

Contribution to the occurrence of gall midges (Diptera: Cecidomyiidae) in Bohemia and Moravia (Czech Republic)

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Abstract. The galls of twelve species of gall midges (Diptera: Cecidomyiidae) were found on three species of the genus *Quercus* L. (Fagaceae) at several localities in Bohemia and Moravia in the Czech Republic. *Arnoldia trotteri* (Kieffer, 1909) and *Janetia plicans* (Kieffer, 1909) are new records for the Czech Republic, *Janetia pustularis* (Kieffer, 1909) is a new record for Bohemia and *Arnoldiola trotteri* (Kieffer, 1909) is the first finding after its description by Kieffer in the year 1909.

Key words. Faunistics, Diptera, Cecidomyiidae, Bohemia, Moravia, Czech Republic.

INTRODUCTION

During the years from 1951 to 2020, the senior author (FG) collected galls of gall midges (Diptera: Cecidomyiidae) on several species of oaks (*Quercus* L.), mainly on *Quercus cerris* L., *Q. robur* L., and *Q. petraea* L. (Fagaceae) at many localities in the environs of Brno, southern Moravia, and at several localities in Bohemia. *Quercus*, the popular name oak, is a tree or shrub in the genus in the family Fagaceae, in the order Fagales. There are approximately 500 extant species of oaks. In the Czech Republic nine species of the genus *Quercus* occur: *Quercus cerris*, *Q. daleschampii* Ten., *Q. frainetto* Ten., *Q. petraea*, *Q. polycarpa* Schur, *Q. pubescens* Willd., *Q. robur* L., *Q. rubra* L., and *Q. virgiliana* Ten.

Eighteen species of gall midges are associated with *Q. robur* and *Q. petraea* and fifteen species of gall midges are associated with *Q. cerris*. This species is the host plant with the highest number of gall midge species associated with one oak host species. Of fifteen species of gall midges, twelve species are gall makers and three species of gall midges areinquilines. All these species have only one generation during one year. Adults fly from the second half of April to early May. Females lay their eggs on, or in oak organs where larvae hatch from eggs after several days. Larval development lasts from several weeks up to several months. The oak *Q. cerris* is the oak native to south-eastern Europe and Asia Minor. It occurs in the Czech Republic originally only in southern Moravia, at other places it was planted out. The oaks *Q. robur* and *Q. petraea* are the most abundant species of oaks in the Czech Republic. They are hosts of about twenty species of gall midges.

MATERIAL AND METHODS

The galls of gall midges developing on oaks were collected from the year 1998 up to the year 2020 by the first author and were identified by the second author. All galls on oak leaves and branches are as herbarium items placed in small translucent sacs of the size 14×9 cm. The galls on oaks were collected at six localities in Bohemia and at 35 localities in

Moravia. In Bohemia, the galls on oaks were collected at the vicinity of Dubice, Libá Hora Hill, 686 m a. s. l., 1952; park of Průhonice, 1998; Třemošnice, Rožnatý hill, 650 m a. s. l., 2011; Žehuň, Chotovice, 2009; and Žehuň-Bludy, 2012.

In Moravia, the galls of gall midges were collected at the following 35 localities: Božice-Karlov, 2002 and 2006; Brno-Řečkovice, Nejedlého ulice, 1999–2000; Brno-Hády, 1944–1950, 2007–2015; Břeclav, 1953; Černá Hora, castle, 2013–2020; Děvín, 2002–2005; Havraníky, 2005; Hlohovec, 2010; Charvátská Nová Ves, 2005–2006; Kčmaň, 1951, 2007, 2012; Kobyly, 2003, 2005; Lednice, 1948–1950; Mikulov – Sv. Kopeček, 2008, 2010; Milovice, 2009, 2012; Moravský Krumlov, 1948, 2002–2011; Morkovice, 2011; Mutěnice-Zbrod, 2007, 2008; Náměšť nad Oslavou, 2002–2009; Nesachleby, 2002; Nová Syrovice, 2012; Podmolí-Kozi hřbet, 2003; Podyjí NP, 2002, 2006; Pohořelice, 2013, 2019; Polánka, 2002–2011; Rohatec-Sobonky, 2012; Rozseč, 2011; Starý Poddvorov, 2008; Těšetice, 2005, 2007; Trnové Pole, windbreak, 2011; Útěchov, U buku, 2002–2020; Valtice, 2003; Valtrovice, windbreak, 2011; Valtice, Randes-vous, 2005; and Vranovská Ves, 2012.

Identification of galls caused by gall midges is based on the publications written by Buhr (1964), Roskam (1919), and Skuhřavá & Skuhřavý (2021). Taxonomy and geographic distribution of follows the publication of Gagné & Jaschhof (2021) and Skuhřavá & Skuhřavý (2021). Herbarium items with galls of gall midges are deposited in the collection of Marcela Skuhřavá in Prague, Czech Republic.

RESULTS

In the following part we bring twelve species of gall midges (Diptera: Cecidomyiidae) which were collected by František Gregor on various *Quercus* species, mainly on *Q. cerris*, *Q. robur* and *Q. petraea* during the years from 1948 to 2020.

Arnoldiola libera (Kieffer, 1909)

White larvae cause very small, rounded galls on leaves of *Q. robur* and *Q. petraea*. Each larva develops in a small flat depression. Only one generation develops per year. Larvae hibernate in the soil. This species occurs in many countries of Europe. The galls of *Arnoldiola libera* were found in Moravia at Děvín in 2005.

Arnoldiola trotteri (Kieffer, 1909)

White larvae develop in pustule galls on the leaves of *Q. cerris*. Galls were found only in Italy. The galls of *Arnoldiola trotteri* were found at Děvín in Moravia in 2005. It is the first finding of this gall since the time of its description by Kieffer in 1909 and a new record in the Czech Republic.

Contarinia quercicola (Rübsaamen, 1899)

Yellow larvae develop in the swollen buds of *Q. cerris*. Only female was described by Rübsaamen (1899). This species was found in Austria, Czech Republic, Great Britain, Greece, Hungary, Romania, Slovakia, Turkey, Ukraine, and former Yugoslavia. The galls of *Contarinia quercicola* were found at Polánka in Moravia in 2005.

Dryomyia circinans (Giraud, 1861)

White larvae cause galls on the leaves of *Q. cerris* L. (Fagaceae). The gall consists of a disc covered with white hairs on the lower leaf side and an opening with circular elevation on the upper side. Only one larva develops in each gall. One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in the spring. Galls of this species were found in Albania, Austria, Bulgaria, Czech Republic, Germany, Greece, Hungary, Italy, Lebanon, Romania, Slovakia, Switzerland, Turkey, and former Yugoslavia. The galls of *Dryomyia circinans* were found in the following localities: in Bohemia in Žehuňská obora, 2012, U buku, 2007, 2010; in Moravia in Brno, 2007, Černá Hora, 2015, Děvín, 2015, Hlohovec, 2010, Náměšť nad Oslavou, 2006, 2009, Moravský Krumlov, 2005, Řečkovice, 2006, 2007, and at Krčmaň in 2007.

Janetia cerris (Kollar, 1850)

Orange-red larvae cause small galls on the leaves of *Q. cerris*. The gall is conical on the upper leaf side and disc-shaped, densely haired, on the lower side. Only one larva develops in a gall.

One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in the spring. Galls of this species were found in Albania, Austria, Bulgaria, Czech Republic, Greece, Hungary, Italy, Netherlands, Poland, Romania, Slovakia, Turkey, and former Yugoslavia. The galls of *J. cerris* were found in the following localities in Bohemia: Žehuňská obora, 2012, U buku, 2007, Valtrovice, 2011, Rožnatý kopec, 2011; in Moravia: Hlohovec, 2010, Znojmo, 2002, Hády, 2007, Řečkovice, 2007, 2015, and at Krčmaň in 2007, 2009, and 2010.

***Janetia homocera* (Löw, 1877)**

Red larvae cause galls on the leaves of *Q. cerris*. The gall is circular and flat on the upper leaf side and disc-shaped, densely haired, on the lower side. Both parts of the gall have a small pointed tooth at the tip. One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in the spring. This species occurs in Austria, Bulgaria, Czech Republic, Greece, Hungary, Italy, Romania, Slovakia, Turkey, and former Yugoslavia. The galls of *J. homocera* were found in Moravia at Hády in 2007 and 2008, and at Děvín in 2005.

***Janetia nervicola* (Kieffer, 1909)**

White larvae cause small swellings on the middle or lateral veins on the leaves of *Q. cerris*. One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in the spring. Galls of this species were found in Austria, Bulgaria, Czech Republic, Germany, Hungary, Romania, Slovakia, Turkey, and former Yugoslavia. The galls of *J. nervicola* were found in Moravia at Hády near Brno in 2006, 2008, 2010, Řečkovice, 2002, Chlumec, 2012, Moravský Krumlov, 2002, 2005 and near Lednice in 2002.

***Janetia plicans* (Kieffer, 1909)**

White larva develops in the rolled leaf margin of young leaf of *Q. cerris*. One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in spring. Galls of this species were found in Greece and Italy. The galls of *J. plicans* were found only at Brno-Řečkovice in 2016 and are a first record for the Czech Republic.

***Janetia pustularis* (Kieffer, 1909)**

Red larvae produce small pustule galls on into galls the leaves of *Q. cerris*. The gall, in diameter of 2.5 mm, has a small elevation in the center of both leaf sides. One generation develops per year. Fully-grown larvae leave galls and fall to the soil where they hibernate and pupate in spring. Galls of this species were found in Austria, Greece, and Slovakia. The galls of *J. pustularis* were found in Moravia at Polánka, 2005, Hády, 2002, Moravský Krumlov, 2011, Chlumec, 2012, and Řečkovice in 2006 and represented a first record for the Czech Republic.

***Janetia szepligetii* (Kieffer, 1896)**

Red larvae cause blister galls on the leaves of *Q. cerris*. Each gall has a small elevation in the centre. In autumn larvae leave the gall using a small lid. Larvae hibernate in the soil where they pupate in spring. One generation develops per year. *Janetia szepligetii* is a southern European species, reaching into southern part of the Czech Republic and Slovakia. Galls were found in the following countries: Bulgaria, Czech Republic, Greece, Hungary, Italy, Rumania, Turkey, and former Yugoslavia. The galls of *Janetia szepligetii* were found only at Moravský Krumlov in 2002.

***Macrodiplosis pustularis* (Bremi, 1847)**

Larvae cause galls on the leaf margin of *Q. robur* and *Q. petraea*. Only one generation develops per year. In the late summer larvae leave the galls, fall to the soil where they hibernate. In the spring of the next year larvae pupate in the upper layer of the soil. Females lay eggs on young, developing leaves after mating. Larvae start to suck plant liquids of the leaf margin and the gall

is formed. *Macrodiplosis pustularis* occurs in many countries of Europe, and in Turkey, Armenia, Georgia, and western Kazakhstan. The galls of *M. pustularis* were found at many localities in the vicinity of Brno in 2011–2020.

Macrodiplosis roboris (Hardy, 1854)

Larvae cause galls on the leaf margin of *Q. robur* and *Q. petraea*. The part of the leaf between two lobes is rolled upwards forming inside a chamber for the development of larvae. The life cycle and distribution of *M. roboris* is similar to the life cycle of *M. pustularis*. The galls of *M. roboris* were found in Bohemia at Rozseč in 2011 and in Moravia at Hády in 2006 and 2007.

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