

## Genus-group names of Afrotropical flea beetles (Coleoptera: Chrysomelidae: Alticinae): Annotated catalogue and biogeographical notes

MAURIZIO BIONDI and PAOLA D'ALESSANDRO

Dipartimento di Scienze Ambientali, University of L'Aquila, 67100 Coppito-L'Aquila, Italy;  
e-mails: maurizio.biondi@univaq.it; paola.dalessandro@univaq.it

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**Abstract.** This paper consists of an up to date annotated catalogue of the Afrotropical genera of Alticinae (Chrysomelidae), with biogeographical notes on the flea beetle fauna occurring in Sub-Saharan Africa and Madagascar. The following new synonymies are proposed: *Eugonotes* Jacoby, 1897 (a subgenus of *Sanckia* Duvivier, 1891) = *Brancucciella* Medvedev, 1995 syn. n.; *Amphimela* Chapuis, 1875 = *Dibolosoma* Jacoby, 1897 syn. n.; *Amphimela* Chapuis, 1875 = *Halticova* Fairmaire, 1898 syn. n.; *Podagrica* Chevrolat, 1837 = *Podagrixena* Bechyné, 1968 syn. n.; *Aphthona* Chevrolat, 1837 = *Pseudeugonotes* Jacoby, 1899 syn. n.; *Nisotra* Baly, 1864 = *Pseudonisotra* Bechyné, 1968 syn. n. The following new combinations are proposed: *Afrorestia sjostedti* (Weise, 1910) comb. n. (from *Crepidodera*); *Bechuana natalensis* (Jacoby, 1906) comb. n. (from *Ochrosis*); *Sesquiphaera natalensis* (Jacoby, 1906) comb. n. (from *Sphaeroderma*). The genus *Hildenbrandtina* Weise, 1910 is transferred from Galerucinae to Alticinae. New distributional data for many genera in the Afrotropical region is provided.

### INTRODUCTION

The Chrysomelidae is one of the largest phytophagous insect families and includes approximately 37,000 to 40,000 species (Jolivet & Verma, 2002). The relationship between two of its subfamilies, the monophyletic Alticinae (commonly termed flea beetles) and closely related Galerucinae is an area of active research on Chrysomelidae phylogeny (Duckett et al., 2004; Gómez-Zurita et al., 2007). In this paper, the Alticinae and Galerucinae are considered to be separate subfamilies because of the metafemoral spring in Alticinae and specific structures of the spermatheca, median lobe of aedeagus and hind wing venation (cf. Furth & Suzuki, 1994, 1998). The Alticinae includes 4,000 to 8,000 species grouped in approximately 500 genera that are distributed worldwide, although most occur in the tropical regions of South America, Africa and Asia (Konstantinov & Vandenberg, 1996; Santiago-Blay, 2004). They are highly specialized phytophagous insects, of which the adults and larvae feed on stems, leaves and roots of most of the higher plant families (Konstantinov & Vandenberg, 1996).

Details of the composition of the Afrotropical flea beetle fauna are incomplete, which is highlighted by the discrepancy in the numbers of morphogenera and morphospecies in African entomological material preserved in public and private collections and those that have been officially described. Current scientific literature includes approximately 300 research papers dedicated in whole or part to Sub-Saharan and Madagascan Chrysomelidae Alticinae, including publications on taxonomy, faunistics and ecology. The chronological trend in the numbers of these publications in time is summarized in Fig. 1, begin-

ning as early as 1830, although the first significant contribution on the Afrotropical (including Madagascar) flea beetle fauna was by the English coleopterist, Joseph Sugar Baly (1816–1890). Subsequently, in the twenty years following Baly's death (1890–1910) there were three important entomologists working on these beetles: Léon Fairmaire (1820–1906), a French specialist on Coleoptera and Hemiptera; Julius Weise (1884–1925), a German coleopterist that, despite his short life, published a large number of scientific papers, not only on Chrysomelidae but also on Coccinellidae, Curculionoidea, etc.; and Martin Jacoby (1842–1907), a German musician and coleopterist who published 150 articles on leaf beetles after moving to London.

A decrease in the number of publications on Afrotropical flea beetle fauna followed, until the revival in 1930–1940 initiated by the English coleopterist Gilbert Ernest Bryant (1878–1965) and the French chrysomelid specialist Victor Laboissière (1875–1942). The Alticinae specialists Jan Bechyné (1920–1973) and Gerhard Scherer then published many monographs (see References) on the flea beetle fauna of Sub-Saharan Africa and, to a less extent, Madagascar, describing many new genera and species from 1950–1970. More recently, contributions on the Afrotropical flea beetle fauna were published by Gerhard Scherer, Maurizio Biondi, Paola D'Alessandro, Manfred Döberl and Serge Doguet (see References).

### MATERIAL AND METHODS

The catalogue is arranged alphabetically by genus. Names that are in square brackets refer to synonymies, genera incorrectly reported in the Afrotropical region or, in some cases, to

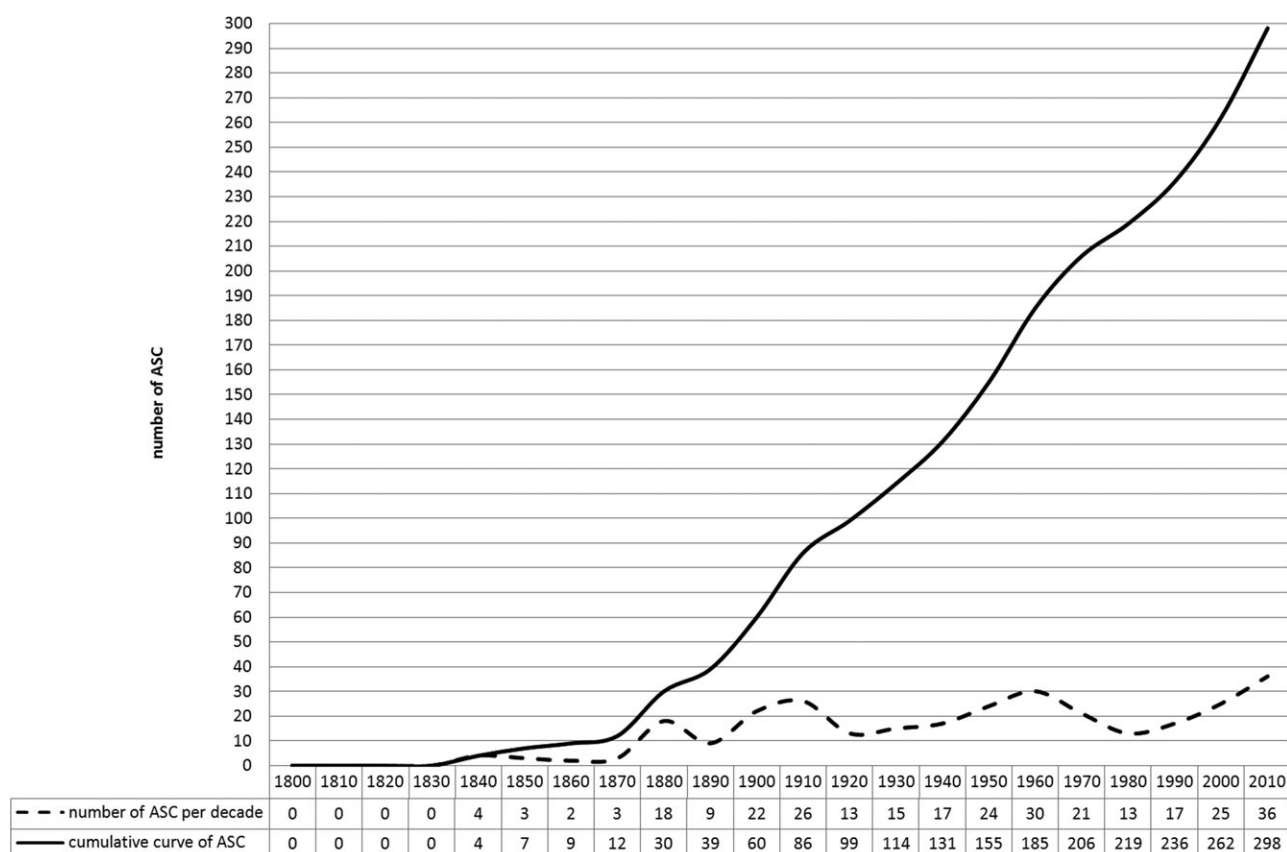


Fig. 1. Chronology of the publications on the Afrotropical flea beetle fauna (ASC).

genera transferred to Galerucinae or to genus-group names that are unavailable.

In addition to author and date of publication, each genus-group name is accompanied by: (a) synonymies, exclusively those for the Afrotropical region; (b) bibliographic references, including the original description and other important taxonomical contributions; (c) type species, including the method of species assignment; (d) geographic distribution in the Afrotropical region (cf. Graf & Cummings, 2007) and other zoogeographical regions (cf. Sclater, 1858); (e) ecological remarks, mainly host-plants and/or habitat preferences; (f) notes, including the number of Afrotropical species and important taxonomical news.

The type material examined for this study is preserved in the following institutions: BAQ – collection of the author, Dipartimento di Scienze Ambientali, University of L'Aquila, Italy; BMNH – The Natural History Museum, London, United Kingdom; ISNB – Institut Royal des Sciences Naturelles de Belgique, Brussels, Belgium; MNHN – Muséum National d'Histoire Naturelle, Paris, France; MCSN – Museo Civico di Storia Naturale "Giacomo Doria", Genova, Italy; MRAC – Musée Royal de l'Afrique Centrale, Tervuren, Belgium; MZLU – Lund University, Sweden; NHMB – Naturhistorisches Museum, Basel, Switzerland; NHRS – Naturhistoriska Riksmuseet, Stockholm, Sweden; SANC – South African National Collection, ARC-Plant Protection Research Institute, Pretoria, South Africa; SMNS – Staatliches Museum für Naturkunde, Stuttgart, Germany; TMSA – Transvaal Museum, Pretoria, South Africa; ZMHB – Museum für Naturkunde der Humboldt-Universität, Berlin, Germany; ZSMC – Zoologische Staatssammlung, Munich, Germany.

## Abbreviations

Regions: AFR – Afrotropical; AUS – Australian; CAF – Central Afrotropical; EAF – Eastern Afrotropical; IND – Indo-Malayan; NEA – Nearctic; NEO – Neotropical; PAL – Palearctic; SAF – Southern Afrotropical; WAF – Western Afrotropical. MAD – Madagascar; MAS – Mascarene Islands; SEY – Seychelles Islands; SSA – Sub-Saharan Africa; (?) – record to be confirmed; (!) – new record.

## CATALOGUE OF AFROTROPICAL FLEA BEETLE GENERA

### *Abrarius* Fairmaire, 1902

=*Entymosina* Weise, 1910 (synonymized by Bechyné, 1958c)

**References.** Fairmaire, 1902: 261; Weise, 1910b: 438; Bechyné, 1947a: 44 (sub *Entymosina*); 1958c: 9.

**Type species.** *Abrarius cribrus* Fairmaire, 1902: 261 (Madagascar: Plateau de l'Ankara), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** Genus endemic to Madagascar and consisting of about ten species. *Abrarius* is very similar to the Neotropical genus *Gioia* Bechyné (1955e: 77), which could be a synonym.

### *Afroaltica* Biondi & D'Alessandro, 2007

**References.** Biondi & D'Alessandro, 2007: 99; D'Alessandro & Biondi, in press.

**Type species.** *Afroaltica subaptera* Biondi & D'Alessandro, 2007: 100 (Republic of South Africa, KwaZulu-Natal, Karkloof area), by original designation.

**Distribution.** Republic of South Africa (Limpopo, Mpumalanga and KwaZulu-Natal).

**Ecology.** *A. subaptera* collected in an open field on Graminae (Biondi & D'Alessandro, 2007).

**Notes.** Two species.

[*Afroalytus* Scherer, 1961]

=*Manobia* Jacoby, 1885

*Afrocrepis* Bechyné, 1954

**References.** Bechyné, 1954b: 680; Heikertinger, 1925: 99 (sub *Derocrepis* Weise, 1886).

**Type species.** *Crepidodera carinipennis* Jacoby, 1903a: 12 (KwaZulu-Natal, Malvern), by original designation.

**Distribution.** Republic of South Africa.

**Ecology.** No information.

**Notes.** Three species. *Crepidodera betiokyensis* Bechyné (1954a: 46), erroneously attributed by Bechyné (1964: 152) to this genus, must be placed in *Afrorestia* Bechyné (cf. Scherer, 1962b: 57; pers. data).

*Afrorestia* Bechyné, 1959

**References.** Bechyné, 1959b: 232.

**Type species.** *Crepidodera laeviuscula* Csiki, 1940: 297 (West Africa), by original designation.

**Distribution.** Ethiopia, Democratic Republic of Congo, Uganda, Rwanda, Burundi, Tanzania, Zimbabwe, Republic of South Africa and Madagascar.

**Ecology.** Some species of this genus were collected on Apiaceae plants in South Africa (pers. data).

**Notes.** About twenty species. *Crepidodera betiokyensis* Bechyné (1954a: 46), erroneously attributed by Bechyné (1964: 152) to *Afrocrepis* Bechyné, must be placed in this genus (cf. Scherer, 1962b: 57; pers. data). *Crepidodera sjostedti* Weise (1910a: 221) from Kilimanjaro was incorrectly attributed to *Asiorestia* Jacobson, 1925 (a genus not occurring in the Afrotropical region) by Bechyné (1957). This species is here transferred to *Afrorestia* Bechyné as *Afrorestia sjostedti* (Weise, 1910) comb. n.

[*Allomorpha* Jacoby, 1892]

=*Hespera* Weise, 1889

*Alocypha* Weise, 1911

**References.** Weise, 1911: 170.

**Type species.** *Alocypha litura* Weise, 1911: 171 (East Africa: Lindi) [= *Aphthona bimaculata* Jacoby, 1903a: 11 (KwaZulu-Natal)], by monotypy.

**Distribution.** Tanzania, Zambia(!), Malawi, Botswana(!), Mozambique(!), Namibia(!) and Republic of South Africa (KwaZulu-Natal).

**Ecology.** *Alocypha bimaculata* is a harmful pest of Sesame (*Sesamum indicum* L.) crops, especially in Tanzania (Mponda et al., 1997).

**Notes.** One species.

*Altica* Geoffroy, 1762

=*Haltica* Illiger, 1801 (unjustified emendation)

=*Graptodera* Chevrolat, 1837 (synonymized by Weise, 1888)

**References.** Geoffroy, 1762: 244; Illiger, 1801: 138; Chevrolat, 1837: 388; Weise, 1888: 825; Allard, 1889: 43 (sub *Graptodera*); Bechyné, 1954a: 43; 1955a: 209; 1960a: 77; Döberl, 2008: 35; 2010: 51.

**Type species.** *Chrysomela oleracea* Linnaeus, 1758: 372 (Europe), by subsequent designation by Latreille (1810: 432).

**Distribution.** All zoogeographical regions.

**Ecology.** Polyphagous genus associated with herbaceous plants, shrubs and trees belonging to several plant families (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Thirty-five species in Sub-Saharan Africa and 8 in Madagascar.

*Amphimela* Chapuis, 1875

=*Diboloides* Jacoby, 1897 (synonymized by Scherer, 1961)

=*Dibolosoma* Jacoby, 1897 syn. n.

=*Halticova* Fairmaire, 1898 syn. n.

=*Halticella* Jacoby, 1899 (nec *Halticella* Stephens, 1829: 36, Hymenoptera, Chalcidoidea).

=*Cercyonia* Weise, 1901 (synonymized by Scherer, 1961)

=*Halticorthaea* Csiki, 1940 (new name for *Halticella* Jacoby, 1899; synonymized by Scherer, 1961)

**References.** Chapuis, 1875: 34; Baly, 1875: 27; Jacoby, 1897: 553, 559; Fairmaire, 1898: 428; Jacoby, 1899b: 357; Weise, 1901: 303; Maulik, 1929: 207 (sub *Diboloides*); Csiki in Heikertinger & Csiki, 1940: 418; Scherer, 1961: 252.

**Type species.** *Amphimela mouhoti* Chapuis, 1875: 36 (Indonesia), by monotypy.

**Distribution.** Afrotropical (including Madagascar), Indo-Malayan and Australian regions.

**Ecology.** *Amphimela bryanti* (Csiki in Heikertinger & Csiki, 1940) on *Bersamia* sp. (Melianthaceae) in Uganda (Bryant, 1936). *A. citri* (Bryant, 1922) cited as a harmful pest of citrus in western Africa (Bryant, 1922 : 474).

**Notes.** About thirty species in the Afrotropical region. Bechyné (1964: 161) established the synonymy between *Dibolosoma quadripustulatum* Jacoby, 1897 [sub *4-punctata* (sic!)] and *Halticova rufoguttata* Fairmaire, 1898.

*Anaxerta* Fairmaire, 1902

**References.** Fairmaire, 1902: 267.

**Type species.** *Anaxerta castanea* Fairmaire, 1902: 268 (Madagascar: Ankarahitra), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** One species.

*Angulaphthona* Bechyné, 1960

**References.** Bechyné, 1960a: 74; Scherer, 1978: 265; Medvedev, 1996: 261.

**Type species.** *Aphthona heteromorpha* Bechyné, 1955c: 62 (Madagascar: Bas Mangoky), by original designation.

**Distribution.** Egypt, Tchad, Sudan, Somaliland, Sierra Leone(!), Nigeria, Democratic Republic of Congo, Uganda(!), Mozambique, Madagascar and Arabian Peninsula (Saudi Arabia and North Yemen).

**Ecology.** *Angulaphthona heteromorpha* collected on cotton plants, *Gossypium* sp. (Malvaceae) (Bechyné 1955c, sub *Aphthona*).

**Notes.** Five species in the Afrotropical region.

*Antanemora* Bechyné, 1964

*Lactica* Erichson, 1847 (pars)

**References.** Erichson, 1847: 173; Bechyné, 1950: 220 (sub *Lactica*); 1964: 145; Bechyné & Bechyné, 1975: 26.

**Type species.** *Lactica carbonaria* Bechyné, 1948a: 7 (Madagascar: Environs de Rogez; Ankazoabo), by original designation.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** About twenty species.

### ***Aphthona* Chevrolat, 1837**

=*Pseudeugonotes* Jacoby, 1899 syn. n.

**References.** Chevrolat, 1837: 415; Jacoby, 1899a: 531; Bechyné, 1960a: 67.

**Type species.** *Altica cyparissiae* Koch, 1803: 80 (Europe), by subsequent designation by Chûjô (1937: 119).

**Distribution.** Afrotropical (including Madagascar), Palaearctic and Indo-Malayan regions. All the species from the Neotropical and Nearctic regions described as *Aphthona* should be attributed to different genera (cf. Konstantinov & Vanderberg, 1996; Konstantinov, 1998).

**Ecology.** Genus mainly associated with Euphorbiaceae, but also with Geraniaceae, Cistaceae, Rosaceae, Linaceae, Iridaceae and Lythraceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About one hundred species in Sub-Saharan Africa and Madagascar. The examination of the holotype of *Pseudeugonotes vanmutellii* Jacoby (1899a: 531) (Somaliland) resulted in the following new synonymy: *Aphthona* Chevrolat, 1837 = *Pseudeugonotes* Jacoby, 1899 syn. n.

### ***Argopistes* Motschulsky, 1860**

**References.** Motschulsky, 1860: 236; Weise, 1895: 335; Bryant, 1922a: 474.

**Type species.** *Argopistes biplagiata* Motschulsky, 1860: 236 (Siberia), by monotypy.

**Distribution.** Central, eastern and southern Africa, and Madagascar; eastern Palaearctic, Nearctic, northern Neotropical, Indo-Malayan and Australian regions.

**Ecology.** Many species of this genus are associated with Oleaceae in Sub-Saharan Africa, especially with Olive trees [*Olea europaea* var. *africana* (Mill.)], on which the larvae are leaf miners and adults defoliators (cf. Jolivet & Hawkeswood, 1995; pers. data).

**Notes.** About fifteen species in Sub-Saharan Africa and Madagascar (pers. data).

### **[*Argopus* Fischer, 1824]**

Not present in the Afrotropical region.

**References.** Fischer, 1824: 184; Weise, 1902a: 171; Laboissière, 1941: 319.

**Notes.** *Argopus maculiceps* Boheman (1859: 200) was transferred by Laboissière (1941) to the genus *Toxaria* Weise; *A. pusillus* Gerstaecker (1871: 85) was transferred by Weise (1902a) to the genus *Sphaeroderma* Stephens.

### **[*Argosomus* Wollaston, 1867]**

=*Sphaeroderma* Stephens, 1831.

### **[*Aridohepera* Selman, 1963]**

=*Eriotica* Harold, 1877

### **[*Asiolestia* Jacobson, 1925]**

Not present in the Afrotropical region.

**References.** Jacobson, 1925: 274; Bechyné, 1957: 181; 1959b: 233.

**Notes.** Bechyné (1957) attributed *Crepidodera sjostedti* Weise (1910a: 221) from Kilimanjaro to this genus. This species is here transferred to *Afrorestia* Bechyné as *Afrorestia sjostedti* (Weise, 1910) comb. n.

### **[*Asphaera* Chevrolat, 1843]**

Not present in the Afrotropical region.

**References.** Chevrolat, 1843: 227; Fairmaire, 1886: 93; Jacoby, 1892: 573; Bechyné, 1959c: 319.

**Notes.** The three species wrongly attributed to this Neotropical genus were transferred by Bechyné (1959c) to the genera *Physomandroya* Bechyné and *Hemipyxis* Chevrolat.

### ***Bangalaltica* Bechyné, 1960**

**References.** Bechyné, 1960b: 9; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Bangalaltica antennalis* Bechyné, 1960b: 9 (Belgian Congo: Bangala; Lubutu-Kituri), by monotypy.

**Distribution.** Congo(!) and Democratic Republic of Congo.

**Ecology.** No information.

**Notes.** One species.

### **[*Balanomorpha* Chevrolat, 1837]**

=*Mantura* Stephens, 1831

### ***Bechuana* Scherer, 1970**

**References.** Scherer, 1970: 301.

**Type species.** *Bechuana nigripes* Scherer, 1970: 302 (Free State: Boshof; North-West Province: Vryburg), by original designation.

**Distribution.** Republic of South Africa [North-West Province(!), Gauteng, KwaZulu-Natal, Free State, Western and Eastern Provinces].

**Ecology.** No information.

**Notes.** Two species. *Ochrosis natalensis* Jacoby (1906: 17) is here attributed to this genus as *Bechuana natalensis* (Jacoby, 1906) comb. n.

### ***Bechynella* Biondi & D'Alessandro, 2010**

*Serraphula* Jacoby, 1897 (pars)

**References.** Biondi & D'Alessandro, 2010: 28; Bechyné, 1955b: 517 (sub *Serraphula*); 1959a: 13 (sub *Serraphula*).

**Type species.** *Serraphula bohumi* Bechyné, 1955b: 517 (French Guinea: Dalaba), by original designation.

**Distribution.** Guinea, Ivory Coast, Nigeria, Cameroon and Democratic Republic of Congo.

**Ecology.** No information.

**Notes.** The three species attributed to this genus were described by Bechyné (1955b, 1959a) under *Serraphula* Jacoby (cf. Biondi & D'Alessandro, 2010).

### ***Bikasha* Maulik, 1931**

**References.** Maulik, 1931: 256.

**Type species.** *Bikasha tenuipunctata* Maulik, 1931: 257 (Seychelles), by original designation.

**Distribution.** Indian Ocean (Seychelles). The recent synonymies established by Konstantinov & Prathapan (2008: 387) indicate that this flea beetle genus occurs also in the Indo-Malayan region.

**Ecology.** In Seychelles, *B. tenuipunctata* Maulik and *B. fortipunctata* Maulik (1931: 258) were collected in forest, and *B. minor* Maulik (1931: 259) in coastal wet meadows.

**Notes.** Three species in Seychelles.

### ***Biodontocnema* Biondi, 2000**

**References.** Biondi, 2000: 347; 2002b: 356.

**Type species.** *Biodontocnema brunnea* Biondi, 2000: 348 (Namibia, Kaross), by monotypy.

**Distribution.** Namibia.

**Ecology.** The only species in this genus is associated with moist habitats (Biondi, 2000).

**Notes.** One species.

### ***Blepharida* Chevrolat, 1837**

includes subgen. *Blepharidina* Bechyné, 1968

=*Eutheca* Baly, 1878 (nec *Eutheca* Kiesenwetter in Erichson, 1877: 155, Coleoptera: Anobiidae).

=*Calothea* Heyden, 1887 (new name for *Eutheca* Baly, 1878; synonymized by Scherer, 1961)

=*Blepharidella* Weise, 1910 (synonymized by Scherer, 1961)

=*Blepharidula* Weise, 1916 (an unnecessary new name for *Eutheca* Baly, 1878).

**References.** Chevrolat, 1837: 418; Heyden, 1887: 98; Duvivier, 1891: 242; Weise, 1910a: 220; Laboissière, 1942: 95; Bryant, 1944a: 129; Scherer, 1961: 252; Bechyné, 1968: 1725; Furth, 1998: 12; Furth & Lee, 2000: 26; Becerra, 2004: 116.

**Type species.** *Chrysomela rhois* Forster, 1771: 21 (North America), by subsequent designation by Chevrolat (1842: 606).

**Distribution.** Afrotropical (including Madagascar), southern Palaearctic (Israel), Nearctic and Neotropical regions.

**Ecology.** The Afrotropical species of *Blepharida* are generally associated with shrubs of *Rhus* (Anacardiaceae) (Furth & Young, 1988: 496; pers. data).

**Notes.** About thirty-five species in Sub-Saharan Africa and two in Madagascar. Mainly the nominotypical subgenus *Blepharida* is widespread in Nearctic and Neotropical regions and the subgenus *Blepharidina* in the Afrotropical region (Furth, 1998).

### ***Blepharidina* Bechyné, 1968**

subgenus of *Blepharida* Chevrolat, 1837

**References.** Bechyné, 1968: 1725; Furth, 1998: 12.

**Type species.** *Blepharida guttulata* Baly, 1881: 52 (Angola), by original designation.

**Distribution.** Afrotropical (including Madagascar) and southern Palaearctic (Israel) regions.

**Ecology.** Genus generally associated with shrubs of *Rhus* (Anacardiaceae) (Furth & Young, 1988: 496; pers. data).

**Notes.** About thirty-five species in Sub-Saharan Africa and two in Madagascar.

### **[*Blepharidula* Weise, 1916]**

=*Blepharida* Chevrolat, 1837

**References.** Weise, 1916: 39; Baly, 1878: 204; Heyden, 1887: 98.

**Notes.** An unnecessary new name proposed by Weise (1916) for *Eutheca* Baly, 1878 (nec *Eutheca* Kiesenwetter in Erichson, 1877: 155, Coleoptera: Anobiidae). Weise incorrectly regarded the previous replacement name for *Eutheca* (*Calothea* Heyden, 1887) as unavailable because it was already in use for a plant genus of Graminae (cf. Palisot de Beauvois, 1812: 85).

### **[*Brinckaltica* Bechyné, 1959]**

=*Chaetocnema* Stephens, 1831

### ***Buphonella* Jacoby, 1903**

**References.** Jacoby, 1903a: 37; Laboissière, 1922: 178.

**Type species.** *Apophyllia murina* Gerstaecker, 1871: 83 (Zanzibar), by subsequent designation by Laboissière (1922: 179).

**Distribution.** Central and eastern Africa.

**Ecology.** Genus associated with Graminae. *Buphonella murina* (Gerstaecker) and *B. metallica* Jacoby (1907: 523) can damage maize (cf. Drinkwater, 1989: 315).

**Notes.** Four species.

### **[*Calothea* Heyden, 1887]**

=*Blepharida* Chevrolat, 1837

**References.** Heyden, 1887: 98; Baly, 1878: 204.

**Notes.** New name for *Eutheca* Baly, 1878 preoccupied by *Eutheca* Kiesenwetter in Erichson, 1877: 155 (Coleoptera, Anobiidae).

### ***Carcharodis* Weise, 1910**

**References.** Weise, 1910b: 434; Bechyné, 1954b: 683; Biondi, 2002b: 356.

**Type species.** *Chaetocnema rugiceps* Baly, 1877b: 308 (Madagascar), by subsequent designation by Bechyné (1954b: 683).

**Distribution.** Central and southern Africa, and Madagascar.

**Ecology.** Species of this genus live in moist habitats and are probably associated with plants of the family Cyperaceae (pers. data).

**Notes.** Seven species.

### ***Celisaltica* Biondi, 2001**

**References.** Biondi, 2001: 644.

**Type species.** *Celisaltica ruwenzorica* Biondi, 2001: 644 (Ruwenzori), by original designation.

**Distribution.** Uganda.

**Ecology.** The only species in this genus lives at high altitudes (3,200–4,000 m a.s.l.) on the Ruwenzori Massif, and is associated with the *Ericetum* plant community (Biondi, 2001).

**Notes.** One species.

### **[*Cercyonia* Weise, 1901]**

=*Amphimela* Chapuis, 1875

### ***Chaetocnema* Stephens, 1831**

=*Plectroscelis* Chevrolat, 1837 (synonymized by Weise, 1886)

=*Exorhina* Weise, 1886 (synonymized by Heikertinger & Csiki, 1939–1940)

=*Brinckaltica* Bechyné 1959 (synonymized by Scherer, 1961)

**References.** Stephens, 1831: 325; Chevrolat, 1837: 417; Baly, 1877a: 166; Weise, 1886: 750; Bryant, 1928: 393; Heikertinger & Csiki, 1940: 376; Laboissière, 1942: 81; Bechyné, 1959b: 236; 1960a: 91; Scherer, 1961: 259; Biondi, 2001b: 233; 2002a: 266; 2002b: 356; Biondi & D'Alessandro, 2006: 720.

**Type species.** *Chrysomela concinna* Marsham, 1802 (Europe), by subsequent designation by Westwood (1840: 42).

**Distribution.** All zoogeographical regions.

**Ecology.** Genus mainly associated with Cyperaceae, Juncaceae, Graminae, Polygonaceae and Chenopodiaceae (cf. Jolivet & Hawkeswood, 1995). In the Afrotropical region some *Chaetocnema* are serious pests of rice (Biondi & D'Alessandro, 2008a).

**Notes.** Over one hundred species in Sub-Saharan Africa and Madagascar.

### ***Chaillucola* Bechyné, 1968**

**References.** Bechyné, 1968: 1713; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Chaillucola formicicornis* Bechyné, 1968: 1714 (Congo: Mbila), by original designation.

**Distribution.** Congo.

**Ecology.** No information.

**Notes.** One species.

### **[*Chaloenus* Westwood, 1862]**

Not present in the Afrotropical region.

**References.** Westwood, 1861: 216; Bryant, 1927: 615; Bechyné, 1955b: 543.

**Notes.** *Chaloenus viridis* Bryant, 1927 (= *Terpnochlorus perrieri* Fairmaire, 1904) was wrongly attributed to this Indo-Malayan genus (Bechyné, 1955b).

### ***Chirodica* Germar, 1834**

**References.** Germar, 1834: 2; Baly, 1876a: 441; Scherer, 1983: 173; Biondi, 1998b: 17, 45.

**Type species.** *Chirodica chalcoptera* Germar, 1834: 16 (Cape of Good Hope), by monotypy.

**Distribution.** Namibia and Republic of South Africa.

**Ecology.** Genus strictly associated with the plant family Proteaceae (mainly *Protea* spp. and *Leucadendron* spp.) (Biondi, 1998b).

**Notes.** Eight species.

#### **[*Cladocera* Hope, 1840]**

=*Polyclada* Chevrolat, 1835

#### **[*Cladotelia* Kolbe, 1894]**

=*Polyclada* Chevrolat, 1835

### ***Collartaltica* Bechyné, 1959**

**References.** Bechyné, 1959a: 27; Biondi, 2002b: 358; Biondi & D'Alessandro, 2004: 286.

**Type species.** *Collartaltica cryptostoma* Bechyné, 1959a: 27 (Belgian Congo: Faradje, Tomati), by monotypy.

**Distribution.** Nigeria, southern Sudan, Central African Republic, Democratic Republic of Congo, Kenya, Tanzania, Zimbabwe and Republic of South Africa.

**Ecology.** The genus is associated with Graminae in moist meadows and forest clearings (Biondi & D'Alessandro, 2004).

**Notes.** Six species.

#### **[*Crepidodera* Chevrolat, 1837]**

Not present in the Afrotropical region.

**References.** Chevrolat, 1837: 415.

**Notes.** Afrotropical species initially attributed to this genus (cf. Bryant, 1927; Jacoby, 1899b, 1903a, 1906, Weise, 1902b, 1910a, 1924) were mainly transferred to the genera *Afrorestia* Bechyné, *Afrocrepis* Bechyné and *Orthocrepis* Weise.

### **[*Cyrtoma* Clark, 1863]**

Nomen nudum.

**Notes.** Clark (1863: 165) uses this genus-name, without any description, for a never published species from Madagascar ["apicale, *Clark*" synonymized with "4-maculata, *Chevr.*" and "Madecassae, *Chevr.*" (also the latter two were never published)].

### ***Decaria* Weise, 1895**

=*Embolimus* Weise, 1902

**References.** Weise, 1895: 344; 1902b: 303; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Decaria tricolor* Weise, 1895: 344 (Sierra Leone, Bang-Haas), by monotypy.

**Distribution.** Afrotropical region (excluding Madagascar).

**Ecology.** Genus mainly associated with Boraginaceae (*Heliotropium*), Sterculiaceae (*Cola*) and Lamiaceae (*Ocimum*) (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About twenty species.

#### **[*Decarthrocera* Laboissière, 1937]**

Genus transferred to the subfamily Galerucinae (Furth & Suzuki, 1994).

**References.** Laboissière, 1937: 27; Furth & Suzuki, 1994: 131.

#### **[*Derocrepis* Weise, 1886]**

Not present in the Afrotropical region.

**References.** Weise, 1886: 676, 686; Heikertinger, 1925: 95.

**Notes.** The species initially attributed to this Palearctic genus were transferred to the genera *Afrocrepis* Bechyné and *Afrorestia* Bechyné.

### ***Diamphidia* Gerstaecker, 1855**

**References.** Gerstaecker, 1855: 638; Baly, 1861: 198; Laboissière, 1942: 109.

**Type species.** *Diamphidia femoralis* Gerstaecker, 1855: 638 (Sena and Port Natal), by monotypy.

**Distribution.** Central, eastern and southeastern Africa.

**Ecology.** Genus associated with shrubs and trees of *Commiphora* (Burseraceae) (cf. Jolivet & Hawkeswood, 1995; Chaboo et al., 2007).

**Notes.** Seventeen species.

### ***Dibolia* Latreille, 1829**

=*Haltitarsus* Berthold, 1827

**References.** Latreille, 1829: 155; Berthold, 1827: 401; Baly, 1876b: 598; Weise, 1926: 24 (sub *Haltitarsus*); Bechyné, 1960a: 101.

**Type species.** *Haltica occultans* Koch, 1803: 22 (Europe), by subsequent designation by Chûjô (1936: 84).

**Distribution.** Sub-Saharan Africa (absent in Madagascar); Palearctic, Nearctic and Neotropical regions.

**Ecology.** Genus mainly associated with Lamiaceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About twenty species in Sub-Saharan Africa.

#### **[*Diboloides* Jacoby, 1897]**

=*Amphimela* Chapuis, 1875

#### **[*Dibolosoma* Jacoby, 1897]**

=*Amphimela* Chapuis, 1875

### ***Dimonikaea* Bechyné, 1968**

**References.** Bechyné, 1968: 1711; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Dimonikaea descarpentriesi* Bechyné, 1968: 1712 (Congo: Dimonika), by original designation.

**Distribution.** Congo.

**Ecology.** No information.

**Notes.** One species. Bechyné (1968) wrongly included *Gabonia mirabilis* Scherer (1963: 652) in this genus (pers. data).

### ***Diphaulacosoma* Jacoby, 1892**

**References.** Jacoby, 1892a: 574.

**Type species.** *Diphaulacosoma laevipenne* Jacoby, 1892: 574–575 (Madagascar), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** One species. *Neoderina* Bechyné, 1952 (currently placed as a subgenus of *Neodera* Duvivier, 1891) could be a synonym of *Diphaulacosoma* (pers. data).

### ***Djallonia* Bechyné, 1955**

**References.** Bechyné, 1955b: 534; Scherer, 1962a: 57.

**Type species.** *Djallonia maindra* Bechyné, 1955b: 534 (French Guinea: Dalaba), by monotypy.

**Distribution.** Guinea and Democratic Republic of Congo.

**Ecology.** No information.

**Notes.** One species.

### ***Drakensbergianella* Biondi & D'Alessandro, 2003**

**References.** Biondi & D'Alessandro, 2003: 100.

**Type species.** *Drakensbergianella rudebecki* Biondi & D'Alessandro, 2003: 100 (Republic of South Africa, Drakensberg), by monotypy.

**Distribution.** Republic of South Africa (Free State and KwaZulu-Natal).

**Ecology.** The only species in this genus lives in alpine meadows (over 2,000 m a.s.l.) on the Drakensberg and was collected on inflorescences of Asteraceae, such as *Senecio* and *Helichrysum* (Biondi & D'Alessandro, 2003).

**Notes.** One species.

### ***Dunbrodya* Jacoby, 1906**

**References.** Jacoby, 1906: 19.

**Type species.** *Dunbrodya nitida* Jacoby, 1906: 20 (Cape Colony), by monotypy.

**Distribution.** Republic of South Africa (Western Cape Province).

**Ecology.** The only species in this genus was collected on *Asparagus* sp. (Asparagaceae) (Jacoby, 1906).

**Notes.** One species.

### **[*Embolimus* Weise, 1902]**

=*Decaria* Weise, 1895

### **[*Entymosina* Weise, 1910]**

=*Abrarius* Fairmaire, 1902

### ***Epitrix* Foudras, 1860**

=*Euplectnema* Jacoby, 1906 (synonymized by Scherer, 1963)

**References.** Foudras, 1860: 147; Jacoby, 1906: 22; Scherer, 1963: 672.

**Type species.** *Epitrix atropae* Foudras, 1860: 55 (Europe), by subsequent designation by Maulik (1926: 130, 133).

**Distribution.** All zoogeographical regions.

**Ecology.** Genus mainly associated with Solanaceae. Some species can be harmful to plants of economic importance (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About a dozen species in Sub-Saharan Africa and Madagascar.

### **[*Eremiella* Weise, 1910]**

=*Eurylegna* Weise, 1910

### ***Eriotica* Harold, 1877**

=*Niphraea* Baly, 1878 (synonymized by Harold, 1878)

=*Aridohespera* Selman, 1963 (synonymized by Selman, 1968)

**References.** Harold, 1877a: 107; 1878: 206; Baly, 1878: 40; Ferreira, 1963: 516; Selman, 1963: 1156; 1968: 248.

**Type species.** *Eriotica fuscipennis* Harold 1877a: 107 (Nyassa), by monotypy.

**Distribution.** Ethiopia, Tanzania, Malawi and Mozambique.

**Ecology.** No information.

**Notes.** Seven species.

### **[*Escaleriella* Weise, 1907]**

=*Lypnea* Baly, 1876

### ***Ethiopia* Scherer, 1972**

**References.** Scherer, 1972: 7; 1978: 265.

**Type species.** *Ethiopia tricolor* Scherer, 1972: 7 (Ethiopia: Agheresalam), by original designation.

**Distribution.** Ethiopia and Yemen(?) (cf. Scherer, 1978).

**Ecology.** No information.

**Notes.** One species.

### ***Eugonotes* Jacoby, 1897**

subgenus of *Sanckia* Duvivier, 1891

=*Brancucciella* Medvedev, 1995 syn. n

**Type species.** *Eugonotes longicornis* Jacoby, 1897: 559 (Madagascar: Diego-Suarez), by monotypy.

**References.** Jacoby, 1897: 558; Laboissière, 1942: 15; Bechyné, 1956: 173; Medvedev, 1995: 479.

**Distribution.** Senegal(!), Guinea, Ethiopia, Democratic Republic of Congo, Uganda, Rwanda, Kenya, Madagascar, southern Indo-Malayan region.

**Ecology.** No information.

**Notes.** Five species in Sub-Saharan Africa and ten in Madagascar. The examination of the type material of *Brancucciella micheli* Medvedev (1995: 480) resulted in the following new synonymy: *Eugonotes* Jacoby, 1897 = *Brancucciella* Medvedev, 1995 syn. n.

### **[*Euplectnema* Jacoby, 1906]**

=*Epitrix* Foudras, 1860

### ***Eurylegna* Weise, 1910**

=*Eremiella* Weise, 1910 (synonymized by Scherer, 1972)

**References.** Weise, 1910a: 228; Scherer, 1972: 10.

**Type species.** *Eurylegna fulva* Weise, 1910a: 228 (Kilimanjaro), by monotypy.

**Distribution.** Ethiopia, Democratic Republic of Congo and Rwanda.

**Ecology.** No information.

**Notes.** Five species.

### ***Eurylegniella* Scherer, 1972**

**References.** Scherer, 1972: 12.

**Type species.** *Eurylegna guineensis* Bechyné, 1955b: 528 (French Guinea: Mount Gangan; Dalaba; Nzérékoré; Mount Nimba), by original designation.

**Distribution.** Nigeria, Guinea and Democratic Republic of Congo (Garamba National Park).

**Ecology.** No information.

**Notes.** One species

### **[*Eutheca* Baly, 1878 nom. praeocc.]**

See *Calotheca* Heyden, 1887 and *Blepharidula* Weise, 1916.

### ***Eutornus* Clark, 1860**

*Oedionychis* Latreille, 1829 (pars)

**References.** Clark, 1860: 64; Bechyné, 1959:

**Type species.** *Oedionychus (Eutornus) africanus* Clark, 1860: 65, by original designation.

**Distribution.** Sub-Saharan Africa (absent in the northern-eastern part of EAF) and Madagascar.

**Ecology.** No information.

**Notes.** About ten species, of which one is on Madagascar.

### **[*Exorhina* Weise, 1886]**

=*Chaetocnema* Stephens, 1831

### ***Gabonia* Jacoby, 1893**

=*Thrymnes* Weise, 1895 (synonymized by Weise, 1902a)

=*Jamesonia* Jacoby, 1895 (synonymized by Weise, 1902a)

=*Orneates* Jacoby, 1899 (synonymized by Weise, 1910a)

**References.** Jacoby, 1893: 101; 1895: 341; 1899b: 345; Weise, 1895: 338; 1902a: 173; 1910a: 231; Bechyné, 1955b: 489; Scherer, 1962a: 21; Scherer & Boppré, 1997: 10, 32; Biondi & D'Alessandro, 2003: 105.

**Type species.** *Gabonia unicostata* Jacoby, 1893: 101 (Gabon), by monotypy.

**Distribution.** Afrotropical region (excluding Madagascar) and Arabian Peninsula(?).

**Ecology.** Polyphagous genus associated with several plant families (cf. Jolivet & Hawkeswood, 1995; pers. data).

**Notes.** About one hundred and fifty species in Sub-Saharan Africa. According to Biondi & D'Alessandro (2003), *Gabonia* is closely related to *Luperomorpha* Weise, 1887, a genus prevalent and widespread in the Oriental and Australian regions, and is probably a synonym. In fact, many species currently attributed to *Gabonia* do not show any significant differences from species of *Luperomorpha*. The diagnostic character reported by Scherer & Boppré (1997) for separating these two genera is the apical spur on the hind tibiae, long and straight in *Gabonia* and very short in *Luperomorpha*, but this character is not always reliable. In view of the high variability shown by the genus *Gabonia* and the need to consider various other genera, synonymy with *Luperomorpha* may be confirmed in the future by a detailed and careful comparative study of this complicated African genus.

**[Gastrida Chapuis, 1879]**

Genus transferred to the subfamily Galerucinae (Furth & Suzuki, 1994).

**References.** Chapuis, 1879: 20; Furth & Suzuki, 1994: 131.

**[Graptodera Chevrolat, 1837]**

=*Altica* Geoffroy, 1762

**Guilelmia Weise, 1924**

**References.** Weise, 1924: 23; Scherer, 1961: 269 (sub *Guilelmia*); Biondi & D'Alessandro, 2003: 97.

**Type species.** *Guilelmia monticola* Weise, 1924: 24 (Birunga, Mount Mukeno), by monotypy.

**Distribution.** Uganda and Rwanda.

**Ecology.** The only species in this genus was collected at a high altitude (3,100 m a.s.l.) (Weise, 1924).

**Notes.** One species.

**Guinerestia Scherer, 1959**

**References.** Scherer, 1959: 243–244; 1962a: 57.

**Type species.** *Guinerestia rubripes* Scherer, 1959: 244 (Nigeria-Cameroun: Mamfe), by original designation.

**Distribution.** Guinea, Nigeria, Democratic Republic of Congo and Rwanda(!).

**Ecology.** No information.

**Notes.** Three species.

**[Haltica Illiger, 1801]**

=*Altica* Geoffroy, 1762

**[Halticella Jacoby, 1899 nom. praeocc.]**

See *Halticorthaea* Csiki, 1940.

**Halticopsis Fairmaire, 1883**

**References.** Fairmaire, 1883a: 197; 1883b: 112.

**Type species.** *Halticopsis spissicornis* Fairmaire, 1883b: 112 (Mountains of Abyssinia), by monotypy.

**Distribution.** Ethiopia.

**Ecology.** No information.

**Notes.** One species.

**[Halticorthaea Csiki, 1940]**

=*Amphimela* Chapuis, 1875

**References.** Csiki in Heikertinger & Csiki, 1940: 418; Jacoby, 1899b: 357.

**Notes.** New name proposed for *Halticella* Jacoby, 1899 preoccupied by *Halticella* Stephens, 1829: 36 (Hymenoptera, Chalcidoidea).

**Halticotropis Fairmaire, 1886**

**References.** Fairmaire, 1886: 95; Bechyné, 1964: 158.

**Type species.** *Halticotropis multiplicata* Fairmaire, 1886: 95 (Madagascar), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** Two species.

**[Halticova Fairmaire, 1898]**

=*Amphimela* Chapuis, 1875

**[Haltitarsus Berthold, 1827]**

=*Dibolia* Latreille, 1829

**Hemipyxis Chevrolat, 1837**

=*Sebaethe* Baly, 1864 (synonymized by Monrós & Bechyné, 1956)

*Asphaera* Chevrolat, 1843 (pars)

**References.** Chevrolat, 1837: 411; 1843: 227; Baly, 1864: 438; Monrós & Bechyné, 1956: 1134; Bechyné, 1958b: 193, 1960a: 110.

**Type species.** *Haltica troglodytes* Olivier, 1808: 700 (India), by subsequent designation by Chevrolat (1845: 6).

**Distribution.** Afrotropical (including Madagascar), eastern Palaearctic, Indo-Malayan and Australian regions.

**Ecology.** Polyphagous genus associated with herbaceous plants and shrubs belonging to many plant families (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About thirty species in Sub-Saharan Africa and about ten in Madagascar. Bechyné (1959c) also attributed *Asphaera brevicornis* Jacoby (1892a: 573) to this genus.

**[Hermaphysa Foudras, 1859]**

Not present in the Afrotropical region.

**References.** Foudras, 1859: 147.

**Notes.** To this Palaearctic genus were attributed species that were subsequently transferred to *Orthocrepis* Weise (cf. Scherer, 1961: 267).

**Hespera Weise, 1889**

=*Allomorpha* Jacoby, 1892 (synonymized by Maulik, 1926)

**References.** Weise, 1889: 638; Jacoby, 1892: 934; Maulik, 1926: 137).

**Type species.** *Hespera sericea* Weise, 1889: 639 (China), by original designation.

**Distribution.** Afrotropical (excluding Madagascar), eastern Palaearctic and Indo-Malayan regions.

**Ecology.** The Afrotropical species of this genus are mainly associated with Anacardiaceae and Ericaceae (cf. Jolivet & Hawkeswood, 1995; pers. data).

**Notes.** About thirty species in Sub-Saharan Africa.

**Hildenbrandtina Weise, 1910**

Genus here transferred from the subfamily Galerucinae.

**References.** Weise, 1910b: 464; Laboissière, 1932: 58; Bechyné, 1948b: 99; 1964: 131.

**Type species.** *Hildenbrandtina variegata* Weise, 1910: 465 (Madagascar), by original designation.

**Distribution.** Madagascar.

**Ecology.** No information.



**Notes.** This genus, with about ten species in Madagascar, is here transferred from Galerucinae to Alticinae because it has a metafemoral spring very similar to that described for the Indo-Malayan genus *Mandarella* Duvivier (1892: 433) (cf. Furth & Suzuki, 1994).

#### ***Homichloda* Weise, 1902**

=*Weiseana* Jacoby, 1903 (synonymized by Cox, 1997)

**References.** Weise, 1902: 165; Jacoby, 1903a: 16; 1906: 23; Cox, 1997: 939.

**Type species.** *Homichloda pauli* Weise, 1902: 166 (Kwai), by monotypy.

**Distribution.** Kenya, Tanzania, Zambia and Republic of South Africa (KwaZulu-Natal).

**Ecology.** Genus associated with Mimosaceae (*Acacia* spp.) (Cox, 1997).

**Notes.** Three species.

#### **[*Hyphasis* Harold, 1877]**

Not present in the Afrotropical region.

**References.** Harold, 1877b: 434; Jacoby, 1901: 298; 1903b: 110; Maulik, 1926: 158, 166; Heikertinger & Csiki, 1940: 457; Bechyné, 1948a: 10; 1958a: 90.

**Notes.** The Malagasy species initially attributed to this Indo-Malayan genus were previously transferred to *Hyphasoma* Jacoby (1903b: 110) (Heikertinger & Csiki, 1940) and then to *Physoma* Clark (Bechyné, 1948a). Bechyné (1958a) reports *Hyphasoma sita* Maulik (1926: 158), described from Sri Lanka (=Ceylon), as an introduced species in the Mascarene Islands (Mauritius).

#### **[*Jamesonia* Jacoby, 1895]**

=*Gabonia* Jacoby, 1893

#### ***Kanonga* Bechyné, 1960**

**References.** Bechyné, 1960a: 54; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Kanonga atra* Bechyné, 1960a: 54 (Upemba National Park: Kanonga), by original designation.

**Distribution.** Democratic Republic of Congo and Togo(!).

**Ecology.** No information.

**Notes.** One species.

#### ***Kenialtica* Bechyné, 1960**

=*Mediafra* Scherer, 1961 (synonymy reported in Seeno & Wilcox, 1982)

**References.** Bechyné, 1960a: 75; Scherer, 1961: 266; Seeno & Wilcox, 1982: 136.

**Type species.** *Aphthona muhavura* Bechyné, 1955a: 207 (Rwanda, East of Muhavura), by original designation.

**Distribution.** Sierra Leone(!), Congo(!), Democratic Republic of Congo, Rwanda, Kenya(!), Republic of South Africa [Limpopo(!)] and Madagascar(!).

**Ecology.** No information.

**Notes.** Seven species.

#### ***Kimongona* Bechyné, 1959**

**References.** Bechyné, 1959a: 19.

**Type species.** *Kimongona callifera* Bechyné, 1959a: 19 (Belgian Congo: Mayumbe, Kimongo), by original designation.

**Distribution.** Democratic Republic of Congo and Rwanda(!).

**Ecology.** No information.

**Notes.** Two species.

#### **[*Lactica* Erichson, 1847]**

Not present in the Afrotropical region.

**References.** Erichson, 1847: 173; Weise, 1902b: 302; Bryant, 1940: 46; Bechyné, 1959a: 19.

**Notes.** The Afrotropical species initially attributed to this Neotropical genus were transferred to *Phygasia* Chapuis (Weise, 1902b; Bryant, 1940) and the Malagasy species to *Antanemora* Bechyné (Bechyné, 1959a).

#### ***Lampedona* Weise, 1907**

**References.** Weise, 1907a: 399.

**Type species.** *Lampedona tarsalis* Weise, 1907a: 399 (Spanish Guinea), by monotypy.

**Distribution.** Equatorial Guinea, Congo, Democratic Republic of Congo and Tanzania.

**Ecology.** This genus is associated with open-steppe habitats.

**Notes.** Three species.

#### ***Lepialtica* Scherer, 1962**

**References.** Scherer, 1962a: 30.

**Type species.** *Lepialtica bicolor* Scherer, 1962a: 31 (Garamba National Park), by monotypy.

**Distribution.** Democratic Republic of Congo.

**Ecology.** No information.

**Notes.** One species.

#### **[*Livolia* Jacoby, 1903]**

Genus transferred to the subfamily Galerucinae (Furth & Suzuki, 1994).

**References.** Jacoby, 1903a: 16; Furth & Suzuki, 1994: 132.

#### ***Longitarsus* Berthold, 1827**

**References.** Berthold, 1827: 401; Bechyné, 1958c: 8; 1960a: 55; Biondi & D'Alessandro, 2008b: 179.

**Type species.** *Chrysomela atricilla* Linnaeus, 1761: 166 (Europe), by subsequent designation by Maulik (1926: 333).

**Distribution.** All zoogeographical regions.

**Ecology.** Polyphagous genus associated with several plant families, in particular Boraginaceae, Asteraceae, Lamiaceae and Scrophulariaceae (cf. Jolivet & Hawkeswood, 1995; pers. data).

**Notes.** Over one hundred species in Sub-Saharan Africa and Madagascar (pers. data).

#### ***Luperomorpha* Weise, 1887**

**References.** Weise, 1887: 202; 1915: 179; Bechyné, 1959a: 1; Doguet, 1979: 308.

**Type species.** *Luperomorpha trivialis* Weise, 1887: 204 (Siberia: Raddefka; Chingan), by original designation.

**Distribution.** Nigeria, Cameroon, Equatorial Guinea, and Democratic Republic of Congo, Arabian Peninsula, and eastern Palaearctic, Indo-Malayan, and Australian regions.

**Ecology.** Polyphagous (cf. Jolivet & Hawkeswood, 1995), but no information for the Afrotropical region.

**Notes.** Only one species in the Afrotropical region: *Luperomorpha vittula* (Weise, 1915) [described under *Jamesonia*, transferred to *Luperomorpha* by Bechyné (1959)].

#### ***Lypnea* Baly, 1876**

=*Escaleriella* Weise, 1907 (synonymized by Scherer, 1961)

=*Poephila* Weise, 1895 [nec *Poephila* Gould, 1842: 93 (pl.), Aves, Estrildidae]

=*Poephilina* Csiki, 1940 (new name for *Poephila* Weise, 1895; synonymized by Bechyné, 1968)

**References.** Baly, 1876a: 446; Weise, 1895: 342; 1907a: 396; Csiki in Heikertinger & Csiki, 1940: 349; Bechyné, 1960b: 15; 1968: 1717–1718; Scherer, 1961: 267.

**Type species.** *Lypnea flava* Baly, 1876a: 446 (New Guinea, Batchian), by monotypy.

**Distribution.** Afrotropical [including Madagascar (1)], eastern Palaearctic, Indo-Malayan and Australian regions.

**Ecology.** *Lypnea flaveola* (Bryant, 1944b: 141) was collected on *Oncoba echinata* Oliver (Flacourtiaceae) (Bryant, 1944b, sub *Poephila*).

**Notes.** About ten species in Sub-Saharan Africa and Madagascar. Bechyné (1968: 1718) considered *Escaleriella* Weise and *Lypnea* Baly to be separate genera because of the different shape of their elytral epipleura: expanded in *Lypnea*; straight and narrow in *Escaleriella*.

#### [*Macroorthocrepis* Pic, 1921]

=*Phygasia* Chevrolat, 1837

#### *Malvernina* Jacoby, 1899

**References.** Jacoby, 1899b: 346; Biondi, 1998a: 37; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Malvernina varicornis* Jacoby, 1899b: 347 (KwaZulu-Natal, Malvern), by monotypy.

**Distribution.** Malawi(!) and Republic of South Africa (Limpopo, North-West Province, Gauteng, Mpumalanga, Free State, KwaZulu-Natal, Eastern Cape Province).

**Ecology.** *Malvernina varicornis* was collected on flowers of *Burchellia bubalina* (L. f.) Simms (Rubiaceae) (Biondi, 1998a).

**Notes.** Two species.

#### *Manobia* Jacoby, 1885

=*Afroalytus* Scherer, 1961 (synonymized by Biondi, 2001)

**References.** Jacoby, 1885: 73; Scherer, 1961: 269; 1962a: 54; Biondi, 2001: 648.

**Type species.** *Manobia nigripennis* Jacoby, 1885: 73 (Sumatra), by subsequent designation by Maulik (1926: 285, 407).

**Distribution.** Western and central Africa; eastern Palaearctic, Indo-Malayan and Australian regions.

**Ecology.** Genus probably polyphagous, reported on Epacridaceae, Urticaceae, Cyatheaceae, Asteraceae, Arecaceae, etc. (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About fifteen species in Sub-Saharan Africa.

#### [*Mantura* Stephens, 1831]

Not present in the Afrotropical region.

=*Balanomorpha* Chevrolat, 1837 (synonymy reported in Heikertinger & Csiki, 1940)

**References.** Stephens, 1831: 285, 322; Chevrolat, 1837: 417; Weise, 1907: 222; Bechyné, 1955a: 220.

**Notes.** *Mantura quadriplagiata* Jacoby (1895: 321) transferred by Bechyné (1955a) to *Podagricina* Chevrolat; *Balanomorpha aethiopica* Chapuis (1879: 13) transferred by Weise (1907) to *Neumannia* Weise, 1907 nom. praeocc. (= *Podagricina* Csiki, 1940).

#### [*Mediafra* Scherer, 1961]

=*Kenialtica* Bechyné, 1960

#### *Mesocrepis* Scherer, 1963

**References.** Scherer, 1963: 668.

**Type species.** *Mesocrepis lindemanae* Scherer, 1963: 669 (Tanzania: Njombe), by original designation.

**Distribution.** Tanzania and Republic of South Africa [Mpumalanga(!)].

**Ecology.** No information.

**Notes.** One species.

#### *Metroserrapha* Bechyné, 1958

**References.** Bechyné 1958a: 86; Doguet, 1974: 120.

**Type species.** *Metroserrapha prima* Bechyné, 1958a: 86 (Mauritius Island), by original designation.

**Distribution.** Mascarene Islands and Madagascar(!).

**Ecology.** Genus probably polyphagous associated with Ericaceae, Asteraceae, Polygonaceae, etc. (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Seven species on the Mascarene Islands and about ten, not yet described, on Madagascar (pers. data).

#### [*Monodaltica* Bechyné, 1955]

=*Trachytetra* Sharp, 1886

#### *Montiaphthona* Scherer, 1961

**References.** Scherer, 1961: 282; 1962a: 17; Biondi & D'Alessandro, 2003: 98.

**Type species.** *Montiaphthona monticola* Scherer, 1961: 285 (Kivu: Mont Muhi), by original designation.

**Distribution.** Democratic Republic of Congo, Rwanda, Uganda(!), Kenya and Tanzania.

**Ecology.** The species of this genus generally live at altitudes above 2,500 m in mixed bamboo forests.

**Notes.** Six species.

#### [*Musaka* Bechyné, 1958]

=*Sphaeroderma* Stephens, 1831

#### *Myrcina* Chapuis, 1875

=*Xenaltica* Baly, 1875 (synonymized by Laboissière, 1942)

=*Myrcinella* Jacoby, 1901 (synonymized by Bechyné, 1964)

**References.** Chapuis, 1875: 124, 126; Baly, 1875: 25; Jacoby, 1901: 301; Laboissière, 1942: 50; Bechyné, 1964: 150).

**Type species.** *Myrcina nigra* Chapuis, 1875: 127 (Vieux-Calabar), by original designation.

**Distribution.** Sub-Saharan Africa (absent in the southern part of SAF) and Madagascar.

**Ecology.** Some species of this genus were collected on *Spathodea* sp. (Bignoniaceae) in eastern Africa (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Twenty-three species.

#### [*Myrcinella* Jacoby, 1901]

=*Myrcina* Chapuis, 1875

#### *Neoderina* Duvivier, 1891

includes subgen. *Neoderina* Bechyné, 1952

**References.** Duvivier, 1891: 316; Bechyné, 1947b: 139; 1952: 251; 1964: 152;

**Type species.** *Crepidodera picticornis* Harold, 1877: 107 (Madagascar), by original designation.

**Distribution.** Madagascar. Weise (1923: 122) described *Neoderina australis* from Australia (Queensland): however the generic attribution of this species needs further confirmation.

**Ecology.** No information.

**Notes.** About fifteen species. The subgenus *Neoderina* Bechyné, 1952 could be a synonym of *Diphaulacosoma* Jacoby, 1892 (pers. data).

#### *Neoderina* Bechyné, 1952

subgenus of *Neoderina* Duvivier, 1891

**References.** Bechyné, 1952: 251.

**Type species.** *Neodera crassicornis* Bechyné, 1952: 251 (Madagascar: Ambohitsitondrona) by monotypy.

**Distribution.** Northeastern Madagascar.

**Ecology.** No information.

**Notes.** One species. *Neoderina* may be a synonym of *Diphaula-cosoma* Jacoby, 1892 (pers. data).

**[Neumannia Weise, 1907 nom. praeocc.]**

See *Podagricina* Csiki, 1940.

**[Niphraea Baly, 1878]**

=*Eriotica* Harold, 1877

**Nisotra Baly, 1864**

=*Pseudonisotra* Bechyné, 1968 syn. n.

**References.** Baly, 1864: 437; Bechyné, 1955a: 220; 1959d: 153; 1960a: 88; 1968: 1719.

**Type species.** *Haltica gemella* Erichson, 1834: 275 (Philippines: Luzon), by subsequent designation by Chapuis (1875: 42).

**Distribution.** Afrotropical (including Madagascar), Indo-Malayan and Australian regions.

**Ecology.** Genus mainly associated with Malvaceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About seventy species of this genus occur in Sub-Saharan Africa and Madagascar. There are no important diagnostic characters distinguishing *Pseudonisotra* Bechyné from *Nisotra*. Therefore, the following new synonymy is proposed: *Nisotra* Baly, 1864 = *Pseudonisotra* Bechyné, 1968 syn. n.

**Notomela Jacoby, 1899**

**References.** Jacoby, 1899b: 357; Bryant, 1931: 255; Scherer, 1969: 371.

**Type species.** *Notomela cyanipennis* Jacoby, 1899b: 357 (Cameroon), by monotypy.

**Distribution.** Liberia, Ivory Coast, Nigeria, Cameroon, Equatorial Guinea (Fernando Poo Island), Uganda, Rwanda(!), Democratic Republic of Congo, and Republic of South Africa (North-West Province and KwaZulu-Natal).

**Ecology.** *Notomela fulvicollis* Bryant, 1931 collected on *Xanthoxylon capense* Harv. (Rutaceae) in southeastern Africa (Bryant, 1931).

**Notes.** Four species.

**Nzerekorena Bechyné, 1955**

**References.** Bechyné, 1955b: 507; Scherer, 1959: 190; Scherer & Boppré, 1997: 10, 32; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Nzerekorena cerambycina* Bechyné, 1955b: 507 (French Guinea: Nzérékoré; Liberia: Kaouyéké; Dahomey: Forêt de Ketou), by original designation.

**Distribution.** Guinea, Liberia, Benin, Nigeria, Cameroon, Democratic Republic of Congo, Kenya and Uganda(!).

**Ecology.** No information.

**Notes.** Nine species.

**[Ochrosis Foudras, 1860]**

Not present in the Afrotropical region.

**References.** Foudras, 1860: 147; Jacoby, 1906: 17.

**Notes.** *Ochrosis natalensis* Jacoby (1906: 17) was attributed to this Palearctic genus. The examination of the type material resulted in the transfer of this species to *Bechuana* as *Bechuana natalensis* (Jacoby, 1906) comb. n.

**[Oedionychis Latreille, 1829]**

Not present in the Afrotropical region.

**References.** Latreille, 1829: 154; Konstantinov & Vandenberg, 1996: 367.

**Notes.** Currently, only four species that occur in southwestern Europe and North Africa are attributed to this genus (Konstantinov & Vandenberg, 1996). Afrotropical species described as *Oedionychis* were previously transferred to the genera *Eutornus* Clark, *Philopona* Weise, *Physodactyla* Chapuis, *Physoma* Clark, and *Physomandroya* Bechyné.

**[Orneates Jacoby, 1899]**

=*Gabonia* Jacoby, 1893

**Orthocrepis Weise, 1888**

*Hermaeophaga* Foudras, 1859 (pars)

*Crepidodera* Chevrolat, 1837 (pars)

**References.** Weise, 1888: 850; Bechyné, 1948a: 4 (sub *Hermaeophaga*); 1954b: 677; 1955a: 224; 1964: 141; Scherer, 1961: 267; 1963: 664.

**Type species.** *Haltica ruficollis* Lucas, 1849: 546 (Algeria), by monotypy.

**Distribution.** Afrotropical (including Madagascar), western Palearctic and Indo-Malayan regions.

**Ecology.** Genus mainly associated with Euphorbiaceae, but also with Leguminosae and Malvaceae (cf. Jolivet & Hawkeswood, 1995; Pollard, 1957).

**Notes.** About twenty-five species in Sub-Saharan Africa and sixteen on Madagascar.

**Paradibolia Baly, 1875**

**References.** Baly, 1875: 31; Weise, 1912: 157; Bryant, 1927: 617.

**Type species.** *Paradibolia indica* Baly, 1875: 31 (India), by monotypy.

**Distribution.** Guinea, Sierra Leone, Cameroon, Democratic Republic of Congo, Namibia(!), Republic of South Africa, and Indo-Malayan and Australian regions.

**Ecology.** Genus associated with Lamiaceae in South Africa (pers. data).

**Notes.** Three species.

**Paropsiderma Bechyné, 1958**

**References.** Bechyné, 1958a: 92.

**Type species.** *Sphaeroderma anthrax* Brancsik, 1891: 151 (Madagascar), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** Three species.

**Perichilona Weise, 1919**

**References.** Weise, 1919: 202.

**Type species.** *Perichilona rufa* Weise, 1919: 203 (Gaviro, Kwiro), by original designation.

**Distribution.** Tanzania.

**Ecology.** No information.

**Notes.** Two species.

**Philopona Weise, 1903**

*Oedionychis* Latreille, 1829 (pars)

**References.** Weise, 1903: 216; Laboissière, 1942: 105.

**Type species.** *Oedionychis* (?) *vernica* Gerstaecker, 1871: 84 (Zanzibar), by original designation.

**Distribution.** Afrotropical (excluding Madagascar), southeastern Palearctic, Indo-Malayan and Australian regions.

**Ecology.** *P. usambarica* Csiki (in Heikertinger & Csiki, 1940: 453) was collected on *Thunbergia alata* Bojer ex Simms (Acanthaceae) in Kenya (Furth, 1985).

**Notes.** About twenty species in Sub-Saharan Africa.

### ***Phygasia* Chevrolat, 1837**

=*Macroorthocrepis* Pic, 1921 (synonymized by Bechyné, 1960a)

*Lactica* Erichson, 1847 (pars)

**References.** Chevrolat, 1837: 411; Harold, 1877: 365; Fairmaire, 1888: 156; Pic, 1921: 14; Bryant, 1940: 46; Bechyné, 1952: 249; 1960a: 82.

**Type species.** *Altica unicolor* Olivier, 1808: 699 (India), by original designation.

**Distribution.** Afrotropical (including Madagascar), eastern Palaearctic and Indo-Malayan regions.

**Ecology.** Genus mainly associated with Asclepiadaceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About forty species in Sub-Saharan Africa and Madagascar.

### ***Phyllotreta* Chevrolat, 1837**

**References.** Chevrolat, 1837: 415; Bryant, 1942a: 145; Bechyné, 1955c: 61.

**Type species.** *Chrysomela brassicae* Fabricius, 1787: 78 (Europe), by subsequent designation by Chevrolat (1845: 6).

**Distribution.** All zoogeographical regions.

**Ecology.** Genus mainly associated with Cruciferae, Resedaceae, and Capparidaceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** About forty species in Sub-Saharan Africa, Arabian Peninsula and Madagascar.

### ***Physodactyla* Chapuis, 1875**

*Oedionychis* Latreille, 1829 (pars)

**References.** Chapuis, 1875: 83, 88; Scherer 1962a: 72.

**Type species.** *Physonychis africana* Chapuis, 1875: 89 (East Africa), by original designation.

**Distribution.** Sudan, Democratic Republic of Congo, Kenya, Tanzania and Republic of South Africa (Mpumalanga and KwaZulu-Natal).

**Ecology.** *P. rubiginosa* (Gerstaecker, 1871: 84) was collected on *Thunbergia alata* Bojer ex Simms (Acanthaceae) in Kenya (Furth, 1985); *P. africana* (Chapuis) on *Digera arvensis* Forssk. (Amaranthaceae) in Sudan (Pollard, 1957, sub *Physonychis*).

**Notes.** Six species.

### ***Physoma* Clark, 1863**

=*Tropidophora* Thomson, 1858: 217 (unavailable; synonymized by Jacoby, 1888)

*Hyphasys* Harold, 1877 (pars)

*Hyphasoma* Jacoby, 1903 (pars)

*Oedionychis* Latreille, 1829 (pars)

**References.** Clark, 1863: 165; Thomson, 1858: 217; Chapuis, 1875: 83, 87; Harold, 1877b: 434; Weise, 1895: 344; Jacoby, 1888: 205; 1903b: 110; Bechyné, 1959c: 318; Scherer, 1962: 73 (sub *Physonychis*).

**Type species.** *Physoma tripartitum* (Thomson, 1858) (Gabon) (= *Physonychis rugicollis* Clark, 1860 i.l.), by subsequent designation by Chapuis (1875).

**Distribution.** Western and central Africa and Madagascar.

**Ecology.** No information.

**Notes.** Two species in Sub-Saharan Africa and about twenty in Madagascar. The generic name *Tropidophora* Thomson is not available because it was ambiguously applied (ICZN, 1999: art. 12.2.5).

### ***Physomandroya* Bechyné, 1959**

*Asphaera* Chevrolat, 1843 (pars)

*Oedionychis* Latreille, 1829 (pars)

**References.** Chevrolat, 1843: 227; Bechyné, 1959c: 318.

**Type species.** *Physomandroya decorsei* Bechyné, 1959c: 319 (Madagascar: Ambowombé), by original designation.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** Seven species. Bechyné (1959c) also transferred to this genus *Asphaera melanarthra* Fairmaire, 1886: 94 (= *Asphaera madagascariensis* Jacoby, 1892a: 573).

### ***Physonychis* Clark, 1860**

**References.** Clark, 1860: 29; Duvivier, 1891: 424; Bechyné, 1959c: 321.

**Type species.** *Physonychis smaragdina* Clark, 1860: 31 (Western Africa), by original designation.

**Distribution.** Sub-Saharan Africa (absent in the southern-western part of SAF and Madagascar). *Physonychis varicornis* Duvivier, 1891 from Madagascar was transferred to the genus *Physoma* Clark by Bechyné (1959c).

**Ecology.** No information.

**Notes.** About thirty species.

### **[*Plectroscelis* Chevrolat, 1837]**

=*Chaetocnema* Stephens, 1831

### ***Podagrica* Chevrolat, 1837**

=*Podagrixena* Bechyné, 1968 syn. n.

**References.** Chevrolat, 1837: 418; Bryant, 1942b: 229; Bechyné, 1960a: 84; 1968: 1719.

**Type species.** *Altica fuscipes* Fabricius, 1775: 114 (Europe), by subsequent designation by Maulik, (1926: 273).

**Distribution.** Afrotropical (excluding Madagascar), Palaearctic and Indo-Malayan regions.

**Ecology.** Genus mainly associated with Malvaceae (cf. Jolivet & Hawkeswood, 1995: 128). Some species can damage cotton crops, *Gossypium* sp. (Malvaceae).

**Notes.** About fifty species in Sub-Saharan Africa. There are no important diagnostic characters distinguishing *Podagrixena* Bechyné from *Podagrica*. Therefore, the following new synonymy is proposed: *Podagrica* Chevrolat, 1837 = *Podagrixena* Bechyné, 1968 syn. n.

### ***Podagricina* Csiki, 1940**

=*Neumannia* Weise, 1907 (nec *Neumania* Lebert, 1879: 357, Acari, Unionicolidae)

**References.** Csiki in Heikertinger & Csiki, 1940: 364; Weise, 1907b: 223; Bechyné, 1960a: 88.

**Type species.** *Balanomorpha aethiopica* Chapuis, 1879: 13 (Ethiopia, Abyssinia), by original designation.

**Distribution.** Ethiopia, Uganda and Tanzania.

**Ecology.** No information.

**Notes.** Three species. New name proposed for *Neumannia* Weise, 1907 preoccupied by *Neumania* Lebert, 1879: 357 (Acari, Unionicolidae).

### **[*Podagrixena* Bechyné, 1968]**

=*Podagrica* Chevrolat, 1837

### **[*Poephila* Weise, 1895 nom. praeocc.]**

See *Poephilina* Csiki, 1940.

### **[*Poephilina* Csiki, 1940]**

=*Lypnea* Baly, 1876

**References.** Csiki in Heikertinger & Csiki, 1940: 349; Weise, 1895: 342.

**Notes.** New name proposed for *Poephila* Weise preoccupied by *Poephila* Gould (1842: 93 [pl.]) (Aves, Estrildidae).

### ***Polyclada* Chevrolat, 1835**

=*Cladocera* Hope, 1840 (synonymy reported in Achard, 1922)

=*Cladotelia* Kolbe, 1894 (synonymy reported in Achard, 1922)

**References.** Chevrolat, 1835: 375; Hope, 1840: 169; Baly, 1861: 198; Kolbe, 1894: 86; Achard, 1922: 4; Medvedev, 1996: 261.

**Type species.** *Clythra pectinicornis* Olivier, 1789: 31 (Africa), by monotypy.

**Distribution.** Sub-Saharan Africa (absent in the southwestern part of SAF and Madagascar), Saudi Arabia and Yemen.

**Ecology.** Genus mainly associated with Anarcadiaceae (cf. Jolivet & Hawkeswood, 1995; Chaboo et al., 2007).

**Notes.** Sixteen species.

### ***Pratima* Maulik, 1931**

**References.** Maulik 1931: 253; Bechyné, 1958a: 84.

**Type species.** *Pratima variabilis* Maulik, 1931: 253 (Seychelles: Silhouette and Mahe), by original designation.

**Distribution.** Indian Ocean (Seychelles and Mascarene Islands).

**Ecology.** The species of this genus live in forests (300–700 m a.s.l.) (Maulik 1931).

**Notes.** Eight species.

### **[*Prototrigona* Chevrolat, 1837]**

Nomen nudum.

**Notes.** Chevrolat (1837) uses this generic name, without any description, for the following two never published species: “*Glaucia. Dej.*” synonymized with “*Prasinipennis. Chevr.*” (also never published) from Madagascar, and “*Viridana. Dej.*” from an unknown locality.

### ***Pseudadorium* Fairmaire, 1885**

**References.** Fairmaire, 1885: 239; Bechyné, 1958b: 193.

**Type species.** *Pseudadorium vernicatum* Fairmaire, 1884: 239 (Madagascar), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** Five species.

### **[*Pseudonisotra* Bechyné, 1968]**

=*Nisotra* Baly, 1864

### ***Psylliodes* Berthold, 1827**

**References.** Berthold, 1827: 401; Biondi, 1996: 257; Nadein, 2007: 317.

**Type species.** *Chrysomela chrysocephala* Linnaeus, 1758: 372 (Europe), by subsequent designation by Maulik (1926: 144).

**Distribution.** All zoogeographical regions. In the Afrotropical region this genus is known from Ethiopia, Kenya, Tanzania and Republic of South Africa.

**Ecology.** Genus mainly associated with Cruciferae, Solanaceae and Graminae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Seven species.

### ***Pydaristes* Harold, 1875**

**References.** Harold, 1875: 446; Scherer, 1961: 252.

**Type species.** *Pydaristes attagenoides* Harold, 1875: 447 (Africa), by monotypy.

**Distribution.** “Africa”.

**Ecology.** No information.

**Notes.** One species. Unfortunately, the location of the type material is unknown. The original description of *Pydaristes* seems to be identical or very close to that of *Amphimela* Chapuis. The synonymy proposed by Scherer (1961) between *Pydaristes* and *Blepharida* Chevrolat is unconvincing because of the absence in *Pydaristes* (by the original description) of dentiform emargination on hind tibiae, characteristically present in *Blepharida*.

### ***Sanckia* Duvivier, 1891**

includes subgen. *Eugonotes* Jacoby, 1897 = *Brancucciella* Medvedev, 1995 syn. n. (see under *Eugonotes*).

**References.** Duvivier, 1891: 316; Jacoby, 1897: 558; Bechyné, 1956: 173; Medvedev, 1995: 479.

**Type species.** *Sanckia johanna* Duvivier, 1891: 316 (Madagascar: Antsianaka Forest), by original designation.

**Distribution.** Senegal(!), Guinea, Ethiopia, Democratic Republic of Congo, Uganda, Rwanda, Kenya and southern Indo-Malayan region (subg. *Eugonotes*); Madagascar (both subgenera).

**Ecology.** No information.

**Notes.** About twenty species in the Afrotropical region, mostly in Madagascar.

### ***Serraphula* Jacoby, 1897**

**References.** Jacoby, 1897: 556; Maulik, 1929: 208; Biondi & D’Alessandro, 2010: 3.

**Type species.** *Serraphula aenea* Jacoby, 1897: 557 (Mashonaland), by monotypy.

**Distribution.** Zimbabwe and Republic of South Africa (Limpopo, Mpumalanga, Free State, KwaZulu-Natal, Eastern and Western Cape Provinces).

**Ecology.** Genus associated with Asteraceae (Biondi & D’Alessandro, 2010).

**Notes.** Nineteen species.

### ***Sesquiphaera* Bechyné, 1958**

**References.** Bechyné, 1958a: 92; Scherer, 1961: 275.

**Type species.** *Sphaeroderma mashonanum* Jacoby, 1900: 252 (Mashonaland: Salisbury), by original designation.

**Distribution.** Guinea Bissau(!), Guinea, Democratic Republic of Congo, Rwanda, Tanzania, Namibia(!), Zimbabwe and Republic of South Africa (Gauteng, Mpumalanga, KwaZulu-Natal).

**Ecology.** No information.

**Notes.** Six species. *Sphaeroderma natalensis* Bryant (1943: 493) is here transferred to this genus as *Sesquiphaera natalensis* (Bryant, 1943) comb. n.

### ***Seychellaltica* Biondi, 2002**

**References.** Biondi, 2002b: 358.

**Type species.** *Chaetocnema mahensis* Maulik, 1931: 250 (Seychelles: Mahé), by original designation.

**Distribution.** Indian Ocean: Seychelles.

**Ecology.** The species in this genus are associated with indigenous forests in Seychelles.

**Notes.** Four species.

### ***Sjoestedtinia* Weise, 1910**

**References.** Weise, 1910a: 205; Bryant, 1953: 162; Scherer, 1963: 648.

**Type species.** *Sjoestedtinia montivaga* Weise, 1910a: 206 (Kilimanjaro: Kibocho), by original designation.

**Distribution.** Uganda, Kenya(!), and Tanzania.

**Ecology.** This genus lives at high altitudes on Kilimanjaro and Mount Elgon. *S. montivaga* was collected on *Lobelia deckeni*

(Asch.) Hemsl. (Campanulaceae) (Weise, 1910a), and *S. fordii* Bryant, 1953 on *Senecio* sp. (Asteraceae) in Uganda (Bryant, 1953) and on *Lobelia* sp. in Kenya (S. Zoia, pers. comm.).

**Notes.** Two species.

### ***Sphaeroderma* Stephens, 1831**

=*Argosomus* Wollaston, 1867 (synonymized by Scherer, 1961)

=*Musaka* Bechyné, 1958 (synonymized by Scherer, 1961)

**References.** Stephens, 1831: 328; Wollaston, 1867: 152; Bryant, 1943: 487; Bechyné, 1958a: 89; 1968: 1702; Scherer, 1961: 252.

**Type species.** *Altica testacea* Fabricius, 1775: 114 (Europe), by subsequent designation by Maulik, (1926: 316).

**Distribution.** Afrotropical (including Madagascar), Palearctic, Indo-Malayan and Australian regions. The species of *Sphaeroderma* reported from the Neotropical and Nearctic regions should be attributed to different genera (cf. Savini & Furth, 2001).

**Ecology.** Genus mainly associated with Asteraceae and Ranunculaceae (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Over fifty species in Sub-Saharan African and about ten in Madagascar. *Sphaeroderma natalensis* Bryant (1943: 493) is here transferred to *Sesquiphaera* Bechyné, 1958 as *Sesquiphaera natalensis* (Bryant, 1943) comb. n.

### ***Sphaerophysa* Baly, 1876**

**References.** Baly, 1876b: 581; Bechyné, 1958c: 10.

**Type species.** *Sphaerophysa clavicornis* Baly, 1876b: 582 (Madagascar), by monotypy.

**Distribution.** Madagascar. *Sphaerophysa piceicollis* Jacoby (1889: 195) from Myanmar (=Burma), previously doubtfully attributed to this genus, was subsequently made the type-species of the genus *Jacobyana* Maulik (1926: 302).

**Ecology.** No information.

**Notes.** Five species. Weise (1910: 496) wrongly established the synonymy between *Sphaerophysa* Baly, 1876 and *Dibolosoma* Jacoby, 1897.

### ***Stegnaspea* Baly, 1877**

**References.** Baly, 1877a: 181.

**Type species.** *Stegnaspea trimeni* Baly, 1877a: 182 (Cape of Good Hope), by monotypy.

**Distribution.** Republic of South Africa (Western and Eastern Cape Provinces) and Tristan da Cunha(!).

**Ecology.** *Stegnaspea trimeni* was collected on Graminae in meadows (pers. data).

**Notes.** One species.

### ***Stuckenbergiana* Scherer, 1963**

**References.** Scherer, 1963: 670.

**Type species.** *Podagrica glabrata* Jacoby, 1899b: 349 (KwaZulu-Natal: Umtweni River; Eastern Cape Province: Port St. John), by original designation.

**Distribution.** Republic of South Africa [Mpumalanga(!), KwaZulu-Natal and Eastern Cape Province].

**Ecology.** No information.

**Notes.** One species.

### ***Terpnochlorus* Fairmaire, 1904**

*Chaloenus* Westwood, 1862 (pars)

**References.** Fairmaire, 1904: 269; Laboissière, 1932: 575; Bryant, 1927: 615; Bechyné, 1955b: 543; 1960a: 101; Furth & Suzuki, 1994: 130; Biondi, 2002b: 364.

**Type species.** *Terpnochlorus perrieri* Fairmaire, 1904: 269 (Madagascar: Soalala), by monotypy.

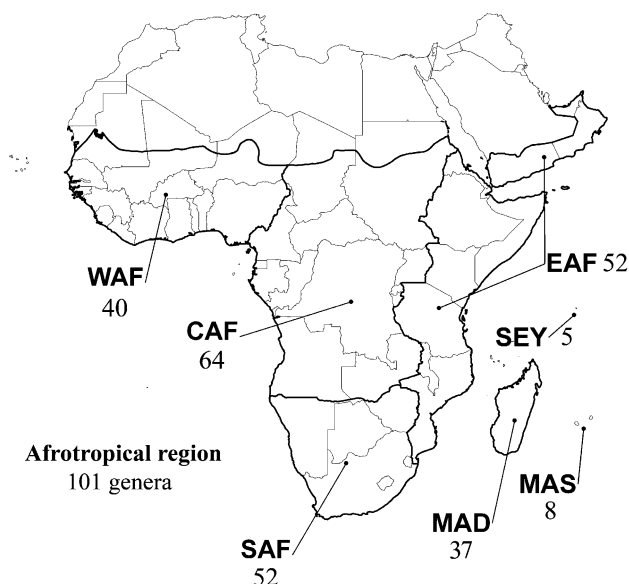


Fig. 2. Number of flea beetle genera occurring in the various areas of the Afrotropical region (see Material and methods for abbreviations) (modified from Graf & Cummings, 2007).

**Distribution.** Mali, Gambia(!), Guinea Bissau(!), Sierra Leone, Democratic Republic of Congo, Botswana(!), Namibia(!), Madagascar and South America (Venezuela and Mexico).

**Ecology.** This genus lives in moist habitats generally associated with Juncaceae (Biondi, 2002b).

**Notes.** Two species in the Afrotropical region. *Chaloenus viridis* Bryant, 1927 = *Terpnochlorus perrieri* Fairmaire, 1904 (cf. Bechyné, 1955b).

### ***Torodera* Weise, 1902**

**References.** Weise, 1902a: 163; Scherer, 1987: 67; Biondi, 1994: 437.

**Type species.** *Torodera octomaculata* Weise, 1902: 164 (Kwai), by subsequent designation by Scherer (1987: 67).

**Distribution.** Guinea, Sierra Leone, Sudan, Congo, Democratic Republic of Congo, Uganda, Kenya, Tanzania, Zimbabwe, Republic of South Africa (KwaZulu-Natal) and Indo-Malayan region.

**Ecology.** Genus reported on Graminae (*Oryza*) in Kenya (cf. Jolivet & Hawkeswood, 1995).

**Notes.** Four species in the Afrotropical region.

### ***Toxaria* Weise, 1903**

**References.** Weise, 1903: 215; 1912: 157; Laboissière, 1941: 318; Bryant, 1943: 488.

**Type species.** *Galleruca indica* Fabricius, 1798: 98 (Western Cape), by original designation.

**Distribution.** Democratic Republic of Congo, Uganda, Kenya and Republic of South Africa.

**Ecology.** No information.

**Notes.** Five species.

### ***Trachytetra* Sharp, 1886**

=*Monodaltica* Bechyné, 1955 (synonymized by Konstantinov & Prathapan, 2008)

**References.** Sharp, 1886: 449; Bechyné, 1955b: 509; Scherer, 1962a: 18 (sub *Monodaltica*); Konstantinov & Prathapan, 2008: 413.

**Type species.** *Phyllotreta rugulosa* Broun, 1880: 636 (New Zealand), by original designation.

TABLE 1. Occurrence of Alticinae genera of the Chrysomelidae in different areas of the Afrotropical region and other zoogeographical areas (see Material and methods for abbreviations).

	WAF	CAF	EAF	SAF	MAD	SEY	MAS	Palearctic	Nearctic	Neotropical	Indo-Malayan	Australian
<i>Abrarius</i>					X					?		
<i>Afroaltica</i>				X								
<i>Afrocrepis</i>				X								
<i>Afrorestia</i>		X	X	X	X							
<i>Alocypha</i>			X	X								
<i>Altica</i>	X	X	X	X	X		X	X	X	X	X	X
<i>Amphimela</i>	X	X	X	X	X						X	X
<i>Anaxerta</i>					X							
<i>Angulaphthona</i>	X	X	X		X			X				
<i>Antanemora</i>					X							
<i>Aphthona</i>	X	X	X	X	X		X	X			X	X
<i>Argopistes</i>		X	X	X	X			X	X	X	X	X
<i>Bangalaltica</i>		X										
<i>Bechuana</i>				X								
<i>Bechynella</i>	X	X										
<i>Bikasha</i>						X					X	
<i>Biodontocnema</i>				X								
<i>Blepharida</i>	X	X	X	X	X			X	X	X		
<i>Buphonella</i>		X	X									
<i>Carcharodis</i>		X		X	X							
<i>Celisaltica</i>		X										
<i>Chaetocnema</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Chaillucola</i>		X										
<i>Chirodica</i>				X								
<i>Collartaltica</i>	X	X	X	X								
<i>Decaria</i>	X	X	X	X								
<i>Diamphidia</i>		X	X	X								
<i>Dibolia</i>	X	X	X	X				X	X	X		
<i>Dimonikaea</i>		X										
<i>Diphaulacosoma</i>					X							
<i>Djallonia</i>	X	X										
<i>Drakensbergianella</i>				X								
<i>Dunbrodia</i>				X								
<i>Epitrix</i>	X	X	X	X	X		X	X	X	X	X	X
<i>Eriotica</i>			X									
<i>Ethiopia</i>			X									
<i>Eurylegna</i>		X	X									
<i>Eurylegniella</i>	X	X										
<i>Eutornus</i>	X	X	X	X	X							
<i>Gabonia</i>	X	X	X	X								
<i>Guilelmia</i>		X										
<i>Guinerestia</i>	X	X										
<i>Halticopsis</i>			X									
<i>Halticotropis</i>					X							
<i>Hemipyxis</i>	X	X	X	X	X			X			X	X
<i>Hildenbrandtina</i>					X							
<i>Homichloda</i>		X	X	X								
<i>Hyphasis</i>							?	X			X	
<i>Kanonga</i>		X	X									
<i>Kenialtica</i>	X	X	X	X	X							
<i>Kimongona</i>		X										
<i>Lampedona</i>		X	X									
<i>Lepialtica</i>		X										
<i>Longitarsus</i>	X	X	X	X	X	X	X	X	X	X	X	X
<i>Luperomorpha</i>		X						X			X	X
<i>Lypnea</i>	X	X	X	X	X			X			X	X
<i>Malvernina</i>			X	X								
<i>Manobia</i>	X	X						X			X	X
<i>Mesocrepis</i>			X	X								

TABLE 1 (continued).

	WAF	CAF	EAF	SAF	MAD	SEY	MAS	Palearctic	Nearctic	Neotropical	Indo-Malayan	Australian
<i>Metroserrapha</i>					X		X					
<i>Montiaphthona</i>		X	X									
<i>Myrcina</i>	X	X	X	X	X							
<i>Neodera</i>					X							?
<i>Nisotra</i>	X	X	X	X	X						X	X
<i>Notomela</i>	X	X		X								
<i>Nzerekorena</i>	X	X	X									
<i>Orthocrepis</i>	X	X	X	X	X			X			X	
<i>Paradibolia</i>	X	X		X							X	X
<i>Paropsiderma</i>					X							
<i>Perichilona</i>			X									
<i>Philopona</i>	X	X	X	X				X			X	X
<i>Phygasia</i>	X	X	X	X	X			X			X	
<i>Phyllotreta</i>	X	X	X	X	X			X	X	X	X	X
<i>Physodactyla</i>		X	X	X								
<i>Physoma</i>	X	X			X							
<i>Physomandroya</i>					X							
<i>Physonychis</i>	X	X	X	X								
<i>Podagrica</i>	X	X	X	X				X			X	
<i>Podagricina</i>		X	X									
<i>Polyclada</i>	X	X	X	X								
<i>Pratima</i>						X	X					
<i>Pseudadorium</i>					X							
<i>Psylliodes</i>			X	X				X	X	X	X	X
<i>Pydaristes</i>				X								
<i>Sanckia</i>	X	X	X		X						X	
<i>Serraphula</i>				X								
<i>Sesquiphaera</i>	X	X	X	X								
<i>Seychellaltica</i>						X						
<i>Sjostedtinia</i>		X	X									
<i>Sphaeroderma</i>	X	X	X	X	X		X	X			X	X
<i>Sphaerophysa</i>					X							
<i>Stegnaspea</i>				X								
<i>Stuckenbergiana</i>				X								
<i>Terpnochlorus</i>	X	X		X	X					X		
<i>Torodera</i>	X	X	X	X							X	
<i>Toxaria</i>		X	X	X								
<i>Trachytetra</i>	X	X						X			X	X
<i>Tritonoaphthona</i>		X										
<i>Upembaltica</i>		X										
<i>Xanthophysca</i>					X							
<i>Yemenaltica</i>			X									
<i>Zomba</i>			X	X								

**Distribution.** Guinea, Sierra Leone, Ghana, Nigeria, Cameroon, and Democratic Republic of Congo; eastern Palearctic, Indo-Malayan and Australian regions.

**Ecology.** No information.

**Notes.** Five species in Sub-Saharan Africa.

#### ***Tritonaphthona* Bechyné, 1960**

**References.** Bechyné, 1960a: 70.

**Type species.** *Aphthona longicornis* Laboissière, 1942: 21 (Albert National Park), by original designation.

**Distribution.** Democratic Republic of Congo.

**Ecology.** No information.

**Notes.** One species.

#### **[*Thrymnes* Weise, 1895]**

=*Gabonia* Jacoby, 1893

#### **[*Tropidophora* Thomson, 1858]**

=*Physoma* Clark, 1863

#### ***Upembaltica* Bechyné, 1960**

**References.** Bechyné, 1960a: 53; Biondi & D'Alessandro, 2003: 104.

**Type species.** *Upembaltica scolytina* Bechyné, 1960a: 53–54 (Upemba National Park: Lupiala; Kaswabilenga), by original designation.

**Distribution.** Democratic Republic of Congo and Gabon(!).

**Ecology.** No information.

**Notes.** One species.

#### **[*Weiseana* Jacoby, 1906]**

=*Homichloda* Weise, 1902



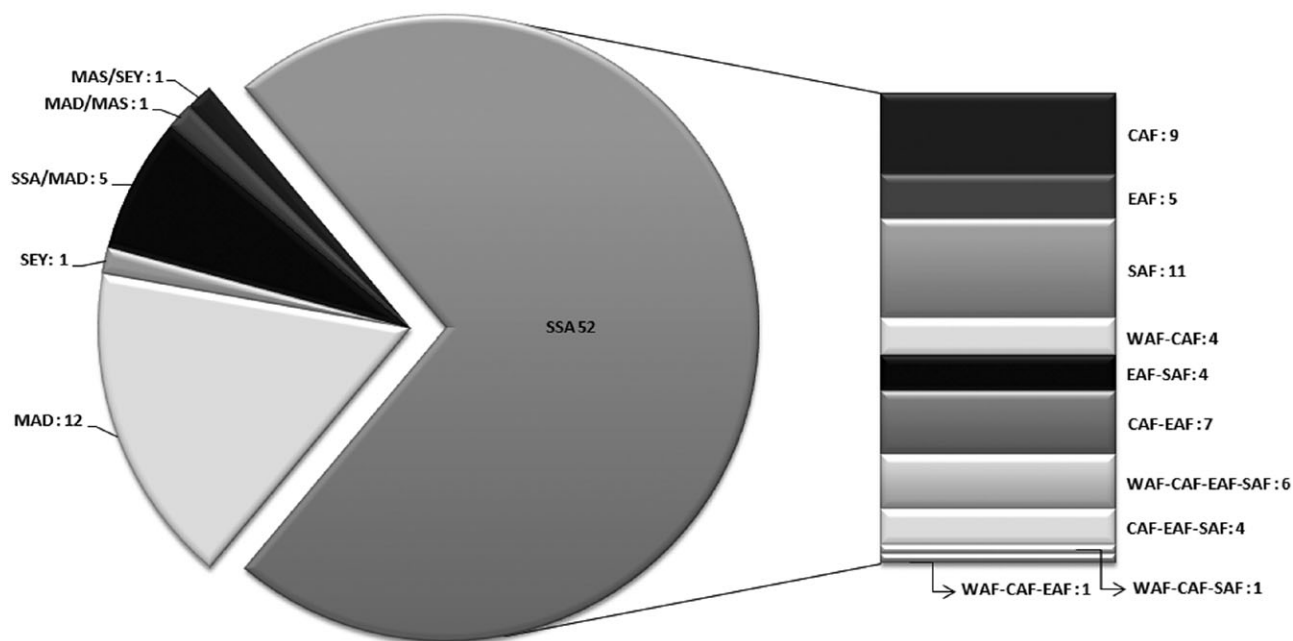


Fig. 3. Number of flea beetle genera endemic to the various areas of the Afrotropical region (see Material and methods for abbreviations).

#### *Xanthophysca* Fairmaire, 1901

**References.** Fairmaire, 1901: 242.

**Type species.** *Xanthophysca perrieri* Fairmaire, 1901: 242 (Madagascar: Saberbieville), by monotypy.

**Distribution.** Madagascar.

**Ecology.** No information.

**Notes.** One species with different colour forms.

#### [*Xenaltica* Baly, 1875]

=*Myrcina* Chapuis, 1875

#### *Yemenaltica* Scherer, 1985

**References.** Scherer, 1985: 86; Medvedev, 1996: 261.

**Type species.** *Yemenaltica scortecii* Scherer, 1985: 86 (Yemen: El Kasaba), by original designation.

**Distribution.** Southern Arabian Peninsula (Saudi Arabia, North Yemen and Oman).

**Ecology.** No information.

**Notes.** One species.

#### *Zomba* Bryant, 1922

**References.** Bryant, 1922a: 263.

**Type species.** *Zomba gossypii* Bryant, 1922a: 264 (Nyasaland: Luchenza; N.W. Rhodesia: Livingstone), by monotypy.

**Distribution.** Malawi and Zimbabwe.

**Ecology.** The only species in this genus was collected on cotton plants, *Gossypium* sp. (Malvaceae) (Bryant, 1922a).

**Notes.** One species. This genus is particularly interesting because it is the only representative of the tribe Monoplatini that occurs in the Afrotropical region. Monoplatini practically

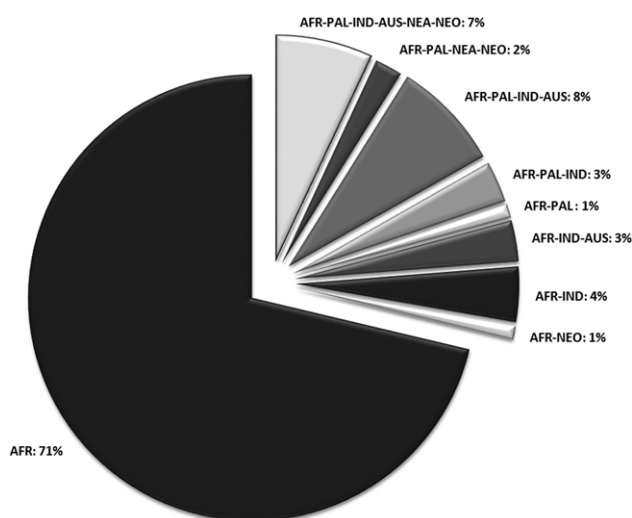


Fig. 4. Distribution of Afrotropical flea beetle genera in the different zoogeographical regions (see Material and methods for abbreviations).

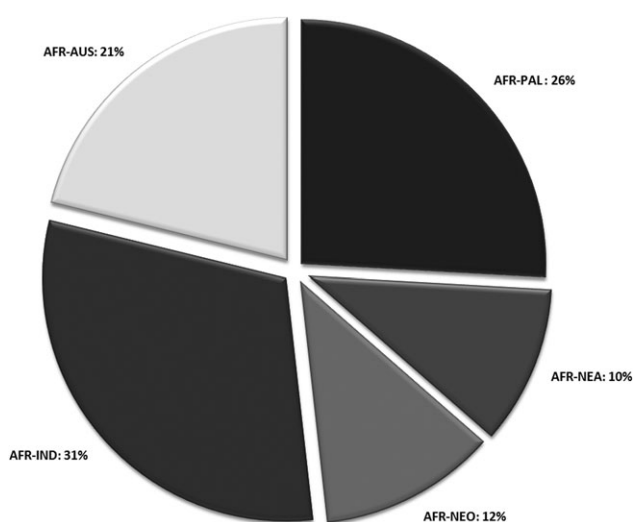


Fig. 5. Percentage of flea beetle genera co-occurring in the Afrotropical and another zoogeographical region (see Material and methods for abbreviations).

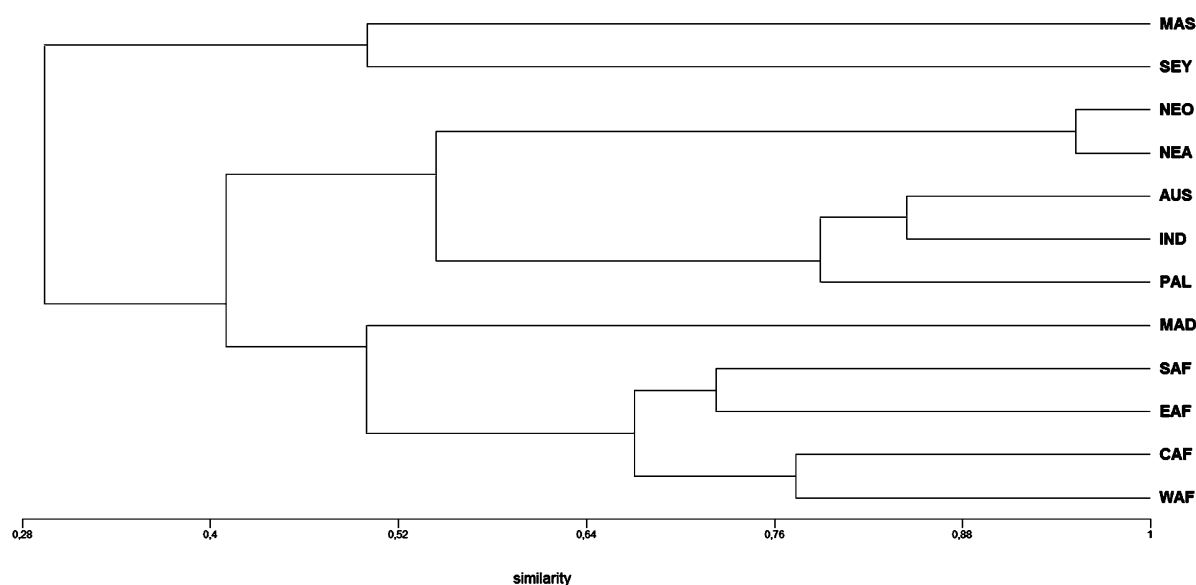


Fig. 6. Faunistic similarities of the different areas of the Afrotropical region with those of other zoogeographical regions [Coincidence index and WPGMA clustering method (Weighted Pair Group Method using Arithmetic averaging) (cf. Biondi, 2006)] (see Material and methods for abbreviations).

exclusively occur in the Neotropical and southern part of the Nearctic regions. The only exceptions are *Zomba* and *Opisthopygme* Blackburn (1896: 41); two species of the latter occur in the Australian region.

## DISCUSSION

Based on this catalogue, of the 101 flea beetle genera, 84 occur in Sub-Saharan Africa (CAF: 64; EAF: 52; SAF: 52; WAF: 40), 37 in Madagascar, 8 in the Mascarene Islands and 5 in the Seychelles Islands (Table 1, Fig. 2). However, these numbers are provisional as information concerning the Afrotropical flea beetle fauna is limited, particularly for Madagascar. This preliminary overview indicates that this fauna is clearly separated from those of other zoogeographical regions (Fig. 6). The geographic distribution of Afrotropical flea beetle genera has distinct Malagasy and Sub-Saharan African components (Fig. 6).

The percentage of genera of Alticinae that are endemic to the Afrotropical region is very high (71.0%), with the following distribution: Sub-Saharan Africa, 52 genera; Madagascar, 13; Seychelles Islands, 1; Sub-Saharan Africa-Madagascar, 4; Madagascar-Mascarene Islands, 1; Seychelles-Mascarene Islands, 1 (Fig. 3). Within the endemic Sub-Saharan African component, only 6 genera occur in all four subregions, while 25 genera occur only in one subregion (SAF: 11; CAF: 9; EAF: 5). There are no endemic flea beetle genera in WAF (Fig. 3).

The percentage of genera occurring in both the Afrotropical and another zoogeographical region is 29.0%, with the cosmopolitan component significant and well represented [7.0% of the total (101)] (Fig. 4). Of those shared genera, the Afrotropical region shares the highest percentage with the Indo-Malayan region (31.0%) (Fig. 5). In this case, the presence of some genera in both regions may be due to a possible Gondwanian origin, such as *Sanckia*, which mainly occurs in Madagascar

although species are found in the Sub-Saharan Africa and southern part of the Indo-Malayan region; *Toroderma*, occurs in Sub-Saharan Africa and the Indo-Malayan region and is absent from Madagascar; *Amphimela*, *Nisotira*, and *Paradibolia*, occur in the Afrotropical, Indo-Malayan and the Australian regions; and *Bikasha*, occurs both on the Seychelles Islands and peninsula of Vietnam. Other genera, such as *Hemipyxis*, *Luperomorpha*, *Lypnea*, *Manobia*, *Philopona* and *Trachytetra* occur not only in the Afrotropical (including Madagascar although infrequently), Indo-Malayan and Australian regions, but also in the eastern part of the Palearctic region. 26.0% of the shared flea beetle genera occur in the Palearctic region (Fig. 5), including the unique Pan-African flea beetle genus, *Angulaphthona*, which occurs in Mediterranean Africa, Sub-Saharan Africa and Madagascar (cf. Biondi & D'Alessandro, 2006). A slightly lower percentage of genera (21.0%) occur in both the Afrotropical and Australian regions, although all can also be found throughout the Indo-Malayan region.

As expected, a low percentage of genera occurs in both the Afrotropical and Nearctic regions (10.0%), and in Afrotropical and Neotropical regions (12.0%). All genera common to the Afrotropical, Nearctic and Neotropical regions are also found in all other zoogeographical regions with the exception of the genus *Terpnochlorus*, which only occurs in the Afrotropical region, Venezuela and Mexico (cf. Furth & Suzuki, 1994). Moreover, the possible synonymy between the genera *Abrarius* from Madagascar and *Gioia* from South America (see above), if confirmed, could indicate an interesting zoogeographical connection among the ancient regions of the Gondwana.

Other likely Gondwanian elements in the Afrotropical flea beetle fauna are:

1. *Zomba*, this unique Afrotropical genus belonging to the tribe Monoplatini which mainly occurs in the Neotropical region with a few species in the Nearctic region. The genus *Opisthopygme* belonging to this tribe of flea beetles is also present in Australia (see above).

2. Two new flea beetle genera to be described, preliminarily mentioned here, that occur in Madagascar and South Africa (Western Cape Province) (Biondi & D'Alessandro, in prep.). Both those genera have clavate or sub-clavate antennae with 11 segments, and are sub-spherical in shape and very small, characteristics they share with related genera in Central America, such as: *Bubiscus* Savini, Furth & Joly (2009: 53), a recently described Costa Rican genus (1 species); *Normaltica* Konstantinov (2002: 2), an endemic genus of Great Antilles (2 species); *Clavicornaltica* Scherer (1974: 58), a genus occurring in the Indo-Malayan (18 species) and Australian regions (1 species) (cf. Konstantinov & Duckett, 2005). Other very closely related flea beetle genera but with a reduced number of antennal segments, are: *Kiskeya* Konstantinov & Chamorro-Lacayo (2006: 276), which has nine-segmented clavate antennae, with 2 species in the Dominican Republic; and *Monotalla* Bechyné (1956: 588), which has ten-segmented clavate antennae, with 1 species in Guadalupe (cf. Savini & Furth, 2001: 907).

## REFERENCES

- ALLARD E. 1889: Diagnoses de Coléoptères nouveaux. *Le Naturaliste (Sér. 2)* **47**: 43.
- BALY J.S. 1864: Descriptions of new genera and species of Phytophaga. *Ann. Mag. Nat. Hist. (3rd ser.)* **14**: 433–442.
- BALY J.S. 1875: Descriptions of new genera and species of Phytophaga. *Trans. Entomol. Soc. Lond.* **1875**: 23–31.
- BALY J.S. 1876a: Descriptions of new genera and species of Halticinae. *Trans. Entomol. Soc. Lond.* **1876**: 433–449.
- BALY J.S. 1876b: Descriptions of new genus and of new species of Halticinae. *Trans. Entomol. Soc. Lond.* **1876**: 581–602.
- BALY J.S. 1877: Descriptions of new genera of uncharacterized species of Halticinae. *Trans. Entomol. Soc. Lond.* **1877**: 157–184; 283–323.
- BALY J.S. 1878a: Characters of new genera and of some undescribed species of phytophagous beetles. *Ann. Mag. Nat. Hist. (5th ser.)* **1**: 38–44.
- BALY J.S. 1878b: Diagnoses of a new genus and some undescribed species of African Phytophaga. *Entomol. Mon. Mag.* **14**: 204–206.
- BALY J.S. 1878c: Descriptions of genera and species of Australian phytophagous beetles. *J. Linn. Soc. (Zool.)* **13**: 458–479.
- BALY J.S. 1881: Description of new species of Galerucidae. *Trans. Entomol. Soc. Lond.* **1881**: 51–59.
- BECERRA J.X. 2004: Molecular systematics of Blepharida beetles (Chrysomelidae: Alticinae) and relatives. *Mol. Phylogenet. Evol.* **30**: 107–117.
- BECHYNÉ J. 1947a: Chrysomeloidea Madagassa (Coleoptera). *Acta Entomol. Mus. Natn. Prag.* **25**: 29–47.
- BECHYNÉ J. 1947b: Notes sur le genre *Neodera* Duviv. (Col. Phytophaga, Alticinae). *Bull. Mens. Soc. Linn. Lyon* **16**: 139–140.
- BECHYNÉ J. 1948a: Novi Halticidi z Madagascaru. De novis speciebus Halticidarum Madagascariensium (Col. Phytophaga). *Acta Soc. Entomol. Cechoslov.* **45**: 3–11.
- BECHYNÉ J. 1948b: Nouveaux Galerucides de Madagascar (Col. Phytophaga). *Bull. Mens. Soc. Linn. Lyon* **17**: 99–101.
- BECHYNÉ J. 1950: Tableau analytique des Lactica de Madagascar (Col. Phytophaga, Alticinae). *Bull. Mens. Soc. Linn. Lyon* **19**: 220–224.
- BECHYNÉ J. 1952: Nouveaux Alticides de Madagascar. *Bull. Mens. Soc. Linn. Lyon* **21**: 248–251.
- BECHYNÉ J. 1954a: Notes sur les Chrysomeloidea de Madagascar (Col. Phytophaga). *Rev. Fr. Entomol.* **21**: 41–47.
- BECHYNÉ J. 1954b: Reise des Herrn G. Frey in Süd-Afrika: Alticinae (Col. Phytoph.). *Entomol. Arb. Mus. G. Frey* **5**: 675–685.
- BECHYNÉ J. 1955a: Contributions à l'étude de la faune entomologique du Ruanda Urundi (Mission P. Basilewsky, 1953) (pars Alticinae). *Ann. Mus. R. Congo Belge (Zool.)* **40**: 204–230.
- BECHYNÉ J. 1955b: Über die Westafrikanischen Alticiden (Col. Phytophaga). *Entomol. Arb. Mus. G. Frey* **6**: 486–568.
- BECHYNÉ J. 1955c: Description de deux nouveaux Alticides de Madagascar (Col. Phytophaga). *Naturaliste Malgache* **7**: 61–62.
- BECHYNÉ J. 1955d: Reise des Herrn G. Frey in Südamerika Alticinae (Col. Phyt.). *Entomol. Arb. Mus. G. Frey* **6**: 74–266.
- BECHYNÉ J. 1956: Über die Alticiden-Sammlung Heikertinger (Col. Phytophaga). *Entomol. Arb. Mus. G. Frey* **7**: 577–598.
- BECHYNÉ J. 1957: Die von Dr. Christa Lindemann und Nina Pavlitzki in Tanganjika gesammelten Alticiden (Col. Phytophaga). *Veröff. Zool. Stsamm. Münch.* **4**: 151–182.
- BECHYNÉ J. 1958a: Contribution à l'étude des Chrysomeloidea des Iles Mascareignes. II. Alticinae. *Bull. Maurit. Inst.* **5**: 83–93.
- BECHYNÉ J. 1958b: Notes sur quelques Oedionychini de Madagascar. *Bull. Mens. Soc. Linn. Lyon* **28**: 318–323.
- BECHYNÉ J. 1958c: Notes sur les Alticides de Madagascar (Col. Phytophaga). *Bull. Mens. Soc. Linn. Lyon* **27**: 8–11.
- BECHYNÉ J. 1959a: Observations sur les Alticides recueillis au Congo Belge par M.A. Collart (Coleoptera, Phytophaga). *Bull. Inst. R. Sci. Nat. Belg.* **35**: 1–36.
- BECHYNÉ J. 1959b: Coleoptera: Chrysomelidae II. *S. Afr. Anim. Life* **6**: 227–238.
- BECHYNÉ J. 1959c: Notes sur quelques Oedionychini de Madagascar. *Bull. Mens. Soc. Linn. Lyon* **28**: 318–323.
- BECHYNÉ J. 1959d: Tableau analytique du genre *Nisotra* Baly de Madagascar (Col. Phytophaga, Alticinae). *Bull. Mens. Soc. Linn. Lyon* **28**: 153–157.
- BECHYNÉ J. 1960a: Notes sur les Alticides Africains des collections de l'Institut Royal des Sciences Naturelles de Belgique (Coleoptera, Phytophaga). *Bull. Inst. R. Sci. Nat. Belg.* **36**: 1–32.
- BECHYNÉ J. 1960b: *Alticinae (Coleoptera, Phytophaga). Exploration du Parc National de l'Upemba. Mission G.F. de Witte (1946–1949). Institut Parcs Nationaux du Congo Belge, Bruxelles, fasc. no. 59, pp. 39–114.*
- BECHYNÉ J. 1964: Notizen zu den madagassischen Chrysomeloidea (Col. Phytophaga). *Mitt. Münch. Entomol. Ges.* **54**: 68–161.
- BECHYNÉ J. 1968: Contribution à la faune du Congo (Brazzaville). Mission A. Villiers et A. Descarpentries. LXXXI. Coléoptères Alticinae. *Bull. Inst. Fr. Afr. Noire (A)* **30**: 1687–1728.
- BECHYNÉ J. & SPRINGLOVA DE BECHYNÉ B. 1975: Notas sobre la serie filetica de *Monomacra* y sus formas convergentes (Col. Phytophaga, Alticinae). *Revta Fac. Agron. Univ. Cent. Venez.* **8**: 25–140.
- BEDEL L. 1898: Faune des coléoptères du bassin de la Seine. *Ann. Soc. Entomol. Fr.* **5**: 181–228.

- BERTHOLD A.A. 1827: *Latreille's Natürliche Familien des Thierreichs. Aus dem Französischen. Mit Anmerkungen und Zusätzen*. Landes-Industrie-Comptoir, Weimar, 606 pp.
- BIONDI M. 1994: Contributo alla conoscenza dei Chrysomelidae Alticinae (Coleoptera) della Sierra Leone. 1a. Nota. *Quad. Accad. Naz. Lincei* **267**: 423–438.
- BIONDI M. 1996: The genus *Psylliodes* in the Afrotropical Region with description of four new species from Kenya, Tanzania and South Africa (Coleoptera, Chrysomelidae). *Fragm. Entomol.* **28**: 257–276.
- BIONDI M. 1998a: The genus *Malvernina* Jacoby with description of a new species from South Africa (Coleoptera, Chrysomelidae). *Nouv. Revue Entomol. (N.S.)* **15**: 37–43.
- BIONDI M. 1998b: Revision of the Genus *Chirodica* Germar with description of five new species (Coleoptera: Chrysomelidae). In Biondi M., Daccordi M. & Furth D.G. (eds): *Proceedings of the Fourth International Symposium on the Chrysomelidae, Firenze 1996*. Museo Regionale di Scienze Naturali, Torino, pp. 17–48.
- BIONDI M. 2000: *Biodontocnema brunnea* n. gen. and n. sp. from South Africa (Coleoptera: Chrysomelidae: Alticinae). *Coleopt. Bull.* **54**: 347–350.
- BIONDI M. 2001a: New flea beetle genus and species (Coleoptera: Chrysomelidae, Alticinae) from Central Africa. *Can. Entomol.* **133**: 643–649.
- BIONDI M. 2001b: Revision of the *Chaetocnema* species from Madagascar (Coleoptera, Chrysomelidae, Alticinae). *Eur. J. Entomol.* **98**: 233–248.
- BIONDI M. 2002a: Checklist of the Afrotropical species of the genus *Chaetocnema* Stephens (Coleoptera, Chrysomelidae: Alticinae): synonymies and geographical distributions. *Afr. Entomol.* **10**: 265–284.
- BIONDI M. 2002b: Comparative analysis of *Chaetocnema* Stephens and its kindred genera, with description of a new genus from the Indian Ocean (Seychelles) (Coleoptera, Chrysomelidae, Alticinae). *Ital. J. Zool.* **69**: 22–33.
- BIONDI M. 2006: Il calcolo della somiglianza con dati binari nelle analisi biogeografiche. *Biogeographia* **37**: 227–251.
- BIONDI M. & D'ALESSANDRO P. 2003: *Drakensbergianella rudebecki*, new genus and new species from the mountains of the Southern Africa, and taxonomic observations on *Gabonia* Jacoby and related genera (Coleoptera: Chrysomelidae, Alticinae). *Zool. Anz.* **242**: 97–106.
- BIONDI M. & D'ALESSANDRO P. 2004: Revision of the Afrotropical flea beetle genus *Collartaltica* Bechyné with description of two new species (Coleoptera, Chrysomelidae, Alticinae). *Insect Syst. Evol.* **35**: 1–14.
- BIONDI M. & D'ALESSANDRO P. 2006: Biogeographical analysis of the flea beetle genus *Chaetocnema* in the Afrotropical Region: distribution patterns and areas of endemism. *J. Biogeogr.* **33**: 720–730.
- BIONDI M. & D'ALESSANDRO P. 2007: *Afroaltica* subaptera, new genus and new species of flea beetles from the southern Africa (Coleoptera: Chrysomelidae: Alticinae). *Eur. J. Entomol.* **104**: 99–103.
- BIONDI M. & D'ALESSANDRO P. 2008a: Revision of the *Chaetocnema pulla* species-group from the Afrotropical region with description of a new species from Central Africa (Coleoptera, Chrysomelidae). In Jolivet P., Santiago-Blay J. & Schmitt M. (eds): *Research on Chrysomelidae. Vol. 1*. Brill, Leiden, Boston, pp. 265–285.
- BIONDI M. & D'ALESSANDRO P. 2008b: Taxonomical revision of the *Longitarsus capensis* species-group: An example of Mediterranean-southern African disjunct distributions (Coleoptera: Chrysomelidae). *Eur. J. Entomol.* **105**: 719–736.
- BIONDI M. & D'ALESSANDRO P. 2010: Revision of the Afrotropical flea beetle genus *Serraphula* Jacoby and description of *Bechynella*, a new genus from Western and Central Africa (Coleoptera, Chrysomelidae, Alticinae). *Zootaxa* **2444**: 1–44.
- BLACKBURN T. 1896: Further notes on Australian Coleoptera, with descriptions of new genera and species. *Trans. R. Soc. S. Aust.* **19**: 35–109.
- BOHEMAN C.H. 1859: Coleoptera. Species novas descripsit. In *Kongliga Svenska Fregatten Eugenies Resa omkring Jorden. Zoologi 1, Insecta*. Vetenskapliga Iakttagelser, Stockholm, pp. 113–218.
- BRANCSIK K. 1891: Beiträge zur Kenntnis Nossibé's und dessen Fauna nach Sendungen und Mitteilungen des Herrn P. Frey. *Jh. Naturw. Ver. Trencsiner Com.* **14**: 123–167.
- BROUN T. 1880: *Manual of the New Zealand Coleoptera. Part I*. Office of James Hughes, Lambton Quay, Wellington, 651 pp.
- BRYANT G.E. 1922a: Some new injurious Phytophaga from Africa. *Bull. Entomol. Res.* **12**: 473–475.
- BRYANT G.E. 1922b: New injurious Phytophaga from India and Brazil. *Bull. Entomol. Res.* **13**: 261–255.
- BRYANT G.E. 1927: New Halticidae (Col.) from Africa and Haiti. *Ann. Mag. Nat. Hist. (9th ser.)* **19**: 615–622.
- BRYANT G.E. 1936: Some new injurious Phytophaga from British East Africa (Col.). *Proc. R. Entomol. Soc. Lond. (B)* **5**: 217–219.
- BRYANT G.E. 1943: New species of African *Sphaeroderma* (Halticinae, Col.). *Ann. Mag. Nat. Hist. (11th ser.)* **10**: 486–494.
- BRYANT G.E. 1944a: New species of *Blepharida* from Africa (Halticinae, Col.). *Ann. Mag. Nat. Hist. (11th ser.)* **12**: 129–137.
- BRYANT G.E. 1944b: Two injurious species of Phytophaga (Halticinae) from Ivory Coast. *Bull. Entomol. Res.* **35**: 141–142.
- CHABOO C.S., GROBBELAAR E. & LARSEN A. 2007: Fecal ecology in Leaf Beetles: Novel records in the African arrow-poison beetles, *Diamphidia* Gerstaecker and *Polyclada* Chevrolat (Chrysomelidae: Galerucinae). *Coleopt. Bull.* **61**: 297–309.
- CHAPUIS F. 1875: In Lacordaire T. (ed.): *Histoire Naturelle des Insectes. Genera des Coléoptères. Vol. 11, Famille des Phytophages*. Librairie Encyclopédique de Roret, Paris, 420 pp., 11 pls.
- CHAPUIS F. 1879: Phytophages abyssiniens du musée civique d'histoire naturelle de Gènes. *Ann. Mus. Civ. Stor. Nat. Genova* **15**: 5–31.
- CHEVROLAT L.A.A. 1835: In Dejean P.F.M.A (ed.): *Catalogue des Coléoptères de la Collection de M. le Comte Dejean. 2nd ed.* Librairie Méquignon-Marvis Père et Fils, Paris, pp. 257–360.
- CHEVROLAT L.A.A. 1837: In Dejean P.F.M.A (ed.): *Catalogue des Coléoptères de la Collection de M. le Comte Dejean. 3rd ed., revue, corrigée et augmentée, livr. 5*. Librairie Méquignon-Marvis Père et Fils, Paris, pp. 385–503.
- CHEVROLAT L.A.A. 1842: In d'Orbigny C.D. (ed.): *Dictionnaire Universel d'Histoire Naturelle, Vol. 2*. C. Renard, Paris, pp. 1–795.
- CHEVROLAT L.A.A. 1843: In d'Orbigny C.D. (ed.): *Dictionnaire Universel d'Histoire Naturelle, Vol. 3*. C. Renard, Paris, pp. 1–744.
- CHEVROLAT L.A.A. 1845: In d'Orbigny C.D. (ed.): *Dictionnaire Universel d'Histoire Naturelle, Vol. 6*. C. Renard, Paris, pp. 1–792.
- CHŪJŌ M. 1936: Studies on the Chrysomelidae in the Japanese Empire (VIII), subfamily Halticinae (4–6). *Trans. Nat. Hist. Soc. Formosa* **148**: 15–30, 84–92, 108–114.
- CHŪJŌ M. 1937: Studies on the Chrysomelidae in the Japanese Empire (VIII), subfamily Halticinae (7–10). *Trans. Nat. Hist. Soc. Formosa* **161**: 35–48; **162**: 52–58.

- CLARK H. 1860: *Catalogue of Halticidae in the Collection of the British Museum. Physapodes and Oedipodes. Part I. Order of Trustees*, London, 301 pp., 10 pls.
- CLARK H. 1863: Catalogue of Halticidae; being a continuation of the British Museum Catalogue, Part 1, 1860. *J. Entomol.* **9**: 163–174.
- COX M.L. 1997: *Homichloda barkeri* (Jacoby) (Coleoptera: Chrysomelidae: Alticinae), a candidate agent for the biocontrol of prickly acacia, *Acacia nilotica* (Mimosaceae) in Australia. *J. Nat. Hist.* **31**: 935–964.
- CURTIS J. 1833: *British Entomology; being Illustrations and Descriptions of the Genera of Insects found in Great Britain and Ireland. Vol. 10*. London, pls 434–481.
- D'ALESSANDRO P. & BIONDI M. in press: The Afrotropical genus *Afroaltica* Biondi & D'Alessandro (Coleoptera, Chrysomelidae, Alticinae): new data and description of a second new species from Limpopo (Republic of South Africa). *Ann. Soc. Entomol. Fr.*
- DÖBERL M. 2008: Über die Typen einiger afrikanischer Arten der Gattung *Altica* Geoffroy, 1762 (Coleoptera: Chrysomelidae: Alticinae). *Acta Coleopt.* **24**: 35–39.
- DÖBERL M. 2010: Beitrag zur Kenntnis der afrotropischen Arten von *Altica* Geoffroy, 1762 unter Ausschluss der Arten Madagaskars (Coleoptera: Chrysomelidae, Alticinae). *Entomol. Z.* **120**: 51–72.
- DOGUET S. 1974: Contribution à l'étude des Alticinae des Iles Mascareignes (Col. Chrysomelidae). *Nouv. Rev. Entomol.* **4**: 119–126.
- DOGUET S. 1979: Insects of Saudi Arabia. Coleoptera: Fam. Chrysomelidae, Subfam. Halticinae. *Fauna of Saudi Arabia* **1**: 308–316.
- DRINKWATER T.W. 1989: *Buphonella murina* Gerstaecker (Coleoptera: Chrysomelidae) another Maize rootworm in South Africa. *Phytophylactica* **21**: 315–316.
- DUCKETT C.N., GILLESPIE J.J. & KJER K.M. 2004: Relationships among the subfamilies of Chrysomelidae inferred from small subunit ribosomal DNA and morphology, with special emphasis on the relationship among the flea beetles and the Galerucinae. In Jolivet P.H., Santiago-Blay J.A. & Schmitt M. (eds): *New Contributions to the Biology of Chrysomelidae*. SPB Academic Publishers, The Hague, pp. 3–18.
- DUVIVIER A. 1891: Diagnoses de phytophages madéagasses. *Ann. Soc. Entomol. Belg.* **35**: 238–245; 313–321; 423–424.
- DUVIVIER A. 1892: Les phytophages du Chota-Nagpore. 2e Note. *Ann. Soc. Entomol. Belg.* **36**: 396–449.
- ERICHSON W.F. 1834: Coleoptera. Beiträge zur Zoologie, gesammelt auf einer Reise um die Erde, von Dr. F.J.F. Meyen. *Nova Acta Acad. Caesar. Leop. Carol.* **16** (Suppl.): 219–284.
- ERICHSON W.F. 1847: Conspectus insectorum coleopterorum, quae in Republica Peruana observata sunt. *Arch. Naturgesch.* **13**: 67–185.
- FABRICIUS J.C. 1775: *Systema entomologiae, sistens insectorum classes, ordines, genera, species, adiectis synonymis, locis, descriptionibus, observationibus*. Officina Libraria Kortii, Flensburgi et Lipsiae, xxx + 832 pp.
- FABRICIUS J.C. 1787: *Mantissa insectorum sistens eorum species nuper detectas adiectis characteribus genericis differentiis specificis, emendationibus, observationibus. Tom. I*. Impensis C.G. Proft, Hafniae, xx + 348 pp.
- FABRICIUS J.C. 1798: *Supplementum entomologiae systematicae*. Proft et Storch, Hafniae, iv + 572 pp.
- FAIRMAIRE L. 1883a: Diagnoses de Coléoptères Abyssins. *Le Naturaliste (sér. 2)* **25**: 197.
- FAIRMAIRE L. 1883b: Descriptions de Coléoptères nouveaux ou peu connus récoltés par Mr. Raffray en Abyssinie. *Ann. Soc. Entomol. Fr.* **3**: 89–112.
- FAIRMAIRE L. 1884: Note sur les Coléoptères recueillis par M. Ach. Raffray à Madagascar et descriptions des espèces nouvelles. 1-ère partie. *Ann. Soc. Entomol. Fr.* **4**: 225–242.
- FAIRMAIRE L. 1886: Notes sur les Coléoptères recueillis par M. Raffray à Madagascar et descriptions des espèces nouvelles. *Ann. Soc. Entomol. Fr.* **6**: 31–96.
- FAIRMAIRE L. 1888: Notes sur les Coléoptères des environs de Pekin. *Rev. Fr. Entomol.* **7**: 111–160.
- FAIRMAIRE L. 1898: Matériaux pour la faune coléoptérique de la région malgache. 5° note. *Ann. Soc. Entomol. Belg.* **42**: 390–439.
- FAIRMAIRE L. 1901: Matériaux pour la faune coléoptérique de la région malgache (11° note). *Rev. Fr. Entomol.* **20**: 101–248.
- FAIRMAIRE L. 1902: Matériaux pour la faune coleopterique malgache. 13° note. *Ann. Soc. Entomol. Belg.* **46**: 236–271.
- FAIRMAIRE L. 1904: Matériaux pour la faune coléoptérique malgache 18° note. *Ann. Soc. Entomol. Belg.* **48**: 225–276.
- FERREIRA M.C. 1963: Catalogo dos Coleopteros de Moçambique: Chrysomelidae Alticinae. *Revta Entomol. Moçamb.* **6**: 515–520.
- FISCHER VON WALDHEIM G. 1824: *Entomographia imperii russici; genera insectorum systematica exposita et analysi iconographica instructa, vol. 2*. Société Impériale des Naturalistes, Mosquae, 262 pp.
- FORSTER J.R. 1771: *Novae Species Insectorum. Centuria I*. Davies and White, London, 100 pp.
- FOUDRAS A.C.M.E. 1860: Altisides. *Ann. Soc. Linn. Lyon* **6**: 137–384.
- FURTH D.G. 1985: Some flea beetles and their foodplants from Kenya (Chrysomelidae: Alticinae). *Coleopt. Bull.* **39**: 259–263.
- FURTH D.G. 1998: New world Blepharida Chevrolat 1836 (Coleoptera: Chrysomelidae: Alticinae). *Mem. Entomol. Soc. Wash.* **21**: 3–109.
- FURTH D.G. & LEE J.E. 2000: Similarity of the Blepharida-group genera using larval and adult characters (Coleoptera: Chrysomelidae: Alticinae). *J. N. Y. Entomol. Soc.* **108**: 26–51.
- FURTH D.G. & SUZUKI K. 1994: Character correlation studies of problematic genera of Alticinae in relation to Galerucinae (Coleoptera: Chrysomelidae). In Furth D.G. (ed.): *Proceedings of the Third International Symposium on the Chrysomelidae, Beijing 1992*. Backhuys, Leiden, pp. 116–135.
- FURTH D.G. & SUZUKI K. 1998: Studies of Oriental and Australian Alticinae genera based on the comparative morphology of the metafemoral spring, genitalia, and hind wing venation. In Biondi M., Daccordi M. & Furth D.G. (eds): *Proceedings of the Fourth International Symposium on the Chrysomelidae, Firenze 1996*. Museo Regionale di Scienze Naturali, Torino, pp. 91–124.
- FURTH D.G. & YOUNG D.A. 1988: Relationships of herbivore feeding and plant flavonoids (Coleoptera: Chrysomelidae and Anacardiaceae: Rhus). *Oecologia* **74**: 496–500.
- GEOFFROY E.L. 1785: In Fourcroy A.F. de (ed.): *Entomologia Parisiensis, sive catalogus Insectorum, quae in agro parisiensi reperiuntur – secundum methodam Geoffraerianam in sectiones, genera et species distributii; cui addita sunt nomina trivialia et fere recentae novae species. Pars prima*. Paris, 544 pp.
- GERMAR E.F. 1834: Description du genre Chirodica. *Rev. Entomol.* **2**: 1–2.
- GERSTAECKER C.E.A. 1871: Beiträge zur Insektenfauna von Zanzibar. III. Coleoptera. *Arch. Naturgesch.* **37**: 42–86.
- GERSTAECKER C.E.A. 1855: Diagnosen der von Peters in Mosambique gesammelten Kafer u. Hymenoptera. *Monatsber. Akad. Wissensch. Berlin* **1855**: 636–639.

- GÓMEZ-ZURITA J., HUNT T., KOPLIKU F. & VÖGLER A.P. 2007: Recalibrated tree of leaf beetles (Chrysomelidae) indicates independent diversification of Angiosperms and their insect herbivores. *PLoS ONE* **2**(4): e360. doi: 10.1371/journal.pone.0000360
- GOULD J. 1842: [Meeting of February 8, 1842]. Mr. Gould pointed out the generic characters of two new genera of Finches. *Proc. Zool. Soc. Lond.* **10**: 17–18.
- GRAF D.L. & CUMMINGS K.S. 2007: Review of the systematics and global diversity of freshwater mussel species (Bivalvia: Unionoida). *J. Mollusc. Stud.* **73**: 291–314.
- HAROLD VON E. 1875: Pydaristes, eine neue Gattung der Halticidae. *Stett. Entomol. Ztg* **36**: 446–448.
- HAROLD VON E. 1877a: Coleopterorum species novae. *Mitt. Münch. Entomol. Ver.* **1**: 97–111.
- HAROLD VON E. 1877b: Beiträge zur Käferfauna von Japan (zweites Stück). *Berl. Entomol. Z.* **21**: 433–434.
- HAROLD VON E. 1878: Synonymies. *Petites Nouv. Entomol.* **2**: 206.
- HEYDEN VON L. 1887: Kleine coleopterologische Mitteilungen. *Wien. Entomol. Ztg* **6**: 98.
- HEIKERTINGER F. 1909: Beschreibung zweier neuer Halticinen. *Verh. K. K. Zool. Bot. Ges. Wien* **59**: 361–374.
- HEIKERTINGER F. 1925: Monographie der Halticinengattung Derocrepis Weise (Coleopt., Chrysomelidae). *Wien. Entomol. Ztg* **42**: 95–178.
- HEIKERTINGER F. & CSIKI C. 1940: *Coleopterorum Catalogus auspiciis et auxilio W. Junk editus a S. Schenkling. Partes 160 et 169. Chrysomelidae: Halticinae*, vol. 25. Dr. W. Junk, Gravenhage, pp. 337–635.
- HOPE F.W. 1840: *The Coleopterist's Manual, Part the Third, Containing Various Families, Genera, and Species, of Beetles, Recorded by Linneus and Fabricius. Also, Descriptions of Newly Discovered and Unpublished Insects*. Bowdery & Kerby, London, 191 pp.
- ILLIGER J.C.W. 1801: Namen der Insekten-Gattungen, ihr Genitiv, ihr Grammaticisches Geschlecht, ihr Silbenmass, ihre Herleitung; zugleich mit den deutschen Benennungen. *Mag. Insekten* **1**: 125–155.
- INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE 1999: *International Code of Zoological Nomenclature. 4th ed.* International Trust for Zoological Nomenclature, The Natural History Museum, London, xxix + 306 pp.
- JACOBSON G.G. 1925: Chrysomelidae (Coleoptera) palaearctici novi vel parum cogniti. V–VI. *Ann. Mus. Zool. Leningrad* **26**: 231–276.
- JACOBY M. 1885: Descriptions of new genera and species of phytophagous Coleoptera from the Indo-Malayan and Austro-Malayan subregions, contained in the Genoa Civic Museum. *Ann. Mus. Civ. Stor. Nat. Genova (ser. 2)* **2**: 20–76.
- JACOBY M. 1888: Descriptions of new or little-known species of phytophagous Coleoptera from Africa and Madagascar. *Trans. Entomol. Soc. Lond.* **1888**: 189–206.
- JACOBY M. 1889: List of the phytophagous Coleoptera obtained by Signor L. Fea at Burmah and Tenasserim, with descriptions of new species. *Ann. Mus. Civ. Stor. Nat. Genova (ser. 2)* **7**: 147–237.
- JACOBY M. 1892a: Descriptions of some new genera and new species of phytophagous Coleoptera from Madagascar. *Proc. R. Entomol. Soc. Lond.* **1892**: 564–579.
- JACOBY M. 1892b: Viaggio di Leonardo Fea in Birmania e regioni vicine. LI. Description of the new genera and species of the phytophagous Coleoptera. *Ann. Mus. Civ. Stor. Nat. Genova (ser. 2)* **12**: 869–999.
- JACOBY M. 1893: Descriptions of some new species of Eumolpidae and Halticidae from Africa (Gaboon). *Entomologist (Suppl.)* **26**: 97–102.
- JACOBY M. 1895: Contributions to the knowledge of African phytophagous Coleoptera. Part II. *Trans. Entomol. Soc. Lond.* **1895**: 317–341.
- JACOBY M. 1897: Further contributions to the knowledge of the phytophagous Coleoptera of Africa, including Madagascar. *Proc. R. Entomol. Soc. Lond.* **1897**: 527–577.
- JACOBY M. 1899a: Some new genera and species of phytophagous Coleoptera collected during Captain Bottego's last expedition. *Ann. Mus. Civ. Stor. Nat. Genova (ser. 2)* **19**: 521–535.
- JACOBY M. 1899b: Additions to the knowledge of the phytophagous Coleoptera of Africa. Part II. *Proc. R. Entomol. Soc. Lond.* **1899**: 339–380.
- JACOBY M. 1900: On new genera and species of phytophagous Coleoptera from South and Central Africa. *Proc. R. Entomol. Soc. Lond.* **1900**: 203–266.
- JACOBY M. 1901: Descriptions of some new genera and species of phytophagous Coleoptera from Madagascar. *Ann. Soc. Entomol. Belg.* **45**: 287–303.
- JACOBY M. 1903a: A further contribution to our knowledge of African phytophagous Coleoptera. Part II. *Trans. Entomol. Soc. Lond.* **1903**: 1–38.
- JACOBY M. 1903b: Descriptions of the new genera and species of phytophagous Coleoptera obtained by Mr. H.L. Andrewes and Mr. T.R.D. Bell at the Nilgiri Hills and Kanara. *Ann. Soc. Entomol. Belg.* **67**: 80–128.
- JACOBY M. 1906: Descriptions of new genera and species of African Halticinae and Galerucinae. *Trans. Entomol. Soc. Lond.* **1906**: 11–52.
- JACOBY M. 1907: Voyage de M. Maurice de Rothschild en Ethiopie et dans l'Afrique orientale (1904–1906). Espèces nouvelles de Chrysomelidae (Col.). *Ann. Soc. Entomol. Fr.* **76**: 515–525.
- JOLIVET P. & HAWKESWOOD T.J. 1995: *Host-Plants of Chrysomelidae of the World. An Essay about the Relationships between the Leaf-Beetles and their Food-Plants*. Backhuys, Leiden, 281 pp.
- JOLIVET P. & VERMA K.K. 2002: *Biology of Leaf Beetles*. Intercept, Andover, Hampshire, xiv + 332 pp.
- KIESENWETTER VON H. 1877: In Erichson W.F. (ed.): *Naturgeschichte der Insecten Deutschlands. Erste Abtheilung. Coleoptera. Fünfter Band, Erste Lieferung, Bogen 1–12*. Nicolaische Verlags-Buchhandlung, Berlin, pp. 1–887.
- KOCH J.D.W. 1803: Monographie der Floehkäfer. *Entomol. Hefte* **2**(1): 3–90.
- KOLBE H.J. 1894: Die Pfeilgiftkäfer der Kalahari-Wüste, *Diamphidia simplex* Perring. (locusta Fairm.). *Stettin. Entomol. Ztg* **55**: 79–86.
- KONSTANTINOV A.S. 1998: Revision of the Palearctic species of *Aphthona* Chevrolat and cladistic classification of the *Aphthonini* (Coleoptera: Chrysomelidae: Alticinae). *Mem. Entomol.* **11**: 1–429.
- KONSTANTINOV A.S. 2002: A new genus of flea beetles from Greater Antilles (Coleoptera: Chrysomelidae). *Zootaxa* **124**: 1–24.
- KONSTANTINOV A.S. & CHAMORRO-LACAYO M.L. 2006: A new genus of moss-inhabiting flea beetles (Coleoptera: Chrysomelidae) from the Dominican Republic. *Coleopt. Bull.* **60**: 275–290.
- KONSTANTINOV A.S. & DUCKETT C.N. 2005: New species of *Clavicornaltica* Scherer (Coleoptera: Chrysomelidae) from continental Asia. *Zootaxa* **1037**: 49–64.

- KONSTANTINOV A.S. & PRATHAPAN K.D. 2008: New generic synonyms in the Oriental flea beetles (Coleoptera: Chrysomelidae). *Coleopt. Bull.* **62**: 381–418.
- KONSTANTINOV A.S. & VANDERBERG N.J. 1996: Handbook of Palearctic Flea Beetles (Coleoptera: Chrysomelidae: Alticinae). *Contrib. Entomol.* **1**: 237–439.
- LABOISSIÈRE V. 1922: Étude des Galerucini de la collection du musée du Congo belge. Troisième Partie. *Rev. Zool. Afr.* **10**: 233–271.
- LABOISSIÈRE V. 1932: *Synopsis des Genres de Galerucini de Madagascar*. Société Entomologique de France, Livre du Centenaire. Paris, pp. 575–592.
- LABOISSIÈRE V. 1933: Descriptions de trois nouveaux Galerucini du Tonkin. *Bull. Mus. Natn. Hist. Nat. (A)* **5**: 203–208.
- LABOISSIÈRE V. 1937: Nouveaux Galerucinae palearctiques. *Bull. Soc. Entomol. Fr.* **42**: 27–31.
- LABOISSIÈRE V. 1941: Nouveaux Halticinae et Galerucinae de la collection du musée du Congo. *Rev. Zool. Bot. Afr.* **34**: 316–321.
- LABOISSIÈRE V. 1942: *Exploration du Parc National Albert. Mission G.F. De Witte (1933–1935). Halticinae (Coleoptera: Phytophaga). Fam. Chrysomelidae*. Institut Parcs Nationaux du Congo Belge, Bruxelles, fasc. no. 39: pp. 3–130.
- LATREILLE P.A. 1810: *Considérations Générales sur l'Ordre Naturel des Animaux Composant les Classes des Crustacés, des Arachnides, et des Insectes. Avec un Tableau Méthodique de leurs Genres, Disposés en Familles*. F. Schoell, Paris, 444 pp.
- LATREILLE P.A. 1829: *Les Crustacés, les Arachnides et les Insectes Distribués en Familles Naturelles, Ouvrage Formant les Tomes 4 et 5 de celui de M. Le Baron Cuvier sur le Règne Animal (2<sup>e</sup> éd.), Vol. 1*. Déterville, Paris, 584 pp.
- LEBERT H. 1879: Hydrachnides du Léman. In Forel F.A. (ed.): *Fauna profonde du Lac Léman*. *Bull. Soc. Vaud. Sci. Nat.* **16**: 327–377.
- LINNAEUS C. 1758: *Systema Naturae per regna tria naturae: secundum classes, ordines, genera, species cum caracteribus, differentiis, synonymis, locis. Tomus I. Editio Decima, reformata*. Laurentii Salvii, Stockholmiae, 824 pp.
- LINNAEUS C. 1761: *Fauna Svecica sistens Animalia Sveciae regni: Mammalia, Aves, Amphibia, Pisces, Insecta, Vermes. Distributa per classes & ordines, genera & species, cum differentiis specierum, synonymis auctorum, nominibus incolarum, locis natalium, descriptionibus insectorum*. Laurentii Salvii, Stockholmiae, 578 pp.
- LUCAS P.H. 1849: Histoire naturelle des animaux articulés. Deuxième partie. Insectes. In: *Exploration Scientifique de l'Algérie pendant les Années 1840, 1841, 1842, Publiée par Ordre du Gouvernement et avec le Concours d'une Commission Académique. Sciences Physiques. Zoologie III*. Imprimerie Nationale, Paris, 590 pp.
- MARSHAM T. 1802: *Entomologia Britannica, sistens insecta Britanniae indigena, secundum methodum Linneanum disposita. I. Coleoptera*. J. White, London, xxxi + 548 pp.
- MAULIK S. 1926: *The Fauna of British India, including Ceylon and Burma. Coleoptera. Chrysomelidae (Chrysomelinae and Halticinae)*. Taylor and Francis, London, xiv + 443 pp.
- MAULIK S. 1929: On the structure of the hind femur in halticine beetles. *Proc. R. Entomol. Soc. Lond.* **1929**: 305–308.
- MAULIK S. 1931: Coleoptera, Chrysomelidae, Eumolpinae, Galerucinae et Halticinae. Percy Sladen Trust Expedition, 1905. *Trans. Linn. Soc. London (Ser. 2, Zool.)* **19**: 241–260.
- MEDVEDEV L. 1995: New species of Alticinae (Coleoptera, Chrysomelidae) from South Asia. *Entomol. Basiliens.* **18**: 479–488.
- MEDVEDEV L. 1996: The Chrysomelidae of Arabia. *Fauna of Saudi Arabia* **15**: 215–263.
- MONRÓS F. & BECHYNÉ J. 1956: Über einige verkannte Chrysomeliden-Namen. *Entomol. Arb. Mus. G. Frey* **7**: 1118–1137.
- MOTSCHULSKY V. 1860: Coleoptères de la Sibérie orientale et en particulier des rives de l'Amour. In Schrenck L. von (ed.): *Reisen und Forschungen im Amurlande, vol. 2*. St. Petersburg, pp. 77–257.
- MPONDA O.K.K., GIBBON D., ARTHUR E. & MORSE S. 1997: Involving farmers in the design of a low-input control programme for sesame flea beetles in Southern Tanzania. *Exp. Agric.* **33**: 313–320.
- MADEIN K.S. 2007: On the taxonomy and classification of the genus *Psylliodes* Latreille, 1825 (Coleoptera, Chrysomelidae, Galerucinae). *Entomol. Basiliens. Coll. Frey* **29**: 307–332.
- OLIVIER G.A. 1789: *Encyclopédie Méthodique, ou par Ordre de Matières; par une Société de Gens de Lettres, de Savans et d'Artistes; Précédée d'un Vocabulaire Universel, Servant de Table pour tout l'Ouvrage, Ornée des Portraits de MM. Diderot & D'Alembert, Premiers Editeurs de l'Encyclopédie. Histoire Naturelle. Insectes. Tome IV*. Panckoucke, Paris, 519 pp.
- OLIVIER G.A. 1808: *Entomologie, ou Histoire Naturelle des Insectes, avec leurs Caractères Génériques et Spécifiques, leur Description, leur Synonymie et leur Figure Enluminée. Coléoptères, Tome VI*. Badouin, Paris, 501 pp.
- PALISOT DE BEAUVOIS A.M.F.J. 1812: *Essai d'une Nouvelle Agrostographie, ou, Nouveaux Genres des Graminées: Avec Figures Représentant les Caractères de tous les Genres*. Imprimé de l'auteur, Paris, xxiv + 182 pp., xxv pls.
- PETITPIERRE E. 2000: *Fauna Iberica, 13. Coleoptera Chrysomelidae 1*. Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Científicas, Madrid, 521 pp.
- PIC M. 1921: Notes diverses, descriptions et diagnoses. *Echange* **37**: 1–6, 9–10, 13–15.
- POLLARD D.G. 1957: Halticinae of the Sudan. *Bull. Entomol. Res.* **47**: 73–87.
- SANTIAGO-BLAY J.A. 2004: Leaf-mining chrysomelids. In Jolivet P., Santiago-Blay J.A. & Schmitt M. (eds): *New Developments on the Biology of Chrysomelidae*. SPB Academic Publishing, The Hague, pp. 305–306 and pp. 1–83 of the enclosed CD-ROM.
- SAVINI V. & FURTH D.G. 2001: The status of *Heikertingerella*, *Monotalla*, *Pseudodibolia*, and *Sphaeroderma* (Coleoptera: Chrysomelidae: Alticinae) in the New World. *Proc. Entomol. Soc. Wash.* **103**: 903–912.
- SAVINI V. & FURTH D.G. 2009: *Bubiscus*, un género nuevo neotropical (Coleoptera, Chrysomelidae, Alticinae). *Bol. Soc. Entomol. Aragon.* **44**: 53–61.
- SHARP D. 1886: On New Zealand Coleoptera, with description of new genera and species. *Trans. R. Dublin Soc.* **3**: 2351–2456.
- SCHERER G. 1959: Die Alticiden-Ausbeute der Expedition des Museums G. Frey nach Nigeria-Kamerun 1955/56 (Col. Phytoph.). *Entomol. Arb. Mus. G. Frey* **10**: 177–265.
- SCHERER G. 1961: Bestimmungsschlüssel der Alticinen-Genera Afrikas. *Entomol. Arb. Mus. G. Frey* **12**: 251–288.
- SCHERER G. 1962a: Beitrag zur Kenntnis der Alticiden-fauna Zentral-Afrikas (Coleoptera: Chrysomelidae: Alticinae). *Ann. Mus. R. Afr. Centr. (Ser. 8, Zool.)* **113**: 7–82.
- SCHERER G. 1962b: Alticinae (Coleoptera, Phytophaga) Fam. Chrysomelidae. Exploration du Parc National de la Garamba. Mission H. De Saeger (1949–1952). *Institut Parcs Nationaux du Congo et du Rwanda (Bruxelles)* **31**: 3–86.

- SCHERER G. 1963: Beitrag zur Kenntnis der Alticidenfauna Afrikas (Coleoptera, Chrysomelidae, Alticinae). *Entomol. Arb. Mus. G. Frey* **14**: 648–684.
- SCHERER G. 1969: Contribution à la connaissance de la faune entomologique de la Côte-d'Ivoire (J. Decelle, 1961–1964). XLIII. Coleoptera Chrysomelidae Alticinae. *Ann. Mus. R. Afr. Centr. (Ser. 8, Zool.)* **175**: 365–371.
- SCHERER G. 1970: Beitrag zur Kenntnis der Alticinae Afrikas (Coleoptera – Chrysomelidae – Alticinae). *Entomol. Arb. Mus. G. Frey* **21**: 298–304.
- SCHERER G. 1972: Coleoptera aus Nordostafrika. Chrysomelidae: Alticinae. *Notul. Entomol.* **52**: 1–17.
- SCHERER G. 1978: Mission 1965 del professor Giuseppe Scortecchi nello Yemen (Arabia meridionale). Coleoptera Chrysomelidae: Alticinae. *Atti Soc. Ital. Sci. Nat. Mus. Civ. Stor. Nat. Milano* **119**: 264–266.
- SCHERER G. 1983: Review of the genus *Chirodica* Germar. *Entomol. Arb. Mus. G. Frey* **31–32**: 173–175.
- SCHERER G. 1985: Yemenaltica, eine neue Gattung aus dem Yemen (Coleoptera Chrysomelidae Alticinae). *Atti Soc. Ital. Sci. Nat. Mus. Civ. Stor. Nat. Milano* **126**: 85–88.
- SCHERER G. 1987: The Genus *Torodera* Weise (Coleoptera – Chrysomelidae – Alticinae). *Entomol. Arb. Mus. G. Frey* **35–36**: 67–71.
- SCHERER G. & BOPPRÉ M. 1997: Attraction of Gabonia and Nzerekorena to pyrrolizidine alkaloids – with description of 13 new species and notes on male structural peculiarities (Insecta, Coleoptera, Chrysomelidae, Alticinae). *Spixiana* **20**: 7–38.
- SCLATER P. 1858: On the general distribution of the members of the Class Aves. *J. Linn. Soc. Lond. (Zool.)* **2**: 130–145.
- SEENO T.N. & WILCOX J.A. 1982: Leaf beetle genera (Coleoptera, Chrysomelidae). *Entomography* **1**: 1–221.
- SELMAN B.J. 1963: Coléopterès Chrysomelides récoltés par M.J. Mateu dans l'Ennedi et au Tchad. *Bull. Inst. Fr. Afr. Noire (A)* **25**: 1148–1162.
- SELMAN B.J. 1968: A revision of the genus *Eriotica* Harold (Halticidae: Coleoptera). *J. Nat. Hist.* **2**: 247–251.
- STEPHENS J.F. 1829: *The Nomenclature of British Insects. A Compendious List of such Species as are Contained in the Systematic Catalogue of British Insects, and of those Discovered Subsequently to its Publication; Forming a Guide to their Classification.* Baldwin & Craddock, London, 68 pp.
- STEPHENS J.F. 1831: *Illustrations of British Entomology; or, a Synopsis of Indigenous Insects: Containing their Generic and Specific Distinctions; with an Account of their Metamorphoses, Times of Appearance, Localities, Food, and Economy, as far as Practicable. Mandibulata. Vol. IV.* Baldwin & Craddock, London, 366 pp.
- THOMSON J. 1858: Voyage au Gabon. *Arch. Entomol.* **2**: 9–471.
- WEISE J. 1886: In Erichson W.F. (ed.): *Naturgeschichte der Insecten Deutschlands. Erste Abtheilung. Coleoptera. Sechster Band, Vierte Lieferung, Bogen 37–48.* Nicolaische Verlags-Buchhandlung, Berlin, pp. 569–768.
- WEISE J. 1887: Neuer sibirische Chrysomeliden und Coccinelliden nebst Bemerkungen über früher beschriebene Arten. *Arch. Naturgesch.* **53**: 164–209.
- WEISE J. 1888: In Erichson W.F. (ed.): *Naturgeschichte der Insecten Deutschlands. Erste Abtheilung. Coleoptera. Sechster Band, Fünfter Lieferung, Bogen 49–60.* Nicolaische Verlags Buchhandlung, Berlin, pp. 769–960.
- WEISE J. 1889: Insecta a Cl. G.N. Potanin in China et in Mongolia novissime Lecta. IX. Chrysomelidae et Coccinellidae. *Horae Soc. Entomol. Ross.* **23**: 560–653.
- WEISE J. 1895: Neue Chrysomeliden nebst synonymischen Bemerkungen. *Dt. Entomol. Z.* **1895**: 327–352.
- WEISE J. 1901: Einige neue afrikanische Chrysomeliden. *Dt. Entomol. Z.* **2**: 301–310.
- WEISE J. 1902a: Afrikanische Chrysomeliden. *Arch. Naturgesch.* **68**: 119–174.
- WEISE J. 1902b: Afrikanische Halticinen. *Dt. Entomol. Z.* **1902**: 301–304.
- WEISE J. 1903: Afrikanische Chrysomeliden. *Arch. Naturgesch.* **69**: 197–226.
- WEISE J. 1907a: Chrysomelidae et Coccinellidae aus dem Spanischen Guinea. *Mem. R. Soc. Esp. Hist. Nat.* **1**: 379–403.
- WEISE J. 1907b: Neue Chrysomeliden und Coccinelliden von der Ausbeute der Herren Oskar Neumann und Baron von Erlanger in Abyssinien. *Arch. Naturgesch.* **73**: 210–232.
- WEISE J. 1910a: Chrysomelidae und Coccinellidae. In Sjostedt Y. (ed.): *Ergebnisse der schwedischen Expedition nach Kilimandjaro. Vol. 7.* P. Palmquists Aktiebolag, Stockholm, pp. 153–266.
- WEISE J. 1910b: Chrysomelidae von Madagaskar, den Comoren und den Inseln Ostafrikas. In Voeltzkow A. (ed.): *Reise in Ostafrika in den Jahren 1903–1905, Band II, Heft 5.* E. Schweizerbartsche Verlagsbuchhandlungen, Nägele & Dr. Sproesser, Stuttgart, pp. 419–506.
- WEISE J. 1911: Neue Chrysomeliden. *Ann. Soc. Entomol. Belg.* **55**: 166–175.
- WEISE J. 1912: Chrysomelidae. In Schubotz H. (ed.): *Wissenschaftliche Ergebnisse der Deutschen Zentral-Afrika-Expedition 1907–1908 unter Führung Adolf Friefrichs, Herzogs zu Mecklenburg.* Klinkhardt & Biermann, Leipzig, 127–163 pp.
- WEISE J. 1915: Chrysomelidae and Coccinellidae: In Schubotz H. (ed.): *Ergebnisse der Zweiten Deutschen Zentral-Afrika-Expedition 1910–1911 unter Führung Adolf Friefrichs, Herzogs zu Mecklenburg.* Klinkhardt & Biermann, Leipzig, pp. 155–184.
- WEISE J. 1916: Synonymische Mitteilungen. *Dt. Entomol. Z.* **1916**: 37–41.
- WEISE J. 1919: Afrikanische Chrysomeliden und Coccinelliden. *Arch. Naturgesch.* **83**: 174–207.
- WEISE J. 1922: Chrysomeliden der Indo-Malayischen Region. *Tijdschr. Entomol.* **65**: 39–130.
- WEISE J. 1923: Results of Dr. E. Mjöberg's Swedish Scientific Expeditions to Australia 1910–1913. 31. Chrysomeliden und Coccinelliden aus Queensland. *Arkiv Zool.* **15**: 1–150.
- WEISE J. 1924: Zoological results of the Swedish expedition to Central Africa, 1921. Insecta 7. Chrysomelidae und Coccinellidae. *Arkiv Zool.* **16**: 1–30.
- WEISE J. 1926: Über Bekannte und neue Chrysomeliden und Coccinelliden aus dem Reichmuseum zu Stockholm. *Arkiv Zool.* **18**: 13–34.
- WESTWOOD J.O. 1840: *An Introduction to the Modern Classification of Insects, Vol. 2.* Longman, Orme, Brown, Green, and Longmans, London, 587 pp.
- WESTWOOD J.O. 1862: Description and figures of a new genus and species of Gallerucidae. *J. Entomol.* **1**: 216–218.
- WOLLASTON T.V. 1867: *Coleoptera Hesperidium, being an Enumeration of the Coleopterous Insects of the Cape Verde Archipelago.* Van Voorst, London, 285 pp.

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