GENERIC LIMITS OF *PHENOLIA* ERICHSON (COLEOPTERA: NITIDULIDAE: NITIDULINAE)

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Abstract

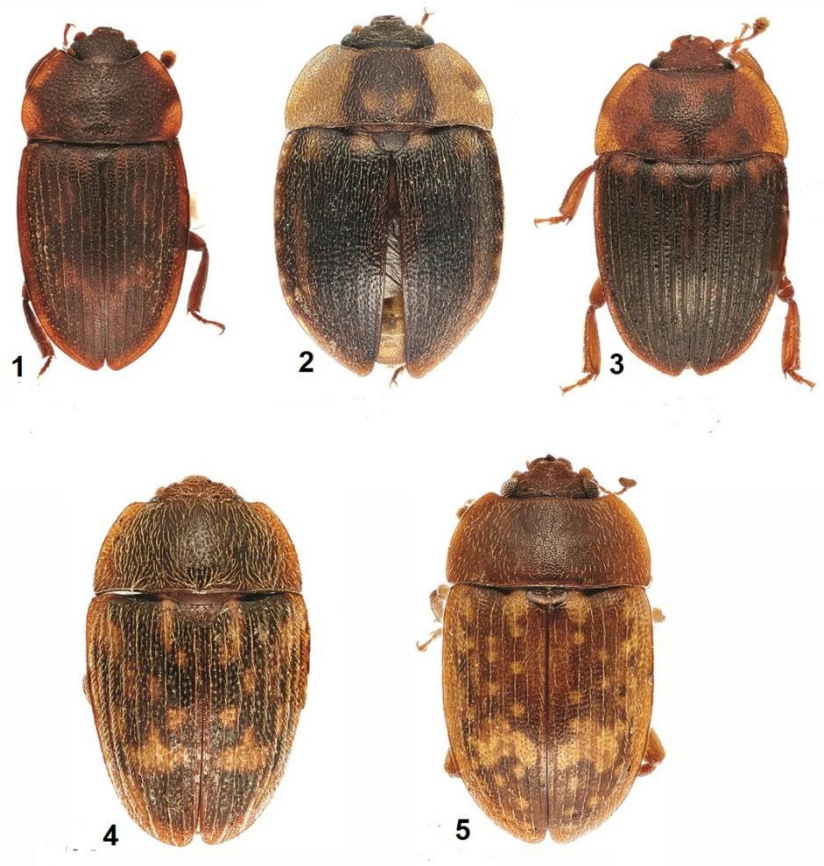
Adult and larval evidence is given for removing the Old World subgenera *Aethinodes* Blackburn, *Lasiodites* Jelínek and *Plesiothina* Kirejtshuk from the North American genus *Phenolia* Erichson and considering each of them a separate genus.

Introduction

The genera *Aethinodes* Blackburn, *Lasiodites* Jelínek and *Plesiothina* Kirejtshuk, all of which occur in Australia, were considered to be subgenera of *Phenolia* Erichson by Kirejtshuk and Kvamme (2002). In the present study, this conclusion is critically reviewed.

Phenolia was described by Erichson (1843) based on a single species, *Nitidula grossa* Fabricius, 1801, occurring in eastern North America (Fig. 1). *Aethinodes* Blackburn (1891) is an endemic Australian genus apparently related to a suite of Old World species placed until recently in the genus *Lasiodactylus* Perty (Figs 3-4). The genus *Plesiothina* was described by Kirejtshuk (1990) based on an Indonesian species, *P. acutula* Kirejtshuk, but also containing the Australian *P. ampla* Kirejtshuk, 2006 (Fig. 2). Kirejtshuk and Lawrence (1999) noted that the name *Lasiodactylus*, which had been used for a number of Old World fruit-eating Nitidulinae, was synonymous with *Lordites* Erichson and should be restricted to a few Neotropical species only. Jelínek (1999) proposed a new generic name *Lasiodites* (type species *Nitidula picta* Macleay, 1825, Fig. 5) for these Old World species and considered them closely related to members of the genus *Aethinodes*. He also mentioned an external similarity with the genus *Phenolia* but noted that this Nearctic genus differed from *Lasiodites* in several respects. Kirejtshuk and Kvamme (2002: 3-4) criticized Jelínek for not providing evidence in support of his interpretation, stating that Jelínek did not regard 'the overall similarity of *Lasiodites* and *Phenolia* as a result of close relationship'. These authors did not specifically mention any of the characters Jelínek used to distinguish *Phenolia* from the *Lasiodites* group but they did include details of character variation among the 27 *Lasiodites* species occurring mainly in Africa and Madagascar, indicating that at least some of Jelínek's characters were variable within that genus. They went on to treat *Lasiodites* and *Aethinodes*, plus the genus *Plesiothina*, as subgenera of *Phenolia* and this has been followed in various general works (Jelínek and Audisio 2007, Cline *et al*. 2014). Although characters were given for the subgenera and for those genera considered to be in the same "complex", the characters distinguishing the newly expanded genus *Phenolia* were never mentioned. It must be stressed

here that, although informal generic complexes might be useful as tools for segregating genera in a large subfamily like Nitidulinae, they have no phylogenetic significance, whereas the inclusion of several genera as subgenera within a genus with an older name represents a phylogenetic hypothesis and, as such, requires more supporting data than were present in the work by Kirejtshuk and Kvamme (2002).



Figs 1-5. Nitidulinae adults, dorsal: (1) *Phenolia grossa* (Fabricius), length = 7.7 mm; (2) *Plesiothina ampla* Kirejtshuk, length = 4.3 mm; (3) *Aethinodes attenuata* (Reitter), length = 5.0 mm; (4) *Aethinodes marmorata* Blackburn, length = 3.0 mm; (5) *Lasiodites picta* (Macleay), length = 6.2 mm.

Adult morphology

Of those adult features used by Jelínek to distinguish *Phenolia grossa* from both *Aethinodes* and *Lasiodites*, some appear to vary at least within *Lasiodites*, while all of them have been questioned by Kirejtshuk (*in litt.*).

The following differences include most of those used by Jelínek and are based on my own observations of all *Aethinodes* species, *Plesiothina ampla* Kirejtshuk, *Lasiodites picta* (Macleay) and a few other species of *Lasiodites* from Africa and Asia. None of them was discussed by Kirejtshuk and Kvamme (2002).

1. Labrum in *Phenolia* shallowly emarginate, while those in the other three genera are more deeply emarginate, usually with a narrow incision at the middle.

2. Mandibular apex in *Phenolia* bidentate, while in the *Aethinodes* group it is unidentate, with a smaller subapical tooth.

3. Prosternal process in the *Aethinodes* group more strongly curved apically, whereas that in *Phenolia* is barely curved.

4. Lateral subapical angles of prosternal process in *Phenolia* acute and strongly projecting laterally. Although lateral expansions of this process occur in all members of the *Aethinodes* group, their apices are not acute.

5. Mesoventrite coarsely punctate in *Phenolia* but impunctate in members of the *Aethinodes* group.

6. Mesoventrite without a median carina in *Phenolia* but with at least a weak carina in members of the *Aethinodes* group.

7. Each pronotal hypomeron in *Phenolia* with what appears to be a stridulatory file extending laterally from the outer corners of the procoxa (Fig. 14). This feature is present in both sexes but it is not known if it is a sound-producing organ.

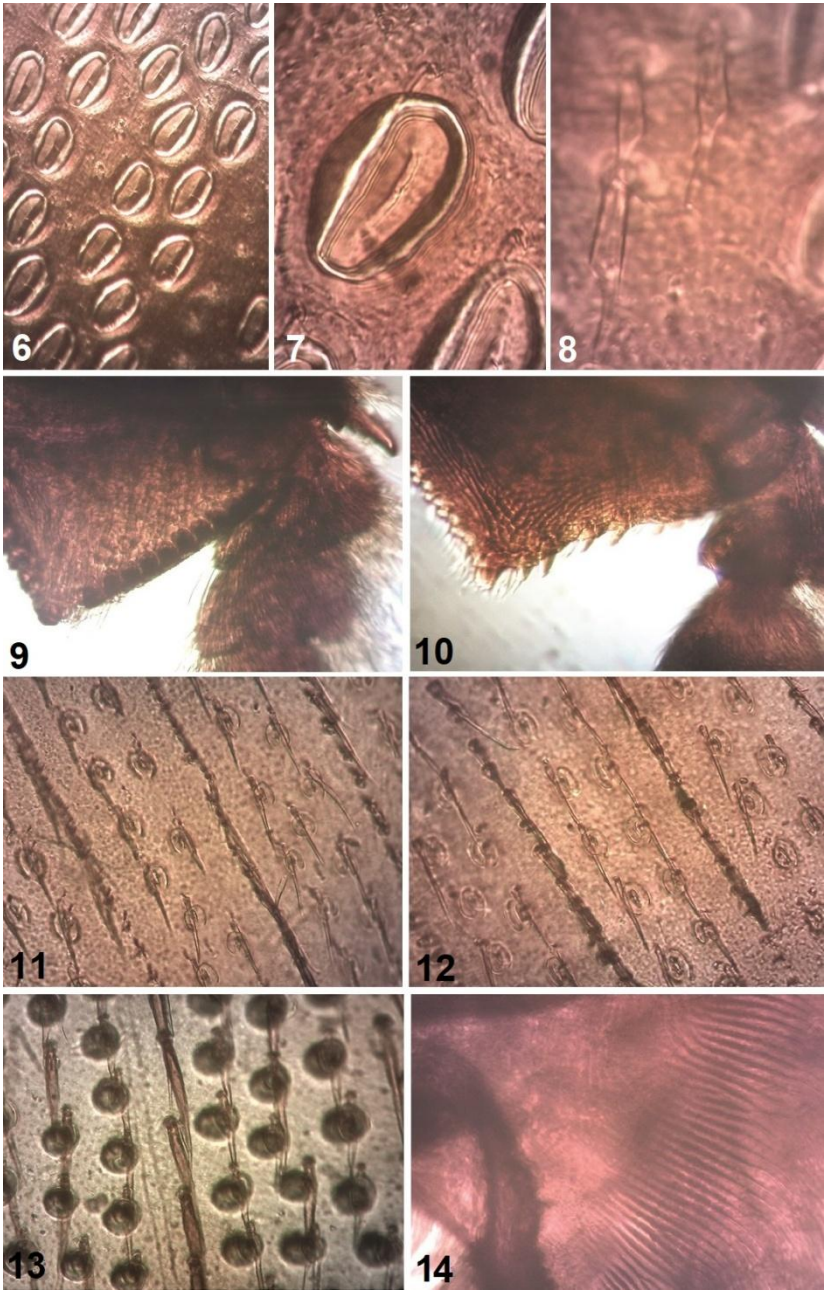
8. Ratio of temple length to eye length in *Phenolia* about 0.7, as compared with 0.5 or less in members of the *Aethinodes* group.

9. Explanate elytral margins in *Phenolia* extend almost to elytral apices; in the *Aethinodes* group they are either absent or end well before the elytral apices.

10. Pronotum widest at about middle in *Phenolia* but near posterior end in members of the *Aethinodes* group.

11. Vertexal line absent in *Phenolia* but complete in the *Aethinodes* group.

12. Protibial apex in males and females of *Phenolia* with a few short, well separated, light coloured, acute spines (Fig. 10) but in males of the *Aethinodes* group with a continuous row of short, dark, blunt spines (Fig. 9). This row of spines in the latter group forms a solid carina, which might be involved in copulation, perhaps as a holdfast; it also occurs in the genera *Gaulodes* Erichson, *Australaethina* Kirejtshuk & Lawrence and some other nitiduline genera.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13. Frst abdominal ventrite without postcoxal lines in *Phenolia* but with postcoxal lines in all members of the *Aethinodes* group.

14. All taxa considered here have a similar type of dual elytral punctation and vestiture, with longer, thicker setae forming dense, longitudinal rows and shorter, finer setae lying in between the rows, with each arising adjacent to a shallow pit (Figs 6, 11-13); this condition with some variation also occurs in many other nitiduline genera, such as *Australaethina* Kirejtshuk & Lawrence, *Australycra* Kirejtshuk & Lawrence, *Physoronia* Reitter, *Pocadites* Reitter, *Rixerodes* Kirejtshuk & Lawrence and *Stelidota* Erichson. The following details, however, are quite different in *Phenolia grossa* from the situation in *Aethinodes*, *Lasiodites* or *Plesiothina*: (1) the rows of macrosetae in *Phenolia* (Fig. 6) are somewhat irregular or incomplete, so that the pits and microsetae alternating with macrosetal rows vary considerably, while in the *Aethinodes* group the rows of macrosetae are more even and alternate with two or three rows of pits and microsetae; (2) macrosetae in the *Aethinodes* group are well pigmented, more or less gradually thickened in the middle and acute at the apex (Figs 11-13), while those in *Phenolia* (Fig. 8) are pale, gradually expanded to about middle, then irregularly narrowed to form a curved acute apex; (3) elytral pits in *Phenolia* (Figs 6-7) are large and elongate-oval with a thick margin and a longitudinal elevation in the middle, quite different from the smaller, circular to slightly ovate pits in the *Aethinodes* group (Figs 11-13).

Jelínek (1999) certainly recognised that his new genus *Lasiodites* appeared to be related to *Aethinodes* (he might have been unaware of *Plesiothina*) but he felt, as I do, that there was not sufficient evidence to assume that the New World *Phenolia grossa* (Fabricius) was so closely related to the group of Old World genera that they should be placed in the same genus.

Larval biology and morphology

An obvious biological difference between the two groups concerns feeding habits. *Phenolia grossa* is a fungivore with a specific host, *Laetiporus sulphureus* (Bull.) Murrill (Polyporaceae) (Böving and Rozen 1962), while the species of *Aethinodes* and *Lasiodites* are primarily saprophagous, feeding on decaying vegetable material, especially fruits.

Figs 6-14. Nitidulinae adults: (6-8) *Phenolia grossa* (Fabricius): (6) portion of elytron showing asymmetrically aligned pits and two short rows of abraded macrosetae; (7) portion of elytron showing a large pit and associated microseta; (8) portion of elytron showing three macrosetae. (9-10) protibial apex of male: (9) *Lasiodites picta* (Macleay) with continuous row of blunt, dark spines; (10) *Phenolia grossa* with well-separated acute, light spines. (11-13) portion of elytron, showing rows of macrosetae and pits: (11) *Lasiodites picta* (Macleay); (12) *Aethinodes attenuata* (Reitter); (13) *Plesiothina ampla* Kirejtshuk. (14) *Phenolia grossa* (Fabricius), left prothoracic hypomeron showing possible stridulatory file.

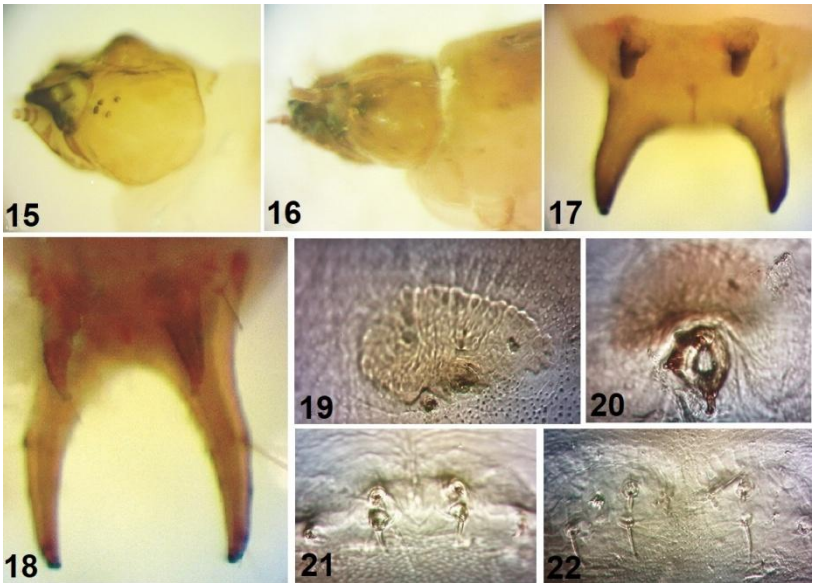
Sufficient larvae have been found in the ANIC to add a few comparisons based on immature forms. The following larvae have been examined:

Phenolia grossa (Fabricius). Several specimens from Dorset, Bennington Co., Vermont, USA, 14.ii.1970, collected on basidiomes of *Laetiporus sulphureus* by C. Parsons (3272 JFL). This larva was first described by Böving and Rozen (1962) based on 80 larvae collected with 16 adults from the same fungus species at Cabin John Bridge, Maryland, U.S.A.

Lasiodites picta (Macleay). Five larvae collected in rotten starfruit (*Averrhoa carambola* L., Oxalidaceae) at Drumsite on Christmas Island, 12.iv.1989 by J.F. Lawrence. A series of adults was also collected from this locality. The larva was also described by Hayashi (1978: p. 18, pls 1-2).

Aethinodes marmorata Blackburn. A number of adults and larvae from 5 km S by W of Millaa Millaa, Qld, 15.v.1980, Berlesate 674, rainforest, I. Naumann, J. Cardale.

Aethinodes calva (Olliff). Five larvae collected near Highlands Guesthouse, Norfolk Island, 9.iv.1984, from a pitfall trap baited with human faeces by J.E. Feehan.



Figs 15-22. Nitidulinae larval parts: (15-16) head, lateral: (15) *Phenolia grossa* (Fabricius); (16) *Lasiodites picta* (Macleay). (17-18) abdominal tergum IX showing urogomphi and pregomphi: (17) *Phenolia grossa*; (18) *Lasiodites picta*. (19-20) portion of left side of abdominal tergum V: (19) *Phenolia grossa*; (20) *Lasiodites picta*. (21-22) central section of abdominal tergum V: (21) *Aethinodes calva* (Olliff); (22) *A. marmorata* Blackburn.

Figs 23-28. Nitidulinae larval parts: (23-25) labrum-epipharynx: (23) *Phenolia grossa* (Fabricius); (24) *Aethinodes calva* (Olliff); (25) *Lasiodites picta* (Macleay) turned right 90º. (26-28) mandibles: (26) *Phenolia grossa*, left mandible, dorsal; (27) same, ventral; (28) *Lasiodites picta*, right mandible, dorsal.

Larval differences between *Phenolia* and the above members of the *Aethinodes* group include the following;

1. Head of the *Phenolia* larva bears a strong median frontal protuberance (Fig. 15 and Böving and Rozen 1952, fig. 51); this is absent in *Aethinodes* larvae, while the head of *Lasiodites picta* (Fig. 16 and Hayashi 1978, figs 1e, 1g) has a pair of weak prominences.

2. Sensorium on antennomere 2 in *Phenolia* is about 0.2 times as long as antennomere 3, while it is at least 0.33 times as long in the *Aethinodes* group.

3. Larval labrum in members of the *Aethinodes* group (Figs 24-25) is semicircular in shape with a continuous margin extending from one basal angle to the other; it is also more or less connate with the clypeal apex. In the *Phenolia* larva the strongly transverse labrum (Fig. 23) is curved at the sides but apically truncate and articulates with the clypeal apex.

4. Labral tormae in *Phenolia* (Fig. 23) are long and parallel but in members of the *Aethinodes* group (Fig. 24) they are shorter, weaker and connected to curved projections arising from a transverse labral bar.

5. Mesotergum, metatergum and abdominal terga I-VIII in *Phenolia grossa* are relatively simple, each with a pair of small, transversely oval paramedian sclerites bearing three well separated short setae (Fig. 19). In *Lasiodites picta* there are similar paired sclerites, each of which lies in front of a well developed trilobed process, with each lobe bearing a short seta (Fig. 20). In *Aethinodes calva* (Fig. 21) and *A. marmorata* (Fig. 22) there is a single strongly transverse, slightly sclerotised tergal plate on each segment, from which arise a number of short setae arising from short tubercles.

6. Outer edge of the larval mandible in *Phenolia* has a sharply defined boss at the base of the apical lobe (Figs 26-27). In *Lasiodites* (Fig. 28) there is a similar boss but less sharp and more rounded and in *Aethinodes* there is at best a slight bulge at this point.

7. Inner edge of mandible in *Phenolia* (Figs 26-27) has an apical lobe with both dorsal and ventral serrations and a prostheca bearing several (usually fewer than 10) relatively short, curved spine-like processes with a blunt edge and without a fringe lining. In *Lasiodites* (Fig. 28) the apical lobe has dorsal serrations only and the spine-like processes of the prostheca are longer, more numerous, narrowly acute and have a fringe on the mesally facing edge. *Aethinodes* larvae are similar in having dorsal serrations and more numerous, acute spine-like processes, usually bearing fringes.

8. Spiracular tubes in *Phenolia* are much shorter than wide, forming a sclerotised ring only slightly longer on one side, so that it barely projects from the surface. In all members of the *Aethinodes* group the tubes are at least as long as and usually longer than wide, projecting well away from the surface, those towards the posterior end of the body more or less skewed posteriorly.

9. Urogomphi in *Phenolia* (Fig. 17) are separated by 1.2 times basal width and lack accessory tubercles. In *Lasiodites* (Fig. 18) the urogomphi are separated by 0.65 times basal width and bear several setose tubercles. The *Aethinodes* urogomphi are narrowly separated with similar setose tubercles.

Discussion

I think it is obvious from the above that both larvae and adults of *Phenolia grossa* differ in a number of respects from those of *Aethinodes* and its relatives. It is also obvious that Kirejtshuk and Kvamme (2002) made no attempt to diagnose the genus *Phenolia* sensu lato including *Aethinodes*, *Lasiodites* and *Plesiothina*, or to compare it with other possibly related Nitidulinae or include it in a phylogenetic analysis. If this latter group represents a single genus, then the oldest name would be *Aethinodes* Blackburn, 1891. Until this group is restudied, I prefer to recognise all three

genera. The informal *Phenolia* complex (Kirejtshuk 2008), which also includes *Stelidota* Erichson, *Gaulodes* Erichson, *Ussuriphila* Kirejtshuk and *Ostomarcha* Kirejtshuk, might be a natural group, but no set of characters has been given to define it or other apparent "complexes".

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