

Whiteflies (Sternorrhyncha, Aleyrodidae) colonising ferns (Pteridophyta: Filicopsida), with descriptions of two new *Trialeurodes* and one new *Metabemisia* species from south-east Asia

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Abstract

Three new whitefly species, *Trialeurodes rex* Martin **sp. nov.**, *T. bruneiensis* Martin **sp. nov.** and *Metabemisia palawana* Martin **sp. nov.** are described from fern hosts in Sulawesi, Borneo and Palawan, respectively. An annotated check list of whiteflies feeding on pteridophyte hosts worldwide is presented, including host records and geographical distribution. A table is presented, comparing the names of fern hosts from literature with their current status.

Key words: whiteflies, new species, check list, ferns, worldwide, puparia.

Introduction

Few present day whitefly species are known to colonise the so-called lower vascular plants, the Pteridophyta. The oldest known Aleyrodoidea in the fossil record are from the late Jurassic (140+ million years ago) (Shcherbakov 2000). This was a time when the world's vegetation largely comprised woody gymnosperms and herbaceous pteridophytes, but beyond this there is no evidence of the host association of these ancient whiteflies. The earliest Lower Cretaceous floras (Neocomian) were still entirely without members of the Angiospermae (flowering plants, the major component of the Spermatophyta today) but by the Barremian-Aptian Stage, at lower latitudes, they were already undergoing significant diversification (Wing & Sues 1992). This is at variance with Schlee's (1970) statement that Lower Cretaceous aleyrodids lived "long before the development of the angiosperms". However, it is true that it was not until the early part of the Late Cretaceous that the angiosperms underwent their greatest diversification, with up to 80% of some fossil

- Gennadius, P. (1889) [Disease of tobacco plantations in the Trikonía. The aleurodid of tobacco.] [In Greek]. *Ellenike Georgia*, 5, 1-3.
- Gerson, U. (1979) The associations between Pteridophytes and Arthropods. *Fern Gazette*, 12, 29-45.
- Goeldi, E.A. (1886) Beiträge zur Kenntnis der kleinen und kleinsten Gliederthierwelt Brasiliens. II Neue brasilianische Aleurodes-Arten. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft*, 7, 241-250.
- Ko, C.-C., Chou, L.-Y. & Wu, W.-J. (1998) Aleyrodidae of Taiwan (Homoptera) Part IV. Unrecorded species. *Entomological Science*, 1, 77-79.
- Kramer, K.U. & Green, P.S. [eds] (1990) *The Families and Genera of Vascular Plants. I. Pteridophytes and Gymnosperms*. Springer-Verlag, Berlin Heidelberg, 404 pp.
- Martin, J.H. (1988) Whitefly of northern Sulawesi, including new species from clove and avocado (Homoptera, Aleyrodidae). *Indo-Malayan Zoology*, 5, 57-85.
- Martin, J.H. (1999) The whitefly fauna of Australia (Sternorrhyncha: Aleyrodidae), a taxonomic account and identification guide. *Technical Paper, CSIRO Entomology*, 38, 1-197.
- Martin, J.H., Mifsud, D. & Rapisarda, C. (2000) The whiteflies (Hemiptera: Aleyrodidae) of Europe and the Mediterranean Basin. *Bulletin of Entomological Research*, 90, 407-448.
- Maskell, W.M. (1890) On some Aleurodididae from New Zealand and Fiji. *Transactions of the New Zealand Institute*, 22, 170-176.
- Mound, L.A. (1961) A new genus and four new species of whitefly from ferns (Homoptera, Aleyrodidae). *Revue de Zoologie et de Botanique Africaine*, 64, 127-132.
- Mound, L.A. (1965) An introduction to the Aleyrodidae of Western Africa (Homoptera). *Bulletin of the British Museum (Natural History) (Entomology)*, 17, 113-160.
- Mound, L.A. (1967) A new species of whitefly (Homoptera: Aleyrodidae) from ferns in British glasshouses. *Proceedings of the Royal Entomological Society of London (B)*, 36, 30-32.
- Mound, L.A. & Halsey, S.H. (1978) *Whitefly of the World*. British Museum (Natural History) / John Wiley & Sons, Chichester. 340 pp.
- Mound, L.A., Martin, J.H. & Polaszek, A. (1994) The insect fauna of *Selaginella* (Pteridophyta: Lycopsidea), with descriptions of three new species. *Journal of Natural History*, 28, 1403-1415.
- Newstead, R. (1911) On a collection of Coccidae and Aleurodididae, chiefly African, in the collection of the Berlin Zoological Museum. *Mitteilungen aus dem Zoologischen Museum in Berlin*, 5, 153-174.
- Quaintance, A.L. (1900) Contribution towards a monograph of the American Aleurodididae. *Technical Series, US Department of Agriculture Bureau of Entomology*, 8, 9-64.
- Quaintance, A.L. & Baker, A.C. (1915) Classification of the Aleyrodidae - Contents and Index. *Technical Series, US Department of Agriculture Bureau of Entomology*, 27 (i-xi), 111-114.
- Quaintance, A.L. & Baker, A.C. (1917) A contribution to our knowledge of the whiteflies of the sub-family Aleurodinae (Aleyrodidae). *Proceedings of the United States National Museum*, 51, 335-445.
- Russell, L.M. (1948) The North American species of whiteflies of the genus *Trialeurodes*. *Miscellaneous publications. United States Department of Agriculture*, 635, 1-85.
- Russell, L.M. (1963) Hosts and distribution of five species of *Trialeurodes* (Homoptera: Aleyrodidae). *Annals of the Entomological Society of America*, 56, 149-153.

- Schneider, J. (1966) Ennemis des fougères ornementales. *Phytoma*, 18, 26-32.
- Shcherbakov, D.E. (2000) The most primitive whiteflies (Hemiptera; Aleyrodidae; Bernaeinae subfam. nov.) from the Mesozoic of Asia and Burmese amber, with an overview of Burmese amber hemipterans. *Bulletin of the Natural History Museum London (Geology)*, 56, 29-37.
- Schlee, D. (1970) Verwandtschaftsforschung an fossilen und rezenten Aleyrodina (Insecta, Hemiptera). *Stuttgarter Beiträge zur Naturkunde aus dem Staatlichen Museum für Naturkunde in Stuttgart*, 213, 1-72.
- Takahashi, R. (1936) Notes on the Aleyrodidae of Japan (Homoptera) IV. *Kontyû*, 10, 150-151.
- Takahashi, R. (1960) Three species of Aleyrodidae from Réunion Island (Homoptera). *Naturaliste Malgache*, 12, 139-143.
- Takahashi, R. (1962) Two new genera and species of Aleyrodidae from Madagascar (Homoptera). *Proceedings of the Royal Entomological Society of London (B)*, 31, 100-102.
- Takahashi, R. (1963) Some species of Aleyrodidae from Japan (Homoptera). *Kontyû*, 31, 49-57
- Trehan, K.N. (1938) Two new species of Aleurodidae found on ferns in greenhouses in Britain (Hemiptera). *Proceedings of the Royal Entomological Society of London (B)*, 7, 182-189.
- Wing, S.L. & Sues, H.-D. (1992) Mesozoic and Early Cenozoic Terrestrial Ecosystems. In: Behrensmeyer, A.K., Damuth, J.D., DiMichele, W.A., Potts, R., Sues, H.-D. & Wing, S.L. (Eds) *Terrestrial Ecosystems through Time - Evolutionary Palaeoecology of Terrestrial Plants and Animals*. University of Chicago Press, Chicago. Pp 327-428.
- Visnya, A. (1941) Vorarbeiten zur Kenntnis der Aleurodiden-fauna von Ungarn, nebst systematischen Bemerkungen über die Gattungen *Aleurochiton*, *Pealius* und *Bemisia* (Homoptera). *Fragmenta Faunistica Hungarica*, 4 (Supplement), 1-19.