

## VALIDATION OF THE FAUNISTIC DATA ON THE GENUS *ALEBRA* FIEBER, 1872 (HEMIPTERA, CICADELLIDAE) IN THE IBERIAN PENINSULA AND MADEIRA

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**Abstract:** Identification of *Alebra* leafhoppers is difficult because most species do not show specific differences in male genital structures. Colour pattern and host plant associations, the characters traditionally used in the recognition of these species, show considerable intraspecific variation. In the last decade, it was proved that the shape of male abdominal apodemes is the most reliable morphological character to separate species of this genus, and since then, some species have been splitted in two. To untangling the systematics of the European species it urges to revise data on host plants and distribution. For the Iberian Peninsula the actual species number was still uncertain because the taxonomic value of apodemes in *Alebra* was unknown when the faunistic records on this region were published. In this work it was analysed material from Spain, Portugal and the island of Madeira and three species were identified: *A. albostriella* (Fallén, 1826), *A. coryli* Le Quesne, 1976, new to the Iberian peninsula, and *A. viridis* Rey, 1894 *sensu* Gillham 1991, recorded for the first time to the fauna of Madeira and Spain.

**Key words:** Hemiptera, Cicadellidae, leafhoppers, *Alebra*, Iberian Peninsula, Madeira, distribution.

**Resumen:** La identificación de cigarrillas del género *Alebra* es difícil porque la mayoría de las especies no presentan diferencias específicas en las estructuras genitales de los machos. Los patrones de color y la asociación a sus plantas huéspedes, caracteres tradicionalmente utilizados en la separación de estas especies, muestran una considerable variación intraespecífica. En la última década, se ha probado que la forma de los apodemas abdominales de los machos es el carácter morfológico más fiable para separar las especies de este género, y desde entonces, algunas especies han sido separadas en dos. Para esclarecer la sistemática de las especies europeas de este género, es necesario hacer una revisión urgente de los datos existentes sobre sus plantas huéspedes y distribución. En la Península Ibérica el número real de especies conocidas todavía era incierto porque el valor taxonómico de los apodemas en *Alebra* era desconocido cuando fueron publicados los datos faunísticos sobre esta región. En este trabajo se ha estudiado material de España, Portugal y la isla de Madeira y han sido identificadas tres especies: *A. albostriella* (Fallén, 1826), *A. coryli* Le Quesne, 1976, nueva cita para la Península Ibérica, y *A. viridis* Rey, 1897 *sensu* Gillham 1991, referida por primera vez para la fauna de Madeira y España.

**Palabras clave:** Hemiptera, Cicadellidae, cigarrillas, *Alebra*, Península Ibérica, Madeira, distribución.

### Introduction

*Alebra* is the only genus of the tribe *Alebrini* present in Europe (NAST, 1987). The species of this genus feed by sucking the palisade cells of leaves of deciduous trees and shrubs (CLARIDGE & WILSON, 1976, 1981). The degree of host association varies among species; some are monophagous, oligophagous or polyphagous (ARZONE & VIDANO, 1987; VIDANO & ARZONE, 1987a, 1987b; CLARIDGE & WILSON, 1976, 1981; AGUIN-POMBO, 1995). Although these leafhoppers are usually found in small numbers, occasionally they can become pests to chestnuts and other plants (DROSOPOULOS *et al.*, 1987; LAUTERER, 1986).

The taxonomy of this genus is very difficult because most species do not show any apparent differences in male genital structures. Colour pattern, body pigmentation and host plant associations, despite of showing intraspecific variation, were for decades the only characters used to separate species (RIBAUT, 1936). Although male calling songs (GILLHAM, 1992) and enzyme polymorphisms (DROSOPOULOS & LOUKAS, 1988; AGUIN-POMBO, 1995) are the most reliable characters for species identification, these cannot be screened in routinely taxonomic work. GILLHAM (1991) proved that the shape of male abdominal apodemes is a reliable character for identification of British species. At present, according to the shape of apodemes can be

clearly separated the six species present in Europe: *A. wahlbergi* (Boheman, 1845), *A. albostriella* (Fallén, 1826), *A. viridis* Rey, 1897 *sensu* GILLHAM 1991, *A. coryli* Le Quesne, 1976, *A. sorbi* Wagner, 1949 and *A. neglecta* Wagner, 1940.

The poor knowledge of the leafhopper fauna present in the Iberian Peninsula is still an important gap to understand the distribution of a great number of species. Only three species of *Alebra* have been recorded so far: *A. wahlbergi*, *A. albostriella* and *A. viridis*, this last species was recorded from Portugal as *A. albostriella* variety *viridis* (AUGUSTO MENDES, 1959). All these species have been referred to Portugal (LALLEMAND, 1929; LINDBERG, 1962; SEABRA, 1930, 1942; QUARTAU & DUARTE RODRIGUES, 1969; AUGUSTO MENDES, 1959) but only one, *A. albostriella*, was reported to Spain (LASSOYLACHA, 1948; BOLIVAR & CHICOTE, 1879; CUNIMARTORELL, 1897). For these two countries, the faunistic data on this genus is scarce. The most recent works were published more than thirty years ago and, at that time, the shape of apodemes was not used as a diagnostic character. Besides, since these publications two new species have been recognised in Europe: *A. coryli* Le Quesne, 1976 and *A. viridis* Rey, 1897. After the recognition of apodemes as new taxonomic characters and

the splitting of some species into new ones, it was necessary to validate previous faunistic data. The aim of this work is to clarify how many species of *Alebra* are present in the Iberian Peninsula and the island of Madeira.

## Material and methods

Most specimens analysed were sampled by sweeping with a net on plant foliage. Those specimens from Villa Rutis (A Coruña) and Puente Viesgo (Santander) were collected by I. Bolívar and belong to the Museum of Natural Sciences of Madrid (MNCN). Identification of males was based on the shape abdominal apodemes following the works of GILLHAM (1992), DWORAKOWSKA (1993) and AGUIN-POMBO (1995). Apodemes were heated in 10 % KOH and then rinsed in distilled water. On a slide with a small drop of glycerol, the apodemes were laid flat, then were covered with a cover-slide and examined under the microscope. Female colour morphs were identified according to GILLHAM (1992) and RIBAUT (1936).

## Results

The material studied corresponds to *A. albostriella*, *A. coryli* and *A. viridis*. Coloration and the shape of apodemes easily distinguished males. Females were identified according to colour pattern and the presence of dark pigmentation on the basis of hind tibia setae and abdomen. Several female specimens could not be identified and were excluded from this study.

The species of this genus do not show uniform colour pattern being described by RIBAUT (1936) and other authors several colour morphs. However, GILLHAM (1991, 1992) recognised later that the variety *viridis* in Ribaut's key of colour morphs was a different species from *A. albostriella*. This new species differed from *A. albostriella* in the shape of male abdominal apodemes, host plant associations and male acoustic signals and I refer to it as *A. viridis sensu* GILLHAM, 1991. All males of *A. albostriella* studied in this work show similar colour pattern while females belong mainly to the variety *typica* but four specimens correspond to the variety *discicollis*. In contrast, all specimens of *A. viridis* correspond to the variety *viridis* described by RIBAUT in his key to colour morphs (1936). These two species coexist frequently and are widely distributed in Galicia (Spain) being mainly associated to chestnut trees.

### *A. albostriella* (Fallén, 1826)

Females of *A. albostriella* from North of Spain were very similar to those of *A. wahlbergi* and *A. coryli* because they showed light colour pattern and almost no dark pigmentation on the abdomen. Therefore, identification of specimens that are light coloured should be based always on the shape of apodemes. LINDBERG (1961) recorded *A. albostriella* from Madeira but despite an extensive sampling done on this island, this species was never found (see discussion).

**Material studied:** SPAIN: A Coruña: Villa Rutis, 1 & data and host unknown. Lugo: Ribeira de Arriba - Quiroga, 600-700 m, 21.VIII.1994, 1 &, on *Castanea sativa*. Fisteus - Quiroga, 700 m, 21.VIII.1994, 1 % 10 && and 2 && *discicollis*

on *Castanea sativa* Mill. Ourense: Alto do Couso - Esgos, 21.VIII.1994, 6 &&, 1 & *discicollis* on *Castanea sativa* Mill. Pontevedra: Portonovo - Sanxenxo on *Castanea sativa* Mill: 5.IX.1991, 1 &; 7.IX.1991, 2 % 11 && and 1 & *discicollis* PORTUGAL. Tras-os-Montes: Vila Real, 6-7.VII.1998, 5 % 1 &.

**Host plants:** This species was found always on *Castanea sativa* but it is a polyphagous species associated to deciduous trees of several plant families (Arzone & Vidano, 1987; Vidano & Arzone, 1987a, 1987b). Adults were found from June to September.

### *Alebra viridis* Rey, 1897 sensu Gillham, 1992

This species is recorded for the first time to Spain and Madeira (but see discussion). The presence of nymphs and teneral male specimens in September, both in Spain and Madeira, suggests that this species probably completes two generations per year, similar to what occurs in Italy and Greece (DROSOPOULOS *et al.* 1987; DEMICHELIS & BOSCO, 1995).

**Material studied:** SPAIN. A Coruña: Villa Rutis, 1 % 5 &&, date and host unknown. Lugo: Fisteus - Quiroga, 21.VIII.1994, 11 % 3 && on *Castanea sativa* Mill. Ourense: Mouruás - San Xoán de Río, 790m, 21.VIII.1994, 8 % 11 &&, on *Castanea sativa* Mill. Alto do Couso - Esgos, 21.VIII.1994, 8 && on *Castanea sativa* Mill. Pontevedra: Portonovo - Sanxenxo, on *Castanea sativa* Mill: 7.IX.1991, 23 % 15 &&; 5.IX.1991, 14 % 17 &&; 6.IX.1992, 1 % Sanxenxo, 23-24.VI.2001, 1 & on *Castanea sativa*. Cantabria: Puente Viesgo, 1 &, date and host unknown. PORTUGAL. Tras-os-Montes: Vila Real, 6-7.VII.1998, 6 &&. Madeira: Poiso: 7.IX.1996, 5 % 19 && on *Quercus robur*; 15.IX.1996 on *Castanea sativa* 7 &&. Curral das Freiras, on *Castanea sativa* Mill.: 4.IX.1996, 4 % 22 && and 2 nymphs; 2.VII.1998, 4 % 5 && and 9 nymphs; Eira do Serrado, on *Castanea sativa*: VIII.1996, 71 % 44 && 1 nymph; 7.IX.1996, 1 &. Serra de Agua, 27.VII.1998 1 % 7 && and 1 nymph on *Castanea sativa*.

**Host plants:** It was collected mainly on chestnuts growing with *Quercus* spp in coppices next to agriculture fields. It was abundant in Northwest of Spain and coexists frequently with *A. albostriella*. The host plant records suggest that is oligophagous. It feeds on deciduous trees of the family Fagaceae being mainly associated to *Castanea sativa* and various species of *Quercus* (GILLHAM, 1991, 1992).

### *Alebra coryli* Le Quesne, 1977

This is a European species that was never recorded to the Iberian Peninsula (NAST, 1987; GILLHAM, 1992). The specimens differed from *A. albostriella* in apodeme shape, colour pattern and pigmentation but body size was similar and this is unusual because *A. coryli* is comparatively smaller (LE QUESNE, 1977). Other studies show that in *A. coryli* differences in body size are common, even among coexisting populations from different hosts (AGUIN-POMBO, 1995); however, the taxonomic status of some host-associated populations is still unclear.

**Material studied:** SPAIN: Lugo: Fisteus - Quiroga, 21.VIII.1994, 4 % These were obtained after sampling on several deciduous trees as *Acer* sp.

**Host plants:** This species was recorded as being monophagous on *Corylus avellana* L. but other studies show that can occur also on some species of *Quercus* (AGUIN-POMBO, 1995).

## Discussion

A detailed study of the genus *Alebra* refers that in Europe coexist several species complexes, which include more than the six species actually recognised (AGUIN-POMBO, 1995). Although some of these species have not been described yet, they can be separated by differences either in morphology, colour pattern, host plant associations, male acoustic signals, allozymes or distribution (AGUIN-POMBO, 1995; 2002; GILLHAM, 1991, 1992). But this situation is even more complicated especially in *A. albostricola*. In this species besides geographic genetic variation, exists also genetic differences among sympatric populations which are morphological similar but associated to different hosts. These populations of uncertain taxonomic status have been suggested to represent different host races at early stages of speciation (AGUIN-POMBO, 2002). To clarify the taxonomic status of these and other populations and to understand the most likely speciation processes involved in this genus, accurate data on host plants and distribution are necessary.

The little information available on the Iberian Peninsula was insufficient to know whether some species coexist in the western limit of its distribution area. This work suggest that *A. coryli*, *A. albostricola* and *A. viridis*, present also in Madeira, coexist in Europe being sympatric in all or part of its range (NAST, 1987). Nevertheless, the presence of *A. wahlbergi* in Portugal needs to be confirmed because this record was based on specimens identified only according to external appearance (AUGUSTO MENDES, 1959). Present data suggests that these three species have been dispersed successfully along with their hosts in Europe reaching some of them the archipelagos of Macaronesia.

The presence of these species in Macaronesia is probably the result of the introduction of chestnut plants by colonisers within the last 500 years. LINDBERG (1941, 1961) recorded *A. albostricola* associated to chestnuts from the islands of San Miguel (Azores archipelago) and Madeira; however, this work suggests that in Madeira is present only *A. viridis*. When Lindberg identified the specimens of Madeira as *A. albostricola*, he did not refer to which variety they belong. However, since *A. viridis* was not recognized at that time as a different species, it is possible that specimens from Madeira were misidentified. In fact when the few female specimens deposited by him at the Museum Municipal of Funchal in Madeira were examined (those deposited at the Finnish Museum of Natural Sciences were no available for this study), all of them resembled *A. viridis*. Their identification was not accurate because colouration was faded.

On the other hand, it is very unlikely that *A. albostricola* occur in Madeira. In an extensive sampling done on chestnuts in several localities of this island, including those visited by Lindberg, no specimens of *A. albostricola* were found. In contrast to this *A. viridis* was very common. Therefore, *A. viridis* is probably the only species of the genus present in Madeira. Other records of *A. albostricola* from Azores need also to be confirmed.

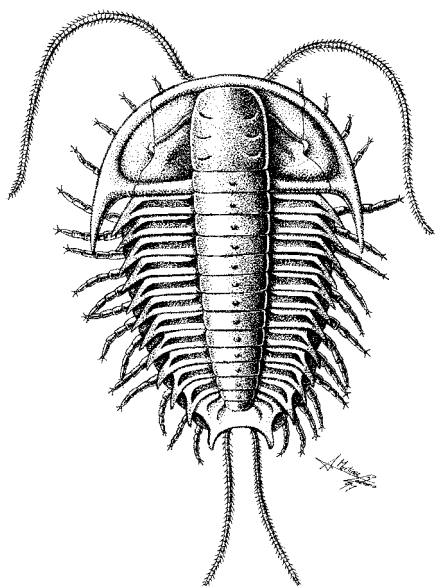
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