



Review and identification of the cuckoo bees of central Europe (Hymenoptera: Halictidae: *Sphecodes*)

PETR BOGUSCH¹ & JAKUB STRAKA²

¹University of Hradec Králové, Department of Biology, Rokytanského 62, CZ-500 03 Hradec Králové, Czech Republic.

E-mail: bogusch.petr@gmail.com

²Charles University in Prague, Faculty of Science, Department of Zoology, Viničná 7, CZ-128 44 Praha 2, Czech Republic.

E-mail: straka.jakub.1@gmail.com

Table of contents

| | |
|--|----|
| Abstract | 2 |
| Introduction | 2 |
| Methods | 3 |
| Identification key of <i>Sphecodes</i> of central Europe | 3 |
| List of species | 7 |
| <i>Sphecodes albilabris</i> (Fabricius, 1793) | 7 |
| <i>Sphecodes alternatus</i> Smith, 1853 | 8 |
| <i>Sphecodes crassanus</i> Warncke, 1992 | 8 |
| <i>Sphecodes crassus</i> Thomson, 1870 | 9 |
| <i>Sphecodes cristatus</i> Hagens, 1882 | 9 |
| <i>Sphecodes croaticus</i> Meyer, 1922 | 9 |
| <i>Sphecodes dusmeti</i> Blüthgen, 1924 | 10 |
| <i>Sphecodes ephippius</i> (Linné, 1767) | 10 |
| <i>Sphecodes ferruginatus</i> Hagens, 1882 | 10 |
| <i>Sphecodes geoffrellus</i> (Kirby, 1802) | 10 |
| <i>Sphecodes gibbus</i> (Linnaeus, 1758) | 11 |
| <i>Sphecodes hyalinatus</i> Hagens, 1882 | 11 |
| <i>Sphecodes intermedius</i> Blüthgen, 1923 | 12 |
| <i>Sphecodes longulus</i> Hagens, 1882 | 12 |
| <i>Sphecodes majalis</i> Pérez, 1903 | 12 |
| <i>Sphecodes marginatus</i> Hagens, 1882 | 13 |
| <i>Sphecodes miniatus</i> Hagens, 1882 | 13 |
| <i>Sphecodes monilicornis</i> (Kirby, 1802) | 13 |
| <i>Sphecodes niger</i> Hagens, 1874 | 14 |
| <i>Sphecodes nomiooidis</i> Pesenko, 1979 | 14 |
| <i>Sphecodes olivieri</i> Lepeletier, 1825 | 14 |
| <i>Sphecodes pellucidus</i> Smith, 1845 | 15 |
| <i>Sphecodes pinguiculus</i> Pérez, 1903 | 15 |
| <i>Sphecodes pseudofasciatus</i> Blüthgen, 1925 | 16 |
| <i>Sphecodes puncticeps</i> Thomson, 1870 | 16 |
| <i>Sphecodes reticulatus</i> Thomson, 1870 | 16 |
| <i>Sphecodes rubicundus</i> Hagens, 1875 | 17 |
| <i>Sphecodes ruficrus</i> (Erichson, 1835) | 17 |
| <i>Sphecodes rufiventris</i> (Panzer, 1798) | 17 |
| <i>Sphecodes scabricollis</i> Wesmael, 1835 | 17 |
| <i>Sphecodes schenckii</i> Hagens, 1882 | 18 |
| <i>Sphecodes spinulosus</i> Hagens, 1875 | 18 |
| <i>Sphecodes zangherii</i> Noskiewicz, 1931 | 18 |
| Acknowledgement | 38 |
| References | 39 |

Abstract

We reviewed nomenclature, biology, hosts, geographical distribution and compiled an identification key for all 33 *Sphecodes* Latreille, 1804 species known from central Europe. The identification key is separated for females and males and include 204 figures (photographs) of identification characters as well as male genitalia of all species. Taxonomically difficult groups within the genus were critically studied and new characters, as well as corrected geographical distribution, are presented, *i.e.*, the *S. reticulatus* group (*S. alternatus* Smith, 1853, *S. crassanus* Warncke, 1992 and *S. reticulatus* Thomson, 1870), *S. croaticus* group (*S. croaticus* Meyer, 1922, *S. pseudofasciatus* Blüthgen, 1925 and *S. zangherii* Noskiewicz, 1931) and *S. miniatus* group (*S. marginatus* Hagens, 1882, *S. miniatus* Hagens, 1882 and *S. nomioidis* Pesenko, 1979). The name *S. nomioidis* is used because it is the only available name for the taxon formerly identified as *S. marginatus* in Eastern Europe. *Sphecodes capverdensis* Pesenko & La Roche, 2002 is considered to be a junior synonym of *S. pinguiculus* Pérez, 1903 (**syn. nov.**). In addition we summarized all known host records of *Sphecodes*, including a discussion of the likelihood of published data and presentation of new host data.

Key words: identification key, taxonomy, ecology, hosts

Introduction

The bees (Hymenoptera: Apoidea: Apiformes) represent one of the richest groups of aculeate Hymenoptera in terms of species. Yet, even as of recently several taxonomically complicated groups remain poorly studied and rarely reviewed. Such typical groups are within the family Halictidae where the only European cuckoo bee genus, *Sphecodes* Latreille, 1804, has been studied several times, but remains one of the most difficult European bee genera to identify at the species level. Knowledge on the taxonomy of the genus was summarized by Hagens (1874, 1875, 1882), who also described the majority of all currently valid species. His descriptions were for the most part the source of information for compilation of later identification keys. Additional species were described by Meyer (1919, 1922) and Noskiewicz (1931). Recently, eight new species from Italy were described by Campadelli & Nobile (2000) and Nobile & Turrisi (2004). However, the validity of these species is doubtful (Schwarz & Gusenleitner 2012) and thus, we do not include them in this article. Burger & Reum (2004) and Burger *et al.* (2006) examined difficult groups of this genus, in particular *S. croaticus* Meyer, 1922 and *S. zangherii* Noskiewicz, 1931. European *Sphecodes* have been keyed four times. Blüthgen (1923a) compiled the first key, followed by Šusterka (1959). Although the nomenclature used in those papers is old, the authors found many previously unknown characters. A useful key was published by Warncke (1992). This publication contains good drawings of male genitalia and distribution maps of all European species. However, most of the key couplets are based on a single and sometimes a very variable character. Thus the key is good but some species are hardly identifiable. The latest key, published by Amiet *et al.* (1999), is in comparison to Warncke's key with fewer species but rely on better identification characters.

The biology of *Sphecodes* was studied by few authors. Brief references are found in monographs on the bees of Europe (Friese 1898, Stoeckert 1930, Westrich 1989, Macek *et al.* 2010), where host species of *Sphecodes* are mentioned occasionally. Blüthgen (1923b, 1934) provided the first review on the biology of *Sphecodes*, including the hosts. These data were cited by Westrich (1989), Celary (1991) and Amiet *et al.* (1999). Hosts of *Sphecodes* were also studied by Vegter (1985, 1993). Sick *et al.* (1994) studied hosts of selected *Sphecodes* species experimentally and reported new information. Except some ecological studies reporting *Sphecodes* hosts and mentioned in the text under the appropriate species, the following species have been studied in detail: *S. cristatus* Hagens, 1882 in Sweden by Svensson (1982), *S. majalis* Pérez, 1903 by Herrmann *et al.* (2003), and *S. ruficrus* Erichson, 1852 by Herrmann (2006). Host specificity of two common species, *S. ephippius* (Linnaeus, 1767) and *S. monilicornis* (Kirby, 1802) was studied by Bogusch *et al.* (2006). Data on the visited flowers were published by Westrich (1989) and Celary (1991), demonstrating polylectic behavior of all species. *Sphecodes* bees are nest cleptoparasites, they only forage on nectar on flowers and do not collect pollen. Thus the visited flowers are not discussed in this publication.

Here, we would like to present a newly compiled identification key based on the study of the material of all included species, and emphasizing the advantages and eliminating the disadvantages of previously published keys. The publication also reviews the synonymy, taxonomy, distribution, and biology of all species included. Host spectrum of all species is critically analyzed. The key includes all species known from central Europe and closely allied areas.