

**DISTRIBUTION OF CALCHAENESTHES SPECIES
(COLEOPTERA: CERAMBYCIDAE: CERAMBYCINAE)
IN THE MEDITERRANEAN REGION**

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ABSTRACT: Three of five species of *Calchaenesthes* Kraatz are distributed in the Mediterranean Region. *Calchaenesthes oblongomaculata* (Guérin-Méneville), a data deficient species on the European Red List of Saproxyllic Beetles, is reported from Bulgaria, Greece, Romania, Cyprus, Jordan and Turkey in the Eastern Mediterranean Region. In Turkey, it occurs only in İstanbul province. Known host plants include the species of oak (Fagaceae: *Quercus*) and blossoming hawthorn (Rosaceae: *Crataegus*). *Calchaenesthes sexmaculata* (Reiche), an endangered species on the European Red List of Saproxyllic Beetles, is reported from Spain, Morocco, Algeria and Tunisia in the Western Mediterranean Region. Known host plants include the species of oak (Fagaceae: *Quercus*). In addition, *Calchaenesthes primis* Özdikmen (Coleoptera: Cerambycidae: Cerambycinae) has not been classified on the European Red List of Saproxyllic Beetles yet, is reported from Cyprus and Turkey in the Eastern Mediterranean Region. In Cyprus, it exists in Paphos and Larnaca Districts. In Turkey, it occurs in Adiyaman, Amasya, Burdur, Gaziantep, Hatay, İçel, Mardin, Niğde and Siirt provinces. Known host plants include kermes oak (*Quercus coccifera* L.), 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 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).

Calchaenesthes oblongomaculata (Guérin-Méneville) and *C. sexmaculata* (Reiche) are classified as “Data Deficient” and “Endangered” on the European Red List of Saproxyllic 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 Saproxyllic Beetles (Nieto & Alexander, 2010). Information on these species is critical to efforts to protect these species from extinction in the Mediterranean basin.

The Mediterranean basin extends approximately 3,800 km east to west from the tip of Portugal to the shores of Lebanon and approximately 1,000 km north to south from Italy to Morocco and Libya. Within the European Union, the

Mediterranean Region encompasses seven countries, either partially (France, Portugal, Italy, Spain) or completely (Greece, Malta, Cyprus) (Sundseth & Brussels, 2009).

The Eastern Mediterranean denotes the countries geographically to the east of the Mediterranean Sea (Levantine Sea basin). This is commonly interpreted in two ways: the region of Syria plus the Cyprus (also known as the Levant), and Turkey, or the Levant plus Greece, and Egypt, thereby including European and African components to the definition. The countries and territories of the Eastern Mediterranean include Cyprus, Greece (mainland and Aegean Islands), Lebanon, Syria, Palestine, Israel, Turkey, Egypt, Jordan and Libya. The Eastern Mediterranean Region encompasses only two countries as Greece and Cyprus within the European Union.

The Western Mediterranean denotes the countries geographically to the west of the Mediterranean Sea. The countries and territories of the Western Mediterranean include Italy, France, Spain, Portugal, Morocco, Algeria and Tunisia. The Western Mediterranean Region encompasses four countries as Italy, France, Spain and Portugal within the European Union.

The Mediterranean basin is recognised as a biodiversity hotspot. About one-third of the Mediterranean fauna is endemic. According to the International Union for Conservation of Nature Red List of Threatened Species, 19% of faunal species (amphibians, birds, cartilaginous fishes, endemic freshwater fishes, crabs and crayfish, mammals, dragonflies, and reptiles) are threatened with extinction (5% Critically Endangered, 7% Endangered, 7% Vulnerable) in the Mediterranean Region. In addition, at least 16 irreplaceable species are already extinct, including some endemics (Vlachogianni et al., 2012; Avgin et al., 2015).

The Mediterranean basin is the richest biogeographic region for invertebrates; 75% of the total European insect fauna are found there (Balletto & Casale, 1991). With most representatives in the Order Coleoptera, insect diversity in the region is also high. In addition, the number of Cerambycidae in countries of the Mediterranean basin is higher than in countries situated farther to the north. For example, the number of cerambycids of Italy equals 296 (Sama & Rapuzzi, 2011), of Greece about 330 (Danilevsky, 2014), whereas in Poland there are only 192 species (Gutowski et al., 2012).

Within borders of region as well as in neighboring countries and regions, Turkey is surrounded on 3 sides by large water bodies, it has continental properties including exceptionally diverse topographical features. The latter have provided refugia in which many species have survived in spite of harsh geological and climatic changes. Turkey is located at an intersection of geographical regions with large climatic and geographical gradients as well as a diversity of ecosystems and habitats (Kahraman et al., 2011; International Union for Conservation of Nature, 2012; Avgin et al., 2015). The great biological importance of Turkey is evident from the remarkable variety of arthropods in Turkey. The coleopteran fauna of Turkey is estimated to include 25 000 species (Koçak & Kemal, 2009). More than 700 cerambycid species occur in Turkey. As a result of this, Turkey plays an important geographic and ecological role in safeguarding biodiversity.

C. oblongomaculata, *C. primis* and *C. sexmaculata* are among the saproxylic beetles in Europe. *C. oblongomaculata* and *C. sexmaculata* are considered "Data Deficient" and "Endangered" respectively. *C. primis* that described in 2013, however, has not been considered until now (Nieto & Alexander, 2010). Thus, the primary objective of this paper is to propose for acceptance of *C. primis* as a threatened long-horned species at the European and European Union level 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 Mediterranean Region. 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 Turkey, Reported occurrence outside Turkey, Host plants, Life cycle and biology and Status and conservation of threatened species. Moreover, a distribution map of *Calchaenesthes* species in the Mediterranean Region is also given (Fig. 1). Reported global occurrences of *Calchaenesthes* species with bibliographic citations are also provided (Tables 1, 2 and 3).

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. *parvumaculatus* 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.

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. *Calchaenesthes oblongomaculata* and *Calchaenesthes primis* occur in Turkey. *Calchaenesthes oblongomaculata* is reported as occurring only in 1 of Turkey's 81 provinces (Fig. 1). This is İstanbul province in European Turkey. Location reports along with specific citation(s) of those reports are listed in Table 1. Özdikmen et al. (2013) stated that the species is very likely distributed only in European Turkey for Turkey. Since, the synonym taxon *Callidium nogelii* was described by Frivaldszky (1845) from İstanbul province. *C. oblongomaculata*, however, is not distributed in Anatolia for Turkey. Since old records of this species from Anatolia should be belong to *C. primis*.

Calchaenesthes primis is reported as occurring in 9 of Turkey's 81 provinces (Fig. 1). These are Adiyaman, Amasya, Burdur, Gaziantep, Hatay, İçel, Mardin, Niğde and Siirt provinces. Location reports along with specific citation(s) of those reports are listed in Table 2.

Reported occurrence outside Turkey. *Calchaenesthes oblongomaculata* is recorded from the Eastern Mediterranean Region, from Balkan Peninsula to Jordan, Bulgaria, Greece, Romania, European Turkey, Cyprus and Jordan. Citations of confirmed occurrence of *C. oblongomaculata* are listed in Table 1, and the recorded distribution is shown in Fig. 1. However, Özdikmen et al. (2013) stated that the records of Cyprus and Jordan of *C. oblongomaculata* need to be confirmed. As a matter of fact, Ambrus et al. (2014) reported only *C. primis* from Cyprus and did not mention another species of *Calchaenesthes* from Cyprus in their article. In addition, *C. oblongomaculata* was reported by Sama et al. (2002) from Jordan on *Quercus* spp. including *Quercus coccifera* and *Quercus alnifolia*. As known, *Calchaenesthes primis* prefers *Quercus coccifera* as its host plant. Thus, the record from Jordan is very likely belonging to *C. primis*.

Calchaenesthes primis is recorded from the Western Palaearctic Region, from Turkey (Anatolia) and Cyprus. Citations of confirmed occurrence of *Calchaenesthes primis* are listed in Table 2, and the recorded distribution is shown in Fig. 1.

Calchaenesthes sexmaculata is recorded only from the Western Mediterranean Region, from Iberian Peninsula to Tunisia, Spain, Morocco, Algeria and Tunisia. Citations of confirmed occurrence of *C. sexmaculata* are listed in Table 3, and the recorded distribution is shown in Fig. 1.

Host plants. *Calchaenesthes oblongomaculata* is apparently polyphagous in deciduous trees in the plant families Fagaceae (*Quercus* spp. including *Quercus macrolepis*, *Quercus coccifera* and *Quercus alnifolia*) and Rosaceae (*Crateagus* spp.) (Sama et al., 2002; Walczak et al., 2014; Hoskovec et al., 2017).

Calchaenesthes primis is apparently polyphagous in deciduous trees in the plant family Fagaceae, e.g. *Quercus coccifera* (Özdikmen et al., 2013; Özbek et al., 2015; Hoskovec et al., 2016) and probably also other *Quercus* species (Rejzek &

Hoskovec, 1999; Malmusi & Saltini, 2005; HSama et al., 2011; Hoskovec et al., 2017).

Calchaenesthes sexmaculata is apparently polyphagous in deciduous trees in the plant family Fagaceae, *Quercus* species (Vives, 2000, 2001; Verdugo, 2004; Plaza, 2011; Verdugo & Coello, 2015), e.g. *Quercus mirbeckii* (Villiers, 1946; Plaza, 2011; Verdugo & Coello, 2015), *Quercus suber* (Plaza & Ferrer, 1988; Plaza, 1989, 2011), *Quercus pubescens*, *Quercus pyrenaica*, *Quercus lusitanica* (Verdugo, 2008), *Quercus faginea* (Plaza, 2011), *Quercus canariensis* (Verdugo & Coello, 2015; Hoskovec et al., 2017).

Life cycle and biology. Adults and larvae of *Calchaenesthes oblongomaculata* can be collected only from the host plants growing in lowland and foothill habitats up to 1,000 m above sea level. Adults can usually be found sitting on the leaves or flying around of their host, especially from April to June. Authors' observations show high activity of imagines starting at 20 °C, especially in the environment of flowering oaks and hawthorns. Duration of the life cycle is at least 2-3 years. Eggs are laid on living twigs. Larvae develop in living twigs of the host plant. Pupation takes place in the autumn and adults overwinter in the pupal cells (Sama et al., 2002; Walczak et al., 2014; Hoskovec et al., 2017).

Adults and larvae of *Calchaenesthes sexmaculata* can be collected only from the host plants growing in lowland and foothill habitats up to 1,000 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 at least 2-3 years. Larvae develop in living twigs of the host plant. The overwintering stage is most likely the larval stage. Pupation takes place in the autumn and adults overwinter in the pupal cells (Plaza & Ferrer, 1988; Plaza, 1989, 2011; Vives, 2000, 2001; Verdugo, 2004, 2008; Verdugo & Coello, 2015; Hoskovec et al., 2017).

Adults and larvae of *Calchaenesthes primis* can be collected only from the host plants growing in lowland and foothill habitats up to 1,000 m above sea level. Adults can usually be found sitting on the leaves or flying around of their host, especially from early April to late June. Duration of the life cycle is at least 2-3 years. Larvae develop in living twigs of the host plant. Pupation takes place in the autumn and adults overwinter in the pupal cells. Interestingly, the beetles tend to gather on selected living trees showing a strong preference for stunted oaks growing on poor stony grounds. This behaviour implies that a infochemical (aggregation or sex pheromone) mediated communication might be used by this species (Demelt, 1963; Rejzek & Hoskovec, 1999; Malmusi & Saltini, 2005; Sama et al., 2011; Özdikmen et al., 2013; Ambrus et al., 2014; Özbek et al., 2015; Hoskovec et al., 2017).

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

Calchaenesthes oblongomaculata is among the saproxylic beetles in Europe and Turkey. It is classified in the category of "Data Deficient" in the European Red List of Saproxylic Beetles (Nieto & Alexander, 2010). 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). Subsequently, we propose that this beetle should be classified in the category of "Vulnerable" on the European Red List at the European and European Union level. Besides, Özdikmen (2014) suggested that the species should be listed in the category of "Data Deficient" in the Turkish Red List. Based on its distribution, collection dates, and records from Turkey, we concur with that placement.

Calchaenesthes sexmaculata is among the saproxylic beetles in Europe and North Africa. It is classified in the category of “Endangered” in the European Red List of Saproxylic Beetles (Nieto & Alexander, 2010). 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). Based on its very restricted distribution (only in Andalusia, has been cited only several times), the known small number of populations with a high degree of fragmentation and, apparently, by the very reduced population density in the Iberian Peninsula, we concur with that placement. In addition, this species is classified in the category of “Vulnerable” because it is a north-africano-betico endemism in the Western Mediterranean Region in the Red Book of the invertebrates of Andalusia (Verdugo, 2008) and the Atlas of threatened invertebrates of Spain (Plaza, 2011), we also concur with that placement for its worldwide distribution.

Calchaenesthes primis is among the saproxylic beetles in Europe and Turkey, however, has not been classified on the European Red List of Saproxylic Beetles until now (Nieto & Alexander, 2010). Since this species was described by Özdikmen (2013 in Özdikmen et al., 2013) from Turkey and was firstly reported by Ambrus et al. (2014) from Cyprus. 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). Subsequently, we propose that this beetle should be classified in the category of “Endangered” on the European Red List at the European and European Union level. Besides, we suggested that the species should be listed in the category of “Vulnerable” in the Turkish Red List based on its distribution, collection dates, and records from Turkey.

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Figure 1. Distribution of *Calchaenesthes* species in the Mediterranean basin (■ *C. oblongomaculata*, ■ *C. primis*, ■ *C. sexmaculata*).

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

Country	Regional Unit	Locality	Citations
Turkey			Ganglbauer, 1881; Löbl & Smetana, 2010; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Turkey	Istanbul		Frivaldszky, 1845; Kraatz, 1863; Ganglbauer, 1881; Özdikmen et al., 2013
Greece			Guérin-Méneville, 1844; Ganglbauer, 1881; Serafim, 2009; Löbl & Smetana, 2010; Maican & Serafim, 2012; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Greece	Mainland: Evros	Pessani Forest	Berger, 2005
Greece	Mainland: Ioannina	Vrosina	Berger, 2005
Greece	Peloponnese	Taygetus	Pic, 1945
Greece	Peloponnese: Achaia	Alpochori	Berger, 2005
Greece	Peloponnese: Achaia	Kalogria	Berger, 2005
Greece	Peloponnese: Arcadia	Agios Petros	Walczak et al., 2014
Greece	Peloponnese: Arcadia	Kosmas	Berger, 2005
Greece	Peloponnese: Arcadia	Tripoli	Hoskovec et al., 2017
Greece	Peloponnese: Elis	Ilida: Andritsaina	Berger, 2005
Greece	Peloponnese: Laconia	Geronthres	Berger, 2005
Greece	Lesbos Island	Olympos Mt.	Peslier, 2011
Cyprus			Kraatz, 1863; Serafim, 2009; Löbl & Smetana, 2010; Maican & Serafim, 2012; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Bulgaria			Serafim, 2009; Löbl & Smetana, 2010; Maican & Serafim, 2012; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Romania			Löbl & Smetana, 2010; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Romania	Dobrogea: Constanta	Esechioi	Panin & Săvulescu, 1961; Serafim, 2009; Maican & Serafim, 2012
Jordan			Serafim, 2009; Löbl & Smetana, 2010; Maican & Serafim, 2012; Özdikmen et al., 2013; Danilevsky, 2017
Jordan	Ajloun	Sakib	Sama et al., 2002

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

Country	Province	Locality	Citations
Turkey	Adiyaman	Kahta (Karadut)	Rejzek & Hoskovec, 1999; Özdikmen et al., 2013; Hoskovec et al., 2017
Turkey	Amasya	Gümüşhacıköy (İnegöl Mt.)	Malmusi & Saltini, 2005; Özdikmen et al., 2013
Turkey	Burdur	Altınyayla env.	Sama et al., 2011
Turkey	Gaziantep	Islahiye	Demelt, 1963; Özdikmen et al., 2013
Turkey	Hatay	Hassa (Akbez)	Pic, 1897
Turkey	Isparta	Kovada Lake National Park	Şabanoğlu & Şen, 2016
Turkey	İçel	Erdemli (Güzeloluk)	Malmusi & Saltini, 2005; Özdikmen et al., 2013; Hoskovec et al., 2017
Turkey	İçel	Erdemli (Arslanlı)	Ambrus et al., 2014
Turkey	İçel	Mut	Özdikmen et al., 2013; Özbek et al., 2015
Turkey	Mardin	Midyat (Haberli)	Hoskovec et al., 2017
Turkey	Niğde	Ulukışla (Çiftehan)	Holzschuh, 1977; Özdikmen et al., 2013
Turkey	Siirt	Şirvan	Holzschuh, 1977; Özdikmen et al., 2013
Turkey			Ganglbauer, 1881; Lodos, 1998; Ambrus et al., 2014; Danilevsky, 2017
Cyprus	Paphos	Eledio	Ambrus et al., 2014
Cyprus	Larnaca	Pano Lefkara	Ambrus et al., 2014
Cyprus			Ambrus et al., 2014; Danilevsky, 2017

Table 3. Reported global occurrence of *Calchaenesthes sexmaculata*, with bibliographic citations.

Country	Regional Unit	Locality	Citations
Algeria			Ganglbauer, 1881; Pic, 1891; Villiers, 1943, 1946; Vives, 2000; Verdugo, 2004, 2008; Löbl & Smetana, 2010; Plaza, 2011; Özdikmen et al., 2013; Verdugo & Coello, 2015; Danilevsky, 2017
Algeria	Kabylia		Reiche, 1861; Frivaldszky, 1845; Kraatz, 1863; Pic, 1922; Löbl & Smetana, 2010; Özdikmen et al., 2013; Hoskovec et al., 2017; Danilevsky, 2017
Algeria	Kabylia	Yakouren and Akfadou forests	Pic, 1896; Villiers, 1946
Algeria	Skikda	Philippeville	Villiers, 1946

Morocco			Villiers, 1943, 1946; Vives, 2000; Verdugo, 2004, 2008; Plaza, 2011; Löbl & Smetana, 2010; Özdikmen et al., 2013; Verdugo & Coello, 2015; Danilevsky, 2017
Morocco	Ben Silimane	Boulhaut	Rungs, 1952
Morocco	Fès-Boulemane	Daïet Achlef	Villiers, 1946
Morocco	Moyen Atlas Mts.		Arahou, 2008; Hoskovec et al., 2017
Morocco	Moyen Atlas Mts.	Ifrane: Dayet	Villiers, 1946; Rungs, 1947
		Aoua	
Morocco	Tangier		Villiers, 1946
Tunisia			Villiers, 1943, 1946; Vives, 2000; Verdugo, 2004, 2008; Plaza, 2011; Löbl & Smetana, 2010; Özdikmen et al., 2013; Verdugo & Coello, 2015; Danilevsky, 2017
Tunisia	Jendouba	El Feidja	Villiers, 1946
Spain			Ganglbauer, 1881; Villiers, 1943; Vives, 2000, 2001; Löbl & Smetana, 2010; Özdikmen et al., 2013; Verdugo & Coello, 2015; Danilevsky, 2017
Spain	Andalusia		Lacordaire, 1869; Vives, 2000, 2001
Spain	Andalusia: Cádiz	Posada del Ahogado. Sierra de Ojén (Tarifa)	Plaza & Ferrer, 1988; Verdugo, 2004; Plaza, 2011
Spain	Andalusia: Cádiz	Montera del Torero (Los Barrios)	Plaza, 1989, 2011; Verdugo, 2004
Spain	Andalusia: Cádiz	La Almoráima (Castelar de La Frontera)	Plaza, 2011
Spain	Andalusia: Cádiz	Los Alcornocales	Sláma & Simón Sorli, 2001; Verdugo, 2008
Spain	Andalusia: Granada		Sláma & Simón Sorli, 2001; Verdugo, 2008; Plaza, 2011
Spain	Andalusia: Málaga	Puerto de los Pilonos (Junquera)	Verdugo, 2004; Plaza, 2011
Spain	Andalusia: Málaga	Sierra de las Nieves	Sláma & Simón Sorli, 2001; Verdugo, 2008
Spain	Andalusia: Cádiz, Granada, Málaga		Verdugo, 2004; Verdugo & Pérez-López, 2004; Verdugo & Coello, 2015
