparent); 3) tail tapering (expanded at midlength); 4) Vprd 41–49 (54–63). *Raja* (*D.*) *kwangtungensis* differs from *R.* (*D.*) *tengu* in: 1) dorsal side of disc with numerous light color markings (without any markings); 2) dorsal head length less than six times the interorbital width (more than 6.5 times); 3) terminal bridge clasper cartilage present and apparent externally (absent).

Distribution. Based on published data and the present material, this species occurs in the waters from off both coasts of Aomori Pref., Japan to the East China Sea as far south as the Senkaku Is., at depths of about 50 to 240 m. Ishiyama (1958b) indicated the Tsugaru Strait as the northern limit for this species.

Raja* (*Okamejei*) *boesemani sp. nov.
(Japanese name: Isago-gangi-ei;
new English name: Black sand skate)
(Fig. 6)

Raja kenojei: Müller and Henle, 1841: 149, pl. 48 (in part).

Raia kenojei (not of Müller and Henle, 1841): Richardson, 1846: 197 (after a picutre of Reeves', 1828 drawings, cf. Whitehead, 1970).

Raja kenojei (not of Müller and Henle, 1841): Gray, 1851: 112 (listed according to Reeves' collection); Wang, 1933: 105, fig. 7 (misident.)

Raja hollandi (not of Jordan and Richardson, 1909): Ui, 1929: 22 (misident.); Matsubara, 1936: 25 (in part); Okada and Matsubara, 1938: 35, fig. 1 (egg-capsule); Kamohara, 1950: 17 (in part); Ishiyama, 1951b: 119 fig. 1 (age determination); Matsubara, 1955: 137 (in key); Ishiyama, 1958a, 14 (egg-capsule); Lindberg and Legeza, 1959: 118 (in part); Zhu, 1960: 141, figs. 130–132 (descr. in Chinese); ASIZB et al., 1962: 57, fig. 46 (descr. in Chinese); Teng, 1962: 210 (in key; descr.); Zhu et al., 1963; 58, fig. 43 (descr. in Chinese); Chen and Chung, 1971: 21, fig. 15 (descr.); ISJ, 1981: 460 (listed); Dolganov, 1983: 57, fig. 79 (in key); Shen, 1984a: 74, fig. (in key); Masuda et al., 1984: 13, pl. 13-C (descr.); Zhu and Meng, 1984: 67, fig. 38 (descr. in Chinese); Iwai, 1986: 46, pl. 38, bottom (descr. in Japanese); Yamada, 1986: 34, pl. (diagnosis; key; range).

Raja (*Okamejei*) *hollandi* (not of Jordan and Richardson, 1909): Ishiyama, 1958b: 361, fig. 75 (descr.; in key; notes): Ishiyama, 1967: 13, fig. 3, pls. 4 and 5 (descr.; range; ecology); Ishihara and Ishiyama, 1986: 278, figs. 6 and 8 (listed).

Raja sp.: Wu, 1929: 11, fig. 8 (descr., Amoy).

Raja porosa (not of Günther, 1874): Tortonese, 1939: 212, fig. 4 (misident.).

Raja fusca (not of Garman, 1885): FNU, 1973: 397, pl. 9 (misident.).

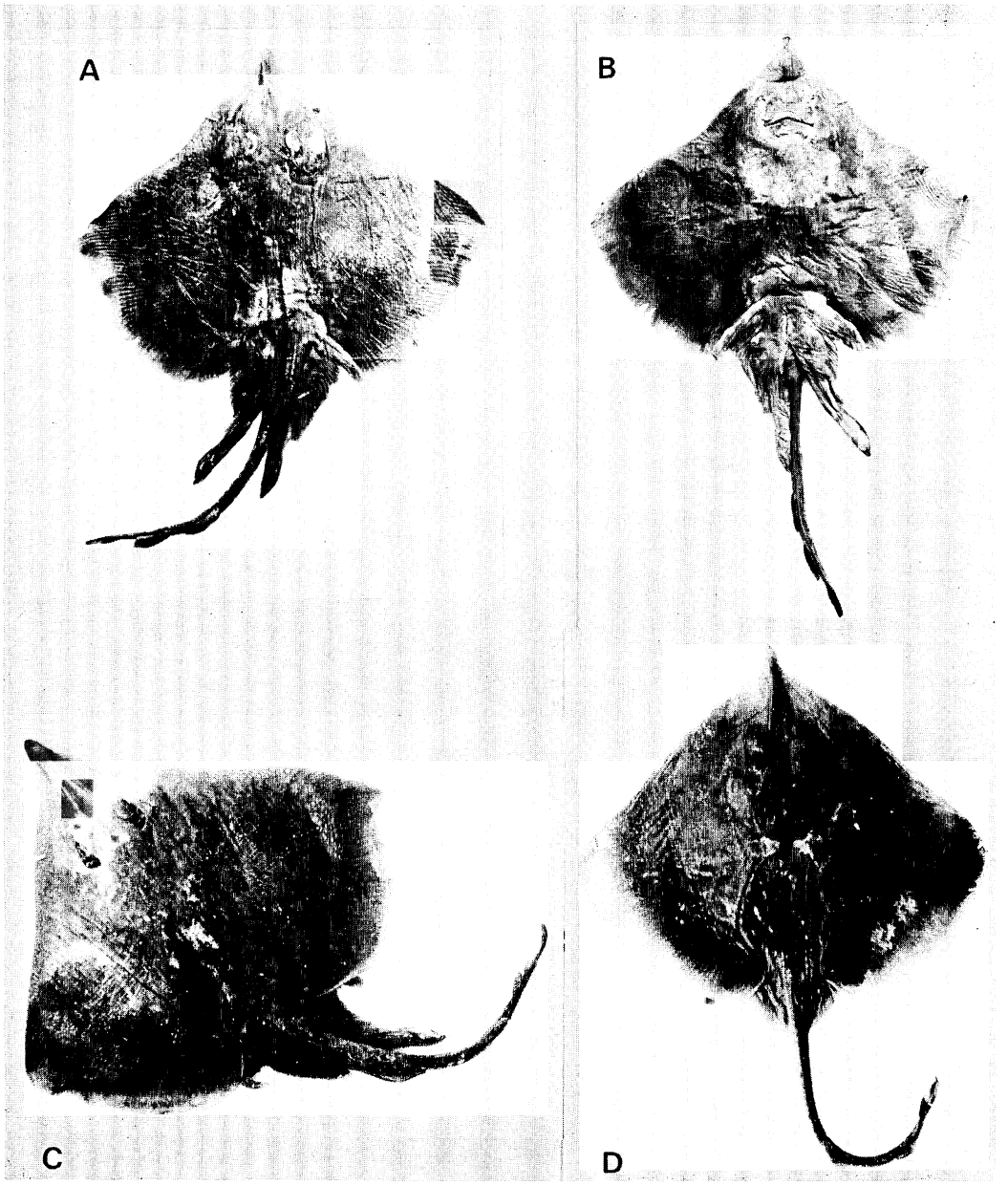

Fig. 6. *Raja* (*Okamejei*) *boesemani* sp. nov. A, B, holotype, MTUF 25916, adult male, 468.5 mm TL; C, paratype, HK6, adult male, 424 mm TL; D, paratype, HUMZ 15855, young male, 220 mm TL.

Raja sp. 3: Gloerfelt-Tarp and Kailola, 1984: 33, fig. (descr., south of Java I.).

Material examined. Holotype: MTUF 25916, adult male, 468.5 mm TL, East China Sea, 32°15′N, 125° 05′E, depth unknown, May 25, 1950, collected by R. Ishiyama; Paratypes (28): 8 adult males: HUMZ 33375, 354.5 mm TL, off Kuching, 3°14′N, 109°57′E, depth unknown, Dec. 6, 1966, collected by K. Matsuura; HUMZ 37603, 306 mm TL, off Kuching, 2°58′N, 109°19′E, 64–67 m depth, Nov. 17, 1973; HUMZ 37633, 326 mm TL, off Kuching, 3°30′N, 109°08′E, 86 m depth, Nov. 16, 1973; MTUF 24644, 457 mm TL, no data; HK 5, 442 mm TL, South China Sea, 22°10′30″N, 114°14′E, depth unknown, Dec. 16, 1957, collected by R.L. Bolin; HK 6, 424 mm TL, South

China Sea, 22°29′N, 114°23′E, 22 m depth, Jan. 7, 1958, collected by R.L. Bolin; HK 8, 391 mm TL, South China Sea, 19°38′N, 111°30′E, depth unknown, July 21, 1958, collected by R.L. Bolin; HK 13, 405 mm TL, collected with HK 6; 5 adult females: MTUF 24648, 518.5 mm TL, no data; HK 1, 422.5 mm TL, South China Sea, 22°30′15″N, 119°22′10″E, 18.3 m depth, Aug. 29, 1958, collected by R.L. Bolin; HK 2, 409 mm TL, collected with HK 1; HK 11, 483 mm TL, collected with HK 6; HK 12, 501.5 mm TL, collected with HK 5; 8 young males: HUMZ 15855, 220 mm TL, off Kuching, 4°0′N, 105°49′E, depth unknown, Dec. 20, 1957; HUMZ 37678, 192 mm TL, off Kuching, 3°10′N, 111°11′E, 79 m depth, Nov. 20, 1973, collected by K. Matsuura; HK 22, 210.5 mm TL, South China Sea, 22°27′50″N, 114°13′08″E, depth unknown, Jan. 6, 1958, collected by R.L. Bolin; HK 27, 257.5 mm TL, South China Sea, 22°24′N, 114°23′E, 22 m depth, Jan. 7–8, 1958, collected by R.L. Bolin; HK 29, 250 mm TL, collected with HK 6; HK 32, 170.5 mm TL, South China Sea, 21°30′N, 113°35′E, June 25, 1958, collected by F.D. Ommanney; HK 33, collected with HK 32; MTUF 25988, 320.5 mm TL, East China Sea, 1985; 7 young females: HUMZ 37613, 193.5 mm TL, off Kuching, 3°42′N, 109°33′E, 86 m depth, Nov. 16, 1973, collected by K. Matsuura; NA 8, 295.5 mm TL, South China Sea, 11°52′-12°14′N, 109°19′-23′E, depth unknown, Feb. 2, 1961, collected by a South Vietnamese fisherman; NA 9, 272 mm TL, 15°41′30″N, 108°42′E, depth unknown, Feb. 27, 1960, collected by R.L. Bolin; HK 23, 295.5 mm TL, collected with HK 22; HK 28, 247 mm TL, collected with HK 27; HK 30, 234.5 mm TL, collected with HK 5; HK 31, 191.5 mm TL, collected with HK 32.

Diagnosis. A small to large-sized *Raja* (*Okamejei*) species with a maximum total length of about 300–450 mm in males and 450–550 mm in females. Snout pointed, dorsal head length 4.81–5.90 times the interorbital width. Procaudal tail length 21.1–24.1% of TL and 43.6–48.8% of tail length. Postdorsal tail length 28.8–41.4% of dorsal head length and usually more than 1.5 times the D_2 base length. 0–4 nuchal thorns. Dark specks unevenly distributed on entire dorsal side of disc, here and there assembled to form rosette-like patches. A pair of dark rings as large as the orbits present at pectoral axils. An additional pair of dark rings sometimes present at center of pectorals. Ventral sensory pores absent on abdominal region and never forming V-shaped pattern at midlength of metapterygium. Dorsal lobe of clasper with two clefts separated by terminal bridge, and pseudorhipidion, ventral lobe with rhipidion, shield, sentinel, spike, boss and funnel. Proximo-lateral arm of aT1 clasper cartilage extremely elongated. Scapulocoracoid horizontally expanded, its height about a half of its length. Length of egg-capsule 55–60 mm excluding horns. Tooth rows in upper jaw 32–53. Vtr, 26–30; Vprd, 30–47.

Description. Meristic counts and morphometric measurements of the holotype and paratypes are given in Table 4.

External features: Disc rhombic, its greatest width in posterior half, at 55.7–62.7% of disc length. Snout hard and pointed, dorsal head length 4.81–5.39 times the interorbital width; preorbital length 67.7–71.7% of dorsal head length; interorbital width nearly as large as orbit length. Tail stout, its length longer or shorter than precaudal body length; tail gradually tapering rearwards; procaudal tail length 21.1–24.1% of TL and 43.6–48.8% of tail length; two dorsals equal in size, separated by a distance of more than half of D_1 base length and usually less than D_1 base length; postdorsal tail length 6.5–9.7% of TL, 13.5–19.3% of tail length, 28.8–41.1% of dorsal head length and usually more than 1.5 times the D_2 base length; caudal fin only developed dorsally, its height more than the maximum width of lateral tail folds; underside of tail tip with a keel, about half as long as caudal fin base length; lateral tail folds narrow, originating at or near root of tail. Mouth weakly arched with 32–53 parallel rows of pointed teeth in upper jaw in males and 39–52 flattened teeth in quincunx in females; mouth width 45.2–56.8% of preoral length; internarial width 59.1–66.0% of prenarial length; distance between first gill slits (outer rims) 74.0–82.7% of dorsal head length.

Squamation: Dorsal surface of disc with thorns and prickles; nuchal thorns 0–4, mostly 1–3; orbital thorns 3–13, usually 6–9; interdorsal thorns 2–6; in young, one row of tail thorns in both sexes; in adult, 3 rows in males and 5 in females; alar and malar thorns well developed in adult males, and both thorn fields connected; prickles developed dorsally only on snout, anterior margin of disc and on both dorsals; caudal fin often prickly; ventral side smooth, except for snout tip and narrow areas aside nostrils.

Coloration: Dorsal ground color dark brown; snout translucent lighter; dorsal side of disc with unevenly scattered dark specks which here and there assembled to form rosette-like patches;

Table 4. Counts and measurements (mm) of *Raja* (*Okamejei*) *boesemani* sp. nov.

	Holotype	Paratypes										
	♂ MTUF 25916	♂ MTUF 24644	♂ HUMZ 33375	♂ HUMZ 37603	♂ HUMZ 37633	♂ HK-5	♀ MTUF 24648	♀ HK-1	♀ HK-2	♀ HK-11	♀ HK-12	% of TL
Total length	468.5	457	354.5	306	326	442	518.5	422.5	409	483	501.5	—
Disc length	264	251.8	194.5	162	180	240	296	241	242	287.5	284.5	52.6–59.5
Disc width	313	301	219	182	201	277	361.5	284.5	275	343.5	337	59.5–71.1
Snout to maximum disc width	147	153.5	116	100	107	147	170	143	144	167	169	31.4–35.2
Dorsal head length	99	98.5	75	67.3	71.2	92.3	116	96.5	97.5	113	117	20.9–23.8
Preorbital snout length	71	71.2	53.5	47.5	51.1	62.5	81.5	68.9	69	80.6	83	14.1–16.9
Orbit length	17.4	15.8	14.2	12.5	13.3	15	18.1	14.3	12.9	16	16.3	3.2– 4.1
Interorbital width	19.8	19.2	15	13.1	13.2	18.2	24.5	19.9	20.2	23.4	24	4.0– 4.9
Spiracle length	10.5	12.3	8.5	8.5	9	11	13.7	12	11.7	14.5	18.5	2.2– 3.7
Interspiracular width	31	27.8	21.7	20.5	20.3	26.8	33.5	27.5	28.8	32	31.5	6.1– 7.0
Ant. orbit rim to spiracle end	23.2	24.1	19.2	18.5	19.3	22.9	26.5	22.2	22.3	27.5	27.8	4.9– 6.1
Procaudal length	108	99	79.9	73.5	78.5	102.7	112	93.8	86.9	102	108.1	21.1–24.1
D_1 base length	26.2	27.2	19.8	14.5	15.4	26.7	29.4	23.1	22.4	27.5	22.9	4.6– 6.1
D_1 vertical height	14.1	11.9	7.2	5.7	5.9	12	11.5	9.2	11.2	12.5	10.2	1.8– 3.0
D_2 base length	26.6	24.5	16.9	15.6	15	18.5	28.8	21.7	20.4	24	22.5	3.8– 5.7
D_2 vertical height	12.4	10.7	6.2	7	5.9	13.1	12.3	9.6	9.3	11	10.5	1.7– 3.1
Interdorsal distance	15.4	17.5	12.9	13.3	18.1	20.3	16.8	13.1	13.5	12.5	20	2.6– 5.6
Postdorsal length	39.8	29.8	28.8	29.7	31.1	37.2	36.3	33.5	28.1	38.4	39.4	6.9– 9.7
Caudal fin vertical height	3.5	5	3.7	2.6	2.7	3.7	4	3.5	3	4.4	3.4	0.7– 1.1
Lateral tail fold length	170	152.5	134	88	72.5	162.5	170.5	146	135	162	169	22.2–37.8
Precaudal body length	238	237	174	148.5	159.5	220	281.5	220.5	214	261.5	270	48.5–54.3
Tail length	229	220	181	156	161	218	237	202	192	218.5	232.5	45.2–51.1
Ventral head length	135.5	134.5	105.5	92	99	124.5	154	128	122	145.5	152	28.2–30.4
Preoral snout length	69.8	69.5	54.8	44.7	51.9	62.2	83	70.3	68.8	82.2	83	14.1–17.0
Mouth width	34.5	36.5	28.5	24.4	26	33.3	40.7	31.8	33.1	40.5	41.9	7.4– 8.4
Prenarial snout length	55.3	56.5	40.8	37.3	41.5	48.2	65.6	55.8	53.3	64.5	65.5	10.9–13.4
Internarial width	34.5	32.8	25	24.4	26	30	39.5	33	32.5	39	40.7	6.8– 8.1
Nasal curtain length	23.5	19.8	20.5	12.9	16.1	23.7	24.5	20	25	26.3	24.5	4.2– 6.1
Over 1st gill slits (outer rims)	78.5	70	59	49.8	53	73.2	91	78	76	91	95	15.3–18.9
Ant. pelvic lobe length	54.2	53.2	38.8	34.5	38.7	52	64	56.5	50.8	52	57.1	9.7–12.4
Post. pelvic lobe length	80.8	63	41.5	40.2	42.3	77.3	70.5	60	57.5	72.3	69.2	11.6–17.5
Clasper length	110.6	100.6	75.4	54.3	65.5	105.3	—	—	—	—	—	17.7–23.9
Tooth rows in upper jaw	40	42	47	53	47	43	43	43	39	41	47	
Vtr	28	—	29	27	30	27	—	27	27	27	26	
Vprd	37	—	47	43	41	41	—	39	41	39	41	
Cranium length	104	—	76	73	78	—	—	—	—	—	—	
Rostral cartilage length	53.5	—	39	37	43	—	—	—	—	—	—	
Prefontanelle length	45	—	32.5	33	33.5	—	—	—	—	—	—	
Cranium width	51	—	39	38	38	—	—	—	—	—	—	
Interorbital width	18	—	14	13	13	—	—	—	—	—	—	
Ant. fontanelle length	20	—	13.5	15	16	—	—	—	—	—	—	
Post. fontanelle length	20	—	13	13.5	14	—	—	—	—	—	—	

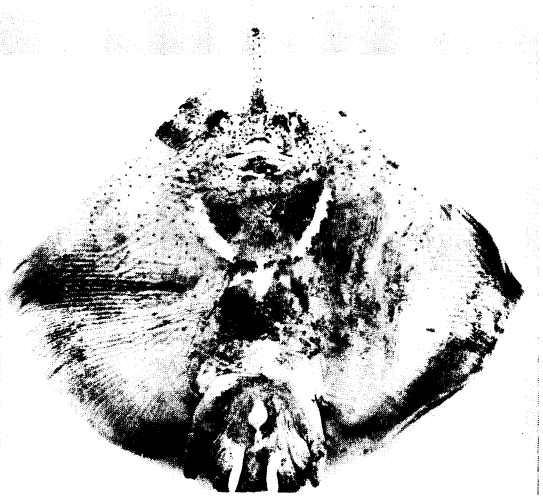

Fig. 7. Ventral side of *Raja (Okamejei) boesemani* sp. nov., MTUF 25988, showing ventral sensory pore patterns.

these patches sometimes arranged symmetrically at both sides of disc; a pair of dark rings as large as orbit present at pectoral axils, which become obscure after formalin preservation; another pair of dark rings sometimes present at center of pectorals and dark specks marked off from ground color inside the rings; tips of both dorsals and tail darkish; ventral side usually whitish, dusky in some specimens.

Ventral sensory pores: Rather sparsely distributed on about anterior half of disc; absent on abdominal region and pelvic lobes; series of posteriormost pores undulated and W-shaped (Fig. 7).

Clasper: Slender with pointed tip, its length 34.8–48.3% of tail length; dorsal lobe with pseudorhipidion and two clefts separated by terminal bridge; ventral lobe with bilobed rhipidion, shield, sentinel, spike, boss (bs) and funnel (fn); tip of st crab-shaped; tip of sk pointed and close to tip of st (Fig. 8A).

Clasper skeleton: Consists of 3 dorsal terminal, 2 accessory terminal, terminal bridge, ventral terminal, 2 marginal and axial cartilages; distal end of dM bifurcated, lateral longer tip forming pr externally; medial shorter tip only slightly produced; dT1 almost parallelogram-shaped, rotated onto ventral side and united with vT; dT2 boot-shaped, proximally united to dM at above tip of dM and distally united with Ax by tb and with dT3; dT3 long and slender, its tip united to Ax; tb apparent externally; longer tip of dM and tb forming proximal cf, and tb and dT1 forming distal cf externally; vT J-shaped, lateral convex

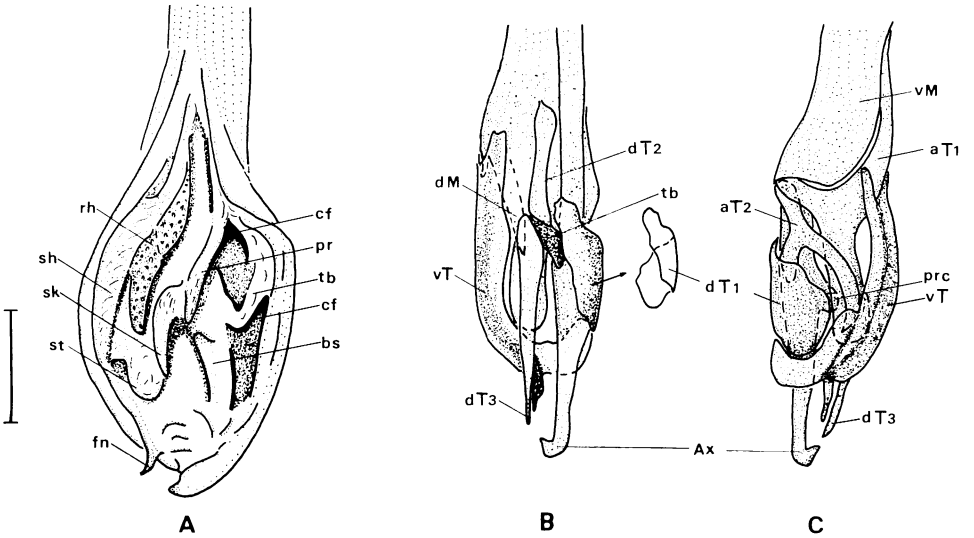

Fig. 8. Left clasper of *Raja (Okamejei) boesemani* sp. nov., MTUF 24644. A, clasper components (clasper glans opened); B, clasper skeleton in dorsal view; C, clasper skeleton in ventral view. aT1 and aT2, accessory terminals 1 and 2; Ax, axial cartilage; bs, boss; cf, cleft; dM, dorsal marginal; dT1–dT3, dorsal terminals 1 to 3; fn, funnel; pr, pseudorhipidion; prc, process of Ax; rh, rhipidion; sh, shield; sk, spike; st, sentinel; tb, terminal bridge; vM, ventral marginal; vT, ventral terminal. Scale indicates 10 mm.

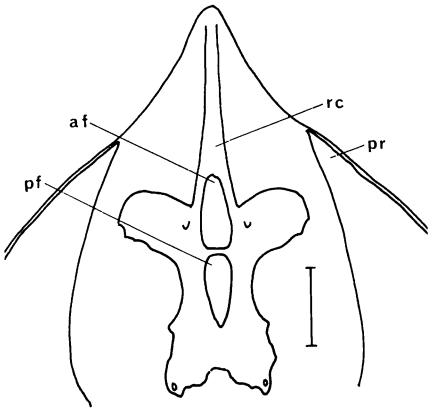

Fig. 9. Cranium of *Raja (Okamejei) boesemani* sp. nov., holotype, MTUF 25916, 468.5 mm TL. af, anterior fontanelle; pf, posterior fontanelle; pr, pectoral radials; rc, rostral cartilage. Scale indicates 20 mm.

ridge running along entire length of cartilage and forming sh externally; medial ridge of vT twisted about 90 degrees through three-fourths length of cartilage, its tip pointed and forming fn externally; anterior notch of vT well developed; aT1 Y-shaped with two proximal arms and one distal arm; proximo-lateral arm of aT1 extremely elongated, its length about twice the length of distal arm; tip of distal arm of aT1 blunt and forming st externally; aT2 inverse Y-shaped with two distal arms; lateral arm of aT2 curved, its pointed tip forming sk externally; another distal arm of aT2 firmly connected to Ax distally and forming bs externally; aT3 absent; Ax with laterally produced process at level of tip of aT1 (Fig. 8B, C).

Cranium: Measurements are given in Table 4. Length of rostral cartilage 50.7–55.1% of cranium length; prefontanelle length 42.8–45.2%; cranium width 48.7–52.1%; interorbital width 16.7–18.4%; length of anterior fontanelle 17.8–20.5%; length of posterior fontanelle 17.1–19.2%. Anterior fontanelle oval with distinct anterior margin and flat posteriormarg in; posterior fontanelle gourd-shaped; both fontanelles almost equal in length (Fig. 9).

Scapulocoracoid: Measurements are given in Table 5. Almost rectangular with anterior fenestra, postdorsal foramen and postventral foramen; scapulocoracoid greatly horizontally expanded, its height 57.7% of its length; anterior fenestra almost circular; postdorsal and postventral foramina horizontally elliptical; postventral foramen small, its length about onethird of length of postdorsal foramen; posterodorsal margin well elevated and somewhat concave (Fig. 10).

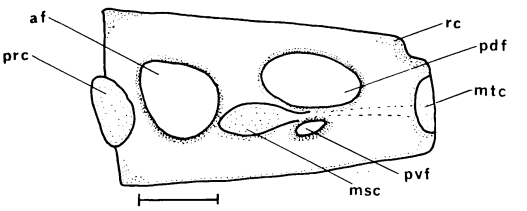

Fig. 10. Left scapulocoracoid of *Raja (Okamejei) boesemani* sp. nov., paratype, MTUF 24648, 518.5 mm TL. af, anterior fenestra; msc, mesocondyle; mtc, metacondyle; pdf, postdorsal foramen; prc, procondyle; pvf, postventral foramen; rc, rear corner. Scale indicates 10 mm.

Table 5. Measurements (mm) of the left scapulocoracoid of *Raja (Okamejei) boesemani* sp. nov., MTUF 24648.

Character		% of greatest length
Greatest length	44.4	100
Greatest height	25.6	57.7
Premesocondyle length	21.0	47.3
Postmesocondyle length	23.4	52.7
Anterior fenestra length	10.9	24.5
Anterior fenestra height	10.6	23.9
Postdorsal foramen length	14.1	31.8
Postdorsal foramen height	7.2	16.2
Postventral foramen length	5.5	12.4
Postventral foramen height	3.1	7.0
Height of rear corner	17.2	38.7

Table 6. Measurements (mm) of the egg-capsule of *Raja (Okamejei) boesemani* sp. nov. collected off Nomo, Nagasaki Pref., Japan.

Character	
Length (without horns)	61.3
Width: maximum	36.5
minimum	28.8
Ant. horn length	23.5
Post. horn length	27.8
Ant. apron width	4.7
Post. apron width	15.6
Keel width	—

Egg-capsule: Measurements are given in Table 6. Egg-capsule almost rectangular, with horns at

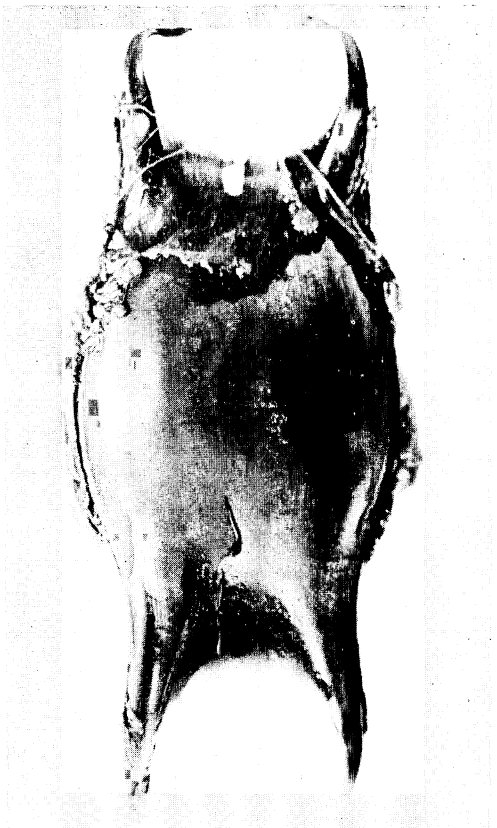

Fig. 11. Egg-capsule of *Raja* (*Okamejei*) *boesemani* sp. nov., collected in the East China Sea. 61.3 mm in length excluding horns.

each corner; lateral edges rather deeply convex; bases of horns stout; posterior horns obliquely straight and longer than anterior horns; tip of anterior horns curved inwards; anterior margin concave and posterior margin flat; lateral keel indistinct; anterior apron moderately developed; posterior apron well developed, its posterior edge reaching to midlength of posterior horns; ground color of both sides yellowish brown; edge of posterior apron translucent lighter (Fig. 11).

Remarks. *Raja* (*Okamejei*) *boesemani* sp. nov. has been confused with *R.* (*O.*) *hollandi* Jordan et Richardson, 1909 by Japanese authors since Ui (1929) misidentified his specimen from Japanese waters as *R. hollandi* (see the remarks on *R.* (*O.*) *hollandi*). Both species show close resemblance to each other externally as well as internally: 1) snout pointed, dorsal head length more than 4.8 times the interorbital width; 2) procaudal tail length long, its length more than 21% of TL and more than 41% of tail length; 3) postdorsal tail length long, its length more than 6.5% of TL, usually more than 30% of dorsal head length and usually more than 1.5 times the D_2 base length; 4) interdorsal distance wide, its width more than half of D_1 base length; 5) dorsal side of disc with dark specks; 6) ventral sensory pores absent on abdominal region and posteriormost series of pores undulated and W-shaped, but never forming V-shaped pattern at midlength of metapterygium; 7) dorsal lobe of clasper with two clefts separated by terminal bridge instead of slit; 8) scapulocoracoid horizontally expanded, its height less than 60% of its length. Based on the combination of these characters, both species are distinct from the other species of the western North Pacific *Raja* (*Okamejei*), viz., *R.* (*O.*) *acutispina*, *R.* (*O.*) *kenojei*, *R.* (*O.*) *meerdervoortii* and *R.* (*O.*) *schmidti*.

However, *R.* (*O.*) *boesemani* differs from *R.* (*O.*) *hollandi* in the following respects: 1) interdorsal distance usually shorter than D_1 base length in *R.* (*O.*) *boesemani* (longer in *R.* (*O.*) *hollandi*); 2) dark specks of upper side of disc unevenly distributed and assembled to form rosette-like patches (evenly distributed and never forming any patterns); 3) a pair of dark rings present at pectoral axils and sometimes an additional pair of dark rings at center of pectorals (no dark ring present on disc); 4) no light spots present on upper side of disc (small yellowish spots present on disc); 5) anterior fenestra of scapulocoracoid circular (oval); 6) postventral foramen of scapulocoracoid about one-third of size of postdorsal foramen (two-thirds); 7) posterodorsal margin of scapulocoracoid only slightly concave (deeply concave); 8) proximo-lateral arm of accessory terminal 1 clasper cartilage extremely elongated (moderately elongated); 9) dorsoproximal end of dorsal terminal 1 clasper cartilage tapering (straight).

A picture of "*R. kenojei*" published in Müller and Henle (1841: pl. 48), which seems to have been modified from a picture in the Bürger's Ms. for *R. kenojei* and has no relation to both the original description and the four types of the species in RMNH, might be identified as *R.* (*O.*) *boesemani*, because of its long postdorsal length (twice as long as D_2 base length; see the remarks on *R.* (*O.*) *kenojei*). Richardson (1846) identified a specimen of a Chinese skate appeared in