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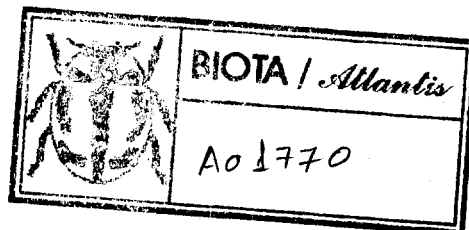
Aphid Parasites from the Canary Islands

(Hym. Aphidiidae)

BY

M. J. P. MACKAUER (*)

Belleville.



The Canaries are a part of the Mediterranean subregion of the Palearctic. Previously no aphid parasites were recorded from these islands. The insect collection of the Instituto Español de Entomología, Madrid, Spain, contains about 80 specimens collected by A. Cabrera from 1895 to 1934 on the islands of Tenerife and La Palma. This material was studied in 1961. It represents 12 different species.

The specimens were collected between September and the middle of June, the great majority from December to April. This corresponds to the humid and semi-humid season in the Canary Islands. The collecting data indicate that the different species enter diapause in late spring and early summer, and emerge in the following fall when the dry period is over.

The references given under each species are based both on literature and on data from various private collections. The occurrence in the Iberian peninsula, in North Africa, and in the Middle East is quoted from unpublished records of my own collection and of material received for identification.

1. *Ephedrus nitidus* Gahan.

Ephedrus nitidus Gahan, 1917, Proc. U. S. Nat. Mus. 53: 195, ♀.

Synonymy: *Ephedrus vidali* Quilis, 1931; *E. pulchellus* Stelfox, 1941; *E. interstitialis* Watanabe, 1941; *E. impressus* Granger, 1949; *E. holmani* Starý, 1958.

(*) Entomology Research Institute for Biological Control, Research Branch, Canada Department of Agriculture, Belleville, Ontario.

This species was recorded (under different synonyms) from Europe, North Africa, the Middle East, Asia, North America, South Africa, and Madagascar. It is assumed that it is native to the temperate zones of the Palearctic region, and was accidentally introduced to other parts of the world.

Material from the Canary Islands.—Tenerife: Bco. Honda, 16.ii.1905 (1 ♀, collected from Gramineae, *Triticum* sp.), 23.x.1904 (1 ♀, collected from "Gramineae, n. v. Gerrillo de burro"); Montaña de Guerra, 11.xii.1905 (1 ♀); Medano, 13.26.xii.1932 (1 ♀); Güümar, 22.i.1933 (1 ♀).

2. *Praon volucre* (Haliday) s. lat.

Aphidius (Praon) volucris Haliday, 1833, Ent. Mag. 1: 484, ♀ ♂.

P. volucre sensu auctt. is supposed to be a complex of sibling species. Its different forms were found throughout Europe, North Africa, and the Middle East, and are likely to occur in most parts of the Holarctic region.

Material from the Canary Islands.—Tenerife: La Coperana, Los Berros, 18.vi.1900 (1 ♂); Tejina, 31.i.1902 (1 ♂); La Esperanza, 15.ii.1902 (1 ♀); Cno. de la Riida, 10.i.1905 (1 a), 16.i.1905 (1 A), 12.ii.1905 (1 ♂); Cno. de las Mercedes, 16.i.1905 (1 o), 10.iii.1905 (1 ♀); Laguna, 16.v.1899 (1 ♂), 21.ii.1905 (1 ♀, reared from "Pulgón del crisantemo de jardín"), 16.iv.1905 (1 a), 10.ix.1906 (1 ?), 28.iv.1912 (1 ♂).

3. *Lysiphlebus ambiguus* (Haliday).

Aphidius ambiguus Haliday, 1834, Ent. Mag. 2: 104, ♀.
Synonymy: *Aphidius cardui* Marshall, 1896 (partim).

This parasite was found throughout Europe (except the Iberian peninsula) and in the Middle East (Israel, northern Iran).

Material from the Canary Islands.—Tenerife: Laguna, 23.xii.1930 (1 ♀).—La Palma: Isla de la Palma, 1905, leg. E. Santos (1 ♀).

4. *Aphidius ervi ervi* Haliday.

Aphidius ervi Haliday, 1834, Ent. Mag. 2: 100, ♀ ♂.
Synonymy: *Aphidius matraginis* Marshall, 1898; *A. fumipennis* Györfi, 1958.

The nominal subspecies is distributed over Europe, North Africa, and the Middle East. The subspecies *smithi* Sharma and Subba Rao is native to India but was purposely introduced to California and Hawaii for the biological control of the pea aphid; the subspecies *pisivorus* Smith (most certainly a synonym of *ervi*) was recorded from North America.

Material from the Canary Islands.—Tenerife: Cno. de San Miguel, 13.ii.1905 (1 ♂); Cno. de la Ruda, 16.i.1905 (1 ♂); Laguna, 7.ix.1899 (1 ♀), 10.iv.1904 (1 ♀), 24.v.1911 (1 ♂), 17.i.1933 (1 ♀); Bajamar, 27.iii.1905 (1 ♀); Tejina, 30.i.1902 (1 ♀, 1 ♂), 14.v.1902 (1 ♂); Aguirre, 9.iv.1933 (2 ♀ ♀).

5. *Aphidius avenae* Haliday.

Aphidius avenae Haliday, 1834, Ent. Mag. 2: 97, ♀ ♂.
Synonymy: *Aphidius granarius* Marshall, 1896.

This species was collected in various localities in Europe, North Africa, and the Middle East. As the host aphid is spread over the Holarctic region and was accidentally introduced to other parts of the world, it is probable that *avenae* is much more widely distributed than the records show.

Material from the Canary Islands.—Tenerife: Cno. del valle Jimenes, 7.iii.1904 (1 ♀); Cno. de los Baldios, 1.iii.1905 (1 ♀); Cno. San Miguel, 18.ii.1905 (1 ♂); Bco. Hondo, 15.ii.1905 (1 ♀); Pinar de la Esperanza, 10.ii.1905 (2 ♀ ♀); Monte de las Mercedes, 3.i.1905 (1 ♀); Laguna, 14.xii.1904 (1 ♀); Tejina, Costa, La Cordonera, 12.ii.1933 (1 ♀); Güümar, Montaña Grande, 29.i.1933 (2 ♀ ♀); Aguirre, 9.iv.1933 (1 ♀).

6. *Aphidius rosae* Haliday.

Aphidius rosae Haliday, 1834, Ent. Mag. 2: 97, ♀ ♂.

This aphid parasite was recorded from Europe, North Africa and Asia. In addition it occurs in North America (usually referred to as *confusus* Ashmead or *nigripes* Ashmead, rarely as *rosae*) and was presumably introduced to other parts of the world.

Material from the Canary Islands.—Tenerife: Bajamar, 5.ii.1904 (1 ♀).

7. *Aphidius matricariae* Haliday s. lat.

Aphidius matricariae Haliday, 1834, Ent. Mag. 2: 103, ♀.

Synonymy: *Aphidius cirsii* Haliday, 1834, non Curtis, 1831; *A. arundinis* Haliday, 1834; *A. polygoni* Marshall, 1896; *A. lychnidis* Marshall, 1896; *A. valentinus* Quilis, 1931; *A. affinis* Quilis, 1931; (?) *A. arundinis* var. *obscuriforme* Quilis, 1931; *A. renominatus* Hincks, 1943; *A. griteus* Smith, 1944.

A. matricariae is distributed over the Holarctic region (but may be native to the Palaearctic zone only), and probably also occurs in South America.

Material from the Canary Islands.—Tenerife: Monte de la Mina, 2.xii.1904 (1 ♀); Monte de las Mercedes, 3.i.1905 (1 ♂); Agua García, 10.iii.1899 (1 ♀); Pinar de la Esperanza, 15.ii.1902 (1 ?); Cno. de la Ruda, 10.i.1905 (1 ♀); Cno. de la Santa, 25.ii.1905 (1 ♀), 26.ii.1905 (1 ♂); Eco. Hondo, 15.ii.1905 (1 ♂, 1 ♂); Afür, 18.iii.1934 (2 ♂♂).

8. *Aphidius* sp. inc.

Material of the genus *Aphidius* Nees contained one male with 21 antennal segments, which morphologically resembled males of *A. cirsii*, but differed by having a yellow face. This specimen was collected on the island of La Palma (La Caldereta, 13.iv.1903).

9. *Diacretiella rapae* (Curtis).

Aphidius rapae Curtis, 1835, in M'Intosh, Book of the Garden, vol. 2: 194, ♀.

Synonymy: *Diacretus chenopodii* Foerster, in Kirchner, 1867; *Trioxys pictus* Cresson, 1880; *Lipohis chenopodiaphidis* Ashmead, 1889; *Aphidius brassicae* Marshall, 1896; *Diacretus californicus* Baker, 1909; *D. nigropennis* Viereck, 1911; *D. nopus* Quilis, 1931; *D. croaticus* Quilis, 1934; *D. flosiorapae* Blanchard, 1940; *D. aphidum* Mukerjee and Chatterjee, 1950.

This parasite is probably a cosmopolitan species. It was recorded from Europe, North Africa, Asia, North America, South America, the Oriental region, and Australia.

Material from the Canary Islands.—Tenerife: Laguna, 15.ix.1895 (1 ♂), 10.xi.1906 (1 ♀).

10. *Trioxys pannonicus* Stary.

Trioxys (Trioxys) pannonicus Stary, 1960, Bull. Soc. Ent. Mulhouse, vol. 1960: 93, figs. 1-3, ♀.

T. pannonicus was described from material collected in the Pannonic steppes of eastern and south-eastern Europe.

Examination of the 2 specimens from Tenerife did not reveal any differences in the external morphology or in colour between these and the original description or eastern European material: the single female specimen has 11 antennal segments, the male has 13 segments; the pterostigma is very short, nearly triangular, the metacarp is short; the propodeum is smooth, without any carinae or wrinkles.

Material from the Canary Islands.—Tenerife: Laguna, 7.iv.1910 (1 ♂); Güimar, Montaña Grande, 19.ii.1933 (1 ♀).

11. *Binodoxys angelicae granatensis* (Quilis).

Trioxys granatensis Quilis, 1931, Eos 7: 74, figs. 81-89, ♀ ♂.

Synonymy: *Trioxys obscuriformis* Quilis, 1931; *T. junariae* Quilis, 1931; *T. boscai* Quilis, 1931; *Trioxys Wollastonii* Cabrera, ♀ (nomen

nudum) [Tenerife, Laguna, 6.iii.1899; holotype in Coll. Inst. Esp. Ent., Madrid], NEW SYNONYMY.

B. angelicae granatensis represents a geographical subspecies that replaces the nominal form in the western part of the Mediterranean subregion, but does not occur in the Middle East (Israel). Members of the *angelicae* complex range over Europe, North Africa, the Middle East, and spread as far as Russia and southwestern Asia.

Material from the Canary Islands.—Tenerife: Cno. de la Ruda, 15.i.1905 (1 ♀), 16.i.1905 (1 ♂); Cno. San Miguel, 15.ii.1905 (1 ♀); Cno. de la Esperanza, 20.ii.1905 (1 ♀); Pinar de la Esperanza, 10.ii.1905 (1 ♀); Bco. Hondo, 15.ii.1905 (2 ♀♀, 1 ♂); Sta. Maria de Gracia, 15.ii.1903 (1 ♀); Agua Garcia, 10.iii.1899 (1 ♂); Laguna, 19.ix.1898 (1 ♀), 6.iii.1899 (1 ♀), ii.1902 (1 ♀), 3.iv.1904 (1 ♂), 18.xi.1905 (1 ♀), 16.i.1907 (1 ♀); Monte de las Mercedes, 30.i.1902 (leg. Mr. Gonnella (1 ♀)).

12. *Binodoxys brevicornis* (Haliday).

Aphidius (*Trioxys*) *brevicornis* Haliday, 1833, Ent. Mag. 1: 491, ♀.
Synonymy: (?) *Aphidius* (*Trioxys*) *minimus* Haliday, 1833.

B. brevicornis was collected in Europe, North Africa, and in the Middle East (Israel).

Material from the Canary Islands.—Tenerife: Laguna Camino del Bronco, 6.xi.1928 (1 ♀).

ZOOGEOGRAPHY.

Twelve species of aphid parasites are recorded from the Canary Islands. All specimens, except two, were collected on Tenerife. Only one specimen of *Lysiphlebus ambiguus* and one specimen of an unidentified *Aphidius* sp. were found on La Palma. Nothing is known of the fauna of the other islands of the group.

The species may be divided tentatively into four groups according to their host spectrum and geographical distribution:

- (1) Parasites of the *Brachycandus-Myzus* series:
Ephedrus nitidus,
Aphidius matricariae s. l.

- Diaeretiella rapae*;
- (2) Parasites of the subtribe Dactynotina:
(2 a) Widely distributed European species:
Praon volucre s. l.,
Aphidius crvi ervi,
Aphidius avenae,
Aphidius rosae,
Aphidius sp. inc.;
- (2 b) Relict species:
Trioxys pannonicus;
- (3) Parasite of the subtribe Brachycolina:
Binodoxys brevicornis;
- (4) Parasites of the subtribe Aphidina:
Lysiphlebus ambiguus,
Binodoxys angelicae granatensis.

Group (1) contains species that are spread throughout the Holarctic region or are cosmopolitan. *E. nitidus* is native to the temperate zones of the Palaearctic and was probably introduced from Central Europe via the Iberian peninsula to the Canary Islands. The Canarian specimens of *nitidus* are different from *E. palacstinensis* Mackauer which seems to be a related but endemic form found in the eastern Levant (Cyprus, Jordan, Israel). The origin of *A. matricariae* and *D. rapae* is doubtful. *A. matricariae* is supposed to be a Palearctic species that was accidentally introduced to North America and other continents.

The parasites of the groups (2 a) and (3) are biologically more specialized than are the species of group (1). All species are native to Europe. Some are spread over the Palaearctic region or were introduced to North America in relatively recent times.

The only representative of group (2 b), *Trioxys pannonicus*, attacks the aphid *Titanosiphon artemisiae* (Koch) which feeds on *Artemisia campestris* L. This parasite inhabits the arid and semi-arid steppes of eastern and south-eastern Europe (Slovakia, Hungary, eastern Germany). Its occurrence in the Canary Islands can not be connected with any records from Central Europe, the Mediterranean subregion, or from the Middle East, though its host aphid is distributed throughout Europe and *Artemisia* spp. are common plants in the Mediterranean area. Related aphid parasites were described from Turkestan

(*T. asiaticus* Telega) and northern Iran (*T. vandenboschi* Mackauer); in addition *T. infrequens* Smith, found once in Colorado, U. S. A., also probably belongs to this group. *T. pannonicus* and the previously mentioned species may be spread more widely than the records show. Nevertheless, the peculiar geographic range gives support to the hypothesis that *pannonicus* is a faunal relic in the Canaries from the warm tertiary period. The phylogenetic age of these species is evident. It is less probable therefore that *pannonicus* was introduced as aerial plankton or by human transports in recent times.

The two species of group (4) are restricted to a rather small geographic area and a small host group. *L. ambiguus* is very common in northern, central, western and eastern Europe. It is less abundant in the Mediterranean region, in North Africa, and in the Middle East. This parasite may have entered the Canary Islands from the African coast via the east-Mediterranean countries, rather than via Spain and Portugal where the species has yet to be found. The second species, *B. angulicæ granatensis*, occurs throughout the west-Mediterranean area. There is no proof that this subspecies originated in the Iberian peninsula and immigrated from there to North and North-west Africa, although the present distribution indicates this. The subspecies *granatensis* ranges eastwards as far as to Libya and Egypt.

The number of specimens of each species and the composition of the faunal list show that the majority of the parasites were collected by sweeping on cultivated land and on field-paths. At least eight species are parasites of Holarctic or cosmopolitan pest aphids of the family Aphididae (Homoptera: Aphidoidea); no parasites of other aphid families were present in this collection. The forms that are restricted to natural habitats (with the exception of *T. pannonicus*) are missing. This is obviously the reason that no endemic species or subspecies (which are otherwise not uncommon in insect collections from the Canary Islands) were found in this material.

The list of Aphidiidae given resembles broadly the Spanish or North-African fauna of corresponding habitats. Most parasites of aphids feeding on cultivated plants followed the Spanish colonization and probably were introduced either accidentally by man, or reached the Canaries as aerial plankton from the adjacent African mainland by crossing the relatively narrow strait (the shortest distance between the island of Fuerteventura and Cabo Yubi, Rio de Oro, is only 100 km.). This similarity in relatively recent species does not imply the European

origin of the Canarian fauna of Aphidiidae as such. Only the occurrence of *T. pannonicus* may indicate that a former land connection with continental Europe existed. Evidence is added by this to the results of similar research work on the geographic distribution of other insect families and especially on the flora of the Macaronesian islands.

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