

Caddisflies of Baltic Amber

4. New descriptions of *Palaeohelicopsyche*

(Trichoptera, Helicopsychidae)

Kjell Arne JOHANSON and Wilfried WICHARD

Abstract

Palaeohelicopsyche ULMER, 1912 is reviewed. A new species, *Palaeohelicopsyche groteae* sp.n. is described. The species strongly resembles the Australian *Helicopsyche tillyardi* MOSELY, 1953. A female *Palaeohelicopsyche* sp. is described. Its wing venation differs slightly from that of the female *Palaeohelicopsyche serricornis* ULMER, 1912. The specific status of this specimen and the female *Palaeohelicopsyche serricornis* is discussed.

Introduction

ULMER (1912) erected the subfamily Helicopsychinae within Sericostomatidae. He included the genera *Helicopsyche* VON SIEBOLD, 1856, *Saetotrichia* BRAUER, 1865, *Tetanonema* ULMER, 1905, *Palaeohelicopsyche* ULMER, 1912 and *Electrohelicopsyche* ULMER, 1912. The genera *Saetotrichia* and *Tetanonema* were later synonymized with *Helicopsyche* VON SIEBOLD, 1856 and *Cochliopsyche* MÜLLER, 1885, respectively (NEBOISS 1986, ULMER 1955). The subfamily was erected to family level by ROSS (1944).

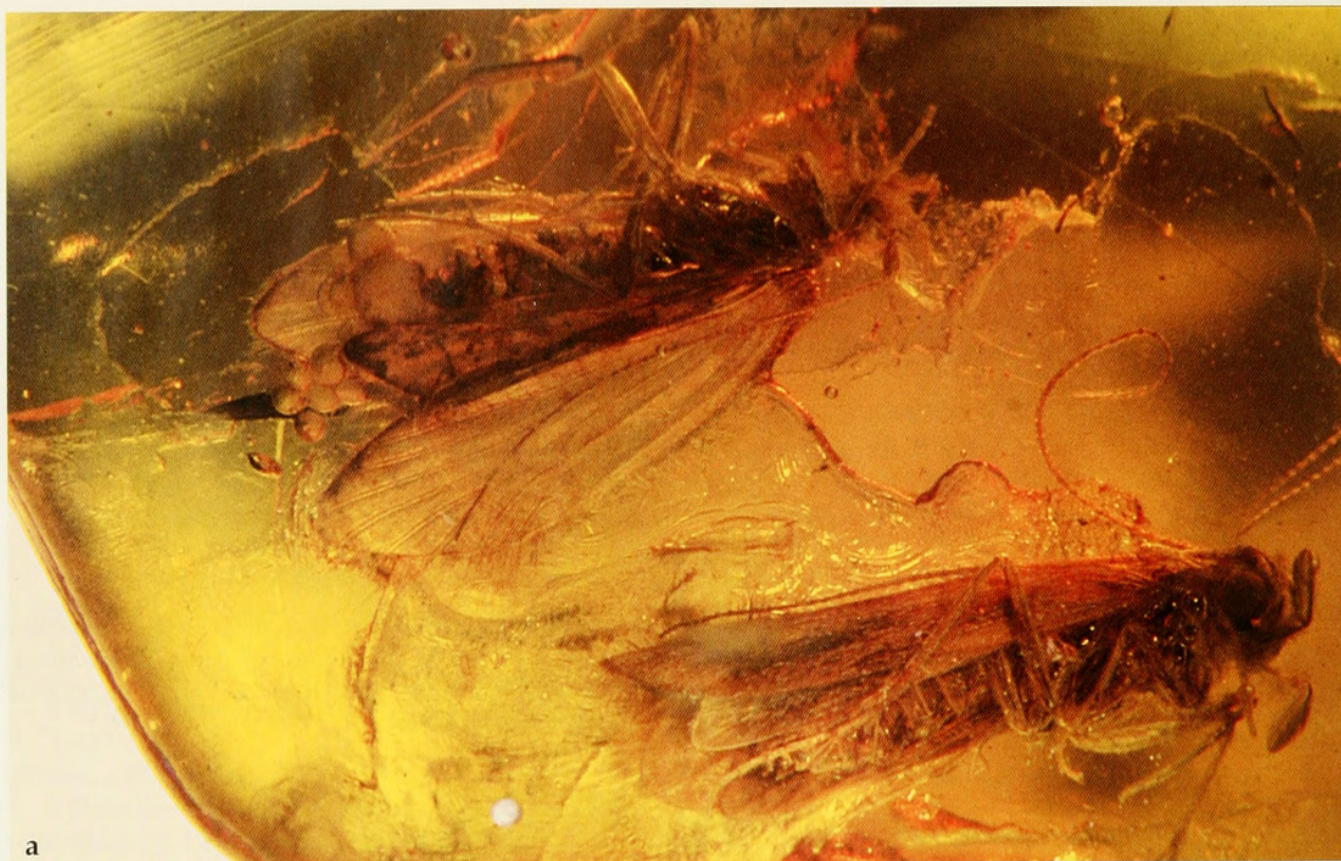
The oldest known fossils for the Helicopsychidae were described by ULMER (1912) from Baltic amber, dated to Eocene (approximately 45 MYR). He described both the new genera *Palaeohelicopsyche* and *Electrohelicopsyche* and two females of the recent genus *Helicopsyche*.

Systematic descriptions

Family Helicopsychidae ULMER, 1906

Type genus: *Helicopsyche* VON SIEBOLD, 1856 [subsequently designated by FLINT (1964)], syn. *Helicopsyche revelieri* McLACHLAN, 1884; syn. *Helicopsyche corsica* VAILLANT, 1953.

Diagnosis (adults). Head without ocelli. Male maxillary palps 2-4 jointed; 5-jointed in females. Postantennal and cephalic setal warts well developed. Tentorial arms without lateral processes; tentorial bridge without central process. Spur formula 1, 2, 4 or 2, 2, 4. Fore wing with forks 1, 2, 3 and 5; nigma absent; Dc present. Hind wing with forks 1, 3 and 5; with well developed hamuli; nigma absent; Dc absent; anterior margin sigmoid. Abdomen with or without sternal reticulation. Abdominal sternum VI with ventral process. Abdominal sternites with posterior transverse apodeme. Male genitalia with well developed gonocoxite (gonopodes, clasper) divided into a large, dorsal primary branch and – in many species – into a ventral secondary branch. Cercus absent. Xth tergum simple.



a



b

Plate 1

a: *Palaeohelicopsyche serricornis* ULMER, 1912, male and female with eggs; Baltic amber; Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr.: 3777.

b: *Palaeohelicopsyche serricornis* ULMER, 1912, male genitalia, ventral view; Baltic amber; Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr.: 3777.



a



b

Plate 2

a: *Palaeohelicopsyche groteae* sp.n., male, lateral view; Baltic amber; Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr.: 3776.

b: *Palaeohelicopsyche groteae* sp.n., male, dorsal view; Baltic amber; Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr.: 3776.

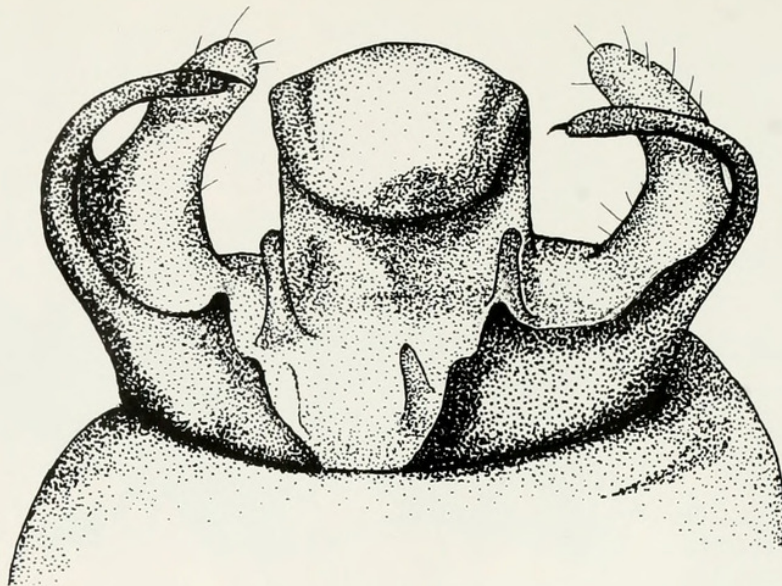


Fig. 1: *Palaeohelicopsyche serricornis* (male), Baltic amber. Genitalia, ventral view.

Genus *Palaeohelicopsyche* ULMER, 1912

Type species: *Palaeohelicopsyche serricornis* ULMER, 1912.

Diagnosis: Male: Head strongly elaborated dorsad. Maxillary palp with second joint slightly longer than first joint. Fore wing with Dc about as long as half the wing length. Forks 1 and 2 present in the fore wings. Cu1 simple, runs very close to and parallel with Cu2. Hind wings with forks 1 and 5. Spurs 2, 2, 4. Abdominal reticulation absent. VIth sternal process truncate. Gonocoxite with a large dorsal primary branch and a small ventral secondary branch.

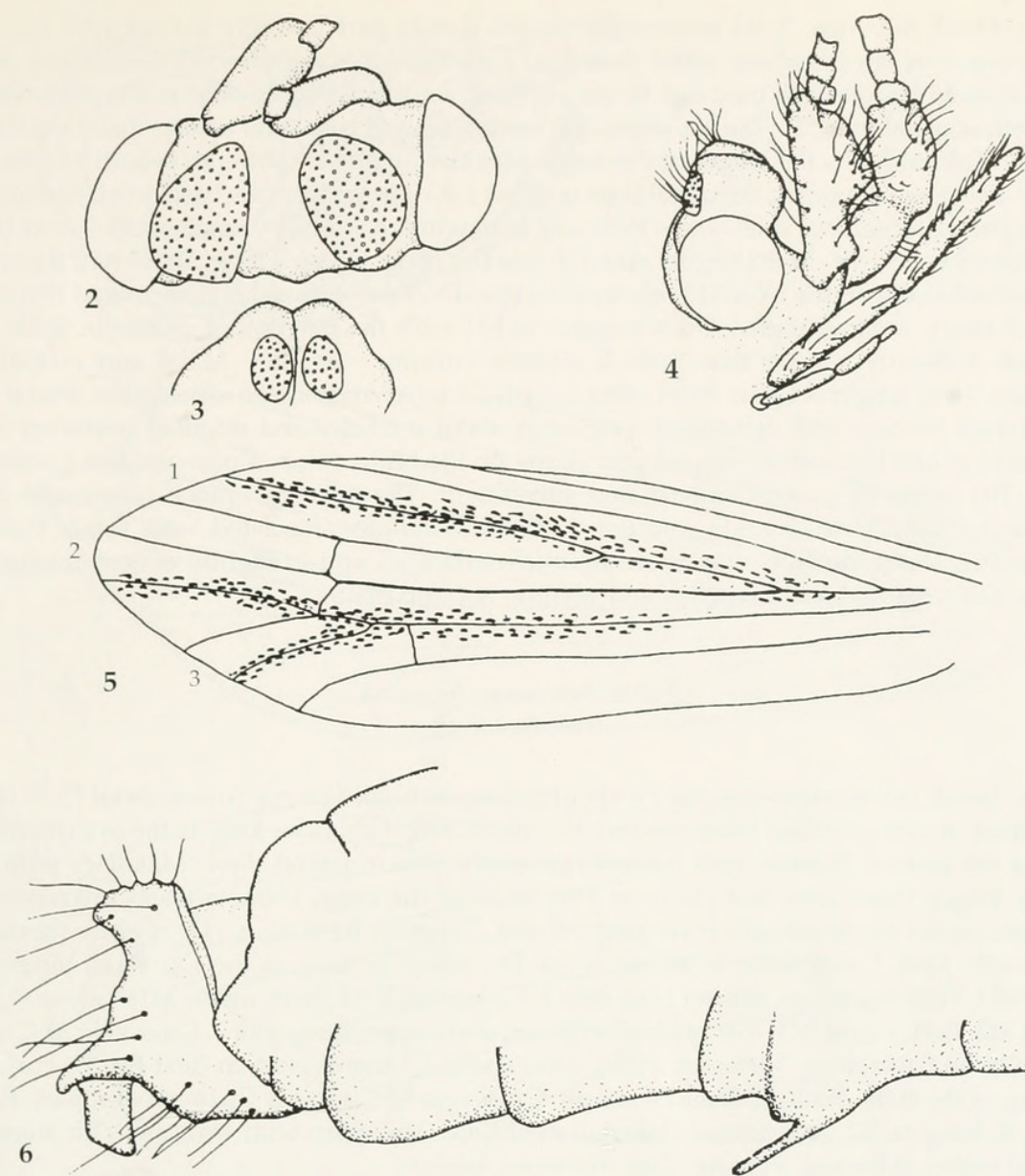
Female: with short dorsal lobes between the eyes. Fore wing with long Dc, as in male.

***Palaeohelicopsyche serricornis* ULMER, 1912 (pl. 1a, b, text-fig. 1)**

Emendation based on ULMER (1912). Male genitalia differs from the description by ULMER (1912). The paired gonocoxite are well developed and divide into a broad, dorsal branch and into a bifurcated ventral branch. The ventral secondary branch is basally broad, mediad with a short process, and distally slender, angled about 90° and slightly pointed. ULMER changed by mistake the primary dorsal branch with the appendices praeanales. The gonopodes were not completely visible. Both tongue-shaped primary branches of the paired gonopodes are dorso-laterally nearby the penis (from ventral view: behind the penis: pl. 1b, text-fig. 1).

Material: The examined Baltic amber contains 3 specimen of *Palaeohelicopsyche serricornis* ULMER, 1912: male and female with eggs (pl. 1a) and separately a decomposed male with a distinct genitalia (pl. 1b; text-fig. 1). It is kept Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr. 3777.

The holotype described by Ulmer (1912) is lost. A paratype is kept in Senckenberg-Museum, Frankfurt (Coll. Gwinner: SMF-Nr. VI 14a).



Figs 2-6: *Palaeohelicopsyche groteae* sp.n. (male), Baltic amber. 2. Head, dorsal view. 3. Mesonotum, dorsal view. 4. Head, lateral view. 5. Left fore leg. 6. Abdomen and genitalia, lateral view.

Palaeohelicopsyche groteae sp.n.
(pl. 2 a,b, text-figs. 2-6)

Holotype: Male within a clear Baltic amber, Coll. Geological-Palaeontological Museum, University of Hamburg; Typ. Kat. Nr. 3776.

Etymology: Dedicated to Hilda GROTE, Heist near Hamburg. She made her interesting Baltic amber (*Palaeohelicopsyche serricornis* ULMER, 1912: pl. 1a, b, text-fig. 1) available to our study.

Diagnosis: Head with two large dorsal lobes; scapes with a pair of small median and large distal processes. Fork 1 originate at basal half of Dc. Abdominal reticulation absent. Abdomen with large, truncate VIth sternal process. Genitalia have gonocoxites with primary branches large, oriented dorsally and slightly bent posteriad; with undulated dorsal margin; secondary branch strongly pointed and directed posteriad. Posterior margin of gonocoxite slightly W-shaped.

Description: Head (text-figs. 2, 4) posteriorly on the dorsal part strongly extend into two lobes and occupied by a pair of large cephalic warts (text-figs. 2, 4). The lobes are directed dorsad and are about as long as the eyes. In lateral view (text-fig. 4), the cephalic warts are visible only at the posterolateral part. Antennae with scape about $1.3 \times$ the eye diameter; having a small basal and a large distal mediad oriented process. Pedicel about $0.15 \times$ the length of the scape. Maxillary palps are straight, cylindrical; the basal joint length about as the eye diameter, the distal joint is about $1.5 \times$ longer than the basal joint. Mesonotum (text-fig. 3) with a pair of large, oval setal warts. Fore and hind wings covered by small scaloid setae (text-fig. 5). Fore wing venation (text-fig. 5): R1 begins about $\frac{1}{5}$ into the wing. Dc very long, about half the wing length; fork 1 originates basally on the Dc and is about as long as Dc. R4+5 bifurcates close to and before crossvein R3-R4; fork 2 short, without nigma; R5 is tangent to M1 with the deletion of crossvein R-M; R4 and R5 straight. Fork 3 slightly shorter than fork 2, slightly curving posteriad. M3+4 and cubital veins not apparent. Fore wing length 3.4 mm, hind wing length 2.6 mm. Abdominal reticulation absent. Abdomen with VIth sternal process well developed, originates about medially and oriented posteriad (text-fig. 6). Genitalia (text-fig. 6) with well developed gonocoxite divided into a dorsal primary and a ventral secondary branch. The posterior margin smooth and substraight. The primary branch is oriented dorsad and slightly hook-shaped. Dorsal margin undulated, the undulations associated with setae. The secondary branch originates about medially, tapers strongly towards apex and is slightly curved mediad. Superior appendages, Xth tergum, basal branches and phallus not apparent.

Palaeohelicopsyche sp. A
(text-figs. 7-9)

Description: Head, lateral view (text-fig. 7), about as long as high. The eye covers about 75 % of the lateral part of the head. A pair of dorsal lobes present, but small. Scape about as long as the eye diameter and $4 \times$ the length of the pedicel. Frontal setal warts large, easily seen in lateral view. Maxillary palp with basal joint slightly longer than scape and about as long as head diameter. Pronotalwarts unknown. A pair of large, oval mesonotal warts present. Fore wing 5.0 mm. Venation (text-fig. 8): Dc slightly shorter than half the wing length. Fork 1 originates at about $\frac{2}{3}$ the Dc, about as long as the Dc. R4+5 bifurcates before crossvein R3-R4. Fork 2 straight, shorter than fork 1. Crossvein R-M short, meets M1+2 close to bifurcation into M1 and M2. Fork 3 long M3+4 originates approximately opposite to fork 1. Crossvein M-Cu long, ends about medially on Cu1a. Fork 5 present. Hind wing about 3.3 mm. Venation (text-fig. 9): Fork 1 long; R2 about as long as the stalk. Forks 2, 3, and 4 absent. Crossvein M-Cu meets Cu1a at basal part. Fork 5 large; Cu1a about as long as R2. Abdominal reticulation absent. Abdomen with truncate VIth sternal process. Genitalia unknown. (Material: Female, Coll. WICHARD, Bonn)

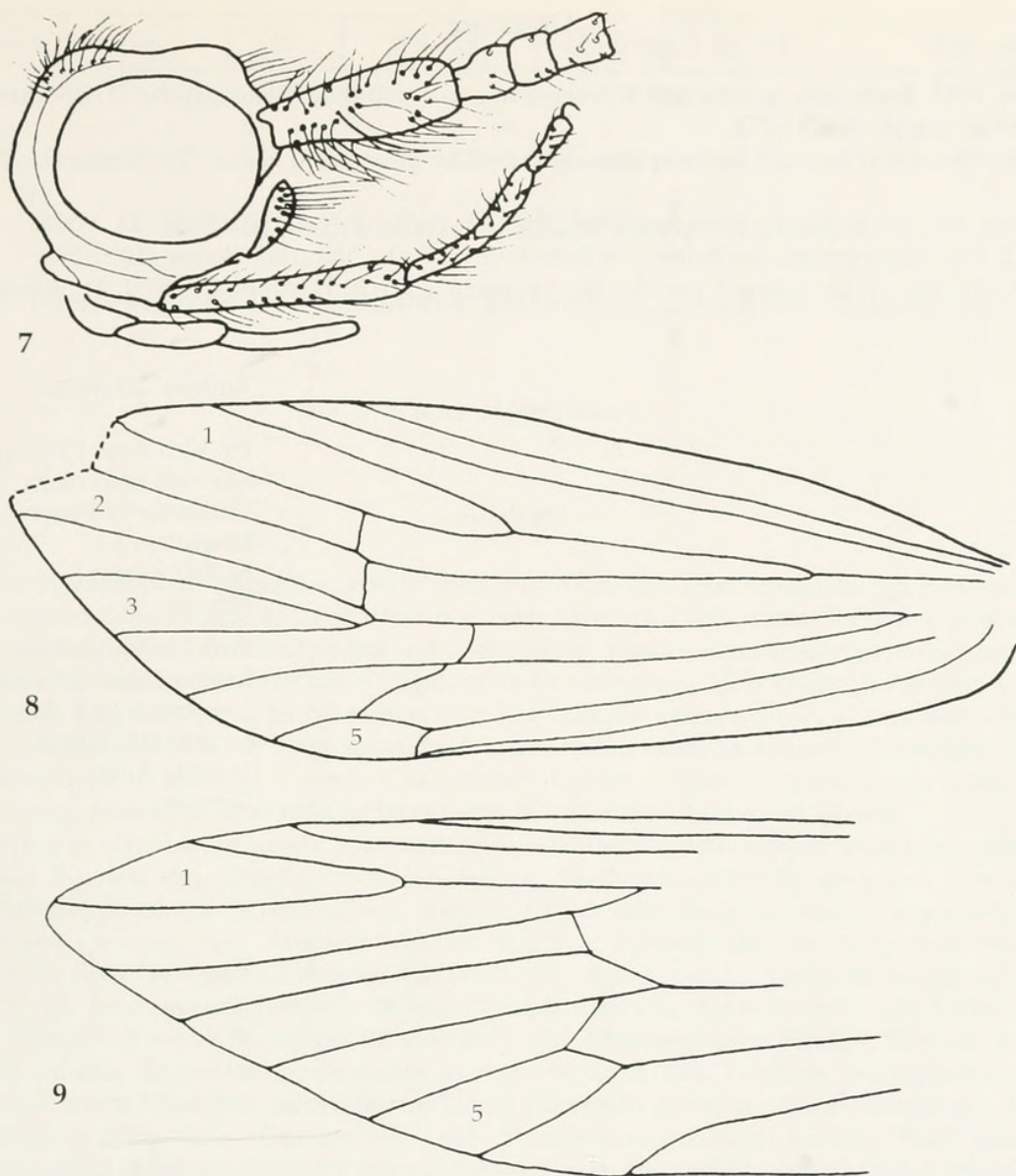
Discussion

Palaeohelicopsyche groteae sp.n. is only known from males. Commonly, the wing venation between the same sex of related species is very similar, and based on the examined material, definite association of the females are not possible. The finding of a second species consequently raises a question about the validity of the associations made by ULMER (1912).

The two *Palaeohelicopsyche* species both have strongly dorsad expanded processes between the eyes, a trend not known in other species within Helicopsychidae. The fore wing venation of *Palaeohelicopsyche* is characteristic in that fork 1 originating medially or slightly basally on the Dc. This character is probably derived from a more distal origin of the fork as found within all other species groups of the family, except in the recent Australian *Helicopsyche* (JOHANSON, 1995). In *Palaeohelicopsyche* the Dc is rather longer than in recent species. The VIth sternal process of the two *Palaeohelicopsyche* spp. is strongly truncate. This character state is unique to the *Palaeohelicopsyche* and the Australian, New Zealand, and New Caledonian *Helicopsyche*.

The shape of the gonocoxite of *P. groteae* sp.n. strongly resembles that of the Australian *Helicopsyche tillyardi* MOSELY, 1953 (JOHANSON, 1995), and the New Zealand endemics *Helicopsyche zealandica* HUDSON, 1904 and *Helicopsyche howesi* TILLYARD, 1924. In the New Zealand species the secondary branch is longer than in *P. groteae* sp.n.

The shape of the primary branch of the gonocoxite of *P. serricornis* ULMER, 1912 resembles the recent



Figs 7-9: *Palaeohelicopsyche* sp. A (female), Baltic amber. 7. Head, lateral view. 8. Left fore wing. 9. Right hind wing.

European species *Helicopsyche shuttleworthi* VON SIEBOLD, 1856 and *Helicopsyche helicifex* (ALLEN, 1857) and the Oriental *Helicopsyche amarawathi* SCHMID, 1958, *Helicopsyche leucothoe* SCHMID, 1993 and *Helicopsyche lata* ULMER, 1951. *P. serricornis* differs from the rest of the species by the small lobe dorsally on the head; long discoidal cell and fork 1 of the fore wing; absence of abdominal reticulation and truncate sternal process VI.

P. groteae sp.n. differs from *P. serricornis* ULMER, 1912 by the median processes on the scapes, scaloid setae on both fore and hind wings, the abdomen with long VIth sternal process and the gonocoxites which in lateral view are divided into a broad and little curved primary and a long, pointed secondary branch.

The female of *Palaeohelicopsyche serricornis* ULMER, 1912 and *Palaeohelicopsyche* sp. A differs slightly in wing venation, but not in the same manner as between the males of the two. The fore wing of *Palaeohelicopsyche* sp. A, have longer Dc, the crossvein M-Cu1 situated more basally, and Cu2 meets Cu1 at wing margin. The hind wings have longer fork 1. Both females have wings without scaloid setae. Thus, association to males probably is more complicated than demonstrated by ULMER (1912).

In summary, the *Palaeohelicopsyche* species resemble the recent Australian *Helicopsyche* more than other recent species groups. The following list of characters may possibly be interpreted as synapomorphies: fork 1 originates medially on the discoidal cell, the truncate VIth sternal process, and the shape of the gonocoxite. If so, nomenclatorial changes within Helicopsychidae are consequently required. However, action in this direction will not be taken before a more comprehensive analysis of the character distributions in the family has been demonstrated.

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Authors' addresses:

Dr. Kjell Arne JOHANSON
Museum of Zoology
University of Bergen
Muséplass 3
N-5007 Bergen
Norway

Prof. Dr. Wilfried WICHARD
Institut f. Biologie und ihre Didaktik
Universität zu Köln
Gronewaldstraße 2
D-50931 Köln
Germany



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