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Twelve oak gall wasp species (Hymenoptera, Cynipidae) new to the Turkish fauna

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Abstract: This study was conducted to contribute to the Turkish oak gall wasp fauna (Hymenoptera: Cynipidae). Oak cynipid galls were collected between 2011 and 2013 from different regions of Turkey; we found that *Andricus assarehi*, *A. coriariformis*, *A. csokai*, *A. glandulae*, *Andricus legitimus*, *A. paradoxus*, *A. sadeghii*, *A. serotinus*, *A. stellatus*, *A. trotteri*, *Cynips longiventris*, and *Trigonaspis megaptera* were new to the Turkish Cynipidae fauna. A new distribution range is also provided for the previously recorded gall wasp species *Andricus pseudoarises*.

Key words: Cynipidae, fauna, first report, Turkey, oak gall wasps

Oak gall wasps from the family Cynipidae are obligate parasites of various oak taxa. They form the largest tribe of the family Cynipidae, comprising over 1000 described species (Liljeblad et al., 2008). Within their distribution range, the Nearctic region includes about 700 species (Stone et al., 2002) and the western Palearctic contains around 140 species (Abe et al., 2007). Located in the western Palearctic, Turkey has special importance due to its location between Europe and Asia, with a high number of oak taxa. Currently there are a high number of oak species and hybrids between these taxa with large populations in Turkey (Yaltırık, 1984; Kasaplıgil, 1992), and it is thought that Turkish oak gall wasp species diversity might be much higher than the currently known number.

There has been an increase in the number of recent studies on the Turkish oak gall wasp fauna (Melika and Stone, 2001; Katılmış and Kıyak, 2008; Kemal and Koçak, 2010; Mutun and Dinç, 2011; Mete and Demirsoy, 2012). In a checklist of oak gall-inducing cynipid wasps published by Katılmış and Kıyak (2008), 81 species were listed. Katılmış and Kıyak (2011) also carried out a study in inner western Anatolia covering Afyonkarahisar, Denizli, Kütahya, and Uşak provinces and reported 58 gall wasp species from 11 genera. The latest studies on oak gall wasps by Dinç et al. (2014) and Mutun et al. (2014) described 5 new species from Turkey with 2 new records for the Turkish cynipid fauna. Nonetheless, studies are still very limited; thus, more rigorous work is necessary for revealing the gall

wasp taxa currently found in Turkey. The major aim of this study was to contribute to the Turkish Cynipidae fauna by conducting field studies in Turkey.

Oak cynipid galls were collected from *Quercus robur* L., *Q. petraea* (Matt.) Liebl., *Q. infectoria* Olivier, *Q. macranthera* Fisch. & C.A.Mey. ex Hohen, and *Q. pubescens* Wild. from different localities in Turkey. Collection trips were carried out between 2011 and 2013 to search for galls of oak gall wasps in forested areas. During the field trips, asexual generation galls of oak gall wasps from the forested areas of Turkey were collected in order to rear adults from those galls. Coordinates and elevation of each sampled locality were noted using a Garmin model geographic positioning system, together with identification information for the host species. After galls were collected, they were put in a plastic bag and brought into the laboratory to rear adult gall wasps. Hatched individuals were preserved in 75% ethanol. All specimens are stored in the Molecular Zoology Laboratory of the Abant İzzet Baysal University Department of Biology, Faculty of Science and Arts, Bolu, Turkey.

In this current study, a total of 12 new species from 3 genera (listed below) from the family Cynipidae were recorded from different localities in Turkey, and a new distribution range for *A. pseudoarises* is also provided. Among these new records, 10 species are from the genus *Andricus*, 1 species is from the genus *Cynips*, and 1 is from the genus *Trigonaspis*.

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***Andricus assarehi* Melika & Sadeghi, 2008**

Material examined: KAHRAMANMARAŞ, Yazı village, 38°17'N, 36°77'E, 1339 m a.s.l., 08.IX.2012, 3 galls. **Host:** *Q. infectoria*. Distribution: Iran, Turkey. Phenology: The asexual galls develop in mid-summer and adults emerge in mid-autumn.

***Andricus coriariformis* Melika, Challis & Stone, 2008**

Material examined: DENİZLİ, İğdir village, 38°33'N, 29°74'E, 1024 m a.s.l., 20.IX.2012, 3 galls; AFYONKARAHİSAR, Sandıklı route, 38°70'N, 30°31'E, 1151 m a.s.l., 02.VIII.2012, 1 gall; Tekke village, 38°47'N, 30°43'E, 1350 m a.s.l., 03.VIII.2012, 1 gall; KÜTAHYA, Altıntaş, 39°21'N, 30°03'E, 1207 m a.s.l., 02.VIII.2012, 2 galls; Aslanapa, 39°27'N, 29°90'E, 1216 m a.s.l., 03.VIII.2012, 3 galls. **Host:** *Q. infectoria*. Distribution: Iran, Azerbaijan. Phenology: The asexual galls develop in mid-summer and adults emerge by the beginning of autumn.

***Andricus csokai* Melika & Tavakoli, 2008**

Material examined: SİVAS, near Akmeşe village, 39°46'N, 38°00'E, 1300 m a.s.l., 01.IX.2012, 3 galls; ELAZIĞ, Baskil Kayabey village, 38°57'N, 38°86'E, 1392 m a.s.l., 09.IX.2012, 2 galls; ADIYAMAN, Sorgun village, 37°57'N, 37°48'E, 907 m a.s.l., 15.IX.2012, 5 galls. **Host:** *Q. infectoria*. Distribution: Iran. Phenology: The asexual galls develop in mid-summer and adults emerge in mid-autumn.

***Andricus glandulae* (Hartig 1840)**

Material examined: ISPARTA, Yukarıgökdere village, 37°73'N, 30°83'E, 1483 m a.s.l., 25.IX.2013, 9 galls. **Host:** *Q. petraea*, *Q. infectoria*. Distribution: Andorra, Austria, Germany, England, Moldavia, Czech Republic, Poland, Slovakian Republic, Spain, Netherland, Romania, Ukraine. Phenology: The asexual galls develop through the summer and mature in autumn.

***Andricus legitimus* Wiebes-Rijks 1980**

Material examined: KONYA, Irmaklı Esence, 37°76'N, 32°30'E, 1362 m a.s.l., 17.IX.2012, 2 galls; ESKİŞEHİR, after İnönü, 39°64'N, 30°15'E, 955 m a.s.l., 02.VIII.2012, 1 gall; ZONGULDAK, Perşembe, 41°42'N, 32°17'E, 31 m a.s.l., 23.VIII.2012, 2 galls; ARTVİN, Şavşat, 41°23'N, 42°43'E, 1795 m a.s.l., 29.VIII.2012, 3 galls; ÇORUM, İskilip road, 40°58'N, 34°70'E, 1003 m a.s.l., 02.IX.2012, 2 galls. **Host:** *Q. infectoria*, *Q. petraea*. Distribution: Bulgaria, Hungary, Spain, the Netherlands, Ukraine. Phenology: The asexual galls develop in midsummer and adults emerge by the beginning of autumn.

***Andricus paradoxus* (Radoszkowski, 1866)**

Material examined: ADANA, Pozantı Akçatekir, 37°46'N, 34°87'E, 857 m a.s.l., 17.IX.2012, 1 gall. **Host:** *Q. infectoria*, *Q. robur*. Distribution: Andorra, Austria, Belgium, France, Germany, Great Britain, Italy, Denmark, Sweden, Hungary, Iberian Peninsula, Moldavia, Poland, Netherlands, Romania, Russia, Ukraine. Phenology: The asexual generation galls mature in autumn.

***Andricus sadeghii* Melika, Stone, Atkinson & Aligolizade, 2008**

Material examined: SİİRT, Kozluk near Ziyaret, 38°12'N, 41°67'E, 759 m a.s.l., 13.IX.2012, 7 galls; KASTAMONU, Ulus road, 41°60'N, 32°97'E, 998 m a.s.l., 23.VIII.2012, 3 galls; SAMSUN, Ahmetsaray village, 41°00'N, 35°87'E, 868 m a.s.l., 26.VIII.2012, 6 galls. **Host:** *Q. macranthera*. Distribution: Iran, Azerbaijan. Phenology: The asexual galls develop through the summer and mature in autumn.

***Andricus serotinus* (Giraud, 1859)**

Material examined: ADANA, Pozantı Akçatekir, 37°46'N, 34°87'E, 857 m a.s.l., 17.IX.2012, 1 gall; KAHRAMANMARAŞ, Yeniyapan village, 38°10'N, 36°62'E, 1403 m a.s.l., 08.IX.2012, 3 galls. **Host:** *Q. infectoria*. Distribution: Hungary, Austria, Moldova, Poland, Romania, Ukraine. Phenology: The asexual galls mature in the autumn.

***Andricus stellatus* Melika & Tavakoli, 2008**

Material examined: TOKAT, Camidere village, 40°48'N, 36°95'E, 355 m a.s.l., 26.VIII.2012, 3 galls. **Host:** *Q. pubescens*, *Q. petraea*. Distribution: Iran, West Azerbaijan. Phenology: The asexual galls develop through the summer.

***Andricus trotteri* Kieffer, 1898**

Material examined: ISPARTA, Yukarıgökdere village, 37°73'N, 30°83'E, 1483 m a.s.l., 25.IX.2013, 1 gall; KAHRAMANMARAŞ, Keklikoluk village, 38°20'N, 36°43'E, 1640 m a.s.l., 08.IX.2012, 2 galls. **Host:** *Q. infectoria*. Distribution: Croatia, Hungary. Phenology: The asexual galls develop through the summer.

***Cynips longiventris* Hartig, 1840**

Material examined: BOLU, Gökçöy, 40°71'N, 31°51'E, 908 m a.s.l., 04.XI.2011, 1 gall; EDİRNE, Sazlı Malkoç village, 41°36'N, 26°85'E, 93 m a.s.l., 10.IX.2013, 7 galls; Muhacir Kadı, 41°33'N, 26°87'E, 56 m a.s.l., 10.IX.2013, 5 galls; Başağıl village, 41°27'N, 26°78'E, 55 m a.s.l., 10.IX.2013, 13 galls; TEKİRDAĞ, Kozyörük, 40°99'N, 26°94'E, 147 m a.s.l., 10.IX.2013, 10 galls; SAKARYA, after Ferizli, 40°73'N, 30°11'E, 69 m a.s.l., 21.VIII.2011, 13 galls; ZONGULDAK, Perşembe, 41°42'N, 32°17'E, 31 m a.s.l., 23.VIII.2012, 7 galls. **Host:** *Quercus petraea*, *Q. pubescens*. Distribution: Eastern and central Europe, Georgia, Iberian Peninsula, Russia, Ukraine. Phenology: The asexual generation galls mature at the end of the summer.

***Trigonaspis megaptera* (Panzer, 1801)**

Material examined: ISPARTA, Yakaköy, 37°73'N, 31°25'E, 1403 m a.s.l., 19.IX.2012, 20 galls; near Cankurtaran, 38°13'N, 31°17'E, 1338 m a.s.l., 18.IX.2011, 12 galls; near Gelendost, 38°17'N, 31°12'E, 1082 m a.s.l., 18.IX.2011, 20 galls. **Host:** *Q. infectoria*, *Q. petraea*, *Q. pubescens*. Distribution: Central and eastern Europe,

Georgia, Iran, Moldova, Russia, Turkey, Ukraine. Phenology: The asexual galls develop through the summer.

Andricus pseudoaries Melika, Stone & Sadeghi, 2008

Material examined: ISPARTA, Şarkikaraağaç, 38°15'N, 31°43'E, 1488 m a.s.l., 26.IX.2013, 2 galls; KAHRAMANMARAŞ, Yazı village, 38°17'N, 36°77'E, 1339 m a.s.l., 08.IX.2012, 10 galls. **Host:** *Q. macranthera*, *Q. petraea*. Distribution: Iran, Azerbaijan, Turkey. Phenology: The galls mature in the autumn. This species was previously reported from the Van area by Kemal and Koçak (2010); this is the second report of the species.

Due partly to its geologic history and topography, varied climates, the presence of diverse phytogeographic regions, and its location between Europe and Asia, Turkey

is thought to be one of the most important areas in the Mediterranean with high species diversity (Çıplak et al., 1993). However, for such an important area, the oak gall wasp fauna of Turkey remains little-studied and the Turkish fauna of Cynipidae requires further and more detailed investigation. We therefore consider that this study represents preliminary results of the area for the cynipid fauna; more are expected to be discovered in Turkey after more collection and investigative trips.

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