

NITOKRA SPHAEROMATA, A NEW HARPACTICOID
COPEPOD CRUSTACEAN ASSOCIATED WITH THE
WOOD-BORING ISOPOD, *SPHAEROMA PERUVIANUM*,
IN COSTA RICA

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Abstract.—*Nitokra sphaeromata* is described from the pleopods of the marine flabelliferan isopod *Sphaeroma peruvianum*, collected from burrows in mangroves in the Gulf of Nicoya, Costa Rica. It is the fourth species of *Nitokra*, a genus with about 40 species, known to have commensal relationships. Other crustaceans associated with species of *Sphaeroma*, *Iais* spp. (Isopoda: Asellota), and *Microsyssistria* (Ostracoda: Entocytheridae) are listed. The commonly used spelling *Nitocra* is replaced by Boeck's correct original spelling *Nitokra*.

During an investigation of the effect of the wood-boring isopod, *Sphaeroma peruvianum* Richardson, 1910, on red mangroves of Pacific Costa Rica by Richard C. Brusca and Diane Perry, a harpacticoid copepod was found on the pleopods of the isopod. Specimens were sent to me for identification, and they proved to be the new species of *Nitokra* described below.

Nitokra sphaeromata, new species
Figs. 1-16

Material.—Costa Rica: Gulf of Nicoya, Punta Morales (ca. 10°04'N, 84°58'W), from pleopods of *Sphaeroma peruvianum* collected from its burrows in red mangroves: holotype ♀ USNM 234096; paratypes 4 ♀, 2 ♂, 1 juv. USNM 234097. Leg. Richard C. Brusca and Diane Perry, Feb 1984.

Etymology.—*Sphaeromata* = "of *Sphaeroma*," the host genus.

Description.—Lengths of 4 ♀, 1.22, 1.24, 1.25, 1.26 mm; of 2 ♂, 1.10, 1.16 mm. Prosome (head + pedigers 1-4) subequal in length to urosome (pediger 5 thru caudal rami). Greatest body width at level of head. Rostrum oval, short. Urosomites 2-5 with submarginal row of spinules limited to lateral surface, except on anal somite where

row is marginal and continues dorsally. Anal operculum with marginal spinules. Caudal ramus about as long as wide, without spinules; medial seta and inner of 2 lateral seta subequal in length; outer lateral seta half as long; dorsal seta reduced to short spine at base of inner terminal seta.

Antenna 1 of ♀ with row of setules on anterior margin of segment 1; in ♂ with 2 serrate spines on segment 4 and 2 clublike setae on penultimate segment. Antenna 2, outer seta of exopod longer than others. Mandibular palp, segment 1 with seta on produced distomedial corner; segment 2 with 1 marginal and 5 terminal setae. Maxilla 1 inner lobe with 3 terminal spines and 1 seta on medial margin; middle lobe with 3 terminal setae; outer lobe with 5 terminal setae and 2 long setae on basal swelling. Maxilla 2 proximal endite produced into curved process with flaring tip armed with close-set setules; middle endite with 2 terminal setae; distal endite produced into claw with 2 slender basal setae and 1 basal seta with broadened tip having concave terminal margin. Maxilliped segment 1 with 3 setae on posterior margin and 1 at anterodistal corner.

All rami of swimming legs 1-4 3-merous. Leg 1 exopod segments (Re 1-3) subequal

in length; Re 1–3 with 1-1-5 outer and terminal spines (Se and St) and 0-1-0 inner setae (Si); endopod segments (Ri 1–3) with no Se, 1-1-0 Si, and 3 terminal setae. Ri 1 about $2\times$ as long as Ri 2 and Ri 3 combined and slightly longer than entire exopod. Inner spine on 2nd basipod modified to dumbbell shape in δ .

Re 1–3 of legs 2–4 with 1-1-3 Se, those of leg 2 enlarged, 1 St, and 0-1-3 Si. Ri 1–3 of legs 2–4 with 1-1-3, 1-1-3, and 1-1-4 Si, and 1 St.

Leg 5 of η , proximal segment as long as broad, with 5 distal setae; next-to-outermost seta slightly more than $2\times$ length of segment, other setae subequal, as long as segment. Distal segment slightly longer than proximal segment, $2\times$ as long as wide, with 5 distal setae having proportionate lengths (medial to lateral) 24:20:10:18:28 = 100.

Leg 5 of δ , proximal segment very short, with 4 distal setae; 3 medial setae about $3\times$ as long as segment, lateral seta about as long as segment. Distal segment about $2\times$ as long as wide, with 5 setae having proportionate lengths (medial to lateral) 14:13:38:5:30 = 100.

Leg 6 of δ a tiny lobe armed with 2 setae; medial seta nearly $2\times$ length of lateral seta.

Comparisons.—In Wells (1976) *Nitokra sphaeromata* keys to *N. mediterranea* Brian (1928) and *N. reunionensis* Bozic (1969), from Italy and Réunion Island (western Indian Ocean) respectively. These two species, however, are clearly distinct from *N. sphaeromata*.

Nitokra mediterranea is much smaller, 0.4 mm in length. In legs 2–4 the endopod is shorter than the first two exopod segments

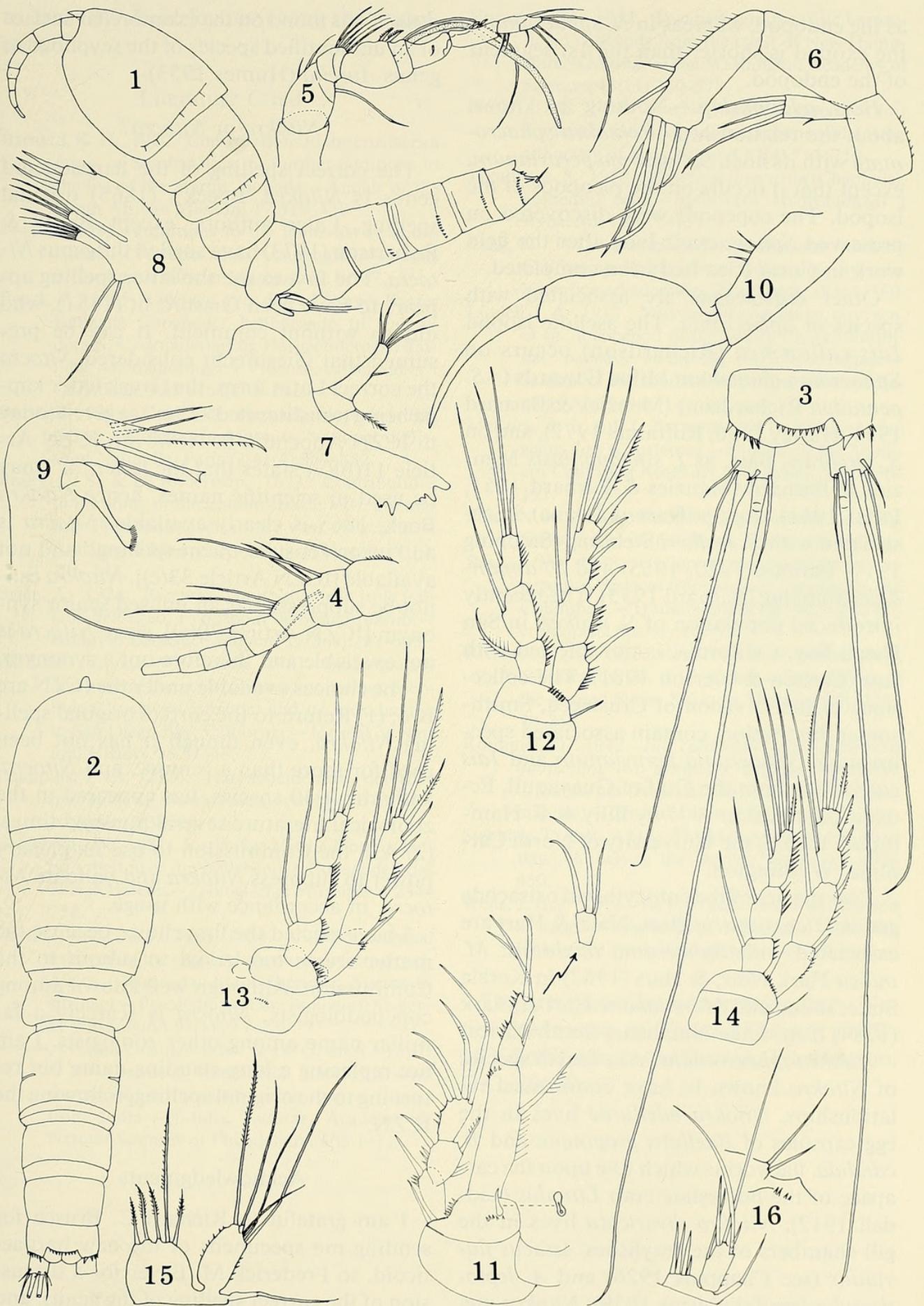
combined, whereas in *N. sphaeromata* the endopod of legs 2–4 is nearly as long as the exopod. In leg 1 the third exopod segment has four rather than five spines. In the η leg 5 proximal segment the two lateral setae are subequal, and the distal segment has six rather than five setae. In the δ leg 5 proximal segment the two lateral setae are subequal. Finally, the anal operculum of *N. mediterranea* is unarmed.

Nitokra reunionensis is also smaller than *N. sphaeromata*, η ca. 0.75 mm, δ 0.70 mm. It has a dorsal spine row on the preanal segment, and the spines of the anal operculum reach beyond the posterior margin of the anal segment. The rami of leg 1 are subequal in length. The η leg 5 proximal segment has four rather than five setae. The δ leg 5 proximal segment has two rather than four setae, and the distal segment has six rather than five setae. There are also important differences in the armament of maxilla 1 and 2.

From the Pacific coast of the Americas the only *Nitokra*'s known are the two new taxa described from Monterey Bay, California, by Lang (1965), *N. spinipes armata* and *N. affinis* f. *californica*, and *N. lacustris columbianus* Reid (1988) from Bahía Solano, Colombia (6°17'N, 77°25'W). In both California forms the subterminal row of spines on the urosomites extends completely around them, whereas in *N. sphaeromata* the row is confined to the lateral surface. Also in both the endopod of leg 4 reaches barely beyond the proximal margin of the second exopod segment, and the δ leg 6 has three rather than two setae. In *Nitocra lacustris* the exopod of leg 1 is about as long

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Figs. 1–16. *Nitokra sphaeromata*: 1, Female, lateral; 2, Female, dorsal; 3, Anal segment and caudal rami of female, dorsal; 4, Antenna 1, female, setae of distal segments omitted; 5, Antenna 1, male; 6, Antenna 2; 7, Mandible; 8, Maxilla 1; 9, Maxilla 2; 10, Maxilliped; 11, Leg 1, arrow points to endopod segment 3 in lateral view, dashed line leads to modified spine on 2nd basipod of male; 12, Leg 2; 13, Leg 3; 14, Leg 4; 15, Leg 5, female; 16, Legs 5 and 6, male.



as the endopod, whereas in *N. sphaeromata* the exopod is shorter than the 1st segment of the endopod.

Host relationship.—Nothing is known about the relationship of *Nitokra sphaeromata* with its host, *Sphaeroma peruvianum*, except that it occurs on the pleopods of the isopod. The copepods were discovered on preserved *Sphaeroma*'s long after the field work in Costa Rica had been completed.

Other crustaceans are associated with species of *Sphaeroma*. The asellote isopod *Iais californica* (Richardson) occurs on *Sphaeroma quoyanum* Milne Edwards (= *S. pentadon* Richardson) (Menzies & Barnard 1951, Hurley 1956, Rotramel 1972), and on *S. terebrans* Bate, as *I. singaporensis* Menzies & Barnard (Menzies & Barnard 1951, Pillai 1961). *Iais pubescens* (Dana) is associated with *S. walkeri* Stebbing (Stebbing 1917, Barnard 1920, 1955) and *S. annandalei* Stebbing (Barnard 1955). The recently introduced population of *S. walkeri* in San Diego Bay, California, is not infested with *Iais* (Carlton & Iverson 1981). The collections of the Division of Crustacea, Smithsonian Institution, contain associated specimens of *Sphaeroma peruvianum* and *Iais californica* from the Gulf of Guayaquil, Ecuador, donated in 1977 by Billy A. F. Hammond, then of the University of North Carolina, Wilmington.

Two species of the entocytherid ostracode genus *Microsyssitria* Hart, Nair, & Hart are associated with *Sphaeroma terebrans*: *M. indica* Hart, Nair, & Hart (1967) in Kerala State, India, and *M. nhlabane* Hart & Clark (1984) from Lake Nhlabane, South Africa.

Nitokra sphaeromata is the fourth species of *Nitokra* known to have commensal relationships. *Nitokra bdelluræ* lives in the egg capsules of *Bdellura propinqua* and *B. candida*, flatworms which live upon the carapace of the horseshoe crab *Limulus* (Liddell 1912). *Nitokra divaricata* lives in the gill chambers of the crayfishes *Astacus fluviatilis* (see Chappuis 1926) and *A. leptodactylus* (see Jakubisiak 1939). *Nitokra me-*

dusea was found on the exumbrellar surface of an unidentified species of the scyphozoan genus *Aurelia* (Humes 1953).

Nitokra or *Nitocra*?

The correct spelling of the harpacticoid genus is *Nitokra*, Boeck's (1865) original spelling. Later authors, except Brady & Robertson (1873) have spelled the genus *Nitocra*. The first to use the latter spelling appears to have been Giesbrecht (1881), who did so without comment. It can be presumed that Giesbrecht considered *Nitocra* the correct Latin form, the Greek letter kappa being transliterated as "c," as given today in ICZN Appendix B. However, ICZN Article 11(b)(v) states that the letter "k" may be used in scientific names, hence *Nitokra* Boek, 1865 is clearly available. *Nitocra* is an "incorrect subsequent spelling" and not available [ICZN Article 33(c)]. *Nitokra* cannot be suppressed as an unused senior synonym [ICZN Article 79(c)], since *Nitocra* is not available and therefore not a synonym.

The choices available under the ICZN are two: (1) Return to the correct original spelling *Nitokra*, even though it has not been used for more than a century, and *Nitocra*, with about 40 species, has appeared in the zoological literature several hundred times. (2) Ask the Commission to use its plenary power to suppress *Nitokra* and validate *Nitocra*, in accordance with usage.

I have elected the first choice because the matter seems too trivial to submit to the Commission. Although well known among copepodologists, *Nitocra* is scarcely a familiar name among other zoologists. I am not replacing a long-standing name but returning to the original spelling, following the ICZN.

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