

ZOOTAXA

1803

Identification guide to species in the scale insect tribe *Iceryini* (Coccoidea: Monophlebidae)

CORINNE M. UNRUH & PENNY J. GULLAN



Magnolia Press
Auckland, New Zealand

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(*Zootaxa* 1803)

106 pp.; 30 cm.

16 June 2008

ISBN 978-1-86977-223-9 (paperback)

ISBN 978-1-86977-224-6 (Online edition)

FIRST PUBLISHED IN 2008 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: zootaxa@mapress.com

<http://www.mapress.com/zootaxa/>

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)



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Abstract

We recently revised the scale insect tribe *Iceryini* (Coccoidea: Monophlebidae) based on a molecular phylogenetic hypothesis and supporting morphological evidence. As a result of this revision, we proposed new generic concepts that required significant reorganization of species in three of the five iceryine genera: *Crypticerya* Cockerell, *Gigantococcus* Pesson & Bielenin and *Icerya* Signoret. The other two genera, *Echinicerya* Morrison and *Gueriniella* Fernald, remain unchanged. Here we discuss taxonomic characters important for iceryine identification and provide a comprehensive review of all described iceryine species. We include keys to the genera and to the species of each genus of *Iceryini* based on features of the adult females. We present new diagnoses for all the species for which type material was available for examination and summarize original descriptions for species for which we were unable to examine material. We designate lectotypes for the following species names (valid name given in parentheses): *Llaveia abrahami* Newstead (*C. abrahami*), *Icerya brasiliensis* Hempel (*C. brasiliensis*), *Icerya colimensis* Cockerell (*C. colimensis*), *Icerya genistae* Hempel (*C. genistae*), *Icerya (Crypticerya) littoralis* Cockerell (*C. littoralis*), *Icerya littoralis mimosae* Cockerell (*C. littoralis*),

Icerya littoralis tonilensis Cockerell (*C. littoralis*), *Crypticerya rosae mexicana* Cockerell & Parrott (*C. mexicana*), *Icerya minima* Morrison (*C. minima*), *Icerya montserratensis* Riley & Howard (*C. montserratensis*), *Palaeococcus morrilli* Cockerell (*C. morrilli*), *Icerya palmeri* Riley & Howard (*C. palmeri*), *Icerya rileyi* Cockerell (*C. rileyi*), *Icerya rileyi larreae* Cockerell (*C. rileyi*), *Steatococcus tabernicolus* Ferris (*C. tabernicola*), *Icerya (Crypticerya) townsendi* Cockerell (*C. townsendi*), *Icerya (Crypticerya) townsendi pluchae* Cockerell (*C. townsendi*), *Icerya zeteki* Cockerell (*C. zeteki*), *Icerya seychellarum albolutea* Cockerell (*Gi. alboluteus*), *Crypticerya bicolor* DeLotto (*Gi. bicolor*), *Icerya brachystegiae* Newstead (*Gi. brachystegiae*), *Palaeococcus cajani* Newstead (*Gi. cajani*), *Palaeococcus caudata* Newstead (*Gi. caudatus*), *Icerya euphorbiae* Brain (*Gi. euphorbiae*), *Aspidoproctus gowdeyi* Newstead (*Gi. gowdeyi*), *Icerya longisetosa* Newstead (*Gi. longisetosus*), *Icerya nigroareolata* Newstead (*Gi. nigroareolatus*), *Icerya sulfurea pattersoni* Newstead (*Gi. pattersoni*), *Palaeococcus theobromae* Newstead (*Gi. theobromae*), *Crossotosoma aegyptiacum* Douglas (*I. aegyptiaca*), *Icerya rosae australis* Maskell (*I. australis*), *Icerya crocea* Green (*I. crocea*), *Icerya formicarum* Newstead (*I. formicarum*), *Icerya jacobsoni* Green (*I. jacobsoni*), *Icerya koebelei* Maskell (*I. koebelei*), *Icerya minor* Green (*I. minor*), *Icerya (Crypticerya) nuda* Green (*I. nuda*), *Icerya nudata* Maskell (*I. nudata*), *Icerya hyperici* Froggatt (*I. nudata*), *Palaeococcus dymocki* Froggatt (*I. nudata*), *Icerya pilosa* Green (*I. pilosa*), *Icerya purchasi citriperda* Hempel (*I. purchasi*), *Icerya purchasi crawii* Cockerell (*I. purchasi*), *Icerya purchasi maskelli* Cockerell (*I. purchasi*), and *Icerya schrottkyi* Hempel (*I. schrottkyi*).

Key words: *Crypticerya*, *Echinicerya*, *Gigantococcus*, *Gueriniella*, *Icerya*

Introduction

The tribe Iceryini was erected by Cockerell (1899c) with *Icerya* as the type genus. Morrison (1928) placed Iceryini in the Monophlebinae (now Monophlebidae) and included just five genera split into two groups: Group 1 comprised only *Gueriniella* Fernald and Group 2 included *Auloicerya* Morrison, *Crypticerya* Cockerell, *Icerya* Signoret and *Steatococcus* Ferris. *Echinicerya* Morrison and *Gigantococcus* Pesson & Bielenin were added to the tribe in 1930 and 1966, respectively (Morrison, 1930; Pesson & Bielenin, 1966). We published a molecular phylogeny of the scale insect tribe Iceryini recently in which four of the previously recognized genera were not monophyletic (Unruh & Gullan, 2008). Our hypothesis of relationships was supported by morphological characters of the adult females, especially features of the wax-exuding cuticular pores, and we recovered groups that reflected biogeography. Consequently, we redescribed genera and reorganized the species of Iceryini. The genera *Auloicerya* and *Steatococcus* were recognised as junior synonyms of *Icerya* and *Crypticerya*, respectively, and we expanded the concepts of *Crypticerya*, *Gigantococcus* and *Icerya* based on pore structure and species' distributions. The concepts of *Gueriniella* and *Echinicerya* remain unchanged. We now recognise 74 described species of Iceryini in five genera: *Crypticerya*, *Echinicerya*, *Gigantococcus*, *Gueriniella* and *Icerya*. Unruh & Gullan (2008) provided a review of the taxonomic history and justification of the revised generic concepts.

Several authors have discussed the importance of pore structure and distribution in identification of adult females of Iceryini (Morrison, 1928; Rao, 1951a, b). Rao (1951a, b) was the first to compare pore types comprehensively among species in the Indomalayan region and he attempted to classify the different pore types he observed. Our recent revision of the tribe also recognised the utility of pore structure as a taxonomic tool and we categorised and illustrated the range of pore types present in the Iceryini (Unruh & Gullan, 2008).

Here we summarise the main morphological characteristics of the adult females of 74 species of Iceryini and for each species we provide original diagnoses or adaptations of descriptions based either on the original description or on a subsequent description based on type material. We provide keys to the genera of Iceryini and to the species of each genus of Iceryini, all based on adult females. We include illustrations of diagnostic pore types, distributed by body region, for most iceryine species. We give detailed type material information for all species and designate lectotypes for 45 species names.