

Far Eastern Entomologist

Дальневосточный энтомолог

Journal published by Far East Branch
of the Russian Entomological Society
and Laboratory of Entomology,
Institute of Biology and Soil Science,
Vladivostok

Number 275: 1-12

ISSN 1026-051X

April 2014

<http://urn:lsid:zoobank.org:pub:3261794A-9A55-413A-B7B2-B163A30FEF50>

A REVIEW OF SPECIES OF THE GENUS *ASCOGASTER* WESMAEL (HYMENOPTERA: BRACONIDAE, CHELONINAE) FROM IRAN

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The genus *Ascogaster* Wesmael, 1835 was taxonomically studied in northern Iran. Nine species were collected and identified of which four species as *Ascogaster bimar* Tobias, 1986, *A. disparilis* Tobias, 1986, *A. klugii* (Nees, 1816), and *A. varipes* Wesmael, 1835, are newly recorded from Iran. A key to Iranian species of the genus *Ascogaster* is given.

KEY WORDS: Braconidae, Cheloninae, *Ascogaster*, Iran, fauna, new records, key.

С. Ферахани¹⁾, А. А. Талеби^{1*)}, К. ван Ахтерберг²⁾, Е. Рахшани³⁾. Обзор видов рода *Ascogaster* Wesmael (Hymenoptera: Braconidae, Cheloninae) Ирана // Дальневосточный энтомолог. 2014. N 275. С. 1-12.

Проведено таксономическое исследование рода *Ascogaster* Wesmael, 1835 Северного Ирана. Собрано и определено 9 видов, из которых *Ascogaster bimar* Tobias, 1986, *A. disparilis* Tobias, 1986, *A. klugii* (Nees, 1816) и *A. varipes* Wesmael, 1835 впервые приводятся для Ирана. Дана определительная таблица иранских видов рода *Ascogaster*.

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INTRODUCTION

Subfamily Cheloninae occurs worldwide and contains 20 genera, of which eight genera are found in the Palearctic region (Zettel, 1990; Yu *et al.*, 2013). The tribe Chelonini contains two genera in the Palearctic region, *Ascogaster* Wesmael, 1835 and *Chelonus* Panzer, 1806, including *Microchelonus* Szepliget (Tobias, 1986b; Zettel, 1990; Yu *et al.*, 2013).

The genus *Ascogaster* differs from *Chelonus* in having vein 1–SR+M of the fore wing present and the compound eyes mainly glabrous. *Ascogaster* is a cosmopolitan genus containing solitary koinobiont endoparasitoids of Lepidoptera, principally Tortricidae (Shaw & Huddleston, 1991). The female oviposits into the egg of the lepidopteran host and the adult parasitoids emerge from the larvae or pupae (Shaw & Huddleston, 1991). Huddleston (1984) listed host records for some species of *Ascogaster*, but the biology of the most species this genus is unknown (Yu *et al.*, 2013).

A revised key to the Palearctic species of the genus *Ascogaster* was published by Huddleston (1984), who recorded a total 30 species, four of which were described as new to science. Subsequently, Tobias (1986a, 1986b, 1988), Papp (1989) and Belokobylskij & Tobias (2000) added 16 species records to this region. Tang & Marsh (1994) listed and keyed 23 species of *Ascogaster* in China and Taiwan, of which 13 species were new to science. Chen *et al.* (1994) and Chen & Ji (2003) added 12 new species to Chinese fauna. Aydogdo & Beyarslan (2012) reviewed of the genus *Ascogaster* in Turkey.

The first records of Iranian *Ascogaster* were published by Telenga (1941) and Huddleston (1984). The most recent taxonomic study on *Ascogaster* from Iran was suggested by Farahani *et al.* (2013) who recorded here five species.

The goal of this study is additional study of the fauna of *Ascogaster* species in Iran. A key to the nine species of *Ascogaster* collected from different regions of northern Iran is prepared.

MATERIAL AND METHODS

Sampling was undertaken from March to November, using Malaise trap during 2010 and 2011. Malaise traps were placed in various habitats such as forests, rangelands and orchards. The collected specimens were identified using the keys provided by Huddleston (1984) and Tobias (1986b). The terminology used in this paper, especially for the wing venation, follows van Achterberg (1988). The external morphology of specimens were studied and illustrated using an Olympus™ SZX9 stereomicroscope equipped with a Sony CCD digital camera. Most specimens are deposited in the insect collection of the Department of Entomology, Tarbiat Modares University, Tehran, Iran; some duplicates are in the collection of the Naturalis Biodiversity Center, Leiden, Netherlands.

LIST OF THE IRANIAN SPECIES OF THE GENUS *ASCOGASTER* WESMAEL, 1835

Nine species were collected in Iran and identified including five previously reported species, i.e. *Ascogaster annularis* (Nees, 1816), *A. excavata* Telenga, 1941, *A. grahami* Huddleston, 1984, *A. kasparyani* Tobias, 1976 and *A. quadridentata* Wesmael, 1835; *A. bimar* Tobias, 1986, *A. disparilis* Tobias, 1986, *A. klugii* (Nees, 1816), and *A. varipes* Wesmael, 1835 are recorded for Iranian fauna for the first time.

Ascogaster annularis (Nees, 1816)

Figs 19, 20

MATERIAL EXAMINED. **Iran:** Alborz Province, Chalous Road, Sarzariat (35°55'10.38" N, 51°06'51.24" E, 1980 m a.s.l.), 05.VII 2010, 1 ♀; Qazvin Province, Zereshk Road (36°21'39.72" N, 50°03'55.56" E, 1541 m a.s.l.), 08.VI 2011, 3 ♂; Qazvin Province, Koochin (36°22'14.22" N, 49°40'2.38'02.28" E, 1514 m a.s.l.), 21.VI 2011, 1 ♀ (all specimens A. Mohammadi leg.).

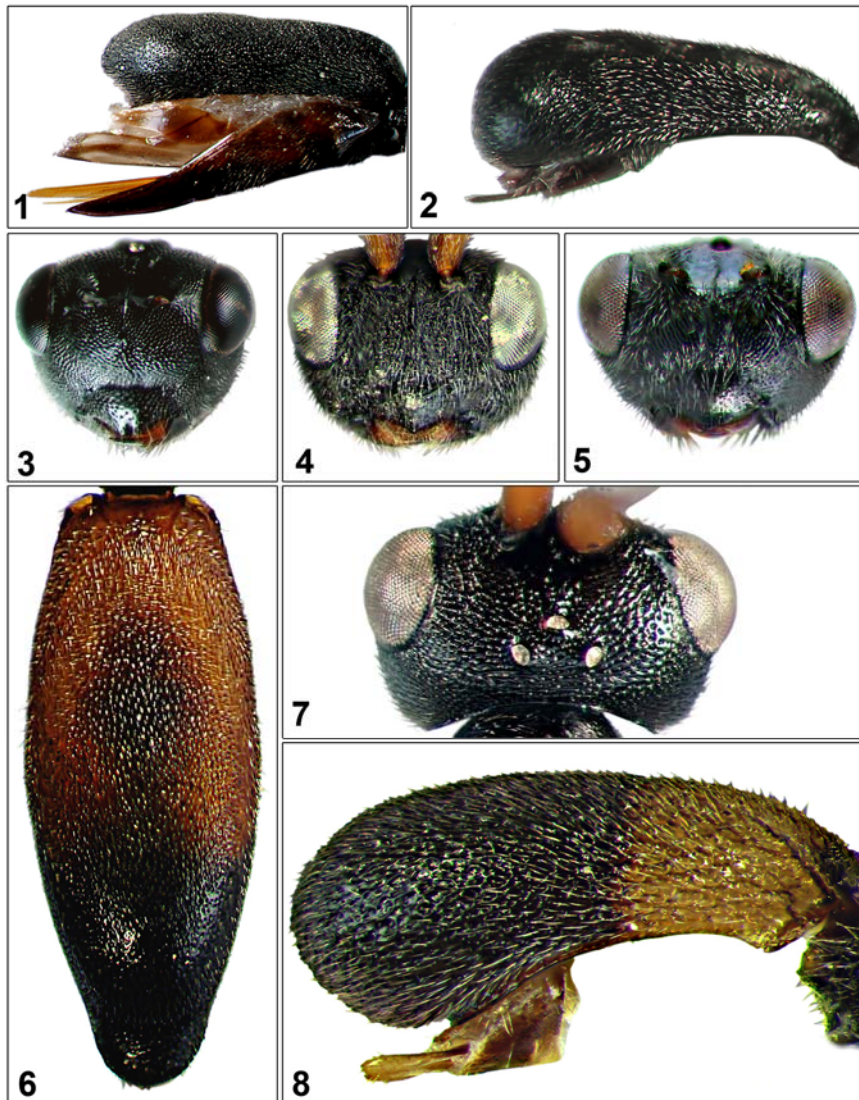
DISTRIBUTION. Armenia, Austria, Bulgaria, Czech Republic, Finland, France, Georgia, Germany, Hungary, Israel, Italy, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Netherlands, Poland, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom (Yu *et al.*, 2013), Iran (Farahani *et al.*, 2013).

Ascogaster bimar Tobias, 1986

Fig. 21

MATERIAL EXAMINED. **Iran:** Guilan Province, Roodsar, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 19.IV 2010, 1 ♀, 1 ♂; 17.V 2010, 1 ♀, 1 ♂; Guilan Province, Roodsar, Rahimabad, Ghazichak (36°45'57.54" N, 50°19'35.22" E, 1803 m a. s. l.), 10.V 2010, 1 ♀ (all specimens M. Khayrandish leg.).

DISTRIBUTION. Azerbaijan, Georgia, Russia (North Caucasus) (Yu *et al.*, 2013). New record for the fauna of Iran.



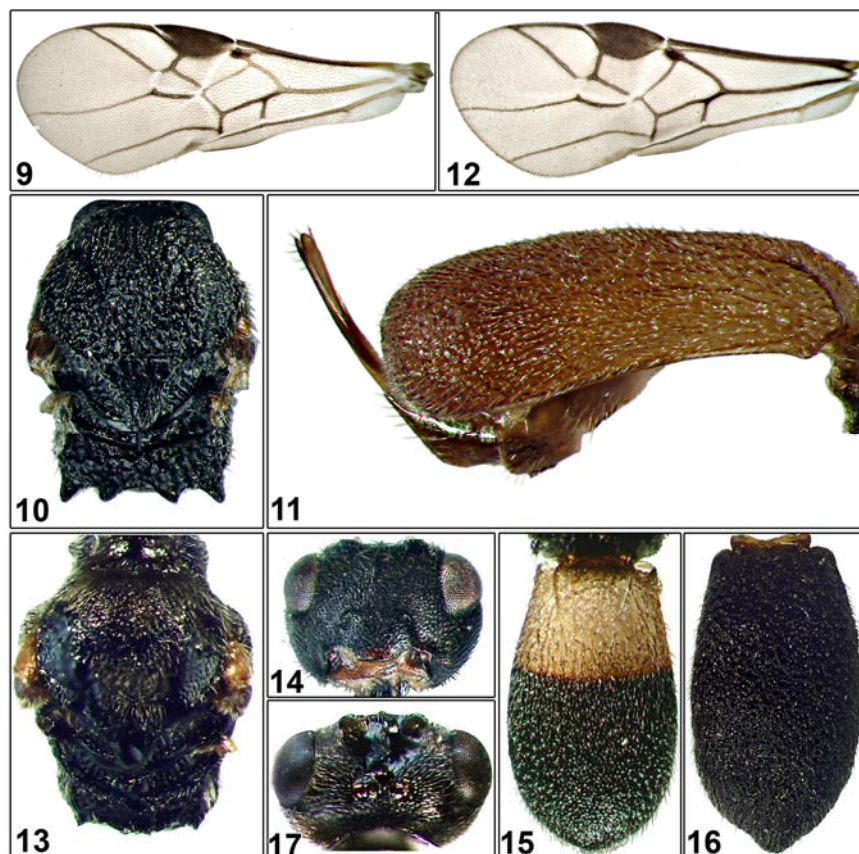
Figs 1–8. *Ascogaster* spp. 1 – carapace of *A. excavata* in lateral view, 2 – carapace of *A. grahami* in lateral view, 3 – head of *A. kasparyani*, 4 – head of *A. quadridentata*, 5 – head of *A. grahami* in frontal view, 6 – carapace of *A. kasparyani* in dorsal view, 7 – head of *A. kasparyani* in dorsal view, 8 – carapace of *A. varipes* in lateral view.

Ascogaster disparilis Tobias, 1986

Figs 11, 22–24

MATERIAL EXAMINED. **Iran:** Guilan Province, Roodsar, Rahimabad, Ziaz (36°52'34.44" N, 50°13'17.40" E, 537m a. s. l.), 10.V 2010, 3 ♀; 07.VI 2010, 1 ♀ (M. Khayrandish leg.).

DISTRIBUTION. Russia, Turkey (Yu *et al.*, 2013). New record for the fauna of Iran.



Figs 9–17. *Ascogaster* spp. 9 – fore wing of *A. varipes*, 10 – mesosoma of *A. quadridentata* in dorsal view, 11 – carapace of *A. disparilis* in lateral view, 12 – fore wing of *A. grahami*, 13 – mesosoma of *A. grahami* in dorsal view, 14 – head of *A. varipes*, 15 – carapace of *A. varipes* in dorsal view, 16 – carapace of *A. quadridentata* in dorsal view, 17 – head of *A. grahami* in dorsal view.

***Ascogaster excavata* Telenga, 1941**

Fig. 1

MATERIAL EXAMINED. **Iran:** Alborz Province, Chalous Road, Shahrestanak (35°58'16.26" N, 51°21'25.80" E, 2225 m a.s.l.), 19.VII 2010, A. Nadimi leg., 1 ♀.

DISTRIBUTION. Kazakhstan, Russia and Switzerland (Yu *et al.*, 2013), Iran (Farahani *et al.*, 2013).

***Ascogaster grahami* Huddleston, 1984**

Figs 2, 5, 12, 17, 18

MATERIAL EXAMINED. **Iran:** Guilan Province, Roodsar, Orkom (36°45'44.34" N, 50°18'11.88" E, 1201 m a.s.l.), 18.IV 2010, 1 ♂; 03.V 2010, 1 ♀; 16.V 2010; 1 ♀; Guilan Province, Roodsar, Ghazichak (36°45'52.62" N, 50°20'01.08" E, 1787 m a.s.l.), 16.V 2010, 1 ♂; 23.V 2010, 1 ♂; 30.V 2010, 1 ♀; 06.VI 2010, 1 ♀; Mazandaran Province, Noor, Gaznasara (36°16'56.82" N, 52°10'58.50" E, 2032 m a.s.l.), 09.V 2011, 3 ♂; 25.V 2011, 5 ♀, 6 ♂; 06.VI 2011, 1 ♀, 1 ♂ (all material collected by M. Khayrandish).

DISTRIBUTION. Austria, China, Czech Republic, France, Germany, Hungary, Israel, Italy, Korea, Netherlands, Russia, Sweden, Switzerland, Turkey, United Kingdom (Yu *et al.*, 2013), Iran (Farahani *et al.*, 2013).

***Ascogaster kasparyani* Tobias, 1976**

Figs 3, 6, 7

MATERIAL EXAMINED. **Iran:** Alborz Province, Karaj (35°46'20.16" N, 50°56'44.94" E, 1278 m a.s.l.), 18.IV 2010, 1 ♀; Alborz Province, Shahrestanak (35°58'16.26" N, 51°21'25.80" E, 2225 m a.s.l.), 21.VI 2010, 1 ♀, 1 ♂; 28.VI 2010, 1 ♀, 2 ♂; 05.VII 2010, 6 ♂; 14.VII 2010, 1 ♂; Qazvin Province, Loshan (36°40'09.12" N, 49°25'37.74" E, 291 m a.s.l.), 24.V 2011, 2 ♀, 4 ♂; 08.VI 2011, 8 ♀, 10 ♂; Qazvin Province, Zereshk Road (36°25'23.88" N, 50°06'37.68" E, 1926 m a.s.l.), 08.VI 2011, 1 ♀; 21.VI 2011, 2 ♀; Qazvin Province, Koohin (36°22'14.22" N, 49°40'2.38'02.28" E, 1514 m a.s.l.), 21.VI 2011, 2 ♀, 3 ♂; Tehran Province, Shahriar (35°40'03.06" N, 50°56'52.14" E, 1168 m a.s.l.), 17.V 2010, 1 ♂; Tehran Province, Peykanshahr, Iran National Botanical Garden (35°44'19.91" N, 51°10'52.49" E, 1265 m a.s.l.), 17.V 2010, 1 ♀; 07.VI 2010, 1 ♀ (all material collected by A. Mohammadi).

DISTRIBUTION. Georgia, Greece, Turkey (Yu *et al.*, 2013), Iran (Farahani *et al.*, 2013).

***Ascogaster klugii* (Nees, 1816)**

Figs 25, 26

MATERIAL EXAMINED. **Iran:** Mazandaran Province, Noor, Chamestan, Tangehvaz (36°18'51.42" N, 52°07'48.00" E, 702 m a. s. l.), 07.VI 2011, 1 ♂;

28.VI 2011, 3♂; Mazandaran Province, Noor, Chamestan, Gaznasara (36°16'58.08" N, 52°10'55.62" E, 2013 m a. s. l.), 28.VI 2011, 1♂ (all material collected by A. Mohammadi).

DISTRIBUTION. Austria, Azerbaijan, Belgium, Bulgaria, Czech Republic, Finland, France, Georgia, Germany, Hungary, Italy, Korea, Latvia, Lithuania, Moldova, Netherlands, Poland, Russia, Slovakia, Sweden, Switzerland, former Yugoslavia (Yu *et al.*, 2013). New record for the fauna of Iran.

***Ascogaster quadridentata* Wesmael, 1835**

Figs 4, 10, 16

MATERIAL EXAMINED. **Iran:** Alborz Province, Arangeh (35°55'07.20" N, 51°05'09.24" E, 1891 m a.s.l.), 05.VII 2010, 1♀; Guilan Province, Astaneh Ashrafiyeh, Eshman Kamachal (37°21'10.50" N, 49°57'56.16" E, 2 m a.s.l.), 23.V 2010, 1♂; 31.V 2010, 1♂; Mazandaran Province, Noor, Chamestan, Tangehvaz (36°21'55.02" N, 52°06'10.74" E, 692 m a.s.l.), 15.VIII 2011, 1♀ (all material collected by A. Nadimi).

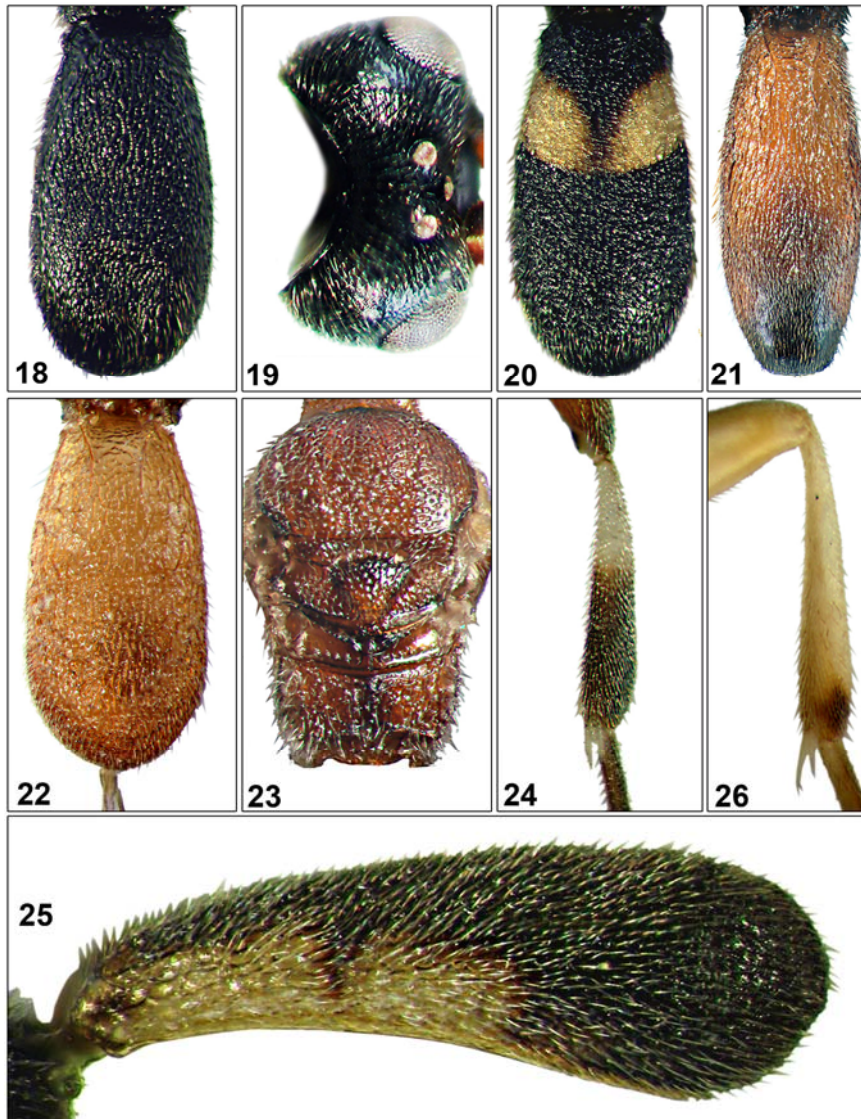
DISTRIBUTION. Armenia, Austria, Azerbaijan, Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czech Republic, Egypt, Finland, France, Germany, Greece, Hungary, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Macedonia, Madeira Islands, Moldova, Mongolia, Morocco, Netherlands, New Zealand, Peru, Poland, Romania, Russia, Serbia, Slovakia, Spain, Sweden, Switzerland, Turkey, Turkmenistan, U.S.A., Ukraine, United Kingdom, Uzbekistan (Yu *et al.*, 2013), Iran (Ranjbar Aghdam & Fathipour, 2010; Farahani *et al.*, 2013).

***Ascogaster varipes* Wesmael, 1835**

Figs 8, 9, 14, 15

MATERIAL EXAMINED. **Iran:** Alborz Province, Chalous Road, Shahrestanak (35°58'16.26" N, 51°21'25.80" E, 2225 m a.s.l.), 14.VII 2010, 1♀; Guilan Province, Astaneh Ashrafiyeh, Eshman Kamachal (37°22'03.66" N, 49°57'57.84" E, -1 m b.s.l.), 03.V 2010, 1♂; 17.V 2010, 1♂; 24.V 2010, 1♂; 14.VI 2010, 1♂; 05.VII 2010, 1♂; 11.VII 2010, 2♂; 25.VII 2010, 2♀; 16.VIII 2010, 3♂; 29.VIII 2010, 5♀, 19♂; 05.IX 2010, 6♀, 20♂; 13.IX 2010, 4♂; 19.IX 2010, 1♂; 27.IX 2010, 1♀, 1♂; 04.X 2010, 1♀; Mazandaran Province, Noor, Chamestan, Gaznasara (36°16'56.82" N, 52°10'58.50" E, 2032 m a. s. l.), 28.VI 2011, 1♀ (all material collected by A. Nadimi).

DISTRIBUTION. Albania, Armenia, Austria, Azerbaijan, Belgium, China, Czech Republic, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Kazakhstan, Korea, Latvia, Lithuania, Moldova, Mongolia, Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, United Kingdom (Yu *et al.*, 2013). New record for the fauna of Iran.



Figs 18–25. *Ascogaster* spp. 18 – carapace of *A. grahami* in dorsal view, 19 – head of *A. annularis* in dorsal view, 20 – carapace of *A. annularis* in dorsal view, 21 – carapace of *A. bimarilis* in dorsal view, 22 – carapace of *A. disparilis* in dorsal view, 23 – mesosoma of *A. disparilis* in dorsal view, 24 – hind tibia of *A. disparilis*, 25 – carapace of *A. klugii* in lateral view, 26 – hind tibia of *A. klugii*.

KEY TO IRANIAN SPECIES OF THE GENUS ASCOGASTER

1. Ovipositor sheath broad and apically rounded; carapace concave posteriorly (lateral view) (Fig. 1) **A. excavata Telenga**
- Ovipositor sheath slender and apically narrowed; carapace rounded posteriorly (lateral view) (Fig. 2) 2
2. Lower margin of clypeus with two median teeth (Fig. 3) 3
- Lower margin of clypeus with a single tooth (Fig. 4) or without teeth (Fig. 5) 5
3. Carapace of female strongly narrowed posteriorly (Fig. 6); clypeus ventrally with two small to medium-sized median teeth (Fig. 3); antenna of female with more than 28 segments; temple shorter than eye in dorsal view (Fig. 7) **A. kasparyani Tobias**
- Carapace of female rounded posteriorly; clypeus ventrally with two large median teeth; antenna of female with 25–26 segments; temple as long as eye in dorsal view 4
4. Labio-maxillary complex projecting weakly beneath the head, exerted part never as long as malar space; clypeus protuberant; hypopygium short, not projecting beyond carapace **A. bicarinata (Herrich-Schäffer)**
- Labio-maxillary complex projecting distinctly, exerted part distinctly longer than malar space; clypeus not protuberant; hypopygium long, sometimes projecting beyond carapace **A. caucasica Kokujev**
5. Ovipositor short (Fig. 8); vein r of fore wing emitted from or weakly before about middle of pterostigma (Fig. 9); propodeum with four sharp teeth posteriorly (Fig. 10) 6
- Ovipositor long (Fig. 11); vein r of fore wing emitted from distal third of pterostigma (Fig. 12); propodeum without sharp teeth posteriorly (Fig. 13) 7
6. Mandible with distinct semicircular depression basally (Fig. 14); antenna of female 34–35-segmented; ventrally clypeus without medial teeth (Fig. 14); hind coxa of female yellow; apex of carapace of female rounded in dorsal view and pale yellow basally (Fig. 15) **A. varipes Wesmael**
- Mandible without depression basally; antenna of female 29–33-segmented; ventrally clypeus with a distinct tooth medio-ventrally (Fig. 4); hind coxa of female black; apex of carapace of female sometimes with a distinct tubercle in dorsal view and entirely black (Fig. 16) **A. quadridentata Wesmael**
7. Setae on upper part of face directed downwards; head completely black . . . 8
- Setae on upper part of face directed upwards; head generally pale in colour (exceptionally stemmaticum) or at least face reddish brown 9
8. Temple shorter than eye in dorsal view (Fig. 17); carapace generally black (Fig. 18), occasionally with yellow spots basally; hypopygium generally not exerted **A. grahami Huddleston**
- Temple as long as eye in dorsal view (Fig. 19); carapace always with two yellow spots basally (Fig. 20); hypopygium often projecting beyond apex of carapace **A. annularis (Nees)**

9. Carapace rather long, distinctly tapered posteriorly (Fig. 21); scutellum smooth; antenna of female about 34-segmented **A. *bimaris* Tobias**
 – Carapace oval, distinctly rounded posteriorly (Fig. 22); scutellum sculptured; antenna of female 27–30-segmented 10
10. Scutellum densely punctate (Fig. 23); carapace brownish yellow (Fig. 22); hind tibia distinctly darkened apically and basal half pale yellow (Fig. 24) **A. *disparilis* Tobias**
 – Scutellum sparsely punctate; carapace black and antero-laterally yellow (Fig. 25); hind tibia completely pale yellow, slightly darkened apically (Fig. 26) **A. *klugii* (Nees)**

DISCUSSION

The genus *Ascogaster* is informally divided into six species groups by Huddleston (1984): *abdominator*, *annularis*, *bidentula*, *caucasica*, *quadridentata* and *semenovi*. The *caucasica*, *semenovi* and *abdominator* groups differ from other species groups in having the setae on the upper part of the face directed upwards and the face reticulate-punctate. Up to now, the *abdominator* group has been not recorded from Iran.

According to our research and previous literature 11 species of *Ascogaster* occur in Iran. Most recorded species have a wide Palearctic distribution; of the newly recorded species only *A. bimaris* Tobias and *A. disparilis* Tobias have a more restricted southern distribution.

Ascogaster bicarinata (Herrich-Schäffer) and *A. caucasica* Kokujev were not found in our study area. *Ascogaster quadridentata* is a cosmopolitan species that is present in the Nearctic, Neotropical, Oceanic, Oriental and Palearctic regions (Yu *et al.* 2013). In this study, *Ascogaster klugii* was collected only in the Mazandaran Province while *A. bimaris* and *A. disparilis* were found only in the Guilan Province. Other species of *Ascogaster* have been recorded at least from two provinces in Iran.

Tobias (1986b) and Belokobylskij & Tobias (2000) reported 38 species of *Ascogaster* from both the former USSR and Russia. Aydogdo & Beyarslan (2012) recorded up to 17 *Ascogaster* species from Turkey. Since Iran has various geographical regions and climates, it is likely that many additional species of *Ascogaster* remain to be discovered and many parts of Iran have not been investigated so far. North Iran is characterized by great variability in vegetation, natural ecosystems and farm land use due to significant differences in topography and climate. Therefore, it would be expected that also in the study area many additional species remain to be discovered.

Because in the studied specimens were collected in Malaise traps, the biology of the recorded species is unknown. Ranjbar Aghdam & Fathipour (2010) reported *A. quadridentata* as a parasitoid of the codling moth, *Cydia pomonella* (Linnaeus) (Lepidoptera: Tortricidae) in the East Azerbaijan Province. *Ascogaster klugii* was reared from *Borkhausenia subochreella* (Doubleday, 1859), *Denisia stipella* (Linnaeus, 1758) (Lepidoptera: Oecophoridae), and *Dryocoetes villosus* (Fabricius,

1792) (Coleoptera: Curculionidae), but last record needs to confirm (Huddleston 1984; Yu *et al.*, 2013). Hosts of *A. disparilis* and *A. bimarlis* are yet unknown (Yu *et al.*, 2013).

ACKNOWLEDGEMENTS

We would like to thank the Department of Entomology, Tarbiat Modares University for providing financial support. Our cordial thanks are expressed to Drs M. Khayrandish, A. Mohammadi and A. Nadimi for helping us in collecting the specimens. S.A. Belokobylskij (Zoological Institute, St. Petersburg, Russia) was kind to review and improve the manuscript.

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