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## A NEW SISORID CATFISH OF THE GENUS GAGATA BLEEKER FROM INDIA

by

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With six figures

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### INTRODUCTION

Recently four specimens of a species of the genus *Gagata* Bleeker, from North Koel River at Daltonganj (Chotanagpur, South Bihar), were collected by the author; three of these are females and one is a male. Fortunately, we discovered three more similar specimens, all males, among the unidentified lots in our old collections, bearing the locality label "Delhi", exact locality unknown, while a few more examples were procured from an area adjoining the first locality, River Ganga at Haldi-Chapra. By a thorough examination of this material, we could ascertain that they belong to a species yet unnamed. The material is, therefore, described here under the new name *Gagata sexualis*, nov. spec.

### DESCRIPTION

#### ***Gagata sexualis* nov. spec. (figs. 1-6)**

It is a small statured fish (the largest sexually mature specimen being 58 mm long) in which the dorsal profile rises gradually to the origin of

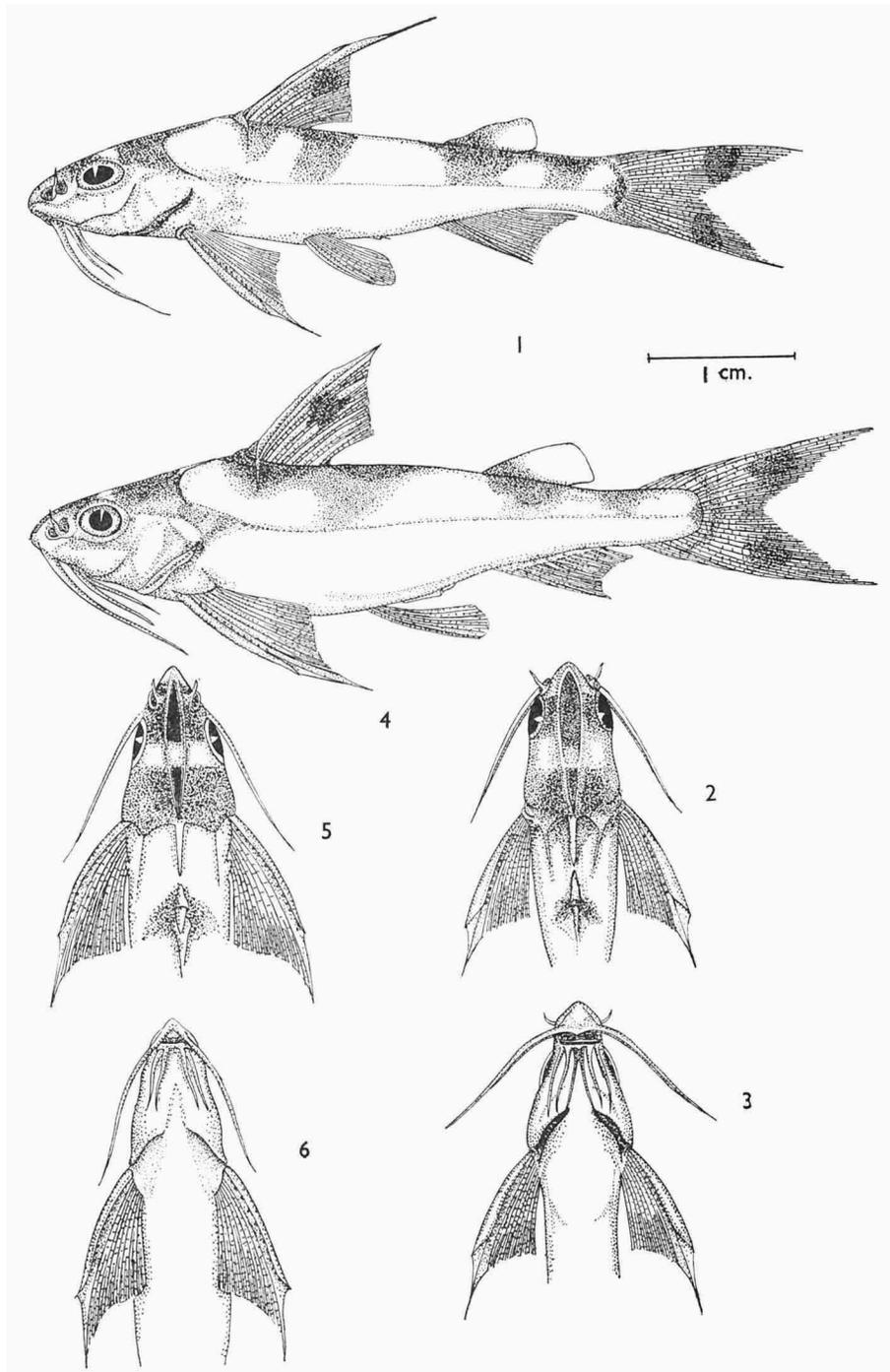


Fig. 1. Lateral view of male of *Gagata sexualis*, nov. spec.; fig. 2. Dorsal side of head of male; fig. 3. Ventral side of head of male; fig. 4. Lateral view of female of *Gagata sexualis*, nov. spec.; fig. 5. Dorsal side of head of same; fig. 6. Ventral side of head of same.

the dorsal fin, after which it slopes down similarly to the base of the caudal. The ventral profile is more or less straight in males, while in females it is arched up to the base of the pelvics, after which it rises gradually to the base of the caudal. The head and the body are laterally compressed.

Anteriorly the head is narrow, posteriorly broad. Its length is contained from 4.75-5.48 times in the total length and from 3.91-4.19 times in the standard length. The height of the head at the occiput is contained 1.23-1.52 times and its width 1.08-1.54 times in its length. The snout is acuminate and projects much beyond the mouth; its length is contained 2.81-4.1 times in the length of the head. The eyes are globular and without a free orbital margin. They are placed on the head in dorso-lateral position, somewhat nearer to the tip of the snout than to the end of the operculum. The antero-posterior diameter of the eye is comprised 2.94-3.26 times in the length of the head, 0.73-1.1 times in the length of the snout and 0.63-0.78 times in the interorbital width. The eyes are seen very distinctly from the dorsal side; however, in the males they are visible from the ventral side too.

The anterior and posterior nostrils are prominent and situated close together, separated only by a wide membranous flap which is drawn out into a small nasal tendril. The posterior nostril is nearer to the front edge of the eye than the anterior nostril is in relation to the tip of the snout. The longitudinal groove on the dorsal surface of the head extends from a point opposite the anterior nostril to nearly the base of the supra-occipital spine, which misses the basal bone of the dorsal fin by a short distance. The anterior and the posterior fontanels of the skull are elongated and separated from each other by a small bony symphysis formed by the frontals. The posterior fontanel falls short of the base of the supra-occipital spine by a distance equal to  $1/6.0-1/4.2$  of fontanel length. The supra-occipital spine (occipital process) is small, narrow and smooth; it is nearly 6.25-10.5 times as long as broad at its base.

The mouth is small and transverse. It is bordered by thick, wavy and smooth lips which are continuous at the angles of the mouth. Anterior to the upper jaw and next the inner base of the maxillary barbel, there is a small crescentic depression on either side. The depressions usually contain small particles of sand and stones. Similarly, there are six elongated grooves, three on either side of the chin, on the ventral side of the head. The two outer grooves of either side are shallow and originate from the bases of the mandibular barbels, which are partly located in these grooves. The innermost grooves on both sides are much deeper than the outer ones and converge anteriorly to merge into one behind the lower jaw. These deeper grooves also

contain small stone particles. There are patches of small villiform teeth on both the jaws. The palate is edentulous.

There are four pairs of barbels of different lengths. The nasal pair of barbels is so small that they hardly reach the anterior border of the eye. They are much smaller than the longitudinal diameter of the eye. The maxillary pair of barbels is the longest of all. Their bases are supported by rodlike edentulous and reduced maxillary bones. A small membrane extends posteriorly for a very short distance along their bases. These barbels are longer than the head and extend up to nearly one-third of its length along the pectoral fin. The bases of the mandibular barbels are also stiffened, but by means of pieces of cartilage, and originate more or less in a transverse line behind the lower jaw. The outer pair of the mandibular barbels is less than half the length of the maxillary pair. The inner pair of mandibular barbels is shorter than the outer. The gill membranes are united with a moderate isthmus which is contained 1.5-2.41 times in the diameter of the eye.

The female examples are deeper than the males. The depth of the body in males is contained 7.34-8.08 times in the total length and 5.69-6.47 times in the standard length, whereas in female examples the same data are 5.17-5.6 times in total length and 4.01-4.6 times in standard length. The least height of the caudal peduncle is contained 1.86-2.7 times in its length. The swimbladder is much reduced and divided into two saccules which are completely enclosed by bone except laterally. On the lateral sides of the body there are hardly any indications of the presence of the swimbladder. The cubito-humeral process of the pectoral girdle is small and embedded in skin. The urino-genital opening lies immediately behind the anus and is slightly covered by the posterior anal flap. Posterior to the anal opening extends a small genital papilla.

The base of the dorsal fin is situated in advance of the pelvics; the latter originate opposite a point where the former ends. The height of the dorsal fin considerably surpasses the length of the head in the males and is slightly smaller than the head length in the female specimens. In males the membrane extending from the tip of the dorsal spine is much elongated and drawn out into a thread-like prolongation. The spine of the dorsal fin is smooth on both the anterior and the posterior sides although some specimens show 1-2 small serrations at the tip of the anterior side. Its length is contained 1.42-1.66 times in the length of the head. The length of the base of the adipose dorsal fin may be equal to, or smaller than that of the rayed dorsal. The rayed and adipose dorsal fins are situated widely apart and the distance between their bases is 1.73-2.18 times the length of the base of the rayed dorsal fin.

The pectoral fins are mostly longer than the head. The membranous extension from the tip of the pectoral fin is much elongated and reaches the

base of the pelvic fins. The pectoral spine is smooth on the outer surface and bears 8-10 sharp teeth along the inner border. The pelvic fins reach to beyond the anal opening but do not reach the anal fin. The anal fin is of moderate length and its longest ray may be equal to, or slightly shorter than that of the ventral fin. The caudal fin is deeply forked and its upper lobe is slightly longer than the lower.

In specimens preserved in spirits the ground colour is yellowish with a silvery shine laterally. There are two black transversal bands on the dorsal surface of the head and four on the back, where they tend to extend to the lateral line. There is a dark band across the spine and the anterior three rays of the dorsal fin in their upper halves. Across the middle of each lobe of the caudal there is a dark band. A dark blotch is found at the base of the caudal fin. The pectoral-, the ventral- and the anal fins do not show any markings.

Type-locality: North Koel River at Daltonganj (Chotanagpur).

Holotype. — One example, male, 55 mm long, reg. no. F 5592/2, coll. R. Tilak (from North Koel River at Daltonganj, Chotanagpur).

Paratypes. — Three examples, females, reg. nos. F 5593/2 to F 5595/2, coll. R. Tilak (from North Koel River at Daltonganj, Chotanagpur); three examples, males, reg. nos. F 5596/2 to F 5598/2 (from an unknown locality at Delhi, collector unknown). The types are deposited at the Zoological Survey of India, Calcutta. Two additional examples, male and female, reg. no. RMNH 26072, col. R. Tilak (from Ganga River at Haldi-Chapra) have been presented to the Leiden Museum.

#### SEXUAL DIMORPHISM

None of the other species of this genus, so far described, shows sexual dimorphism (Hora, 1941; Volz, 1904). The material of *Gagata sexualis* hence differs from all of them in this respect because the males and females exhibit marked differences in the following characters.

(1) In the males a long membranous prolongation arises from the tip of the dorsal spine, making the height of the dorsal much surpassing the length of the head. In the female examples, on the other hand, no membranous prolongation arises from the spine of the dorsal fin.

(2) In the male specimens the body is thin and narrow; the depth of the body is contained 5.69-6.47 times in the standard length and 7.34-8.08 times in the total length. The body of the female examples is quite deep, the depth of the body being contained 4.01-4.6 times in the standard length and 5.17-5.6 times in the total length. The females look stouter than the males.

#### RELATIONSHIPS

The closest relatives of *G. sexualis*, among the Indian species of this genus, are *Gagata cenia* (Ham.) and *Gagata itchkeea* (Sykes), but both differ

from it in a large number of characters given below. In the North Koel River, the new species thrives well along with *G. cenia* (Ham.), *G. viridescens* (Ham.), and *G. nangra* (Ham.). The new species differs from *G. nangra* (Ham.) in the length of the nasal barbels, while from *G. viridescens* (Ham.) it differs in the general shape of head and body and in the bases of the mandibular barbels being situated in a transverse line. From *G. gagata* (Ham.) it differs in the shape and length of the posterior fontanel, the general shape of head and body, and the colouration. There is an important difference in the pars sustentaculum of the two species. In *G. gagata* (Ham.) the tip of the ventro-posteriorly flexed anterior process of the parapophysis of the 4th vertebra is much branched, forming an incomplete chamber around the swim-bladder (Tilak, 1963). In *G. sexualis* the tip of this process is fused completely with that of the posterior, forming a complete cover over the reduced swim-bladder. (Details on the osteology of *G. sexualis* will be given in a separate paper).

*Gagata sexualis* differs from *Gagata cenia* in the following characters:

- (1) In males the eyes can be seen in ventral view of the head (versus not seen in ventral view of head).
- (2) The posterior fontanel is long and approaching the base of the supra-occipital spine, missing it by only a distance equal to  $1/6-1/4.2$  of fontanel length (versus posterior fontanel falls short of base of supra-occipital spine by a distance more than  $1/4$  of fontanel length).
- (3) The supra-occipital spine is 6.25-10.5 times as long as broad at its base (versus supra-occipital spine 3 times as long as broad at its base).
- (4) Both the lips are smooth, although somewhat wavy (versus upper swollen and plicated).
- (5) The nasal and maxillary barbels are comparatively long (versus both barbels relatively short).
- (6) The isthmus is relatively wide (versus isthmus narrow).
- (7) The dorsal spine is smooth (versus finely serrated along the anterior border).
- (8) The pectoral fin is usually longer than the head and a membranous prolongation from its tip reaches the base of the ventral fin (versus pectoral generally shorter than head and without membranous prolongation).
- (9) There is sexual dimorphism (versus sexual dimorphism absent).
- (10) The pectoral spine is smooth along the outer border (versus serrated along distal half of outer border).

(11) There are only two dark bands across the head, a band on internarial space being absent (versus three colour bands on head, a band on internarial space present).

*G. sexualis* has the following differences from *G. itchkeea*:

- (1) The posterior fontanel is elongated (versus a small oval shape).
- (2) In males the eyes can be seen in ventral view of head (versus not seen in ventral view of head).
- (3) The nostrils are situated somewhat in the posterior half of the snout (versus in middle of length of snout).
- (4) The breadth at the base of the supra-occipital spine is contained 6.25-10.5 times in its length (versus 3 times in its length).
- (5) The snout is pointed (versus snout rounded, resembling a pugheaded fish).
- (6) There are six longitudinal grooves on the ventral side of the head (versus grooves absent).
- (7) The bases of the mandibular barbels are arranged in a transverse line (versus not exactly in a transverse row).
- (8) Marked sexual dimorphism present (versus no difference between sexes).
- (9) The length of the caudal peduncle equals 1.86-2.7 times its least height (versus 1.14-1.85 times).
- (10) There are two dark bands on head (versus no dark bands on head).

A KEY TO THE SPECIES OF THE ALLIED GENERA  
GAGATA BLEEKER AND SUNDAGAGATA BOESEMAN

Hora & Law (1941) revised the Indian species of the genus *Gagata* Bleeker and relegated the genus *Nangra* of Day (1877) to its synonymy; they recognized five species in this genus. Volz (1904) described a species of the genus, *Gagata schmidti* (Volz) (= *Callomystax schmidti* Volz), from Sumatra but, being an extra-Indian species, it was not included in the work of Hora & Law (1941). The species from Sumatra has some aberrant characters. Later workers (Weber & de Beaufort, 1913 and Boeseman, 1966) did not have the opportunity to study material of *G. schmidti* and only the description of Volz (1904) has been used for the purpose of comparison. Boeseman (1966) has recently described a new genus and a species, *Sundagagata robusta* Boeseman, based on a single specimen from a river near

Bogor (Buitenzorg), Java. Boeseman has suggested the inclusion of *Gagata schmidti* (Volz) under his new genus, *Sundagagata*, since many of its characters agree with it, although the two species differ, e.g., in the size of the nostrils. The exact systematic position of *G. schmidti* can only be scrutinized if fresh material of the same from Sumatra becomes available. Till that time it seems appropriate to include this species in *Sundagagata* Boeseman, as suggested by Boeseman. With the description of the present species, *Gagata sexualis* nov. spec., the total number of known and recognised species of the genus *Gagata* in India as well as elsewhere becomes six. The differences between *Gagata* and *Sundagagata*, as clearly seen from the study of Boeseman (1966), are of generic status. At the same time, it is evident that the two genera are closely related to each other. Therefore, a key has been drawn up here to accomodate the six species of the genus *Gagata* Bleeker and two of the allied genus *Sundagagata* Boeseman.

### Key

1. Head depressed; median groove or distinct bordering ridges absent; fontanels on the head small; occipital process reaches basal bone of the dorsal spine; eyes small (more than ten times in head length); nostrils small (except in *S. schmidti*) — Genus *Sundagagata* Boeseman, 1966 . . . . . (2)  
 Head compressed; a distinct median groove bordered by prominent longitudinal ridges present; fontanels large; occipital process does not reach the basal bone of the dorsal spine; eyes large (less than six times in head length); nostrils large — Genus *Gagata* Bleeker, 1858 . . . . . (3)
2. The depth of the body 3.85 times in the standard length; eye 11 times in head length; nostrils small . . . . . *Sundagagata robusta* Boeseman  
 The depth of the body 5.5-6.25 times in standard length; eye 13 times in head length; nostrils large . . . . . *Sundagagata schmidti* (Volz)
3. Nasal barbels as long as, or longer than the head . . . . . *Gagata nangra* (Ham.)  
 Nasal barbels small or rudimentary, being almost as long as, or considerably shorter than longitudinal diameter of eye . . . . . (4)
4. The groove on the head extends from the nasal openings to the end of the supra-occipital spine (occipital process); distal parts of all fins, except the caudal, coloured black . . . . . *Gagata gagata* (Ham.)  
 The groove on the head extends from the nasal openings to the base of the supra-occipital spine; distal parts of fins not coloured black . . . . . (5)
5. Maxillary barbels shorter than head . . . . . (6)  
 Maxillary barbels longer than head . . . . . (7)
6. Bases of mandibular barbels close together and in a transverse line; width of head considerably less than length in front of pectorals . . . . . *Gagata cenia* (Ham.)  
 Bases of mandibular barbels set widely apart and at different levels; width of head equal to length in front of pectorals . . . . . *Gagata viridescens* (Ham.)
7. The posterior fontanel is small and oval; the snout is rounded . . . . .  
 . . . . . *Gagata ūchkeea* (Sykes)  
 The posterior fontanel is elongated; the snout is pointed . . . . .  
 . . . . . *Gagata sexualis* nov. spec.

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