DISTRIBUTION OF *CALCHAENESTHES* SPECIES (COLEOPTERA: CERAMBYCIDAE: CERAMBYCINAE) IN THE SOUTH-WESTERN ASIA

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ABSTRACT: Two of five species of *Calchaenesthes* Kraatz (Coleoptera: Cerambycidae: Cerambycinae) are distributed in the South-Western Asia. *Calchaenesthes pistacivora* Holzschuh, an endangered species, is reported only from Iran in the South-Western Asia. Known host plants include the species of pistachio (Anacardiaceae: *Pistacia*), e.g. *Pistacia vera*, *Pistacia atlantica mutica* and *Pistacia khinjuk*. *Calchaenesthes diversicollis* Holzschuh, an endangered species, is reported from Iran, ?Iraq and ?Turkey in the South-Western Asia. In Turkey, if present, it probably occurs only in South-Eastern Anatolia. Known host plants include Brant's oak or Persian oak (*Quercus brantii*), and probably also other *Quercus* species (Fagaceae).

KEY WORDS: *Calchaenesthes*, longhorned beetles, distribution, host plants

The family of longhorn beetles (Cerambycidae) is one of the most speciose and well-known group of beetles with approximately 35,000 described species (Švácha & Lawrence, 2014). More than 600 species and 700 species occur in Europe and Turkey respectively.

The Western Palaearctic genus *Calchaenesthes* Kraatz (Coleoptera: Cerambycidae: Cerambycinae) includes only five species as *C. diversicollis* Holzschuh, 1977, *C. oblongomaculata* (Guérin-Méneville, 1844), *C. primis* Özdikmen, 2013, *C. pistacivora* Holzschuh, 2003, *C. sexmaculata* (Reiche, 1861) (Özdikmen et al., 2013; Danilevsky, 2017). *C. oblongomaculata*, *C. primis* and *C. sexmaculata* are distributed in the Mediterranean Region (*C. oblongomaculata* and *C. primis* in the Eastern Mediterranean Region, and *C. sexmaculata* in the Western Mediterranean Region), and *C. diversicollis* Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 are distributed in the South-Western Asia.

South-Western Asia or Western Asia is the westernmost subregion of Asia (Figs. 1 and 2). It significantly overlaps with the Middle East (or Near East), the main difference being the exclusion of Egypt. As a geographic concept, it includes Anatolia, Iran, Armenian Highlands, South Caucasus, the Levant, Mesopotamia, the Arabian peninsula and the Sinai Peninsula.

South-Western Asia is located directly south of Eastern Europe. To the north, the region is delimited from Europe by the Caucasus Mountains, to the southwest, it is delimited from Africa by the Isthmus of Suez, while to the east, the region adjoins Central Asia and South Asia. The Dasht-e Kavir and Dasht-e Lut deserts in eastern Iran naturally delimit the region somewhat from Asia itself. In addition, the region is surrounded by seven major seas as the Aegean Sea, the Black Sea, the Caspian Sea, the Persian Gulf, the Arabian Sea, the Red Sea, and the Mediterranean Sea.

The countries and territories of Western Asia can be listed below:

Armenia, Azerbaijan, Bahrain, Cyprus, Georgia, Iraq, Iran, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey (Anatolia), United Arab Emirates and Yemen (Figs. 1 and 2).

Calchaenesthes oblongomaculata (Guérin-Méneville) and *C. sexmaculata* (Reiche) are classified as "Data Deficient" and "Endangered" on the European Red List of Saproxylic Beetles respectively (Nieto & Alexander, 2010). *C. primis* was described by Özdikmen (2013 in Özdikmen et al., 2013) from İçel province of Turkey. This species, therefore, has not been classified on the European Red List of Saproxylic Beetles (Nieto & Alexander, 2010).

C. diversicollis Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 are among the saproxylic beetles in the South-Western Asia. Unfortunately, threat categories of *C. diversicollis* Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 has not been determined up to now. Information on these species is critical to efforts to protect these species from extinction in the South-Western Asia. Thus, the primary objective of this paper is to propose for acceptation of *C. diversicollis* Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 as threatened long-horned species in the South-Western Asia and is to define the known distribution of these insects along with information on their ecological habits and host plants. In addition, a bibliography of previous studies related to these species is included.

MATERIALS AND METHODS

The material of this work is a comprehensive review of the scientific literature that was conducted to delineate the known distribution of *Calchaenesthes* species in the South-Western Asia. Host plants and ecological habits were recorded when available. Additional surveys for these insects were conducted by many researchers and are reported herein. We included information and data that are important in assessing the level of threat to the species. These protocols included geographic range, population data, and habitat preferences (Nieto & Alexander, 2010; International Union for Conservation of Nature, 2012). Information and data of these species are presented under the title Taxonomic history, Reported occurrence in the South-Western Asia, Host plants, Life cycle and biology and Status and conservation of threatened species. Moreover, a distribution map of *Calchaenesthes* species in the South-Western Asia is also given (Figs. 1 and 2). Reported global occurrences of *Calchaenesthes* species with bibliographic citations are also provided (Tables 1 and 2).

RESULTS AND DISCUSSION

Taxonomic history. The cerambycid genus *Calchaenesthes* was erected by Kraatz (1863) with the type species *Callidium oblongomaculatum* Guérin-Méneville, 1844. *Callidium nogelii* Frivaldszky, 1845, *Calchaenesthes oblongomaculatus* var. *subjunctus* Pic, 1945 and *Calchaenesthes oblongomaculata* var. *quadrimaculata* Pic, 1912 are known synonyms of the type species. *Calchaenesthes oblongomaculata* (Guérin-Méneville, 1844) is distributed in Balkan Peninsula (Bulgaria, Greece and Romania), European Turkey, ?Jordan and ?Cyprus.

The other senior species, *Calchaenesthes sexmaculata* was described by Reiche (1861) from Algeria (Kabylia) as *Anoplistes oblongomaculatum* var. *sexmaculatum*. This species occurs also in Europe (Spain) and North Africa (Morocco and Tunisia). *Calchaenesthes 6-maculatus* var. *junctus* Pic, 1922 and

Purpuricenus (*Calchaenesthes*) *sexmaculatus* var. *parvimaculatus* Rungs, 1947 are known synonyms of the species.

Calchaenesthes diversicollis was described by Holzschuh (1977) from Iran (Luristan) as a subspecies of *Calchaenesthes oblongomaculatus*. It was upgraded by Holzschuh (2003) to the species level. This species is also distributed in Iraq and Turkey (Löbl & Smetana 2010 and Danilevsky 2017). G. Sama is the real author for the genus in Löbl & Smetana (2010). According to the catalogue, the species is distributed in Iran, Iraq and Turkey. However, it has not been any published record from Iraq in real. So the record of Iraq based on the unpublished data of G. Sama. In addition to this, the records of Turkey should be belong to new species *C. primis* Özdikmen, 2013. Consequently, the species is not known from Turkey. Moreover, the record of Iraq need to be confirmed.

Calchaenesthes pistacivora was described by Holzschuh (2003) from Iran (Kerman). This species is endemic to Iran.

Calchaenesthes primis was described by Özdikmen (2013 in Özdikmen et al. 2013) from Turkey (İçel). This species occurs also in Cyprus.

Consequently, the Western Palaearctic genus *Calchaenesthes* Kraatz, 1863 is included 5 species.

An identification key for adults of *Calchaenesthes* species.

1. Pronotum without any medio-lateral extension; postmedian spots on elytra large and oblong; Eastern Mediterranean species.....*C. oblongomaculata* (Guérin-Méneville, 1844)
--- Pronotum with more or less distinct, medio-lateral dental extensions; postmedian spots on elytra small.....2

2. Elytra with six black spots at least in males; Western Mediterranean species.....
.....*C. sexmaculata* (Reiche, 1861)
--- Elytra with four black spots in both sexes.....3

3. Pronotum almost completely black (except reddish anterior angles); Iranian species.....
.....*C. pistacivora* Holzschuh, 2003
--- Pronotum with reddish edges at least in anterior half.....4

4. Basal black spots on elytra always reaching the suture; Western Asiatic species.....
.....*C. diversicollis* Holzschuh, 1977
--- Basal black spots on elytra never reaching the suture; Eastern Mediterranean species.....
.....*C. primis* Özdikmen, 2013

Reported occurrence in Turkey. Only *Calchaenesthes diversicollis* was reported by Löbl & Smetana (2010) and Danilevsky (2017) from Turkey. As mentioned above, the Turkish records of these catalogues should be belong to *C. primis* Özdikmen, 2013 (Özdikmen et al., 2013). So this species is not known from Turkey.

Reported occurrence outside Turkey. *Calchaenesthes diversicollis* is recorded from Iran and ?Iraq. The Turkish records of this species should be belong to *C. primis* Özdikmen, 2013 (Özdikmen et al., 2013). Citations of confirmed occurrence of *C. diversicollis* are listed in Table 1, and the recorded distribution is shown in Fig. 1.

Calchaenesthes pistacivora is recorded only from SE Iran. This species is endemic to Iran. Citations of confirmed occurrence of *Calchaenesthes pistacivora* are listed in Table 2, and the recorded distribution is shown in Fig. 2.

Host plants. *Calchaenesthes diversicollis* is apparently polyphagous in deciduous trees in the plant families Fagaceae (*Quercus* spp. including *Quercus*

brantii). Known host plants for *Calchaenesthes pistacivora* include the species of pistachio (Anacardiaceae: *Pistacia*), e.g. *Pistacia vera*, *Pistacia atlantica mutica* and *Pistacia khinjuk* (Hashemi-Rad, 2006; Achterberg & Mehrnejad, 2011).

Life cycle and biology. Adults and larvae of *Calchaenesthes diversicollis* can be collected only from the host plants growing in lowland and foothill habitats up to 2,000 m above sea level. Adults can usually be found sitting on the leaves or flying around of their host, especially from April to June. Duration of the life cycle is probably at least 2-3 years. Eggs are probably laid on living twigs. Larvae probably develop in living twigs of the host plant. Pupation probably takes place in the autumn and adults overwinter in the pupal cells (Awal, 1997; Hashemi-Rad et al., 2000; Ambrus & Grosser, 2013).

Adult beetles of *Calchaenesthes pistacivora* appear in the early April and feed upon pistachio leaves. Eggs are ovoid, 1 mm diameter and two mm length. The female usually laid eggs on the young twigs or on the pruned branches sites. She laid 40- 45 eggs in her life span. The incubation period for eggs lasts two weeks (approximately) in the natural condition. New hatched larvae penetrate inside the branches and make a tunnel there. The tunnel length is about 15 cm (approximately). Larval period takes 16 to 18 months (in the natural condition) and full-developed larvae pupated in the base of tunnels. Pupa period takes 45 days (approximately). Adults remain five to six months inside the tunnels. Then they emerge at early April. Thus, this insect has one generation over two years. (Hashemi-Rad, 2006; Ahterberg & Mehrnejad, 2011).

Status and conservation of threatened species. These members of *Calchaenesthes* are more or less rare species.

C. diversicollis Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 are among the saproxylic beetles in the South-Western Asia. Unfortunately, threat categories of *C. diversicollis* Holzschuh, 1977 and *C. pistacivora* Holzschuh, 2003 has not been determined up to now. Information on these species is critical to efforts to protect these species from extinction in the South-Western Asia. We included information and data that are important in assessing the level of threat to these species. These protocols included geographic range, population data, and habitat preferences (International Union for Conservation of Nature, 2012). Subsequently, we propose that *C. diversicollis* should be classified in the category of "Vulnerable" on the South-Western Asian Red List. Similarly, we propose that *C. pistacivora* should be classified in the category of "Endangered" on the South-Western Asian Red List.

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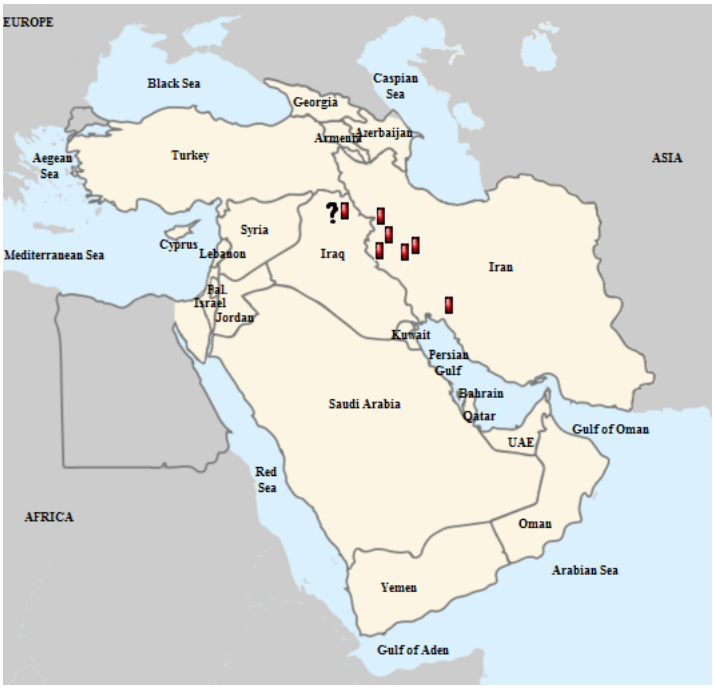

Figure 1. Distribution of *Calchaenesthes diversicollis* in South-Western Asia.

Table 1. Reported global occurrence of *Calchaenesthes diversicollis*, with bibliographic citations.

Country	Regional Unit	Locality	Citations
Iran	Ilam		Hashemi-Rad et al., 2000; Borumand, 2004; Özdikmen et al., 2013
Iran	Kermanshah	Ham	Abai, 1969; Awal, 1997; Özdikmen et al., 2013
Iran	Kohgiluyeh and Boyer Ahmad	Sisakht env.	Ambrus & Grosser, 2013
Iran	Kordestan		Holzschuh, 2003
Iran	Lorestan	Dorud	Sama, 2012; Özdikmen et al., 2013
Iran	Lorestan	Khorramabad	Holzschuh, 1977; Abaii, 2004; Özdikmen et al., 2013
Iran			Özdikmen et al., 2013; Ambrus & Grosser, 2013; Danilevsky, 2017
?Iraq			Holzschuh, 2003; Löbl & Smetana, 2010; Özdikmen et al., 2013; Ambrus & Grosser, 2013; Danilevsky, 2017
?Turkey			Holzschuh, 2003; Löbl & Smetana, 2010; Ambrus & Grosser, 2013; Özdikmen, 2014; Danilevsky, 2017

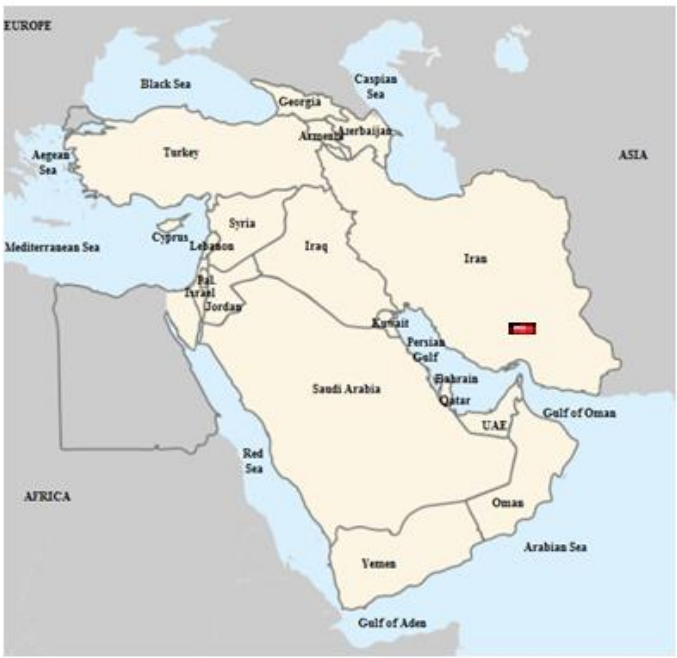

Figure 2. Distribution of *Calchaenesthes pistacivora* in South-Western Asia.

Table 2. Reported global occurrence of *Calchaenesthes pistacivora*, with bibliographic citations.

Country	**Regional Unit**	**Locality**	**Citations**
Iran	Kerman	Sirjan	Hashemi-Rad et al., 2000; Holzschuh, 2003; Abai, 2004; Borumand, 2004; Hashemi-Rad, 2006; Achterberg & Mehrnejad, 2011; Özdikmen et al., 2013
Iran			Löbl & Smetana, 2010; Danilevsky, 2017