The digger wasps of the genus *Alysson* Panzer (Hymenoptera: Crabronidae: Bembicininae) of Russia and adjacent territories, with a key to species and new synonymies

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Abstract

Nine species of *Alysson* Panzer 1806 are recorded from Russia and adjacent territories. The new synonymy is proposed for *Alysson pertheesi* Gorski 1852 = *A. fuscatus* var. *jaroslavensis* Kokujev 1906, = *A. harbinensis* Tsuneki 1967; *Pompilus spinosus* (Panzer 1801) = *Alysson katkovi* Kokujev 1906. The number of valid species-group taxa in the genus *Alysson* is reduced to 39 species. An original key to the species is provided.

Key words: sand wasps, *Alysson*, Palaearctic, fauna

Introduction

*Alysson* Panzer 1806 currently includes 42 species distributed worldwide except the Neotropical Region (Pulawski 2013). Seventeen species are known from the Palearctic Region and six from Russia (Nemkov 2012b). Most of the species are rarely collected, and some are known from the type series only. The females construct nests with one to several cells in hard or more often in sandy soil. The larvae feed on different Homoptera, mainly leafhoppers (Bohart & Menke 1976, Evans & O'Neill 2007, Nemkov 2012a).

This paper deals with *Alysson* of Russia and the adjacent territories (countries of the former Soviet Union, Mongolia, northern China, Korean Peninsula, and northern Japan). These wasps have been revised only by Kokujev (1906) more than a century ago. Within the area considered here there are keys to the species of South and East Asia (Tsuneki 1968), European part of former USSR (Pulawski 1978), Kazakhstan and Middle Asia (Kazenas 1978), China (Wu & Zhou 1987), and Russian Far East (Nemkov et al. 1995).

The current number of the valid species in the genus *Alysson* (including the new synonymies from this paper) is reduced to 39, to 14 in the Palaearctic Region, and to five in Russia.

Materials and methods

About 150 specimens have been studied. The following are abbreviations of the names of institutions in which the type specimens and studied materials are deposited:

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Name</th>
</tr>
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<tbody>
<tr>
<td>CAS</td>
<td>California Academy of Sciences, San Francisco, USA</td>
</tr>
<tr>
<td>ELKU</td>
<td>Entomological Laboratory, Kyushu University, Fukuoka, Japan</td>
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<tr>
<td>IBSS</td>
<td>Institute of Biology and Soils Science, Vladivostok, Russia</td>
</tr>
<tr>
<td>MNHAH</td>
<td>Museum of Nature and Human Activities, Hyogo, Japan</td>
</tr>
<tr>
<td>NNML</td>
<td>Nationaal Naturhistorisch Museum, Leiden, Netherlands</td>
</tr>
<tr>
<td>TMB</td>
<td>Természettudományi Múzeum, Budapest, Hungary</td>
</tr>
<tr>
<td>ZIN</td>
<td>Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia</td>
</tr>
</tbody>
</table>
Descriptive terminology follows Bohart and Menke (1976), but the terms "mesosoma" instead of "thorax" and "metasoma" instead of "gaster" are used. Distributions of the species are based on Pulawski (2013) and the material examined.

Alysson Panzer 1806

Alysson Jurine in Panzer 1801a: 164, suppressed by ICZN (1939).

The genus is closely related to the other two genera of the tribe Alyssontini de Dalla Torre 1897: Didineis Wesmael 1852 and Analysson Krombein 1985, but differs from them in having the labrum truncate or slightly biemarginate apically (trilobate in Analysson), in having the clypeal median lobe tridentate (straight in Analysson), in having the inner eye margins nearly parallel (moderately converging toward the clypeus in Analysson), in having the forewing media diverging at or beyond cu-a (before cu-a in Didineis), in having the metapleuron about half as long as high (much less than half as high in Didineis), and in having metasomal tergum II with two lateral pale spots (without lateral pale spots in Didineis). For a key to genera of the tribe Alyssontini see Nemkov & Lelej (2013).

Key to species

1. Females: flagellum with 10 articles; metasoma with six visible terga; last tergum with pygidial plate ........................................... 2
   - Males: flagellum with 11 articles; metasoma with seven visible terga; last tergum without pygidial plate (unknown in A. verhoeffi) .................................................... 10
2. Metasomal base red ........................................................................................................... 3
   - Metasomal all black ........................................................................................................... 5
3. Mesosoma black. Length 6.5–7.5 mm .............................................................................. A. spinosus (Panzer)
   - Mesosoma entirely red or with red propodeum ................................................................ 4
4. Mesosoma entirely red. Length 6.0 mm ........................................................................ A. maracandensis Radoszkowski
   - Mesosoma mostly black with red propodeum. Length 5–7 mm ..................................... A. pertheesi Gorski
5. Mesosoma mostly red. Length 6.0–7.0 mm ................................. A. tricolor Lepeletier de Saint Fargeau et Audinet-Serville
   - Mesosoma black .............................................................................................................. 6
6. Propodeal enclosure apically triangularly pointed (Fig. 5). ................................................ 7
   - Propodeal enclosure apically rounded (Fig. 6) ................................................................. 9
7. Intertentinal yellow spot extending upward much above level of antennal sockets (Fig. 2); flaggellomeres I and II yellow beneath. Length 7.0 mm ........................................ A. monticola Tsuneki
   - Intertentinal yellow spot not extending upward; flaggellomeres I and II dark beneath ........................................ 8
8. Frons with distinct medial furrow; flaggellomere I nearly 2-times as long as wide at apex. Length 7.0–9.0 mm .................................................. A. ratzeburgi Dahlbom
   - Frons without distinct medial furrow (Fig. 1); flaggellomere I nearly 4-times as long as wide at apex. Length 7.0–8.5 mm . . A. japonicus Tsuneki
   - Apical teeth of clypeus rounded; flaggellomere I nearly 2-times as long as wide at apex. Length 6.0–6.5 mm .................................................. A. verhoeffi Tsuneki
   - Apical teeth of clypeus pointed; flaggellomere I nearly 4-times as long as wide at apex. Length 7.0–12.0 mm ......................................................................... A. cameroni Yasumatsu et Masuda
10. Propodeal enclosure triangular, apically pointed ................................................................. 11
   - Propodeal enclosure apically rounded ............................................................................. 15
11. Flagellum yellow or reddish below .................................................................................. 12
   - Flagellum entirely black or dark-brown ........................................................................... 13
12. Flagellum yellow below and reddish above; legs mainly yellow. Length 5.0 mm . . . . A. maracandensis Radoszkowski
   - Flagellum reddish below and brownish above; legs reddish or brownish. Length 5.0–6.0 mm ........................................................................ A. tricolor Lepeletier de Saint Fargeau et Audinet-Serville
13. Interantennal yellow spot extending upward much above level of antennal sockets (Fig. 4). Length 5.5–7.0 mm .................................
- Interantennal yellow spot not extending upward .......................................................... A. monticola Tsuneki
- Frons with broad and deep medial furrow; scutellum and postscutellum medially deeply furrowed. Length 5.0–7.0 mm ..................... A. ratzeburgi Dahlbom
  - Frons without distinct medial furrow; scutellum and postscutellum not furrowed. Length 5.5–7.0 mm ........................................ A. japonicus Tsuneki
- Clypeus yellow, with dark basal spot (Fig. 3); pronotal collar and scutellum without light spots. Length 6.0–10.0 mm .................. A. cameroni Yasumatsu et Masuda
  - Clypeus entirely yellow or with narrow dark band from base to apex; pronotal collar and scutellum usually with light spots ........ A. pertheesi Gorski
15. Clypeus entirely yellow, with dark basal spot (Fig. 3); pronotal collar and scutellum without light spots. Length 6.0–10.0 mm ........ A. japonicus Tsuneki
- Clypeus yellow, with dark basal spot (Fig. 3); pronotal collar and scutellum without light spots. Length 6.0–10.0 mm ........ A. japonicus Tsuneki
- Clypeus entirely yellow. Length 5.0–6.0 mm ................................................................. A. pertheesi Gorski
- Clypeus with narrow dark median band from base to apex. Length 4.5–6.0 mm. ................................................. A. spinosus (Panzer)


**Alysson cameroni** Yasumatsu et Masuda 1932
(Fig. 3, 6)


**Material examined.** Holotype of *A. cameroni* Yasumatsu et Masuda—♂, Japan: Honshu, Yamanashi Prefecture, Mt. Mitsustõge near Kai, 22.VIII 1931 (Masuda) (ELKU). **Russia:** 1 ♂, Primorskii Krai, Ilistaya River, Nikolaevka, 2.VII 1986 (Lelej) (IBSS); 7 ♂, Primorskii krai, Iman River, Dersu, 20–23.VIII 1991

**Alysson japonicus** Tsuneki 1932

(Sidorenko) (IBSS). **Japan**: 1♂, Hokkaido, Hokkaido Prefecture, Sounkyo, 8–9.VIII 1958 (Tsuneki) (CAS); 1♀, Honshu, Fukui Prefecture, Hatogayu, 2.IX 1962 (Tsuneki) (CAS).

**Distribution.** Russia (Amurskaya Oblast, Primorski Krai), Japan (Hokkaido, Honshu).

**Alysson japonicus** Tsuneki 1977

(Fig. 1)


**Distribution.** Japan (Honshu).

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**Alysson maracandensis** Radoszkowski 1877

*Alysson maracandensis* Radoszkowski 1877: 34, ♀. Holotype: ♀, Uzbekistan, Samarkand (ZMMU), examined.


*Alysson incertus*: de Dalla Torre 1897: 564; Kokujev 1906: 212.


**Distribution.** Uzbekistan.

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**Alysson monticola** Tsuneki 1977

(Fig. 2, 4, 5)


**Distribution.** Russia (Kunashir Island), Japan (Hokkaido, Honshu).

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**Alysson pertheesi** Gorski 1852


**Alysson fuscatus** var. *jaroslavensis* Kokujev 1906: 216, ♀. Holotype: ♀, Russia, Yaroslavskaya Oblast, Yaroslavl (ZIN), examined. **New synonymy.**

*Alysson harbinensis** Tsuneki 1967: 7, ♀. Holotype: ♀, China, Heilongjiang, Harbin (NNML). **New synonymy.**

Material examined. Holotype of Alysson fuscatus var. jaroslavensis Kokujev—♀, Russia: Yaroslavskaya Oblast, Yaroslavl, 14.IX 1896 (Kokujev) (ZIN). Russia: 1♂, Leningradskaya Oblast, Tolmachevo, 13.VII 1936 (Shtakelberg) (ZIN); 2♀, 1♂, Kostromskaya Oblast, Kostroma, 24.VII 1924, 22.VII 1926, 10.VIII 1933 (Gussakovskij) (ZIN); 1♀, Kostromskaya Oblast, Troitsk, 25.VII 1924, 22.VII 1929 (Gussakovskij) (ZIN); 1♀, Krasnoyarskii Krai, Malaya Minusa, 4, 7.VII 2012 (Proshchalykin, Loktionov) (IBSS); 2♀, Krasnoyarskii Krai, 40 km NE Minusinsk, Tes, Tuba River, 7.VII 2012 (Proshchalykin, Loktionov) (IBSS); 1♀, Krasnoyarskii Krai, Minusinsk, 9.VII 2012 (Proshchalykin, Loktionov) (IBSS); 4♀, 2♂, Irkutskaya Oblast, Angarsk, 11.VII–9.IX 1983 (Nemkov) (IBSS); 4♀, Irkutskaya Oblast, 15 km E Ust-Orda, Ordinsk, 2–6.VIII 1994 (Nemkov) (IBSS); 1♀, Khabarovskii Krai, Khabarovsk, 22.VIII 1979 (Ermolenko) (ZIN); 1♀, Khabarovskii Krai, Amurzet, 17.VI 1985 (Belokobylskij) (ZIN); 1♀, Primorski Krai, Yakovlevka, 23.VIII 1926 (Dyakonov, Filipov) (ZIN); 1♀, Primorski Krai, Olga, 27.VII 1979 (Belokobylskij) (ZIN); 1♀, Primorski Krai, Ussuriiskii Reserve, Staraya Baza, 29.VI 1991 (Lelej) (IBSS); 1♀, Primorski Krai, Ryazanovka, 15.VII 1992 (Lelej) (IBSS); 2♀, Primorski Krai, Khasan, 12.VIII 1998 (Belokobylskij) (ZIN); 3♀, Sakhalinskaya Oblast, Sakhalin Island, 10 km E Boshnyakovo, 24.VII 2003 (Lelej, Storozhenko) (IBSS).

Distribution. Netherlands, France, Denmark, Austria, Poland, Slovakia, Hungary, Lithuania, Belarus, Ukraine, Russia (Leningradskaya Oblast, Yaroslavskaya Oblast, Kostromskaya Oblast, Moskovskaya Oblast, Bryanskaya Oblast, Volgogradskaya Oblast, Ulyanovskaya Oblast, Altai, Krasnoyarskii Krai, Iruktskaya Oblast, Buryatiya, Amurskaya Oblast, Khabarovskii Krai, Primorski Krai, Sakhalin, Kuril Islands: Kunashir), Mongolia, China (Heilongjiang, Taiwan), Republic of Korea, Japan (Honshu).

Justification of New Synonymy. Kokujev (1906) described var. jaroslavensis as a form of A. fuscatus (correctly A. spinosus). Bohart and Menke (1976) treated A. fuscatus jaroslavensis as a subspecies of A. spinosus. However, it differs from the latter in having a red propodeum (black in A. spinosus) and is similar in this and other characters to Alysson pertheesi. Pulawski (1978) regarded A. jaroslavensis as a valid species. The examination of the holotype of Alysson fuscatus var. jaroslavensis demonstrated that it is a junior subjective synonym of A. pertheesi.

In the original description of A. harbinensis Tsuneki (1967) indicated that the female (the male was still unknown) differs from A. pertheesi mainly in having a red metapleuron and the propodeal enclosure (enclosure all black in pertheesi). The considerable color variation in the Eastern Asian populations of A. pertheesi was noted later by Tsuneki and Itami (1973). I was not able to examine the holotype of A. harbinensis because of the temporary closure of the collection at the Leiden Museum, but the diagnostic characters of this species are clearly within the limits of the individual variation of A. pertheesi. Specimens with a red propodeal enclosure (in harbinensis) occur in all parts of Russia along with the typically colored specimens (with a black enclosure), although in the western Russia the typical form prevails over the harbinensis form, while in the eastern Russia the specimens with black enclosure are found very rarely. Therefore I regard A. harbinensis as a junior subjective synonym of A. pertheesi Gorski.

Alysson ratzeburgi Dahlbom 1843

Alysson ratzeburgi: Eversmann 1849: 388; Handlirsch 1888: 242; F. Morawitz 1893: 112; Westerlund 1893: 26; de Dalla Torre
Material examined. Ukraine: 1♀, Crimea (coll. F. Morawitz) (ZIN). Russia: 3♀, 1♂, Leningradskaya Oblast, Mednyi Zavod, 27.V–26.VI 1920 (Barovski) (ZIN); 1♀, Leningradskaya Oblast, 40 verst S Luga, 1871 (Solski) (ZIN); 1♀, Tatarstan, Kazan, 10.VI (coll. Eversmann) (ZIN); 1♀, Krasnoyarskii Krai, Berezovka, 1.VII 2012 (Proshchalykin, Loktionov) (IBSS); 1♂, Krasnoyarskii Krai, Znamenka, 6.VII 2012 (Proshchalykin, Loktionov) (IBSS); 1♂, Irkutskaya Oblast, Baikalsk, 16.VII 1986 (Nemkov) (IBSS); 1♂, Irkutskaya Oblast, Irkutsk (coll. Eversmann) (ZIN); 1♀, Irkutskaya Oblast, Kultuk, 23.VII 1933 (coll. Gussakovskij) (ZIN); 1♀, Zabaikalskii Krai, 12 km N Darasun, Tura River, 26.VI 1975 (Kasparyan) (ZIN); 1♀, Zabaikalskii Krai, 16 km ESE Nerchinskii Zavod, 23.VII 1975 (Kasparyan).

Distribution. Belgium, France, Spain, Switzerland, Italy, Germany, Austria, Serbia, Poland, Slovakia, Hungary, Romania, Norway, Sweden, Finland, Belarus, Ukraine, Russia (Karelia, Leningradskaya Oblast, Rostovskaya Oblast, Tatarstan, Khakassiya, Krasnoyarskii Krai, Irkutskaya Oblast, Zabaikalskii Krai, Primorskii Krai), Republic of Korea, Japan (Honshu), Algeria.

Alysson spinosus (Panzer 1801)

Sphex bimaculatus Panzer 1798: 4, ♀. Holotype or syntypes: ♀, Germany, Nürnberg (depository unknown), junior primary homonym of Sphex bimaculatus Fueßlin, 1775 (now in Scoliidae).

Sphex fuscatus Fabricius (misidentification): Panzer 1798: 3.

Pomphilus spinosus Panzer 1801b: 17, ♀. Holotype or syntypes: ♀, Germany: no specific locality (depository unknown).

Synonymized with Alyson bimaculatus (Panzer 1798) by Jurine 1807: 196.


Distribution. Great Britain, Netherlands, Belgium, France, Portugal, Spain, Switzerland, Italy (including Sicilia), Denmark, Germany, Austria, Slovenia, Croatia, Serbia, Greece, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Cyprus, Latvia, Lithuania, Belarus, Ukraine, Turkey, Russia (Pskovskaya Oblast, Leningradskaya Oblast, Yaroslavskaya Oblast, Kostromskaya Oblast, Moskovskaya Oblast, Chuvashiya, Bryanskaya Oblast, Kurskaya Oblast, Belgorodskaya Oblast, Voronezhskaya Oblast, Volgogradskaya Oblast, Rostovskaya Oblast, Krasnodarskii Krai, Stavropol’skii Krai, North Caucasus, Ulyanovskaya Oblast, Tatarstan), Georgia, Kazakhstan.

Justification of New Synonymy. The examination of the holotype of A. katkovi shows that actually it is a small (length 5 mm instead of 6.5–7.5 mm usually) specimen of A. spinosus. I regard it as a junior subjective synonym of Alysson spinosus (Panzer). Pulawski (1978) also supposed such synonymy.

Alysson tricolor Lepeletier de Saint Fargeau et Audinet-Serville 1825


Material examined. Ukraine: 2♀, 1♂, Kharkovskaya Oblast, Kuryazh, 6.VII 1884, 5.VII 1885 (Yaroshevski) (ZIN).

Distribution. Belgium, France, Spain, Switzerland, Italy, Germany, Austria, Slovenia, Serbia, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Ukraine, Turkey.

Alysson verhoeffi Tsuneki 1967

Alysson verhoeffi Tsuneki 1967: 8, ♀. Holotype: ♀, China, Heilongjiang, Harbin (NNML).


Distribution. China (Heilongjiang).

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Tsuneki, K. & Itami, I. (1973) Variation in colour of Alysson pertheesi Gorski with notes on other characters. The Life Study (Fukui), 17, 13.


