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European paper wasps (Hymenoptera: Vespidae: Polistinae) in the collections of the Moravian Museum, Brno

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DVOŘÁK L. 2005: European paper wasps (Hymenoptera: Vespidae: Polistinae) in the collections of the Moravian Museum, Brno. *Acta Musei Moraviae, Scientiae biologicae* (Brno) **90:** 235–241. – The European material of paper wasps deposited in the collections of the Moravian Museum Brno is evaluated. Altogether more than 500 specimens belonging to six species [*Polistes atrimandibularis* (Zimmermann, 1930), *P. biglumis* (Linnaeus, 1758), *P. bischoffi* Weyrauch, 1937, *P. dominulus* (Christ, 1791), *P. gallicus* (Linnaeus, 1767), and *P. nimphus* (Christ, 1791)] are represented. The major part of the material originates from the Czech Republic (especially South Moravia); material from Slovakia and the Balkan countries is less abundant. Changes in the species composition of central European paper wasp fauna in the course of recent decades are briefly discussed.

Key words. Vespidae, Polistinae, *Polistes*, central Europe, Czech Republic, Moravia, Slovakia, the Balkans, faunology

Introduction

Faunistic research on social wasps (including paper wasps) was relatively intensive in the territory of the Czech Republic up to the 1970's. However, only a little data from this period was published, the compilation work of BOUČEK & ŠUSTERA (1956) being especially noteworthy. Further papers which should be consulted in respect to the Moravian fauna are those of LANG (1958), who investigated the environs of Vyškov, near Brno, and PÁDR (1995), who provided a list of species known from the Pálava Biosphere Reserve. Some papers also include data based on specimens from the collections of the Moravian Museum in Brno, e.g. ŠNOFLÁK (1952). Nevertheless, most of the material from central and south-eastern Europe deposited in this institution has not yet been evaluated. The same is true for rich paper wasp material (including quite recent work) in several other central European museums, resulting in a poor knowledge of the distribution of various species in the region.

As well as the European collection, the Moravian museum also holds an extensive collection of Vespidae from Afghanistan, already fully addressed by GUSENLEITNER (1973).

Material and methods

Paper wasps of European origin in the collections of the Moravian Museum were predominantly collected in the period 1937–1980, but several more recent and/or older specimens are deposited there too. The majority of more than 500 specimens come from the southern half of Moravia (Czech Republic), fewer from northern Moravia and

Slovakia. Material from Bohemia (Czech Republic) and other countries (Austria, Bulgaria, Croatia, Montenegro, Turkey) is rather scarce. More than 20 collectors contributed to the collection studied, with the bulk of the specimens added by J. Šnoflák, M. Kocourek, L. Krejcárek, and J. Matoušek.

The works of Bouček & Šustera (1956), Guiglia (1972), Mauss & Treiber (1994), and Starr & Luchetti (1993) were used for determination. Some specimens were kindly revised by Jakub Straka (Prague). The species nomenclature follows Carpenter (1996).

Faunistic data are listed in the order country (bold), locality, code number in parentheses referring to the central European grid for mapping flora and fauna (Ehrendorfer & Hamann 1965, Novák 1989, Pruner & Míka 1996: for the Czech Republic and Slovakia only), date of collection, number and sex of specimens (male, female, queen and worker not distinguished), and abbreviation of collector. A semicolon divides material cited from the same locality but different date or collector, a dash divides different localities.

Abbreviations

Db . . . . . Luboš Dembický
De . . . . . Jan Dezort
Dv . . . . . Dvořák
Fi . . . . . Josef Fiala
Gr . . . . . František Gregor sen.
He . . . . . Engelbert Hepner
Ho . . . . . Augustin Hoffer
Hu . . . . . W. Hurdes
Ka . . . . . P. Kaiser
Ko . . . . . Miroslav Kocourek
Kr . . . . . Ladislav Krejcárek
La . . . . . Pavel Lauterer
Mc . . . . . Jan Macek
Ml . . . . . Alois Maláč
Mn . . . . . Igor Malenovský
Mt . . . . . Jaroslav Matoušek
Ne . . . . . František Netopil
Ob . . . . . Radoslav Obrtel
Ol . . . . . Jiří Olejníček
Pa . . . . . Jakub Palásek
Pe . . . . . Jaroslav Pelikán
Po . . . . . Drahoš Pokora
Ps . . . . . Pospíšilová
Sk . . . . . Skružný
St . . . . . Eduard Staněk
Šn . . . . . Jan Šnoflák
To . . . . . Boleslav Tomšík

List of species

Polistes (*Leptopolistes*) *bischoffi* Weyrauch, 1937

Czech Republic: Brno-Bosonohy (6865), Leskava stream, sweeping, 3.ix.2004, 1♂, Mn & Db. – Brno-Útěchov (6765), hornbeam forest, 16.viii.1998, 1♀, La (J. Straka rev.).

Polistes (*Leptopolistes*) *gallicus* (Linnaeus, 1767)

syn. *Polistes foederatus* Kohl, 1898

Slovakia: Parkan (= Štúrovo) (81–8278), 16.ix.1947, 14♂, 3♀, Ho.
Bulgaria: Harmanli, steppe, 20.vii.1971, 2♀, La. – Liljanovo (Sandanski), Sandanska Bystrica valley, 13.vii.1971, 1♀, La. – Kresnanske defile, Kresnanske Chančie, 18.vii.1971, 1♀, La.
Croatia: Dalmatia, Podgora, 13.vii.1937, 2♀, Pa.
Montenegro: Lovčen Mts., Štirovnik Mt., polje and hill 1 km SW, 20.x.1982, 1♂, 1♀, La.

Polistes (*Polistes*) *biglumis* (Linnaeus, 1758)

Czech Republic: Brno-Bobrava (6865), vi.1943, 1♀, Mt; 12.viii.1946, 3♂, 2♀, Šn; 4.ix.1949, 1♂, Šn. – Brno-Bystrc (6765), 25.viii.1945, 1♀, Šn. – Brno-Hády (6766), 5.vii.1937, 1♂, Ho; 17.viii.1945, 1♂, Šn. – Brno-Řečkovice (6765), 31.viii.1942, 1♀, Šn; 13.vi.1948, 1♀, Šn. – Brno-Říčky, (6764), 17.viii.1945, 1♂, Šn. – Bruntál (6070), 28.vii.1950, 4♀, Šn. – Čelákovice (5854), 1♂, 1♀, Mt. – Čtyři Dvory (6464), 21.viii.2000, 1 ♂, La. – Děvín (7165), 17.ix.1952, 1 ♂, St; below vineyards, 12.vii.1951, 1 ♀, St; S slope, 18.vii.1951, 2 ♀, St. – Divoká Desná (58–5968), 26.vii.1950, 1♀, Šn. – Hlubočepy (5952), 1♂, Mt. – Hrušovany (7164), brickworks, 27.vii.1950, 2 ♀, St; 17.viii.1950, 2 ♀, St. – Jindřichův Hradec (6855), 10.vi.1940, 1♀, To; 3.viii.1940, 1♀, To; 31.v.1941, 1♀, To. – Karlova Studánka (5969), 25.vii.1950, 1♂, Šn. – Kienberk (7165), 14.ix.1950, 1 ♀, St; 6.vii.1951, 1 ♀, St; 14.viii.1953, 1 ♀, St. – Kobylí (7067), 7.ix.1980, 6♂, Ko. – Kouty nad Desnou (5868), 26.vii.1950, 1♀, Šn. – Kytín (6151), viii.1957, 1♀, Mc. – Lysá hora (6476), 23.vii.1945, 1♀, Pe. – Malhostovice (5349), dry grassland on limestone , 27.ix.1997, 1♂, La. – Mikulov (7165), 31.vii.1950, 1♂, 1♀, Šn; Janičův vrch hill, 21.viii.1950, 1 ♂, St; Svatý Kopeček, 26.vii.1950, 1 ♂, 2 ♀, St; 10.vii.1951, 2 ♀, St; 15.iv.1952, 2 ♀, St; 23.vii.1953, 1 ♀, St; Svatý Kopeček, S slope, 13.vii.1950, 1 ♀, St; 19.vii.1950, 1 ♂, 2 ♀, St; 24.vii.1950, 1 ♂, St; Svatý Kopeček II, 22.viii.1950, 1 ♀, St; 20.vii.1951, 1 ♀, St; Svatý Kopeček II, S slope, 31.vii.1950, 1 ♂, St. – Modřany (5952), ix.1951, 1♀, Mc. – Mohelno (6863), 26.ix.1941, 5♂, 7♀, Šn; ix.1942, 1♂, 1♀, Mt; x.1942, 1♀, Mt; ix.1943, 1♂, Mt; 22.vii.1945, 1♀, Ob; 26.vii.1945, 1♀, Ob; 4.viii.1945, 1♂, Ob; 5.viii.1946, 1♀, Ob; 12.ix.1948, 1♂, To. – Moravany nr. Brno (6865), 27.iv.1942, 1♀, Šn. – Muzlov (6365), 30.vii.1956, 1 ♀, St. – Nebovidy (6865), 25.viii.1944, 1♀, Šn. – Nepřívazy nr. Libava (6370), vi.1947, 2♀, Ko. – Nová Ves nr. Batelov (6758), 2♂, To. – Pavlov (7165-6), under Malý Děvín, 31.viii.1950, 3 ♀, St. – Pavlovské vrchy (7165–66), 12.iv.1946, 2♀, Ob; 9.vi.1946, 2♀, Šn; 24.iv.1948, 1♀, Ob. – Perná (7165), under Kotelna, 10.viii.1950, 1 ♀, St. – Pouzdřany (7065), 5.ix.1945, 1♂, Šn. – Radotín (6052), 6.vii.1928, 1 ♀; vi.1943, 1♀, Sk. – Sedlec (7266), sand pit, 19.vii.1951, 2 ♀, St. – Senorady (6863), 1937, 1♀, Mt; 7.viii.1939, 1♀, Mt; 8.ix.1939, 1♀, Mt; 24.vii.1941, 1♀, Mt. – Spálený vrch, 8.v.1951, 1 ♀, St. – Vyškov (6767–8), vii.1964, 1♀, Ko. – Zavadilka (6467), east, 3.v.1957, 1 ♀, St.
Slovakia: Bratislava (7868–9), vi.1948, 1 F. – Čajkov (7777), vii.1960, 1♀, Ko. – Kováčov (8178), 24.vii.1946, 1♂, Šn. – Kozol u Žiliny (6878), 17.vii.1950, 1♂, Pe. – LešŹ (7681), v.1955, 1♀, Ko; vi.1968, 1♀, Ko. – Nitra (7674), Kalvarie, 4.vii.1963, 1 ♀, St. – Zadiel (7390–1), 27.vii.1948, 1♀, Šn.
Austria: Salzburg, Kapruner Tal, 16.ix.1963, 5♂, 7♀, Hu.

Polistes (*Polistes*) *dominulus* (Christ, 1791)

syn. *Polistes gallicus* auct., *nec* Linnaeus, 1767

Czech Republic: Bavory (7165), under Stolová hora hill, 20.vii.1950, 1 ♀, St. – Bořetice (7067), 5.vii.1941, 1♂, Ho. – Brno-Bobrava (6865), 12.viii.1945, 1♀, Šn; 30.v.1946, 1♀, Šn. – Brno-Hády (6766), 17.viii.1945, 1♂, Šn. – Brno-Komín (6765), 19.vii.1950, 1♂, Šn. – Brno-Královo Pole (6765), viii.1944, 1♂, Ob. – Brno-Kraví hora (6865), 28.viii.1941, 1♂, Šn; 6.ix.1941, 1♂, Šn; 14.viii.1942, 1♂, Šn; 9.viii.1948, 3♂, 2♀, Šn. – Brno-Pisárky (67-6865), vi.1963, 1 ♀, Po. – Brno-Řečkovice (6765), 5.ix.1941, 1♂, Šn; 8. viii.1946, 1♂, Šn. – Brno-Říčky (6764), 17.viii.1945, 1♂, Šn. – Brno-Wilsonův les (6765), 12.viii.1968, 1 ♀, Ps. – Brno-Žabovřesky (6765), 12.viii.1945, 1♂, Šn. – Brno-Židenice (67–6865), iv.1948, 1♀, Ko. – Brno-Žlutý kopec (6865), 10.iii.1972, 1♀, La. – Bzenec (7069), v.1948, 1 F; viii.1963, 1♂, Ko. – Čejč, (7067), 13.vii.1939, 1♀, Šn; 9.iv.1944, 1♀, Ko; 26.iv.1953, 1♀, Ko; viii.1953, 3♂, 1♀, Ko; vii.1956, 3♂, 1♀, Ko; viii.1956, 31♂, 11♀, Ko; viii.1958, 12♂, 5♀, Ko; viii.1962, 1♂, 1♀, Ko; viii.1967, 2♂, Ko; 14.viii.1974, 1♀, Kr; 26.viii.1980, 1♀, Ko. – Dolní Věstonice (7165), 18.vii.1946, 1♀, Ho; 26.vii.1946, 1♂, 1♀, Ho; 16.viii.1976, 1♂, 1♀, Ko. – Fryšták-reservoir (6772), 16.viii.1966, 1♂, Kr. – Hodonín (7168), iv.1917, 2 F; iv.1953, 4♀, Ko. – Hrušovany (7164), brickworks, 27.vii.1950, 1 ♀, St. – Kienberk (7165), 19.iv.1952, 1 ♀, St. – Kobylí (7067), viii.1956, 6♂, 2♀, Ko; 5.ix.1972, 1♂, Kr; 13.vii.1979, 1♂, Ko; 17.vii.1979, 1♀, Ko; 7.ix.1980, 1♂, Ko. – Lukov (6772), 2.ix.1971, 1♀, Kr. – Mikulov (7165), 31.vii.1950, 1♂, 1♀, Šn; castle, 3.v.1952, 1 ♀, St; garden above castle, 11.vii.1950, 1 ♀, St; Janičův vrch hill, 21.viii.1950, 1 ♂, St; Jewish cemetery, 23.v.1950, 1 ♀, St; Svatý Kopeček, 26.vii.1950, 1 ♂, 1 ♀, St; 10.vii.1951, 1 ♀, St; 23.vii.1953, 1 ♀, St; Svatý Kopeček, S slope, 23.vii.1950, 1 ♂, St; Svatý Kopeček II, 31.vii.1950, 3 ♂, St; 4.viii.1950, 1 ♀, St; 22.viii.1950, 1 ♂, St; Svatý

Kopeček II, S slope, 31.vii.1950, 1 ♀, St. – Moravský Písek (7069–70), 1968, 1♀, Kr; vii.1972, 1♀, Kr. – Mutěnice (70–7168), viii.1956, 7♂, 1♀, Ko. – Novosedlecký hřeben (7164), S part, 4.viii.1952, 1 ♀, St. – Paseky (6267), 20.viii.1975, 1♂, Kr; 14.viii.1975, 1♂, Kr. – Pavlovské vrchy (7165–66), 9.vi.1946, 2♀, Šn. – Polešovice (6970), 26.vii.1941, 1♂, Ho. – Popice (7065–6), 26.vi.1977, 1♀, Ko. – Pouzdřany (7065), 18.viii.1937, 1♂, Gr; 8.ix.1943, 2♂, Šn; 25.viii.1945, 1♂, Ml; 29.viii.1945, 4♂, 1♀, Šn; 5.ix.1945, 1♂, Šn; 24.viii.1949, 1♀, Šn; – Sedlec (7266), by pond, 6.vii.1952, 1 ♀, St; N, by forest, 5.ix.1950, 1♂, 1 ♀, St. – Spálený vrch, 6.iv.1951, 1 ♀, St. – Šardice (7068), 27.viii.1942, 1♂, Šn. – Šibeničník (7266), 16.viii.1953, 1 ♀, St. – Štípa (6772), 7.viii.1970, 1♀, Kr. – Uherský Brod (6971), vineyards, 5.vi.1966, 1 ♀, St. – Újezdce (location unknown), 30.viii.1942, 1♂, Ho. – Valtice (7266), in fields, 27.vii.1973, 1♂, Ol. – Vyškov (6767–8), iv.1962, 1♀, Ko; vii.1964, 6♂, 2♀, Ko; viii.1964, 11♂, Ko; viii.1980, 1♂, Ko. – Znojmo (7162), vii.1945, 1♂, Mt; iv.1948, 1♀, Ko. – Židlochovice (6965), x.1963, 1♀, De.
Slovakia: Šahy (7979), 15.vi.1970, 1♀, Kr.
Montenegro: Sutomore, vi.1962, 1♀, He.
Turkey: Bursa, 13.iv.1952, 1 ♀, Ka. – Egridirsee, 26.viii.1955, 1 ♀, St. – Kochisar, 18.viii.1955, 1 ♀, St.

Polistes (*Polistes*) *nimphus* (Christ, 1791)

Czech Republic: Bořetice (7067), 5.vii.1941, 1♂, Ho. – Brno (67–6865), 9.ix.1933, 1♀, Fi. – Brno-Bobrava (6865), 30.vi.1946, 1♀, Šn; 12.viii.1946, 1♂, 1♀, Šn; 12.viii.1948, 1♀, Šn; 31. viii.1948, 1♀, Šn; 4.ix.1949, 1♂, Šn. – Brno-Bystrc (6765), 14.viii.1945, 3♂, Šn; 26.viii.1948, 1♂, Šn. – Brno-Komín (6765), 19.vii.1950, 3♀, Šn. – Brno-Kraví hora (6865), 28.viii.1941, 1♂, Šn; 9.viii.1948, 1♀, Šn. – Brno-Řečkovice (6765), 29.vii.1939, 1♀, Šn; 28.viii.1939, 1♂, Šn; 5.ix.1941, 1♂, Šn; 22.viii.1945, 7♂, 2♀, Šn. – Brno-Žabovřesky (6765), 3.v.1944, 1♀, Šn; 12.viii.1945, 7♂, 7♀, Šn. – Brno-Žlutý kopec (6865), 10.iii.1972, 1♀, La. – Bzenec (7069), viii.1963, 1♂, Ko. – Čejč (7067), 26.iv.1953, 1♀, Ko; viii.1958, 1♀, Ko. – Dolní Věstonice (7165), 16.vii.1968, 1 ♂, La; 16.viii.1976, 1♂, Ko. – Fryšták (6772), 22.viii.1974, 1♀, Kr. – Fryšták-reservoir (6772), 20.viii.1966, 1♀, Kr; 29.viii.1966, 1♀, Kr; 7.v.1970, 1♀, Kr. – Hodonín (7168), iv.1953, 4♀, Ko. – Jindřichův Hradec (6855), 24.iv.1940, 1♀, To. – Kobylí (7067), 15.vii.1979, 1♀, Ko. – Lanžhot (7267), 2.vii.1975, 1♀, Ol. – Mikulov (7165), 18.vii.1950, 1 ♀, St; 31.vii.1950, 1♀, Šn; brickworks, 14.vii.1950, 1 ♀, St; Bulhary, valley by foresters' lodge, 9.viii.1953, 1 ♀, St; military exercising ground, 8.viii.1950, 1 ♂, 1 ♀, St; Svatý Kopeček, 10.vii.1961, 1 ♀, St; Svatý Kopeček, S slope, 19.vii.1950, 1 ♀, St; 24.vii.1950, 1 ♂, St; Svatý Kopeček II, 22.viii.1950, 1 ♂, 1 ♀, St; Svatý Kopeček II, S slope, 31.vii.1950, 1 ♀, St. – Mohelno (6863), vii.1937, 1♀, Dv; 25.vii.1945, 1♀, Ob; 6.viii.1945, 1♂, Ob; 5.viii.1946, 1♂, 1♀, Ob; 6.viii.1946, 1♂, 1♀, Ob; 12.ix.1948, 6♂, 2♀, To; 7.viii.1956, Ob; – Moravany nr. Brno (6865), 8.ix.1941, 1♂, Šn. – Nesovice (6868), 27.iv.1952, 1♀, Ne. – Paseky (6267), 2.ix.1975, 2♂, Kr; 11.vii.1975, 1♀, Kr; 21.viii.1975, 1♂, Kr; 20.viii.1975, 1♀, Kr. – Perná (7165), under Kotelna, 30.viii.1950, 1 ♂, St. – Pouzdřany (7065), 5.ix.1945, 1♂, Šn; 27.iv.1947, 1♀, Šn; vi.1948, 1♀, Ko. – Runzengraben (7166), 9.ix.1951, 1 ♀, St. – Sedlec (7266), ground elevation 233, 10.viii.1951, 1 ♀, St. – Senorady (6863), 11.viii.1939, 1♀, Mt; 7.viii.1939, 1♀, Mt; 21.v.1940, 1♀, Mt; 20.ix.1941, 1♂, Mt; 25.ix.1941, 1♂, Mt. – Sobotín (5968), 2.viii.1949, 1♀, Šn. – Šanov (7164), barn, 13.vii.1952, 1 ♀, St. – Tišnov (6664), 16.ix.1962, 1 ♂, La. – Vyškov (6767–8), vii.1964, 1♂, Ko; viii.1964, 2♂, Ko; viii.1980, 1♀, Ko.
Slovakia: Bratislava (7868–9), vi.1948, 2♀, Šn. – Čajkov (7777), vii.1960, 1♀, Ko; viii.1960, 1♂, Ko; vii.1961, 2♀, Ko. – Devínská Nová Ves (7767), 8.viii.1947, 2♀, Šn. – Filakovo (7784), Stará Bašta, 29.vii.1959, 2 ♀, St. – Hronsek (7380), iv.1955, 2♀, Ko. – Chotín (8175), 31.vii.1962, 1 ♀, St. – Ipelské Predmostie (7980), 13.vii.1958, 1 ♀, St. – Kováčov (8178), 24.vii.1946, 1♂, 17♀, Šn. – Královský Chlmec (7597), Kishegy south, 3.vii.1960, 1 ♀, St. – LešŹ (7681), vi.1954, 1♀, Ko. – Levice (7777), viii.1961, 1♀, Ko. – Lučenec (7684), Horní Baba valley, 24.vii.1959, 1 ♀, St. – Modrý Kameň, Bušimce (7782), northern quarry, 19.vii.1959, 1 ♀, St. – Plešivec (7488), 22.vii.1948, 9♀, Šn. – Rimavská Sobota (7686), Ožďany-S, 26.vii.1959, 4 ♀, St. – Somotor (7596), vii.1959, 1♀, Ko; vii.1961, 1♀, Ko. – Šahy (7979), 14.vii.1972, 1♀, Kr; cemetery slope, 6.vii.1968, 1 ♀, St; Hrkovce, 24.vii.1968, 1 ♀, St; Hrkovské kopce hills, 17.vii.1968, 1 ♀, St. – Štúrovo (81–8278), 16.vii.1950, 1♀, Pa; vii.1953, 3♀, Ko; vii.1961, 5♀, Ko; v.1962, 2♀, Ko; vii.1964, 1♀, Ko. – Tornalja (7587), hills by Gemer, 14.ix.1960, 1 ♂, St. – Turo (6878), 18.vii.1950, 1♀, Pe. – Velká Čalomija (7981), vineyards N, 30.vii.1958, 1 ♀, St. – Železovce (7977), Malý Pesek, 6.vii.1965, 1 ♀, St.
Croatia: Križevci SHS, 20.vii.1929, 1♀, Sk; 7.viii.1928, 1♀, Sk; 15.viii.1929, 1♂, Sk.

***Polistes* (*Sulcopolistes*) *atrimandibularis* (Zimmermann, 1930)**

Czech Republic: Velká Kotlina (5969), 2.viii.1942, 1♂, Ob.

Conclusions

In total, eight species of paper wasps are known from the Czech and Slovak Republics (Pádr 1989, Straka 2000, Dvořák 2005) and specimens of six of them are represented in the collections of the Moravian Museum. The inquiline *Polistes* (*Sulcopolistes*) *sulcifer* (Zimmermann, 1930) as well as *Polistes* (*Leptopolistes*) *associus* Kohl, 1898 are absent. *P. sulcifer* lives in the nests of *P. nimphus* and *P. dominulus* (both occur throughout the area studied) and is distributed in southern and central Europe (Carpenter 1996). *P. sulcifer* has not yet been recorded from the Czech Republic. A single finding in southern Slovakia (Lučenec environs) was reported by Bouček & Šustera (1956). Recently, this apparently scarce species was collected in the Muráňská Planina National Park (Smetana 2004). One old specimen of *P. associus* from eastern Slovakia was found in the collections of the East Bohemia museum in Hradec Králové (Dvořák 2005).

P. atrimandibularis is an inquiline species living in the nests of *Polistes biglumis*. The single male from the Velká Kotlina cirque in the Jeseníky Mts. in northern Moravia is the most valuable specimen from the Moravian Museum collection, as it represents the only known record from the whole territory of the Czech Republic (Šnoflák 1952). The species has not been found since and should be ranked as "missing" or "extinct" for the fauna of the Czech Republic.

P. gallicus is a thermophilous species distributed in southern parts of Europe, the Balkan peninsula and Caucasus, northwards to Ukraine, Slovakia and southern Poland (Carpenter 1996, Guiglia 1972, Wisniowski 2004). The species apparently reaches one of the northern limits of its distribution range in southern Slovakia.

The three species *Polistes biglumis*, *P. dominulus*, and *P. nimphus* are represented in the Moravian Museum by numerous individuals. *P. biglumis* seemed to have been the most common paper wasp in the past (e.g. Bouček & Šustera 1956, Lang 1958). At present, it is quite rare in the Czech Republic (L. Dvořák, J. Straka, unpubl. data). *P. biglumis* is a boreomontane element distributed in Scandinavia, eastern Siberia, and mountain areas of continental Europe (Pekkarinen & Gustafsson 1999). In the Czech Republic and Slovakia it is not limited by altitude and may occur at higher elevations (e.g. Jeseníky or Beskydy Mts.), although most records come from lowlands (e.g. Šnoflák 1952).

P. nimphus was also formerly considered to be a relatively common species (Bouček & Šustera 1956). It occurred predominantly in warmer areas. *P. nimphus* is a rare species in the Czech Republic nowadays and seems to be absent from higher elevations; findings above an altitude of 700 m are scarce (L. Dvořák, unpubl. data).

In contrast, *P. dominulus* may previously have been a rare species, distributed only in southern and central Moravia (Bouček & Šustera 1956). It has rapidly spread in recent times and become the most common paper wasp throughout the whole territory of

the Czech Republic including higher elevations (altitudes over 900 m in the Bohemian Forest = Šumava Mts.; L. Dvořák, unpubl. data).

The thermophilous *P. bischoffi* is another paper wasp apparently spreading at present at lower and medium altitudes in southern Moravia and Bohemia. The first known finding of *P. bischoffi* in the Czech Republic (South Bohemia) goes back to 1983; it was later recorded for several other places in South Bohemia and also in southern Moravia (Straka 2000, Straka et al. 2004).

Even though sampled predominantly in southern Moravia, the material in the Moravian Museum collections provides interesting evidence for changes in the paper wasp fauna in central Europe in the course of the last century: *P. dominulus* and *P. bischoffi* are spreading and becoming more frequent whereas *P. nimphus* and *P. biglumis* are apparently retreating to a greater or lesser extent. The situation in the Czech Republic and Slovakia is similar to that in other European countries. Not long ago, *P. dominulus* reached as far as the countries of Benelux (Leclercq et al. 1984, Simonthomas 1984, Barbier et al. 1995), Lithuania, and Latvia (Pekkarinen & Gustafsson 1999). In Poland, *P. dominulus* has recently been reported from several new sites, but the former distribution is unfortunately uncertain due to the frequent confusion of this species with *P. gallicus* (Wisniowski 2004). A rapid increase of *P. bischoffi* and a slight decrease of *P. biglumis* have been observed in Austria (J. Gusenleitner, pers. comm.). Contrary to *P. dominulus*, which seems to have been on the spread in Europe for several decades (Blüthgen 1956) and reaches to northern Europe, *P. bischoffi* has probably started spreading more recently and its northernmost localities are currently situated in southern parts of the Czech Republic, Germany up to 50°N (Mauss 2001), and Benelux (Baugnée 1996). Future research on the distribution of paper wasps, including field investigation of previously unexplored areas and evaluation of other museum and private collections, and more detailed studies on the ecology of different paper wasps species, are needed to better understand this dynamics of the European fauna.

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