The Psenulus pallipes species group in Central Europe (Hymenoptera, Crabronidae)

Dr. Christian Schmid-Egger

Fischerstraße 1 | 10317 Berlin | Germany | christian@ampulex.de | www.bembix.de

Zusammenfassung

Christian Schmid-Egger: Die *Psenulus pallipes*-Gruppe in Mitteleuropa (Hymenoptera, Crabronidae). Im vorliegenden Artikel wird die *Psenulus pallipes*-Gruppe in Mitteleuropa untersucht. *P. brevitarsis* (=syn.nov) ist ein neues Synonym von *P. chevrieri*, letzteres Taxon wird wieder in den Artstatus erhoben (stat. res.). Für die drei Arten *P. meridionalis*, *P. pallipes* und *P. chevrieri* werden neue Unterscheidungsmerkmale angegeben. Die Weibchen sind folgendermaßen charakterisiert. *P. pallipes*: Plattform zwischen den Fühlern klein; *P. chevrieri* und *P. meridionalis*: Plattform zwischen den Fühlern groß; *P. chevrieri*: Kiel unterhalb der Plattform einfach; *P. meridionalis*: Kiel unterhalb der Plattform doppelt. Unterscheidung der Männchen: *P. chevrieri*: Tarsus der Mittelbeine maximal 1.2 x so lang wie Mitteltibia, Haare der Mittelschenkel kurz; *P. pallipes* und *P. meridionalis*: Tarsus der Mittelbeine mindestes 1.3 x so lang wie Mitteltibia, Haare der Mittelschenkel länger; *P. pallipes*: Kiel unterhalb der Plattform (Plattform zwischen den Fühlern), einfach, Fühlerglieder 4–10 mit Tyloiden; *P. meridionalis*: Kiel unterhalb der Plattform doppelt, Fühlerglieder 4–7 mit Tyloiden.

Summary

The *Psenulus pallipes* species group in Central Europe (*P. chevrieri*, *P. meridionalis*, *P. pallipes*) is examined, and new identification characters and a key to species is given. Form of interantennal platform was used as new identification character. *P. chevrieri* was moved from synonymy to rank of valid species (stat. res.), and *P. brevitarsis* (= syn. nov). is a junior synonym of *P. chevrieri*. A high interspecific variation in morphology in *P. pallipes* was found.

Introduction

The *Psenulus pallipes*-species group recently includes in Central Europe 3 species, *P. chevrieri* (= *brevitarsis*), *P. pallipes* and *P. meridionalis*. Other similar species from the Mediterranean area are *P. pan* de Beaumont, 1967, *P. pygmaeus* (Tournier, 1898), and *P. cypriacus* van Lith, 1973. They were not examined and are not treated here. During the Genetic Barcoding of the digger wasps from Central Europe (see Schmidt et. al. 2015 for further details about this project), we could examine several specimens of the *Psenulus pallipes* group from Central Europe and from southern France. The results are presented here, except of the genetic data, which will be published in another paper (Schmid-Egger et al., in preparation).

Fig. 1: *Psenulus chevrieri* ♀, head. (Foto: Schmid-Egger)

Fig. 2: *Psenulus meridionalis* ♀, dorsally. (Foto: Schmid-Egger)

Identification

Key to Females of Central Europe

Definition of the species of the *P. pallipes*-group: Sternites 4 and 5 apically with row of long setae (silk spinnerets; see Melo 1997), propodeum finely striate, clypeus punctate. The lower corner of the interantennal platform is prolonged into a vertical keel. This keel connects the platform with the horizontal keels/carinae in the medial part of the face. The form of vertical part of this keel is diagnostic, and it is mentions here as „vertical keel". It is simple or double. „Double" means that both lower corners of the interantennal platform bears a vertical keel, and both keels are more or less subparallel (fig. 4, 7).

1. Interantennal platform medially at least 1.5x as wide as diameter of midocellus (fig. 4). Vertical keel below interantennal platform double. Mesopleuron enclosure with marked horizontal striation. (fig. 3). . . . . ***meridionalis* de Beaumont, 1937**

– Interantennal platform medially less than 1.5x as wide as diameter of midocellus (figs. 1, 5). Vertical keel simple, at most in medial and upper part (figs. 1, 5). Mesopleuron different **2**

2. Interantennal platform medially wider than diameter of midocellus (1.1–1.2x) (fig. 1). Clypeus entirely finely and densely punctured, dull. Striation of lateral parts of propodeal dorsum coarser than in *P. pallipes* . . . . . ***chevrieri* (Tournier, 1889)**

– Interantennal platform medially narrower than diameter of midocellus (0,8–0,9x) (fig. 5). Clypeus punctate with shiny interspaces, laterally often with a smooth area (but variable character, and in some specimens entirely densely punctured). Striation of lateral parts of propodeal dorsum finer than in *P. chevrieri* . . . . . **pallipes (Panzer, 1798)**

Key to Males of Central Europe

Definition of the species of the *P. pallipes*-group: Vertex between eyes and lateral ocellus striate. Median ventral keel of mesoepisternum (ventral part of pleura) with diagonal striae.

1. Midtarsus, including claws, at most 1.2x as long as midtibia (fig. 6). Midtarsal segment III and VI similar in length. Midfemora (seen from behind, measured medially on largest diameter) short and thick, 2.5x as long as wide (fig. 6). Longest setae of midfemora beneath not longer than midocellar diameter. – AS 3–6 (–8) with tyloids, first and last tyloid often indistinct. Tyloids narrow/oval, yellowish or dark, in apical third of AS. Interantennal platform somewhat narrower than midocellar diamater, vertical keel simple, at most in medial and upper part . . . . . ***chevrieri* (Tournier, 1889)**

– Midtarsus at least 1.3x as long as midtiba (in average 1.5x) (fig. 8). Midtarsal segment III longer than VI. Midfemora narrower, 3.75x as long as maximal width (fig. 8). Longest setae of midfemora beneath at long as 2x midocellar diameter. – Tyloids and interantennal platform otherwise. **2**

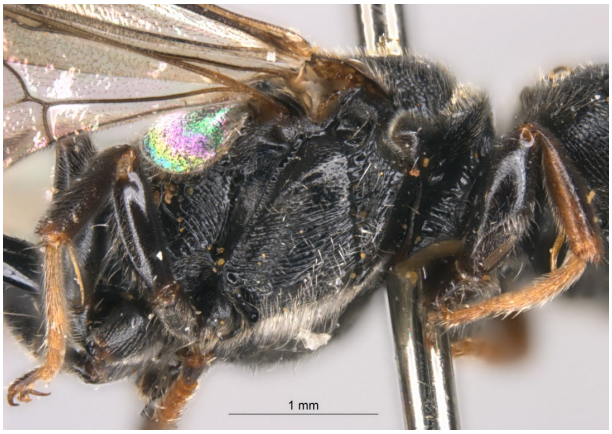

Fig. 3: *Psenulus meridionalis* ♀, thorax laterally. (Foto: Schmid-Egger)

Fig. 4: *Psenulus meridionalis* ♀, head. (Foto: Schmid-Egger)

Fig. 5: *Psenulus pallipes* ♀, head. (Foto: Schmid-Egger)

2. Interantennal platform narrower than midocellar diameter, vertical keel simple, at most in medial and upper part (fig. 9). Platform shorter than lower keel. Tyloids variable, in typical form AS 4–10 (–11) with oval to longitudinal reddish tyloids, in middle of AS, last tyloids short, other specimens with only minute tyloids on AS 4–6 (7) . . . **pallipes (Panzer, 1798)**

– Interantennal platform wider than midocellar diameter, vertical keel double, at most in medial and upper part (fig. 7) Platform longer than lower keels. AS (3–) 4–7 (–8) with linear dark tyloids, in middle of AS, apical tyloids short. . . . . ***meridionalis* de Beaumont, 1937**

Discussion of species

Psenulus chevrieri (Tournier, 1889)

status restituted. Figures 1, 6

= *Psenulus brevitarsis* Merisuo, 1937, syn. nov.

Discussion

The mentioned species has been treated as valid (e.g. Jacobs, 2007) or as synonym of *P. pallipes* (e.g. Bitsch et al. 2007, Pulawski 2015). Species recognition based so far only on males and on length of mid tarsus, which is markedly shorter than in *P. pallipes*. Reliable characters for female recognition were never published. However, the taxon is clearly distinguishable from *P. pallipes* and therefore without doubt a valid species. Genetic data support this assumption. Most recent authors used the taxa name *Psenulus brevitarsis* (e.g. Jacobs 2007). However, Bitsch et al. (2007) pointed out that the taxon was already described by Tournier as *P. chevrieri*. The type specimen is characterized by a short mid tarsus of male, what agree with the definition of *P. brevitarsis* and makes the synonymy of both taxa probable. I share this viewpoint. Consequently *P. chevrieri* must be moved from synonymy as a valid species (stat. res.), and *P. brevitarsis* placed as a junior synonym (syn.nov.) of *P. chevrieri*.

Diagnosis

The female is characterized by a large interantennal elevation. It is markedly wider than in *P. pallipes* and only somewhat narrower than that of *P. meridionalis*. Remaining characters from literature (see Jacobs, 2007) are not suited for species recognition. Punctation of vertex between eye and hindocellus is variable, and *P. pallipes* may have a smooth vertex, while *P. chevrieri* may have some marked striae. Pygidial area on tergite VI is in general shorter in *P. chevrieri* than in *P. pallipes* (what means that extension of lateral keels versus tergal base is shorter in *P. chevrieri* than in *P. pallipes*, but length is variable and therefore not suited as a good character for species recognition). Another good character is clypeus punctation, denser on whole clypeal

Fig. 6: *Psenulus chevrieri* ♂, midleg. (Foto: Schmid-Egger)

Fig. 7: *Psenulus meridionalis* ♂, head. (Foto: Schmid-Egger)

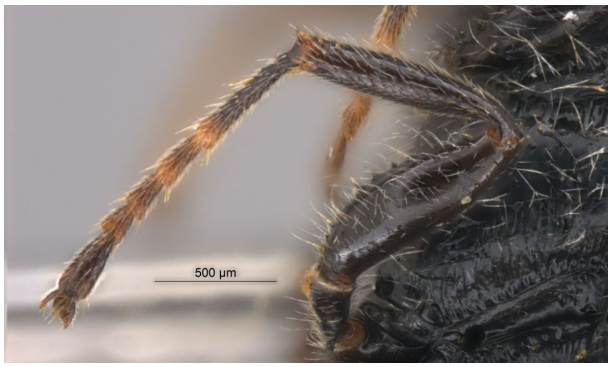

Fig. 8: *Psenulus pallipes* ♂, midleg. (Foto: Schmid-Egger)

Fig. 9: *Psenulus pallipes* ♂, head. (Foto: Schmid-Egger)

surface, giving the clypeus a dull and grained-like microsculptured surface in *P. chevrieri*.
Male is characterized by a short midtarsus, which is (including claws) as long as or somewhat longer than midtibia. Midfemora is markedly thicker and shorter than in *P. pallipes* and *P. meridionalis*, setae are shorter as in both remaining species. Length of pubescence, however, may be variable. Antennal segments 3–7 (–9) have short oval tyloids.

Material examined

70 females and 30 males from coll. Schmid-Egger: **Germany**: Bavaria: Dachau; Passau; Straubing; – Rhinland Palatinate: Wachenheim; Ingelheim; Bacherach – Baden-Württemberg: Niefern/Enz; Freudenstein/Stromberg; Mühhausen/Enz; Südbaden/Grissheim; Müllheim – Mecklenburg-Vorpommern: Darß/Wieck – Hessen: Odenwald/Erbach. **Italy**: Valle d'Aosta/St Pierre. From coll. Neumeyer: **Switzerland**: 3 females 1997 Uri/Seedorf, male 2012 Tessin/Malvaglia.

P. brevitarsis was described from Finnland (Merisuo, 1937).

Psenulus meridionalis Beaumont, 1937

Figures 2, 3, 4, 7

Discussion

P. meridionalis is in most keys mainly characterized by marked striae on mesopleuron (e.g. Jacobs 2007, Bitsch et al. 2007). This character may not be suited for a clear species recognition, because *P. chevrieri* also may have a marked striation on mespleuron in both sexes, similar to that of *P. meridionalis*. So, the best recognition character is the large interantennal platform, which is different from that of *P. pallipes* and *P. chevrieri*. Also, form of the antennal tyloids in male is a good recognition character.

Diagnosis

P. meridionalis is unique among the *P. pallipes* species group by a very large interantennal platform and the form of the anterior and posterior keels (in front and behind of the platform). *P. meridionalis* has two subparallel keels in front of face, and the remaining species only a single keel. Also, platform is longer as length of anterior keels in *P. meridionalis*, and shorter in remaining species. Mesopleuron is always markedly striate, and male antennal segments (3–) 4–7 (–8) have linear tyloids, which are in most specimens dark. They are oval and party reddish in remaining species.

Distribution

Widely distributed in southern Europe, Turkey etc. It reaches Central Europe in Germany, Hungary and Austria. Probably rare in Germany, and restricted to the border of lakes with *Phragmites*.

Material examined (all coll. Schmid-Egger)
Germany, female Bavaria, Starnberg, Lake of Maisingen 22.7.2004 – **Hungary**. 2 males 20.7.1990 Valencer See – **Greece** male 27.8.1989 Joannina lake.

Psenulus pallipes (Panzer, 1798) s.lat.

Figures 5, 8, 9

Discussion

For distinction from *P. chevrieri* and *P. meridionalis* see above. *P. pallipes* in Central Europe probably includes two or more valid species in the present definition. In the examined material it can be observed a high variability in puncture of mesoscutum, a character already mentioned by former authors (see discussion in Dollfuss & Bitsch 2007). Mesoscutum is in some specimens nearly smooth with minute punctures only, which are 3–5 diameters apart. Other specimens have a dense punctation with large punctures, and with small interspaces (0,5–2 diameters apart). Also clypeus punctation is variable (densely and finely punctured, versus all shiny with some minute punctures). Additionally the males show two different types of antennal tyloids (see key).
Larger specimens with denser punctation are described as *Psenulus pallipes* s. str., and smaller ones with minute punctation as *Psenulus pygmaeus* (Tournier, 1898). However, the examined material includes a wide variation in punctation etc., and a clear species recognition is not possible yet. The distinction of males in two groups with 4, resp. 8 tyloids is easier, but the antennal structure is not correlated with punctation of the mesoscutum. The subject needs further examination.
Another problem are four specimens from southern France. The males have a long midtarsus, and are therefore similiar to *P. pallipes*. Females from the same location, however, have a large interocellar platform and resembles therefore *P. chevrieri*.
The genetic barcoding of *Psenulus pallipes* s. lat. results in two different genetic clades for Central European species, with a genetic difference of around 1.5–2 %. Both clades each agree with the morphological characters for *P. pallipes* s. str. and *P. chevrieri*. The genetic tree will not be presented here, but published soon (Schmid-Egger et al. in preparation).
The present results remain provisional and refer only to Central Europe. In the Mediterranean area further species of the *Psenulus pallipes* species group have been described, which have to be taken into account when studying the species: *Psenulus pan* de Beaumont, 1967 from Turkey, *Psenulus cypriacus* van Lith, 1973 from Cyprus, and *P. pygmaeus* (Tournier, 1898) from Switzerland. The barcoding results supports this assumption, because two males from northern Italy (Aosta) and

southern France differ genetically from *P. pallipes* s. str. and *P. chevieri*, and a female from Tunisa also represents a different clade. So, more material and more genetic data have to be taken into account for final results in this species group.

Material examined

20 females 14 males from coll. Schmid-Egger

Germany: Bavaria: Passau, Plattling; Obernzell/Bayerischer Wald – Rhinland Palatinate: Büchelberg – Baden-Württemberg: Black-Forest/Belchen; Niefern; Horb, – Brandenburg; Cottbus. **Italy**: Valle d'Aosta, St Pierre (with different BIN, see above). From coll. Neumeyer: **Switzerland**: 3 males 1995 Uri/Seedorf, 2 males 1995 Basel. **Italy**, female 2010 Ragogna.

Mediterranean area, only specimens which agree with *P. pallipes* s. lat., are taken into account (all coll. Schmid-Egger): **Greece**, Kreta/Omalos. **France**: Procence: a male and a female each from: Basses Alpes/Lurs, and Bouches du Rhone/Alpille/Aureille.

Comments about distribution

Psenulus pallipes is in the examined material rarer than *P. chevrieri*. However, Achim Jacobs (in lit.) found a relation of nearly 50/50 % of both species in his large collection, mainly from northern Germany, and *P. pallipes* occurs up to the coast of the Baltic sea in northeast Germany. Probably both species are widely distributed and common in whole Central Europe.

Acknowledgements

My particular thanks goes to Dr. Stefan Schmidt, Jerome Morinière and other members of the „Barcoding team" of the Zoologische Staatsammlung, Munich/Germany for providing the genetic data, and to Dr. Rainer Neumeyer, Zürich, for sending specimens for examination. I thank Bernhard Schurian from the Museum für Naturkunde, Berlin/Germany for his support in taking pictures. Gabriel Melo kindly checked the draft and the English.

Literature

Bitsch, J. et al. (2007). Faune de France. France et régions limitrophes. 79. Hyménoptères Sphecidae d›Europe occidentale. Volume 3. *Fédération Française des Sociétés de Sciences Naturelles*, Paris.479 pp.

Jacobs, H.-J. (2007). Die Tierwelt Deutschlands und der angrenzenden Meeresteile nach ihren Merkmalen und nach ihrer Lebensweise. Begründet 1925 von Friedrich Dahl. 79. Teil in S. M. Blank and A. Taeger (editors). Hymenoptera III. Die Grabwespen Deutschlands. Ampulicidae, Sphecidae, Crabronidae. Bestimmungsschlüssel. Goecke & Evers, Keltern. 207 pp.

Melo, G.A.R. 1997. Silk glands in adult sphecid wasps (Hymenoptera, Sphecidae, Pemphredoninae). *Journal of Hymenoptera Research* 6: 1–9.

Pulawski, W. (2015). Catalog of Sphecidae sensu lato. ▸ http://researcharchive.calacademy.org/research/entomology/entomology_resources/Hymenoptera/sphecidae/