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SOME REMARKS ON THE IDENTITY OF THE JAPANESE RAYS *RAJA KENOJEI* MÜLLER & HENLE, 1841, AND *RAJA MEERDERVOORTII* BLEEKER, 1860

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With 8 plates

ABSTRACT

Rejecting without valid argumentation a lectotype selection for *Raja kenojei* Müller & Henle, 1841, by the present author (1947), Ishiyama (1967) indicated another of the four Leiden types as such. Both selected specimens are shown to represent only the different sexes of the same species, which is not conspecific with *R. kenojei* sensu Ishiyama et al. (= ? *R. japonica* Nyström, 1887) but rather with *R. porosa* Günther, 1847, as understood by Ishiyama. One of the *R. kenojei* types is referred to *R. meerdervoortii* Bleeker, 1860, a distinct species not identical with *R. kenojei* in either interpretation, and of which *R. macrophthalma* Ishiyama, 1950, may well prove to be a junior synonym. Müller & Henle's coloured illustration of *R. kenojei*, made after a Japanese original, evidently represents a juvenile rajid specimen of uncertain identity.

INTRODUCTION

Though it is usually hardly worth the time or the trouble to correct mere misinterpretations or erroneous identifications, which unfortunately once in a while may happen to every taxonomist, the situation is different when such slips occur in publications of such outstanding value that these may be expected to set a standard in nomenclature for quite some time to come. As a consequence, the present correction to Ishiyama's 1967 monograph on the Japanese Rajidae, in the new Fauna Japonica series, should rather be considered a homage to that author's valuable contributions to our knowledge of Japanese rays than an easy criticism facilitated by having the crucial types at hand. As is shown in the following discussion of the results of a re-examination of these types, two (or possibly three) of the species names as used in Ishiyama's 1967 Fauna Japonica volume on rajids have to be changed.

DISCUSSION

In 1841, J. Müller and J. Henle published in Berlin in their *Systematische Beschreibung der Plagiostomen* the first description and coloured illustrations of a Japanese ray which they named *Raja kenojei* (p. 149, plate (48)). The whole basis for this was the material in the collection of the Rijksmuseum van Natuurlijke Historie at Leiden, which belonged to the (for that time) large collection of Japanese fishes assembled around Nagasaki by two officials of the Netherlands East-Indies government stationed at Deshima, Japan: Ph. F. von Siebold (Japan 1823-1829) and H. Bürger (Japan 1825-1832) (see Holthuis & Sakai, 1970: 23-67). Though Von Siebold and the director of the Leiden museum, C. J. Temminck, intended the Japanese collections to be used for their monumental *Fauna Japonica*, Temminck magnanimously granted Müller and Henle access to the elasmobranch specimens during their visit to Leiden in 1837.

The available material consisted of three dry stuffed specimens (RMNH D2499-2501, a male and two females, collected by Bürger) and probably one male stuffed with cotton-wool, but now preserved in alcohol (RMNH 4243, only with the indication "Japan") (see pls. 4-7). Furthermore a coloured Ms. plate (see pls. 2 & 3) showing dorsal and ventral views, made in Japan, and finally a Ms. description by Bürger (see pl. 1) which evidently was not used by Müller and Henle, but subsequently provided most of the textual information published by Temminck & Schlegel ((1843-)1850: 308). In fact Müller and Henle record four stuffed specimens in Leiden and Günther (1870: 462) none in the British Museum, London (that did receive some *Fauna Japonica* duplicates), which proves that RMNH 4243 should here be included. The colour illustration is a good copy, though slightly reduced and at variance in colour, of the Japanese original. It is remarkable that Müller and Henle correctly describe the types as having on the tail 3-5 rows of spines or thorns, while the plate, both in the original and in the published version, and in agreement with Bürger's Ms. description, only shows a single series. Actually male types have three, the female five rows.

This discrepancy between the description by Müller and Henle and the plate has generally been overlooked, though I (1947: 224) pointed it out with the unfortunately speculation that it might be interpreted as an inaccuracy by the artist, neglecting the Bürger Ms. confirmation. Since there are other Japanese species with 1-3 series of spines on the tail, I indicated RMNH D2499, a female with five series as the lectotype. Also, I showed that RMNH D2501, a 405 mm male with sharp teeth and well developed claspers or myxopterygia must belong to a different species (the only other male in the type series, of 295 mm, having a pavement of flat teeth and rather minute

claspers), being conspecific with the holotype of *R. meerdervoortii* Bleeker (RMNH 7432, well developed male, about 320 mm).

Resuming, while correctly interpreting the type material as heterogeneous (one example being provisionally relegated to *R. meerdervoortii*), I neglected the likely possibility that Bürger's Japanese plate and Ms. description concerned merely a juvenile of any of the several related species occurring in the area (length cf. Bürger and in original figure 250 mm!), thus possibly even another, third species.

A similar conclusion had already been reached by Bleeker (1860: 66). After having first (1858: 42) described a male and two female specimens from Nagasaki as *Raja kenojei*, he removed the male in 1866 to become the holotype of *R. meerdervoortii* (mainly on the base of the large claspers already at a size of 320 mm, disc width 210 mm, and the sharp teeth), while replacing it with a real male of *kenojei* of a similar size but with undeveloped claspers and blunt teeth recently received. In his 1866 (p. 66) remarks ("Aanmerkingen") he states (in translation from Dutch): "The picture, presented in the Systematische Beschreibung der Plagiostomen [of Müller & Henle, 1841] of *Raja kenojei*, has been made after a Japanese drawing, of which I also possess a copy, which has the same inaccuracies, viz. only one median thorn on the back, a single row of alternate larger and smaller spines on the tail, etc. However, it would not surprise me if this picture was made after another species and if therefore at least three species of the genus *Raja* would live in the Japanese waters". Actually, Ishiyama (1967) nowadays records about a dozen *Raja* species from the area, or including related genera, over twenty rajid species.

In his recent review of the Japanese Rajidae, Ishiyama (1967: 7-11) discusses the present species, which he considers conspecific with Bleeker's *meerdervoortii*. As stated before, a comparison of similarly sized males of both nominal species shows distinct differences (see pl. 8). Two males evidently belonging to *R. kenojei* (RMNH 4243, paralectotype, 295 mm; RMNH 7434, coll. Bleeker, 320 mm) both have hardly developed myxopterygia, not reaching the hind tip of the ventrals, a pavement of blunt teeth, dorsal surface of disc smooth except for a few prickles on snout tip, a beginning development of prickles near lateral pectoral angle and along the posterior pectoral margin in largest example, 5 spines from before eye to beside spiracle, 2-3 nuchal spines, and 3 rows of spines or thorns on the tail. Two males of *R. meerdervoortii* (RMNH 7432, Bleeker's holotype, about 320 mm; RMNH D2501, paralectotype of *kenojei*, 405 mm) both have well developed claspers, measuring about twice the length of the posterior (inner) margins of ventrals or slightly more, dorsal disc surface mostly smooth but with large

spines in an elongate patch along the cheeks and slightly within pectoral lateral angles, besides a few smaller prickles on snout tip and along anterior oblique pectoral margin presumably continued onto pectoral angles, 6-7 spines along eye rim to spiracle, 2 nuchal thorns, and 3 rows on tail. The available female specimens (RMNH 2499 & 2500, paralectotypes of *kenojei*, 370 & 410 mm; RMNH 7434, coll. Bleeker, 445 mm), all to be attributed to *R. kenojei*, though larger than the males, all still have a mostly smooth upper disc, with small spines on snout tip and in a band along posterior oblique pectoral margin, 8-9 along eye rim and spiracle, 1-3 nuchal spines, and 5 rows on tail. We have no female specimens attributed to *R. meerdervoortii*.

Considering these facts, it seems clear that at about the same size (or age), *kenojei* still is immature while *meerdervoortii* is adult, while also a considerable difference in the configuration and development of the spines confirms that the two nominal species, synonymized by Ishiyama, are different. Another remarkable aspect is that none of the seven specimens agrees with the Japanese plate used by Müller and Henle, or with Bürger's Ms. description. Also they evidently differ from Ishiyama's *kenojei*, described e.g. as having one row of spines on the tail in males, three in females.

Attention should be drawn here to the strange situation caused by the fact that Ishiyama (1967: 11) did not accept my selection of RMNH D2499 as lectotype for *Raja kenojei* Müller & Henle, evidently because its five peduncular spinerows clearly showed the customary interpretation of the species, especially by Japanese authors, to be incorrect. Though one may sympathize with his intentions, he did not by any means further his cause by selecting the specimen RMNH 4243 as a presumably better lectotype. While indeed that specimen has only three rows of spines on the tail (whereas RMNH D2499 has five), Ishiyama overlooked the fact that his selection concerns a male specimen, mine a female, both belonging to the same species but not to *R. kenojei* sensu Ishiyama (with one series of tail spines in males). Both for this reason and on account of Ishiyama's unorthodox method, incompatible with the rules, his lectotype selection can not be accepted.

Since it is evident that the material on which *Raja kenojei* nec Ishiyama originally was based consists of specimens and a picture representing two, possibly even three species, it is of interest to see if these are conspecific with any of the other Japanese rajid species, since they might well play havoc with other well established names, and to decide which should be the correct name of *kenojei* sensu Ishiyama.

In an extensive paper preceding his 1967 Fauna Japonica volume on the subject, Ishiyama (1958) provides a very detailed and helpful review of the Japanese rajids, unfortunately rather difficult to consult on account of the

usage of several newly conceived technical terms and symbols and a problematical usage of the English language. On the other hand, the condition and limited number of the specimens, listed below, all old and discoloured, several more or less juvenile, some stuffed (including all *kenojei* types), in no way facilitated a proper allocation. Special attention had to be given to the development and distribution of the spines and thorns, already recorded in a previous paragraph, with emphasis on those covering the tail (3 rows in males, 5 in females). Unfortunately, the myxopterygia of the two male *R. kenojei* specimens do not provide much information beside the fact that at a total length of 320 mm the males apparently are still far from adult, and that morphologically they belong to type Cse of Ishiyama (1958: 205; also 200 fig. 2-M), as usual in species from southern Japan. The tail is distinctly depressed with well developed lateral folds (Ishiyama, 1958: 257), its length about 1.28 in disc width in the male paralectotype (RMNH D4243), 1.35 in the slightly larger Bleeker male (RMNH 7434), about 1.3 in the female lectotype (RMNH D2499) and 1.4 in the female paralectotype (RMNH D2500). The procaudal length, i.e. length of tail from beginning of first dorsal fin, is about one-third tail length (Ishiyama, 1958: 196, key 274, 354), and the tail length behind the second dorsal about equals the interorbital width. The diameter of the eye is about 1.4-1.5 in interorbital width. Judging by Ishiyama's 1958 (and 1967) texts, keys and figures, it seems clear that *Raja kenojei* belongs to his subgenus *Okamejei*, where it appears to be close to (or identical with) *R. porosa* Günther, *R. hollandi* Jordan & Richardson, or *R. macrophthalma* Ishiyama (Ishiyama, 1958: 297-299, key; and 302, table 3). Of these, *R. macrophthalma* differs e.g. by having an eye diameter surpassing the interorbital width, while *R. hollandi* has the procaudal length about 2.5 or less in tail length and the length behind the second dorsal fin about twice the interorbital width. Only *R. porosa*, as described by Ishiyama (1958: 366; 1967: 19) shows in almost all morphological characters that could be verified a very close agreement, taking into account the age (size) and sex of the available specimens. The only reason for hesitation seems to be the fact that our 320 mm male (RMNH 7434) still has the claspers hardly developed, while Ishiyama (1958: 367) pictures a 335 mm male with well developed myxopterygia. As it seems possible that (with some individual variation) at a certain age these organs quite rapidly grow to the adult size (Ishiyama, 1967: 14, records "noteworthy changes" at a size of about 300 mm), I am inclined to consider *R. porosa* Günther (as understood by Ishiyama) a junior synonym of *R. kenojei* Müller & Henle, pending verification with adequate "*porosa*" material, including the two (larger) London syntypes of that species.

The same method employed for the two male *R. meerdervoortii* Bleeker specimens (RMNH 7432, holotype; RMNH D2501, originally a syntype of *R. kenojei*) shows that species to have the same affinities as *R. kenojei*, but as here the eye diameter surpasses the interorbital width, I was inclined to consider *meerdervoortii* a senior synonym of *Raja macrophthalma* Ishiyama, an interpretation supported by most further morphological characters. Also the fact that the available material (considering myxopterygia, teeth in males) proves that *meerdervoortii* reaches maturity at a smaller size than *R. kenojei*, with Ishiyama's statement that *macrophthalma* appears to be the smaller species, seems to confirm this. However, the structure of the fully developed claspers does not convincingly agree with that described and figured by Ishiyama (1958: 205-208, fig. 5; 1967: 17, fig. 4-E), or with those of any of the further Japanese species as described by that author. Therefore, due to lack of sufficient comparable material or knowledge about the variability of the clasper structures, the problem whether *R. meerdervoortii* is a separate species not listed (or mixed with another related form) by Ishiyama here must remain unsolved.

The Japanese plate belonging to the Bürger Ms., published slightly changed and reduced as *Raja kenojei* by Müller & Henle (1841, pl. (48, not numbered)), presumably portrays a juvenile of 260 mm total length, as may be deduced from the (natural?) size on the original plate and from Bürger's text. Remarkable are the sizes of eyes and interorbital width, the snout, the slender and rather roundish appearance of the tail, the long procaudal length (about 2.5 in tail) and the length of the tail behind the second dorsal fin. All these characters seem to point to *Raja hollandi* Jordan & Richardson rather than to any of the other Japanese rajids. Ishiyama (1958: 169, fig. 75-04; 1967: 15, fig. 3-A) pictures a young male of that species which seems quite similar to that on the Japanese plate, except that the ventral fins reach considerably more backwards, but the necessary comparable material for a definite identification is not available. Bürger states that small specimens regularly were seen at the Nagasaki fish market, and that the species becomes very large.

Finally, since the *Raja kenojei* of Ishiyama (and several other authors, especially Japanese) has been wrongly named, it is necessary to see if there is another name for that species in previous publications. Judging by the consulted literature, only the name *Raja japonica* Nyström (1887) may concern Ishiyama's *kenojei* and therefore *japonica* might replace that name. But unfortunately *R. japonica* was based on a single juvenile specimen, measuring only 215 mm, a size at which some of the crucial characters given in the scanty description by Nyström (1887: 52), e.g. the single row of spines on

the tail and the single nuchal spine, apply to several related species. Therefore, to arrive at a definite name for *R. kenojei* sensu Ishiyama, the holotype of *R. japonica* (presumably in the collection of the Uppsala University Museum of Zoology) should be reexamined, and if it proves to be different, a new name should be given.

It has been suggested that the current (Japanese) interpretation of *kenojei* could be maintained by considering Müller and Henle's text invalid since it provides no real diagnostic information, and to base the name only on Müller and Henle's plate, believed to represent *kenojei* sensu Ishiyama et al. But such a procedure evidently is against the Rules: the species is validly described and types are still available for consultation and final interpretation. Moreover, the plate, of which the model is lost, either shows a female with only one row of spines on the caudal penduncle (in females of *kenojei* sensu Ishiyama et al three rows!), or (even far more likely, as aforesaid) a juvenile specimen of uncertain identity (since several species with 3-5 rows start with a single series). Thus the plate too apparently provides insufficient diagnostic information.

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CONSULTED MATERIAL

Raja kenojei: - RMNH D2499, Japan [Nagasaki], leg. H. Bürger, 1 ♀, 370 mm TL (lectotype of *R. kenojei* Müller & Henle, designated by Boeseman, 1947: 224); - RMNH D2500, Japan [Nagasaki], leg. H. Bürger, 1 ♀, 410 mm TL (paralectotype of *R. kenojei* Müller & Henle); - RMNH 4243, Japan [Nagasaki?], leg.?, ♂, 295 mm TL (paralectotype of *R. kenojei* Müller & Henle, erroneously designated as lectotype by Ishiyama, 1958: 11); - RMNH 7434, Nagasaki, Japan, coll. Dr. P. Bleeker (auction 1879), 1 ♂, 320 mm TL, 1 ♀, 445 mm TL.

Raja meerdervoortii Bleeker: - RMNH 7432, Nagasaki, Japan, coll. Dr. P. Bleeker (auction 1879), 1 ♂, ca. 320 mm TL (holotype of *R. meerdervoortii* Bleeker); - RMNH D2501, Japan [Nagasaki], leg. H. Bürger, 1 ♂, 405 mm TL (erroneously included paralectotype of *R. kenojei*).

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APPENDIX

Translation of Bürger's Ms. description of *Raja kenojei*:

No. 12

PISCES CHONDROPTERIIGII. —

Fam.: II

Selaciens, Cuv: *Plagiostomes* Dum: *Raya*, Cuv: *Kenojei*.

Raja Kenojei, Jap. [Japanese characters]

(*Raie batis*, Laceped: *Raya batis*, Linn:)

Body: in the shape of an oblong square disc, with a thin roundish tail, which besides with two dorsal fins is armoured with a row of spines. —

Head: united with the lateral fins, anteriorly tapering into a sharp triangular point, roundish, strongly flattened. —

Mouth: below, one and a half inch distant from the projecting point of the head, large, roundish. —

Jaws: both equally long, paved with several rows of flat blunt teeth. —

Nostrils: big angular close before the mouth.

Eyes: on top of the head, situated one and a half inch from its projecting point, small, oval. —

Iris: bluish. —

Spiracles: very large, roundish, close behind the eyes. The eye-rims and spiracles above armoured with a row of sharp spines. —

Gill-apertures: as usual five, below, slightly backward of the mouth. —

Back: roundish. —

Belly: almost wholly flat. —

On top of the back a little farther back than the eyes armoured with a small spine. —

Tail: roundish compressed, thin, with a row of spines and two small dorsal fins situated close to its end, moreover provided with a small caudal fin. —

Vent: small roundish, at the beginning of the tail. —

Lateral line: indistinct. —

Ventral fins: broad angular on either side of the vent. —

Pectoral fins: large broad angular, united with the head, reaching to over the ventral fins. —

Colour: above brownish yellow, below whitish. —

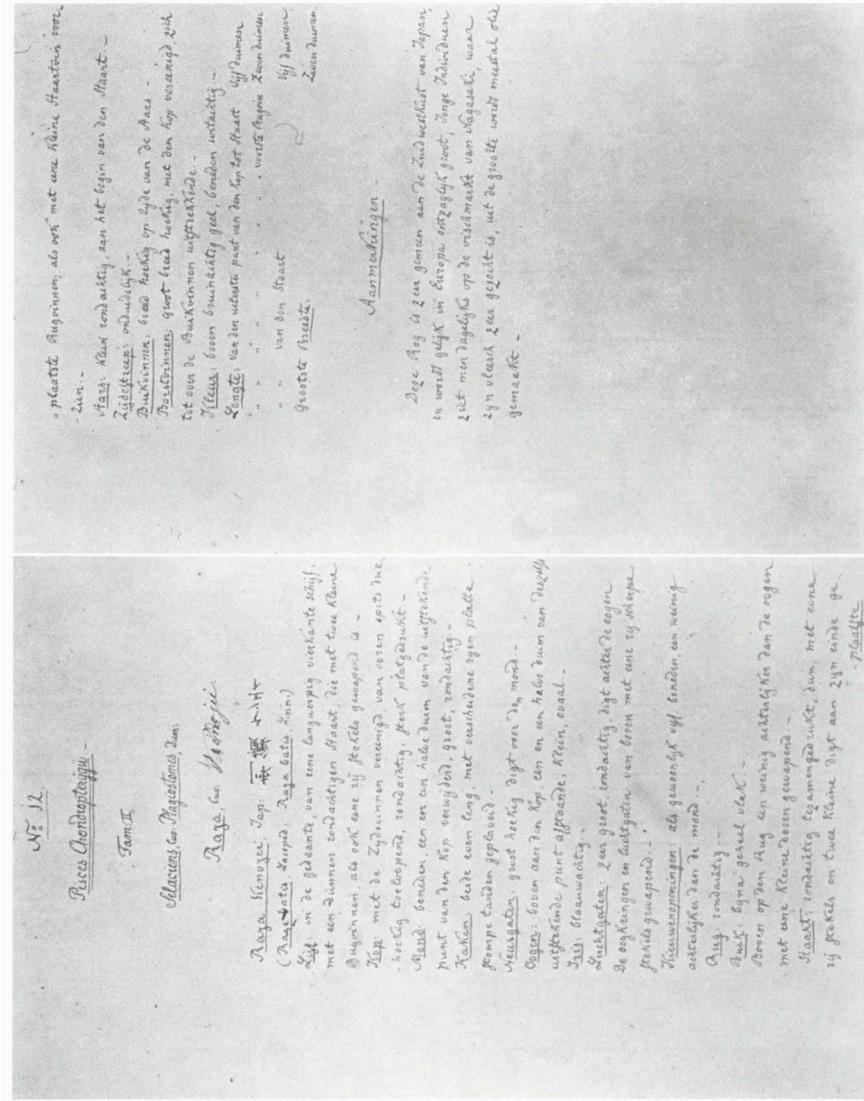
Length: from utmost tip of head to tail five inches

Length: from utmost tip of head to anterior dorsal fin seven inch

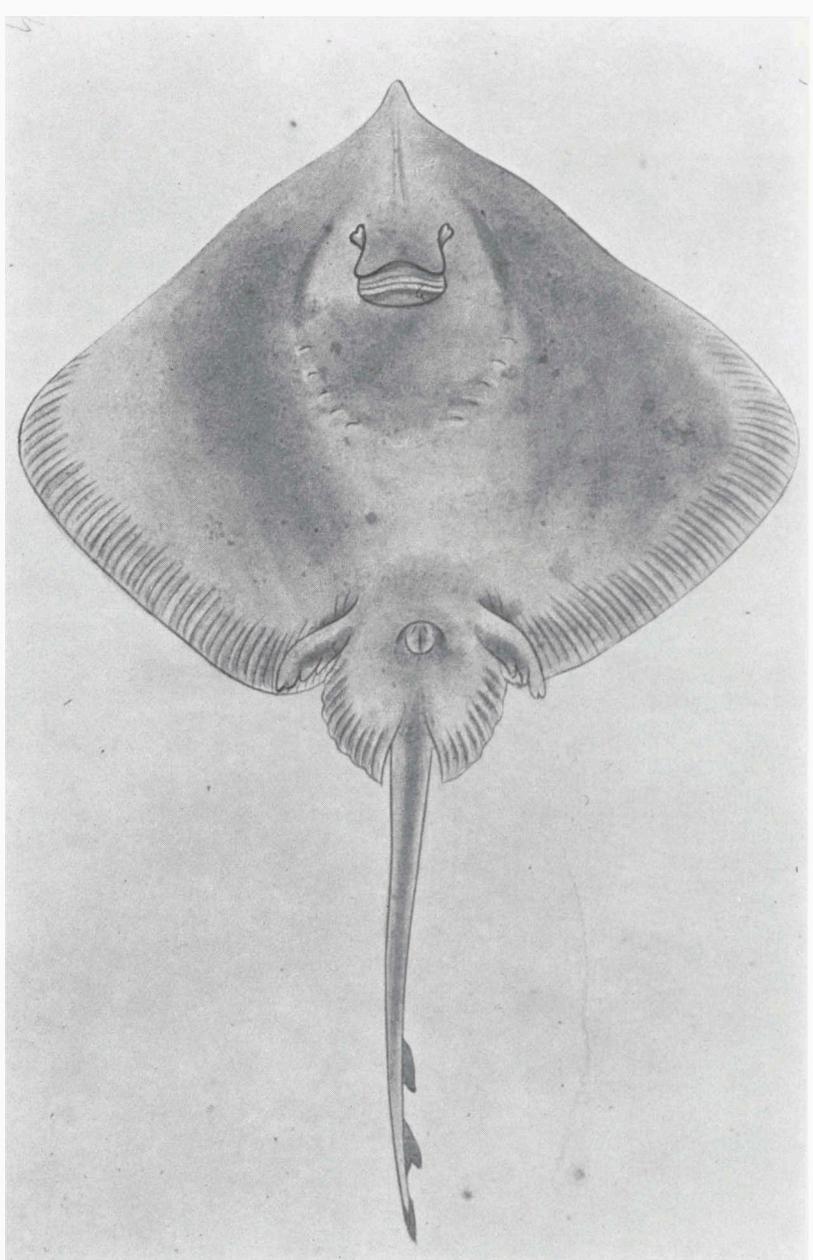
Length: of the tail five inches

Largest *width*: seven inches

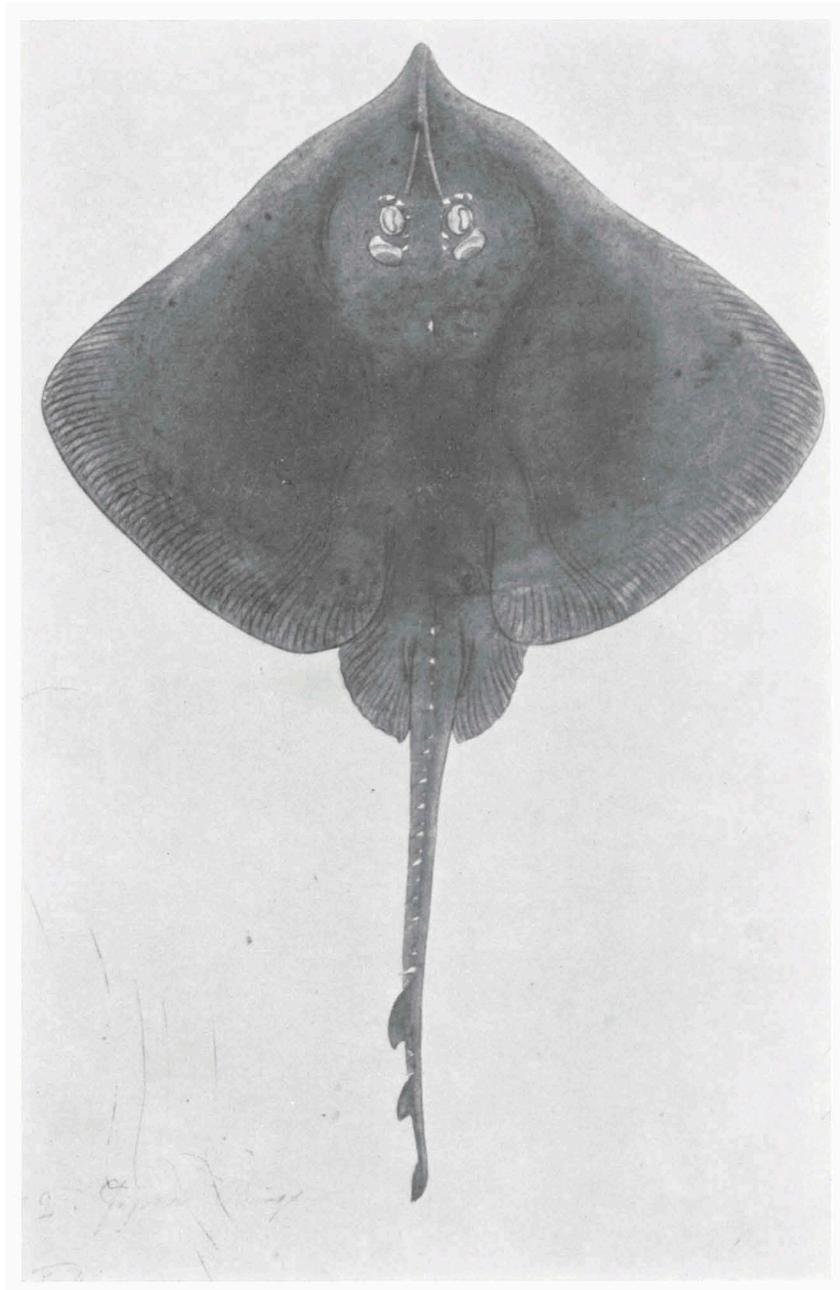
Remarks. — This Ray is very common along the southwest coast of Japan, and like in Europe becomes awfully large; young specimens are daily seen at the fish market of Nagasaki, where its flesh is in great demand, from the larger usually oil is made. —



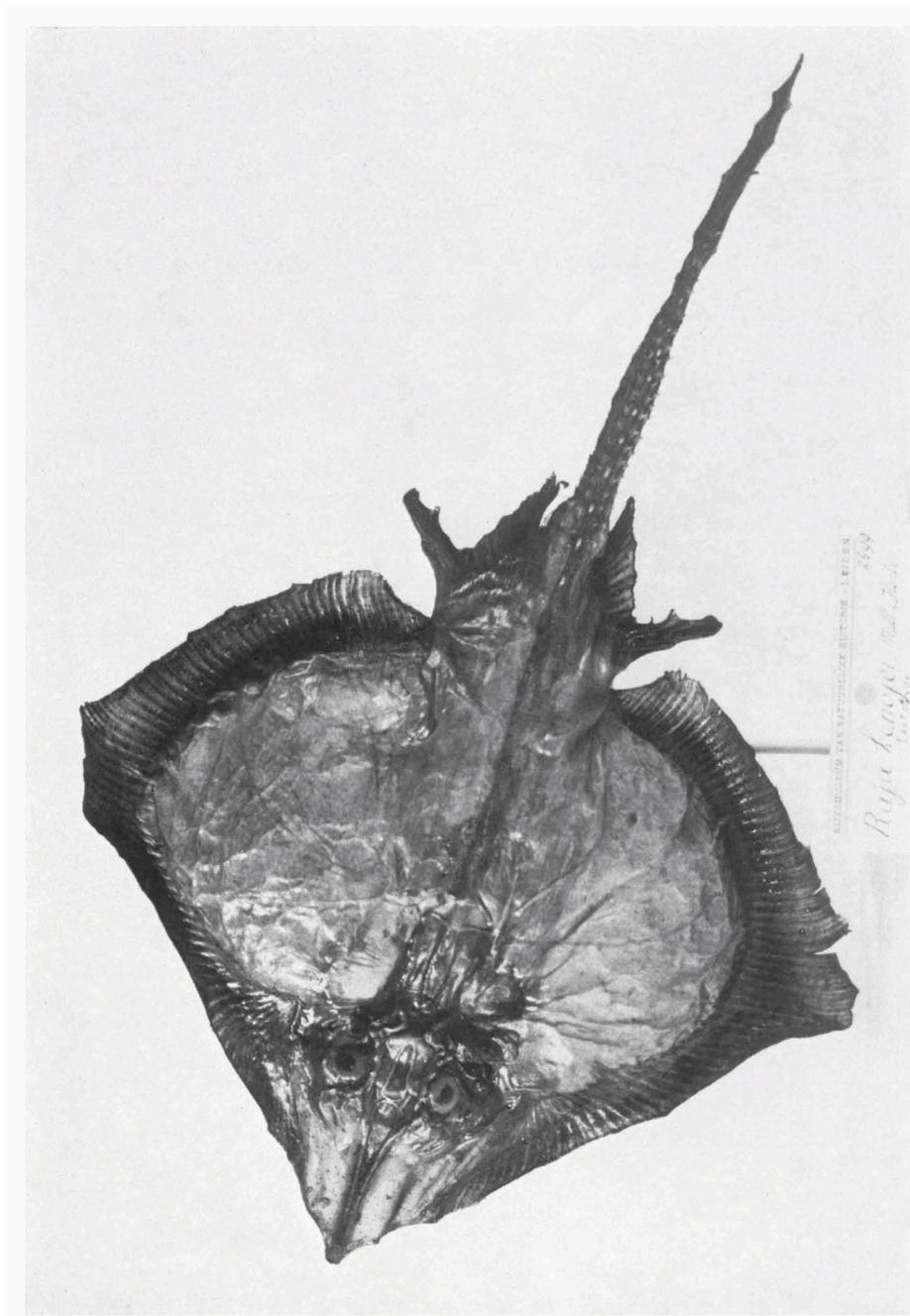
Bürger's Ms., sheet no. 12, 21 X 34 cm, both sides. Note description of tail ("Staat"), in translation: "roundish compressed, thin, with one row of spines and two small dorsal fins situated near the end, besides being provided with a small caudal fin". Idem length ("Lengte"): "from the extreme tip of the head to tail five inches [,] from the extreme tip of the head [to] first dorsal fin seven inches [,] of the tail five inches". Idem maximum width ("Grootste Breedte"): "seven inches".



Bürger's Ms., sheet 49.5 × 33.5 cm, left half. Picture of *Raja kenoei* Müller & Henle, in ventral view.



Bürger's Ms. sheet 49.5 × 33.5 cm, right half. Picture of *Raja kenoei* Müller & Henle, in dorsal view.



Raja kenojei Müller & Henle (RMNH D2499, ♀, 370 mm TL), lectotype, in dorsal view.



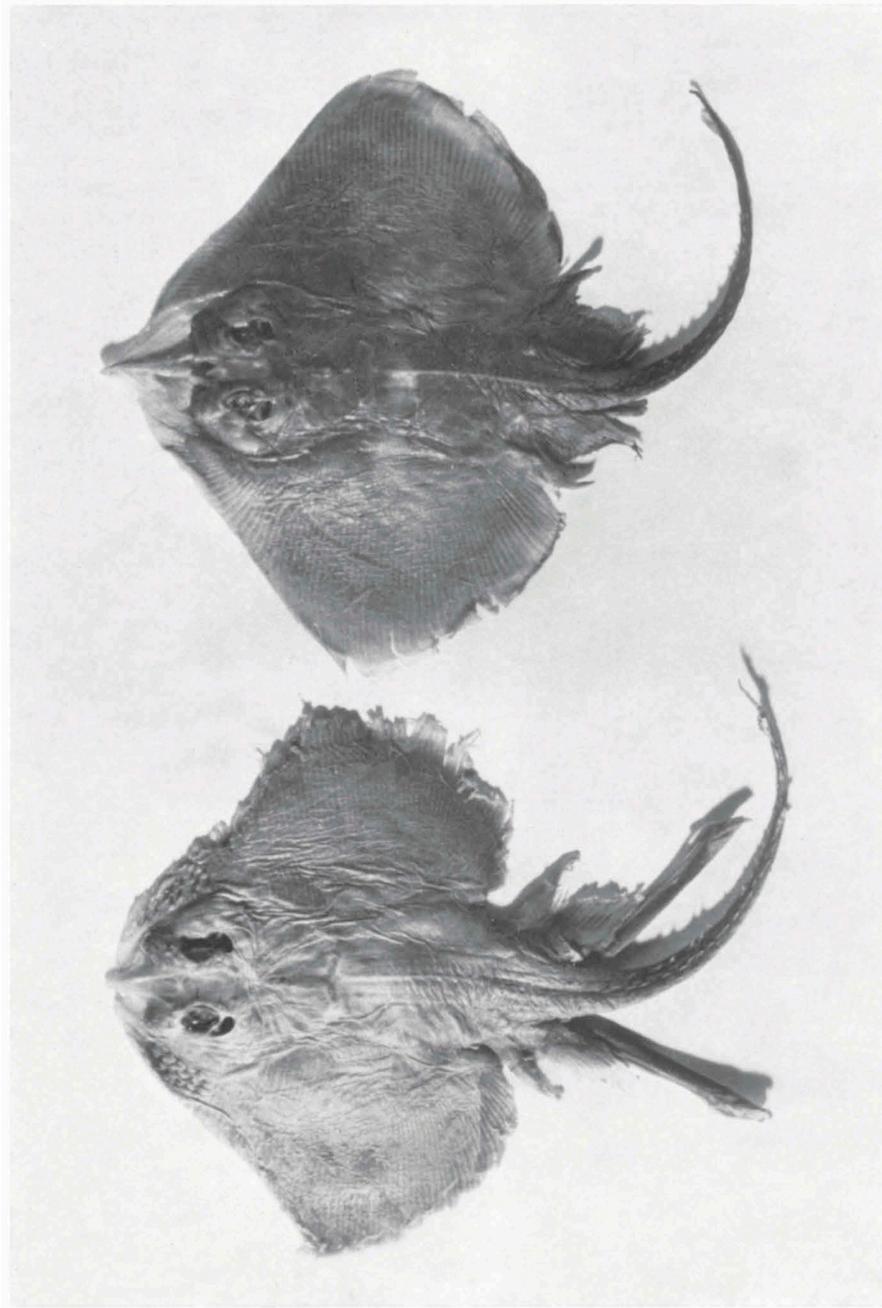
Rajia kenoyei Müller & Henle (RMNH D2500, ♀, 410 mm TL), paralectotype, in dorsal view.



Raja meerdervoortii Bleeker (RMNH D2501, ♂, 405 mm TL), paralectotype of *Raja kenoei* Müller & Henle, in dorsal view.



Raja kenoei Müller & Henle (RMNH 4243, ♂, 295 mm TL), paralectotype, in dorsal view.



At left: *Raja meerdervoortii* Bleeker (RMNH 7432, ♂, 320 mm TL), holotype, in dorsal view. At right: *Raja kenojei* Müller & Henle (RMNH 7434, ♂, 320 mm TL), from Bleeker's collection, in dorsal view. Note difference in development of myxopterygia