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New Amphipoda from Baltic amber

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Abstract

Several amphipods from Baltic amber are described. A well preserved amphipod is refered to the genus *Palaeogammarus*. Another amphipod specimen with upward turned pereopods 6–7 and small spines on urosomite 1–2 is reminiscent of recent Gammaridae. A third amber amphipod is very similar to recent *Niphargus* species of the subgenus *Phaenogammarus*. The problem of how aquatic animals could be trapped into the resin is discussed.
Keywords: Crustacea, Amphipoda, Niphargidae, Baltic amber

1. Introduction

Very few crustaceans have been found in amber, and these were predominantly terrestrial isopods. Terrestrial amphipods (Talitridae), were recorded from amber by Bousfield, Poinar (1994, 1995), but there are only a few records of aquatic amphipods in amber, all of them classified as *Palaeogammarus*. The genus was erected by Zaddach (1864), for *P. sambiensis*. *Palaeogammarus balticus* was described by Lucks (1927). *Palaeogammarus danicus* was published by Just (1974) and Jażdżewski, Kulicka (2000a and in press) found the new species *Palaeogammarus polonicus*.

Recently some amphipods were found in Baltic amber (late Eocene, c. 35–40 Ma) that belong to groups never previously reported from amber. One of these amphipods was classified as a corophioid, resembling recent *Paracorophium* species (Weitschat *et al.*, in prep.). The first amber amphipod species of Niphargidae is described herein.

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2. Materials and methods

The amber piece a) with *Niphargus groehni* n. sp. studied herein belongs to the private collection of Carsten Gröhn (Hamburg), catalogued as No. 2650; amber piece b) No. 2701 with *Palaeogammarus* sp. is from the same collection. It was collected in the amber mine of Jantarny (Palmnicken), on the eastern shore of Bay of Gdansk, and bought by Mr. Gröhn.

Amber piece c) belongs to the collection of Stefan Liebermann (Berlin), who collected it close to Bitterfeld (30 km north of Leipzig, Germany).

The amber pieces a) and b) can be borrowed via the Geological-Palaeontological Institute and Museum of the University of Hamburg.

Amber piece a) is triangular, 37 mm long and 30 mm on the base.

Along with the amphipod it contained 1 undetermined Collembola and 1 Acari. Dimensions of piece b) are 38×19 mm with Trichoptera and Diptera as associated fauna. In piece c) 81×43 mm were several specimens of 2 species of Coleoptera, Diptera and an Araneae.

A precise determination of these amphipods is difficult because many important taxonomic characters are not visible. Since material belongs to private collectors, proper polishing or destruction of the amber, which often contains other inclusions in order to examine the amphipods more fully, is prohibited.

Drawings were made with a camera lucida on a Leica Wild M8 dissecting microscope.

3. Results

Amber piece a: *Niphargus (Phaenogammarus) groehni* n. sp. Figs 1a, 2a–e

ETYMOLOGY. The species is named for Carsten Gröhn, who kindly made the amber piece available for study.

DESCRIPTION. Head, longer than pereonite 1, with strongly produced and rounded anterior lobe. Pereon segments 1–3 subequal, segments 4–7 slightly longer. Pleonites 1–2 longer than pereonite 7; epimeron 1 shorter than 2 and 3; posterolateral margins of pleonite 1–2 weakly convex; posterolateral margin of pleonite 3? with 2 shallow excavations; posteroventral angle of pleonite 1–3 roundly angular; ventral margin of epimera 2–3 with 2 spines; lateral face of each epimeron with ridges. Urosomite 1 longest, posterior margin of urosomite 3 not visible, hidden behind several small air bubbles.

Antenna 1 (Fig. 2a): peduncular article 1 longest, with short anterodistal process, article 2 slightly shorter than 1, accessory flagellum present, 2-articulate with distal seta.

Antenna 2 (Fig. 2a): peduncular article 2 cone-like produced, article 3 apically oblique.

Mouthparts not visible, hidden behind gnathopods.

Pereopod (gnathopod) 1 (Fig. 2a, b): coxa parallelogram-shaped; carpus tapering distally, apically pointed; propodus slightly smaller than that of pereopod 2, with row of setae posteromarginally; palmar region with short and long, slender setae; dactylus with very small setae on inner curvature, few longer setae on anterior margin.

Pereopod (gnathopod) 2 (Fig. 2a, b): coxa slightly longer than that of pereopod 1; basis subrectangular; ischium slender with excavations on anterior and posterior margin; merus to propodus with signs of cuticular shrinkage;

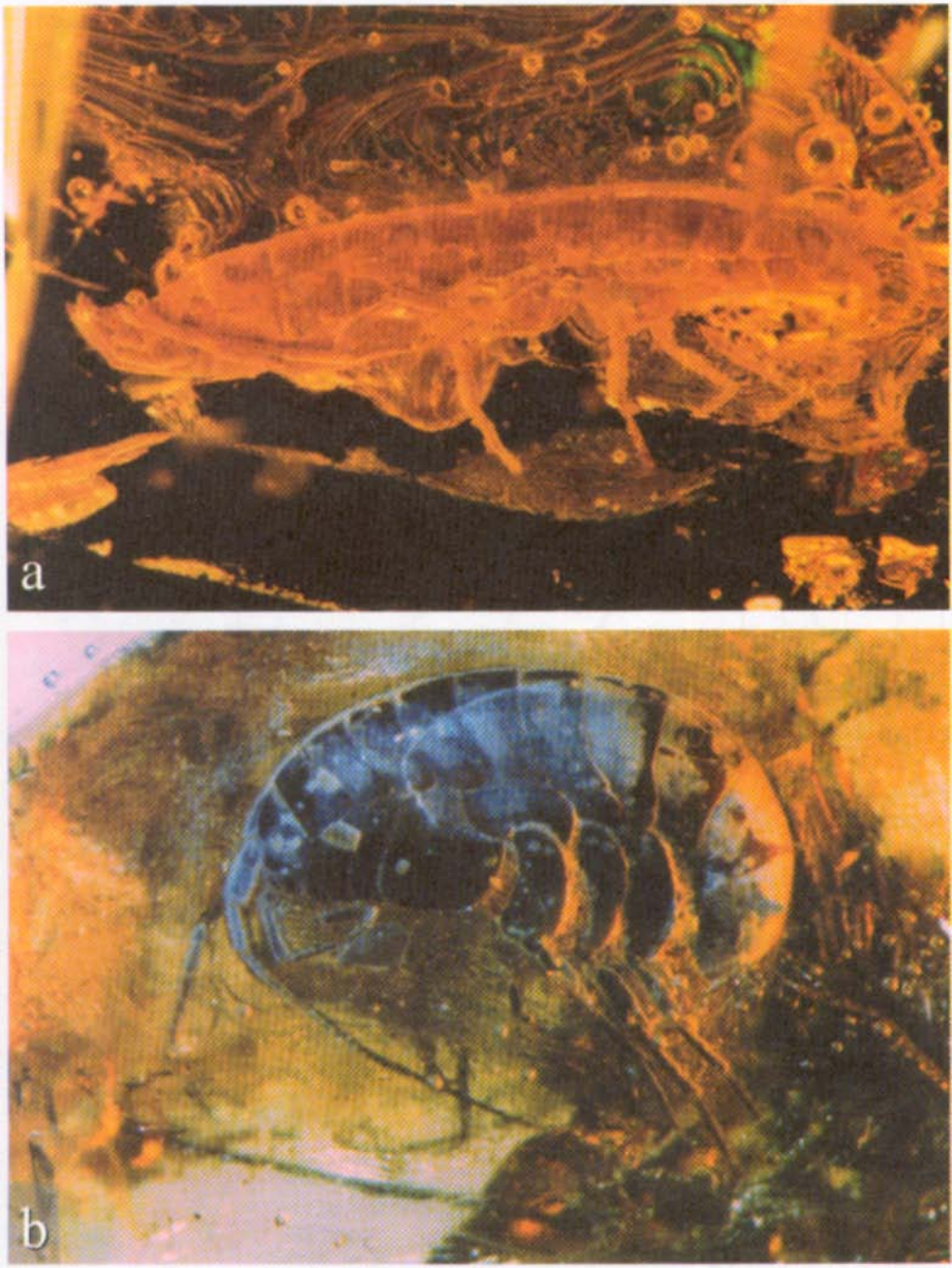

Fig. 1a–b. Macrophotographies of amber pieces with a: *Niphargus (Phaenogammarus) groehni* n. sp., holotype. b: *Palaeogammarus* sp. Photographies by C. Gröhn

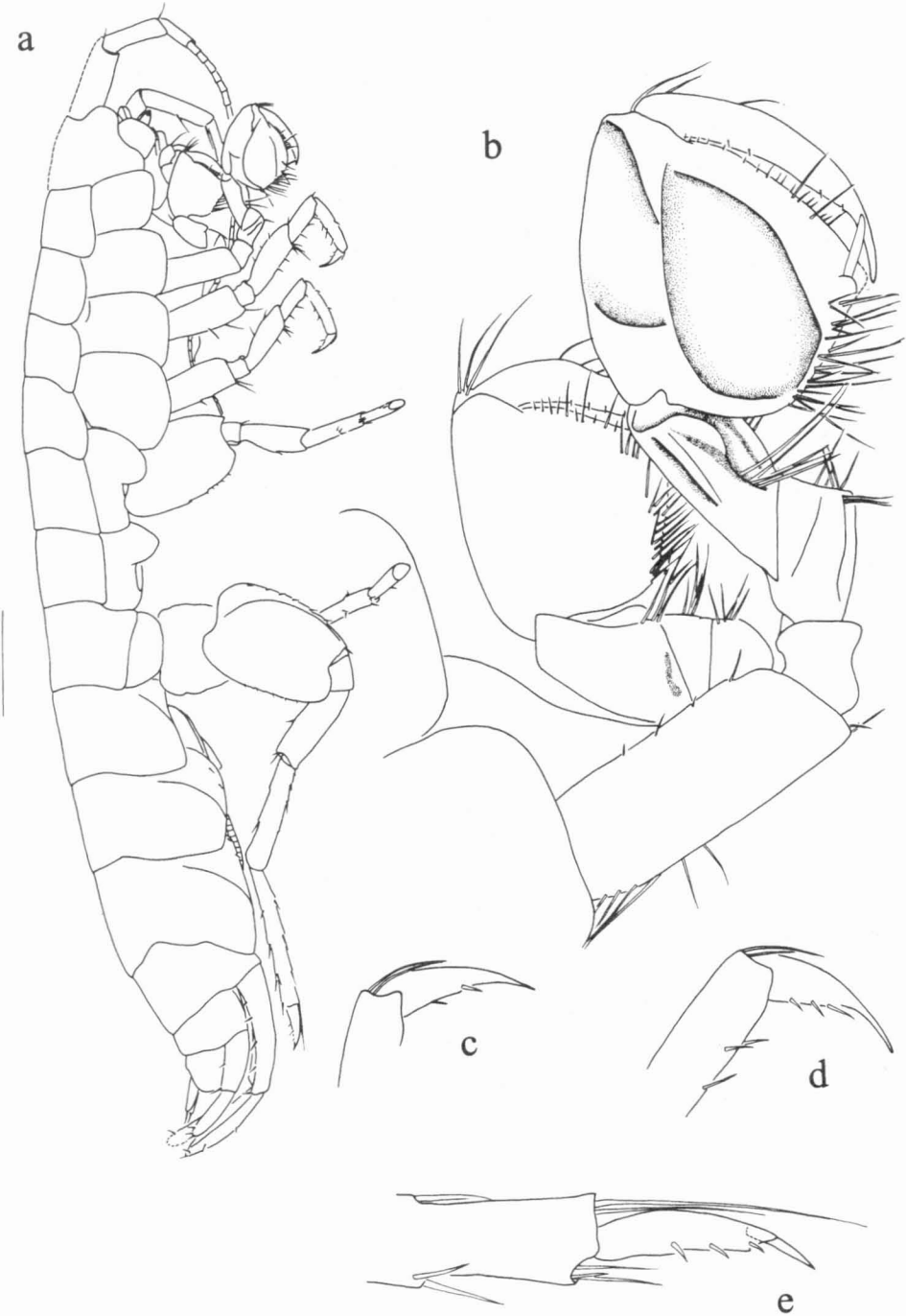

Fig. 2 a–e. *Niphargus (Phaenogammarus) groehni* n. sp., holotype. a: right side habitus; b: detail with gnathopod 1–2; c: dactylus of pereopod 3; d: dactylus of pereopod 4; e: dactylus of pereopod 6. Scale bar: 1 mm

propodus expanded distally, with posteromarginal setae; palm weakly convex with short and long slender setae, palm with long spine-like seta posteriorly.

Pereopod 3 (Fig. 2a, c): coxa subequal to coxa 2; basis slightly expanded distally; ischium narrow with anteromarginal excavation; merus expanded distally, anterodistally acutely produced; carpus shorter than merus and propodus; dactylus with short setae on inner curvature.

Pereopod 4 (Fig. 2a, d): coxa wider than that of pereopod 3, rounded distally; basis to dactylus as in pereopod 3.

Pereopod 5 (Fig. 2a): coxa bilobate, anterior lobe longer and rounded, posterior lobe truncate ventrally; basis ovoid, distally excavate; ischium narrow; merus distally expanded; carpus narrower than merus; propodus damaged, dactylus missing.

Pereopod 6 (Fig. 2, e) of the same shape as pereopod 5, but all articles relatively longer; dactylus as in Fig. 2e.

Pereopod 7 (Fig. 2a): coxa smallest, rounded distally; basis and ischium not visible; merus slender, propodus damaged; dactylus missing.

Uropod 1 (Fig. 2a): peduncle not extending beyond posterior margin of urosomite 3; rami turned upwards.

Uropod 2 (Fig. 2a): peduncle not extending beyond posterior margin of urosomite 3, rami shorter than that of uropod 1.

Uropod 3 missing.

Telson deeply excavate, with spiniform setae on apices.

REMARKS. This amber amphipod superficially resembles *Niphargus puteanus* (C.L. Koch, 1835) which is common in Germany (Schellenberg, 1942; Stock, 1974). This species lives today in subterranean habitats and would not be expected to occur in amber. During evolution, however, their ecological niche may have changed. Amongst the recent *Niphargus* species, those from the subgenus *Phaenogammarus* live in surface waters in Anatolia, Italy and Bavaria (Ruffo 1992). These recent niphargids from the *Phaenogammarus*-group share some characters with the specimen studied herein: the dactyli of pereopod 3–6 bear small spine-like setae on the posterior margin; epimera are subacute and angular posteroventrally; epimeron 3 is produced. Unfortunately the posterior margin of urosomite 3 is not visible due to air bubbles and could not be checked for spiniform setae which are an important diagnostic feature for certain niphargids. Also the lateral margin of the telson lobes are not clearly visible, but it seems that spiniform setae are only present on the apices of the lobes.

Amber piece b: *Palaeogammarus* sp. Figs. 1b, 3

DESCRIPTION. Head large with sinuous anterior margin. Eyes not visible. Pereonite 1 longer than 2, angular anteroventrally. Pereonite 2 and 3 subequal; pereonite 4–6 subequal, slightly longer than pereonites 1–2; pereonite 7 the longest. Pleonites 1–3 longer than pereonite 7, subequal in length.

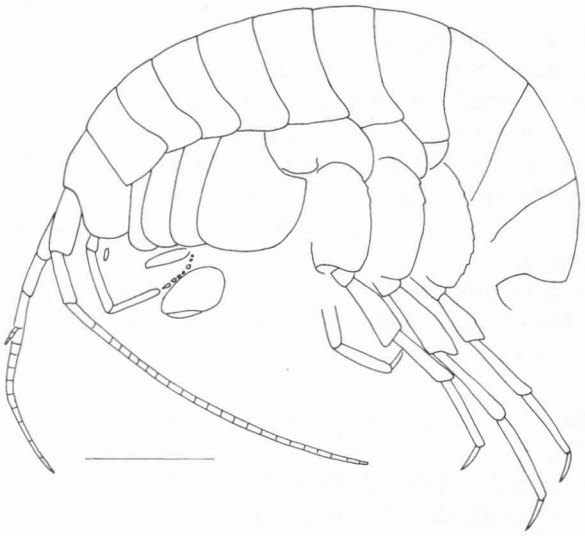

Fig. 3. Drawing of *Palaeogammarus* sp. from amber piece b). Scale bar: 1 mm

Antenna 1 with stout peduncular article 1, article 2 slightly shorter and much narrower; accessory flagellum 3-articulate.

Antenna 2: peduncular articles 4 and 5 elongate.

Anteroventral angle of coxae 1–3 rounded. Coxa 4 widest, with rounded anteroventral angle, weakly convex apex, posteromarginal process angular. Coxa 5 wider than long, bilobed, posterior lobe longer than anterior one, partly hidden by proximal region of basis; basis shorter than that of pereopods 6–7, with short serration posteromarginally; ischium the shortest; merus expanded distally; carpus slender, weakly expanded distally, apical margin truncate; propodus subrectangular, slender; dactylus rather straight, slender. Coxa of pereopod 6 rounded posteriorly; basis of the same shape but slightly longer than that of pereopod 5; ischium to dactylus each longer than these articles of pereopod 5. Coxa 7 shorter than coxae 1–6, basis longer than on pereopod 5–6, with serrate posterior margin; merus to dactylus about equal in length to pereopod 5. Posteroventral margins of epimera and urosome not visible.

REMARKS. The specimen studied herein is very similar to previously published species of *Palaeogammarus*. As none of these animals are completely visible in the amber it is very difficult to distinguish between them. The following characters of the studied animal somewhat differ from the published data: 1) pereopod coxa 3 is rounded versus truncate in *P. danicus* and *P. balticus,* at least as illustrated on the left side habitus and 2) articles 4 and 5 of antenna 2 are elongate in the specimen studied herein.

Amber piece c: undeterminable fragment Fig. 4

DESCRIPTION. The anterior region of this amphipod specimen is covered by an unidentifiable matrix and therefore details are not visible. Distal articles

of pereopod 6 are directed anteriorly and in pereopod 7 turned upwards. Pereopod 6–7 basis anterior and posterior margins, weakly excavate distally; ischium simple, subrectangular; merus weakly expanded distally; carpus slightly longer than merus and somewhat shorter than propodus. Pleonites 1–3 subequal in length; posteroventral corner of epimeral plate 2 rounded angular. Urosomite 1 longest, spines close to posterior margin of urosomite 1–2. Rami of uropod 2 subequal in length. Telson deeply cleft with apical spiniform setae.

REMARKS. The posterior part of this amphipod is reminiscent of recent Gammaridae.

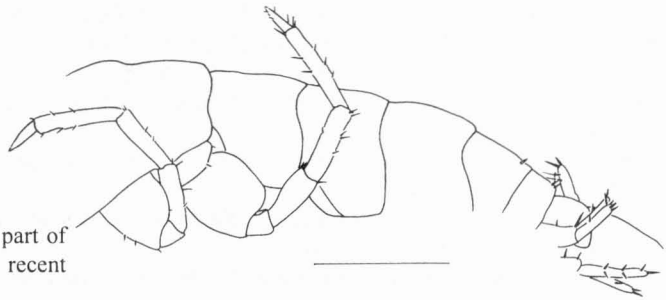

Fig. 4. Drawing of the posterior part of an amber amphipod similar to recent Gammaridae. Scale bar: 2 mm

4. Discussion

An important question is how purely aquatic animals could be trapped in the resin. There is the possibility that the animals were spilled ashore and then when dried, transported by wind into the resin. This way was considered by Zaddach (1864), as his *P. sambiensis* was broken and sandgrains were sticking on its cuticle. The state of the cuticle, especially the signs of shrinkage of gnathopod 2 of the niphargid specimen described herein, and the bad state of the latter described specimen may point to a dry inclusion into the resin. Jażdżewski, Kulicka (2000b) described a sample of amber containing several amphipods that could have been included in resin in a half-dry condition near the water line.

On the other hand Lucks' (1927) and Just's (1974) specimens had obviously expelled faecal pellets and schlieres in the amber with *P. balticus* may indicate that the animal was moving and alive when entrapped in the resin.

Paleontologists generally use a broader species concept than neontologists and, if in doubt, give a new species name for practical reasons. We follow this approach with *N. groehni* n. sp.

A related problem is whether fossil taxa should in principle be placed in a separate genus to recent taxa. Barnard and Barnard (1983) consider the genus *Palaeogammarus to be* a "theoretical" taxon, certainly because this fossil taxon is so similar to recent *Crangonyx* that a separate genus is questionable. On the other hand the deeply cleft telson of *Palaeogammarus* is completely different from recent *Crangonyx* species (Jażdżewski, Kulicka, in press).

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