

The genus *Neocyclops* Gurney in the West Indies: an update including the description of *Neocyclops (Protoneocyclops) geltrudeae* n. sp. (Crustacea, Copepoda, Cyclopidae)

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Abstract

Neocyclops (Protoneocyclops) geltrudeae n. sp. is described from the marine interstitial of Curaçao. *Neocyclops (Neocyclops) medius* Herbst, 1955 and *N. (Neocyclops) vicinus* Herbst, 1955 are for the first time recorded from the West Indies. New localities for *Neocyclops (Protoneocyclops) stocki* Pesce, 1985 from the West Indies are reported.

Résumé

On décrit *Neocyclops (Protoneocyclops) geltrudeae* n. sp. des eaux interstitielles marines de l'île de Curaçao. *Neocyclops (Neocyclops) medius* Herbst, 1955 et *Neocyclops (Neocyclops) vicinus* Herbst, 1955 sont signalés pour la première fois des Antilles. Des localités antillaises nouvelles pour *Neocyclops (Protoneocyclops) stocki* Pesce, 1985 sont rapportées.

Introduction

In a collection of cyclopoid copepods from different groundwater habitats of West Indian Islands, entrusted to us through the kindness of Prof. Dr. J.H. Stock and Dr. L. Botosaneanu (Amsterdam), four interesting species of the genus *Neocyclops* Gurney, 1927 were present, viz. *Neocyclops (Neocyclops) medius* Herbst, 1955, *Neocyclops (Neocyclops) vicinus* (Herbst, 1955), both for the first time recorded from the Caribbean region, *Neocyclops*

(*Protoneocyclops) stocki* Pesce, 1985, previously recorded from Bonaire (Pesce, 1985), Bermuda, St. Andres, and Cuba (Petkovski, 1986), and a new species from Curaçao, described herein as *Neocyclops (Protoneocyclops) geltrudeae* n. sp.

The discovery of these taxa in the West Indies brings the total number of species of the genus *Neocyclops* in the Caribbean up to seven, the others being *N. improvisus*** Pleşa, 1973 from Cuba, and *N. (Neocyclops) affinis* (Pleşa, 1961) and *N. (Protoneocyclops) papuensis* Fiers, 1986, both from the Bahamas (Fiers, in litt.).

According to Petkovski (1986), *N. (Protoneocyclops) mediterraneus* (Kiefer, 1960), reported from Cuba by Pleşa (1981), is in fact *N. (Protoneocyclops) stocki* Pesce, 1985.

The type material is preserved in the collections of the Zoologisch Museum, Amsterdam, The Netherlands (ZMA) and in the zoological collections of the "Dipartimento di Scienze Ambientali", University of L'Aquila, Italy (GPC).

The following abbreviations are used throughout the text and figures: A1 = antennula; A2 = antenna; P1–P6 = 1st to 6th legs.

Taxonomic part

Family Cyclopidae G.O. Sars, 1913
Subfamily Halicyclopinæ Kiefer, 1927
Genus *Neocyclops* Gurney, 1927

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** The subgeneric status of this species is unknown since it was described only on female specimens, while Petkovski (1986) established the subgenera *Neocyclops* and *Protoneocyclops* according to the articulation of the male P5.

Subgenus *Neocyclops* Petkovski, 1986*Neocyclops (Neocyclops) medius* Herbst, 1955

Material. – Amsterdam Expeditions to the West Indian Islands: Sta. 82/05, Tortuga, Pta. Arenas, El Larenero (10°53'54"N 65°14'43"W), 18 February 1982, coll. J.H. Stock & N. Broodbakker: 5 ♀♀. Sta. 82/14, Blanquilla, Falucho, surf zone (11°49'27"N 64°36'10"W), 20 February 1982, coll. J.H. Stock & J. Notenboom: 10 ♀♀. Sta. 82/55, Los Roques, Dos Mosquises, E. coast, end of air strip, intertidal (11°48'14"N 66°53'25"W), 5 March 1982, coll. J.H. Stock & S. Weinberg: 2 ♀♀. Sta. 82/18, Margarita, beach of Puerto Viejo, 1 km N. of Pietro Coszaleck (11°07'40"N 63°55'16"W), 21 February 1982, coll. L. Botosaneanu: 1 ♂. Sta. 84/226, Bonaire, shore Lac near Sorobon, behind Hotel ruins (12°05'53"N 68°14'02"W), 11 June 1984, coll. J.H. Stock & J.J. Vermeulen: 1 ♂.

Remarks. – The present material equals the original description of *N. (N.) medius* by Herbst (1955) in nearly all aspects. Some negligible differences were noticed in the morphology of the P5, which is more slender and elongated and in the P4, which has a more strongly developed apical spine on the distal segment of the endopodite.

Up to now, *N. (N.) medius* was only known from two localities along the Brazilian Atlantic Coast (Herbst, 1955; Lotufo & Da Rocha, 1993). The present collection clearly demonstrates that *N. (N.) medius* is widespread throughout the West Indian islands.

Neocyclops (Neocyclops) vicinus (Herbst, 1955)

Syn. – *Pareuryte vicina* Herbst, 1955.

Neocyclops vicinus; Lotufo & Da Rocha, 1993.

Material. – Amsterdam Expeditions to the West Indian Islands: Sta. 82/51, Los Roques, Bekebe, leeward side, in seawater seeping through beach barrier (11°51'22"N 66°56'02"W), 4 March 1982, coll. J.H. Stock & S. Weinberg: 1 ♀. Sta. 82/118, Jamaica, Discovery Bay (Parish of St. Ann), near pumphouse of Marine Laboratory, about 15 m from the sea (18°27'28"N 77°24'31"W), 22 March 1982, coll. J.H. Stock: 2 ♀♀.

Remarks. – Our material agrees in nearly all aspects with the original description of *Pareuryte vicina* by Herbst (1955) from Brazil. Differences of little systematic value are visible in the length ratio

between the inner and the outer apical furcal setae, and in the more robust appearance of the vestigial A2 exopodite.

As far as we know, *N. (N.) vicinus* is recorded here for the first time from the West Indies (Los Roques, Jamaica). The presence of this species in the Black Sea (Pleša, 1963; Monchenko, 1975; both as *Eurycyclops remanei vicinus*) is biogeographically disconcerting and needs future verification. Moreover, its presence in Cuba (Dussart & Defaye, 1985; Reid, 1990) is considered now as erroneous (Dussart, in litt.; Reid, in litt.).

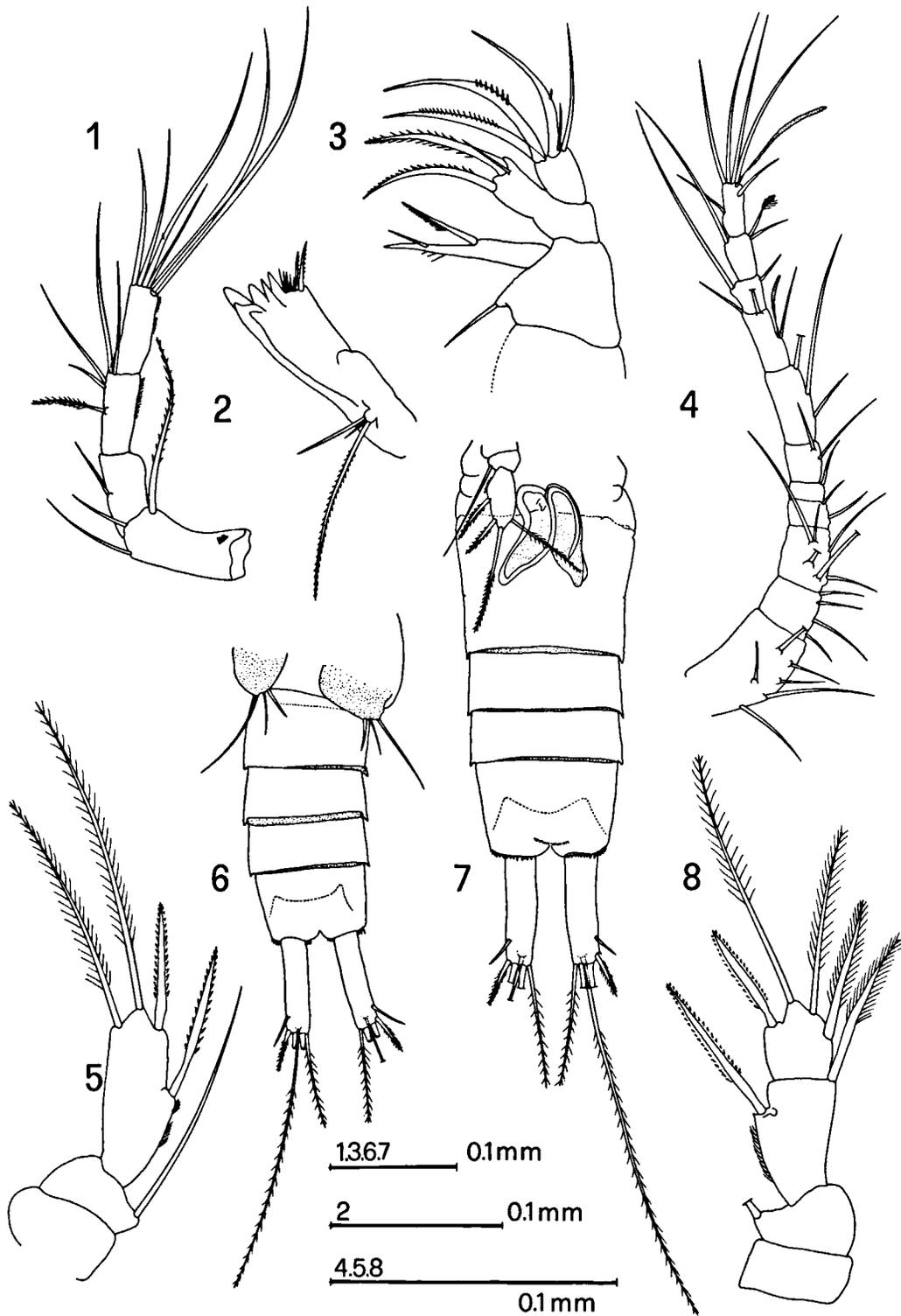
Subgenus *Protoneocyclops* Petkovski, 1986*Neocyclops (Protoneocyclops) geltrudeae* n. sp.
(Figs. 1–13)

Material. – Amsterdam Expeditions to the West Indian Islands: Sta. 84/86, Curaçao, Santa Marta Bay, inner bay, behind Field Lab. (12°16'19"N 69°07'37"W), Bou-Rouch pump, probe at 80 cm below substrate surface. Substrate: coral debris and sand, 2 May 1981, coll. J.H. Stock & J.J. Vermeulen: 1 ♀ (holotype), dissected and mounted in Faure's medium (slide labelled Ne. 012) (GPC), 1 ♂ (paratype), mounted as above (slide labelled Ne. 013) (GPC), 2 ♀♀ (paratypes), mounted as above (ZMA).

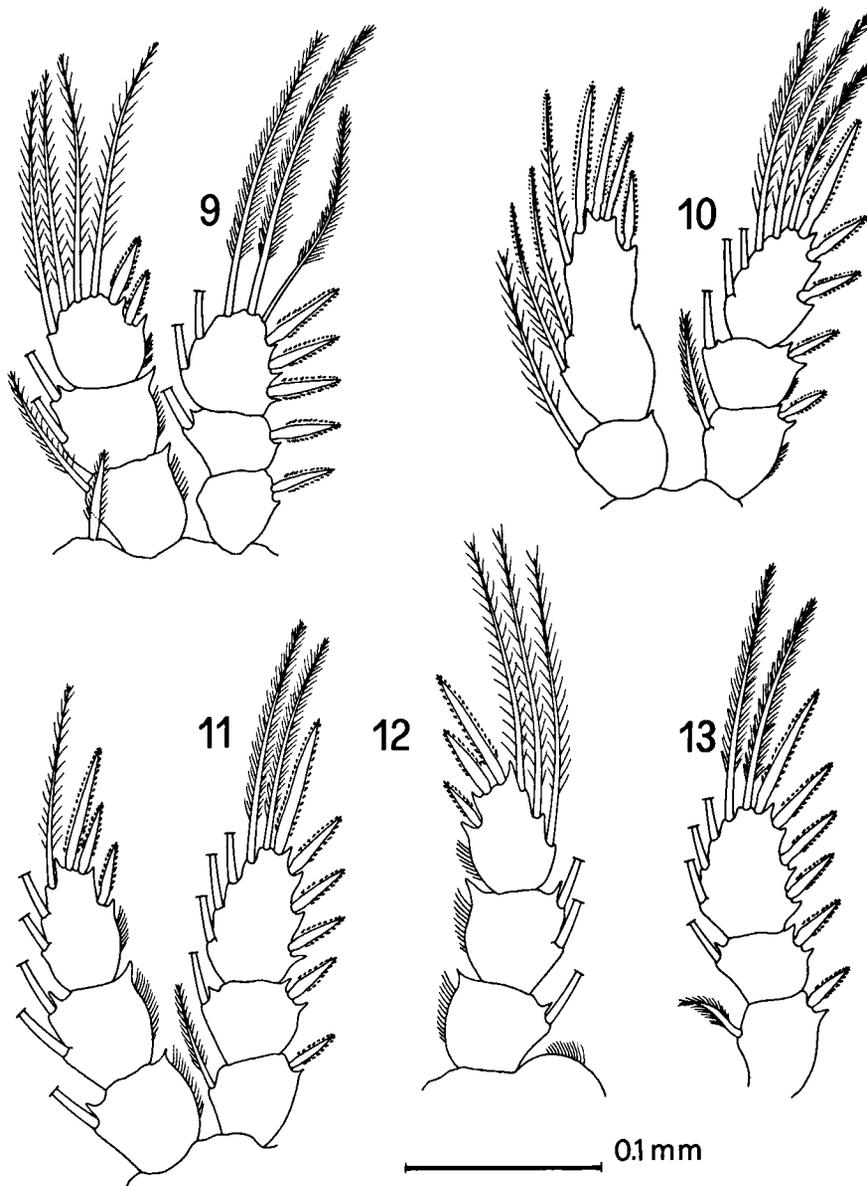
Description. – Female. Habitus with typical cyclopoid shape; length, excluding A1 and furcal setae, 0.740–0.850 mm; holotype 0.765 mm; cephalothorax with largest width at posterior margin; genital segment about as long as wide; anal operculum slightly convex.

A1: 11-segmented, reaching towards middle of cephalothorax; aesthetascs implanted on 8th and 11th segments; remaining ornamentation arranged as illustrated in Fig. 4. A2: basipodite with two naked setae inserted on the anterior caudal margin, one long plumose seta (vestigial exopodite) inserted on the posterior surface ("usual status", according to Reid, 1991), and a short proximal row of minute teeth at the posterior proximal corner; endopodite segments 1–3 with 1, 5, and 6 setae, respectively.

Mandible (Fig. 2): gnathobasis with strong teeth, additional short spines and 2 feathered setae; palp minute, bearing 3 setae of different lengths, outer one the longest. Other mouthparts without particular characteristics. Maxilla 2 illustrated (Fig. 3).



Figs. 1–8. *Neocyclops (Protoneocyclops) geltrudeae* n. sp. (1–5, 7 ♀; 6, 8 ♂): 1, A2 (holotype); 2, mandible (holotype); 3, maxilla 2 (holotype); 4, A1 (holotype); 5, P5 (paratype); 6, abdomen and furcal rami, ventral view (paratype); 7, abdomen and furcal rami, ventral view (holotype); 8, P5 (paratype).



Figs. 9–13. *Neocyclops (Protoneocyclops) geltrudeae* n. sp. (♀ holotype): 9, P1; 10, P4; 11, P3; 12, P2, endopodite; 13, P2, exopodite.

P1–P3 (Figs. 9, 11–13) with 3-segmented exopodites and endopodites; P4 with 2-segmented endopodite and 3-segmented exopodite. Spine formula of exopodite of P1–P4: 3.4.4.3. Coxa-basipodites and couplers of legs 1–4 and armature of P1–P3 without particular characteristics.

P4 (Fig. 10): basal and middle segment of exopodite each with 1 outer spine and 1 inner feathered seta, distal segment with 3 spines and 5 long, modified (plumose proximally and finely serrate distally)

setae; basal segment of endopodite with 1 inner seta, second segment with 4 spines and 3 setae; ornamentation of the setae on the second segment of the endopodite typical, with setules along the proximal parts of the stems and finely spinulose on the more distal part.

P5 (Fig. 5): coxa lacking setation; basis with 1 outer smooth seta; exopodite subovoid, with 1 apical plumose, 2 outer spinulose and 1 inner plumose setae.

Spermatophores as illustrated in Fig. 7.

Furcal rami (Fig. 7) 3.9–4.0 times as long as wide; lateral seta implanted in distal third of external margin; outer apical furcal seta spiniform; inner apical furcal seta longer (2.50–2.55 : 1) than outer one; dorsal seta very long, over 3 times as long as furcal ramus; median setae long, inner one longest and over 4 times as long as furcal ramus.

Male. – Habitus similar to the female; length, 0.630 mm. P4 with both exopodite and endopodite 3-segmented. P5 (Fig. 8): basis with 1 outer seta (broken); exopodite 2-segmented, first segment with 1 inner seta and 1 outer spine, distal segment with 1 medial seta, 1 outer spine, and 2 inner setae. P6 consisting of large plate bearing 1 inner spine and 2 outer setae (Fig. 6). Other characteristics as in the female.

Etymology. – The species is dedicated to Dr. Geltrude Chiappini, member of our Department, who contributed to the present study.

Discussion. – *Neocyclops (Protoneocyclops) geltrudeae* n. sp. is related to *Neocyclops improvisus* Pleša, 1973, known from Cuba and *Neocyclops (Protoneocyclops) papuensis* Fiers, 1986, described from Papua New Guinea and recently found in the Bahamas (Fiers, in litt.). *N. (P.) geltrudeae* and *N. improvisus* share an 11-segmented antennula, as a result of the fusion between the original third and fourth segments. With *N. (P.) papuensis*, the present species shares the mandibular palp with 3 setae, the 2-segmented endopodite of female P4, as well as the identical morphology of the P1–P3. Furthermore, both species show the same ornamentation along the inner endopodal setae (Fiers, in litt.).

The new species differs from *N. improvisus* by several characteristics: the presence of a vestigial exopodal seta on the basipodite of the A2 (vs. absence), the 2-segmented endopodite of the female P4, the length and armature of the furcal rami, the shape of the setae/spines of the female P5 and the armature of the male P5. It differs from *N. (P.) papuensis* by the different ornamentation of the spines/setae in the P4 [the proximal endopodal seta

is setulose in *N. (P.) papuensis*, setulose/spinulose in the new species], the different number and shape of the setae/spines on the distal segment of the male P5, the different length ratio between the inner apical furcal seta and the outer apical furcal seta and, finally, the considerably longer dorsal furcal seta.

N. (P.) geltrudeae n. sp. is easily distinguished from its other congeners by the peculiar armature of the male P5 and the remarkably long furcal dorsal seta.

Neocyclops (Protoneocyclops) stocki Pesce, 1985

Material. – Amsterdam Expeditions to the West Indian Islands: Sta. 84/214, Bonaire, Plantation Bolivia, well near cave named “Spelonk” (12°13'23"N 68°13'12"W), 2 June 1984, coll. J.H. Stock & J.J. Vermeulen: 2 ♀♀. Sta. 84/103, Curaçao, St. Michiel Inner Bay; sand and coral debris, 25 May 1984, coll. J.H. Stock & J.J. Vermeulen: 2 ♀♀. Sta. 84/133, Curaçao, Kennedy Boulevard, coral rubble, intertidal, 30 May 1984, coll. J.H. Stock & J.J. Vermeulen: 1 ♂.

Remarks. – Pesce (1985) described *Neocyclops (Protoneocyclops) stocki* from groundwaters (wells) of Bonaire. Later on the species was recorded from St. Andres and Bermuda (Petkovski, 1986), while some *Neocyclops* sp. reported by Pleša (1981) from Cuba were identified as *Neocyclops (Protoneocyclops) stocki* by Petkovski (1986).

The present data from Bonaire and Curaçao enlarge the distribution of this species in the West Indies, showing that it is widespread in the Caribbean.

Key to females of species of *Neocyclops* from the Caribbean

1. A1, 11-segmented 2
- A1, 12-segmented 3
2. A1 without vestigial exopodal seta; endopodite of P4, 3-segmented
..... *N. improvisus* Pleša, 1973
- A1 with vestigial exopodal seta; endopodite of P4, 2-segmented *N. (P.) geltrudeae* n. sp.
3. Endopodite of P4, 2-segmented
..... *N. (P.) papuensis* Fiers, 1986
- Endopodite of P4, 3-segmented or with segments 2 and 3 partially fused 4
4. Inner apical furcal seta longer than outer one 5

- Inner apical furcal seta slightly shorter or as long as outer one 6
- 5. Inner apical furcal seta more than twice as long as outer one; dorsal seta more than twice as long as furcal ramus
..... *N. (P.) stocki* Pesce, 1985
- Inner apical furcal seta slightly longer than outer one; dorsal seta about as long as furcal ramus
..... *N. (N.) medius* Herbst, 1955
- 6. Furcal rami about 2 times longer than wide; mandibular palp absent
..... *N. (N.) affinis* (Pleşa, 1961)
- Furcal rami about 3 times longer than wide; mandibular palp present
..... *N. (N.) vicinus* (Herbst, 1955)

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