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CLARIAS NIGRICANS, A NEW SPECIES OF CLARIID CATFISH (TELEOSTEI: SILURIFORMES) FROM EASTERN BORNEO

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***ABSTRACT.* –** *Clarias nigricans*, new species, is described from the Mahakam River drainage in eastern Borneo. It belongs to the *C. nieuhofii* species group, which is distinguished from other Asian clariids in having a greatly elongated body with 87–108 dorsal fin rays, 74–91 anal fin rays, 74–82 vertebrae and confluent median fins. *Clarias nigricans* can be distinguished from other members of the *C. nieuhofii* species group in having a narrow snout (with an egg-shaped head when viewed dorsally), dark violet grey coloration with small white spots on flanks, a narrow head (11.7–12.3% SL), a relatively large distance between the tip of the occipital process and the base of the first dorsal fin ray (8.1–9.8% SL), and few large serrations on the anterior edge of the pectoral spine.

***KEY WORDS.* –** *Clarias*, Clariidae, catfish, Borneo, Mahakam River.

INTRODUCTION

Catfishes of the genus *Clarias* Scopoli, 1777, are naturally found in freshwater throughout much of the Old World. They are easily distinguished from other catfishes by an anguilliform body, long-based dorsal and anal-fins, and the presence of an accessory breathing organ comprising of modified gill arches. The clariid catfishes of Asia, particularly those of Southeast Asia, have been the focus of recent studies (e.g. Ng, 1999; Lim & Ng, 1999; Teugels et al., 2001), with much hidden diversity being documented.

During a recent ichthyological survey of the Kajan and the Mahakam River drainages in eastern Borneo, specimens of what were initially identified as *Clarias nieuhofii* Valenciennes in Cuvier & Valenciennes, 1840, were obtained from the lower Mahakam River drainage. Close examination of this and older museum material collected from the same locality and comparison with material from other parts of Southeast Asia have revealed consistent, distinct differences. This led to the recognition of the lower Mahakam material as belonging to an unnamed species, which is described in the study below.

MATERIALS AND METHODS

Measurements were made point to point with dial callipers and data recorded to tenths of a millimetre. Counts and measurements were made on the left side of specimens whenever possible. Subunits of the head are presented as proportions of head length (HL). Head length itself and measurements of body parts are given as proportions of standard length (SL). Measurements and counts were made following Ng (1999).

Fin rays were counted under a binocular dissecting microscope using transmitted light and from radiographs. Vertebral counts were taken from radiographs following the method of Roberts (1994). Numbers in parentheses following a particular fin-ray, branchiostegal-ray, gill-raker or vertebral count indicate the number of specimens with that count. Institutional codes follow Eschmeyer (1998).

TAXONOMY

Clarias nigricans, new species

(Figs. 1, 2, 3a)

Clarias nieuhofi – Weber & de Beaufort, 1913: 189 (in part) (non Valenciennes).

***Material examined.* –** Holotype – MZB 10705, 307.5 mm SL, Borneo: Kalimantan Timur, market in Samarinda, coll. H. H. Tan & D. Wowor, 7 Nov.1999.

Paratypes – 5 ex., 232.4–305.0 mm SL, ZMA 121.631, Borneo: Kalimantan Timur, Samarinda, coll. H. J. Lorentz, 20 May.1909; 2 ex., 197.4–315.1 mm SL, ZRC 45590, data as for holotype.

***Diagnosis.* –** *Clarias nigricans* can be distinguished from congeners of the *C. nieuhofii* species group in having a narrow snout (with an egg-shaped head when viewed dorsally), dark violet grey coloration with small white spots

Table 1. Morphometric data for *Clarias nigricans* (n=8).

MORPHOMETRICS	Range	Mean±SD
%SL		
Predorsal length	25.2–27.6	25.8±0.83
Preanal length	36.7–39.8	38.1±0.91
Prepelvic length	31.7–36.1	34.0±1.3
Prepectoral length	13.6–15.7	14.6±0.74
Length of dorsal-fin base	74.1–76.2	75.0±0.78
Length of anal-fin base	59.6–63.8	62.3±1.37
Pelvic-fin length	4.1–5.4	4.8±0.48
Pectoral-fin length	5.2–8.5	6.6±1.41
Pectoral-spine length	3.4–5.2	4.3±0.87
Caudal-fin length	10.7–13.5	11.6±0.85
Distance between occipital process and dorsal fin	8.1–9.8	8.5±0.54
Body depth at anus	10.4–13.0	11.3±0.98
Caudal peduncle depth	4.0–5.4	4.5±0.50
Head length	17.4–18.3	17.8±0.38
Head width	11.7–12.3	12.1±0.21
Head depth	8.5–10.9	9.4±0.89
%HL		
Snout length	29.2–34.9	32.4±1.93
Interorbital distance	40.3–44.0	41.9±1.32
Eye diameter	4.5–5.6	4.8±0.41
Nasal barbel length	59.7–84.1	74.0±7.98
Maxillary barbel length	106.0–144.7	127.6±12.76
Inner mandibular barbel length	51.5–74.0	64.1±9.39
Outer mandibular barbel length	75.3–106.1	92.2±11.78
Front fontanel length	8.6–14.4	11.3±2.17
Front fontanel width	3.8–6.8	4.9±1.03
Occipital fontanel length	5.6–8.4	7.0±0.94
Occipital fontanel width	2.9–4.7	3.6±0.57
Occipital process length	11.7–16.2	13.3±1.44
Occipital process width	26.0–32.8	29.1±2.39

on flanks, a narrow head (11.7–12.3% SL), a relatively large distance between the tip of the occipital process and the base of the first dorsal fin ray (8.1–9.8% SL), and few large serrations on the anterior edge of the pectoral spine.

***Description.* –** Head depressed; dorsal profile slightly convex and ventral profile almost straight. Bony elements of dorsal surface of head covered with thick skin; bones not readily visible, but sutures sometimes evident. Front fontanel short and squat ("sole-shaped" of Teugels, 1986); anterior tip reaching just posterior to line through posterior orbital margins. Occipital process acutely rounded. Eye ovoid, horizontal axis longest, subcutaneous; located dorsolaterally on head. Gill openings narrow, extending from dorsalmost point of pectoral-fin base to isthmus. Gill membranes free from but united to each other across isthmus, with 9 (n=7) or 10 (n=1) branchiostegal rays. First branchial arch with 3+15 (n=2) gill rakers.

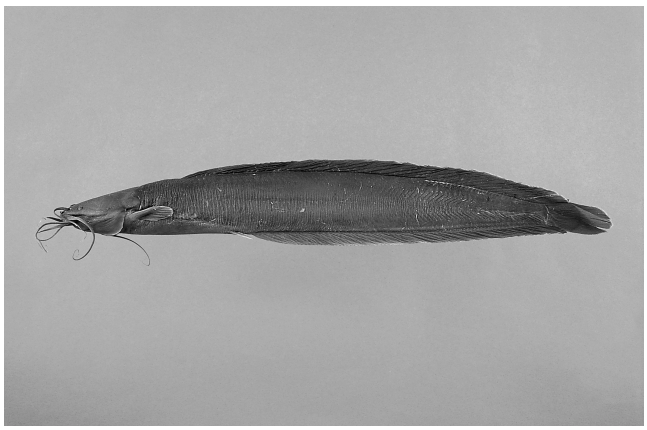

Fig. 1. *Clarias nigricans*, paratype, 197.4 mm SL mm SL, ZRC 45590, Borneo: Kalimantan Timur, Samarinda.

Mouth subterminal, with fleshy, plicate lips. Oral teeth small and in irregular rows on all tooth-bearing surfaces. Premaxillary tooth band rectangular, with median notch on posterior edge. Dentary tooth band much narrower than premaxillary tooth band at symphysis, tapering laterally. Vomerine tooth band unpaired, continuous across midline; crescentic and smoothly arched along anterior margin, posterior margin with a median posteriorly-directed process. Premaxillary and dentary teeth viliform, vomerine teeth subgranular.

Barbels in four pairs; long and slender with thick fleshy

bases. Maxillary barbel extending nearly to base of first dorsal-fin ray. Nasal barbel, extending nearly to tip of occipital process. Inner mandibular-barbel origin close to midline; barbel thicker and longer than nasal barbel and extending to base of pectoral spine. Outer mandibular barbel originates posterolateral of inner mandibular barbel, extending to tip of pectoral fin.

Body cylindrical, becoming compressed towards caudal peduncle. Dorsal profile rising gently from tip of snout to origin of dorsal fin and thereafter almost horizontal to end of caudal peduncle. Ventral profile slightly convex to middle of head and thereafter almost horizontal to end of caudal peduncle.

Skin smooth. Lateral line complete and midlateral in position. Vertebrae 21+55=76 (n=1), 21+57=78 (n=1), 22+56=78 (n=1), 22+58=80 (n=1), 24+57=81 (n=1), 23+59=82 (n=1), 24+58=82 (n=1) or 23+60=83 (n=1).

Dorsal fin with long base, spanning posterior three-quarters of body; with 92 (n=1), 93 (n=1), 94 (n=3), 95 (n=1) or 97 (n=2) rays covered by thick layer of skin and without spine. Dorsal-fin margin straight, parallel to dorsal edge of body. Dorsal fin confluent with caudal fin along most of posteriormost dorsal-fin ray.

Pectoral fin with small spine, sharply pointed at tip, and 7,i (n=8) rays. Proximal three-quarters of anterior spine margin with large serrations; distal quarter of anterior spine margin and posterior spine margin smooth. Pectoral-fin margin straight anteriorly, convex posteriorly.

Pelvic-fin origin at anterior third of body, with i,5 (n=8) rays and convex margin; tip of adpressed fin reaching base of first few anal-fin rays. Anus and urogenital openings located at vertical through middle of adpressed pelvic fin.

Anal fin with long base and 80 (n=2), 82 (n=2), 84 (n=3) or 86 (n=1) rays covered by thick layer of skin; margin straight and parallel to ventral edge of body. Anal fin confluent with caudal fin along most of posteriormost anal-fin ray.

Caudal peduncle short. Caudal fin rounded, with i,5,5,i (n=3), i,6,5,i (n=4) or i,6,6,i (n=1) principal rays.

Morphometric data as in Table 1.

***Colour.* –** Dorsal and lateral surfaces of head and body dark violet grey, fading to pale grey on ventral surfaces. Thirteen to fourteen vertical rows of two to five minute white spots present, subtended ventrally with an irregular row of minute white spots running just below lateral line. Dorsal and caudal fins dark violet grey with very thin hyaline distal margin. Anal fin light grey, with thin hyaline distal margin. Pectoral-fin rays dark violet grey, with hyaline interradial membranes. Pelvic fins hyaline. Barbels and pectoral spines dark violet grey dorsally and light grey ventrally.

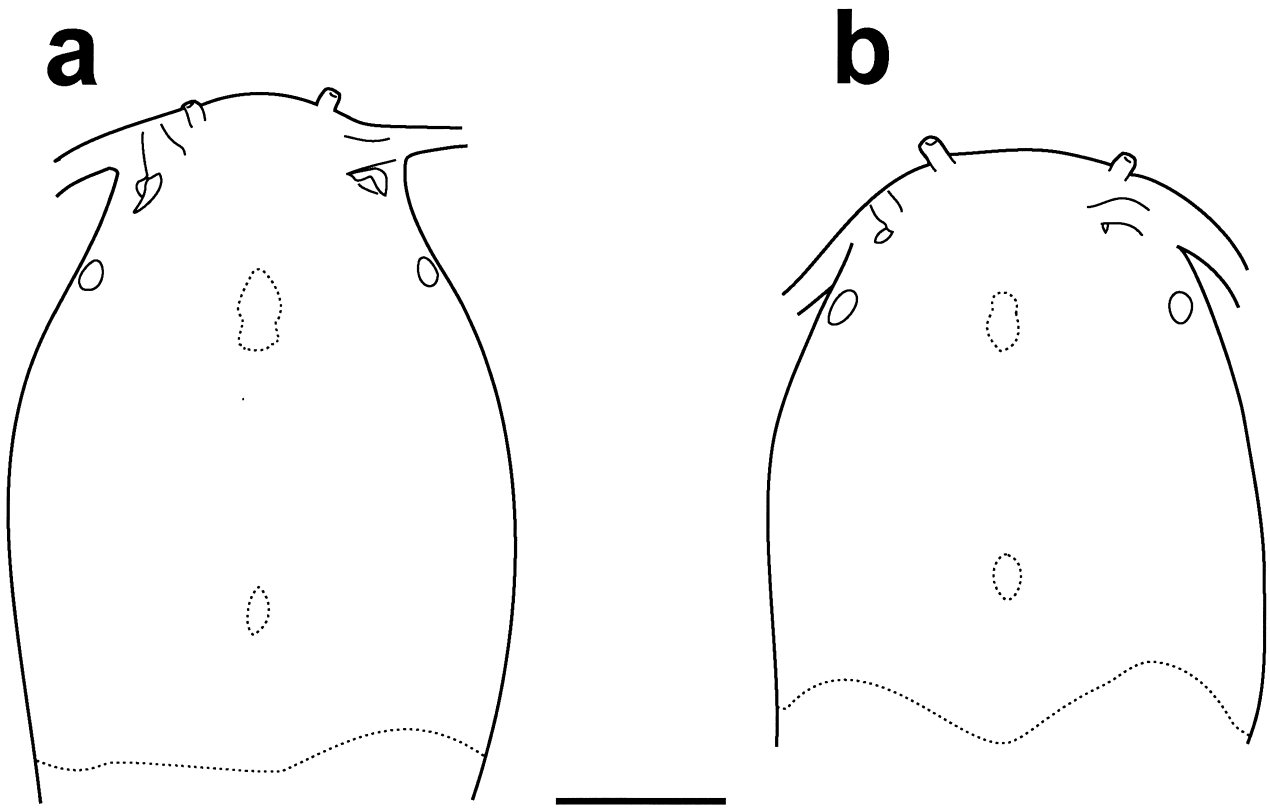

Fig. 2. Dorsal views of heads of: a. *Clarias nigricans*, ZRC 45590, 197.4 mm SL; b. *C. nieuhofii*, ZRC 38978, 202.5 mm SL. Scale bar represents 10 mm.

Etymology. – The Latin adjective nigricans, meaning blackish. In reference to the relatively dark colour of this species.

Distribution. – Known only from the Mahakam drainage in eastern Borneo.

DISCUSSION

Southeast Asian *Clarias* species can be generally divided into three artificial species-groups (Ng, 1999). One such group, consisting of species with greatly elongate bodies (with 81–108 dorsal fin rays and 74–83 vertebrae vs. 60–76 dorsal fin rays and 61–71 vertebrae in other Southeast Asian *Clarias*) and confluent median fins may be a natural assemblage if these characters are found to be synapomorphies that diagnose the group. The nominal species included within this group are: *C. gilli* Smith & Seale, 1906, *C. nieuhofii* Valenciennes in Cuvier & Valenciennes, 1840, and *C. pentapterus* Bleeker, 1851, of which only *C. nieuhofii* is considered valid (Lim & Ng, 1999).

Lim & Ng (1999) confirmed the status of *C. gilli* as a junior synonym of *C. nieuhofii* (first proposed by Fowler, 1941), but noted that the holotype of *C. gilli* they examined differed in eye diameter, interorbital distance and length of occipital process from *C. nieuhofii*, which suggested that *C. gilli* may be a valid species. Since then, the examination of a larger series of elongate *Clarias* from Mindanao identified as *C. gilli* has shown the ranges for these measurements to overlap, confirming the synonymy of the two species.

Clarias nigricans can be distinguished from *C. nieuhofii* in having a narrow snout (with an egg-shaped head when viewed dorsally; Fig. 2), and a narrower head (11.7–12.3% SL vs. 11.6–15.2). This difference is only meaningful when specimens of the same size are compared (Fig. 3) and are unlikely to be due to ontogeny, as bivariate analysis (ANCOVA) shows that the regression lines of eye diameter and pelvic-fin length on SL are significantly different (at P=0.00363; Fig. 2).

The coloration and the size of the white spots on the flanks of *C. nigricans* also differ from that of *C. nieuhofii*. In the latter species, the body is a medium grey, and there are two parallel rows of densely concentrated white spots located along and below the lateral line, which are perpendicular to the 13–14 well-spaced vertical rows of white spots. In the latter species, the body is a dark violet grey, with only one row of white spots along the flanks, perpendicular to the 13–14 well-spaced vertical rows of spots. The white spots in *C. nigricans* are reduced in size, so much so that they are very difficult to make out in some specimens. The serrations on the anterior edge of the pectoral spine in *C. nigricans* are also larger than those in *C. nieuhofii* when material of similar sizes are compared (Fig. 4).

Clarias nigricans can be found sympatrically with *C. nieuhofii* in the lower Mahakam River. However, since all of the material examined was obtained from market purchases, it is uncertain whether the two species occur syntopically. The isolation of the Mahakam River drainage from the other major river drainages on Borneo was complete sometime during the late Miocene (ca. 8 million years ago)

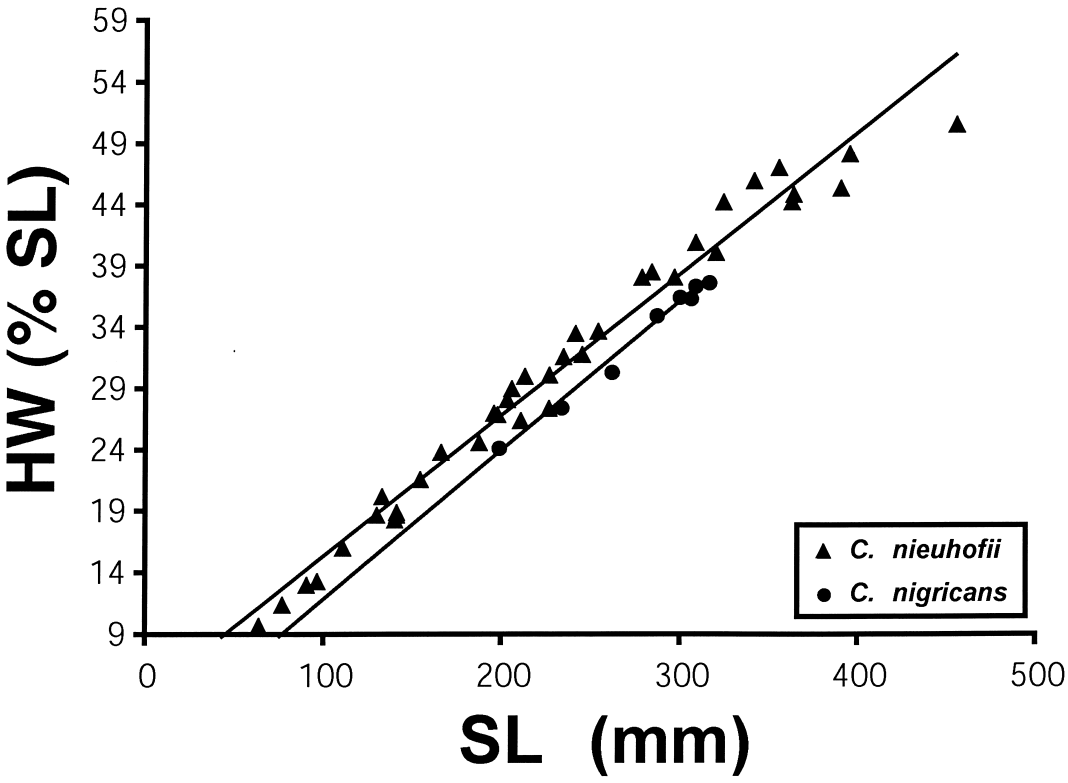

Fig. 3. Scatterplots for *C. nigricans* and *C. nieuhofii* of head width (HW) against standard length (SL).

as a result of the orogenesis of the central Bornean highlands (Moss & Wilson, 1998). The formation of this regional drainage divide may have been responsible for the allopatric speciation of *C. nigricans*. However, this simple vicariance scenario is complicated by the presence of *C. nieuhofii* in the Mahakam River drainage, which may have resulted from post-vicariance dispersal.

Comparative material. – *Clarias nieuhofii*: holotype, 394.8 mm SL, MNHN B300, Java; holotype of *C. pentapterus*, 244.5 mm SL, RMNH 6804, Borneo: Banjarmasin; holotype of *C. gilli*, 292.0 mm SL, USNM 55620, Mindanao: Rio Grande.

MALAY PENINSULA: 1 ex., 110.0 mm SL, ZRC 13629, Johor: Kota Tinggi, Gunung Panti foothills; 1 ex., 165.2 mm SL, ZRC 15390; 1 ex., 129.0 mm SL, ZRC 15391; 1 ex., 75.8 mm SL, ZRC 15392; 2 ex., 139.4–225.7 mm SL, ZRC 17676–17677, Selangor: North Selangor peat swamp forest; 2 ex., 153.5–253.4 mm SL, ZRC 24584; 1 ex., 89.6 mm SL, ZRC 37603, Selangor: Sabak Bernam.

JAVA: 1 ex., , 390 mm SL, NMW 46994, Buitenzorg.

SUMATRA: 1 ex., 140.2 mm SL, ZRC 37506, Riau Archipelago: Pulau Bintan N; 1 ex., 140.3 mm SL, ZRC 37522, Riau Archipelago: Pulau Bintan, 49 km on highway from Tanjung Ubon to Tanjung Pinang; 5 ex., 202.5–240.7 mm SL, ZRC 38978; 10 ex., 165.8–216.4 mm SL, ZRC 43219, Jambi: Jambi fish market; 5 ex., 204.5–358.0 mm SL, ZRC 39093, Riau: Rengat fish market.

BORNEO: 1 ex., 186.6 mm SL, CMK 6868, Kalimantan Barat: Mintas Sembolong, a shortcut between meanders S of Kapuas river mainstream, upstream of Nanga Embaluh; 3 ex., 195.0–210.0 mm
SL, ZRC 40071, Kalimantan Selatan: Banjarmasin fish market; 1 ex., 283.3 mm SL, ZRC 40043, Kalimantan Tengah: Muara Teweh; 6 ex., 234.0–355.0 mm SL, ZRC 40552, Sarawak: Miri, said to be from Sungai Bakung (tributary of Baram River); 1 ex., 363.2 mm SL, ZRC 47761, Kalimantan Timur: Samarinda fish market.

PHILIPPINE ISLANDS: 4 ex., 227.0–309.3 mm SL, CAS 113746; 284.5–263.5 mm SL, UMMZ 100322, Mindanao: Fort Pikit, Cotabato; 1 ex., 300.2 mm SL, CAS 138345, Luzon: Manila market.

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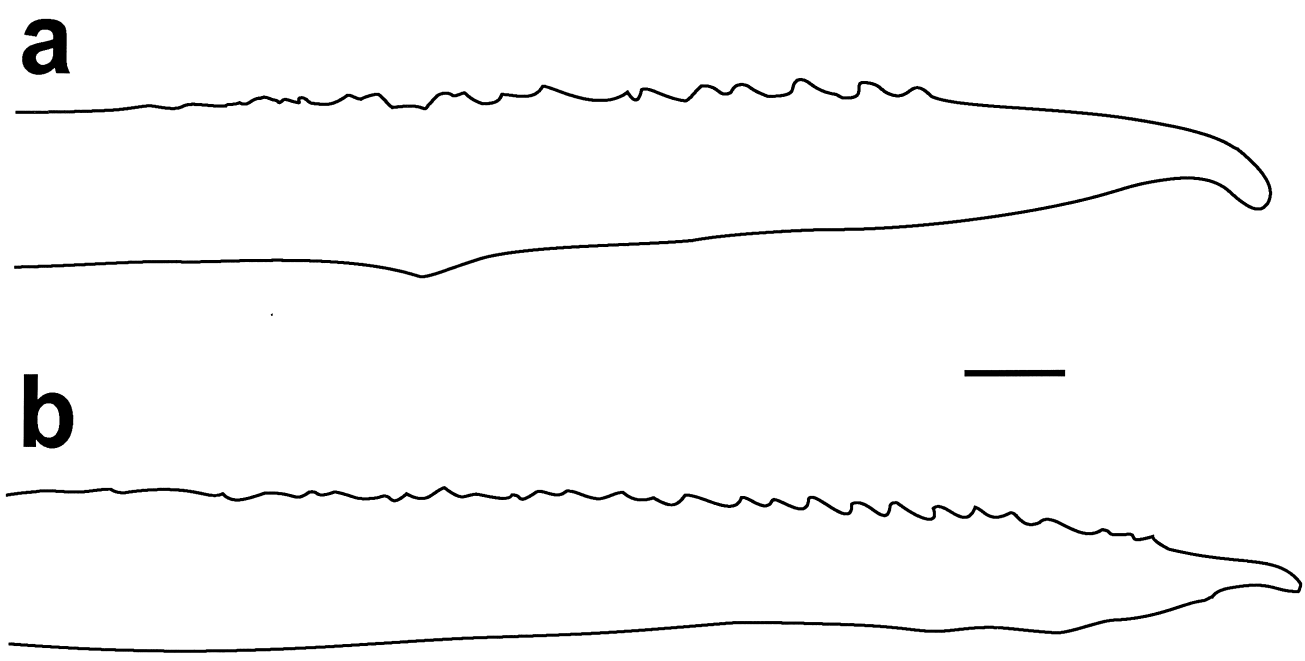

Fig. 4. Right pectoral spines of: *C. nigricans*, ZRC 45590, 197.4 mm SL; b. *C. nieuhofii*, ZRC 43219, 186.2 mm SL. Scale bar represents 1 mm.

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