

Full Length Research Paper

Annotated catalogue of whiteflies (Hemiptera: Sternorrhyncha: Aleyrodidae) from Arasbaran, Northwestern Iran

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The fauna of whiteflies (Hemiptera: Sternorrhyncha: Aleyrodidae) was studied in Arasbaran region, Northwestern Iran. A total of 25 species of 15 genera were collected which of these, two species including, *Tetralicia ericae* Harrison and *Trialeurodes ericae* Bink-Moenen are new records for Iran.

Key words: Aleyrodidae, fauna, new record, arasbaran, Iran.

INTRODUCTION

Whiteflies belonging to the order Hemiptera and comprise a single super family, Aleyrodoidea, within the suborder Sternorrhyncha. They are all placed in a single family, Aleyrodidae, and are small sap-sucking insects whose adults bear a remarkable superficial resemblance to tiny moths. Adult whiteflies are very small insects, most measuring 1 - 3 mm in body length. A structure known as a 'vasiform orifice' is unique to aleyrodids, and comprises the anus, a 'lingula' which ejects excreta, and an 'operculum' which partially or wholly covers the orifice itself.

The vasiform orifice is present in all larval stages, as well in the adults (Mound and Halsey, 1978; Gerling, 1990).

Amongst the Sternorrhyncha, whiteflies appear to be a recently evolved group, with the oldest known fossil remains (not recognizably belonging to one of the two modern subfamilies) being from Lebanese amber from the lower Cretaceous, 135 million years ago (Schlee, 1970). Whiteflies with modern affinities are thus known from a period during which angiosperm plants underwent great diversification (Campbell et al., 1994). Many the rare species such as *Selaginella* (Mound et al., 1994) that habitually feed on ferns, and on 'fern allies' are exceptions to the rule. The great majority of whiteflies in existence today colonize only dicotyledonous angiosperms and a smaller, but significant, feed on monocots,

particularly grasses and palms. The list of cultivated plants colonized by whiteflies is extensive, but a great many records concern the relatively few highly polyphagous whitefly species (Mound and Halsey, 1978; Carver and Reid, 1996). In the geographical area covered by this study, whiteflies are primarily pests of vegetable crops (especially in greenhouses), citrus and ornamental plants (Martin, 1999).

The systematic of both subfamilies is currently based almost entirely on the puparial stage, and adults in isolation can be identified only rarely. This situation has arisen, in part, because puparia are often discovered in the absence of adult insects. However, adult characters have been used with most success in the least speciose subfamily, Aleurodicinae, but a fundamental appraisal is much needed before adults are likely to be used more widely in whitefly systematics. The use of modern molecular techniques also promises to assist our understanding of the systematics of this insect group (Martin et al., 2000).

Arasbaran is an important region in East Azarbaijan province. This biosphere reserve situated in the north of Iran at the border to Armenia and Azerbaijan belongs to the Caucasus Iranian Highlands. In-between the Caspian, Caucasus and Mediterranean region, the area covers mountains up to 2,200 meters, high alpine meadows, semi- arid steppes, rangelands and forests, rivers and springs.

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Arasbaran is the territory of about 23,500 nomads who are mainly living in the buffer and transition zones (2000). Economic activities in the biosphere reserve are mainly agriculture, animal husbandry, horticulture, apiculture, handicrafts and tourism, but business activities can also be found in urbanized areas. The location of Arasbaran is 38°40' to 39°08'N; 46°39' to 47°02'E and its Altitude (metres above sea level) is +250 to +2,887.

The fauna of Iranian whiteflies is very diverse but rather unknown. Although, there have been a number of publications of whiteflies in different regions, but there has been no account of the group across the whole region. In the present research, the fauna of these important pests I studied in Arasbaran region.

MATERIALS AND METHODS

In connection with this study, the puparia of whiteflies were collected on host plants' leaves from different regions of Arasbaran region (East Azarbaijan province, Northwestern Iran). Slide-mounted material was prepared as the method of Martin (1985). Detailed information about synonymies and distribution of quoted species are available in this work (Evans, 2005; Martin and Mound, 2007).

RESULTS AND DISCUSSIONS

In a total of 25 species of 15 genera including, *Paraleyrodes*, *Acaudaleyrodes*, *Aleuroclava*, *Aleurolobus*, *Aleurothrixus*, *Aleuroviggianus*, *Aleyrodes*, *Asterobemisia*, *Bemisia*, *Bulgarialeurodes*, *Dialeurodes*, *Parabemisia*, *Siphoninus*, *Tetralicia* and *Trialeurodes* were collected from Arasbaran region. Of these, two species including, *Tetralicia ericae* Harrison and *Trialeurodes ericae* Bink-Moenen are new records for Iran. The list of species is presented as follow with the synonymies and distributional data.

Family aleyrodidae Westwood 1840

The family Aleyrodidae (Hemiptera) includes 161 genera and 1556 species in 3 extant (living) subfamilies (Aleurodicinae, Aleyrodinae and Udamosellinae), and one fossil (non-living) subfamily (Bernaeinae). The identification of genera and species is largely based upon characteristics present in the fourth stage nymph, known as the puparium. The family Udamosellinae, also known as "giant whiteflies" includes only 2 Neotropical species. Most whitefly species can be classified into their respective subfamilies (Aleyrodinae or Aleurodicinae) with the following key:

Key to subfamilies of aleyrodidae (Puparium) [Adapted from Evans, 2007]

1- Puparium usually with compound or agglomerate pores present, a claw present at the apex of each thoracic leg; lingula usually very long, extending past the

vasiform orifice with two or more pairs of setae at its apex.....Aleurodicinae

1b- Pupa without compound pores present (simple pores rarely present), thoracic legs with adhesive or circular disc at the apices of the legs; lingula usually not long and extending past the vasiform orifice and with 1 pair of setaeAleyrodinae

Key to the subfamilies of aleyrodidae (Adults) [Adapted from Evans, 2007]

1- Forewing usually with a forked, central vein (Rs present, R1 and media veins strongly developed), forewing of *Paraleyrodes* with a single vein, males with 3 and females with four antennal segments; tarsal paronychium thin and spine-like; females with 4 and males with 3 ventral abdominal plates, respectively.....Aleurodicinae.

1b- Forewing with a single non-forked central vein (Rs present, R1 usually short or absent), tarsal paronychium thick and blade-like; females with 2 and males with 4 ventral abdominal plates, respectively.....Aleyrodinae.

Species list of aleyrodidae from arasbaran

In a total of 25 whitefly species from 15 genera and two Subfamilies Aleurodicinae and Aleyrodinae were collected and identified from different regions of Arasbaran. The list of species is below:

I. Subfamily Aleurodicinae Quaintance and baker 1913

Aleurodicinae Quaintance and Baker 1913: 25.

Genus *Paraleyrodes* Quaintance 1909

Paraleyrodes Quaintance 1909: 169 - 170. Type species: *Aleurodes perseae* Quaintance 1900, by monotypy.

Paraleyrodes minei laccarino 1990

Paraleyrodes minei laccarino 1990: 132. Holotype male. Syria: Tartous, 17.viii.1988, on *Citrus aurantium* (Rutaceae), Martin 1996: 1856.

Material: Khodafarin, July 2007 on *Piper* sp. (Piperaceae).

Distribution: Belize, Benin, Bermuda, Guatemala, Hawaii, Honduras, Hong Kong, Iran, Israel, Lebanon, Mexico, Morocco, Puerto Rico, Spain, Syria, Turkey, USA.

II. Subfamily Aleyrodinae Westwood 1840

Aleyrodinae Westwood 1840: 442.

Genus *Acaudaleyrodes* Takahashi 1951

Acaudaleyrodes Takahashi 1951a: 382. Type-species: *Acaudaleyrodes pauliani* Takahashi 1951, by monotypy.

Acaudaleyrodes rachipora (Singh) 1931

Aleurotrachelus rachipora Singh 1931: Syntypes. India: Pusa and Dholi (Bihar), Navsari (Baroda), Miani (Punjab, on *Cassia fistula* (Fabaceae), *Euphorbia pilulifera* (Euphorbiaceae), *Bauhinia* sp. (Fabaceae) and *Dalbergia sissoo* (Fabaceae).

Acaudaleyrodes rachipora (Singh); Russell 1962: 64

Aleurotrachelus citri Priesner and Hosny 1934. Syntypes. Egypt: Behera, on *Citrus* spp. (Rutaceae), *Punica granatum* (Punicaceae) and other plants; synonymy according to Jesudasan and David 1991: 242.

Acaudaleyrodes citri (Priesner and Hosny); Russell 1962: 64.

Aleurotrachelus alhagi Priesner and Hosny 1934. Syntype. Egypt, Minya, Luxor-Karnak, on *Alhagi* sp. (Fabaceae); Mound 1965: 119.

Material: Kalibar, August 2006 on *Punica granatum* (Punicaceae).

Distribution: Cameroon, Canary Islands, Chad, Cyperus, Egypt, India, Iran, Iraq, Israel, Jordan, Kenya, Liberia, Madagascar, Niger, Nigeria, Saudi Arabia, Sierra Leon, South Africa, Sudan.

Genus *Aleuroclava* Singh 1931

Aleuroclava Singh 1931: 90. Type species: *Aleuroclava complex* Singh 1931, by monotypy.

Aleuromigda Singh 1931. Nomen nudum, no type species designated.

Aleurotuberculatus Takahashi 1932: 20. Type species.

Aleurotuberculatus gordoniae Takahashi 1932, by original designation; synonymy according to Martin 1999: 31.

Japaneyrodes Zahradnik 1962: 13. Type species.

Aleurotuberculatus trachelospermi Takahashi 1938, by original designation; synonymy according to Mound and Halsey 1978: 78.

Hindaleyrodes Meganathan and David 1994: 37. Type species. *Hinaleyrodes hindustanicus*, by monotypy; synonymy according to Martin and Mound 2007: 9.

Martiniella Jesudasan and David 1990: 7. Type species.

Aleurotuberculatus canagae Corbett 1935, by original

designation; synonymy according to Martin 1999: 31; Manzari and Quicke 2006: 2470.

Taiwanaleyrodes Takahashi 1932: 28. Type species.

Taiwanaleyrodes meliosmae Takahashi 1932, by monotypy; synonymy according to Manzari and Quicke 2006: 2470.

Note: Martin 1999: 31 synonymized *Martiniella* Jesudasan and David 1990 with *Aleuroclava*, stating that the characters used to separate it from *Aleuroclava* - the very much enlarged, jointed cephalic and first abdominal setae were also present in species of *Taiwanaleyrodes* and *Dialeurodes*, and that this character has been seen to vary among samples. Sundararaj and Dubey 2004: 358 considered *Martiniella* to be a valid genus based upon its differentiated type of setae.

Aleuroclava neolitsea (Takahashi) 1934

Aleurotuberculatus neolitsea Takahashi 1934: 55. Syntypes. Taiwan: on *Neolitsea acuminatissima* (Lauraceae), TARI.

Aleuroclava neolitsea (Takahashi); Martin 1999: 31.

Material: Ahar, July 2007 on *Syzygium* sp. (Myrtaceae).

Distribution: Iran, Malaysia, New Guinea, Sarawak, Sulawesi, Taiwan.

Genus *Aleurolobus* Quaintance and Baker 1914

Aleurolobus Quaintance and Baker 1914: 108. Type species: *Aleurodes marlatti* Quaintance 1903, by original designation.

Neoaleurolobus Takahashi 1951b: 5. Type species. *Aleurolobus musae* Corbett 1935, by monotypy; synonymy according to Regu and David 1993: 32; Martin and Mound 2007: 13.

Rositalleyrodes Meganathan and David 1994: 48. Type species. *Aleurolobus opilismeni* Takahashi 1931, by monotypy; synonymy according to Manzari and Quicke 2006: 2471; Martin and Mound 2007: 13.

Aleurolobus marlatti (Quaintance) 1903

Aleurodes marlatti Quaintance 1903: 61. Lectotype (designated Martin 1999:43). Japan: on orange [*Citrus* sp. (Rutaceae)], USNM.

Aleurolobus marlatti (Quaintance); Quaintance & Baker 1914: 109.

Aleurolobus niloticus Priesner and Hosny 1934: 1. Syntypes. Egypt: on *Zizyphus spina-christi* (Rhamnaceae), USNM; Bink-Moenen 1983: 50; synonymy according to Martin 1999: 43.

Aleurolobus ravisei Cohic 1968: 95. Syntypes. Congo: on *Hymenocardia acida* (Euphorbiaceae), CORSTOM; synonymized with *A. niloticus* by Bink-Moenen 1983: 50.

Material: Khomarloo, September 2007 on *Hedera* p. (Araliaceae).
Distribution: Chad, China, Egypt, India, Iran, Israel, Japan, Java, Jordan, Malaysia, Philippines, Saudi Arabia, Taiwan.

***Aleurolobus moundi* David and Subramaniam 1976**

Aleurolobus moundi David and Subramaniam 1976: 161. Holotype. India: on *Bassia* sp. (Chenopodiaceae), ZSI.

Material: Aras boundary, September 2006 on *Euphorbia* sp. (Euphorbiaceae).

Distribution: Iran, India.

***Aleurolobus olivinus* (Silvestri) 1911**

Aleurodes olivinus Silvestri 1911: 214. Syntypes. Italy: on *Olea* sp. (Oleaceae), IESP.

Aleurolobus olivinus (Silvestri); Quaintance and Baker 1915.

Material: Kalibar, August 2006 on *Olea ferruginea* (Oleaceae).

Distribution: China, Cyperus, Egypt, France, Israel, Italy, Morocco, Spain.

***Aleurolobus selangorensis* Corbett 1935**

Aleurolobus selangorensis Corbett 1935b: 819. Syntypes. Malaya: on undetermined plant; Martin 1985: 317.

Material: Ahar, September 2007 on *Vitex pseudo-negundo* (Verbenaceae).

Distribution: Iran, Malaya, Papua New Guinea.

Genus *Aleurothrixus* Quaintance and Baker 1914

Aleurothrixus Quaintance and Baker 1914: 103. Type species. *Aleyrodes howardi* Quaintance 1907: 91, junior synonym of *Aleurodes floccosa* Maskell 1896: 432.

Aleurothrixus (Philodamus) Quaintance and Baker 1917: 404. Type species. *Aleyrodes interrogationis* Bemis 1904, by monotypy.

Hempelia Sampson and Drews 1941: 166. Type species. *Hempelia chivelensis* Sampson and Drews 1941, by monotypy; synonymy according to Martin 2005: 20.

***Aleurothrixus floccosus* (Maskell) 1895**

Aleurodes floccosa Maskell 1895: 432. Syntypes. Cuba: on *Citrus* sp. (Rutaceae), NZAC.

Aleurothrixus floccosus (Maskell); Quaintance and Baker

1914: 91.

Aleyrodes horridus Hempel 1899: 394. Syntypes. Brazil: on *Psidium guajava* (Myrtaceae).

Aleurothrixus horridus (Hempel); Quaintance and Baker 1914: 103.

Aleyrodes howardi Quaintance 1907: 91. Syntypes. Cuba: on *Citrus* sp., USNM; synonymized by Costa Lima 1942: 425.

Material: Khodaafrin, July 2007 on: *Cordia* sp. (Boraginaceae).

Distribution: Angola, Antigua, Argentina, Bahamas, Barbados, Bermuda, Bolivia, Brazil, Canary Islands, Chile, Colombia, Congo, Costa Rica, Colombia, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, France, Gabon, Guadeloupe, Guam, Guatemala, Guinea, Guyana, Haiti, Honduras, India, Iran, Italy, Jamaica, Japan, Liberia, Madeira, Martinique, Mexico, Montserrat, Morocco, Nicaragua, Nigeria, Panama, Paraguay, Portugal, Puerto Rico, Reunion, Sicily, Spain, Suriname, Tahiti, Taiwan, Thailand, Trinidad & Tobago, Uruguay, USA, Venezuela, Virgin Islands.

Genus *Aleuroviggianus* Iaccarino 1982

Aleuroviggianus Iaccarino 1982: 37. Type species. *Aleuroviggianus adrianae* Iaccarino 1982, by original designation.

***Aleuroviggianus adrianae* Iaccarino 1982**

Aleuroviggianus adrianae Iaccarino 1982: 38. Holotype. Italy: Portici, on *Quercus ilex* (Fagaceae), UNP.

Material: Ahar, September 2007 on *Quercus macranthera* (Fagaceae).

Distribution: France, Greece, Iran, Italy, Spain.

***Aleuroviggianus halperini* Bink-Moenen 1992**

Aleuroviggianus halperini Bink-Moenen 1992, in Bink-Moenen and Gerling 1991: 14. Holotype. Israel: Mt. Meron, ix.1976, R. Neeman, on *Quercus calliprinos* (Fagaceae), BMCOL.

Material: Kalibar, August 2006 on *Quercus petraea* (Fagaceae).

Distribution: Crete, Greece, Iran, Rhodes, Turkey.

Genus *Aleyrodes* Latreille 1796

Aleyrodes Latreille 1796: 93. Type species. *Phalaena (Tinea) proleta* Linnaeus 1758: 537, by monotypy.

Conantulus Goux 1987: 65. Type species. *Conantulus*

lacombiensis Goux 1988, by monotypy; synonymy according to Martin 1999: 53.

***Aleyrodes Ionicerae* Walker 1852**

Aleyrodes Ionicerae Walker 1852: 1092. Syntypes. England: on *Lonicera periclymenum* (Caprifoliaceae). *Aleyrodes borchsenii* Danzig 1966: 371. Holotype. USSR: southern Maritime Territory, on *Urtica* sp. (Urticaceae), ZIN; Danzig 2004.

Aleyrodes fragariae Walker 1852: 1092. Syntypes. England: on *Fragaria* sp. (Rosaceae); Ossianniilsson 1955: 193.

Conantulus lacombiensis Goux 1987: 65; Martin 1999: 53.

Aleyrodes menthae Haupt 1934: 139. Syntypes. Germany: on *Mentha piperita* (Labiatae); Ossianniilsson 1955: 193.

Aleyrodes spiraeae Douglas 1894b: 73. Syntypes. Germany: on *Lonicera xylosteum* (Caprifoliaceae); Mound 1966: 406.

Aleyrodes rubi Signoret 1868: 382. Syntypes. France: on *Rubus fruticosus* (Rosaceae); Trehan 1940: 608.

Material: Aynalo, June 2007 on *Solanum melongena* (Solanaceae).

Distribution: Austria, England, Finland, France, Germany, Hungary, Iran, Israel, Italy, Korea, Poland, Portugal, Russia, Sweden, Switzerland, Turkey, USSR, Yugoslavia.

***Aleyrodes proletella* (Linnaeus) 1758**

Phalaena (Tinea) proletella Linnaeus 1758: 537. Syntypes. Europe: on *Brassica* sp. (Brassicaceae).

Aleyrodes brassicae Walker 1852: 1092. Syntypes. England: on cabbage (*Brassica* sp.); Haupt 1935: 256. *Aleyrodes chelidonii* Latreille 1807; Walker 1852: 1092.

Aleyrodes euphorbiae Low 1867: 746. Syntypes. Austria: on *Euphorbia peplus* (Euphorbiaceae); Zahradnik 1991: 113.

Coccus preanthis Schrank 1801: 147.

Aleyrodes preanthis (Schrank) 1801; Cockerell 1902: 281.

Aleyrodes youngi Hempel 1901: 385. Syntypes. Brazil: on cabbage [*Brassica* sp. (Brassicaceae)].

Material: Khodafarin, July 2006 on *Brassica oleracea* (Brassicaceae).

Distribution: Angola, Austria, Azores, Belgium, Bermuda, Brazil, Canary Islands, Czech Republic, Egypt, England, Finland, France, Germany, Hong Kong, Hungary, Iran, Italy, Kenya, Mexico, Mozambique, New Zealand, Puerto Rico, Poland, Portugal, Russia, Sierra Leon, Spain, Sweden, Switzerland, USA (intercepted in

USA but not known to be established), USSR, Virgin Islands, Yugoslavia, Zimbabwe.

Genus *Asterobemisia* Trehan 1940

Asterobemisia Trehan 1940: 591. Type species.

Aleurodes carpini Koch 1857, by monotypy. [*Aleyrodes* [*sic*] *carpini* Koch].

Bemisia (*Neobemisia*) Visnya 1941: 8. Type species: *Bemisia yanagicola* Takahashi 1934, by original designation; Mound and Halsey 1978: 104.

Neobemisia Visnya; synonymy according to Zahradnik 1961: 61.

***Asterobemisia carpini* (Koch) 1857**

Aleurodes carpini Koch 1857: 327. Syntypes. Germany (west): on *Carpinus betulus* (Betulaceae), BMNH.

Asterobemisia carpini (Koch) 1857; Trehan 1940: 593.

Aleurodes avellanae Signoret 1868: 385. Lectotype (designated by Zahradnik 1961: 437). France: on *Corylus avellana* (Betulaceae), IESP; Mound and Halsey 1978: 105.

Aleurochiton avellanae (Signoret); Harrison 1920: 59; Zahradnik 1956: 44.

Bemisia (*Neobemisia*) *avellanae* (Signoret); Visnya 1941: 8.

Aleurodes ribium Douglas 1888: 265. Lectotype. unknown host and locality, BMNH.

Bemisia (*Neobemisia*) *ribium* (Douglas); Visnya 1941: 9.

Aleurodes rubicola Douglas 1891: 200. Lectotype. England: on bramble [*Rubus* sp. (Rosaceae)] leaves, BMNH; Trehan 1939: 266.

Aleurochiton vaccinii Kunow 1880: 46. Syntypes. Konisberg Prov, on *Vaccinium uliginosum* (Ericaceae), BMNH.

Material: Horand, October 2006 on *Corylus avellana* (Betulaceae).

Distribution: Austria, Costa Rica, Czech Republic, Denmark, England, Finland, France, Germany, Hungary, Iran, Italy, Korea, Moldavia, Netherlands, Spain, Sweden, Taiwan, USSR, Former Yugoslavia.

Genus *Bemisia* Quaintance and Baker 1914

Bemisia Quaintance & Baker 1914: 99. Type species. *Aleurodes inconspicua* Quaintance 1900: 28 (junior synonym of *Aleurodes tabaci* Gennadius 1889).

Cortesiana Goux 1988: 63. Type species. *Cortesiana restonicae* Goux 1988, by monotypy; synonymy according to Martin 1999: 54.

Roucasia Goux 1940: 45. Type species. *Roucasia ovata* Goux 1940, by monotypy; synonymy according to Danzig 1964: 326.

***Bemisia afer* (Priesner and Hosny) 1934**

Dialeurodoides afer Priesner and Hosny 1934: 6. Syntypes. Egypt, Kom Ombo, 4.vii.1931, on *Lawsonia alba* (Lythraceae), USNM.

Bemisia afer (Priesner and Hosny); Habib and Farag 1970: 8.

Bemisia (*Neobemisia*) *afra* [sic] (Priesner and Hosny); Visnya 1941: 8.

Bemisia citricola Gomez-Menor 1945: 293. Syntypes. Spain, Orihuela, Alicante, on *Citrus limonium*, *Citrus aurantium* (Rutaceae), *Eucalyptus* sp. (Myrtaceae), *Morus* sp. (Moraceae), *Cynanchum acutum*, *Laurus nobilis* (Lauraceae).

Bemisia hancocki Corbett 1936. Syntypes. Uganda: 1934, G. Hancock, on cotton [*Gossypium* sp. (Malvaceae)]; BMNH; synonymy according to Bink-Moenen 1983: 95.

Bemisia (*Neobemisia*) *hancocki* Corbett; Visnya 1941: 8.

Material: Khodafarin, July 2006 on *Gossypium hirsutum* (Malvaceae).

Distribution: Australia, Brazil, Cameroon, Chad, China, Congo, Egypt, Guinea, India, Iran, Israel, Italy, Ivory Coast, Kenya, Korea, Madagascar, Mulawi, New Guinea, Niger, Nigeria, Pakistan, Sicily, Sierra Leon, Spain, South Africa, Sudan, Uganda, Zaire.

***Bemisia tabaci* (Gennadius) 1889**

Aleurodes tabaci Gennadius 1889: 1-3. Syntypes. Greece: on tobacco [*Nicotiana* sp. (Solanaceae)], USNM. *Bemisia tabaci* (Gennadius); Takahashi 1936: 110.

Bemisia argentifolii Bellows and Perring 1994, in Bellows et al., 1994; synonymy according to De Barro et al., 2005: 201.

Bemisia achyranthes Singh 1931: 82. Syntypes. India: on *Achyranthes aspera* [synonymized with *B. gossypiperda* by Corbett 1935b: 783].

Bemisia argentifolii Bellows and Perring 1994, in Bellows et al. 1994. Holotype pupal case. USA: California, xii.1992, stock culture, on *Phaseolus limensis* (Fabaceae).

Bemisia bahiana Bondar 1928: 30. Syntypes. Brazil: on *Nicotiana tabacum*.

Bemisia costa-limai Bondar 1928: 27. Syntypes. Brazil: on *Euphorbia hirtella* (Euphorbiaceae).

Bemisia emiliae Corbett 1926: 273. Syntypes. Sri Lanka: on *Emilia sonchifolia* (Asteraceae).

Bemisia goldingi Corbett 1935c: 249. Syntypes. Nigeria: on cotton [*Gossypium* sp. (Malvaceae)].

Bemisia gossypiperda Misra and Singh 1929: 1. Syntypes. India: on many plants.

Bemisia gossypiperda var *mosaicivectura* Ghesquiere 1934: 30. Syntypes. Zaire: on *Jatropha multifida* (Euphorbiaceae) and *Manihot* sp. (Euphorbiaceae).

Bemisia hibisci Takahashi 1933: 17. Syntypes. Taiwan: on *Hibiscus rosa-sinensis* (Malvaceae).

Aleurodes inconspicua Quaintance 1900: 28. Syntypes. USA; Florida, Barlow, on *Physalis* sp. (Solanaceae), USNM; Russell 1957: 122.

Bemisia longispina Priesner & Hosny 1934: 6. Syntypes. Egypt: on *Psidium guajava* (Myrtaceae).

Bemisia lonicerae Takahashi 1957: 16. Syntypes. Japan: on *Lonicera japonica* (Caprifoliaceae).

Bemisia manihotis Frappa 1938: 30. Syntypes. Madagascar: on *Manihot* sp. (Euphorbiaceae).

Bemisia minima Danzig 1964: 638. Holotype. USSR: Caucasian Black Sea coast, on *Elsholtzia patrini*. *Bemisia miniscula* Danzig 1964: 640. Holotype. USSR: Adzharia, on *Cissus salvifolius* (Vitaceae).

Bemisia nigeriensis Corbett 1935c: 250. Syntypes. Nigeria: on cassava [*Manihot* sp. (Euphorbiaceae)].

Bemisia rhodesiansis Corbett 1936: 22. Syntypes. Rhodesia: on tobacco [*Nicotiana* sp.].

Bemisia signata Bondar 1928: 29. Syntypes. Brazil: on *Nicotiana glauca*.

Bemisia vayssierei Frappa 1939: 255. Syntypes. Madagascar: on tobacco [*Nicotiana* sp.].

Cortesiana restonicae Goux 1988. Holotype. Corsica.

Material: Abshahmad, June 2006 on *Nerium oleander* (Apocynaceae); Khomarloo, August 2006 on *Nerium oleander* (Apocynaceae); Aras boundary, September 2006 on *Plantago* sp. (Plantaginaceae); Ahar, July 2007 on *Beta vulgaris* (Chenopodiaceae); Kalibar, July 2008 on *Brassica campestris* (Brassicaceae).

Distribution: Virtually worldwide; Afghanistan, Algeria, Andaman and Nicobar Islands, Argentina, Australia, Barbados, Brazil, Cameroon, Canary Island, Chile, Caroline Islands, Central African Republic, Chad, China, Colombia, Congo, Cuba, Cyprus, Dominican Republic, Ecuador, Egypt, El Salvador, England, Ethiopia, Fiji, France, French Guiana, Guadeloupe, Haiti, Honduras, Gabon, Gambia, Ghana, Greece, Grenada, Guatemala, Guam, Guyana, Hawaii, Hong Kong, India, Iran, Iraq, Israel, Italy, Ivory Coast, Jamaica, Japan, Jordan, Kenya, Korea, Lebanon, Liberia, Libya, Madagascar, Malaysia, Mariana Islands, Mauritius, Mexico, Mozambique, Netherlands, New Guinea, Nicaragua, Nigeria, Pakistan, Panama, Peru, Philippines, Portugal, Puerto Rico, Romania, Saipan, Saudi Arabia, Senegal, Seychelles, Singapore, Sierra Leone, South Africa, Spain, Sri Lanka, Sudan, Sumatra, Syria, Tahiti, Taiwan, Thailand, Trinidad and Tobago, Turkey, Uganda, United Kingdom, USA, Venezuela, Virgin Islands, Yemen, Zaire, Zimbabwe.

Genus *Bulgarialeurodes* Corbett 1936

Bulgarialeurodes Corbett 1936: 18. Type species: *Bulgarialeurodes rosae* Corbett 1936 (syn. *Aleurodes cotesii* Maskell 1896), by monotypy.

Bulgarialeurodes cotesii (Maskell) 1895
Aleurodes cotesii Maskell 1895: 427. Syntypes. Pakistan: on *Rosa* sp. (Rosaceae), ADSIR.

Bulgarialeurodes cotesii (Maskell); Russell 1960: 30.
Aleurodes rosae Kiriukhin 1947: 10. Syntypes. Iran: on *Rosa* spp.; synonymy according to Russell 1960: 30.
Bulgarialeurodes rosae Corbett 1936: 18. Syntypes. Bulgaria: on *Rosa damascena*; synonymy according to Russell 1960a: 30.

Material: Kalibar, August 2008 on *Rosa canina* (Rosaceae).

Distribution: Afghanistan, Bulgaria, Iran, Pakistan, Romania, Turkmenistan, USSR, Yugoslavia.

Genus *Dialeurodes* cockerel 1902

Aleyrodes (*Dialeurodes*) Cockerell 1902: 283. Type species. *Aleyrodes citri* Riley & Howard 1893, by original designation, a synonym of *A. citri* Ashmead 1885: 704.

Dialeurodes Cockerell; full genus, Quaintance and Baker 1914: 97.

Kanakarajiella David and Sundararaj 1993. Type species. *Dialeurodes vulgaris* Singh 1931, by original designation; synonymy according to Martin and Mound 2007: 28.

Lankaleurodes David 1993: 23. Type species. *Dialeurodes radiipuncta* Quaintance & Baker 1917, by original designation; synonymy according to Martin and Mound 2007: 28.

Shanthinia David 2000, in P.M.M. David 2000: 125. Type species - *Shanthinia sheryli* David 2000, by monotypy and original designation; synonymy according to Martin and Mound 2007: 28.

Comment: Martin and Mound (2007) tentatively listed species in the following subgenera of *Dialeurodes* as being in the genus *Dialeurodes*: *Dialeurodes* (*Dialeuronomada*) Quaintance and Baker 1917: 51; *Dialeurodes* (*Rabdostigma*) Quaintance and Baker 1917: 426, *Dialeurodes* (*Gigaleurodes*) Quaintance and Baker 1917: 426, and *Dialeurodes* (*Dialeuroplata*) Quaintance and Baker 1917: 435.

Dialeuronomada Quaintance and Baker; full genus by Sundararaj and David 1991.

Dialeurodes kirkaldyi (Kotinsky) 1907

Aleyrodes kirkaldyi Kotinsky 1907: 95-96. Syntypes. USA: Hawaii, on undetermined trailing shrub, *Beaumontia grandifolia*, *Morinda citrifolia* (Rubiaceae) and *Jasminum grandiflorum* (Oleaceae), USNM.

Dialeurodes kirkaldyi (Kotinsky); Quaintance and Baker 1914: 98.

Dialeurodes yercaudensis Jesudasan and David 1991: 307. Holotype pupal case. India: on *Ligustrum walkeri* (Oleaceae), IDAV; synonymy according to Sundararaj and Dubey 2006.

Material: Khodafarin, July 2007 on *Malva sylvestris* (Malvaceae).

Distribution: Andaman and Nicobar Islands, Australia, Azores, Bahamas, Barbados, Burma, Caroline Islands, China, Cook Islands, Costa Rica, Cuba, Egypt, Fiji, Ghana, Greece, Guam, Guyana, Hawaii, Hong Kong, India, Iran, Israel, Jamaica, Japan, Lebanon, Malaysia, Mexico, Pakistan, Philippines, Puerto Rico, Samoa, Sri Lanka, Syria, Tahiti, Taiwan, Thailand, Trinidad, Turkey, UK, USA, Virgin Islands.

Genus *Parabemisia* Takahashi 1952

Parabemisia Takahashi and Mamet 1952: 21. Type species. *Parabemisia maculata* Takahashi 1952, by original designation.

Parabemisia myrica (Kuwana) 1927

Bemisia myrica Kuwana 1927: 249. Syntypes. Japan: on *Myrica rubra* (Myricaceae), *Morus alba* (Moraceae), *Citrus* spp. (Rutaceae) and other plants, TARI.

Parabemisia myrica (Kuwana); Takahashi 1952: 24.

Material: Khomarloo, September 2007 on *Lantana camara* (Verbenaceae).

Distribution: China, Egypt, Hawaii, India, Iran, Israel, Italy, Japan, Morocco, Spain, Taiwan, Turkey, USA, Venezuela.

Genus *Siphoninus* Silvestri 1915

Siphoninus Silvestri 1915: 245. Type species: *Siphoninus finitimus* Silvestri 1915, regarded by Mound and Halsey 1978: 191 as synonym of *S. phillyrae*, by original designation.

Siphoninus immaculatus (Heeger) 1856

Aleurodes immaculatus Heeger 1856: 33. Syntypes. Germany? On *Hedera helix* (Araliaceae).

Aleurochiton immaculatus (Heeger); Quaintance and Baker 1914: 105.

Trialeurodes immaculatus (Heeger); Quaintance and Baker 1915.

Siphoninus immaculatus (Heeger); Trehan 1940: 601.

Aleurodes immaculatus Heeger 1856: 33. Syntypes. Germany? On *Hedera helix*.

Siphoninus heegeri Haupt 1935: 259; synonymy according to Zahradnik 1963: 9.

Material: Khodafarin, August 2008 on *Fraxinus* sp. (Oleaceae).

Distribution: Austria, Czech Republic, England, Germany, Hungary, Iran, Italy, Sweden, USSR.

***Siphoninus phillyreae* (Haliday) 1835**

Aleurodes phillyreae Haliday 1835: 119. Syntypes. Ireland: on *Phillyrea latifolia* (Oleaceae), HAL.
Trialeurodes phillyreae (Haliday); Quaintance and Baker 1915.
Siphoninus phillyreae (Haliday); Silvestri 1915: 247.
Siphoninus phillyreae inequalis Goux 1949: 11. Syntypes. France: on pear [*Pyrus* sp. (Rosaceae)].
Siphoninus phillyreae multitubulatus Goux 1949: 11. Syntypes. Corsica: on *Olea europea* (Oleaceae).
Siphoninus phillyreae multitubulatus Goux; Mound and Halsey 1978: 192.
Aleurodes dubia Heeger 1859: 223. Syntypes, Germany?, on *Fraxinus* sp. (Oleaceae); Frauenfeld 1867: 796.
Aleurochiton dubius (Heeger); Quaintance and Baker 1914: 105.
Siphoninus dubiosa Haupt 1935: 259; synonymy according to Zahradnik 1963: 9.
Aleurodes phylliceae Bouche 1851: 110. Syntypes. Southern Europe: on *Phillyrea latifolia*? (Oleaceae).
Aleurodes phylliceae Bouche 1851; Frauenfeld 1867: 786.
Asterochiton phillyreae (Haliday); Quaintance and Baker 1914: 105.
Siphoninus finitimus Silvestri 1915: 245. Syntypes. Eritrea: on *Olea chrysophylla* (Oleaceae), IESP.
Siphoninus finitimus Silvestri; Mound and Halsey 1978: 192.
Siphoninus granati Priesner and Hosny 1932: 1. Syntypes. Egypt: Meadi, 16.viii.1931, Priesner and Hosny, on *Punica granatum* (Punicaceae), EDAC.
Siphoninus granati Priesner and Hosny; Mound and Halsey 1978: 192.
Trialeurodes inaequalis Gautier 1923: 339. Syntypes. France: on *Pyrus* sp. (Rosaceae); synonymy according to Mound and Halsey 1978: 192.

Material: Khodafarin, September 2006, on *Malus communis* (Rosaceae).

Distribution: Australia, Bulgaria, Cameroon, Corsica, Cyprus, England, Egypt, Eritrea, Ethiopia, Finland, France, Germany, Greece, Hungary, Iran, Ireland, Israel, Italy, Java, Jordan, Mexico, Peru, Spain, Sudan, Syria, Taiwan, USA, USSR, Venezuela, Yugoslavia, Zaire.

Genus *Tetralicia* Harrison 1917

Tetralicia Harrison 1917: 60. Type species. *Tetralicia ericae* Harrison 1917, by monotypy.

***Tetralicia ericae* Harrison 1917**

Tetralicia ericae Harrison 1917: 61. Syntypes. England: on *Erica tetralix* (Ericaceae), BMNH; Bink-Moenen 1976.

Material: Khodafarin, September 2007 on *Erica* sp. (Ericaceae). New record for Iran.

Distribution: Austria, Czech Republic, England, Italy, Netherlands, Sweden, Scotland, USSR, Wales.

Genus *Trialeurodes* Cockerell 1902

Aleurodes (*Trialeurodes*) Cockerell 1902: 283. Type species. *Aleurodes pergandei* Quaintance 1900, by original designation.
Trialeurodes Cockerell; full genus by Quaintance and Baker 1915.
Aleurodes (*Asterochiton*) Maskell; misidentification; Kirkaldy 1907: 43; Quaintance and Baker 1914: 104.
Aleurodes (*Ogivaurodes*) Goux 1948: 31. Types species. *Aleurodes lauri*, by monotypy; synonymy according to Mound and Halsey 1978: 205.
Gymnaurodes Sampson and Drews 1940: 29. Types species. *Gymnaurodes bellissima*, by monotypy; synonymy according to Sampson 1943: 209.

***Trialeurodes ericae* Bink-Moenen 1976**

Trialeurodes ericae Bink-Moenen 1976: 17. Holotype. The Netherlands: on *Erica tetralix* (Ericaceae), NHM (Rapisarda 1986: 497); Bink-Moenen 1989: 176.
Trialeurodes (*Ericaleurodes*) *ericae* Bink-Moenen; Rapisarda 1986: 490.

Material: Ahar, August 2008 on *Erica* sp. (Ericaceae). New record for Iran.

Distribution: Crete, Corsica, France, Majorca, Netherlands, Spain.

***Trialeurodes lauri* (Signoret) 1882**

Aleurodes lauri Signoret 1882: CLVIII. Syntypes. Greece: Athens (Grenadius), on *Laurus nobilis* (Lauraceae).
Aleuroparadoxus lauri (Signoret); Silvestri 1934: 399.
Trialeurodes lauri (Signoret); Russell 1947: 6.
Aleurodes (*Ogivaurodes*) *lauri* (Signoret); Goux 1948: 31.
Ogivaurodes lauri (Signoret); Goux 1951: 12.
Trialeurodes lauri (Signoret); Zahradnik 1963: 232.
Trialeurodes klemmi Takahashi 1940: 148. Syntypes. Yugoslavia: Rab, on *Laurus nobilis*; synonymy according to Russell 1947: 6.

Material: Kalibar, October 2007 on *Laurus nobilis* (Lauraceae).

Distribution: Australia, Belgium, Cyprus, France, Greece, Iran, Israel, Italy, Lebanon, Luxembourg, Switzerland, Turkey, USSR, Yugoslavia.

***Trialeurodes ricini* (Misra) 1924**

Aleyrodes ricini Misra 1924: 131. Syntypes. India: on *Ricinus communis* (Euphorbiaceae), USNM. *Trialeurodes ricini* (Misra); Singh 1931: 46.

Trialeurodes rara Singh 1931: 47. Syntypes. India, on *Breynia* sp. (Euphorbiaceae); synonymy according to Bink-Moenen 1983: 185.

Trialeurodes desmodii Corbett 1935c: 243. Syntypes. Sierra Leone, on *Desmodium lasiocarpum* (Fabaceae), BMNH; synonymy [with *T. rara*] according to Mound & Halsey 1978: 217.

Trialeurodes lubia El Khidir & Khalifa 1962: 47. Holotype. Sudan: on *Dolichos lablab* (Fabaceae); synonymy with *T. rara* according to Mound 1965: 157.

Material: Kalibar, July 2006 on *Ipomoea* sp. (Convolvulaceae).

Distribution: Andaman and Nicobar Islands, Cambodia, Cameroon, Central African Republic, Chad, India, Iran, Israel, Ivory Coast, Gabon, Madagascar, Malaya, Malaysia, Nigeria, Pakistan, Sierra Leon, Saudi Arabia, Sri Lanka, Sudan, Thailand, Turkey, Uganda, Zaire, Zimbabwe.

***Trialeurodes vaporariorum* (Westwood) 1856**

Aleurodes vaporariorum Westwood 1856: 852. Syntypes. England: on *Gonolobus* sp. (Asclepiadaceae), *Tecoma velutina* (Bignoniaceae), other plants, OUMNH.

Asterochiton vaporariorum (Westwood); Quaintance and Baker 1914: 105.

Trialeurodes vaporariorum (Westwood); Quaintance and Baker 1915.

Aleyrodes glacialis Bemis (misidentification in part); Bemis 1904: 518.

Asterochiton lecanioides Maskell 1879 (in part); Maskell 1879: 215. Syntypes. New Zealand: on *Pittosporum eugenioides* and *Polypodium billardieri*, ADSIR; synonymy according to Quaintance and Baker 1914: 105.

Trialeurodes mossopi Corbett 1935a: 9. Syntypes. Rhodesia: on *Phaseolus vulgaris* (Fabaceae), BMNH; synonymy according to Russell 1948: 44.

Aleurodes nicotiana Maskell 1895: 436. Syntypes. Mexico: on *Nicotiana tabacum* (Solanaceae), USNM; synonymy according to Quaintance and Baker 1914: 105.

Asterochiton papillifer Maskell 1890b: 173. Syntypes. New Zealand: on *Pittosporum eugenioides* (Pittosporaceae), ADSIR; synonymy according to Quaintance and Baker 1914: 105.

Trialeurodes sesbania Corbett 1936: 19. Syntypes. Australia: on *Sesbania tripeti* (Fabaceae), BMNH; synonymy according to Russell 1948: 44.

Aleyrodes sonchi Kotinsky 1907: 97. Syntypes. USA: Hawaii, Honolulu, on *Sonchus oleraceus* (Asteraceae), USNM; synonymy according to Baker and Moles 1923: 645.

Asterochiton sonchi (Kotinsky); Quaintance and Baker 1914: 105.

Trialeurodes sonchi (Kotinsky); Quaintance and Baker 1914: 105.

Material: Aynalo, June 2007 on *Solanum melongena* (Solanaceae); Khomarloo, September 2007 on *Cucumis sativus* (Cucurbitaceae); Aras boundary, September 2006 on *Mentha* sp. (Labiatae); Horand, October 2006 on *Cucurbita pepo* (Cucurbitaceae).

Distribution: Worldwide; Argentina, Australia, Austria, Azores, Bangladesh, Belgium, Bermuda, Brazil, Bulgaria, Canada, Canary Islands, Chile, Colombia, Costa Rica, Cuba, Denmark, Dominican Republic, Ecuador, El Salvador, Ethiopia, France, Germany, Greece, Guadeloupe, Guatemala, Hawaii, Honduras, Hungary, Hong Kong, Korea, India, Indonesia, Iran, Ireland, Italy, Israel, Jamaica, Japan, Jordan, Kenya, Mexico, Netherlands, New Guinea, New Zealand, Norway, Peru, Philippines, Poland, Portugal, Puerto Rico, Reunion, South Africa, Spain, Sri Lanka, Turkey, United Kingdom, USA, Venezuela, Zimbabwe.

Arasbaran is rather large region of northwestern Iran with various climates. Although totally 25 species were collected from this region, but surely the same surveys must be continued in this region and neighboring areas. We expect that continuing the faunistic survey in Arasbaran will be resulted to many other species and new country records.

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