

A faunistic study on the hoverflies (Diptera: Syrphidae) from West Azarbaijan province, Iran

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Published on 2015-12-21

Summary

Hoverflies (Diptera: Syrphidae) play an efficient role in biological control of agricultural pests and also in pollination. This paper deals with the faunistic data on Syrphidae from West Azarbaijan province, northwestern Iran. In total 34 species from 21 genera and 2 subfamilies (Milesiinae and Syrphinae) were collected and determined.

Key words

Diptera, Syrphidae, hoverflies, fauna, West Azarbaijan, Iran

Zusammenfassung

Schwebfliegen (Diptera: Syrphidae) spielen eine bedeutende Rolle in der biologischen Bekämpfung von landwirtschaftlichen Schädlingen sowie als Bestäuber. Hier präsentieren wir faunistische Daten über Syrphidae aus der West Azarbaijan Provinz, Nordwest-Iran. Insgesamt wurden 34 Arten aus 21 Gattungen und 2 Unterfamilien (Milesiinae und Syrphinae) gesammelt und determiniert.

Introduction

Syrphidae with 200 genera and more than 6000 species worldwide is one of the most diverse families in order Diptera (STUBBS & FALK 2002). Larvae of syrphid flies have an efficient role in biological control of aphids (Hemiptera: Aphididae). Also some of the members of the family are common pollinators which are active wherever flowers are found, being absent only in truly arid areas and the Polar Regions (FAEGRI & VAN DER PIJL 1979; KEVAN & BAKER 1983). An important function of natural refugia is the occurrence not only

of various phytophages, but also their predators and parasites (OLSAK 1999; BENNEWICZ 2011). It is also assumed that the specialized syrphid predators play a major role in limiting aphid populations (BUGG 1993; BROWN 2004; SPEIGHT 2011). Habitats rich in flowering plants, constituting a source of food for adult aphidophagous syrphids, are of great importance for these insects, not to mention other beneficial organisms (FRANK 1999; CANDEMIR & KARA 2003). Many species, being regular visitors of flowers, are important pollina-

tors of various plants including vegetables, fruit trees (e.g. Asteraceae, Brassicaceae, and Rosaceae) and flowering plants (KEVAN & BAKER 1983; SIMIC & GLUMAC 1987; SSYMANK et al. 2008).

The fauna of Iranian Syrphidae has been studied well and several papers have been published recently (e.g. KHIABAN et al. 1998; DOUSTI 1999; GHARALI et al. 2000; PASHAE RAD et al. 2002; KHIABAN & ADIM 2002; ALICHI et al. 2002; GOLDASTEH et al. 2002; SADEGHI et al. 2002; SADEGHI 2003; KAMANGAR et al. 2004; GOLMOHAMMADI & KHIABAN 2004; GILASIAN 2005; KAMANGAR et al. 2006; MOTAMEDI NIA & WYATT 2006; SADEGHI 2008; BEDOREH et al. 2008; HOSSEINI & SADEGHI 2008; GHAHARI et al. 2008a, b; SAKENIN CHELAV et al. 2008; KHAGHANINIA 2010; EHTESHAMNIA et al. 2010; KHAGHANINIA et al. 2010a, b, c, d; JABBARI 2011; KHAGHANINIA 2011; KHAGHANINIA et al. 2011; GILASIAN & SOROKINA 2011; Naderloo et al. 2011; KHAGHANINIA & SHAKERYARI 2012; SHAKERYARI & KHAGHANINIA 2012; BEDOREH & ANSARI POUR 2012; KHAGHANINIA et al. 2012a, b, 2014; SHAKERYARI et al. 2012; KAZERANI et al. 2012; KHAGHANINIA & HOSSEINI 2013; MOHAMMADI & KHAGHANINIA 2013; VOSUGHIAN et al. 2013; KHAGHANINIA 2014; GHARALI & REEMER 2014; KHAGHANINIA & KAZERANI 2014; HOSSEINI & KHAGHANINIA 2014, 2015; KHOSRAVIAN et al. 2015; MENGUAL et al. 2015). Checklists of Iranian hoverflies were prepared by PECK (1988), MODARRES AWAL (1997), DOUSTI & HAYAT (2006) and KAZERANI et al. (2013). In this paper, the syrphid fauna of West Azarbaijan province (located in North West of Iran, bordering with Turkey, Iraq and Armenia, and the provinces of East Azarbaijan, Zanjan and Kurdistan – fig. 1) is dealt with. It covers an area of 43,660 km², and the climate is largely influenced by the rainy winds of the Atlantic Ocean and Mediterranean. According to existing meteorological data, local temperatures vary within the province. The highest temperature reaches 34 °C in July, and the lowest temperature is –16 °C in January.

Materials and Methods

The specimens of this research were collected by sweeping net and Malaise traps in different regions of West Azarbaijan province (37.5528°N 45.0759°E) during spring and summer of 2012-2013. The sampled regions were Khoy, Ourmieh, Maku, Mahabad, Oshnavieh, Salmas, and Miandoab, and the collected materials were placed in a desiccator (having water at its bottom) for about 24 h in order to soak and soften them. Thereafter, they were pinned and their wings and legs set on appropriate setting boards to facilitate morphological studies and the others were put into tubes filled with 70 % alcohol. In addition to the sampled materials, the insect collection of Islamic Azad University was checked and the data are used in this paper. The specimens were

examined with a stereomicroscope and identified using the relevant literature such as BEZZI (1966), BEI-BIENKO (1988), PAPP & DARVAS (1997, 1998, 2000), STUBBS & FALK (2002), VAN VEEN (2004), LYNEBORG & BARKE-MEYER (2005) and SPEIGHT (2011). The materials are preserved in the collections of the authors. The distribution data of Syrphidae mostly suggested by SPEIGHT (2011) have been followed.

Results

In total 34 syrphid species from 21 genera and 2 subfamilies, Milesiinae and Syrphinae were collected and identified. The list of species is given below with distribution data.

Subfamily Milesiinae

Genus *Cheilosia* MEIGEN, 1822

Cheilosia scutellata (FALLÉN, 1817)

Material examined: West Azarbaijan province, Maku, 39°29'N 44.51°E, 2 ♀, 2-3 July 2012.

Distribution outside Iran: Fennoscandia south to Iberia and round the Mediterranean to Greece, Turkey and North Africa; from Ireland eastwards through Eurasia to the Pacific coast.

Genus *Eristalinus* RONDANI, 1845

Eristalinus aeneus (SCOPOLI, 1763)

Material examined: West Azarbaijan province, Khoy, 38°33'N 44°57'E, 1 ♂, 15-17 May 2012; Mahabad, 36°46'N 45°44'E, 1 ♂, 22-29 June 2012; Ourmieh, 37°33'N 45°00'E, 1 ♀, 3-5 August 2013.

Distribution outside Iran: Cosmopolitan; south to N Africa and the Canary Isles; Afrotropical region south to Kenya and Tanzania; southern Sweden; from Ireland eastwards through central and southern Europe and on through Russia and China to the Pacific and south into the Oriental region; Mauritius; in North America from Minnesota and Ontario south to California and Texas; Hawaii, Australia and the Gilbert and Ellis Islands in Australia; Bermuda.

Eristalinus taeniops (WIEDEMANN, 1818)

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 1 ♀, 1 ♂, 3-5 August 2013.

Distribution outside Iran: Portugal, Spain and round the Mediterranean basin (southern France including Corsica, Italy, former Yugoslavia, Albania, Romania, Cyprus, Greece, Syria, Turkey, Lebanon, Israel, North Africa including Egypt, Libya, Tunisia, Morocco), Canary Islands, Transcaucasus; in eastern parts of the Afrotropical region down to South Africa and in Nepal and parts of Pakistan and northern India in the Oriental region.

Genus *Eristalis* LATREILLE, 1804

Eristalis nemorum (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 1 ♂, 22-26 June 2012; Salmas, 38°11'N 44°44'E, 1 ♀, 3-6 April 2013.

Distribution outside Iran: From Scandinavia to Spain, Italy, former Yugoslavia, Bulgaria; North European territory to Transcaucasus, Kazakhstan, Kyrgyzstan, West Siberia, Far East; Mongolia and Nearctic Region.

Genus *Eumerus* MEIGEN, 1822

Eumerus sogdianus STACKELBERG, 1952

Material examined: West Azarbaijan province, Oshnavieh, 37°03'N 45°05'E, 1 ♀, 14 May 2013.

Distribution outside Iran: Denmark south to southern Spain; from Belgium eastwards through central and southern Europe into European parts of Russia and on into central Asia (Kazakhstan, Tajikistan, Uzbekistan, Mongolia); China.

Eumerus strigatus (FALLEN, 1817)

Material examined: West Azarbaijan province, Maku, 39°29'N 44.51°E, 1 ♀, 1 ♂, 2-3 July 2012.

Distribution outside Iran: Australia, Canada, Fennoscandia, Iberia and the Mediterranean, Japan, N America, New Zealand, Russia, Turkey.

Genus *Helophilus* MEIGEN, 1822

Helophilus trivittatus (FABRICIUS, 1805)

Material examined: West Azarbaijan province, Khoy, 38°33'N 44°57'E, 2 ♂, 15-17 May 2012.

Distribution outside Iran: From Fennoscandia south to the Mediterranean and from Ireland eastwards through Eurasia to the Pacific, Afghanistan.

Genus *Melanogaster* RONDANI, 1857

Melanogaster hirtella (LOEW, 1843)

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 2 ♀, 22-29 June 2012.

Distribution outside Iran: Denmark south to the Pyrenees and Portugal; Ireland southwards to the Alps (Switzerland, Liechtenstein); United Kingdom.

Genus *Neoascia* WILLISTON, 1886

Neoascia podagrica (FABRICIUS, 1775)

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 1 ♀, 22-29 June 2012.

Distribution outside Iran: From Fennoscandia south to Iberia and the Mediterranean, including Madeira, Cyprus and Crete; N Africa; from Ireland eastwards through northern, central and southern Europe (Italy, former Yugoslavia, Greece) to Turkey and Israel; European parts of Russia and western Siberia as far as Cis-Baikal.

Genus *Orthonevra* MACQUART, 1829

Orthonevra brevicornis (LOEW, 1840)

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 1 ♀, 7-11 June 2012.

Distribution outside Iran: Southern Finland and Denmark south to northern France (Brittany); from Britain (England) eastwards through parts of central Europe (Netherlands, Belgium, Germany, Poland) into European parts of Russia, the Caucasus and western Siberia.

Genus *Syritta* LE PELETIER et SERVILLE, 1828

Syritta pipiens (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Oshnavieh, 37°03'N 45°05'E, 2 ♀, 1 ♂, 14 May 2013.

Distribution outside Iran: Cosmopolitan; known from most of the Palaearctic, including North Africa, most of North America, South America and the Oriental region.

Genus *Tropidia* MEIGEN, 1822

Tropidia scita (HARRIS, 1780)

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 1 ♀, 22-29 June 2012.

Distribution outside Iran: From Fennoscandia south to central France; from Ireland eastwards through central Europe and on through Russia to the Caucasus and in Asia as far as the Pacific coast and Japan.

Genus *Volucella* GEOFFROY, 1762

Volucella inanis (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Oshnavieh, 37°03'N 45°05'E, 2 ♀, 1 ♂, 14 May 2013.

Distribution outside Iran: From southern Fennoscandia south to Spain and the Mediterranean (including islands, e.g. Crete), north Africa and Asia Minor (Syria); from Britain (southern England) eastwards through central and southern Europe into Turkey and European parts of Russia and through Siberia to the Pacific; Afghanistan, Mongolia, China.

Volucella zonaria (PODA, 1761)

Material examined: West Azarbaijan province, Maku, 39°29'N 44.51°E, 1 ♂, 2-3 July 2012; Salmas, 38°11'N 44°44'E, 1 ♀, 3-6 April 2013.

Distribution outside Iran: From Poland south to the Mediterranean (including islands, e.g. Crete) and North Africa; from Britain (southern England) eastwards through central and southern Europe (Italy, former Yugoslavia, Greece) into Turkey and European parts of Russia and through Siberia to the Pacific; Mongolia.

Subfamily Syrphinae

Genus *Chrysotoxum* MEIGEN, 1803

Chrysotoxum veralli COLLIN, 1940

Material examined: West Azarbaijan province, Salmas, 38°11'N 44°44'E, 1 ♀, 3-6 April 2013.

Distribution outside Iran: Denmark south to central France; Britain (Wales and central/southern England) eastwards through central Europe into European parts of Russia to the Caucasus and eastern Siberia.

Chrysotoxum elegans LOEW, 1841

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 1 ♀, 1 ♂, 22-29 June 2012.

Distribution outside Iran: Fennoscandia south to Iberia and the Mediterranean; through central and southern Europe into European parts of Russia as far as the Caucasus Mountains and into Turkey.

Chrysotoxum octomaculatum CURTIS, 1837

Material examined: West Azarbaijan province, Mian-doab, 36°57'N 46°00'E, 2 ♂, 14-16 April 2013.

Distribution outside Iran: Britain (southern England) and Netherlands south to the Mediterranean and eastwards through central and southern Europe into southern parts of Russia to as far as Armenia and Kazakhstan.

Chrysotoxum vernale LOEW, 1841

Material examined: West Azarbaijan province, Khoy, 38°33'N 44°57'E, 1 ♂, 15-17 May 2012.

Distribution outside Iran: Fennoscandia south to the Pyrenees; from Britain (southern England) eastwards through most of Europe into Asia almost to the Pacific.

Genus *Dasysyrphus* ENDERLEIN, 1938

Dasysyrphus albostrigatus (FALLÉN, 1817)

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 2 ♀, 3-5 August 2013.

Distribution outside Iran: Central Asia, North Africa; from Fennoscandia south to Iberia; from Ireland eastwards through central and southern Europe (Italy, former Yugoslavia) to Crete, Turkey and European parts of Russia (from the north to the Crimea and the Caucasus); Japan.

Genus *Episyrphus* MATSUMURA et ADACHI, 1917

Episyrphus balteatus (DE GEER, 1776)

Material examined: West Azarbaijan province, Mian-doab, 36°57'N 46°00'E, 1 ♀, 1 ♂, 14-16 April 2013; Oshnavieh, 37°03'N 45°05'E, 1 ♀, 14 May 2013; Ourmieh, 37°33'N 45°00'E, 2 ♀, 1 ♂, 7-11 June 2012; Mahabad, 36°46'N 45°44'E, 1 ♀, 22-29 June 2012; Khoy, 38°33'N 44°57'E, 1 ♂, 15-17 May 2012; Salmas, 38°11'N 44°44'E, 1 ♀, 1 ♂, 3-6 April 2013.

Distribution outside Iran: Fennoscandia to the Mediterranean; Canary Isles, Azores and N Africa; Ireland through Eurasia to the Pacific coast; south through the Oriental region to Sri Lanka; Australia.

Genus *Eupeodes* OSTEN SACKEN, 1877

Eupeodes luniger (MEIGEN, 1822)

Material examined: West Azarbaijan province, Salmas, 38°11'N 44°44'E, 2 ♀, 3-6 April 2013.

Distribution outside Iran: From Fennoscandia south to Iberia, the Mediterranean, Madeira and N Africa; from Ireland eastwards through most of Europe into European parts of Russia and Asia Minor (including Turkey); in Siberia from the Urals to the Pacific coast (Kuril Isles); Japan; India.

Eupeodes nuba (WIEDEMANN, 1830)

Material examined: West Azarbaijan province, Mian-doab, 36°57'N 46°00'E, 1 ♀, 1 ♂, 14-16 April 2013.

Distribution outside Iran: Canary Isles, Mediterranean basin, from southern France to Italy and former Yugoslavia, Crete, Cyprus, Lebanon, Israel, Egypt and Morocco; Switzerland in central Europe, Romania; Transcaucasus and south-western parts of Asia (Uzbekistan, Kyrgyzstan, Tajikistan) to Afghanistan and Mongolia. In eastern parts of the Afrotropical region from Ethiopia south to S Africa.

Genus *Ischidon* SACK, 1913

Ischidon aegyptius (WIEDEMANN, 1830)

Material examined: West Azarbaijan province, Oshnavieh, 37°03'N 45°05'E, 1 ♀, 14 May 2013.

Distribution outside Iran: Throughout the Afrotropical region and into N Africa to the coast of the Mediterranean and Yemen; southern Spain, southern Italy, the Balearic Islands and the Canaries.

Genus *Melanostoma* SCHINER, 1860

Melanostoma mellinum (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Mian-doab, 36°57'N 46°00'E, 1 ♀, 14-16 April 2013.

Distribution outside Iran: From Iceland and Fennoscandia south to Iberia, the Mediterranean and North Africa;

from Ireland eastwards through most of Europe into European parts of Russia; Siberia from the Urals to the Pacific coast; North America from Alaska to Quebec and south to Washington.

Genus *Paragus* LATREILLE, 1804

Paragus (Pandasyopthalmus) abrogans GOELDIN, 1971

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 2 ♀, 7-11 June 2012.

Distribution outside Iran: Greece, Kyrgyzstan, Tajikistan, Turkey, Turkmenistan, Uzbekistan.

Paragus (Paragus) albifrons (FALLÉN, 1817)

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 1 ♂, 7-11 June 2012.

Distribution outside Iran: From southern Norway and Denmark south to the Mediterranean; from Britain (southern England) eastwards through central and southern Europe (Italy, the former Yugoslavia, Bulgaria) into European parts of Russia and the Caucasus and on to the Pacific; Afghanistan and Mongolia, Turkey.

Paragus (Paragus) bicolor FABRICIUS, 1794

Material examined: West Azarbaijan province, Mian-doab, 36°57'N 46°00'E, 1 ♀, 2 ♂, 14-16 April 2013.

Distribution outside Iran: Afghanistan, Denmark, France, Kazakhstan, Kirghizia, Mongolia, North America, Russia, south to the Mediterranean, Sweden, North Africa, Tajikistan, Turkmenistan.

Paragus (Paragus) compeditus (WIEDEMANN, 1830)

Material examined: West Azarbaijan province, Ourmieh, 37°33'N 45°00'E, 2 ♀, 7-11 June 2012.

Distribution outside Iran: Asiatic Russia, China, Cyprus, Italy, Kazakhstan, Kyrgyzstan, Middle East, North Africa, Tajikistan, Turkey, Ukraine, Uzbekistan.

Paragus (Paragus) pecchiolii RONDANI, 1857

Material examined: West Azarbaijan province, Salmas, 38°11'N 44°44'E, 1 ♀, 1 ♂, 3-6 April 2013.

Distribution outside Iran: Austria, Czech Republic, Denmark, European parts of Russia, France, Germany,

Liechtenstein, Mediterranean Islands, North Africa, Norway, Romania, Spain, Switzerland, Turkey, former Yugoslavia.

Genus *Scaeva* FABRICIUS, 1850

Scaeva albomaculata (MACQUART, 1842)

Material examined: West Azarbaijan province, Khoy, 38°33'N 44°57'E, 1 ♀, 15-17 May 2012.

Distribution outside Iran: Afghanistan, Canary Islands, Caucasus, China, Iberian Peninsula, Mediterranean basin to Morocco, Mongolia, Russia, Siberia, UK.

Scaeva dignota RÓNDANI, 1857

Material examined: West Azarbaijan province, Oshnavieh, 37°03'N 45°05'E, 2 ♀, 14 May 2013.

Distribution outside Iran: Austria, Belgium, Brittany, Czech Republic, Denmark, Sweden, France, Germany, Greece, northern Africa, Portugal, Spain, Switzerland, Turkey, former Yugoslavia.

Genus *Sphaerophoria* LE PELETIER et SERVILLE, 1828

Sphaerophoria rueppellii (WIEDEMANN, 1830)

Material examined: West Azarbaijan province, Salmas, 38°11'N 44°44'E, 1 ♂, 3-6 April 2013.

Distribution outside Iran: From southern Norway and Sweden south to North Africa and the Canary Isles; from Ireland east through central and southern Europe, including Greece, Turkey and Mediterranean islands into Asia Minor, Russia and Afghanistan and on to the Pacific coast, China and Korea; in eastern parts of the Afrotropical region south to Kenya.

Sphaerophoria scripta (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Mahabad, 36°46'N 45°44'E, 1 ♀, 1 ♂, 22-29 June 2012.

Distribution outside Iran: A highly migratory species; southwest Greenland, Iceland and Fennoscandia south to the Mediterranean, the Canary Isles and N Africa; from Ireland eastwards through much of the Palaearctic to the Pacific coast of Asia; Kashmir and Nepal.

Genus *Syrphus* FABRICIUS, 1775

Syrphus ribesii (LINNAEUS, 1758)

Material examined: West Azarbaijan province, Khoy, 38°33'N 44°57'E, 1 ♀, 1 ♂, 15-17 May 2012; Miandoab, 36°57'N 46°00'E, 1 ♀, 14-16 April 2013.

Distribution outside Iran: From Iceland and Fennoscandia south to Iberia and the Mediterranean; Canary Isles; from Ireland eastwards through most of Europe into Turkey, European parts of Russia and Afghanistan; from the Urals to the Pacific coast (Kuril Isles); Japan; North America from Alaska south to central parts of the USA.

Discussion

The results of this research indicate that there is a diverse fauna of Syrphidae in West Azarbaijan province, and of course we expect that some other species remain to be discovered. To find new species and distributional records, more studies should be conducted on this important insect group in West Azarbaijan province. Among the collected species, *Episyrphus balteatus* is widely distributed and occurring in most of the sampled regions. The larva of many species of hoverflies, particularly subfamily Syrphinae are efficient predators of aphids and other agricultural pests which can play important role in biological control (Gilbert 1981; Müller & Godfrey 1999). Therefore the faunistic surveys on these beneficial insects must be continued in order to determine the species diversity of syrphids in the mentioned province and also other areas of Iran.

Acknowledgements

The authors are warmly thanks to R. Hayat (Turkey), J. Bennewicz (Poland), and A. Jabbari (Iran) for their valuable helps in progress of this project. The research was supported by Young Researchers and Elite Club, Qaemshahr Islamic Azad University, and Bydgoszcz University of Technology and Life Sciences.

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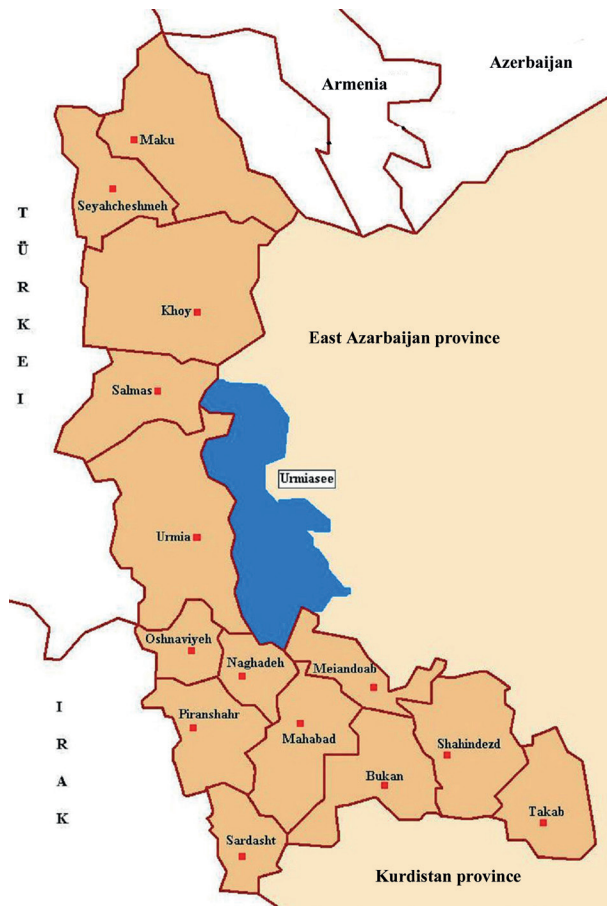


Fig. 1: West Azarbaijan province and its cities.

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