

# Stuttgarter Beiträge zur Naturkunde

## Serie B (Geologie und Paläontologie)

Herausgeber:

Staatliches Museum für Naturkunde, Rosenstein 1, D-70191 Stuttgart

Stuttgarter Beitr. Naturk.	Ser. B	Nr. 351	11 pp., 15 figs., 2 pls.	Stuttgart, 30. 12. 2004
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### Two fossil symphylan species, *Scutigerella baltica* n. sp. and *Hanseniella baltica* n. sp. (Tracheata, Scutigerellidae), in Baltic amber

ULF SCHELLER & JÖRG WUNDERLICH

#### Abstract

Two specimens of the myriapod class Symphyla from Early Tertiary Baltic amber have been found (by J. W.) and two new species are reported and described (by U. S.), *Scutigerella baltica* n. sp. and *Hanseniella baltica* n. sp. The former species, represented by an adult female, is the first symphylan from amber, which has been described on adult material.

Key words: Symphyla, *Scutigerella*, *Hanseniella*, fossil, new species, Baltic amber, Eocene.

#### Zusammenfassung

Es wurden zwei Myriapoda der Klasse Symphyla in frühtertiärem Baltischen Bernstein nachgewiesen (durch J. W.), und zwei neue Arten werden identifiziert und beschrieben (durch U. S.), *Scutigerella baltica* n. sp. und *Hanseniella baltica* n. sp. Das Weibchen der ersten Art repräsentiert den ersten Vertreter der Symphyla, der anhand von adultem Material im Bernstein beschrieben wird.

#### 1. Introduction

Symphylans are common in litter and soil, but their manner of living, with at least some periods of the year in deeper layers, has led to a very rare occurrence in amber and they have been reported in the literature a few times only.

The first report seems to be in BACHOFEN VON ECHT's paper from 1942 on myriapods in amber. The author mentioned (p. 396) a symphylan but gave no description at all. He said that the family Scolopendrellidae occurs in amber but his photo (pl. 1, fig. 2) shows a representative of Scutigerellidae. BACHOFEN VON ECHT repeated later his statement in his book "Der Bernstein und seine Einschlüsse" (1949).

Some years later a *Scutigerella* species was mentioned by KOSMOWSKA-CERANOWICZ & MIERZEJEWSKI (1978), and a symphylan, evidently belonging to Scutigerellidae, was reported by WEITSCHAT & WICHARD in 1998.

A fifth publication mentioning symphylans, POINAR & EDWARDS (1995), is more exhaustive, and contains a rather detailed description of a new species, *Scutigerella*

*dominicana*, from Dominican amber. Though POINAR & EDWARDS had the opportunity of using two specimens their description is of limited taxonomic value because both specimens were juvenile, one is a 4<sup>th</sup> and the other a 3<sup>rd</sup> instar larva. Besides, many valuable characters were not available for study because the specimens were partly bloated or surrounded by fine strands of silk or fungal hyphae.

#### Acknowledgements

Dr G. BECHLY, Stuttgart, and an anonymous reviewer are thanked for valuable comments. Dr G. BECHLY is also thanked for the photos.

## 2. Material

The *Scutigereilla* specimen reported for below is adult. It is also in good condition, which indicates that it was either alive or recently dead at the time it was covered by the resin flow. Several details could be studied, but unfortunately the head and the antennae were partly inaccessible, the former by optical reasons and the latter by strong contraction. The *Hanseniella* specimen is subadult with 11 pairs of legs, unfortunately partly non-transparent.

Syninclusions: No.

Both specimens are deposited in the Staatliches Museum für Naturkunde Stuttgart (SMNS), Germany.

## 3. Systematics

(U. SCHELLER)

The Symphyla comprise two families only with 13 genera and about 200 now living species.

### Family Scutigereillidae BAGNALL, 1913

Both specimens studied here have to be placed in Scutigereillidae due to the following features: 1. well developed styli; 2. 1<sup>st</sup> pair of legs more than half of the length of the following pair; 3. cerci without distal transverse stripes on the terminal area.

The family has 5 genera and about 125 species.

### Genus *Scutigereilla* RYDER, 1882

Type species: *Scutigereilla immaculata* NEWPORT, 1845

The genus has about 30 now living species distributed in both the temperate and the subtropic parts of the Northern Hemisphere. Several species are living in Europe.

### *Scutigereilla baltica* n. sp.

Figs 1–11, Pl. 1

Holotype: Adult ♀, SMNS BB-2382.

Type locality: Baltic.

Type horizon and age: Baltic amber, Eocene (40–50 my bp).

**Etymology:** From Latin *balticus* = from the Baltic (from Baltic amber).

**Material:** One adult specimen which has to be placed in *Scutigera* because: 1. it has a distinct posteromedian cavity in the last tergite; 2. the setae on the tergites are subequal in size.

The amber piece measures 27–17×14–7×2–3 mm. The specimen is completely and excellently preserved in clear amber but the body sides and the antennae are to a great extent covered by a coat of gas or liquid.

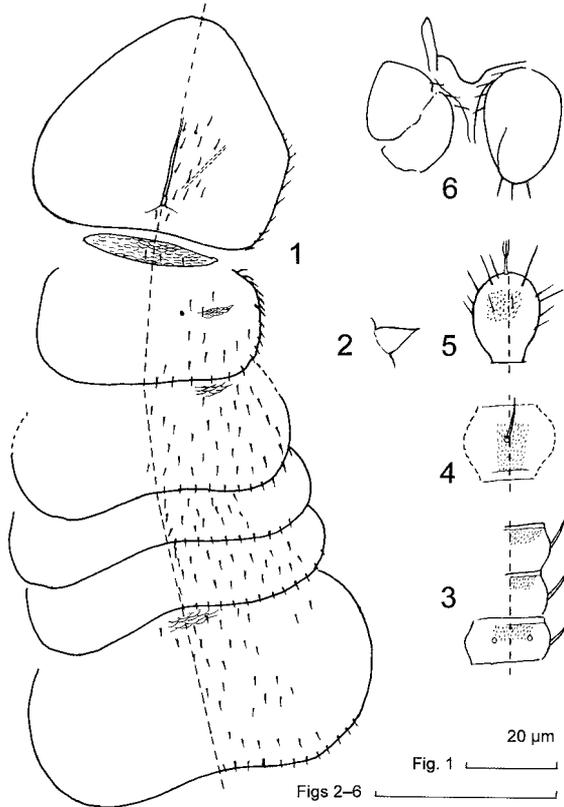
**Diagnosis.** – The new species is distinguished from other species of the genus in having both additional setae on the styli and straight-sided, broadly triangular, posterior emarginations of the tergites 10–14. Six now living species are known to have additional setae on the styli but they are all easy to distinguish from *S. baltica* n. sp. In the three European species *S. alpina* ROCHAIX, 1955, *S. echinostylus* SCHELLER, 1966 and *S. seposita* SCHELLER, 1966 the number of such setae is greater (ROCHAIX 1955, SCHELLER 1966). The first mentioned of these species is also in general much denser setose than *S. baltica* n. sp. and the two latter have setae of varying lengths on the tergites, not subequal ones. A fourth European species with additional setae on the styli is *S. silvestrii* MICHELBACHER, 1942, but in that species the tergites of the anterior part of the body are deeply emarginate and, too, it has proportionately longer and denser setose cerci (MICHELBACHER 1942). There are also two North American species with additional setae on the styli: *S. inculta* MICHELBACHER, 1942 and *S. aduncus* SCHELLER, 1986. The former is well distinguished from *S. baltica* n. sp. in having only one additional seta on the styli and the tergites are also provided with long lateral setae (MICHELBACHER 1942). The latter species also seems not to be close, because its tergites have deep V-shaped emarginations, the last pair of legs is sparsely setose and the main claw is sickle-shaped (SCHELLER 1986).

**Description.** – Stage: Adult ♀. Length: 4.55 mm. Colour: Originally probably white, now greyish.

**Head:** About 1.1 times as broad as long, broadest at about the middle (Fig. 1); lateral angle at articulation point of mandible distinct. Central rod distinct, narrowing anteriorly; anterior branches not recognisable, oblique posterior rods vestigial. Long setae at base of mandible not found. Dorsal surface of head covered with many subequal setae; setae at inner base of antenna not possible to study. Cuticle glabrous. Palp of first maxilla conical, pointed (Fig. 2).

**Antennae:** Strongly contracted. Right antenna long with at least 30 segments, main part of left antenna not possible to study. Proximal segments with a single primary whorl of setae, inner setae there at least half of the diameter of segment (Fig. 3). Only one whorl of setae on tergal side of 16<sup>th</sup> segment (Fig. 4). Probably three whorls of setae on some subdistal segments. Terminal segment 1.4 times as long as wide with many mostly anteriorly directed setae (Fig. 5); longest setae about as long as longest setae on proximal segments. Apical spined organ 0.4 of length of segment, branching point in the middle. Antennae with dense short pubescence.

**Tergites:** First tergite rudimentary with scaly cuticular pattern (Fig. 1). Second tergite complete with almost straight lateral and posterior margins; it is 1.7 times as broad as long with about 35 marginal (-submarginal) setae, one lateromarginal seta may be somewhat prominent. Surface of tergite with many subequal short setae on posterior three fourths. Cuticle with mesh-pattern and short pubescence. Third tergite broader and longer, 2.1 times as broad as long, with posterior margin shallowly emarginate; setae and cuticula similar to those on preceding tergite. Fourth tergite about 3.3 times as broad as long. All the following tergites with similar chaetotaxy



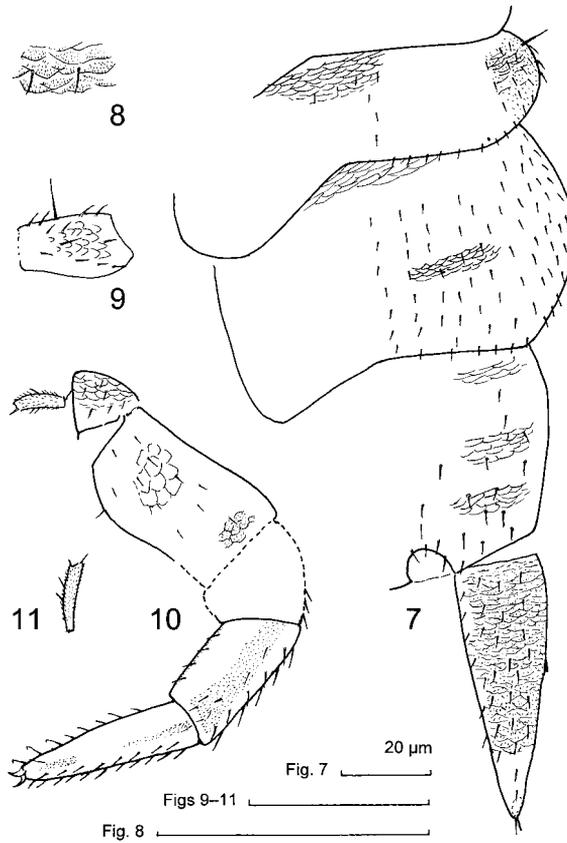
**Figs 1–6.** *Scutigerebella baltica* n. sp., adult ♀ in Baltic amber, SMNS BB-2382.

1: Head and tergites 1–6, tergal view; 2: Palp of first maxilla, left side, sternal view; 3–5: Right antenna, tergal view; 3: Segments 4–6; 4: 16<sup>th</sup> segment; 5: Apical segment; 6: Genital opening. Parts not drawn are not available for study.

and cuticular structure. Tergites 2, 6, 9, 12, 14 and 15 longer than other tergites. Posterior indentation of tergites 10–14 very broadly V-shaped. Tergites 12, 13 and penultimate tergite only weakly deeper emarginate than preceding ones. Last tergite with broad U-shaped posteromedian cavity (Fig. 7). Genital opening V-shaped, of the same shape as in now living species (Fig. 6).

Legs: 12 pairs of legs. First pair for the most part hidden. These legs well developed but shorter than following pair. Femur with several setae on posterior and sternal side, at least one of them long and protruding; cuticle glabrous with scaly pattern. The long femoral seta occurs also on at least legs 2, 4, 5, 6 and 9. A long protruding seta also occurs on the trochanter of at least legs 2 (Fig. 9), 4, 5, 6 and 9.

Tarsus of leg 12 tapering, 3.6 times as long as its greatest diameter, dorsal side straight (Fig. 10). Setae on dorsal side strongest, all subsimilar, about 0.4 of greatest diameter of tarsus; longest row with 8 or 9 setae. Setae on ventral side thinner, somewhat increasing in length distally, about 8 setae in longest row. Tarsus with short dense pubescence. Tibia 2.2 times as long as wide; its length 0.9 of length of tarsus.



**Figs 7–11.** *Scutigerebella baltica* n. sp., adult ♀ in Baltic amber, SMNS BB-2382.

**7:** Posterior part of body with tergites 13–15 and right cercus, tergal view; **8:** Right cercus, detail of cuticle and two setae, tergal view; **9:** Leg 2, left side, trochanter, posterior view; **10:** Leg 12 with stylus with 3 additional setae, left side, anterior view; **11:** Stylus at leg 7 with 2 additional setae. Parts not drawn are not available for study.

Setae as on tarsus but distal setae on tergal side longer than proximal ones, longest dorsal seta 0.3 of greatest diameter of tibia; 5 setae in longest dorsal row, 4 in longest ventral row. Tibia with short dense pubescence. Femur as long as wide, setae hidden besides a few short ones on distal part of dorsal side. Trochanter almost as long as tarsus, 1.6 times as long as its greatest diameter, all setae short and thin; cuticle with mesh-pattern and most distally also short pubescence. Anterior claw somewhat thicker than posterior one but scarcely longer. Length of anterior claw about 0.1 of length of tarsus. Claws of all legs of similar shape. On leg 2 a long seta protrudes perpendicularly from dorsal side of trochanter, length of seta 0.4 of length of segment.

Styli of leg 12 somewhat bent, 3 times longer than wide, length of subdistal seta 0.2 of length of stylus; at least 3 additional setae in the middle; stylus with short pubescence. Additional setae have been recognised on styli of legs 7 (Fig. 11), 8, 9 and 12.

Coxal sacs at bases of legs 3–10. Coxal plates not possible to study.

Cerci: They are 3.0 times longer than wide, 0.1 of the length of body, about half of the length of leg 12 (Fig. 7). Setae short, thin, pointed, depressed, subequal in length; longest tergal row with 8 setae. Two apical setae, both short. Terminal area shorter than 0.1 of the length of cercus. Cuticle distinctly scaly with short pubescence (Fig. 8).

### Genus *Hanseniella* BAGNALL, 1913

Type species: *Hanseniella nivea* (SCOPOLI, 1763).

The genus has about 80 now living species distributed in both the warmtemperate-subtropical zone and in the tropics. One species, *Hanseniella nivea* (SCOPOLI), is living in the southern half of Europe.

#### *Hanseniella baltica* n. sp.

Figs 12–15, Pl. 2

Holotype: Subadult ♀, SMNS BB-2381.

Type locality: Baltic.

Type horizon and age: Baltic amber, Eocene (40–50 my bp).

Etymology: From Latin *balticus* = from the Baltic (from Baltic amber).

Material: One subadult specimen which has to be placed in *Hanseniella* because: 1. no posteromedian cavity in the last tergite; 2. long protruding macrochaetae on at least some tergites.

The amber piece is triangular with sides 9, 13 and 14 mm long, thickness 0.5–2 mm. The specimen is completely and well preserved in clear amber, but the body and antennae are to a large extent non-transparent.

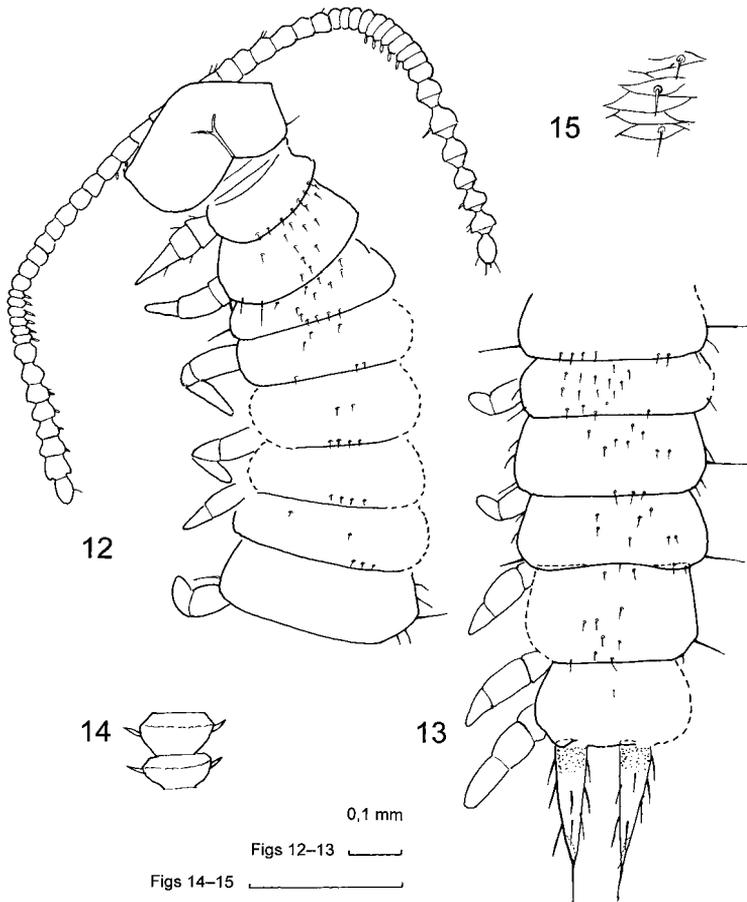
Diagnosis. – The relationships are difficult to trace because only a limited number of characters could be studied. Good distinguishing characters are the long posterolateral setae on the tergites 10, 12, 13 and 14 in combination with unusually thick setae on the inner sides of most antennal segments and thin cerci with a proportionally low number of long setae.

Description. – Stage: Subadult ♀. Length: 1.90 mm. Colour: Originally probably white, now greyish.

Head: Head short, lateral angle at articulation point of mandible distinct. Central rod distinct, anterior branches well developed (Fig. 12).

Antennae: Partly strongly contracted (Fig. 12). Both antennae with ≈25 segments. Distal segments at least as wide as proximal segments. The latter with a single primary whorl of setae, inner setae there about half of the diameter of segment. Most subdistal segments with at least two whorls of setae. A distinctly thickened seta occurs on inner side of most segments except the two distal ones; a similar seta on at least some segments on outer side too (Fig. 14). Terminal segment 1.6 times as long as wide with many mostly anteriorly directed setae; longest setae longer than longest setae on proximal segments.

Tergites: First tergite rudimentary (Fig. 12). Second tergite complete with rounded posterior margin; it is about 2.5 times as broad as long and with short thin pointed setae on its posterior part. Cuticle with distinct scaly pattern, probably glabrous (Fig. 15). Third tergite broader and longer, twice broader than long, with posterior margin somewhat rounded; cuticula similar to that on preceding tergite. Fourth tergite about 2.8 times as broad as long. Most following tergites with almost



**Figs 12–15.** *Hanskiella baltica* n. sp., subadult ♀ in Baltic amber, SMNS BB-2381. **12:** Head with antennae and tergites 1–9; **13:** Posterior part with tergites 10–15 and cerci; **14:** Left antenna, segments 12–13, with thickened setae (other setae not shown); **15:** Tergite 3, anteromedian part, with setae and cuticular scaly pattern. Legs drawn on left side only. Not studied parts (hidden or non-transparent) are blank without setae.

straight posterior margin, tergite 13, however, might be somewhat concave posteriorly (Fig. 13). Tergites 4, 5, 7 and 8 somewhat shorter than surrounding tergites. Long macrochaetae at least on tergites 3, 4, 6, 9, 10, 11, 12, 13 and 14, longest ones from tergite 10 and backward. Last tergite with straight posterior margin without median cavity. Inner setae of tergites short and pointed.

Legs: 11 pairs of legs, moderately increasing in length posteriorly. Tarsi tapering, those of last pair of legs 5.8 times as long as their greatest width, dorsal side straight.

Coxal sacs at bases of legs 2–9.

Cerci: Straight, thin, strongly pointed, 4.0 times longer than wide, 0.1 of the length of body (Fig. 13). Setae long, thin, pointed, depressed, subequal in length, except in most distal whorl, longest setae there about 0.3 of length of cercus. Two apical setae, one long, 0.3 of length of cercus, the other very short. Terminal area facing outwards-downwards, 0.2 of length of cercus. Cuticle glabrous.

#### 4. Discussion

The climate of the Early Tertiary forest in which *Scutigereella baltica* n. sp. and *Hanseniella baltica* n. sp. lived, 50–40 million years ago, was mainly subtropic, but the fauna included tropical species too (WEITSCHAT & WICHARD 1998). Acari and Collembola were frequent, Myriapoda, Thysanura, Diplura and Nematoda were rare, see also WUNDERLICH in BACHOFEN-ECHE (1996). Because the now living representatives of the genus *Scutigereella* have their present main area in the northern temperate zone and those belonging to *Hanseniella* now are mainly tropic-subtropic, the climate of the fossilisation sites probably were more temperate-subtropic than tropic.

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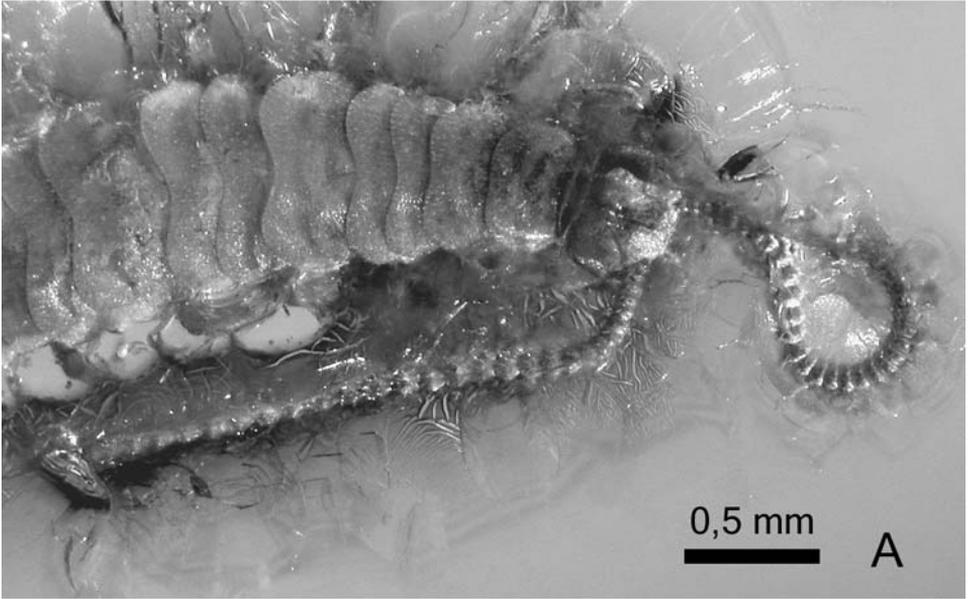
Manuscript received: 10.2.2004, accepted: 25.10.2004

#### Plate 1

*Scutigereella baltica* n. sp., adult ♀ in Baltic amber, SMNS BB-2382.

**A:** Head with antennae and tergites 1–10, tergal view.

**B:** Anterior part with legs 1–6, sternal view.

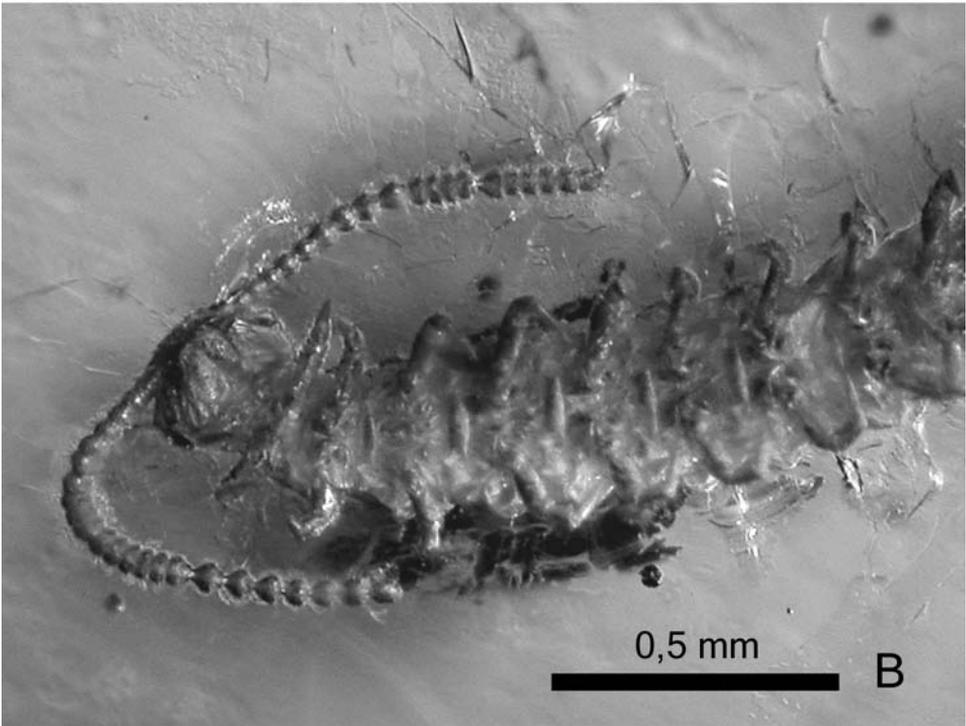
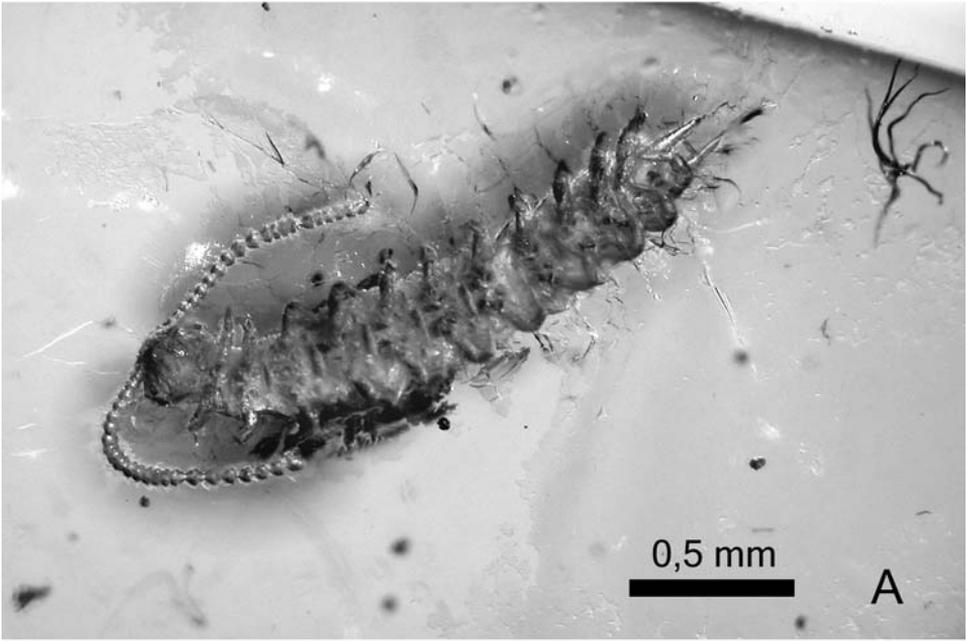


**Plate 2**

*Hanseniella baltica* n. sp., subadult ♀ in Baltic amber, SMNS BB-2381.

**A:** Sternal view.

**B:** Anterior part, sternal view.



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ISSN 0341-0153

Autoren-Richtlinien: <http://www.naturkundemuseum-bw.de/stuttgart/schriften>  
Schriftleitung: Dr. Ronald Böttcher, Rosenstein 1, 70191 Stuttgart  
Gesamtherstellung: Gulde-Druck GmbH, 72072 Tübingen