

**A NEW CAVERNICOLOUS CRAB (CRUSTACEA,
DECAPODA, PSEUDOTHELPHUSIDAE)
FROM COLOMBIA**

**NOVA JAMSKA RAKOVICA (Crustacea, Decapoda,
Pseudothelphusidae) IZ KOLUMBIJE**

RODRIGUEZ, G.

Instituto Venezolano de Investigaciones
Científicas, Apartado 1827, Caracas 1010-A,
Venezuela.

UDC (UDK) 595.384(24)(861)(045) = 20

DESCRIPTORS: Decapoda Neostrengeria sketi — classification / Colombia

DESKRIPTORJI: Decapoda Neostrengeria sketi — klasifikacija / Kolumbija

Original research paper (izvirno raziskovalno delo)

Received for publication (sprejeto) 1985-5-31

ABSTRACT — RODRIGUEZ, G.: A NEW CAVERNICOLOUS CRAB (CRUSTACEA, DECAPODA, PSEUDOTHELPHUSIDAE) FROM COLOMBIA. Biol. vestn. 33 (1985) 2 (73—80) (Engl., 20 ref., 3 fig., 1 tab.). Instituto Venezolano de Investigaciones Científicas, Apartado 1827, Caracas 1010-A, Venezuela.

Neostrengeria sketi, new species, is described from two caves in Departamento Santander, Colombia. It is closely related to 2 epigeal species of the zone, but the pereopods are unusually long and slender, the corneae are reduced and the body is partly depigmented. The species is derived from one of the epigeal; it is in the early stages of adaptation to cavernicolous life.

IZVLEČEK — RODRIGUEZ, G.: NOVA JAMSKA RAKOVICA (CRUSTACEA, DECAPODA, PSEUDOTHELPHUSIDAE) IZ KOLUMBIJE. Biol. vestn. 33 (1985) 2 (73—80) (angl., povzetek slov., 20 citatov, 3 slike, 1 tab.). Instituto Venezolano de Investigaciones, Científicas, Apartado 1827, Caracas 1010-A Venezuela.

Neostrengeria sketi je nova vrsta, opisana iz dveh jam v Kolumbiji, v področju Santander. Je podobna dvema površinskima vrstama z istega področja, vendar pa so njene noge izredno dolge in vitke, oči so zmanjšane in telo je deloma depigmentirano. Vrsta je nastala iz ene od površinskih. Je na zgodnji stopnji prilagajanja na življenje v jamah.

1. INTRODUCTION

During the 1984 Yugoslav Speleological Expedition to Colombia a number of freshwater crabs was obtained. These were collected by Dr. Boris Sket and other expedition members in the course of studies of invertebrates in the caves of the Santander Department, in the Eastern Cordillera, at height of between 1000 and 2000 m above sea level. Two of the species found by the expedition have already been dealt with by CAMPOS and RODRÍGUEZ (1985). A third species, new to science, will be described in this paper.

I am most indebted to Dr. Sket for placing this interesting collection of crabs at my disposal, and for providing information on the collecting localities, and to Dr. L. B. Holt-huis, who very generously transmitted to me this material that had been sent to him for study.

The material, including holo- and allotypes, forms part of the collection of the Biology Institute, University of Ljubljana. Paratypes of the new species are deposited in the Rijksmuseum van Natuurlijke Historie, Leiden, and in the Instituto Venezolano de Investigaciones Científicas, Caracas.

The abbreviations cb and cl are used here for carapace breadth and carapace length.

2. LOCALITIES

The following information on the caves was obtained from the collector.

1. Hoyo del Aire is near the town of La Paz, 1800 m above sea level. Six specimens of the new species, *Neostrengeria sketi*, were obtained here.

2. Hoyo Colombia is near the town of La Paz, 1800 above sea level. Seven specimens of the same new species were collected here.

3. Cueva de Los Indios is near the town of La Paz, 1995 m above sea level. One specimen of *Neostrengeria charalensis* Campos and Rodríguez 1985 was collected here.

4. Cueva del Páramo is near the town of San Gil, 1450 m above sea level. One specimen of *Neostrengeria niceforoi* (Schmitt 1969) was obtained here.

3. DESCRIPTION

NEOSTRENGERIA SKETI SP. N.

Material: Hoyo del Aire, La Paz, Departamento Santander, 1800 m, June 1984; B. Sket: 1 male holotype, cb. 44.9, cl. 24.2 mm; 3 male paratypes, cb. 47.3, 42.8, 29.9, cl. 29.9, 24.1, 16.2 mm, 2 (spent) female allotypes, cb. 47.9, 38.9, cl. 27.2, 22.3 mm. — Hoyo Colombia, La Paz, Departamento Santander, 1800 m, Jun 1984; B. Sket: 1 male, with broken carapace, 7 females, cb. 40.0, 37.5, 31.2, 26.7, 26.5, 25.0, 23.2 mm, cl. 21.8, 20.8, 17.6, 15.5, 14.2, 14.0 mm.

The carapace is wider than in other species of the genus. The anterolateral border between the external orbital angle and the cervical groove is almost perpendicular to the longitudinal axis of the body, and consequently the border in this area forms a continuous straight line; this segment of the border is provided with small rounded irregularly placed papillae; the rest of the anterolateral border bears small denticles interspaced with rounded papillae and arranged in an irregular row; the branchial, subbranchial and subhepatic areas are

Table 1. Proportions of the carapace and larger chela in several species of *Neostrengeria* (N = number of specimens; cl = carapace length; i = length of ischium; f = fingers; h and l = height and length of chela)

	Carapace		Larger cheliped			
	N	cb/cl	N	i/cl	f/l	h/l
<i>N. boyacensis</i>	2	1.65	1	0.75	0.51	0.37
<i>N. charalensis</i>	5	1.73	3	0.81	0.51	0.33
<i>N. guenteri</i>	1	1.69	1	0.79	0.46	0.41
<i>N. macropa</i>	2	1.55	2	0.62	0.56	0.31
<i>N. monterrondensis</i>	15	1.66				
<i>N. niceforoi</i>	21	1.71	4	0.88	0.47	0.37
<i>N. sketi</i>	6	1.78	6	1.06	0.56	0.24

covered by small, flat papillae. The cervical groove is narrow and straight; it does not reach the margin of the carapace. The frontal lobes are reduced to two small rounded prominences. The median groove forms a shallow and wide depression. The surface of the carapace behind the front is slightly inclined anteriorly and towards the midline. The upper border of the front is bilobed in dorsal view; the margin of each lobe is somewhat oblique, and consequently the lobes are more advanced near the midline. In frontal view the upper margin is strongly sinuous and inclined towards the midline; it is marked by rounded papillae, irregularly placed. The lower margin is strongly sinuous from frontal view. The surface of the front between the upper and lower margin is narrow. The eyes are very small leaving a large empty space in the orbits; the ocular peduncle and cornea taper distally; the cornea do not widen distally, and is partially unpigmented. The surface of the carapace is polished with the regions strongly marked-off.

The chelae are elongated. The palm from frontal view is narrower than in other species of the genus. The fingers are long and slender, more than half the total length of the chela; when closed the fingers gape strongly, leaving a sizeable space between them; their tips cross; in dorsal view they are strongly arched inwards; the fingers have 4 larger teeth on their proximal half interspaced with 1 or 2 smaller teeth; these larger teeth decrease in size distally and have 3—4 smaller teeth between them. The ischium of chelipeds are very long, as long or even longer than the total breadth of carapace, its supero-interior margin has a row of small spines that diminish in size proximally, and small papillae over the inferior internal margin. The carpus is also elongated, and has 1 larger spine and 2—3 minute spines on the inner margin. The fingers have small dark points; the upper surface of the hand and carpus and the external border of the merus are covered by small squamiform papillae which become papilliform tubercles on the proximal half of merus.

The walking legs are long and slender, the largest being those of the third pair (total length approximately 1.3 times the breadth of the carapace); in this pair the merus is 4.5 times longer than wide. The dactyli are very long and slender; there are five rows of minute spines with 6 to 10 spines in each row; these spines increase in size distally and, the last spine of the lateral rows is considerably stronger. There are minute spines on the upper margin of the carpus, and in the upper and lower margins of the propodus, and small tubercles or squamiform papillae on the upper margin of the merus. The male gonopod has the two lateral lobes characteristic of the genus; the surface of the appendage has conspicuous rugae on

its cephalic surface; the apex in distal view has a conspicuous triangular tooth on its lateral margin.

This species has the perforated area or pseudolung characteristic of Pseudothelphusidae in the branchial chamber (DIAZ and RODRIGUEZ 1977).

The colour is much lighter than in most species of Pseudothelphusidae, but the crabs are not conspicuously depigmented. The upper surface of the carapace is light yellowish brown in living animals (brown-red or brown-olive when preserved). The pereopods and underside are also brown and slightly paler (retaining their colour when preserved).

4. TAXONOMICAL RELATIONSHIPS AND EVALUATION OF CAVERNICOLOUS CHARACTERS

The specimens from the two caves studied are apparently conspecific, although the gonopod of the only male from Hoyo Colombia has a more acute cephalic tooth, directed mesially. The two caves are almost certainly not connected by a water flow (SKET in litt.).

In addition to the present species, the genus *Neostrengeria* contains 10 epigeal species distributed throughout the Eastern Cordillera of Colombia, between 700 and 2900 m, with some overlap among the species (CAMPOS and RODRÍGUEZ 1985). *N. sketi* is derived undoubtedly from one of these epigeal forms. The phylogenetic relationships of the genus are discussed elsewhere (RODRIGUEZ in press).

The gonopod of *Neostrengeria sketi* resembles those of *N. macropa* (H. Milne Edwards 1853) and *N. charalensis* CAMPOS and RODRÍGUEZ 1985, in the outline of the apex as seen in distal view, but the cephalic tooth is stronger and implanted more mesially. Additionally, the walking legs of the three species differ in the spinulation of the dactylus and the proportions of the merus. The type locality of *N. sketi* is covered by the distributional range of *N. charalensis*, and the territory of both species is next to that of *N. macropa* (see map in CAMPOS and RODRÍGUEZ 1985), strongly suggesting an allopatric speciation of *N. charalensis* and *N. macropa*, and a subsequent hypogean differentiation of *N. sketi* from *N. charalensis*.

Some of the peculiar characters of *Neostrengeria sketi* are generic, and others should be attributed to its hypogean habitat. In all species of Pseudothelphusidae the relative width of carapace, cb/cl ratio ranges between 1.46 and 1.7 ($\pm = 1.61$, $N = 106$) (data from RODRÍGUEZ 1982). In *Neostrengeria*, except *N. macropa*, the ratio is considerably larger than the mean ratio (Table 1); in *N. sketi* it is even larger than in any other species of Pseudothelphusidae. *N. sketi* also has the palm of the chela thinner (ratio height/length = 0.24) than any other *Neostrengeria*, but this character, and also the pale body colour, the slender walking legs and the reduction of the cornea, is generally attributed to the cavernicolous habitat (VANDEL 1964).

Cavernicolous crabs have been reported before from three well known karstic areas in the Neotropics.

1. The Eastern Sierra Madre of Chiapas, Mexico. The first troglitic Pseudothelphusidae, *Typhlopseudothelphusa mocinoi* Rioja 1953, and the only troglitic Trichodactylidae known, *Trichodactylus (Rodriguezia) mensabak* Cottarelli & Argano 1977, came from this area. Both species are blind, depigmented and have extremely long and slender pereopods. Additionally 3 species of cavernicolous palaemonid shrimps have been described from this area in the Chiapas and Tabasco States (see references in HOLTHUIS 1977).

2. The mountains of Alta Verapaz, Guatemala. The Sierra de Tamá and other eleva-

tions around the town of Cobán, are a continuation of the karstic topography of Chiapas (ENJAELBERT 1962). Several epigean and cave species of Pseudothelphusidae have been described from this area, but the taxonomic status of some of them is doubtful. Two cave species — blind and depigmented, with extremely slender pereopods — are undoubtedly troglobious, *Typhlopseudothelphusa mitcheli* Delamare Deboutteville, 1976 and *T. juberthei* Delamare Deboutteville, 1976. The other species collected in caves, *Phrygiopillus acanthophallus* Smalley 1979, and *Gordonia longipes* Pretzmann 1965, have long, slender legs but normal eyes. Another species with long, slender legs, is *Boscia gracilipes* (A. Milne Edwards 1866), but it is not known whether it was collected in a cave. *Gordonia longipes* and *Boscia gracilipes* are incertae sedis species since they were described from female holotypes (RODRÍGUEZ 1982).

3. Sierra de los Organos and other karstic areas of Pinar del Río, Cuba (FURRAZOTO-BERMÚDEZ et al. 1964). *Epilobocera gertraudae* Pretzmann 1965, a species with long, slender legs, is known from a single specimen collected in a cave at Los Baños, Viñales (CHACE and HOBBS 1969). Two other troglotic decapods, a palaemonid shrimp and a cambarid crayfish, also come from this area (see references in CHACE and HOBBS 1969).

Until recently, all Palaeotropical crabs collected in caves were troglaxens, or at least, troglaphiles (VANDEL 1964), but in the last few years HOLTHUIS (1979; 1980; 1982) has described 5 species which are true troglobites or show some adaptations to subterranean life: *Cerberusa caeca* Holthuis 1979, *C. tipula* Holthuis 1979, and *Adeleana chapmani* Holthuis 1979, from Northern Sarawak, Borneo, and *Hoethuisiana alba* Holthuis 1980, and *Rouxana phreatica* Holthuis 1982, from Papua New Guinea.

Cave adaptations in all these crabs comprise one or more of the following characteristics: (a) long, slender legs; (b) depigmentation of the legs and carapace, which sometimes becomes (c) translucent; (d) reduction or (e) obsolescence of the corneae. The first characteristic affected is always the robustness of the pereopods, since in all cavernicolous species these are long and slender; this stage is usually accompanied by some depigmentation. Total absence of cornea occurs only in 4 of the species mentioned earlier. *Holthuisiana alba* has vestigial corneae, and some of the other species have reduced corneae. In its final stage, in addition to the total depigmentation of the body, the internal organs become partially visible due to the translucence of the carapace wall.

As was mentioned before, in all Pseudothelphusidae, including *N. sketi*, the lining of the branchial chamber has a spongy tissue or pseudolung (DÍAZ and RODRÍGUEZ 1977). *Typhlopseudothelphusa mocinoi* lacks this pseudolung (this aspect has not been investigated in other cave species); it is possible that this obsolescence is due to an advanced adaptation to the humid air of caves.

The partial depigmentation of body, slenderness of appendages and reduction of the eyes suggest that *Neostrengeria sketi* is a true troglotic, although it is only in the first stage of its adaptation to cavernicolous conditions.

Povzetek

NOVA JAMSKA RAKOVICA (CRUSTACEA, DECAPODA, PSEUDOTHELPHUSIDAE) IZ KOLUMBIJE

Jamarski zvezi Slovenije ter Bosne in Hercegovine sta leta 1984 organizirali speleološko odpravo v Kolumbijo. Odprava je raziskovala predvsem v departmaju Stantander v Vzhodni Kordiljeri, na višinah med 1000 in 2000 m n. m. Med člani odprave je bil tudi biolog. Poleg drugih živali so našli tri vrste rakovic. Površinski vrsti *Neostrengeria charalensis* Campos et Rodriguez 1985 in *N. niceforoi* (Schmitt 1969) sta obravnavani drugje (CAMPOS and RODRIGUEZ 1985), tukaj pa je opisana nova, jamska vrsta.

Neostrengeria sketi sp. n. je bila najdena v jamah Hoyo del Aire in Hoyo Colombia na nadmorski višini okoli 1800 m. Karapaks je širši kot pri drugih vrstah tega rodu. Oči so zelo majhne in puščajo veliko prostora v orbitah. Kornea je deloma nepigmentirana. Škarje so podaljšane in vitke, prav tako noge, katerih najdaljše dosežejo 130 % širine karapaksa. Barva je razmeroma bleda, rumenkasto rjava.

Osebki iz obeh jam očitno pripadajo isti vrsti, kljub manjšim razlikam na gonopodih. Rod *Neostrengeria* vsebuje poleg omenjene še 10 površinskih vrst, njihovi areali so razporejeni vzdolž kolumbijske Vzhodne Kordiljere, med 700 in 2900 m n. m., nekateri se deloma prekrivajo. Tipsko nahajališče vrste *N. sketi* je znotraj areala vrste *N. charalensis* in blizu areala *N. macropa* (H. Milne Edwards 1853). Morfologija in razširjenost teh vrst kaže, da sta se *N. charalensis* in *N. macropa* razvili ob alopatrični speciaciji, *N. sketi* pa je nastala iz *N. charalensis* po izolaciji v podzemlju. V povzetku omenjene značilnosti nove vrste so vse očitno v zvezi s prilagajanjem na jamsko okolje.

Jamske rakovice so bile doslej znane z naslednjih področij: vzhodna Sierra Madre v Chiapas (Mehika), gore v Alta Verapaz (Guatemala), Pinar del Rio (Kuba), Severni Saravak ter Papua. Nekateri imajo le podaljšane noge, druge pa so povsem slepe. *N. sketi* je edina troglobionska vrsta, ki jo poznamo iz Južne Amerike.

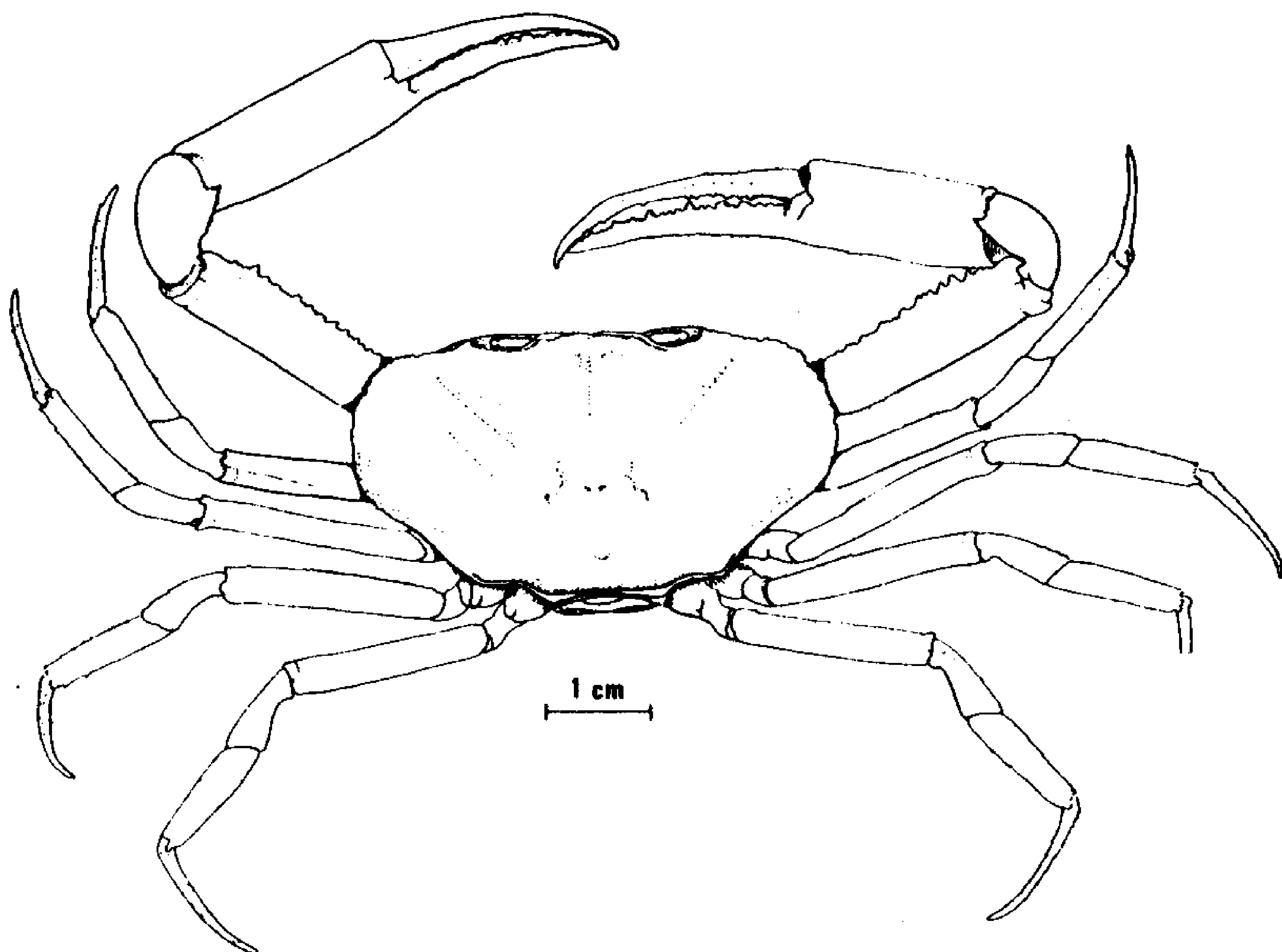


Figure 1. *Neostrengeria sketi* sp. n., male holotype.

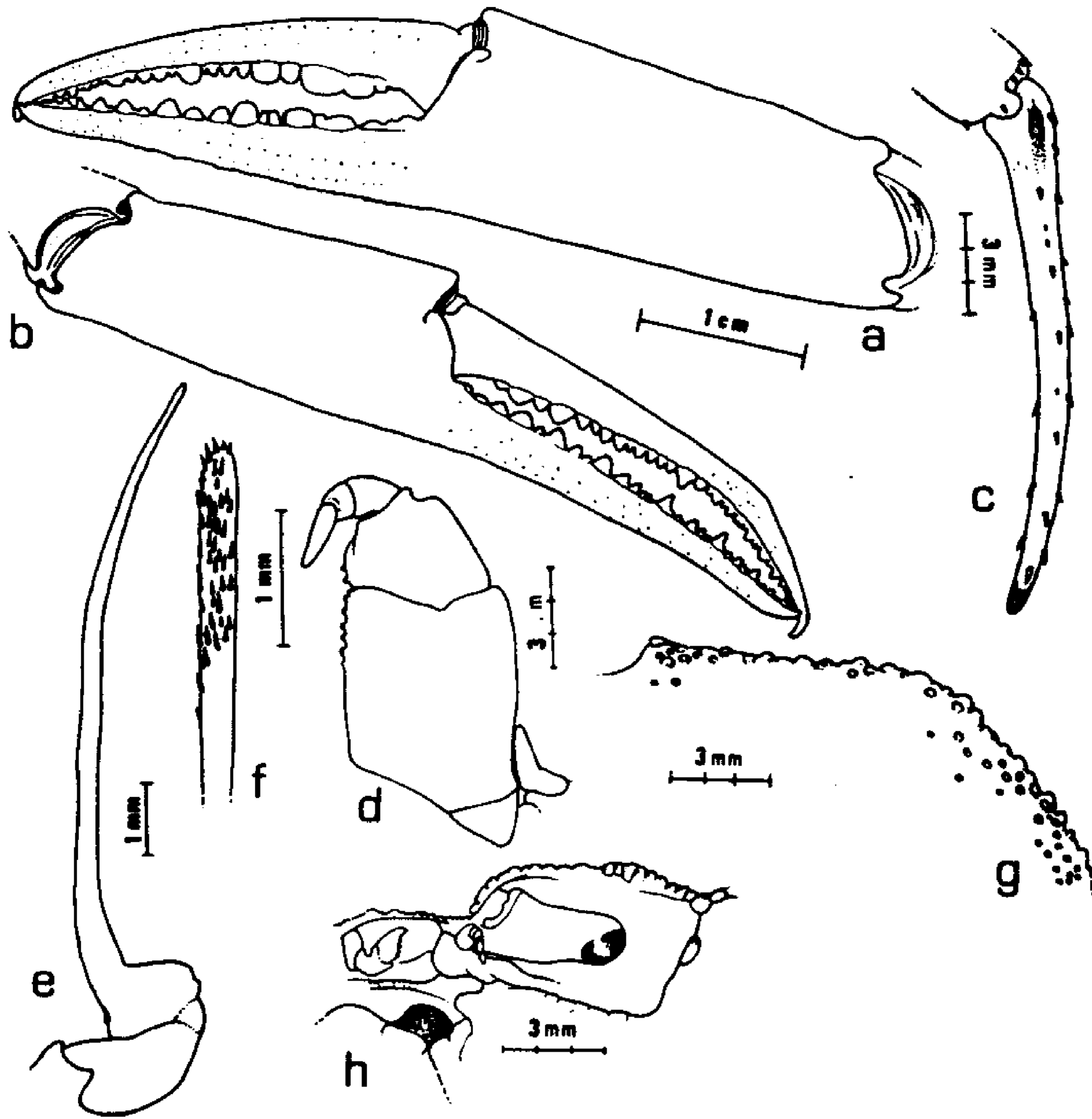


Figure 2. *Neostrengeria sketi* sp. n., male holotype. a, large cheliped; b, small cheliped; c, dactylus of third left walking leg; d, third maxilliped, left; e, second male pleopod, left; f, apex of second male pleopod; g, post orbital area of carapace, left; h, orbit, eye, antennular area and efferent aperture, left.

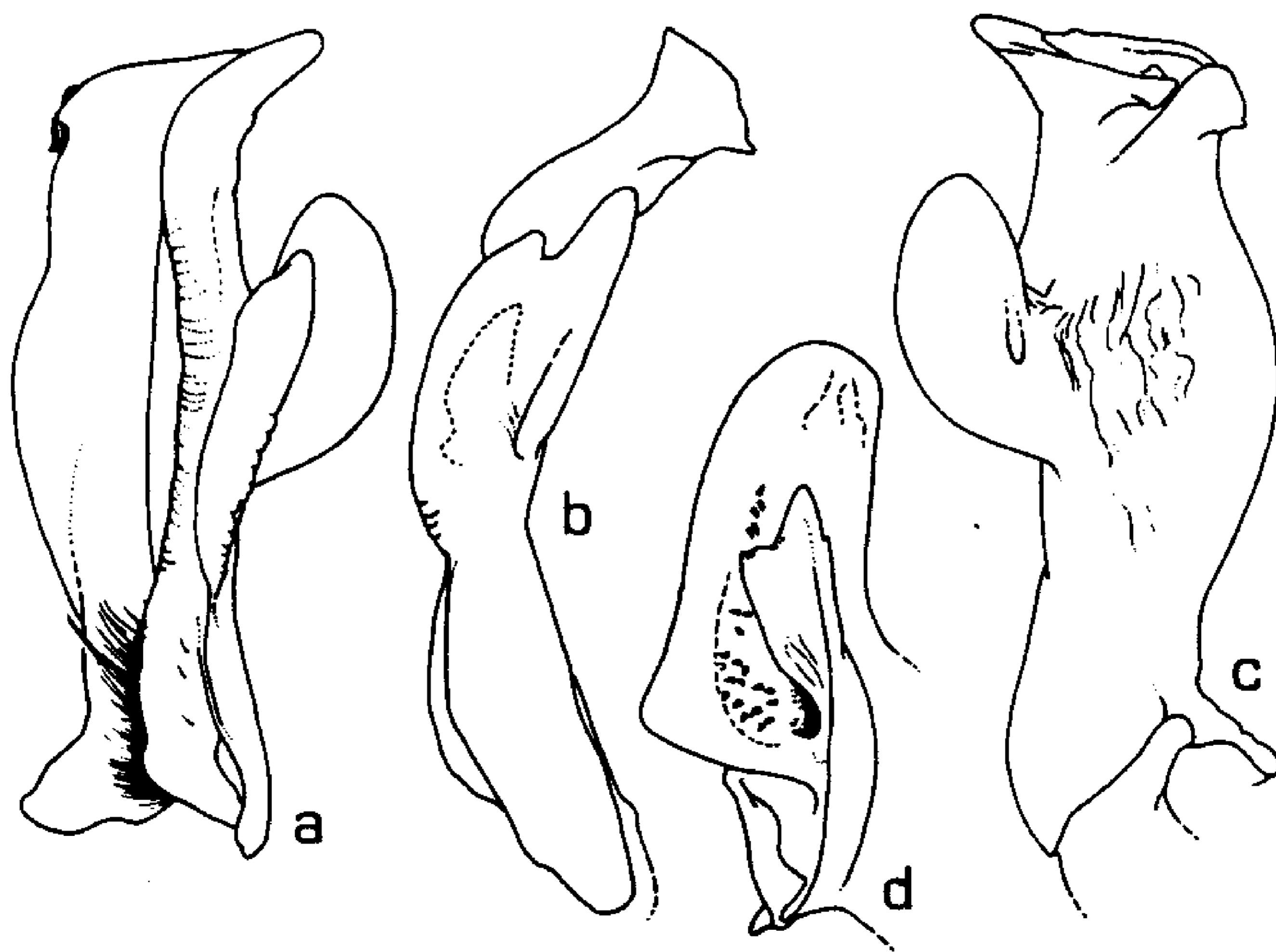


Figure 3. *Neostrengeria sketi* sp. n., male holotype, left gonopod. a, caudal view; b, lateral view; c, mesial view; d, apex in distal view.

LITERATURE

- CAMPOS, M. and G. RODRIGUEZ 1985: A new species of *Neostrengeria* (Crustacea, Decapoda, Pseudothelphusidae) with notes on geographical distribution of the genus, Proc. Biol. Soc. Wash., 98 (3): 718—727.
- CHACE, F. A., JR., and H. H. HOBBS, JR. 1969: The freshwater and terrestrial decapod crustacea of West Indies with special reference to Dominica, U. S. Natl. Mus. Bull., 292: I—VII, 1—258.
- COTTARELLI, V. E. and R. ARGANO 1977: *Trichodactylus (Rodriguezia) mensabak*, n. sp. (Crustacea, Decapoda, Brachyura), granchio cieco delle acque sotterranee del Chiapas (Messico), Quad. Prob. Att. Sci. Cult., Acad. Naz. Lincei, 171 (3): 207—212.
- DELAMARE DEBOUTTEVILLE, C. 1976 a: Sur la radiation evolutive des crabes du genre *Typhlopseudothelphusa* au Guatemala et au Mexique avec description d'espèces nouvelles, Ann. Spéléol., 31: 115—129.
- DELAMARE DEBOUTTEVILLE, C. 1976 b: Intérêt biologique et écologique des crabes cavernicoles du Guatemala et du Mexique appartenant au genre *Typhlopseudothelphusa* Rioja, C. R. Acad. Sc. Paris, Ser. D, 283: 837—840.
- DIAZ, H. and G. RODRIGUEZ, 1977: The branchial chamber in terrestrial Crabs: a comparative study, Biol. Bull., 153: 485—504.
- ENJAELEBERT, H. 1964: Phénomènes karstiques au Mexico et au Guatemala, Bull. Assoc. Geogr. Fr., 324—325: 30—58.
- FURRAZOLA-BERMUDEZ, G., C. M. JUDOLEY, M. S. MIJAILOVSKAYA, Y. S. MIROLIUBOV, I. P. NOVAJATSKY, A. N. NUNEZ JIMENEZ y J. B. SOLSANA 1964: Geología de Cuba, Editorial del Consejo Nacional de Cuba, La Habana, 239 pp.
- HOLTHUIS, L. B. 1977: Cave shrimps (Crustacea, Decapoda, Natantia) from Mexico, Prob. Att. Sci. cult., Acad. Naz. Lincei, 124 (171): 173—195.
- HOLTHUIS, L. B. 1979: Cavernicolous and terrestrial decapod Crustacea from Northern Sarawak, Borneo. Zool. Verhand. Leiden, 171: 1—47, Pl. 1—8.
- HOLTHUIS, L. B. 1980: A new cavernicolous fresh-water crab from New Guinea (Crustacea Decapoda), Zool. Mededel., 55 (27): 313—320.
- HOLTHUIS, L. B. 1982: Notes on Indo-West Pacific Crustacea Decapoda, I. *Rouxana phreatica*, a new cavernicolous Crab from New Guinea, Crustaceana, 42: 26—31.
- MILNE EDWARDS, A. 1866: Description de trois nouvelles du genre *Boscia*, Crustacés Brachyures de la tribu des Telphusiens, Anns. Soc. ent. Fr., (4) 5: 203—205.
- PRETZMANN, G. 1965: Vorläufiger Bericht über die Familie Pseudothelphusidae, Anz. math. naturh. Kl., Osterr. Akad. Wiss., (1), 1: 1—10.
- RIOJA, E. 1952: Estudios carcinológicos. XXVIII. Descripción de un nuevo género de Potamonidos cavernícolas y ciegos de la Cueva del Tío Ticho, Comitán, Chis. An. Inst. Biol. Univ. Méx., 23 (1—2): 217—225.
- RODRIGUEZ, G. 1982. Les crabes d'eau douce d'Amérique. Famille des Pseudothelphusidae, Faune Tropicale, ORSTOM, 22: 1—223.
- RODRIGUEZ, G. (in press), Centers of radiation of freshwater crabs in the Neotropics. In: R. H. GORE and K. L. HECK Eds., Crustacean Issues 3: Biogeography of the Crustacea. A. A. Balkema, Rotterdam.
- SCHMITT, W. L. 1969, Colombian freshwater crab notes. Proc. Biol. Soc. Wash., 82: 93—112.
- SMALLEY, A. E. 1970, A new genus of freshwater crabs from Guatemala, with a key to the Middle American genera (Crustacea Decapoda, Pseudothelphusidae), Am. Midl. Nat., 83 (1): 96—106.
- VANDEL, A. 1964: Biospéologie — la biologie des animaux cavernicoles, Gauthier — Villars, Paris pp. 1—619.