

NEW GENUS-GROUP SYNONYMY IN STIGMODERINI
(COLEOPTERA: BUPRESTIDAE)

C. L. BELLAMY
Plant Pest Diagnostic Laboratory
California Department of Food & Agriculture
3294 Meadowview Road
Sacramento, CA 95832, U.S.A.
cbellamy@cdfa.ca.gov

AND

ULF NYLANDER
Åsvägen 15
818 33 Valbo, SWEDEN
ulf.nylander@mbox303.swipnet.se

Abstract

The recently described buprestid genus *Petersonia* Hawkeswood, 2007 is proposed as a new subjective junior synonym of the large Australasian genus *Castiarina* Gory & Laporte, 1838. A brief discussion about male antennal modifications in Buprestidae is given. A list of criteria and considerations on erecting genus-group names from an earlier paper by Holm & Schoeman (1999) is repeated verbatim.

The recent description of *Castiarina shelleybarkeri* Nylander (2006) from Papua New Guinea was followed by the erection of a new monotypic genus, *Petersonia* Hawkeswood (2007). We view this taxonomic act as a subjective judgment based on parochial evidence rather than specimen study and instead propose an alternative classification below.

Abbreviations used herein are: PNG = Papua New Guinea; rev. = revision; spp. cat. = species catalogue; spp. key = species key; syn. = synonym.

Taxonomy

Stigmodera (*Castiarina*) Gory & Laporte 1838:4, 22–47 (*Stigmodera*, 3rd Division); Barker 1979:1 (spp. cat.); 1986:1 (checklist).

Type species: *Stigmodera* (*Castiarina*) *pertyi* Gory & Laporte 1838 (fixed by subsequent designation: Barker 1979:1).

Castiarina: Gardner 1989:340; Nylander 2001:51 (PNG spp.); Bellamy 2002:181; 2003:57; Barker 2006:35 (rev., spp. key); Nylander 2006:10 (PNG spp. key).

Hypostigmodera Blackburn 1892:215; Gardner 1989:341 (syn. of *Castiarina*); Bellamy 2002:181; 2003:57.

Type species: *Hypostigmodera variegata* Blackburn 1892 (fixed by monotypy).

Petersonia Hawkeswood 2007:1. **syn. nov.**

Type species: *Castiarina shelleybarkeri* Nylander 2006 (fixed by original designation).

Discussion

The discussion given by Nylander (2006) regarding the peculiar antennae of *C. shelleybarkeri* Nylander in comparison to other *Castiarina* species as well as *Hypostigmodera variegata* Blackburn, 1892 presented one interpretive option for considering the placement of a taxon that possesses an autapomorphic character or character state. Hawkeswood (2007) presented an opposing interpretation by using the extreme development of the bipectinate male antennae to justify placement in a separate, monotypic genus, partially based on a comparison with *Hypostigmodera*, another monotypic genus-group taxon which has been considered to be a synonym of *Castiarina* since Gardner's (1989) analysis of all constituents of the Stigmoderini. Since genus-group names are, by their nature, only convenient constructs of specialists' working philosophies and perspectives, some foundation or common filter would be welcome to help the taxonomic community and specialists in any particular group apply a more consistent definition and rank to genus-group taxa. The best, and most recent, discussion of recommended criteria to make such decisions is found under the heading "Criteria and considerations on erecting genera" in a paper on Afrotropical *Acmaeodera* Eschscholtz, 1829 (Buprestidae) by Holm & Schoeman (1999). That paper may be difficult for some to obtain, so we repeat their criteria below due to the pertinence to our proposed new synonymy herein.

Criteria and considerations on erecting genera (from Holm & Schoeman 1999):

1. It is generally accepted that the matter of ranking above the species level is more or less subjective. There are, however, a number of criteria which taxonomists do apply more or less consistently, and to which we owe the fact that genera are more often agreed upon between workers than not. Some of the more widely accepted norms are the following:
 - 1.1. Overall similarity between members of a genus should be greater than between genera of any given group.
 - 1.2. A genus should be defined by at least one, but preferably more, recognizable and unique apomorphic characters.
 - 1.3. A genus should constitute a monophyletic group.
 - 1.4. Phylogenetic and/or phenotypic distances between genera should be approximately of the same magnitude in different taxonomic groups. An objective measure of distance is obviously impossible, but there is a traditional agreement on approximate limits for the genus.
2. Formal taxonomic names and classifications have to satisfy three often conflicting requirements (*vide* e.g. Hull 1970). They should ideally be consistent with the phylogeny of the group (but at least they should not contradict it); they should ideally be stable (but must of course be corrected if incorrect); and they should be practically useful for the purpose of identification. All the criteria are most crucial at the generic level, since genera are the closest phylogenetic groups and generic stability also affects species names (through homonymy). Therefore, the genus is the rank which should be handled most conservatively of all. Certainly there should be compelling phylogenetic reasons and/or an unambiguous unique definition before a new genus is erected.
3. Authors often justify complex higher classification on the argument that information is lost if such taxonomical edifices are not erected. This is simply not the case. A phylogenetic tree or cladogram can convey the (often very putative) relationships without resorting to taxonomic names for each and every branch. In the case of species-groupings, there is moreover the

very useful subgeneric rank to identify related species-groups without affecting stability of genera or species names. We have used the sub-genus in cases where the genus seems inappropriate:

- 3.1. Mosaic evolution, i.e. disjunct distribution of apparently homologous character states.
- 3.2. Diagnostic character states consistent but grading, weak, or difficult to identify.
- 3.3. Paraphyletic groups, i.e. clearly defined specialized groups which split off from an unspecialized group which is then defined by plesiomorphic features only.

Conclusions

Applying such criteria beyond any personal bias shows that outside of the extreme development of the unique male holotype antennae, no other distinguishing features separate *C. shelleybarkeri* from the morphological diversity found within the very large genus *Castiarina*. If we agreed that an appropriate benchmark for comparison of *C. shelleybarkeri* to *Castiarina* is the now synonymized *Hypostigmodera*, thus *C. variegata*, the decision to erect *Petersonia* still seems premature since *C. shelleybarkeri* is only known from a single male. The sexual dimorphism found in *C. variegata* would be informative if the female of *C. shelleybarkeri* was known too. During the time that the manuscript describing *C. shelleybarkeri* was being prepared, we exchanged various thoughts and perspectives about whether or not this represented a second species of "*Hypostigmodera*" and would thus better qualify that taxon for resurrection (either to genus or subgenus rank) from the perspective of having a second species that would strengthen confidence about such a decision. We concluded that *C. shelleybarkeri* did not seem to match all character states with *C. variegata* and thus placement of both taxa in *Castiarina* seemed the best choice awaiting further specimens and especially the female of *C. shelleybarkeri*. Therefore we propose that the genus-group name *Petersonia* be considered a subjective junior synonym of *Castiarina* pending convincing additional data and/or arguments to the contrary. We should note that the description of *Petersonia* and discussion of relationships by Hawkeswood (2007) were made without the benefit of examination of any actual specimen of *C. shelleybarkeri* since the holotype is kept in the research collection of the junior author of this paper. Thus, Hawkeswood's paper was based solely on the original description and photographs of *C. shelleybarkeri* by Nylander (2006); the same photos were reproduced by Hawkeswood, without permission from either the editor of *Lambillionea* (J. Hecq, in litt.) or the junior author. We feel that it is insufficient for new taxa to be proposed in the absence of actual specimen study, using only descriptive prose and one or two views from photographs on pages 8 & 9 (Nylander 2006), which the publisher of *Calodema* apparently elongated in error.

The very recent appearance of a paper (Westcott & Barr 2007) resurrecting the New World chrysobothrine genus *Knowltonia* Fisher 1935 widens the discussion about *Petersonia* and *Hypostigmodera*, since all three possess extraordinary male antennal modifications. Species assigned to these three genus-group names, along with those in *Hesperorhipis* Fall, 1930 and *Xenorhipis* LeConte, 1866 (Buprestinae: Xenorhipidini: Xenorhipidina) and *Trichinorhipis* Barr 1948 (Xenorhipidini: Trichinorhipidina) from the New World, *Australorhipis* Bellamy 1986 (Buprestinae: Curidini) from Australia, and *Mendizabalia* Cobos 1957 and *Philandia* Germán & Kerremans 1906 (Mendizabaliini) from Chile, each have

various male antennal morphology differences from the typical buprestid antenna, i.e. serrate. In the case of these latter six genera, the male antennae modify from a more pronounced serration to a very extended flabellate to even lamellate condition. *Knowltonia*, *Hypostigmodera* and *Petersonia* are most similar due to the dual projections of the male antennomeres, which might be termed 'bipectinate', 'biflabellate' or even, although apparently incorrect ontogenetically (fide Brusca & Brusca 1990), 'biramose'. However, *Knowltonia* is a genus of four species which inhabit arid habitats North America and are associated with host plants in the genus *Atriplex* (Chenopodiaceae), and the separation of the genus and four species from *Chrysobothris* Eschscholtz 1829 is beyond just the difference in the male antennae. For the reverse reason, Gardner (1989) decided to synonymize *Hypostigmodera* under *Castiarina* since it was only the male antennae in *C. variegata* that diverged from the very broad groundplan of *Castiarina* spp. The male antennae of *C. shelleybarkeri* differ from those in *C. variegata*, but not to such a significant extent as to warrant that either species is separated into its own monotypic genus. The whole aspect of male antennal modifications in the Buprestidae presents an interesting research theme, but more observation is needed, certainly of live males and females to ascertain, rather than speculate, the purpose of such evolutionary invention and the utility of the resulting organs. As it stands now, it cannot be stated with any degree of confidence if male antennal modifications in buprestids represent a synapomorphy across a broad transformation series or if in each of the groups mentioned above antennal adaptations are unrelated synapomorphies, or in the cases of *Australorhipis* and *Knowltonia* respectively, their antennal structures are autapomorphic in contrast to their sister-taxa.

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