

Changes and Comments on the Taxonomy and Nomenclature of Some Taxa in the Families Coccidae, Eriococcidae and Pseudococcidae (Homoptera: Coccoidea)

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Catalogues of soft scale insects (Coccidae), felt scales (Eriococcidae) and mealybugs (Pseudococcidae) will soon be placed on the World Wide Web. Before these data are made available, several taxonomic and nomenclatural changes in taxa of these families must be validated in print.

KEY WORDS: Coccoidea; Coccidae; Eriococcidae; Pseudococcidae; Nomenclature; ScaleNet; World Wide Web.

INTRODUCTION

ScaleNet is a systematic database of the scale insects (Homoptera: Coccoidea) of the world and is currently being developed as a World Wide Web site (<http://www.sel.barc.usda.gov/scalenet.htm>) by Y. Ben-Dov (Bet Dagan, Israel) and D.R. Miller (Beltsville, Maryland, USA). The database for the families Conchaspidae and Eriococcidae is currently available through the World Wide Web (27) and, in due course, all 21 families of scale insects (Coccoidea) will be included. The next additions will be an updated version of the Coccidae and Pseudococcidae.

This note is intended to introduce several nomenclatural changes and to comment on the names of some taxa in the Coccidae, Eriococcidae and Pseudococcidae so that they can be used in ScaleNet.

The depositories mentioned are indicated by the following acronyms:

BMNH – The Natural History Museum, London, UK.

PPDD – Coccoidea Collection, Plant Protection Research Institute, Dokki, Giza, Egypt.

SANC – South African National Collection of Insects, Pretoria, South Africa.

USNM – U.S. National Museum of Natural History, Washington, DC, USA.

COCCIDAE

Cardiococcus major (Maskell) **comb. nov.** and **change of rank**

Inglisia foraminifer major Maskell, 1897: 309; Ben-Dov, 1993: 148.

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Specimens of *Inglisia foraminifer major* (deposited in USNM) were examined by D.R. Miller and it was concluded that the species differs sufficiently from the nominotypical species *foraminifer foraminifer* to be considered a distinct species, belonging to *Cardiococcus* rather than to *Inglisia*.

Ceronema iceryoides Green

Ceronema iceryoides Green, 1922: 1029; Ben-Dov, 1993: 18.
Marsipococcus iceryoides (Green); Tang, 1991: 116.

Tang (1991) [37] transferred this species to *Marsipococcus*, whereas Ben-Dov (1993) [4] retained it in *Ceronema*. Adult females of the type series in the BMNH were studied by C.J. Hodgson and found to possess numerous tubular ducts throughout most of the dorsum. *Ceronema iceryoides* is therefore considered to belong to either the Filippiinae or Eriopeltinae (as defined by Hodgson, 1994a, ref. 19) and therefore cannot be assigned to *Marsipococcus*. Although almost certainly not congeneric with *Ceronema banksiae* Maskell, it is sufficiently close to be retained with the genus *Ceronema* until this genus has been revised.

Ceronema koebeli Green

Ceronema koebeli Green, 1909: 256; Ben-Dov, 1993: 18.
Mametia koebeli (Green); Tang, 1991: 62.

Tang (1991) [37] transferred this species to *Mametia*, whereas Ben-Dov (1993) [4] retained it in *Ceronema*. Adult females of the type series in the BMNH were studied by C.J. Hodgson and found to possess numerous tubular ducts throughout most of the dorsum, indicating clearly that this species belonged within the Filippiinae or Eriopeltinae (as defined by Hodgson, 1994a, ref. 19). It is quite close to *C. iceryoides*, with which it might be congeneric. *Ceronema* and *Mametia* are closely related genera, but the absence of abundant dorsal tubular ducts in a broad median line in *C. koebeli* suggests that this species should be retained in *Ceronema* until this genus has been revised.

Eulecanium tiliae (L.)

Coccus tiliae Linnaeus, 1758: 456.
Eulecanium tiliae (L.); Ben-Dov, 1993: 135.
Eulecanium coryli cimbricus Wünn, 1937: 47. **syn. nov.**

The specific name *coryli* Linnaeus, 1758 [22], as published in the binomen *Coccus coryli*, was suppressed by the ruling of Opinion 1303 (30), while *tiliae* Linnaeus, 1758 [22], as published in the binomen *Coccus tiliae*, was placed as the valid name by the same ruling. However, this suppression did not affect the status of the subspecies *Eulecanium coryli cimbricus* Wünn. The depository of types of the latter species is unknown (4) and no further information has become available. Based on Wünn's description, this subspecies appears to fall within the intraspecific range of variation of *E. tiliae*, and is considered to be a junior synonym of the latter.

Maacoccus Tao, Wong & Chang

- Maacoccus* Tao, Wong & Chang, 1983: 71.
Maacoccus Tao & Wong; Kosztarab *et al.*, 1986: 9 [erroneous authorship].
Maacoccus Tao, Wong & Chang; Ben-Dov, 1993: 170.
Maacoccus Tao & Wong; Hodgson, 1994b: 324 [erroneous authorship].
Sharanococcus Avasthi, 1993: 74. **syn. nov.**

Maacoccus was described by Tao, Wong and Chang (1983) [38] without any restriction of authorship. Later, C.C. Tao indicated in a letter to Kosztarab (see ref. 21) that the correct authorship of the five genera described in Tao *et al.* (38) should be "Tao & Wong". However, according to the International Code, authorship cannot be retrospectively restricted and so the published authorship must stand.

Sharanococcus is a junior objective synonym of *Maacoccus* because they share the same type species, namely, *Lecanium bicruciatum* Green, 1904 [14].

Neoplatylecanium tripartitum (Green)

- Lecanium tripartitum* Green, 1922: 1025.
Neoplatylecanium tripartitum (Green); Takahashi, 1929: 54; Ben-Dov, 1993: 195.
Marsipococcus tripartitus (Green); Tang, 1991: 118.

This species was originally placed in *Lecanium* by Green (1922) [16], but was transferred to *Neoplatylecanium* by Takahashi (1929) [36] and then to *Marsipococcus* by Tang (1991) [37]. Adult females of the type series in the BMNH were studied by C.J. Hodgson. *Neoplatylecanium* is well-defined as it is the only genus possessing a distinctive type of dorsal pore from which a very long inner ductule arises (19). This characteristic pore is present in *N. tripartitum* which should therefore be left in *Neoplatylecanium*, with which it shares a number of other characters.

Neosaissetia Tao, Wong & Chang

- Neosaissetia* Tao, Wong & Chang, 1983: 79.
Neosaissetia Tao & Wong; Kosztarab *et al.*, 1986: 11 [erroneous authorship].
Neosaissetia Tao, Wong & Chang; Ben-Dov, 1993: 196.
Neosaissetia Tao & Wong; Hodgson, 1994b: 404 [erroneous authorship].

The explanation regarding the correct authorship, as given above for *Maacoccus*, also applies to *Neosaissetia*.

Parthenolecanium persicae (Fabricius)

- Chermes persicae* Fabricius, 1776: 304.
Parthenolecanium persicae (Fabricius); Ben-Dov, 1993: 221.
Lecanium berberidis major Maskell, 1898: 238. **syn. nov.**

The nominotypical species *Coccus berberidis berberidis* Schrank, 1801 [33] is a synonym of *P. persicae* (see ref. 4). The type series of *L. berberidis major* is lost (10). However, Maskell (28) distinguished his new species from *C. berberidis berberidis* only by its size. Since this is a character with considerable intraspecific variation (7), we believe it is justified to synonymize *L. berberidis major* with *P. persicae*.

Podoparalecanium Tao, Wong & Chang

Podoparalecanium Tao, Wong & Chang, 1983: 100.

Podoparalecanium Tao & Wong; Kosztarab *et al.*, 1986: 13 [erroneous authorship].

Podoparalecanium Tao, Wong & Chang; Ben-Dov, 1993: 241.

Podoparalecanium Tao & Wong; Hodgson, 1994b: 482 [erroneous authorship].

The explanation about the correct authorship, as given above for *Maacoccus*, also applies to *Podoparalecanium*.

Saccharipulvinaria Tao, Wong & Chang

Saccharipulvinaria Tao, Wong & Chang, 1983: 85.

Saccharipulvinaria Tao & Wong; Kosztarab *et al.*, 1986: 14 [erroneous authorship].

Saccharipulvinaria Tao, Wong & Chang; Ben-Dov, 1993: 301.

Saccharipulvinaria Tao & Wong; Hodgson, 1994b: 525 [erroneous authorship].

The explanation about the correct authorship, as given above for *Maacoccus*, also applies to *Saccharipulvinaria*.

Taiwansaissetia Tao, Wong & Chang

Taiwansaissetia Tao, Wong & Chang, 1983: 76.

Taiwansaissetia Tao & Wong; Kosztarab *et al.*, 1986: 16 [erroneous authorship].

Taiwansaissetia Tao, Wong & Chang; Ben-Dov, 1993: 326.

Taiwansaissetia Tao & Wong; Hodgson, 1994b: 566 [erroneous authorship].

The explanation regarding the correct authorship, as given above for *Maacoccus*, also applies to *Taiwansaissetia*.

Toumeyella pini (King)

Toumeyella corrugatum neglectum Pettit & McDaniel, 1920: 7; Ben-Dov, 1993: 329. **syn. nov.**

Williams and Kosztarab (39) strongly suggested the above synonymy. Since then no type material has become available. The issue was also supported by Dr. Michael Williams in a letter to Ben-Dov (1996) and is formally introduced here.

Udinia lamborni (Newstead) **change of rank**

Lecanium punctuliferum lamborni Newstead, 1914: 523.

Udinia punctuliferum lamborni (Newstead); Ben-Dov, 1993: 337.

The nominotypical species *Lecanium punctuliferum punctuliferum* Green, 1904 [14] has been considered a synonym of *Coccus hesperidum* Linnaeus (see ref. 4). However, De Lotto [8] studied the "... unique mounted specimen of *Lecanium punctuliferum lamborni*. . ." and suggested that it was "... a preadult of a species very likely referable. . ." to *Udinia*. Hanford (p. 21), in her revision of *Udinia*, was unable to study the above specimen, but studied "...dry material, which appears to be the only remaining specimens of the original type material". While no decision was taken by Hanford (18), she suggested "...that further type specimens do exist." Until such material will be recovered, this subspecies is here raised to species level.

ERIOCOCCIDAE

Apezococcus idiastes Ferris

Apezococcus idiastes Ferris, 1955: 79.

Antonina dakotensis Kosztarab & McDaniel, 1969: 111. **syn. nov.**

D.R. Miller examined the holotype of this species (in USNM) and determined that it is not a mealybug as previously suggested (5,22), but an eriococcid. It possesses microtubular ducts and cruciform pores that are characteristic of the Eriococcidae. In addition, we conclude that *Antonina dakotensis* is a junior synonym of *Apezococcus idiastes*, since both species share the following features: a characteristic anal ring, a pair of large sclerotized areas on the metathorax (that are remnants of the hind pair of legs) and distinctive small-sized enlarged setae.

Eriochiton spinosus Maskell

Ctenochiton spinosus Maskell, 1879: 212.

Eriochiton spinosus (Maskell); Maskell, 1887: 47.

Ctenochiton spinosus (Maskell); Ben-Dov, 1963: 103.

This species was listed in the family Coccidae by Ben-Dov (4). Following the revision and assignment of *Eriochiton* to the Eriococcidae (19) this species is placed in its proper family.

PSEUDOCOCCIDAE

Lenania africana (Brain) **comb. nov.**

Sphaerococcus africanus Brain, 1915: 95.

This species was originally assigned to the subfamily Coccinae. De Lotto (9) suggested that it was a mealybug, very likely referable to *Lenania*. Mr. Ian Millar (Pretoria, South Africa) has kindly informed us that he found an unpublished note by De Lotto in which he reiterated this interpretation. Mr. Millar examined the types (in SANC) and concluded that *L. africanus* does share some characters with *L. prisca*, the type species of *Lenania*, but that it differs in some features of the legs.

Phenacoccus halli Ezzat

Phenacoccus halli Ezzat, 1962: 164.

Phenacoccus halli Priesner and Hosny; Ezzat, 1962: 164; Kozár and Walter, 1985: 71;

Mohammad *et al.*, 1995: 501 [erroneous authorship].

This species was overlooked and therefore was not included in the recently published Catalogue of the Pseudococcidae (5), because of its obscure nomenclatural history.

The binomen *Phenacoccus halli* was first published by Ezzat (11) together with distinct collection data and depositories of the type series. Moreover, the key (p. 164) presented some of its distinguishing characters from other *Phenacoccus* species of Egypt. Ezzat's description (11), although extremely meager, is sufficient to validate *P. halli* and to credit it

to Ezzat (1962). Ezzat (11), Kozar and Walter (23) and Mohammad *et al.* (30) erroneously attributed this species to Priesner and Hosny. However, such a binomen was not mentioned in Priesner and Hosny (34). Mohammad *et al.* (30) redescribed the adult female and designated the lectotype (PPDD). Paralectotypes are also deposited in BMNH.

Pseudococcus pipturicolus Beardsley

Pseudococcus dorsispinosus Beardsley, 1959: 40 [primary homonym of *Pseudococcus dorsispinosus* Wirjati, 1958].

Pseudococcus pipturicolus Beardsley, 1963: 230 [replacement name].

Pseudococcus dorsispinosus Beardsley; Ben-Dov, 1994: 407, line 30 [mis-spelling of *Pseudococcus dorsispinosus*].

Pseudococcus dorsispinosus Beardsley, 1959 [2] is a primary homonym of *Pseudococcus dorsispinosus* Wirjati, 1958 [40], according to Articles 57(f) and 58(10) [one-letter difference] of the International Code of Zoological Nomenclature. This mealybug is mentioned here, under its valid name *Pseudococcus pipturicolus* Beardsley, merely to indicate that its primary homonym was mis-spelled *Pseudococcus dorsispinosus* Beardsley by Ben-Dov (5).

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REFERENCES

1. Avasthi, R.K. (1993) Three new genera of Coccidae (Homoptera: Coccoidea). *J. Bombay Nat. Hist. Soc.* 89: 73-77.
2. Beardsley, J.W. (1959) New species and new records of endemic Hawaiian mealybugs (Homoptera: Pseudococcidae). *Proc. Hawaii. Entomol. Soc.* 17: 38-55.
3. Beardsley, J.W. (1963) Notes on Hawaiian *Pseudococcus*, with a description of a new endemic species (Homoptera: Pseudococcidae). *Proc. Hawaii. Entomol. Soc.* 18: 229-234.
4. Ben-Dov, Y. (1993) A Systematic Catalogue of the Soft Scale Insects of the World (Homoptera: Coccoidea: Coccidae) with Data on Geographical Distribution, Host Plants, Biology and Economic Importance. Sandhill Crane Press Inc., Gainesville, FL, USA.
5. Ben-Dov, Y. (1994) A Systematic Catalogue of the Mealybugs of the World (Insecta: Homoptera: Coccoidea: Pseudococcidae and Putoidae) with Data on Geographical Distribution, Host Plants, Biology and Economic Importance. Intercept Ltd., Andover, UK.
6. Brain, C.K. (1915) The Coccidae of South Africa. I. *Trans. R. Soc. S. Afr.* 5:65-194.
7. Danzig, E.M. (1995) Intraspecific variation in the scale insects (Homoptera: Coccinea). *Isr. J. Entomol.* 29: 19-24.

8. De Lotto, G. (1963) New species and a new genus of hard scales from East Africa (Homoptera: Coccidae). *Proc. R. Entomol. Soc. Lond. (B)* 32: 191-200.
9. De Lotto, G. (1969) The mealy bugs of South Africa (Homoptera: Pseudococcidae), II. *S. Afr. Dept. Agric. Tech. Serv. Entomol. Mem.* 20: 1-30.
10. Deitz, L.L. and Tocker, M.F. (1980) W.M. Maskell's Homoptera: Species-group names and type-material. *N. Z. Dep. Sci. Ind. Res. Inf. Ser.* 146: 1-76.
11. Ezzat, Y.M. (1962) A synopsis of the family Pseudococcidae as known in Egypt, U.A.R. (Homoptera: Coccoidea). *Bull. Soc. Entomol. Egypte* 46: 155-170.
12. Fabricius, J.C. (1776) *Genera Insectorum. Chilonii, Bartschii.* 310 pp.
13. Ferris, G.F. (1955) Atlas of the Scale Insects of North America. Vol. vii, The Families Acleridae, Asterolecaniidae, Conchaspidae, Dactylopiidae and Lacciferidae. Stanford University Press, Stanford, CA, USA.
14. Green, E.E. (1904) The Coccidae of Ceylon. Pt. III. Dulau & Co., London, UK. pp. 171-249.
15. Green, E.E. (1909) The Coccidae of Ceylon. Vol. IV. Dulau & Co., London. pp. 250-344.
16. Green, E.E. (1922) Supplementary notes on the Coccidae of Ceylon. *J. Bombay Nat. Hist. Soc.* 28: 1007-1037.
17. Green, E.E. (1926) On some new genera and species of Coccidae. *Bull. Entomol. Res.* 17:55-65.
18. Hanford, L. (1974) The African scale insect genus *Udinia* De Lotto (Coccidae). *Trans. R. Entomol. Soc. Lond.* 126: 1-40.
19. Hodgson, C.J. (1994a) *Eriochiton* and a new genus of the scale insect family Eriococcidae (Homoptera: Coccoidea). *J. R. Soc. N.Z.* 24: 171-208.
20. Hodgson, C.J. (1994b) The Scale Insect Family Coccidae, An Identification Manual to Genera. CAB International, Wallingford, UK.
21. Kosztarab, M., Ben-Dov, Y. and Kosztarab, M.P. (1986) An annotated list of generic names of the scale insects (Homoptera: Coccoidea). *Va. Polytech. Inst. State Univ. Res. Div. Bull.*, 862: 138.
22. Kosztarab, M. and McDaniel, B. (1969) A new species of *Antonina* Signoret from South Dakota with new records for *A. boutelouae* Parrott (Homoptera: Coccoidea: Pseudococcidae). *Proc. Entomol. Soc. Wash.* 71: 111-114.
23. Kozár, F. and Walter, J. (1985) Check-list of the Palaearctic Coccoidea (Homoptera). *Folia Entomol. Hung.* 46: 63-110.
24. Linnaeus, C. (1758) *Systema Naturae*, ed. X, Vol. I. Salvii, Holmiae. 823 pp.
25. Maskell, W.M. (1879) On some Coccidae in New Zealand. *Trans. Proc. N. Z. Inst.* 11: 187-230.
26. Maskell, W.M. (1887) Further notes on New Zealand Coccidae. *Trans. Proc. N. Z. Inst.* 19: 45-49.
27. Maskell, W.M. (1897) Further coccid notes: with descriptions of new species and discussions of points of interest. *Trans. Proc. N. Z. Inst.* 29: 293-331.
28. Maskell, W.M. (1898) Art. XXVI. – Further coccid notes: with descriptions of new species and discussion of points of interest. *Trans. Proc. N. Z. Inst.* 30: 219-252.
29. Miller, D.R. and Gimpel, M.E. (1996) Nomenclatural changes in the Eriococcidae (Homoptera: Coccoidea). *Proc. Entomol. Soc. Wash.* 98: 597-606.
30. Mohammad, Z.K., Ezzat, Y.M. and Aly, A.G. (1995) Recent review of Egyptian little known species of Coccoidea. *J. Egypt. German Soc. Zool. Entomol.* 16(E): 477-533.
31. Newstead, R. (1914) Homoptera (Psyllidae and Coccidae) collected in the Lagos District by W.A. Lamborn. *Trans. Entomol. Soc. Lond. (1913)*: 520-524.

32. Opinion 1303. (1985) *Coccus* Linnaeus, 1758 and *Parthenolecanium* Šulc, 1908 (Insecta, Hemiptera, Homoptera): type species designated. *Bull. Zool. Nomencl.* 42: 139-141.
33. Pettit, R.H. and McDaniel, E. (1920) The Lecania of Michigan. *Michigan Agric. Coll. Exp. Stn. Tech. Bull.* 48: 1-35.
34. Priesner, H. and Hosny, M. (1935) Brief descriptions of two new mealybugs. *Bull. Soc. R. Entomol. Egypte* 19: 112-115.
35. Schrank, F. (1801) *Fauna Boica*. Nürnberg. 374 pp.
36. Takahashi, R. (1929) Observations on the Coccidae of Formosa. – 1. *Formosa Rep. Govt. Res. Inst. Dept. Agric.* 40: 1-82.
37. Tang, F.T. (1991) *The Coccidae of China*. Shanxi United Universities Press, Shanxi, China [Chinese, with English abstract].
38. Tao, C.C.C., Wong, C.Y. and Chang, Y.C. (1983) Monograph of Coccidae of Taiwan, Republic of China (Homoptera: Coccoidea). *J. Taiwan Mus.* 36: 57-107.
39. Williams, M.L. and Kosztarab, M. (1972) Morphology and systematics of the Coccidae of Virginia with notes on their biology (Homoptera: Coccoidea). *Va. Polytech. Inst. State Univ. Res. Div. Bull.* 74: 1-215.
40. Wirjati. (1958) On a small mealybug from a virgin forest. *Idea, J. Entomol. Soc. Indones.* 11: 14-17.
41. Wünn, H. (1937) Zur Coccidenfauna von Schleswig-Holstein (12. Mitteilung über Cocciden). *Schr. Naturwiss. Ver. Schleswig-Holstein* 22: 1-69.