

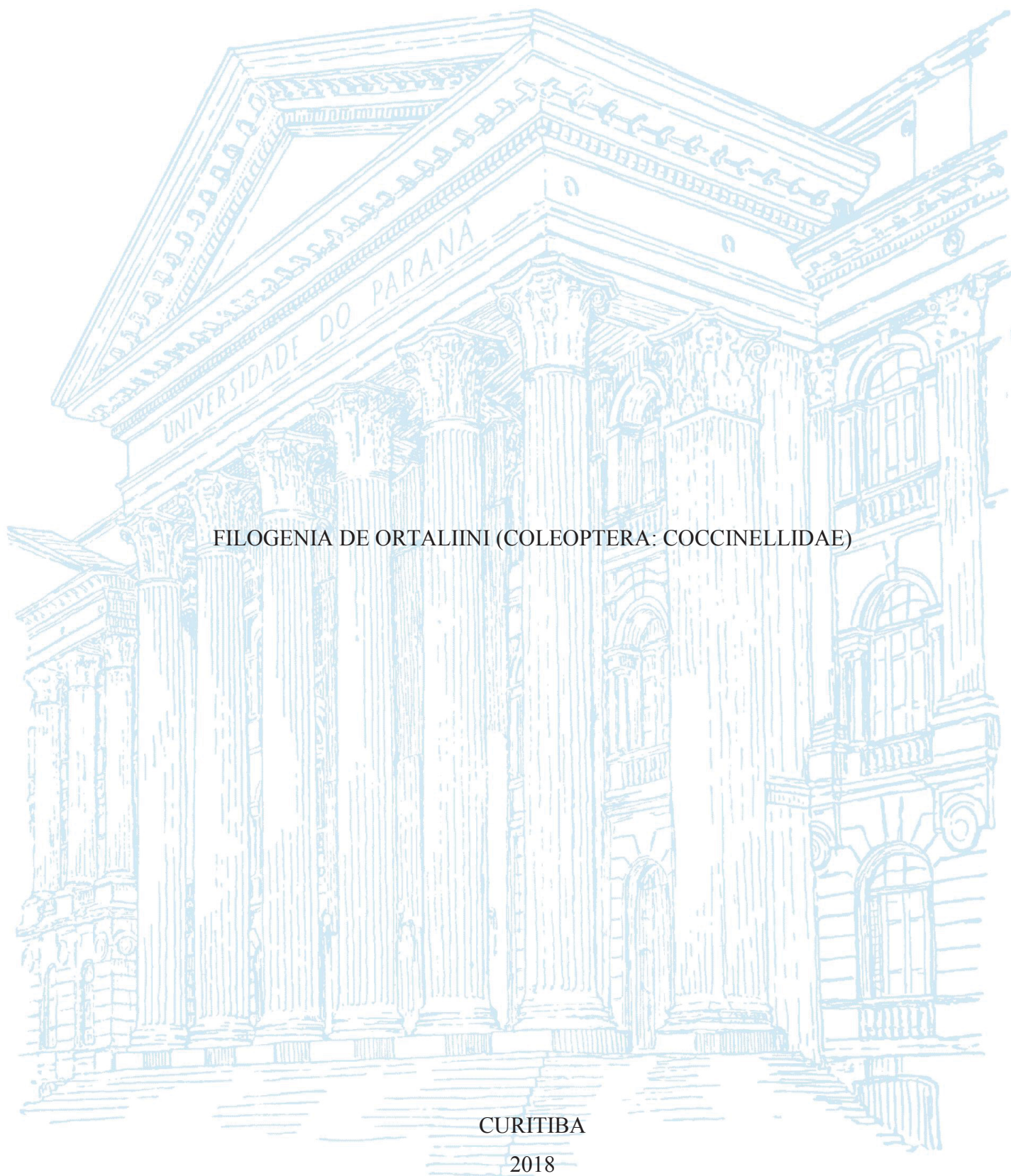
UNIVERSIDADE FEDERAL DO PARANÁ

PAULA BATISTA DOS SANTOS

FILOGENIA DE ORTALIINI (COLEOPTERA: COCCINELLIDAE)

CURITIBA

2018



PAULA BATISTA DOS SANTOS

FILOGENIA DE ORTALIINI (COLEOPTERA: COCCINELLIDAE)

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Orientadora: Profa. Dra. Lúcia Massutti de Almeida

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Os membros da Banca Examinadora designada pelo Colegiado do Programa de Pós-Graduação em CIÊNCIAS BIOLÓGICAS (ENTOMOLOGIA) da Universidade Federal do Paraná foram convocados para realizar a arguição da tese de Doutorado de **PAULA BATISTA DOS SANTOS** intitulada: **Filogenia de Ortaliini (Coleoptera: Coccinellidae)**, após terem inquirido a aluna e realizado a avaliação do trabalho, são de parecer pela sua aprovação no rito de defesa.

A outorga do título de doutor está sujeita à homologação pelo colegiado, ao atendimento de todas as indicações e correções solicitadas pela banca e ao pleno atendimento das demandas regimentais do Programa de Pós-Graduação.

Curitiba, 29 de Outubro de 2018.

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A minha mãe, pelo amor, apoio e
confiança. Aos meus filhos por serem fonte de
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Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. There is grandeur in this view of life, with its several powers, having been originally breathed into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being, evolved.

(Charles Darwin, 1859, p. 490)

RESUMO

Ortaliini é uma tribo de Coccinellidae (Coleoptera: Coccinelloidea) constituída por predadores e foi tratada filogeneticamente em escala global pela primeira vez neste estudo. Como resultado de várias mudanças em sua história, a tribo tem atualmente 11 gêneros: *Amida* Lewis, 1896; *Anortalia* Weise, 1902; *Azoria* Mulsant, 1850; *Elnidortalia* Recuenco-Adorada, 2011; *Ortalia* Mulsant, 1850; *Ortalistes* Gorham, 1897; *Paramida* Sicard, 1909; *Pseudoladonia* **Crotch, 1874**; *Scymnhova* Sicard, 1909; *Semra* (Gorham, 1899) e *Zenoria* Mulsant, 1850. A ampla diversidade morfológica entre os gêneros e os estudos escassos dificultam a delimitação dessa tribo, suas relações filogenéticas internas e sua taxonomia em nível de gênero. A fim de aumentar a compreensão de Ortaliini, testar sua monofilia e fornecer uma classificação baseada em filogenia, esta análise incluiu, pela primeira vez, todas as espécies-tipo entre os gêneros e um conjunto de dados, consistindo de uma matriz de caracteres morfológicos. A monofilia da tribo foi recuperada, e uma nova classificação foi proposta com base na análise cladística. Os resultados sugerem que a tribo é composta apenas por *Zenoria*, *Ortalia*, *Amida*, *Elnidortalia*, *Anortalia*, enquanto os gêneros remanescentes são para- e polifiléticos. *Amida* e *Ortalia* necessitam de revisão. Os seguintes sinônimos são registrados aqui pela primeira vez: *Amida jinghongiensis* (Pang and Mao, 1979) **syn. nov.** de *Anortalia fleutaiuxi* Weise, 1902; *Amida novempunctata* Hoàng, 1982 **syn. nov.** de *Anortalia fleutaiuxi maculata* Weise, 1902; *Anortalia fleutaiuxi maculata* Weise, 1902 **syn. nov.** de *Anortalia fleutaiuxi* Weise, 1902. *Acanthoscymnus* **nom. nov.** é o novo nome de substituição para *Ortalistes pexus* Gorham, 1897. Os seguintes gêneros foram excluídos e provisoriamente transferidos para outras tribos: *Azoria* Mulsant, 1850 (espécie-tipo *Azoria subviolacea*) para Coccidulini Mulsant, 1846; *Ortalistes* Gorham, 1897 (espécie-tipo *Ortalistes obesus* Gorham, 1897) para Diomini Gordon, 1999; *Acanthoscymnus pexus* (Gorham, 1897) (espécie-tipo *Ortalistes pexus* Gorham, 1897) para Coccidulini Mulsant, 1846; *Paramida* Sicard, 1909 (espécie-tipo *Paramida griseipennis* Sicard, 1909) para Epilachnini Mulsant, 1846; *Pseudoladonia* Crotch, 1874 (espécie-tipo *Pseudoladonia simulans* Crotch, 1874) para Cephaloscymnini Gordon, 1985; *Scymnhova* Sicard, 1909 (espécie-tipo *Scymnhova ornatipennis* Sicard, 1909) para Coccidulini Mulsant, 1846; *Semra* Özdikmen, 2007 (espécie-tipo *Semra picta* (Gorham, 1899)) para Hyperaspidini Mulsant, 1846.

Palavras-chave: filogenia. Coccinellidae. taxonomia. classificação. Ortaliini.

ABSTRACT

Ortaliini is a tribe of predator Coccinellidae (Coleoptera: Coccinelloidea) and it was phylogenetically treated on a global scale for the first time in this study. As a result of several changes on its history, the tribe has currently 11 genera: *Amida* Lewis, 1896; *Anortalia* Weise, 1902; *Azoria* Mulsant, 1850; *Elnidortalia* Recuenco-Adorada, 2011; *Ortalia* Mulsant, 1850; *Ortalistes* Gorham, 1897; *Paramida* Sicard, 1909; *Pseudoladoria* Crotch, 1874; *Scymnhova* Sicard, 1909; *Semra* (Gorham, 1899) and *Zenoria* Mulsant, 1850. The broad morphological diversity among the genera and the scarce studies difficult to delimitate this tribe, its internal phylogenetic relationships and their genus-level taxonomy. In order to increase the understanding of Ortaliini, test its monophyly and provide a phylogeny-based classification, this analysis included for the first time all the type-species among the genera and a dataset, consisting of matrix of morphological characters. The monophyly of the tribe was recovered, and a new classification was proposed based on the cladistic analysis. The results suggest that the tribe is composed only by *Zenoria*, *Ortalia*, *Amida*, *Elnidortalia*, *Anortalia*, while the remain genera are para- and polyphyletic. *Amida* and *Ortalia* need to be revised. The following synonymies are recorded here for the first time: *Amida jinghongiensis* (Pang and Mao, 1979) **syn. nov.** of *Anortalia fleutaiuxi* Weise, 1902; *Amida novempunctata* Hoàng, 1982 **syn. nov.** of *Anortalia fleutaiuxi maculata* Weise, 1902; and *Anortalia fleutaiuxi maculata* Weise, 1902 **syn. nov.** of *Anortalia fleutaiuxi* Weise, 1902. *Acanthoscymnus* **nom. nov.** is the new replacement name for *Ortalistes pexus* Gorham, 1897. The following genera were excluded from Ortaliini and transferred to different other tribes: *Azoria* Mulsant, 1850 (type species *Azoria subviolacea*) to Coccidulini Mulsant, 1846; *Ortalistes* Gorham, 1897 (type species *Ortalistes obesus* Gorham, 1897) to Diomini Gordon, 1999; *Acanthoscymnus pexus* Santos & Almeida, 2018 (type species *Acanthoscymnus pexus* (Gorham, 1897)) to Coccidulini Mulsant, 1846; *Paramida* Sicard, 1909 (type species *Paramida griseipennis* Sicard, 1909) to Epilachnini Mulsant, 1846; *Pseudoladoria* Crotch, 1874 (type species *Pseudoladoria simulans* Crotch, 1874) to Cephaloscymnini Gordon, 1985; *Scymnhova* Sicard, 1909 (type species *Scymnhova ornatipennis* Sicard, 1909) to Coccidulini Mulsant, 1846; *Semra* Özdikmen, 2007 (type species *Semra picta* (Gorham, 1899)) to Hyperaspidini Mulsant, 1846.

Keywords: phylogeny. Coccinellidae. taxonomy. classification. Ortaliini.

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A presente tese é parte dos requisitos para obtenção do título de doutor no Programa de Entomologia, da Universidade Federal do Paraná, e, como tal, não é considerada uma publicação, de acordo com as normas do Código Internacional de Nomenclatura Zoológica (ICZN, 1999: artigo 8).

As mudanças taxonômicas descritas nesta dissertação devem ser consideradas provisórias e não devem ser citadas em hipótese alguma, com exceção das descritas nos artigos já aceitos.

1 Introdução Geral

Coccinellidae Latreille, 1807 constituem um grupo em sua maioria predador, ecológica e morfológicamente diversos, de besouros Polyphaga Emery 1886, com cerca de 6000 espécies, que variam de 0,8 mm a 18 mm e constituem atualmente a maior e mais representativa das 15 famílias de Coccinelloidea (Robertson *et al.*, 2015).

A monofilia da família vem sendo confirmada recentemente através de diversas análises morfológicas e moleculares, caracterizadas por alguns grupos fortemente apoiados (Hunt *et al.* 2007; Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.*, 2010; Lawrence *et al.* 2011; Seago *et al.*, 2011; Robertson *et al.*, 2015; Mckenna *et al.*, 2015).

Duas subfamílias, Microweiseinae Leng, 1920 e Coccinellinae Latreille, 1807, são atualmente corroboradas (Seago *et al.*, 2011; Robertson *et al.*, 2015) e embora não haja consenso entre os autores sobre os relacionamentos internos, 23 tribos são reconhecidas na classificação proposta por Seago *et al.* (2011).

Ortaliini Mulsant, foco deste estudo, foi alocada em diferentes subfamílias desde o seu estabelecimento e com o avanço das análises moleculares sua classificação começou a ser redefinida. A monofilia de Ortaliinae *sensu* Kovář (1996) enquanto subfamília composta por Ortaliini e Noviini foi questionada e o relacionamento filogenético de Ortaliini na família não exibiu concordância entre as topologias encontradas por diferentes autores (Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.*, 2010; Seago *et al.*, 2011; Robertson *et al.*, 2015, Szawaryn *et al.*, 2015).

As relações filogenéticas internas em Ortaliini foram avaliadas para os gêneros *Ortalia* Mulsant, 1850 e *Amida* Lewis, 1896 sugerindo a monofilia da tribo (Aruggoda *et al.*, 2010; Seago *et al.*, 2011). A posição taxonômica dos gêneros que compõem Ortaliini permanece incerta, havendo a necessidade de trabalhos mais aprofundados sobre o grupo e análises com amostragem mais ampla, a fim de esclarecer a delimitação e o posicionamento da tribo.

Atualmente Ortaliini possui cerca de 100 espécies alocadas em 11 gêneros, sendo que nove deles nunca foram testados através de metodologias filogenéticas: *Amida* Lewis, 1896; *Anortalia* Weise, 1902; *Azoria* Mulsant, 1850; *Elnidortalia* Recuenco-Adorada, 2011; *Ortalia* Mulsant, 1850; *Ortalistes* Gorham, 1897; *Paramida* Sicard, 1909; *Pseudoladoria* Crotch, 1874; *Scymnhova* Sicard, 1909; *Semra* (Gorham, 1899) e *Zenoria* Mulsant, 1850. Neste contexto, a análise filogenética do grupo e a definição de uma nova classificação torna-

se necessária. O presente trabalho teve como objetivo promover um aumento na compreensão dos gêneros que compõe Ortaliini, suas relações filogenéticas e evolução. Uma análise cladística testando a monofilia da tribo e incluindo pela primeira vez a análise do material-tipo de todos os gêneros dá suporte a uma Ortaliini monofilética, contribuindo para o entendimento taxonômico através de estudos morfológicos.

A tese foi subdividida em dois capítulos. O primeiro é uma revisão de literatura com o objetivo de fornecer um levantamento bibliográfico sobre os gêneros e sobre as estruturas morfológicas elencadas ao longo da história do grupo e que foram ou não utilizadas na filogenia do presente estudo.

O segundo capítulo trata da análise filogenética de Ortaliini com dados morfológicos, com diagnose e comentários sobre os agrupamentos inicialmente definidos para a tribo. O mesmo é o resultado principal do projeto inicial da tese, baseado nos resultados da filogenia e no histórico do grupo.

O Capítulo 2 foi formatado segundo a provável revista ao qual será submetido.

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2 REVISÃO DE LITERATURA PARA OS GÊNEROS DE ORTALIINI

Ao longo da história, Coccinellidae Latreille, 1807 foi geralmente aceita como um agrupamento natural e classificada na Série Cerylonidae Crowson, 1955, um grupo presumivelmente derivado de besouros na superfamília Cucujoidea Latreille, 1802, subordem Polyphaga Emery 1886, que incluía as famílias Alexiidae, Bothrideridae, Cerylonidae, Corylophidae, Discolomatidae, Endomychidae, Latridiidae e Akalyptoischiidae (Crowson, 1955; Hunt *et al.*, 2007; Robertson *et al.*, 2008; Lord *et al.*, 2010; Bocak *et al.*, 2014). Análises recentes confirmaram a monofilia desta série e a superfamília Coccinelloidea foi formalmente reconhecida por Robertson *et al.* (2015) corroborando resultados anteriores (Hunt *et al.*, 2007; Robertson *et al.*, 2008; Bocak *et al.*, 2014).

Os relacionamentos internos em Coccinelloidea recuperaram diversas hipóteses para o grupo-irmão de Coccinellidae: Alexiidae + Anamorphinae (Hunt *et al.*, 2007), Endomychidae (Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Seago *et al.*, 2011), Corylophidae (Robertson *et al.*, 2008, 2013; Lawrence *et al.*, 2011), Alexiidae (Bocak *et al.*, 2014) ou Eupsilobiidae (anteriormente Endomychidae) (Robertson *et al.*, 2015).

Estima-se que o ancestral de Coccinellidae viveu no Jurássico Médio (~ 150 Ma) (Mckenna *et al.*, 2015) e os fósseis mais antigos encontrados datam do Eoceno Inferior (~53 Ma) (Kirejtshuk & Nel, 2012).

Análises morfológicas e/ou moleculares (Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.*, 2010; Seago *et al.*, 2011; Robertson *et al.*, 2015; Mckenna *et al.*, 2015) corroboraram a monofilia da família e, embora as relações internas tenham sido controversas, sugerem uma rápida radiação recente.

Duas subfamílias, Microweiseinae Leng, 1920 e Coccinellinae Latreille, 1807, são atualmente corroboradas (Seago *et al.*, 2011; Robertson *et al.*, 2015) e embora não haja consenso entre os autores sobre os relacionamentos internos, das 37 tribos com nomes válidos (Bouchard *et al.*, 2011), 23 são reconhecidas na classificação proposta por Seago *et al.* (2011).

Os coccinelídeos são morfológica e troficamente diversificados e constituem a maior família de Coccinelloidea (Robertson *et al.*, 2015), com cerca de 360 gêneros e 6000 espécies distribuídas em todo o mundo (Vandenberg, 2002). O comportamento alimentar, tanto de larvas quanto de adultos, pode ser dividido em três grupos principais de acordo com sua especialização: predadores (acarófagos, afidófagos e coccidófagos), fitófagos (filógafos, frugívoros e polenófagos) e micófagos, embora possam ser polífagos na ausência de seu alimento preferencial (Guedes, 2013). Tais hábitos popularizaram certas espécies de coccinelídeos como agentes de controle biológico e de importância econômica (Van Lenteren, 2011; Michaud, 2012) e mais recentemente destacam-se nas discussões sobre os impactos de

espécies introduzidas ou invasoras sobre populações de espécies nativas (Rondoni *et al.*, 2017).

As análises filogenéticas da família (Giorgi *et al.*, 2009; Seago *et al.*, 2011) sugerem a origem de um comportamento alimentar predador no ancestral de Coccinellidae originado a partir de um ancestral micófago e o posterior desenvolvimento de defesas químicas e estruturais em adultos e larvas (Seago *et al.*, 2011), como catalizadores do seu sucesso evolutivo e rápida diversificação.

Apesar de sua importância e diversidade, o conhecimento da família ainda é fragmentado e a classificação interna é uma questão em aberto. As relações e definições das tribos e gêneros são instáveis, devido a um conjunto de fatores: revisões regionais, carência de tratamento taxonômico recente para muitos grupos e descrições de novas espécies baseadas em caracteres lábeis (Vandenberg, 2002; Szawaryn *et al.*, 2015). Este cenário, combinado com o grande número de espécies, bem como a importância econômica, faz os estudos taxonômicos na família cada vez mais necessários.

2.1 Classificações relevantes para Ortaliini

Linneu (1758) reuniu insetos que estavam distintamente separados de outros Coleoptera e os designou sob o nome genérico *Coccinella* Lineu, 1758. Muitas espécies foram descritas no gênero até Kugelmann (1794) começar o desmembramento de *Coccinella* com a criação do gênero *Scymnus* Kugelmann, 1794 para espécies pequenas e pubescentes. Este novo corte genérico não foi imediatamente reconhecido e somente o gênero Linnaeano é registrado nas primeiras obras de Latreille (1796, 1802-1805). Latreille (1804) reorganiza o agrupamento (incluindo *Scymnus*) como Tridigités, baseado nos tarsos trímeros, juntamente com Endomychidae e mais tarde Latreille (1807) separou Endomychidae de Coccinellidae.

A primeira classificação interna significativa da família foi realizada quando Redtenbacher (1843) subdividiu a família com base nos hábitos alimentares. Seu grupo Aphidophagous provou ser um agrupamento artificial, mas o grupo Phytophagous corresponde a atual Epilachnini.

No trabalho sobre os Coleoptera da França, Mulsant (1846) incluiu os Coleoptera trímeros. Mulsant (1850), publicou a descrição de cerca de mil espécies, na classificação global de Coleoptera Trimera Securipalpes, que dividiu em dois grandes grupos Gynossomides e Trichosomides, quanto a ausência ou a presença de pubescência. O primeiro grupo compreendeu três famílias: Coccinelliens, Chilochooriens e Hyperaspiens e o segundo

grupo, seis famílias Epilachniens, Poriens, Ortaliens, Chnoodiens, Scymniens e Cocciduliens, totalizando 864 espécies (Fig. 1).

Nesta classificação, os élitros sutilmente pontuados agrupavam as famílias Epilachiniens, Poriens, Ortaliens, Chnoodiens, Scymniens e as separavam de Cocciduliens, com pontuação distinta, élitros posteriormente mais largos que o protórax e olhos grosseiramente facetados. A posição anterior das inserções antenais, os olhos inteiros, o clipeo não emarginado e as mandíbulas multidentadas distinguem Epilachiniens dos demais.

Os élitros arredondados nos ângulos e anteriormente distintamente mais largos que o protórax, o clipeo inteiro e as antenas de 11 artículos, mais longos que largos agrupavam Poriens e Ortaliens, enquanto élitros mais pronunciados nos ângulos humerais, raramente arredondados e, as antenas curtas de 8 artículos agrupavam Chnoodiens e Scymniens.

O comprimento das antenas e a forma dos artículos distinguia Ortaliens (antenas longas, compactamente articuladas e com clava ovoide) de Poriens (antenas muito longas, fracamente articuladas e com clava serrada).

A família Ortaliens foi descrita por Mulsant (1850) como um agrupamento caracterizado pelos élitros sutilmente pontuados, notavelmente mais largos que o protórax e com ângulos anteriores arredondados; antenas inseridas na parte antero interna dos olhos e que se prolongam posteriormente até a metade do comprimento do protórax, a clava composta de artículos mais longos que largos, o clipeo não emarginado e o pronoto emarginado posteriormente até a margem externa dos olhos, sinuosamente pronunciado.

Neste agrupamento Mulsant (1850) diferenciou dois ramos baseados em caracteres de antenas e olhos. O ramo Ortaliaires com antenas com clava ovoide e olhos emarginados e o ramo Rodoliaires com antenas com clava truncada na extremidade e olhos não emarginados.

No ramo Ortaliaires Mulsant descreveu os gêneros *Ortalia*, *Prodilis* e *Zenoria*, diferenciados entre si pela forma da linha pós-coxal abdominal. *Ortalia* e *Prodilis* com linhas recurvadas, completas lateralmente em *Prodilis* e amplas, incompletas lateralmente em *Ortalia*. *Zenoria* com linha pós-coxal abdominal ampla, angulosa e incompleta lateralmente.

O gênero *Ortalia* foi caracterizado pela forma do corpo pouco convexa, da linha pós-coxal abdominal ampla, recurvada e geralmente incompleta lateralmente; protórax truncado anteriormente e subsinuoso de cada lado na base, élitros obtusamente arredondados posteriormente e garras tarsais bífidas. Várias espécies de *Ortalia* de Madagascar e do continente africano foram descritas ou redescritas por Mulsant (1850).

O gênero *Prodilis* foi estabelecido por Mulsant (1850) para uma única espécie proveniente de Nova Granada (Colômbia), e caracterizado pela forma da linha pós-coxal

abdominal em arco ou semicírculo, protórax ânguloso, não bissinuoso na base e garras tarsais com um dente basal.

O gênero *Zenoria* foi caracterizado pela forma da linha pós-coxal abdominal angulosa, seguindo paralela à margem posterior do primeiro ventrito abdominal e recurvada quase em ângulo reto próximo à margem externa, incompleta; protórax fortemente bissinuoso de cada lado na base e garras tarsais geralmente bífidas.

O ramo Rodoliares foi caracterizado pelas antenas com a clava truncada na extremidade e semi-circularmente dilatada anteriormente, olhos não emarginados e linha pós-coxal abdominal em arco, completa lateralmente; garras tarsais bífidas com ramo interno muito curto. Os gêneros *Azoria*, *Rodolia* e *Vedalia* foram descritos por Mulsant (1850) neste agrupamento e diferenciados entre si pela forma das pernas.

Azoria, com apenas uma espécie e localidade desconhecida, *A. subviolacea* Mulsant, 1850 foi caracterizada por possuir tíbias não angulosas ou arqueadas na margem externa e sem sulco para receber os tarsos.

Rodolia (10 espécies) e *Vedalia* (2 espécies) foram caracterizadas por possuir tíbias angulosas ou arqueadas e com sulco para recepção dos tarsos. *Rodolia* diferindo de *Vedalia* pelos olhos não emarginados, enquanto *Vedalia* com olhos emarginados na parte anterior por uma extensão transversalmente dirigida.

À excessão dos gêneros, todas as espécies descritas por Mulsant apresentam descrições detalhadas de tamanho, forma do corpo e coloração.

Coccinellidae foi revisado por Crotch (1874) e uma nova classificação em 7 subfamílias foi proposta: Coccinellidae (tribos Epilachnides com 4 gêneros, Coccinellides com 65 gêneros), Thytthaspides (um único gênero), Chilochorides (21 gêneros), Hyperaspides (7 gêneros), Scymnides (4 gêneros), Exoplectrides (grupos Ortaliae com 5 gêneros, Azyae com 1 gênero, Exoplectrae com 8 gêneros), Rhyzobiides com 20 gêneros (tribo Discotomides com 6 gêneros) (Fig. 1).

Neste trabalho Crotch (1874) descreveu a subfamília Exoplectrides como bastante heterogênea e sugeriu que *Ortalia* possivelmente estaria mais relacionada a Scymnides e *Azya* estaria mais relacionada a *Hyperaspis*. Citou a semelhança nos padrões de coloração de algumas espécies de *Zenoria* com *Azya* Mulsant e *Ortalia*.

O grupo Ortaliae foi caracterizado acrescentando novos caracteres, epipleuras não foveoladas, olhos grandes, ovais, finamente facetados, pontuação igual (*Ortalia*) ou desigual (*Prodilis*, *Zenoria*) e tíbias não anguladas. O autor designou a espécie-tipo de *Ortalia*, *O. variata* Mulsant (Madagascar, Reiche) e acrescentou que os machos dessa espécie possuem

um tubérculo mediano no quinto ventrito abdominal. Caracterizou *Ortalia* pelo pronoto emarginado na base, pontuação uniforme, garras bífidas, epipleuras não foveoladas, acuminadas, antenas curtas, olhos grandes, ovais.

Prodilis foi redescrito por Crotch (1874) com pontuação dos élitros grosseira, muito desigual, esparsa, pronoto emarginado na base, olhos grandes, finamente facetados, linhas abdominais pós-coxais completas, atingindo a metade do segmento, o processo intercoxal do primeiro ventrito abdominal profundamente emarginado e epipleura subfoveolada e acuminada nos dois terços apicais. Designou a espécie tipo *P. pallidifrons* Mulsant e descreveu mais uma espécie para o México.

Crotch (1874) designou *Zenoria revestita* Mulsant como espécie tipo do gênero. Redescreveu *Zenoria* com pontuação dos élitros desigual, grosseira, esparsa, pubescência longa; o pronoto sinuoso na base e com uma linha interna distinta; olhos menores e pouco mais convexos que em *Ortalia* e *Prodilis*, pernas finas e tíbias não sulcadas. No grupo *Ortaliae*, Crotch (1874) acrescentou dois novos gêneros, *Pseudoladonia*, espécie tipo *P. simulans* Crotch, 1874, de Ega (Bates) (atualmente Tefê) que foi caracterizado por possuir pontuação do élitro esparsa, bastante forte, linhas abdominais pós-coxais completas, bastante pronunciadas posteriormente, olhos grandes, finamente facetados, tíbias com sulcos nos tarsos e garras tarsais com dente na base.

Crotch (1874) descreveu ainda *Rhynchortalia*, espécie tipo *R. insueta*, da Malásia, com os seguintes caracteres: olhos proeminentes, cabeça côncava entre eles, antenas longas, inseridas um pouco na frente dos olhos, clipeo e labro prolongados, palpo alongado, não securiforme, o pronoto truncado na frente do escutelo, com uma linha de dupla impressão ao longo da base; élitros com uma pontuação grossa e desigual, epipleura plana, não foveolada e tíbias longas.

No catálogo, Gemminger & Harold (1874) listaram as espécies descritas *Ortalia calliops*, *O. duponti*, *O. flaveola*, *O. funesta*, *O. mäklini* (error), *O. pallens* (variações *argilacea*, *vermiculata* e *guillebeauï*), *O. proxima*, *O. scabrosa*, *O. variata*, *O. wallacci* e forneceram a etimologia dos gêneros *Ortalia*, *Pseudoladonia* e *Rhynchortalia*.

Chapuis, in Lacordaire (1876) fez uma extensa revisão e caracterização de Coccinellides e propôs uma classificação em duas tribos: Aphidifages, caracterizada pelas mandíbulas apicalmente simples ou bífidas, dividida em 13 grupos (Cranophorites, Chilochorites, Hyperaspites, Bucolites, Discotomites, Hippodamiites, Coccinellites, Cariites, Coccidulites, Chnoodites, Poriites, Ortaliites, Scymnites) e Phytophages com mandíbulas multidentadas em um grupo Epilachnites (Fig. 1). O autor agrupou *Azya* e *Exoplectra*

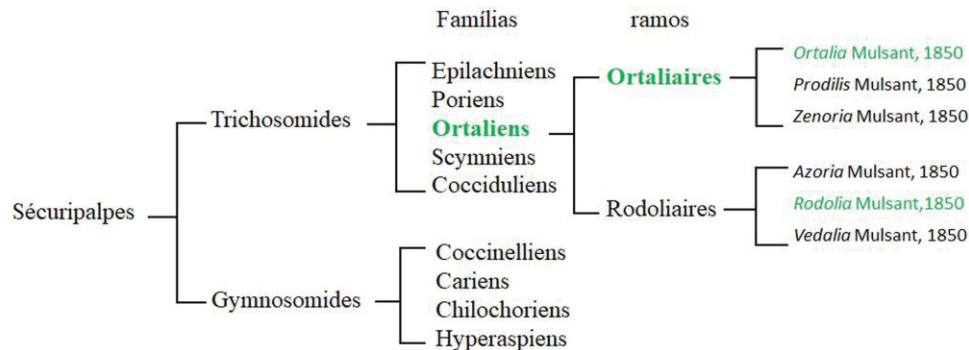
Chevrolat, 1844, com *Cryptogonus* Mulsant e *Bucolus* Mulsant, sob Bucolites, criando outra subfamília, Chnoodites, para incluir *Chnoodes* Chevrolat, 1849 e, Ortaliites para *Ortalia* e mais cinco gêneros (*Prodilis*, *Zenoria*, *Azoria*, *Rodolia* e *Vedalia*), sem considerar os gêneros descritos por Crotch, *Rhynchortalia* e *Pseudoladoria*. Apresentou uma chave para os grupos propostos, onde os Ortaliites foram diferenciados do grupo Scymniites pelo pronoto mais estreito que a base dos élitros e de Poriites pelo comprimento das antenas. Ortaliites foi descrito com os seguintes caracteres: corpo ligeiramente oval ou arredondado, bastante convexo, pubescente. Clípeo com margem anterior não emarginada. Antenas inseridas na parte antero-interna dos olhos, com a base exposta, 11 artículos, atingindo meio dos lados do pronoto, clava formada de artículos mais longos do que largos. Élitros irregularmente pontuados, mais largos na base do que o pronoto, arredondados nos ângulos e epipleuras sem fôveas. Linhas abdominais pós-coxais variáveis. Pernas curtas, garras tarsais bífidas ou apendiculadas.

Dos seis gêneros incluídos na família Ortaliens de Mulsant, apenas a metade deles (*Ortalia*, *Rodolia* e *Zenoria*) foi estudada por Chapuis, in Lacordaire (1876), o qual mencionou a raridade destas espécies nas coleções. Em uma breve diagnose, o autor sugere que Ortaliites estaria mais relacionado a Chnoodites e Scymnites. Segundo o autor Ortaliites se distinguem dos Chnoodites pelo clípeo inteiro, e de Scymnites, exceto o gênero *Novius* Mulsant, 1846, pela largura do pronoto marcadamente menor na base do que os élitros. Apontou o pequeno número de espécies e a distribuição no Novo e no Velho Mundo com alguns gêneros com representantes em ambos. Por fim, acrescentou a chave de Mulsant para os gêneros: *Ortalia*, *Prodilis*, *Zenoria*, *Rodolia*, *Azoria* e *Vedalia* e redescreveu os gêneros *Ortalia*, *Zenoria* e *Rodolia*.

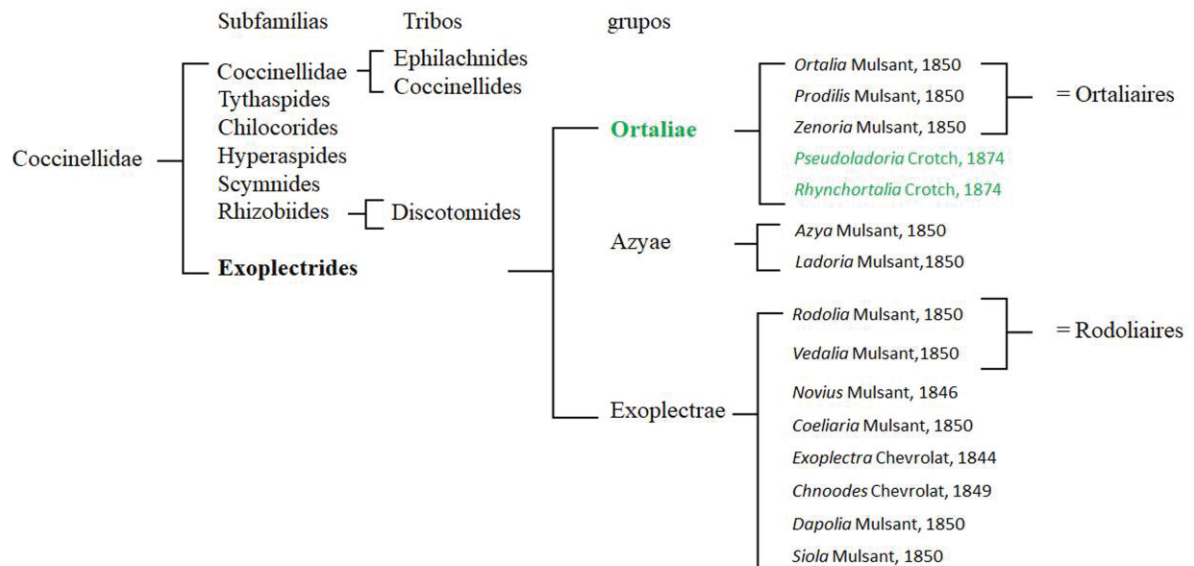
Ortalia foi redescrito Chapuis, in Lacordaire (1876) com os caracteres: cabeça inserida no protórax, inclinada. Olhos muito grandes, margem interna fracamente retraída. Antenas inseridas nos ângulos internos e anteriores dos olhos, não atingindo o meio das margens laterais do pronoto, clava pequena, compacta e ovoide. Pronoto transversal, mais estreito que os élitros, margem anterior fracamente emarginada em arco, margens laterais convergentes da base ao ápice, arredondadas, posteriormente e truncadas no meio, subsinuosa em cada lado da base; scutellum em forma de triângulo equilátero. Élitros brevemente ovais, arredondados nos ângulos, estreitamente emarginados; epipleura estreita, plana. Prosterno muito estreito; mesosterno truncado anteriormente. Abdome com cinco ventritos e indícios de um sexto. Linhas pós-coxais abdominais recurvadas, ocupando dois terços do comprimento

do ventrito e incompletas externamente. Pernas simples, garras tarsais bífidas com a divisão interna um pouco mais curta do que a externa e internamente dirigida.

Mulsant 1846, 1850



Crotch 1874



Chapuis in Lacordaire 1876

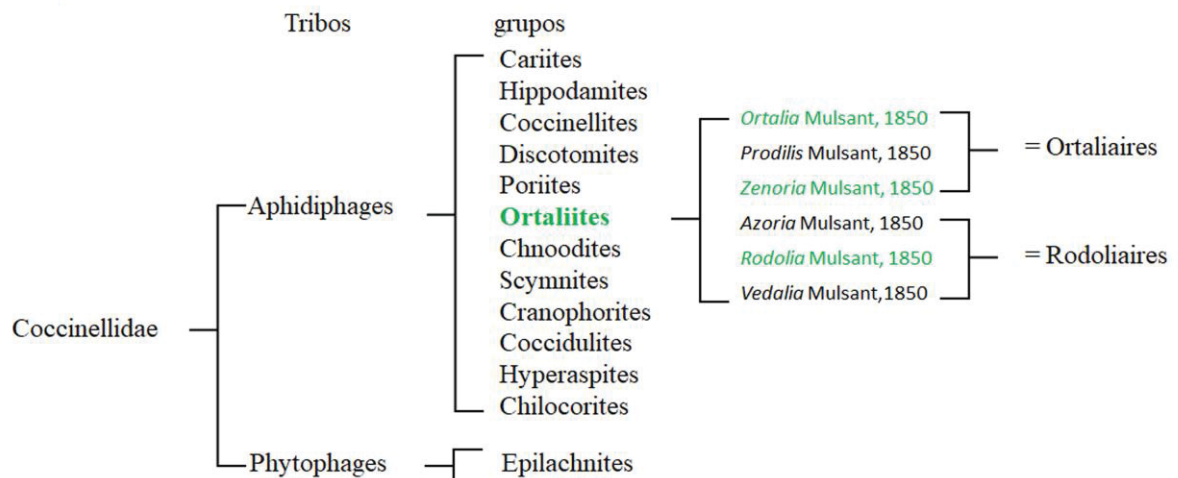


Figura 1. Esquemas da classificação de Ortaliini – Mulsant (1850), Crotch (1874) e Chapuis in Lacordaire (1876).

Chapuis, in Lacordaire (1876) comentou ainda que os olhos são extremamente desenvolvidos, suas margens internas são retas, paralelas entre si, a fronte é quase regularmente quadrada, o clipeo obtuso e o labro alongado. A inserção das antenas distinguiria este gênero dos Epilachnites, a forma da clava de *Poria* e *Eupalea*. As linhas pós-coxais abdominais são incompletas externamente, e completas em *Prodilis*. Citou que 7 espécies de *Ortalia* ocorrem em Madagascar, e outras duas espécies no Gabão.

Zenoria foi redescrito por Chapuis, in Lacordaire (1876) com os seguintes caracteres: cabeça triangular, inserida no protórax; labro truncado. Olhos muito grandes, estreitamente recuados na na margem interna. Antenas inseridas em direção ao ângulo ântero-interno, não muito próximas ao meio dos lados do pronoto, com uma pequena clava, compacta, truncada no final. Pronoto transversal, mais estreito do que os élitros; margem anterior fracamente recuada, em arco; margens laterais subconcêntricas, fortemente convergentes da base para a frente; margem posterior arredondada no meio, sinuosa em cada lado; escutelo em triângulo equilátero. Élitros brevemente ovais, marginados lateralmente, bastante convexos, um pouco largo e quase plano, posteriormente. Prosterno muito estreito; mesosterno truncado. Abdome formado por 5 ventritos, o último um pouco mais oculto na margem posterior. Linhas pós-coxais abdominais que ocupam todo o comprimento do primeiro ventrito, limitadas internamente por um arco regular e externamente por uma linha reta perpendicular à margem do ventrito. Tíbias pequenas e longas, atenuadas em direção a base; tarsos com garras bífidas, a divisão interna um pouco mais curta e arqueada internamente. O autor evidenciou como um caráter distinto, que os tarsos posteriores possuíam um dente interno curto e quadrado, enquanto os dos outros dois pares eram bífidos. As cinco espécies citadas ocorrem no Brasil e Colômbia.

Os principais caracteres de *Rodolia* são a ausência de emarginação nos olhos e a estrutura das tíbias sulcadas longitudinalmente e angulosas em direção à base, com espécies conhecidas no Novo e Velho Mundo.

Weise (1879) dividiu Coccinellidae Aphidophagous em sete tribos (Chilocorini, Coccinellini, Hippodamiini, Hyperaspini, Rhizobiini, Scymnini and Synonychini) e alocou *Ortalia* em Scymnini.

Gorham (1894) estudou as espécies de Coccinellidae da coleção Andrewes coletadas por ele, Bells e Smith do serviço florestal da Índia e descreveu espécies de *Ortalia*.

Weise (1895a) definiu e diferenciou em Scymnini três agrupamentos genéricos, Scymni (antennas curtas com 11 artículos), Ortaliae (antennas longas com 10 artículos) e Novii (antenas curtas com 8 artículos) (*Novius* Mulsant, 1846, *Rodolia* and *Eurodolia* Weise,

1895) (Fig. 2). No mesmo ano Weise (1895b, 1895c) e em anos subsequentes, Weise (1898, 1900, 1901, 1909, 1910 a, b, 1917) descreveu diversas espécies de *Ortalia* da região oriental e etiópica, incluindo Madagascar.

O estado da família passou a ser revisto a partir de Verhoeff (1895) e mais tarde Dobzhansky (1926), que realizaram estudos detalhados sobre a genitália masculina, atualmente amplamente utilizados para identificar espécies. O trabalho de Weise (1896) foi precursor em Coccinellidae e ilustrou as genitálias masculinas de algumas espécies de *Poria* Mulsant e *Ortalia maeklini* Mulsant.

Lewis (1896) erigiu o gênero *Amida* e transferiu *Scymnus tricolor* Harold, 1878 para este gênero e a espécie *Amida tricolor* foi redescrita brevemente para Yamaguchi e Nara (Japão).

Gorham (1897) analisou gêneros que ocorrem na América Central, comparando as diferentes classificações de Crotch (1874) e Chapuis (1876) e agrupou sob Exoplectrides a subfamília Ortaliides na qual descreveu dois gêneros: *Neaporia* Gorham, 1897 (16 espécies) e *Ortalistes* Gorham, 1897 (*O. obesus*, *O. rubidus*, *O. germanus*, *O. pexus* e *O. immersus*). *Neaporia* foi descrita com linhas pós-coxais abdominais completas, pontuação em geral uniforme, forte, grosseira, pubescência densa, tíbias e as garras tarsais simples. A forma do corpo de *Ortalistes* foi comparada à *Brachyacantha* Dejean, 1837, os élitros muito obtusos e que não cobrem o ápice do abdome. Citou as semelhanças de *O. immersus* e *Scymnus coloratus* também descrito por ele neste estudo na subfamília Scymnides.

No suplemento Gorham (1899), acrescentou notas e descrições sobre o material recebido posteriormente e indicou seu posicionamento. Nele considerou que *Zenoria* é o gênero que precede *Neaporia* em Ortaliides e descreveu *Zenoria circumclusa* Gorham, 1899. O gênero seguinte a *Neaporia*, *Cinachyra* Gorham, 1899 foi descrito com uma espécie para o México, *C. picta* Gorham, 1899 e caracterizado pela sinuosidade pós-ocular da fronte bastante profunda, élitros rugosos e pernas longas.

Casey (1898) citou semelhanças do abdômem de Ortaliini e Scymnillini e comentou que este caráter os distinguiria claramente dos Hyperaspini ou Scymnini.

Ganglebauer (1899) referiu-se pela primeira vez a Noviini, baseando-se em *Novius* Mulsant, 1846 (Noviaries), tribo de Coccinellinae.

Weise (1901) descreveu *Ortalia pectoralis* da Índia e, ao estudar o material de Nova Guiné do Museu de Bruxelas determinou que *Ortalia wallacei* Crotch pertenceria a *Rhynchortalia* Crotch. O autor fez uma chave para diferenciar os gêneros *Ortalia* e *Rhynchortalia* com os seguintes caracteres diagnósticos: clipeo curto e transversal; antenas

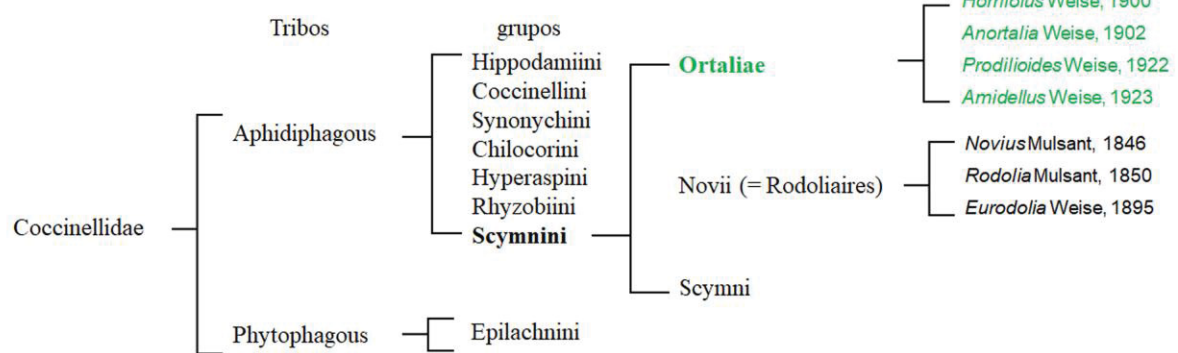
com 10 artículos, clava com dois artículos; ângulos anteriores do pronoto simples, não separado por peças ventrais - *Ortalia* Mulsant e clipeo longo e estreito, antenas de 11 artículos, os três últimos formando uma clava solta; ângulos anteriores do pronoto duplos, formando um ângulo largo e arredondado e uma estrutura em ângulo reto entre os dois uma fôvea estreita e profunda - *Rhynchortalia* Crotch.

Weise (1902) descreveu *Anortalia*, espécie tipo *A. fleutiauxi* Weise, 1902 e a variação *maculata* para o Vietnã, caracterizada por trocânteres grandes, coxas largas, comprimidas, muito sulcadas, pernas achatadas, afinando em direção à base, subarqueadamente emarginadas; linhas pós-coxais abdominais amplas, moderadamente curvas, incompletas. Concluiu que está proximamente relacionada com *Ortalia*, mas o corpo é ligeiramente arredondado, lateralmente quase paralelo e relativamente estreito, fronte ligeiramente mais larga junto ao clipeo, mais elevada no centro e fracamente inclinada abaixo dos olhos. O pronoto é duas vezes tão largo quanto longo, estreitado a partir dos ângulos traseiros de forma gradual anteriormente, perto dos ângulos frontais um pouco mais pronunciados. Élitros com úmero fortemente marcado. Trocânteres e pernas com sulcos consideravelmente maiores do que em *Ortalia*, pernas achatadas, coxas ocas para receber os sulcos, o último na metade superior em um amplo arco para receber os tarsos; as garras divididas, dotadas de um dente no meio, as linhas pós-coxais abdominais planas e incompletas, como em *Ortalia*.

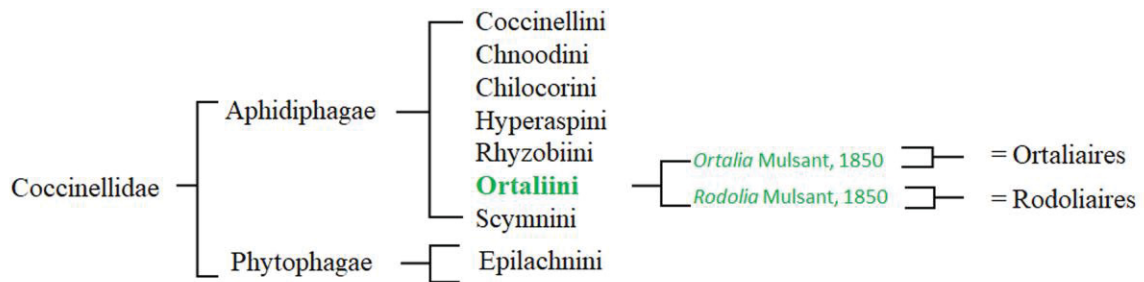
Na revisão dos Coccinellidae da fauna de Madagascar, Sicard (1909) propõe a classificação em Coccinellidae Aphidiphagae incluindo Coccinellini, Chnoodini, Scymnini, Ortaliini, Hyperaspidini, Chilochochini, Rhyzobiini (Fig. 2). Na chave de subfamílias Ortaliini difere de Scymnini pelo pronoto mais estreito que os élitros e antena de 8 a 10 artículos. Segundo Sicard (1909) este grupo tem as relações mais próximas com o Hyperaspidini e Scymnini, entre os quais possui uma transição natural, separando-se do primeiro por seu clipeo sem emarginação e antenas de menos de onze artículos e, do segundo pelo seu protórax menor do que a largura dos élitros. Dos dois gêneros de Madagascar (*Ortalia* e *Rodolia*) que pertencem a este grupo, um é semelhante ao grupo anterior pelas suas antenas com o primeiro artículo semi-circularmente dilatado e, o outro do próximo grupo por suas antenas de dez artículos e a forma geral do corpo. As linhas pós-coxais abdominais em ambos os gêneros são achatadas, muito transversais e não arredondadas ou anguladas posteriormente. Ambos foram caracterizados da seguinte forma: *Rodolia* - antenas de oito artículos e labro curto e transversal; *Ortalia* - antenas de 10 artículos e labro tão longo quanto largo.

Sicard (1909) descreveu ainda algumas variações e várias espécies novas e ao final das descrições, Sicard incluiu uma chave para estas espécies utilizando tamanho, forma e coloração do corpo. Adicionou uma nota em que mencionou a prioridade de Weise (1909) sobre uma espécie descrita por ele. A sinonímia seria indicada ao final deste estudo, mas ele não a fez. A única espécie de *Ortalia* descrita por Weise em 1909 foi *O. modesta* Weise.

Weise 1879, 1895, 1900, 1902, 1922, 1923



Sicard 1909



Korschefsky 1931-1932

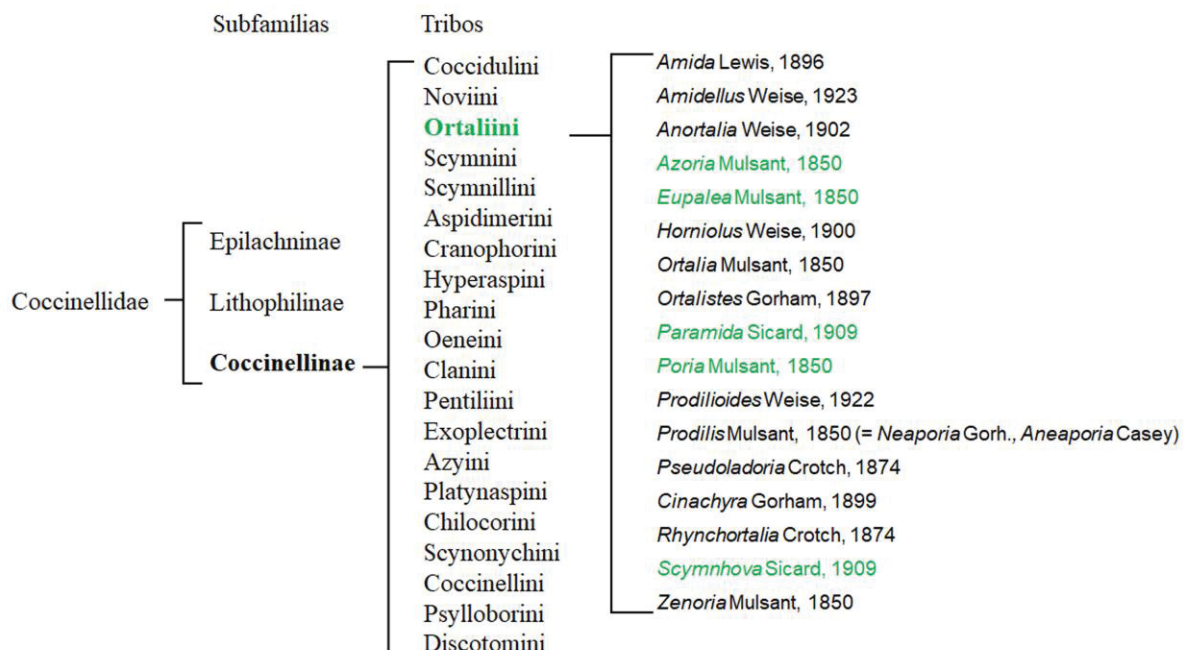


Figura 2. Esquemas da classificação de Ortaliini – Weise (1895), Sicard (1909) e Korschefsky (1931-1932).

Sicard (1909) caracterizou o gênero *Ortalia* por sua cabeça inclinada, o clipeo continuando por um labro alongado; os olhos muito longos, ovais longitudinalmente, retos na margem interna e, limitando a fronte longa; antenas de 10 artículos, curtas, com clava ovoide. Pontuação dos élitros simples. Linhas pós-coxais abdominais em forma de banda transversal, ou segmento circular fortemente achatado e garras bífidas. Comentou que em alguns specimes, as linhas são completas externamente, mas que isso seria específico.

Sicard (1912) descreveu e comparou espécies da Índia e Miamar (Birmânia) na coleção Andrewes em Londres e da coleção do British Museum. Sicard (1930) descreveu uma nova variação de *O. punctata* para Kassini *O. punctata sexnotata* Sicard, 1912.

Scymnhova inornata Sicard, 1931 para a África do Sul, a única espécie do gênero *Scymnhova* que ocorre no continente, caracterizada pelo prosterno com carenas paralelas e linhas pós-coxais abdominais completas. O autor diferenciou *Scymnhova inornata* Sicard, 1931 de *Scymnides* pelas antenas mais longas.

Em seu catálogo, Korschefsky (1931-1932) propôs uma nova classificação de Coccinellidae em três subfamílias e Ortaliini foi alocada como tribo de Coccinellinae (Fig. 2). Listou em Ortaliini 17 gêneros. Muitos deles estavam alocados em outras tribos (*Poria* Mulsant, 1850; *Eupalea* Mulsant, 1850; *Scymnhova* Sicard, 1909 *Paramida* Sicard, 1909) além dos gêneros já decritos para Ortaliini (*Amida*, *Amidellus*, *Anortalia*, *Cinachyra*, *Horniolus*, *Ortalia*, *Prodilis*, *Prodiloides*, *Zenoria*, *Pseudoladoria*, *Rhynchortalia*, *Ortalistes*). *Azoria* Mulsant, 1850 foi alocada em Ortaliini e em Noviini os gêneros *Anovia* Casey, 1908, *Novius* Mulsant, 1846, *Eurodolia* Weise, 1895 e *Vedalia* Mulsant, 1850.

O gênero *Prodiloides* Weise, 1922, espécie-tipo *Prodiloides bipunctata* Weise, 1922, foi descrito em Ortaliae. O gênero *Aneaporia* foi descrito por Casey (1908) e Brèthes (1925) descreveu *Neaporia arrowi* e *N. gorhami*. Korschefsky (1931) alocou todas as espécies descritas anteriormente em *Neaporia* como sinônimo de *Prodilis* Mulsant, 1850 e *Aneaporia* como um subgênero.

Blackwelder (1945) listou para Ortaliini oito gêneros neotropicais: *Poria*, *Eupalea*, *Ortalistes*, *Zenoria*, *Pseudoladoria*, *Cinachyra*, *Prodilis* e *Prodiloides*.

Mader (1945) considerou Ortaliini tribo de Coccinellinae juntamente com Chilochorini, Platynaspini, Pentiliini, Telsimiini, Coelopterini, Hyperaspini, Exoplectrini, Aspidimerini, Scymnini, Noviini e Coccidulini. Em 1954, o autor fez um estudo com as espécies de *Ortalia*, descreveu espécies novas e publicou uma chave.

Bielawski (1957 e 1961) descreveu espécies de *Ortalia* e ilustrou a genitália das espécies do gênero pela primeira vez. Kamiya (1965) listou Scymnini, Hyperaspini, Telsimiini, Stethorini e Ortaliini como tendo larvas cobertas com exudato ceroso. O autor considerou as afinidades de *Amida* como muito incertas, no entanto, em 1968 Sasaji incluiu o gênero em Ortaliini e considerou essa tribo como a mais derivada dentro de Scymninae.

Sasaji (1968, 1971), ao revisar a fauna do Japão, propôs uma nova classificação de Coccinellidae baseada em caracteres de larvas e adultos, em seis subfamílias. O autor definiu Scymninae composta pelas tribos Scymnini, Stethorini, Hyperaspini, Aspidimerini e Ortaliini. Mais tarde, Sasaji (1971a, b) adicionou ainda Scymnillini e Cranophorini a este agrupamento. Este sistema foi seguido pela maioria dos autores contemporâneos (Gordon, 1985; Booth *et al.*, 1990; Pakaluk *et al.*, 1994; Lawrence e Newton, 1995; Vandenberg, 2002).

Segundo a classificação de Sasaji (1968), os principais caracteres, que justificaram alocar Ortaliini em Scymninae (Fig. 3) basearam-se no estudo de *Amida tricolor* Harold, 1878 comparadas com o gênero *Axinoscymnus* Kamiya, 1963 (Scymnini), que possui olhos grandes, fronte estreita e profundamente emarginada, antenas com 11 artículos, processo prosternal proeminente e tarsos verdadeiramente trimeros, além da presença de exsudato ceroso branco nas larvas.

Gordon (1971) revisou o gênero *Zenoria* propôs diagnose, chave de identificação e descrições com ilustrações e destacou vários caracteres para o gênero afirmando que *Zenoria* é um gênero exclusivamente Neotropical que ocorre desde o sul do México à Bolívia e sul do Brasil. Segundo o autor, os gêneros que mais se assemelham a *Zenoria* são *Ortalistes* Gorham (Ortaliini) e *Eupalea* Mulsant (Coccinellini) e algumas espécies possuem um padrão de coloração muito similar a *Azya* e *Mada* Mulsant ('Madaini'). Posteriormente, Gordon (1972) examinou o material das coleções Sicard, Le Moult e Dejean (Muséum national d'Histoire naturelle e Musée des Confluences respectivamente), designou lectótipos, redescreveu *Z. linteolata* e descreveu quatro novas espécies.

Pang e Mao (1979) estudaram *Ortalia* Mulsant da Índia e China, descreveram mais três espécies novas e uma subespécie para a China com ilustrações de genitália e chave.

Ao estudar a produção de secreção cerosa em formas imaturas de alguns gêneros de Coccinellidae, Pope (1979) incluiu o único material larval disponível de Ortaliini, uma exúvia de *Ortalia pallens* Mulsant, e enfatizou a carência de informações sobre os hábitos alimentares e formas imaturas de *Ortalia* à exceção do estudo de Harris (1921). O exame da exúvia revelou áreas com estruturas em forma de discos septados de secreção, semelhantes às de *Cryptolaenus montrouzieri* Mulsant, 1853. O autor concluiu que *Ortalia* estaria

intimamente relacionada com *Amida* Lewis. Citou a propriedade característica da secreção cerosa de Ortaliini, bem como de Hyperaspidini, Cryptognathini, Azyini e Telsimiini, a coloração branca semelhante em espectro aos coccídeos, pseudococcídeos e afídeos.

Desde 1896, apenas uma espécie de *Amida* foi listada na literatura (Korschefsky, 1931) até que Hoàng (1982, 1983, 1990), ao estudar as espécies do Vietnã, descreveu nove espécies novas.

A revisão taxonômica dos gêneros sul-americanos de Coccidulinae foi realizada por Gordon (1994), propôs Poriini para o gênero *Poria* Mulsant e transferiu *Eupalea* Mulsant para Coccidulini, ambos anteriormente listados por Korschefsky (1931) e Blackwelder (1945) em Ortaliini.

Gordon (1996) citou que *Zenoria* é o único representante de Ortaliini na América do Sul, informação que foi omitida da lista tribal e genérica publicada previamente na revisão de Coccidulini (Gordon 1994).

Duas classificações alternativas e intuitivas, com uma lista global de gêneros de Coccinellidae foram publicadas por Chazeau *et al.* (1989) e Fürsch (1990) na tentativa de buscar um consenso entre as modificações na classificação da família feitas desde Sasaji (1968). Nesta classificação em seis subfamílias (Coccidulinae, Scymninae, Chilocorinae, Sticholotidinae, Coccinellinae, Epilachninae) Ortaliini é uma tribo de Scymninae juntamente com Aspidimerini, Stethorini, Scymnini, Scymnillini, Selvadiini, Cranophorini, Hyperaspidini e Cryptognathini.

Kovář (1996) propôs uma nova classificação para a família (sete subfamílias e 38 tribos) e nela adicionou Ortaliinae para incluir Ortalini (Scymninae *sensu* Sasaji) e Noviini (Coccidulinae *sensu* Sasaji), definiu os caracteres da nova subfamília e transferiu *Scymnodes* Blackburn (1889) de Scymnini para Ortaliinae (Fig. 3). O autor assinalou algumas tendências comuns a Noviini e Ortaliini: olhos grandes, antenas curtas, epipleura elital curta, ampla placa genital e espermateca na fêmea, bem como peculiaridades na organização larval (projeções laterais cerdosas em forma de mamilo e abundantes cerdas clavadas no ápice do tibiotarso). Segundo o autor ambas as tribos provavelmente se especializaram muito cedo, baseado no estado derivado da antena (8 artículos), prosterno com lobos basiternais verticais, pernas anguladas externamente e tarsos trímeros em Noviini, enquanto que os estados opostos desses caracteres ocorrem em Ortaliini juntamente com epipleura elital encurtada com margem interna não atingindo o ápice, diferentemente de Scymninae. Ortaliinae, segundo Kovář, tem uma forte afinidade em certas estruturas com as outras subfamílias, como a tendência a especialização tropical, com base no desenvolvimento gradual dos olhos, mais do

que as outras subfamílias, e por ser altamente derivada de Coccidulinae e/ou mais primitiva do que Scymninae. São elas: clipeo truncado ou emarginado, ângulos anterolaterais mais delgados e freqüentemente pronunciados, projetados anterior ou anterolateralmente; pronoto quadrado, às vezes trapezoidal, mas os ângulos posteriores geralmente amplos e arqueados, margem anterior não encobrindo completamente a cabeça, às vezes fortemente emarginada, padrão de cores indistinto a muito marcante, aposemático; antena bastante primitiva, às vezes serrilhada (Noviini). Mencionou afinidades com alguns Coccidulinae-Scymninae e Coccinellinae-Epilachninae, e caracteres variáveis, como a distância do mesotórax, o tipo de genitália da fêmea, e as diferenças no número de artículos antenais.

Yu (2000) revisou as espécies de *Amida* descritas para a China, descreveu uma espécie nova, acrescentou um novo registro e propôs duas novas combinações para as espécies de *Ortalia* descritas por Pang & Mao (1979).

Poorani (2002) forneceu o checklist dos Coccinellidae (Coleoptera) da região oriental compreendendo 400 espécies (incluindo subespécies) de 79 gêneros, em 22 tribos e cinco subfamílias. Listou *Amida vietnamica* Hoàng e 10 espécies de *Ortalia*. Acrescentou uma comunicação pessoal do Dr. Booth sobre a dificuldade de uma distinção genérica baseada unicamente no número de artículos das antenas e no tamanho do corpo.

Fürsch (2006) publicou uma chave para as espécies de *Ortalia*, descrições e ilustrações e dividiu as espécies do continente africano em três grupos de espécies, e as espécies de Madagascar em um provável quarto grupo. O autor redescreveu *Ortalia* com os seguintes caracteres: antenas de 10 artículos, artículos uniformes 3-7 e 8-10 formando uma clava compacta. Mandíbulas com dente subapical. Prosterno não proeminente, com uma ampla extensão plana, sem carena. Seis ventritos visíveis em ambos os sexos. Tibias simples e sem espinhos. Tarsos trímeros e garras tarsais bífidas em ambos os sexos. Epipleura estreita, plana. Guia do pênis geralmente assimétrica.

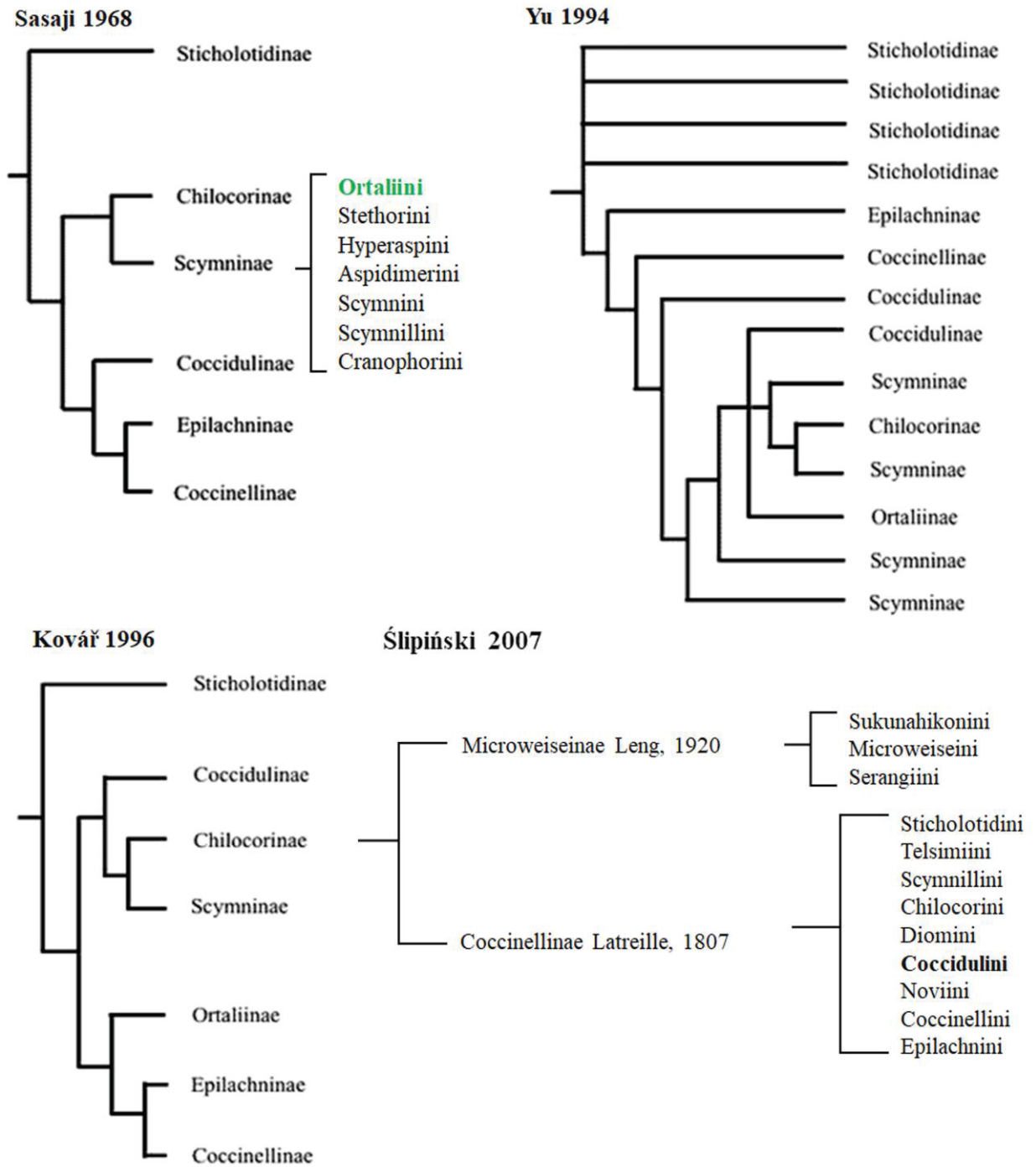


Figura 3. Esquemas da classificação de Ortaliini – Sasaji (1968), Yu (1994), Kovář (1996) e Ślipiński (2007).

De acordo com Fürsch (2006) menos de 50 espécies de *Ortalia* foram descritas principalmente para a região etiópica e Madagascar, e algumas nas regiões oriental e paleártica.

No seu livro sobre a fauna da Austrália, Ślipiński (2007) fez uma nova proposta de classificação de Coccinellidae em duas subfamílias Microweiseinae Leng, 1920 e Coccinellinae Latreille, 1807 (Fig. 3). Redefiniu Coccidulini para incluir Coccidulini Mulsant, 1846; Rhyzobiini Mulsant, 1846; Scymnini Mulsant, 1846; Stethorini Dobzansky, 1924 e Exoplectrini Crotch, 1874. Elevou o status de *Apolinus* (Pope & Lawrence, 1990), anteriormente subgênero de *Scymnodes* Blackburn, 1889 (Ortaliini *sensu* Kovář 1996) e alocou ambos e *Rhynchortalia* Crotch em Coccidulini Mulsant, 1846. Sinonimizou *Amidellus* Weise, 1923 (Ortaliini) a *Diomus*. O autor citou que Ortaliini provavelmente não é um grupo natural.

Hoàng (2007) no catálogo para o Vietnã listou duas espécies de *Ortalia*, 10 espécies de *Amida* e uma de *Anortalia*.

Rhynchortalia Crotch foi revisado por Poorani & Ślipiński (2010) seguindo a classificação de Kovář (1996), em Ortaliinae. Os autores apontaram as semelhanças entre *Ortalia* Mulsant e *Rhynchortalia*: cabeça hipognata, garras tarsais bífidas em ambos os sexos e um prosterno reto e com processo prosternal estreito. Citaram que *Ortalia* difere de *Rhynchortalia* por possuir olhos distintamente maiores, proeminentes e densamente setosos com um canthus pós-antenal distintamente emarginado, processo prosternal carenado, linhas pós-coxais abdominais distintas e incompletas (como em *Sasajiscymnus* Vandenberg, 2004), e a genitália masculina geralmente com a guia do pênis assimétrica e o pênis altamente modificado.

Recueno-Adorada (2011) descreveu um novo gênero monotípico em Ortaliini, *Elnidortalia* (espécie-tipo *E. bipunctata* Recueno-Adorada, 2011), para espécimes com pênis curto e grosso com cápsula do pênis distinta. Na chave para os gêneros distinguiu *Amida* dos demais pelo processo prosternal apicalmente arredondado e carenado, enquanto *Ortalia* e *Elnidortalia* por possuir um processo prosternal apicalmente quadrado. Caracterizou os gêneros *Amida* e *Ortalia* por possuírem a genitália masculina com um longo e estreito pênis com dois processos laterais e com ou sem o processo apical da cápsula do pênis.

A revisão nomenclatural de Bouchard *et al.* (2011) indicou Ortaliini na subfamília Coccinellinae Latreille, 1807 (34 tribos), relativa à Ortaliens de Mulsant, 1850, gênero tipo *Ortalia*, latinizado por Crotch, 1874 como Ortaliae.

2.2 Hipóteses filogenéticas

Houve apenas algumas tentativas para esclarecer as relações evolutivas em Coccinellidae. O primeiro trabalho com metodologia cladística para Coccinellidae foi realizado por Yu (1994). Nele, o autor analisou separadamente dados de adultos e larvas, o que resultou em topologias conflitantes. Ortaliini foi alocada em Scymninae, como grupo parafilético.

A ampla análise molecular de Robertson *et al.* (2008) utilizou espécies de *Ortalia*. Nela, os resultados sugerem Scymninae polifilética e Ortaliini mais relacionada com Epilachninae.

As análises filogenéticas de Giorgi *et al.* (2009) utilizaram espécies de *Ortalia* e mencionaram como resultados relacionamentos pouco suportados e conflitantes e a falta de evidências morfológicas ou comportamentais para apoiar os agrupamentos Epilachninae, Coccidulinae, Ortaliinae, Scymninae, Chilocorinae e parte de Sticholotidinae.

Análises moleculares de Magro *et al.* (2010) utilizaram *Ortalia* e citaram que, apesar da pouca resolução nas análises, o clado formado por Epilachninae, Ortaliinae, Sticholotidinae e o gênero *Stethorus* Weise (então Scymnini) ocupa uma posição mais basal como sugerido por Sasaji (1968) e Kovář (1996).

2.3 A monofilia de Ortaliini

Aruggoda *et al.* (2010) utilizaram espécies paleárticas e orientais de *Ortalia* e *Amida* e foram os primeiros a sugerir a monofilia de Ortaliini e a considerar que a subfamília Ortaliinae (*sensu* Kovář 1996) é polifilética. Nesse trabalho a monofilia de Ortaliini foi bem apoiada em ambas as análises de sequências de rDNA 16S. Espécies Orientais e Paleárticas dos gêneros *Amida* e *Ortalia* foram aninhados com altos valores de bootstrap dentro da tribo. Os autores citaram que caracteres importantes da tribo Epilachnini eram comuns com Ortaliini e não estavam relacionados com Scymnini ou Chilocorini e Platynaspini.

As análises morfológicas e/ou moleculares sugeriram que Ortaliini (*Amida* e *Ortalia*) é uma tribo monofilética (Aruggoda *et al.*, 2010; Seago *et al.*, 2011), mas não concordaram com o seu posicionamento dentro da família. Seus resultados indicaram que Ortaliini é parafilética em relação a Scymninae, (atualmente Coccidulini) discordando das hipóteses intuitivas de Sasaji (1968), e em relação a Ortaliinae (incluindo Noviini) de Kovář (1996).

As mudanças na classificação de Coccinellidae feitas pelas análises de Seago *et al.* (2011) impactaram o status de diversas tribos e subfamílias tradicionalmente reconhecidas e confirmaram em grande parte as hipóteses de Ślipiński (2007) e Giorgi *et al.* (2009). Apenas Microweiseinae Leng e Coccinellinae Latreille foram reconhecidas como subfamílias e Ortaliini foi classificada como tribo de Coccinellinae. Tais análises também indicaram que *Rhynchortalia* Crotch, 1874 e *Cryptolaemus* Mulsant, 1853 formam um clado bem suportado e grupo-irmão de ‘Azyiini’ e, portanto, que *Rhynchortalia* não pertence a Ortaliini.

Por fim, o gênero *Horniolus* que foi proposto por Weise (1901) em Scymnini (espécie-tipo *Horniolus dispar* Weise, por monotipia), e foi atribuído por Korschefsky (1931) à Ortaliini, nestas análises, forma também um clado de Coccidulini, juntamente com *Rodolia* Mulsant. Enquanto *Amida* e *Ortalia* formam um grupo monofilético mais relacionado com *Diomus* Mulsant, 1850 (Diomini Gordon, 1999).

Os caracteres morfológicos destacados pelas análises de Seago *et al.* (2011) para Ortaliini são as linhas pós-coxais abdominais não recurvadas, paralelas e distintamente separadas da margem posterior (vs. não recurvadas, paralelas e unidas a margem posterior em Diomini ou recurvadas em Coccidulini) e ventrito 5 nas fêmeas distintamente mais longo que o ventrito 4. *Amida* com 11 antenômeros, distância meso-metaventral muito ampla (1 ou mais vezes o diâmetro coxal), junção do meso-metaventrito reta e processo intercoxal abdominal reto e *Ortalia* com 10 antenômeros, distância meso-metaventral ampla, junção do meso-metaventrito arqueada e processo intercoxal abdominal fortemente emarginado.

Apesar destes resultados, Nedvěd & Kovář (2012) compilando dados moleculares e morfológicos recentemente publicados à classificação de Kovář (1996) (com sete subfamílias e 38 tribos) e sem realizar análises cladísticas, propuseram nove subfamílias (adicionando Exoplectrinae e Microweiseinae) e 42 tribos. Segundo este trabalho, as duas tribos Noviini e Ortaliini, combinam alguns caracteres de Coccidulinae e Scymninae e alguns de Coccinellinae e Epilachninae, e foram mantidas na subfamília Ortaliinae em sua nova proposta intuitiva de classificação de Coccinellidae.

Ao analisar caracteres morfológicos e moleculares para Epilachnini, Szawaryn *et al.* (2015) utilizaram em seu grupo-externo, *Amida tricolor* e *Ortalia pallens*. Os gêneros ficaram agrupados como clado-irmão dos gêneros de Coccidulini. Os caracteres morfológicos que definem a tribo nestas análises e que reúnem os gêneros *Amida* e *Ortalia* são: olhos grandes (maiores que 0.75 vezes o comprimento da cabeça), distância interocular estreita (menor que 0.5 vezes a largura da cabeça), antenômeros 6 e 7 ao menos 1.5 vezes mais longos que largos, clava antenal com o penúltimo artigo assimétrico, palpos maxilares alongados e amplos

apicalmente, tendões do metendoesternito separados por muito menos que a largura da haste e posicionados próximos ao meio, coxitos transversos, retangulares, ducto espermático e espermateca ausentes. *Amida* com pontuações desiguais nos élitros e linha pós-coxal metaventral unida medialmente no processo metaventral. *Ortalia* com antenas de 10 artículos, sem carena no processo prosternal e trocânteres simples.

Considerando todo o histórico taxonômico, permanecem alocados em Ortaliini atualmente 11 gêneros. Destes, nove nunca foram testados através de metodologias filogenéticas, apenas *Amida* e/ou *Ortalia* (Yu, 1994; Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Aruggoda *et al.* 2010; Magro *et al.*, 2010; Seago *et al.*, 2011) e dados moleculares estão disponíveis para poucas espécies destes dois gêneros (Robertson *et al.*, 2008, 2015; Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.*, 2010; Seago *et al.*, 2011; Szawaryn *et al.* 2015).

Amida Lewis, 1896, gênero com 13 espécies, teve trabalhos de revisão regionais para espécies do Vietnã e China (Hoàng, 1990; Yu, 2000).

Ortalia foi revisada para o continente Africano e algumas espécies de Madagascar por Fürsch (2006) e, segundo o autor possui menos de 50 espécies descritas.

O artigo de Santos *et al.* (2018 submetido) elevou o número de espécies conhecidas de *Zenoria* para 41 com a descrição de três novas espécies e uma sinonímia.

Os demais gêneros possuem apenas as descrições originais: para a região Neotropical, *Ortalistes* Gorham, 1897 (cinco espécies) e *Pseudoladoria* Crotch, 1874 (uma espécie); *Semra* Özdikmen, 2007 (uma espécie) descrita para a região Neártica (México); dois gêneros de Madagascar, *Paramida* Sicard, 1909 (uma espécie) e *Scymnhova* Sicard, 1909 (quatro espécies); um gênero Oriental, *Anortalia* Weise, 1902 (uma espécie e uma variação); *Azoria* Mulsant, 1850 (uma espécie localidade-tipo desconhecida), e o gênero recentemente descrito para as Filipinas, *Elnidortalia* Recuenco-Adorada (2011) (uma espécie).

Ortaliini é uma das 20 tribos de Coccinellinae (Seago *et al.*, 2011) e possui atualmente cerca de 100 espécies considerando trabalhos recentes de Yu (2000), Fürsch (2006) e Hoàng (2007) que ocorrem nas regiões (*sensu* Ficetola *et al.*, 2017) Etiópica, Madagascar, Paleártica, Oriental, Neotropical e Neártica.

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3 PHYLOGENETIC ANALYSIS OF ORTALIINI (COLEOPTERA, COCCINELLIDAE) BASED ON MORPHOLOGICAL CHARACTERS

(Revista escolhida para futura submissão: Systematic Entomology)

Phylogenetic analysis of Ortaliini (Coleoptera, Coccinellidae) based on morphological characters

Abstract

Predaceous ladybird beetles Ortaliini are widely distributed in worldwide tropical areas. The tribe is poorly characterized morphologically, and little is known about its internal phylogenetic relationships and their genus-level taxonomy. The monophyly and phylogenetic relationships of the tribe Ortaliini were investigated. Thirty-five in-group taxa, representing all known genera of Ortaliini, were included in a cladistic analysis, based on 114 adult morphological characters. The parsimony analysis of the resulting data matrix does not support the monophyly of Ortaliini *sensu lato*. *Anortalia* Weise, *Amida* Lewis, *Azoria* Mulsant, *Ortalia* Mulsant, *Elnidortalia* Recuenco-Adorada, *Paramida* Sicard, *Scymnhova* Sicard, *Semra* Gorham, *Ortalistes* Gorham, and *Pseudoladonia* Crotch are shown to be poly- or paraphyletic. *Zenoria* Mulsant, 1850 forms a sister-group of *Ortalia* Mulsant, *Anortalia* Weise, *Amida* Lewis, *Elnidortalia* Recuenco-Adorada. The relationships among *Amida* and *Ortalia* were confirmed. Ortaliini *new sense* is diagnosed and illustrated. The internal phylogenetic relationships among all its genera were recognized with the addition of new morphological characters that define major clades and clearly diagnose each group. The following synonymies are recorded here for the first time: *Amida jinghongiensis* (Pang and Mao, 1979) **syn. nov.** of *Anortalia fleutaiuxi* Weise, 1902; *Amida novempunctata* Hoàng, 1982 **syn. nov.** of *Anortalia fleutaiuxi maculata* Weise, 1902; *Anortalia fleutaiuxi maculata* Weise, 1902 **syn. nov.** of *Anortalia fleutaiuxi* Weise, 1902. The following replacement name is used here for the first time: *Acanthoscymnus* **nom. nov.** for *Ortalistes pexus* Gorham, 1897. The following genera do not belong to Ortaliini and provisionally transferred: *Azoria* Mulsant, 1850 (type species *Azoria subviolacea*) to Coccidulini Mulsant, 1846; *Ortalistes* Gorham, 1897 (type species *Ortalistes obesus* Gorham, 1897) to Diomini Gordon, 1999; *Acanthoscymnus pexus* Santos & Almeida, 2018 (type species *Ortalistes pexus* Gorham, 1897) to Coccidulini Mulsant, 1846; *Paramida* Sicard, 1909 (type species *Paramida griseipennis* Sicard, 1909) to Epilachnini Mulsant, 1846; *Pseudoladonia* Crotch, 1874 (type species *Pseudoladonia simulans* Crotch, 1874) to Cephaloscymnini Gordon, 1985; *Scymnhova* Sicard, 1909 (type species *Scymnhova ornatipennis* Sicard, 1909) to Coccidulini

Mulsant, 1846; *Semra* Özdikmen, 2007 (type species *Semra picta* (Gorham, 1899)) to Hyperaspidini Mulsant, 1846.

Keywords

taxonomy, morphology, checklist, new taxa, geographical distribution

ZooBank: <http://zoobank.org/>

3.1 Introduction

Ortaliini is distinguished from other coccinellids by their densely pubescent bodies often bearing pastel patterns of pale colors, yellow, orange and reddish, sometimes with black spots or completely dark, with or without orange spots, and the large eyes distinctly emarginated.

For decades, several authors attempted to propose classification systems regarding the relationships within Ortaliini. The grouping Ortaliens was proposed by Mulsant (1850) in Trichosomides, together with Epilachniens, Poriens, Scymniens and Cocciduliens, and divided it into two distinct branches: Ortaliaires (*Ortalia*, *Prodilis*, and *Zenoria*) with emarginate eyes and 11-segmented antennae and Rodoliaires (*Azoria*, *Rodolia*, *Vedalia*) with eyes not emarginate and 8-segmented antennae. The classification of Coccinellidae was reviewed by Crotch (1874), describing Ortaliae (Ortaliens of Mulsant in part) in the subfamily Exoplectrides together with Azyae and Exoplectrae. Chapuis in Lacordaire (1876), described Ortaliites (Ortaliens) in Aphidiphages (Cariites, Hippodamites, Coccinellites, Discotomites, Poriites, Scymnites, Cranophorites, Coccidulites, Hyperaspites, Chilacorites). Weise (1879) divided aphidophagous Coccinellidae into seven tribes (Chilacorini, Coccinellini, Hippodamiini, Hyperaspini, Rhizobiini, Scymnini and Synonymychini). Weise (1895) defined Scymnini, Scymni (11-segmented short antennae), Ortaliae (10-segmented long antennae) and Novii (8-segmented short antennae) (*Novius* Mulsant, 1846, *Rodolia* and *Eurodolia* Weise, 1895). The genus *Amida* was erected by Lewis in 1896. Subsequently, Gorham and Weise described seven more genera to Ortaliini (*Neaporia* Gorham, 1897; *Ortalistes* Gorham, 1897; *Cinachyra* Gorham, 1899; and *Horniolus* Weise, 1900; *Anortalia* Weise, 1902; *Prodiloides* Weise, 1922; *Amidellus* Weise, 1923). Coccinellidae of Madagascar was arranged by Sicard (1907, 1909) in 'Phytophagae' and 'Aphidiphagae' with seven tribes (Coccinellini, Chilacorini, Hyperaspini, Chnoodini, Ortaliini, Scymnini, Rhizobiini) and included *Rodolia* (Noviini) in Ortaliini. A new classification in three subfamilies (Coccinellinae, Epilachninae, and Lithophilinae) was proposed by Korschefsky (1931, 1932) which listed Ortaliini in Coccinellinae with 17 genera, some of that previously described in other groups (*Azoria* Mulsant, 1850; *Poria* Mulsant, 1850; *Eupalea* Mulsant, 1850; *Scymnhova* Sicard, 1909; *Paramida* Sicard, 1909) and, *Amida*, *Anortalia*, *Amidellus*, *Prodiloides*, *Horniolus*, *Ortalistes*, *Ortalia*, *Zenoria*, *Pseudoladonia*, *Rhynchortalia*, *Cinachyra*, *Prodilis* (= *Neaporia* Gorham, *Aneaporia* Casey, 1908). The checklist of the Americas by Blackwelder (1945) listed eight

New World genera for Ortaliini (*Poria*, *Eupalea*, *Ortalistes*, *Zenoria*, *Pseudoladoria*, *Cinachyra*, *Prodilis*, and *Prodiloides*).

Sasaji (1968, 1971) divided Coccinellidae into six subfamilies, (Sticholotinae, Scymninae, Chilocorinae, Coccidulinae, Coccinellinae, and Epilachninae) indicating Ortaliini in Scymninae. Kovář (1996), elevated Ortaliini to the subfamily Ortaliinae composed by Ortaliini and Noviini, including *Scymnodes* Blackburn, 1889.

Some of those genera were allocated to other tribes after more recent revision works: *Prodilis* Mulsant, 1850, *Prodiloides* Weise, 1922 and related genera in Cephaloscymnini Gordon, 1985; *Poria* Mulsant, 1850 in Poriini Gordon, 1994; *Eupalea* Mulsant, 1850 in Coccidulini Mulsant, 1846; *Amidellus* Weise, 1923, was synonymized under *Diomus* Mulsant, 1850 in Diomini Gordon, 1999 and, *Rhynchortalia* and *Scymnodes* were placed in Coccidulini by Ślipiński (2007); *Horniolus* was placed in Coccidulini by Seago *et al.* (2011).

The recent phylogenetic analyses recovered Ortaliinae *sensu* Kovář (Ortaliini and Noviini) as polyphyletic and Ortaliini as monophyletic (Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.* 2010; Seago *et al.*, 2011) and consequently, the former subfamily became Ortaliini within a broadly defined Coccinellinae (Ślipiński & Tomaszewska 2010; Seago *et al.*, 2011).

The phylogenetic relationships of Ortaliini were evaluated only to *Amida* and/or *Ortalia*, (Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Magro *et al.*, 2010; Aruggoda *et al.*, 2010), since Seago *et al.* (2011) corroborated the hypothesis of Ślipiński (2007), and *Scymnodes*, *Rhynchortalia*, *Amidellus*, and *Horniolus* do not belong to Ortaliini. Their results also indicated that *Amida* and *Ortalia* form a monophyletic group more closely related to *Diomus*.

Most recently Nedvěd & Kovář (2012) revisited Kovář's (1996) classification rejecting the recent phylogenetic hypothesis (Giorgi *et al.*, 2009; Magro *et al.*, 2010; Aruggoda *et al.*, 2010; Seago *et al.* 2011), proposing Ortaliinae (Ortaliini and Noviini).

Therefore, Ortaliini currently consists of 11 genera ~100 species distributed in tropical areas of Neotropical, Ethiopic, including Madagascar, Palearctic and Oriental regions, except Australia and New Guinea, with *Ortalia* Mulsant (~50 species) and *Zenoria* Mulsant (~38 species) containing most of the species (Pope, 1979; Fürsch, 2006; Santos & González, 2016).

Among the Neotropical genera, only *Zenoria* was reviewed by Gordon (1971). The genera *Paramida*, *Scymnhova*, *Anortalia*, and *Azoria* were never revised. *Amida* and *Ortalia* had regional reviews to Vietnam (Hoàng, 1990), China (Yu, 2000), Africa and Madagascar

(Fürsch, 2006), and molecular data are available for a few species (Robertson *et al.*, 2008; Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.*, 2010; Seago *et al.*, 2011).

Although the monophyly of Ortaliini has been suggested by Aruggoda *et al.* (2010) and Seago *et al.* (2011), the genus-type of the tribe and other nine genera that belonging to Ortaliini were never phylogenetically tested. Moreover, its knowledge is still fragmented, with regional revisions of few genera and the tribal classification in Coccinellidae is an open question. The lack of reliable data for major part of Ortaliini genera may be limiting the comprehension of delimitation of monophyletic taxa, evolutionary relationships, and classification of Ortaliini.

Therefore, the aim of this study is to test the monophyly and infer the phylogenetic relationships of genera that belong to Ortaliini mainly based on morphological data from the study of type material and additional species of each genus. The resulting phylogenetic hypotheses will provide a framework for delimiting the tribe and will contribute to elucidating the relationship among the genera.

3.2 Material and methods

Material

The material studied (Appendix S1) belongs to the following collections and curators: Coleção Entomológica Pe. J.S. Moure, Universidade Federal do Paraná, Curitiba, Brazil (DZUP, Lúcia Massutti de Almeida); Fundação Instituto Oswaldo Cruz, Rio de Janeiro, Brazil (FIOC, Márcio Félix); Instituto Nacional de Pesquisas da Amazônia, Manaus, Brazil (INPA, José Albertino Rafael); Musée des Confluences, Lyon, France (MHNL, Harold Labrique); Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZSP, Sonia Casari); Museu Nacional, Universidade Federal do Rio Janeiro, Rio de Janeiro, Brazil (MNRJ, Marcela Monné Freire); Museum für Naturkunde - Leibniz-Institut für Evolutions - und Biodiversitätsforschung, Berlin, Germany (MfN Berlin, Manfred Uhlig); Muséum National d'Histoire Naturelle, Paris, France (MNHN, Romain Nattier); Museum of Zoology, Lund University, Lund, Sweden (MZLU, Christoffer Fagerstron); Natural History Museum, London, (BMNH, Maxwell Barclay); Naturhistorischen Museum, Basel, Switzerland (NMB, Isabelle Zuercher);

United States National Collection, Smithsonian Institution, Washington, DC, USA (USNM, Nathalia Vandenberg);

University Museum of Zoology, Cambridge University (CAMZM, Edgar Turner);

University of Wisconsin-Madison, Madison, Wisconsin, USA (UWM, Steven Krauth);

Zoological Institute of the Russian Academy of Sciences, Saint Petersburg, Russia (ZIN, Boris A. Korotyaev);

Zoologischen Staatssammlung München, Germany (ZSM, Michael Balke).

Laboratory procedures

The genitalia was extracted by immersing the entire abdomen in a solution of 10% KOH. The abdomen was then washed with distilled water and the genital structures were separated under a stereomicroscope, with the help of microdissection tools. All genital structures were preserved in microvials with glycerin, along with the respective specimen.

Measurements were made using ImageJ (Rasband, 2017) as follows: body length, from the apical margin of clypeus to the apex of elytra; width, across both elytra (at widest part) and characters were constructed on the basis of relations of length or width of the structures.

Layer digital images were made at the Laboratório de Sistemática e Bioecologia de Coleoptera, Universidade Federal do Paraná, with a Leica DMC 2900 digital camera attached to a Leica M205C stereomicroscope. Digital photos were combined using the software Leica LAS Multifocus. Sony Cybershot DSC-W300 digital camera attached to Zeiss Standart M20 microscope, using Automontage-Pro (Syncroscopy). Some images were made in BMNH and CAMZM collections, others were sent by the curators. Scanning electron microscopy images were produced at Centro de Microscopia Eletrônica (CME), Universidade Federal do Paraná.

Data handling

Specimens were selected from available adult specimens only. In most cases, both sexes were used, if available for dissection. We made all effort to study the type species, and the material was compared carefully with the bibliography.

Label data of specimens were arranged in sequence from top to bottom after the country and the number of specimens within parentheses. Information taken from a single

label was placed within double quotes ("), a slash (/) separates the rows, and the collection of deposition and additional information were indicated in brackets (Appendix S1).

Taxon sampling

The ingroup taxa were chosen following the criteria proposed by Prendini (2001): it was included at least two terminals for each genus, including the type species, and, for genera with many species, it was included the widest range of morphological variation, besides wide geographical distribution.

Taxon sampling covers all genera of Orталиini and more extensive sampling of species groups in *Ortalia* (Table 1). In this study, six species representing groups proposed by Fürsch (2006) were selected for African and Madagascan *Ortalia*. They were chosen based on diverse morphology and available material: *O. punctata*-group (two species), *O. ochracea*-group (two species) and *O. flaveola*-group (one species and the type species of the genus, *Ortalia variata*).

In the ingroup, the holotype of *Azoria subviolacea* Mulsant, 1850, deposited in MNHN, could not be dissected because it is the only known specimen. *Pseudoladoria simulans*, *Scymnhova ornatipennis*, *Semra picta*, and *Ortalistes germanus*, *O. imersus*, *O. obesus*, and *O. rubidus* were also unique type specimens or female specimens which was difficult to study in more detail (Table S1).

Table 1. Genera and species number of Orталиini with biogeographical distribution and a number of ingroup species used in the analysis.

Genera (in the group)	Species number	Used in analysis	Biogeographical region
<i>Amida</i> Lewis, 1896	13	3	Palaearctic, Oriental
<i>Anortalia</i> Weise, 1902	1	1	Oriental
<i>Azoria</i> Mulsant, 1850	1	1	unknown
<i>Elnidortalia</i> Recuenco-Adorada, 2011	1	1	Oriental
<i>Ortalia</i> Mulsant, 1850	~50	13	Ethiopic, Palaearctic, Oriental
<i>Ortalistes</i> Gorham, 1887	5	5	Neotropical
<i>Paramida</i> Sicard, 1909	1	1	Ethiopic/Madagascar
<i>Pseudoladoria</i> Crotch, 1874	1	1	Neotropical
<i>Scymnhova</i> Sicard, 1909	4	4	Ethiopic/Madagascar
<i>Semra</i> (Gorham, 1899)	1	1	Neartic
<i>Zenoria</i> Mulsant, 1850	38	4	Neotropical

The out-group was chosen based on their relationship with Ortaliini, as suggested by the phylogenies of Giorgi *et al.* (2009), Magro *et al.* (2010), Aruggoda *et al.* (2010), and Seago *et al.* (2011). We included eight species of polyphyletic Coccidulini (*Azya* Mulsant, 1850; *Chnoodes* Chevrolat, 1849; *Cryptolaemus* Mulsant, 1853; *Poria* Mulsant, 1850; *Rhynchortalia* Crotch, 1874; *Rhyzobius* Stephens, 1829; *Scymnodes* Blackburn, 1889; *Scymnus* Kugelann, 1794), and of phytophagous Epilachnini (*Epilachna* Chevrolat in Dejean, 1837), one of Sticholotidini (*Sticholotis* Crotch, 1874), one of Cephaloscymnini (*Prodilis* Mulsant, 1850), one of Diomini (*Diomus* Mulsant, 1850), and one of Coccinellini (*Coccinella* Linnaeus, 1758). There were also included as terminals of Hyperaspini (*Hyperaspis* Chevrolat in Dejean, 1833), and Noviini (*Rodolia* Mulsant, 1850), which were previously considered to be closely related to Ortaliini by Sasaji (1968, 1971) and Kovář (1996) (Table S1). The out-group represented nine of the 23 recognized tribes *sensu* Seago *et al.* (2011).

Microweisea Cockerell, 1903, the type genus of the tribe Microweiseini Leng, 1920 (Microweiseinae), considered by most authors, as the basal group of Coccinellidae (Giorgi *et al.*, 2009; Magro *et al.* 2010; Seago *et al.*, 2011; Robertson *et al.*, 2015; Szawaryn *et al.*, 2015), was used to root the tree.

Terminology

The general terminology follows Ślipiński (2007) and Lawrence *et al.* (2010, 2011), and classification Seago *et al.* (2011). The species-level taxonomy follows Gordon (1971, 1972), Hoàng (1990), Yu (2000), Fürsch (2006) Recuenco-Adorada (2011) and Santos & González (2016).

Character coding

The comparative study of the proposed homology was based on direct observations of adult males and females and/or on information is taken from the literature. A contingent coding strategy was used for some characters (Forey & Kitching, 2000), and multistate characters were treated as unordered (non-additive) and were optimized on cladograms using unambiguous optimization in Winclada (Nixon, 2002). The characters not observed were coded as ‘?’ and those not applicable were coded as ‘–’.

The selected morphological characters were coded in matrix data (Table S2), edited through Mesquite 3.51 (Maddison & Maddison, 2018) and subsequently exported in Nexus format for phylogenetic analysis in TNT (Goloboff *et al.*, 2008).

Each character is followed by its (CI) and (RI) indices, obtained in the consensus tree of equal weights analyses.

Morphological matrix analyses

In the phylogenetic analyses, the search for the most parsimonious trees and the Bremer support values (BS) (Bremer, 1994) were performed with TNT version 1.1 (Goloboff *et al.*, 2008), using Fitch parsimony (Fitch, 1971) as the criterion of optimization, assigning equal (EW) and implied (IW) weights and the cladograms were edited in Winclada (Nixon, 2002).

The implied weighting analyses were performed to minimize the effect of homoplasy over the phylogenetic signal by using various values of concavity constant, K , ranging from 0 to 10. The value of K indicates the strength of the weighting against homoplastic characters, as measured by the number of additional steps required to fit the cladogram topology in question; with a higher value of K weighting less strongly against the homoplasy (Goloboff, 1993).

However, there are no well-justified criteria to choose some particular value of K , and this decision is probably matrix-dependent (Goloboff, 1993). To set the value of K used in this analysis, we used the methodology proposed by Mirande (2009), which divides at regular intervals the mean fit values of each character in the most-parsimonious trees obtained under different values of K and for which the main criterion for choosing among these trees is their stability. This methodology was applied using the script for TNT developed by Mirande (2009) (Available from <http://phylo.wikidot.com/tntwiki>). The most stable trees are those that share the largest number of nodes with the remaining trees, as measured by the SPR distance using 1000 replications (Goloboff *et al.*, 2008b).

The parameters used in all searches were as follows: Analyse> ‘traditional search’; ‘max. tree’=2000 000; ‘random seed’=100; ‘number of additional sequences’=5000; ‘tree to save per replication’=400, utilizing ‘tree bisection reconnection’(TBR) as the permutation algorithm of the branches. After obtaining the trees, a new TBR analysis was performed from the suboptimal trees, ‘tree from RAM.’ to compare the trees obtained, the consistency (CI) and retention (RI) indices were recovered, and a strict consensus tree was generated (min. length=0).

Absolute Bremer support (ABS) (Bremer, 1994) was utilized for equal weighting analysis using: traditional search (as explained earlier)> memory (2000000)>suboptimal (one

step longer than the most-parsimonious trees)>traditional search (trees form RAM, stop maxtrees when hit)>Bremer support (absolute support)>check and note which clades were lost>repeat this procedure, increasing the memory and suboptimal values gradually, until all clades of interest were lost. ‘Retain trees suboptimal by’ (ten steps were used).

For the IW analysis, relative Bremer Support (RBS) and symmetric resampling were used (Goloboff *et al.*, 2003), the latter because it is not affected by the scheme of character weighting (Goloboff & Farris, 2001; Goloboff *et al.*, 2003; Mirande, 2009). The symmetric resampling analyses were run with parameters as for the traditional search (as explained earlier) and ‘group presented/contradicted’ was used with the program default values. In the IW analysis cladogram, branch support values are shown above and below each branch as follows: ‘relative Bremer support/symmetric resampling’.

We evaluated branch-support by ABS (Bremer, 1994), RBS (relative fit difference, Goloboff & Farris, 2001), which attempts to correct by the amount of evidence contradicting a given node instead of looking at the absolute Bremer value.

3.3 Results and Discussion

List of morphological characters

0. *Body, dorsal* CI: 33; RI: 33 (Seago *et al.* 2011 car. 1)

(0) glabrous (Fig. 17A)

(1) pubescent (Fig. 15A)

The presence or absence of the pubescence has no significance in higher categories, even in a generic rank (Sasaji, 1968). However, *Semra picta* and two outgroup taxa have the S0.

1. *Head, eyes, length in relation to the head capsule (frontal view)* CI: 50, RI: 92. (Lawrence *et al.*, 2011 car. 8 modified by Szawaryn *et al.*, 2015 car. 1)

(0) less than 0.5 times

(1) 0.5–0.75 times as long as a head capsule (Fig. 15 B)

(2) longer than 0.75 times (Fig. 7A)

Length of the occipital region is the distance between a line joining the posterior edges of the eyes and a line tangential to the posterior edge of the head capsule (Lawrence *et al.*, 2011). The length of the head capsule here refers to the distance (at middle) between a

line joining the posterior edge of the clypeus and a line tangential to the posterior edge of the head.

Amida, *Anortalia*, *Elnidortalia* and, *Ortalia* have the eyes reaching or almost reaching the posterior margin of the head (S2). The eyes are small in Epilachnini and Sticholotidini (S0).

2. *Head, eyes* CI: 50; RI: 80 (Seago *et al.*, 2011 car. 5)

(0) finely faceted (Fig 2A)

(1) coarsely faceted (Figs 17A, B, C)

3. *Head, eyes, inner orbits, ocular canthus (frontal view)* CI: 25, RI: 25 (Seago *et al.* 2011 car. 6; Szawaryn *et al.* car. 2)

(0) not extending into the eyes (Fig. 17C)

(1) occupying less than one-third of an eye (Figs 5B, 6A)

(2) occupying at least one-third of an eye

Ocular canthus is the visible portion of inner orbits projected laterally onto eye above antennal insertions, sometimes referred to as eye emargination. The inner orbits are usually weakly developed or emarginate below antennal insertions in S0.

The emargination of the eyes has been important *sensu* Mulsant (1850) to define the branches of Ortaliens, differentiating Rodoliares (S0) from Ortaliares (S1).

4. *Head, ocular canthus in front antennal insertions* CI: 57, RI: 86

(0) prominent narrow and elongate (Figs 2A, 7B, 9A, 10A)

(1) prominent broad and bent upward (Fig. 8D)

(2) prominent small and triangular

(3) prominent and large

(4) not prominent, weakly developed or lobe-like

Inapplicable car. 3-S0.

The ocular canthus is very prominent in Ortaliini, with the narrow base, projected laterally onto the eye (Sasaji, 1968). However, in *Elnidortalia* and some Oriental and Palearctic *Ortalia* and, *Amida mirifica*, the ocular canthus is broader and slightly bent upward S1.

5. *Head, interocular distance in relation to head width* CI: 33, RI: 89 (Szawaryn *et al.* car. 3, modified)

(0) narrow, 0.5 times or less

(1) 0.6 times or more

The narrowest distance between the inner margins of eyes (interocular distance) is an important taxonomic character to Orkaliini (*Zenoria*, *Ortalia*, *Amida*, *Anortalia* and *Elnidortalia*).

6. *Head, inner orbits shape* CI: 62, RI: 87 (Szawaryn *et al.* car. 4 modified)

(0) parallel, the same distance along frons or slightly divergent on the vertex (Figs 5A, 7A, B, 9A, 10A)

(1) arcuate, closest at the middle (Fig. 2A)

(2) convergent, closer near vertex than anteriorly

(3) emarginate anteromedially, closer posteriorly

(4) slightly rounded or sinuate and convergent anteriorly

(5) closest before the middle (Fig. 8B)

The inner margins are parallel along frons or nearly so, slightly divergent on the vertex in *Ortalia*, *Amida*, but also in *Poria*, *Rodolia*, *Prodilis* and *Pseudoladoria simulans*. However, in *Elnidortalia* and some Oriental and Palearctic *Ortalia* and, *Amida mirifica*, the inner orbits are closest before the middle S5.

7. *Head, eyes, interfacetal setae* CI: 33; RI: 66 (Lawrence *et al.*, 2011 car. 17 modified)

(0) present (Fig. 5A)

(1) absent (Figs 13D, 17C)

8. *Antennal insertions (dorsal view)* CI: 33; RI: 66 (Seago *et al.*, 2011 car. 9 modified)

(0) exposed (at least part of the foramen visible from above) (Fig. 7B)

(1) partially hidden (Fig. 15B)

9. *Antennae, distance between insertions* CI: 20; RI: 80 (Seago *et al.*, 2011 car. 10 modified)

(0) less than between the inner eye margins (Figs 2A, 5A, 7B, 9A, 10A)

(1) equal or greater than that between inner eye margins (Fig. 8B)

10. *Antenna, posterior margin of antennal socket* CI: 100; RI: 100 (Seago *et al.*, 2011 car. 11)

- (0) adjacent to anterior eye margin (Fig. 3C)
- (1) slightly in front (posterior margin within or touching the eye line) (Fig. 14B)
- (2) distinctly in front and between the eyes

11. *Head, antenna length* CI: 40, RI: 25 (Seago *et al.* car. 12; modified by Szawaryn *et al.* car. 7)

- (0) less than 0.5 head width
- (1) 0.5-1.0 head width (Fig. 4C)
- (2) more than head width

12. *Head, antenna, number of antennomeres* CI: 33, RI: 40 (Lawrence *et al.*, 2011 car. 37; Seago *et al.*, 2011 car. 13; modified by Szawaryn *et al.*, 2015 car. 8)

- (0) 8-segmented
- (1) 9-segmented
- (2) 10-segmented (Fig. 4D)
- (3) 11-segmented

The most of beetles have 11-segmented antennae (S2), and scattered taxa throughout the family, including some Coccidulini, Sticholotidini, and Microweisini, have the number reduced to 10 (S1). Eight segmented antennae (S0) occur in Noviini.

These reductions show some phylogenetic tendency though not always constant in a tribe or genus (e.g. *Hyperaspis*, *Diomus*, *Scymnus*).

13. *Head, antenna, scape shape* CI: 50, RI: 33 (Seago *et al.*, 2011 car. 14 modified)

- (0) normal, longer than broad (Fig. 5B)
- (1) slightly convex external surface (Fig. 9B)
- (2) distinctly thicker than long, with distinct convex or carinate external surface

14. *Head, antenna, pedicel* CI: 25, RI: 70 (Seago *et al.*, 2011 car. 16; Szawaryn *et al.*, 2015 car. 9)

- (0) about as broad as a scape
- (1) narrower than scape

15. *Head, antenna, flagellum club* CI: 50, RI: 95 (Seago *et al.*, 2011 car. 19 modified)

(0) with the indistinct club, formed gradually

(1) with a distinct club (Figs 2A, 7B, 9B)

16. *Head, antenna, antennal club articulation* CI: 16, RI: 64 (Lawrence *et al.*, 2011 car. 50)

(0) loosely articulated

(1) tightly articulated, compact (Fig. 5B, 8C, D)

17. *Head, antenna, antennal club shape* CI: 25, RI: 78

(0) cylindrical, truncate or cut obliquely (Fig. 16C)

(1) oval, rounded (Fig. 10A)

(2) spindle-shaped (Figs 2A, 7B)

The oval club has a rounded and slightly elongated outline or has a shape fusiform or spindle-shaped when the club thicker in the center and tapering at both ends.

Ethiopic and Madagascan *Ortalia* and *Zenoria* are distinguished by the compactly articulated and well-developed spindle-shaped club even as *Sticholotis* and *Hyperaspis*. In *Amida*, *Elnidortalia*, and *Anortalia* the club are oval.

18. *Head, antenna, antennal club, symmetry* CI: 33, RI: 33 (Lawrence *et al.*, 2011 car. 49 modified)

(0) not or only slightly asymmetrical

(1) distinctly asymmetrical, serrated

The S1 distinguishes some Coccidulini, as *Poria*, *Azya*, *Rodolia* and, *Azoria* (Ortaliini).

19. *Head, front, dorsal view* CI: 66, RI: 85

(0) on a lower plan of the eyes

(1) coplanar

(2) raised medially (Fig. 9A)

Anortalia has the frons raised S2. *Elnidortalia* and some Palearctic and Oriental species of *Ortalia* and *Amida mirifica* have the frons distinctly concave S0.

20. *Clypeus shape* CI: 50, RI: 50 (Seago *et al.*, 2011 car. 26 modified)

(0) short, transverse

(1) elongate, rostrate

21. *Clypeus apical margin* CI: 62, RI:86 (Szawaryn *et al.*, 2015 car. 17 modified)

(0) straight medially and straight or weakly arcuate posteriorly (Fig. 9A)

(1) straight medially with lateral acute projections

(2) straight medially with lateral with rounded lobes

(3) arcuate medially and straight or weakly arcuate posteriorly (Fig. 10A)

(4) arcuate medially lateral with rounded lobes

(5) slightly arcuate medially and laterally reflexed

22. *Labrum* CI: 100, RI: 100

(0) short, transverse (Fig. 15B)

(1) elongate, about as long as wide (Figs 7B, 10A)

(2) short, transverse but horizontally expanded beyond clypeus

23. *Labrum, labral apex* CI: 40, RI: 88 (Lawrence *et al.*, 2011 car. 35 modified)

(0) rounded (Fig. 15B)

(1) truncate (Fig. 7B)

(2) emarginate

24. *Mandible, apex* CI: 100, RI: 100 (Seago *et al.*, 2011 car. 27; modified by Szawaryn *et al.* car. 18)

(0) multidentate

(1) with at most two, smooth apical teeth (Fig. 7C)

(2) unidentate

25. *Maxilla with cardo, shape* CI: 66, RI: 83 (Seago *et al.*, 2011 car. 30; modified by Szawaryn *et al.*, 2015 car. 23)

(0) quadrate to weakly transverse (Fig. 7C)

(1) transverse with outer angle extending out of mouth cavity (Fig. 17D)

(2) reduced

26. *Maxilla, terminal palpomere, shape* CI: 37, RI: 58 (Lawrence *et al.*, 2011 car. 35; Seago *et al.*, 2011 car. 32; modified by Szawaryn *et al.*, 2015 car. 31)

- (0) elongate, subcylindrical, tapering or oblique apex
- (1) longer than broad, parallel-sided, or weakly expanded (Fig. 10D)
- (2) at least weakly elongate, parallel-sided or weakly expanded apically oval (Fig. 17D)
- (3) distinctly securiform

The character states are not clearly defined, as there is a gradual transition from one state to another and different interpretations among authors.

27. *Labium, mentum, shape* CI:100, RI:100 (Seago *et al.*, 2011 car. 38 modified by Szawaryn *et al.*, 2015 car. 33)

- (0) distinctly narrowed basally
- (1) trapezoidal, broadening towards the base (Fig. 13C)

The S1 distinguish Epilachnini to all others.

28. *Labium, mentum, apical margin* CI:100, RI:100 (Seago *et al.*, 2011 car. 39)

- (0) truncate weakly arcuate (Fig. 7C)
- (1) deeply emarginate (Fig. 17D)

The S1 distinguish Hyperaspidini to all others.

29. *Labium, mentum, relative length* CI: 50, RI: 85 (Szawaryn *et al.*, 2015 car. 32)

- (0) transverse, less than 2 times broader than long
- (1) transverse, at least 2 times broader than long

30. *Labium, mentum, surface* CI: 100, RI: 100 (Seago *et al.*, 2011 car. 40)

- (0) with the U-shaped impression (Figs 16 A, B, C)
- (1) smooth (Fig. 7C)

Scymnhova species like as *Rhyzobius* Stephens, 1829 and some Coccidulini exhibits the S0: 'Chnoodini' (*Dapolia* Mulsant, 1850 and *Coeliaria* Mulsant, 1850) and Australian genera *Wiolleta*, Ślipiński, 2007; *Iracilda* Ślipiński, 2007 e *Roger* Ślipiński, 2007).

31. *Labium, prementum* CI:100, RI:100 (Szawaryn *et al.*, 2015 car. 34)

- (0) rectangular (Fig. 7C)
- (1) oval

The S1 distinguish Epilachnini to all others.

Prothorax

32. *Prothorax, pronotum, anterior margin* CI:33, RI: 66

(0) not emarginate (Fig. 2B)

(1) emarginate, with a line or carina (Fig. 9A)

33. *Prothorax, pronotum, posterior edge* CI:100, RI: 100 (Lawrence *et al.*, 2011 car. 105 modified)

(0) evenly rounded

(1) slightly sinuate

(2) distinctly sinuate and angulate (Fig. 2B, 11A)

The posterior edge usually represents part of a pro-mesothoracic interlocking mechanism, the various lobes or sinuations fitting against the anterior edges of the scutellum and elytra (Lawrence *et al.*, 2011).

34. *Prothorax, pronotum, lateroposterior angle as viewed from above* CI: 25, RI: 76 (Lawrence *et al.*, 2011 car. 103 modified)

(0) rounded (Fig. 7A)

(1) angulated, acute (Fig. 2B)

The posterior pronotal angle refers to the posterolateral corner of the pronotum, which is not necessarily angular but may be rounded or variously produced (Lawrence *et al.*, 2011).

35. *Prothorax, hypomeron* CI: 50, RI: 66 (Seago *et al.*, 2011 car. 49)

(0) smooth, without cavities (Figs 2C, 7C, 16A)

(1) with anterior C-shaped cavities (Figs 16 B, C)

36. *Prothorax, prosternum lobes length* CI: 100, RI: 100 (Seago *et al.*, 2011 car. 46; modified by Szawaryn *et al.*, 2015 car. 44)

(0) shorter than half length of coxal longitudinal diameter (Figs 2C, 7C, 8F, 9C)

(1) 0.5-1.0 the length of coxal longitudinal diameter (Fig. 16A)

(2) longer than the coxal longitudinal diameter

The prosternum usually T-shaped with broad lateral basisternal lobes (lateral wings) Sassaji (1968). The length of the lateral portion of prosternum in front of the middle of the procoxal cavity in relation to the coxal longitudinal diameter, at the same position.

37. *Prothorax, prosternum shape* CI: 30, RI: 63

- (0) on the same plane (Fig. 16A)
- (1) weakly raised anteriorly (Figs 2C, 9C)
- (2) with anteromedian prominence (chin piece)
- (3) evenly prominent but without chin piece (Fig. 17D)

The chin piece as defined by Lawrence *et al.* (2011). In some Serangiini, Sticholotidini and some Coccidulini, the anterior part of the prosternum is very prominent, forming a chin piece that covers the ventral side of the head from below (Ślipiński, 2007).

38. *Prothorax, prosternum, procoxal cavity anteriorly* CI: 50, RI: 86 (Szawaryn *et al.*, 2015 car. 47)

- (0) without line or carina
- (1) with a line or carina, nearly complete (Fig. 2C, 3C, 7C)
- (2) with a complete line or carina (Fig. 6B)

The lines or carinae on the prosternum extending longitudinally from sides of prosternal process onto the notosternal suture.

The line in Ortaliini is clearly visible, broad and bent upward, almost connecting laterally with an anterior line on the notosternal suture. It's depressed or interrupted on the notosternal suture to receive the antennal club in response. In some it's complete, connecting clearly laterally with the anterior line, delimiting the prothorax.

39. *Prothorax, prosternal process, a width near the middle* CI: 50, RI: 80 (Seago *et al.*, 2011 car. 43)

- (1) narrow (less than 0.6 times width of coxal diameter)
- (2) broad (0.7-1.0 times width of coxal diameter) (Figs 16A, B, C)
- (3) very broad (distinctly broader than coxal diameter)

40. *Prothorax, prosternum, prosternal process surface carina* CI: 30, RI: 62 (Szawaryn *et al.*, 2015 car. 43 modified)

- (0) with separate and incomplete carina (Figs 9C, 10C)
- (1) with carina joined before the anterior margin
- (2) with inverted Y-shaped carina (Fig. 15E)
- (3) with complete carina, joined anteriorly (Figs 8E, F, 16A)
- (4) lacking carinae (Figs 4C, 6B, 7C)

Paired lines or carinae on the prosternum extending anteriorly from sides of prosternal process onto the body of sternite (Lawrence *et al.*, 2011).

41. *Prothorax, prosternum, prosternal process surface* CI: 66, RI: 80

- (0) flat (Fig. 10C)
- (1) concave (Fig. 7C)
- (2) with concave area anteriorly (Fig. 2C)

42. *Prothorax, prosternal process apical edge in ventral view* CI: 20, RI: 57 (Lawrence *et al.*, 2011 car. 125)

- (0) acute or narrowly rounded (Fig. 9C)
- (1) broadly rounded (Figs 8E, F)
- (2) angulate or truncate (Figs 10 B, C)

Pterothorax

43. *Metendosternite stalk* (Seago *et al.* car. 54) CI: 100, RI: 100 (Seago *et al.*, 2011 car. 54)

- (0) at least 0.7 times as long as broad (Fig. 7E)
- (1) distinctly shorter (0.5 or less) than broad to apparently absent

44. *Metendosternite tendons* CI: 40, RI: 81 (Seago *et al.*, 2011 car. 55 modified by Szawaryn *et al.*, 2015 car. 53)

- (0) widely separated and near the apices of arms
- (1) separated much less than the width of the stalk, close to the middle (Fig. 7E)
- (2) separated slightly less than the width of the stalk, on laminae

45. *Elytra, surface punctures* CI: 14, RI: 73 (Szawaryn *et al.*, 2015 car. 56)

- (0) single size (Figs 9D, F, 7H)
- (1) double size (Fig. 2D)

The elytral punctures in Coccinellidae are irregularly distributed with coarse punctuations intercalated by fines S1 or of a single type S0.

46. *Elytra, pubescence of different color forming visible maculae* CI: 50, RI: 50

- (0) present

(1) absent

47. *Elytra, epipleuron, inner margin* CI: 28, RI: 37 (Seago *et al.*, 2011 car. 57 modified by Szawaryn *et al.*, 2015 car. 58)

(0) without line or carina

(1) with a line or carina extending at most to the level of mid coxa

(2) with line nearly complete, fading before the base of elytron

48. *Elytra, epipleuron, inner margin with line nearly complete*: CI: 25, RI: 70 (Seago *et al.*, 2011 car. 57 modified)

(0) straight and not crossing epipleuron at the elytral base (Figs 3A, B, 7F)

(1) curved and crossing epipleuron to outer margin (Figs 2 E, 9E, 10B)

Inapplicable car. 47-S0.

49. *Elytra, epipleuron basal margin* CI: 33, RI: 60

(0) rounded

(1) subtruncate (Fig. 16C)

50. *Elytra, epipleuron surface, fovea* CI: 50, RI: 50 (Seago *et al.*, 2011 car. 56 modified by Szawaryn *et al.*, 2015 car. 57)

(0) present (Fig. 17B)

(1) absent

In some groups, the epipleuron are foveate for receiving tips of mid and/or hind femora (Hyperaspidini, Serangiini, Aspidimerini and Platynaspidini and ‘Azyini’).

51. *Meso-metaventral process, width* CI: 25, RI: 71 (Seago *et al.*, 2011 car. 52 modified)

(0) narrow, 0.5 times coxal diameter or less

(1) broad, 0.6-0.9 times coxal diameter

(2) very broad, one coxal diameter or more (Figs 8A, F, 10B)

52. *Junction of meso- and metaventrites* CI: 40, RI: 50 (Seago *et al.*, 2011 car. 53)

(0) straight (Figs 8A, B, F, 7D, 12H, 13A)

(1) arcuate or angulate anteriorly (Figs 12 B, D, F)

(2) arcuate or angulate posteriorly (Figs 4A, B, C)

In some tribes of Microweiseinae and Diomini the metaventricle forms an arcuate lobe extending anteriorly above the mesoventrite and makes the mesoventrite look very short (Ślipiński, 2007).

53. *Metaventricle, postcoxal lines, laterally* CI: 33, RI: 33 (Seago *et al.*, 2011 car. 61 modified by Szawaryn *et al.*, 2015 car. 60)

(0) complete and recurved or straight (Fig. 2F, 7D)

(1) complete and descending (Fig 3D)

(2) descending and continuing on the lateral border of metaventricle

54. *Metaventricle, metaventral postcoxal lines, on metaventral process* CI: 20, RI: 50 (Szawaryn *et al.*, 2015 car. 59 modified)

(0) widely separated (Fig. 4A, B, C)

(1) joined (Figs 3A, B, D, 6C, 7D)

The S0 in *Ortalia ochracea* and *O. pallens*.

55. *Metaventricle, discrimen* CI: 50, RI: 80 (Seago *et al.*, 2011 car. 62 modified)

(0) present

(1) absent (Figs 12 B, D, F, H)

Legs

56. *Trochanters, the outer margin on fore and mid legs* CI: 16, RI: 80 (Szawaryn *et al.*, 2015 car. 61)

(0) simple (Figs 4A, B, 8A, B)

(1) angulately produced (Figs 3A, B, 9G, 10B)

The shape of the trochanter is usually subtrapezoidal with a straight inner margin, but often the inner margin is sinuate and produced.

57. *Femur, forelegs* CI: 25, RI: 86

(0) lengthy, distinctly visible from above (Figs 12 A, E, G, I)

(1) not or slightly visible from above

58. *Protibia (shape)* CI: 14, RI: 40 (Seago *et al.*, 2011 car. 63)

(0) cylindrical slender (Fig. 7A)

- (1) flattened (Figs 3A, B, 10B, 15C, D, E, F)

Amida, *Anortalia* and *Ortalia quadripunctata* exhibits the state S1.

59. *Protibia*, outer edge CI: 50, RI: 50 (Seago *et al.*, 2011 car. 64)

- (0) smooth (Fig. 7A)

- (1) angulate (Fig. 9A)

Anortalia exhibits the state S1.

60. *Protarsus* CI: 20, RI: 83 (Lawrence *et al.*, 2011 car. 259; Seago *et al.*, 2011 car. 66; Szawaryn *et al.*, 2015 car. 71 modified)

- (0) 3-segmented (Figs 9A, 6C)

- (1) 4-segmented (Fig. 15C)

The S0 is a common transformation found in clade B. *Zenoria* S1.

61. *Protarsal claws in female, tooth apically* CI: 100, RI: 100

- (0) simple

- (1) toothed or bifid (Figs 13B, D)

The tarsal claws usually have a basal tooth (appendiculate) S0 and sometimes there is a subapical tooth S1. In Epilachnini the tarsal claws are bifid with or without a basal tooth.

62. *Protarsal claws in female, simple, at base* CI: 28, RI: 70

- (0) smooth or swollen (Fig. 16B)

- (1) with a large triangular tooth (Fig. 10E)

- (2) with a large quadrate tooth

Inapplicable car. 61-S1.

63. *Midtarsal claws in female, tooth apically* CI:100, RI:100

- (0) simple

- (1) toothed or bifid

64. *Midtarsal claws in female, simple, at base* CI: 28, RI: 70 (Seago *et al.*, 2011 car. 67 modified)

- (0) smooth or swollen at the base (Fig. 16B)

- (1) with a large triangular tooth

(2) with a large quadrate tooth

Inapplicable car. 63-S1.

65. *Midtibial spurs* CI: 25, RI: 70 (Lawrence *et al.*, 2011 car. 256; Seago *et al.*, 2011 car. 68 modified)

(0) present

(1) absent

66. *Hind tarsal claws in male apically* CI: 100, RI: 100 (Szawaryn *et al.*, 2015 car. 74 modified)

(0) simple

(1) toothed or bifid

67. *Hind tarsal claws in male, simple, at base* CI: 25, RI: 70

(0) smooth or swollen at base

(1) with the large triangular tooth at the base (Fig. 7I)

(2) with the large quadrate tooth at base

Inapplicable car. 66-S1.

68. *Hind tarsal claws in female, tooth apically* CI: 100, RI: 100

(0) simple

(1) toothed or bifid

69. *Hind tarsal claws at the female, simple, at base* CI: 22, RI: 69

(0) smooth or swollen at the base (Fig. 16B)

(1) with a triangular tooth at base

(2) with a quadrate tooth at the base (Fig. 2G)

Inapplicable car. 75-S1.

70. *Hind tibial spurs* CI: 25, RI: 70 (Lawrence *et al.*, 2011 car. 258; Seago *et al.*, 2011 car. 69 modified)

(0) present

(1) absent

Abdomen

71. *Abdomen, male number of ventrites* CI: 50, RI: 50 (Seago *et al.*, 2011 car. 71)

(0) 5 ventrites (sternites III to VII)

(1) 6 ventrites (sternites III to VIII)

Normally in beetles, there are only five ventrites, which are numbered with Arabic numerals and correspond to abdominal sternites III to VII (most Archostemata, Torridincola, and most Polyphaga); or sternite VIII may also be visible (a variety of polyphagan groups) (Lawrence *et al.*, 2011).

72. *Abdomen, female number of ventrites* CI: 50, RI: 50 (Lawrence *et al.*, 2011 car. 268; Seago *et al.*, 2011 car. 70)

(0) 5 ventrites (sternites III to VII)

(1) 6 ventrites (sternites III to VIII)

73. *Anterior margin of abdominal intercoxal process ventrite 1* CI: 33, RI: 33 (Seago *et al.*, 2011 car. 74 modified)

(0) truncate, arcuate, feebly emarginate

(1) distinctly and deeply emarginate medially (Fig. 14A)

The anterior margin of abdominal intercoxal process is truncate or broadly rounded in most of Coccinellidae genera and, in *Amida*, *Elnidortalia*, *Anortalia* and Oriental and Palearctic *Ortalia* species. *Zenoria* and Ethiopic and Madagascan *Ortalia* are emarginate, but not distinctly and deeply emarginate as in *Ortalistes pexus*, *Prodilis*, *Pseudoladoria* and *Sticholotis*.

74. *Postcoxal line of abdominal ventrite 1* CI: 40, RI: 76 (Lawrence *et al.*, 2011 car. 258 modified by Seago *et al.*, 2011 car. 75 modified by Szawaryn *et al.*, 2015 car. 75 modified)

(0) reduced, hardly visible

(1) descending and incomplete reaching the posterior margin (Figs 12B, D, F, H)

(2) recurved, roundly and incomplete

(3) recurved, roundly and complete (Figs 3A, B, 15D, 16B, C)

(4) slightly recurved broad and incomplete

(5) angulate and incomplete (Figs 2H, I)

The postcoxal lines on ventrite 1 usually begin at the base of the intercoxal process and extend posteriorly, sometimes reaching the posterior edge of the ventrite, in some fading laterally and not recurved S1 or recurved and completely closer S3 or not S2 the post-coxal cavity.

75. *Abdomen, ventrite 2, at the middle of posterior margin, male* CI: 100, RI: 100

(0) unmodified

(1) with a small sharp tooth (Fig. 7J)

The presence of a small sharp tooth on ventrite 2 hind margins is a common synapomorphy in *Ortalia variata* and some Madagascan species of *Ortalia*.

76. *Abdomen, ventrite 3, medially, male* CI: 100, RI: 100

(0) unmodified

(1) with setose fovea (Fig. 7J)

77. *Abdomen, ventrite 4, medially, male* CI: 100, RI: 100

(0) normal

(1) with setose fovea (Fig. 7J)

The presence of a setose fovea on ventrites 3 (76, 1) and 4 (77, 1) is a common synapomorphy in *Ortalia variata* and some Madagascan species of *Ortalia*, except *O. duponti* and according to the descriptions *O. edentulosa* and *O. globosa* Fürsch, 2006.

78. *Abdomen, ventrite 5, at the middle, male* CI: 50, RI: 83

(0) unmodified

(1) with setose fovea (Figs 6D, 7J)

The presence of setose fovea on ventrite 5 is a common transformation in *Zenoria*, *Ortalia duponti*, *O. variata* and some Madagascan species of *Ortalia*.

79. *Abdomen, ventrite 5, at the middle, female* CI:100, RI:100

(0) unmodified

(1) with setose fovea medially (Fig. 2H)

The presence of setose fovea on ventrite 5 in females is an autapomorphy of *Zenoria*.

80. *Abdomen, ventrite 5, male* CI: 20, RI: 68

(0) about as long or slightly longer as 4

(1) distinctly longer than 4

The abdomen with ventrite 5 distinctly longer than 4 is a common transformation in *Elnidortalia*, *Ortalia horni*, *O. bruneiana*, *O. dohrni*, and *Amida mirifica*.

81. *Abdomen, ventrite 5 in female length* CI: 20, RI: 73 (Seago *et al.*, 2011 car. 76)

(0) about as long as 4

(1) distinctly longer than 4 (Figs 2H, 9I, 10F)

The ventrite 5 in the females distinctly longer than 4 is a common transformation present in *Amida*, *Anortalia*, *Elnidortalia*, *Ortalia*, and *Zenoria*, but also in *Prodilis* (Cephaloscymnini) and part of Coccidulini, *Chnoodes*, *Horniolus*, *Azya* and may vary in *Rhyzobius* and *Scymnus*.

82. *Abdomen, hind margin of ventrite 5 in male* CI: 44, RI: 66

(0) regularly rounded or straight (Fig. 15C)

(1) sinuate, feebly emarginate

(2) produced posteriorly

(3) evenly arched anteriorly (Fig. 7J)

(4) emarginate medially

83. *Abdomen, hind margin of ventrite 5 in female* CI: 66, RI: 0 (Szawaryn *et al.*, 2015 car. 77)

(0) regularly rounded or straight (Fig. 10F)

(1) sinuate, feebly emarginate

(2) triangular produced posteriorly

84. *Abdomen, ventrite 5, glandular opening medially in female* CI:100, RI:100

(0) present (Fig. 7K, L)

(1) absent

The presence of pores or glandular openings on the surface of abdominal ventrites or within the intersegmental membrane is found in some Coccinellidae genus. It can occur both in males than females and, can be numerically and morphologically diverse. Presumably, secrete chemicals of diverse nature and function.

Crotch (1874) added to the redescription of *Ortalia variata* (type species of the genus) that males have a median tubercle on the surface of abdominal ventrite 5 in males (lectotype unique and not dissected in CAMZM).

However, the dissection of the *O. variata* additional material (MNHN) revealed that the glandular opening is present only in females, not in males. The lectotype of *Ortalia variata* is a female specimen.

Most of Madagascan *Ortalia* have one large and prominent glandular opening on abdominal ventrite 5 in females, a unique character within the genus.

85. *Abdomen, ventrite 6, medially, male* CI: 100, RI: 100

(0) unmodified

(1) with setose fovea (Figs 6D, 7J)

Inapplicable car. 71-S0.

86. *Abdomen, ventrite 6, laterally, male* CI: 0, RI: 0

(0) unmodified

(1) with patches of setae

Inapplicable car. 71-S0.

S1 is an autapomorphy of *Ortalia pectoralis* Weise, 1901.

87. *Abdomen, hind margin of ventrite 6 in male* CI: 36, RI: 63

(0) unmodified, rounded or straight

(1) sinuate, broadly and shallowly emarginate (Fig. 9H)

(2) deeply emarginate, with a U or V-shaped notch (Fig. 2I)

(3) evenly arched anteriorly, convex (Figs 6D, 7J)

(4) arched anteriorly and notch laterally

Inapplicable car. 71-S0.

The shape of U or V-shaped notch is used to differentiate species of *Rhynchortalia*, *Cryptolaemus*, and *Zenoria*.

88. *Tergite VIII in male* CI: 50, RI: 94 (Seago *et al.*, 2011 car. 72)

(0) visible ventrally

(1) not visible ventrally

Abdominal apex

89. *Laterotergites, tergite IX in male, ventrally* CI: 100; RI: 100

(0) not visible

(1) visible just apically (Fig. 7J)

(2) well sclerotized and completely visible ventrally (Figs 5D, E, F, 6D)

The anteroventral portion of segment IX in the male is often considered to be sternal in origin, but in most cases, it consists partly or entirely of anterior protrusions of the laterotergites, which fuse together and to the sternite to form a subgenital plate. In many taxa the plate becomes membranous and only the sclerotized edges remain (Lawrence *et al.*, 2011).

The S2 is a unique transformation found in *Ortalia ochracea* and *O. duponti* and S1 in *Ortalia variata* and some Ethiopian and Madagascan species.

90. *Apodeme of male tergite IX (spiculum gastrale)* CI: 42, RI: 80 (Seago *et al.*, 2011 car. 85 modified by Szawaryn *et al.*, 2015 car. 90 modified)

(0) single apodeme, narrow and linear

(1) single apodeme, broad and enlarged at apex

(2) paired apodemes, joined by a membrane at the base and fused anteriorly

(3) absent

The anterior edge of the subgenital plate may be broadly rounded, angulate, truncate or emarginate, but in some taxa, it is narrowly rounded or acute or more often drawn out to form a median strut or *spiculum gastrale* (Lawrence *et al.*, 2011).

Different types of *spiculum gastrale* are represented in Coccinellidae. Completely lost in *Poria*, *Rodolia* and, *Sticholotis*.

91. *Tergite X (proctiger) in male* CI: 50, RI: 92

(0) not visible ventrally

(1) well sclerotized and visible ventrally (Figs 3A, 4A, 5D, 6D, 7J)

The proctiger is the sclerite lying just above the anal opening and considered to be homologous to tergite X (Lawrence *et al.*, 2011). Sometimes the proctiger is well developed and free or partly or completely fused to tergite IX. The tergite X prominent in males S1, projecting outside and closer with the last abdominal ventrite, is a common transformation of

some Coccidulini - *Cryptolaemus*, *Poria*, *Rhynchortalia* and *Zenoria* and Ethiopic and Madagascan *Ortalia* species.

In the Oriental and Palearctic *Ortalia* species and *Amida*, *Anortalia* and *Elnidortalia* the tergite X is partly or completely concealed.

Male genitalia

92. *Male genitalia, phallobase, lateral alae* (Gordon 1971) CI: 50, RI: 80

(0) present

(1) absent

S0 is a synapomorphy of *Zenoria*.

93. *Male genitalia, phallobase, tubercles* (Gordon 1971) CI: 50, RI: 83

(0) present

(1) absent

94. *Male genitalia, parameres, internal margin, tooth* CI: 40, RI: 50 (Szawaryn *et al.*, 2015 car. 83 modified)

(0) apical tooth

(1) subapical tooth

(2) absent

95. *Parameres, an internal surface, tooth* CI: 100, RI: 100 (Szawaryn *et al.*, 2015 car. 83 modified)

(0) present

(1) absent

96. *Parameres* CI: 66, RI: 87

(0) unmodified

(1) flared to the base and narrow apex

(1) inflated

97. *Penis guide symmetry* CI: 33, RI: 89 (Seago *et al.* car. 81 modified)

(0) symmetrical

(1) asymmetrical

98. *Penis guide on inner surface* CI: 100, RI: 100

(0) smooth

(1) with small sharp teeth

(2) with a single tooth

The presence of small minute teeth on penis apex inner surface S1 is a synapomorphy of *Zenoria*. *Poria* has a single tooth.

99. *Male genitalia penis apex* CI: 66, RI: 94

(0) simple

(1) complex

(2) with a weakly sclerotized additional process

The penis of Coccinellidae is a tubular structure, generally with a simple apex S0. Sometimes there are numerous and diverse additional 'ornamental' sclerotized processes, as tooth-shaped processes, apophyses rod-shaped, difficult described without figures, structures that combine in a gradient of complexity.

S1 is a common transformation of *Amida*, *Anortalia*, *Elnidortalia* and *Ortalia* species except *Ortalia punctata duodecimmaculata* and *O. oculata*, S2.

100. *Male genitalia, penis, penis capsule* CI: 16, RI: 57 (Seago *et al.*, 2011 car. 84 modified by Szawaryn *et al.*, 2015 car. 87 modified)

(0) undeveloped or reduced

(1) developed capsule, distinctly T-shaped

The character states are not clearly defined, with different interpretations among authors.

Female genitalia

101. *Coxites, gonocoxite IX* CI: 100, RI: 100 (Szawaryn *et al.* car. 92)

(0) much longer than wide, at least 2 times as long as wide

(1) distinctly less than 2 times longer than wide

(2) transverse, shorter than wide

102. *Coxites, gonocoxite IX shape* CI: 75, RI: 96 (Seago *et al.*, 2011 car. 86 modified by Szawaryn *et al.*, 2015 car. 93)

- (0) regularly long
- (1) club-like
- (2) oval
- (3) rectangular

103. *Ovipositor, styli (distal coxital lobe, gonostylus)* CI: 42, RI: 82 (Lawrence *et al.*, 2011 car. 342; modified by Seago *et al.*, 2011 car. 87; modified by Szawaryn *et al.*, 2015 car. 97 modified)

- (0) distinct terminal, well developed, palpiform, with apical setae
- (1) strongly reduced and hardly visible, with apical setae (sometimes represented by a patch of setae only)
- (2) reduced, button-like, with apical setae
- (3) absent

In most of the tribes, the coxites have become heavily sclerotized with the styli reduced (sometimes represented by a tuft of setae only) or lost altogether.

Zenoria styli are more developed than all others S0. Completely lost in *Amida*, *Anortalia*, *Ortalia*, *Elnidortalia*.

104. *Ovipositor, baculi* CI: 50, RI: 80 (Lawrence *et al.*, 2011 car. 335)

- (0) present
- (1) absent

Baculi is longitudinal struts usually located at the ventral edges of the paraprocts in elongate ovipositors (Lawrence *et al.*, 2011).

105. *Tergite IX, paraproct, laterotergite IX, female* CI: 50, RI: 88 (Lawrence *et al.*, 2011 car. 334)

- (0) shorter than gonocoxite
- (1) not more than 1.5 times long
- (2) more than 1.5 times long

106. *Tergite IX, paraproct, laterotergite IX, female* CI: 50, RI: 94

- (0) with tubercles

(1) without tubercles

107. *Infundibulum* CI: 16, RI: 28 (Szawaryn *et al.*, 2015 car. 98 modified)

(0) present

(1) absent

In many groups, the spermatic duct begins in the bursa and thickens in a tube called infundibulum. Other structures at the base of the spermatic duct were called the infundibulum, p. eg, membranous projections and sclerotized horns, but these homologies with the true infundibulum are questionable (Ślipiński, 2007).

108. *Apical piece on bursa copulatrix* CI: 50, RI: 50

(0) present

(1) absent

109. *Spermatheca* CI: 27, RI: 50 (Seago *et al.*, 2011 car. 91; modified by Szawaryn *et al.*, 2015 car. 101 modified)

(0) poorly differentiated spermatheca not or weakly sclerotized

(1) without clear demarcated structures

(2) forming a chamber with the elongate apex

(3) well developed with demarcated structures

The spermatheca is often divided into a basal nodule, a swollen branch and an apical curve portion at the apex called cornu. Sometimes are continuous and not clearly defined. The spermatheca commonly has an accessory gland opening near its base.

The character states are not clearly defined, with different interpretations among authors. *Amida* has spermatheca sclerotized and worm-like, without clear nodulus and ramus.

110. *Spermatheca, cornu apex projection* CI: 50, RI: 50

(0) present

(1) absent

111. *Spermatheca weakly sclerotized area* CI: 100, RI: 100

(0) present

(1) absent

The S0 has referred a delimited weakly sclerotized region between basal nodule and cornu and is a common transformation in Ethiopic and Madagascan *Ortalia*, except in *Ortalia punctata duodecimmaculata* and *O. oculata*.

112. *Spermatheca* CI: 33, RI: 85

(0) simple

(1) with additional paired projections

Some Ortaliini species has a singular additional paired projection in female genitalia which varies in shape, size and position, except *Zenoria*, *Ortalia punctata duodecimmaculata*, and *O. oculata*.

Hoàng (1990) described the shape variations of these structures to distinguished *Amida* species. Unfortunately, in some *Ortalia* species, this character has not yet been explored, although it is present, and it is found distant from the sperm duct (113, 2).

113. *Projections* CI:100, RI:100

(0) with projections between sperm duct and spermatheca

(1) with projections on spermatheca

Inapplicable car. 112-S0.

Preferred tree

This study represents the first comprehensive attempt to elucidate the phylogenetic relationships among the genera of Ortaliini using phylogenetic analyses.

There were scored 114 characters for 51 terminal taxa (Table S2). Analysis under EW yielded four most parsimonious trees (L=451, CI=41; RI=78) (Figs S1-S4) whereas each IW (K=1-10) analysis produced 13 most parsimonious (= fittest) cladograms with relatively different topologies.

Despite the ABS of our results (Fig. S5), they are consistent with the majority-rule consensus of the most parsimonious trees found by nona subsequent heuristic search within this island. The 50% majority-rule consensus tree of the post-burn-in posterior distribution is shown in Fig. S6.

The analysis with K=2 recovered one tree (fit= 47.893; L=465; CI=40; RI=77) based on SPR distances comparison and RBS is shown in Fig. S7.

No parsimony reconstruction supported a monophyletic *Ortaliini sensu lato*, the genera are grouped in dispersed clades in conflict with the recognized genus group and often including species classified in other genera.

The resulting trees provided conflicting support for the relationships. There is no significant support within the nodes along the backbone, only toward the tips of the topology in some cases. The same conflicting support within generic groups was found in Coccinellidae morphological analyses (Seago *et al.*, 2011) and also in molecular analyses (Giorgi *et al.* 2009; Magro *et al.*, 2010; Aruggoda *et al.*, 2010; Seago *et al.*, 2011) and only combined dataset recovered few relationships.

Ortalia and *Amida* type-species are embedded in different clades with other recognized genera, such as *Anortalia* or *Elnidortalia* and to be polyphyletic genera: this suggests a need for revisionary work and new analyses.

Based on this assumption the tree obtained from the implied weights analyses is here presented as our preferred tree and further discussions are mostly based on one tree found (Fig. 1).

Monophyly of Ortaliini and major genera

The traditionally recognized *Ortaliini* is para and/or polyphyletic whereas the monotypic *Paramida*, *Azoria*, *Semra*, *Pseudoladonia* and, also *Scymnhova* (four species) and *Ortalistes* (five species), are embedded within the other recognized tribes, and appears not to be regarded as *Ortaliini* considering the position of *Ortalia*.

Although these results, at first sight, are inconsistent with current knowledge of the *Ortaliini* systematics, it is possible to recognize more comprehensive monophyletic groups as well as relationships proposed by several researchers, as discussed below.

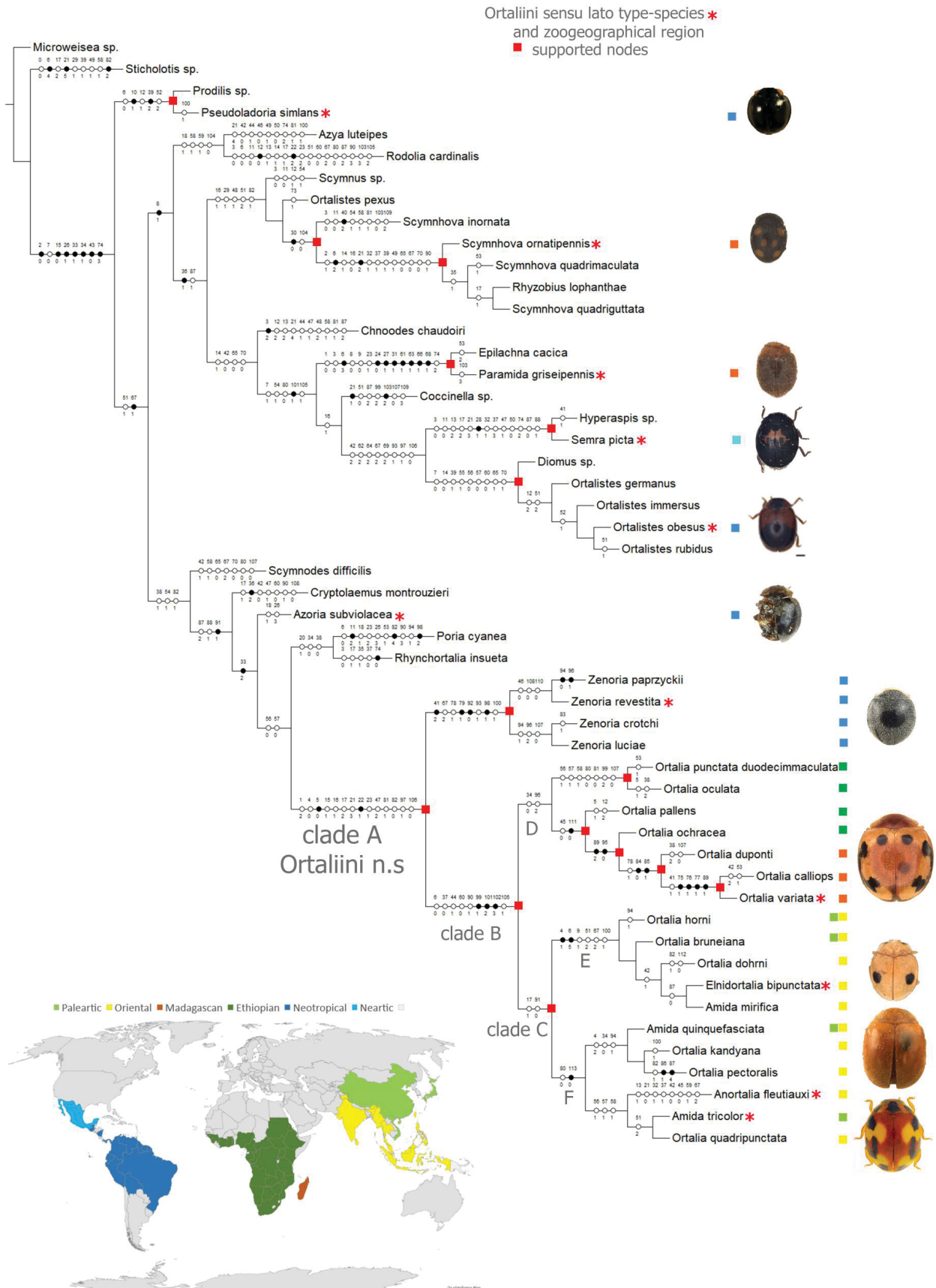
The generic relationships of the remain *Ortaliini*, *Zenoria*, *Ortalia*, *Amida*, *Anortalia* and *Elnidortalia*, are relatively resolved here, despite some those generic groups are poorly supported or recognizable by few morphological diagnostic characters. Future studies should address the question.

It should be made clear that the purpose of the work was not to test the monophyly of the genus, nor was sampling adequately. However, the results found here are relevant, as it is the first time that the type-species and more than one representative of certain genera are included in a phylogeny. The results, although inconclusive regarding the monophyly of the genera, it can aid new works.

The redefinition of the tribe is needed to base the classification on monophyletic entities.

The monophyly of Ortaliini under implied weighting is supported by 14 unambiguous transformations (RBS=100): eyes length in relation to head capsule as longer than 0.75 times (1, 2); ocular canthus prominent, narrow and elongate in front antennal insertions (4, 0); interocular distance narrow, less than 0.5 widths of the head (5, 0); antennal flagellum with distinct club (15, 1), tightly articulated (16, 1) and spindle-shaped (17, 2) in part; clypeus arcuate medially (21,3) except *Anortalia*; labrum elongate (22, 1); labral apex truncate (23, 1); elytral epipleuron with carina nearly complete (47, 2); female ventrite 5 longer than 4 (81, 1); male ventrite 5 hind margin unmodified (82, 0) in part; penis guide asymmetrical (97, 1), female genitalia with tubercles (106, 0).

Some characters used in previous analyses (Seago *et al.*, 2011; Szawaryn *et al.*, 2015) have been corroborated: large eyes (greater than 0.75 times head length), narrow interocular distance (less than 0.5 times the width of the head) and female ventrite 5 longer than 4.



[Clade A – *Zenoria* + (Clade B) sister group]

Species included. *Zenoria paprzyckii*, *Z. crotchi*, *Z. luciae*, *Z. revestita* (type-species)

Zenoria Mulsant is the second largest group of Ortaliini with about 38 species (Santos & González, 2016) distributed in the New World. This genus was recovered as monophyletic (RBS=100). No molecular data is available. The genus is treated for the first time in morphological phylogenetic analyses in Santos *et al.* 2018 (submitted). The taxa selected are distributed on Amazon and Atlantic rainforest areas in Peru and Brazil.

The monophyly of *Zenoria* is based on the unambiguous transformations: prosternal process with concave area anteriorly (41, 2); metatarsal claws in males with subquadrate tooth (67, 2); male abdominal ventrite 5 with setose fovea medially (78, 1); female ventrite 5 with setose fovea medially (79, 1); phallobase with additional sclerotized process (lateral alae *sensu* Gordon, 1971) (92, 0); phallobase with tubercles (93, 1); penis guide inner edge with small sharp teeth (98, 1); penis capsule distinctly T-shaped (100, 1).

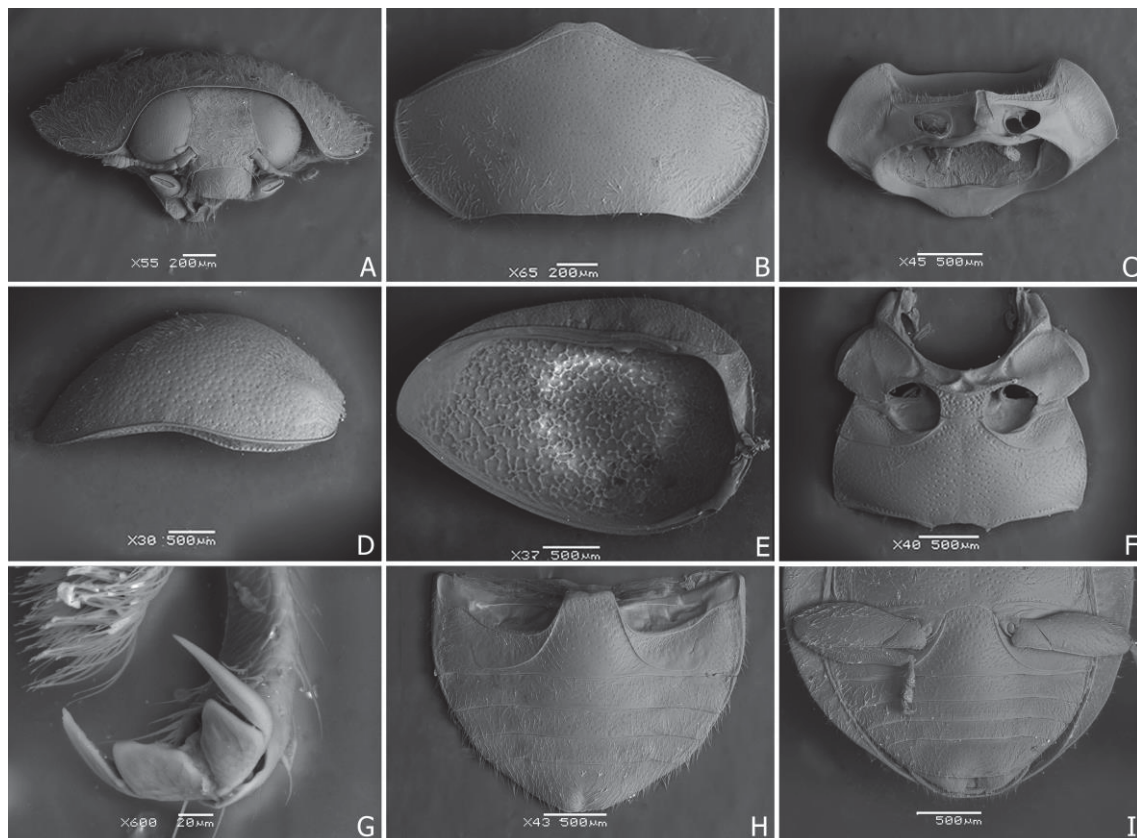


Fig. 2. *Zenoria revestita*: (A) head, dorsal; (B) pronotum; (C) prosternum; (D) elytra, lateral; (E) elytra, ventral; (F) meso-metaventricle; (G) tarsal claw, female; (H) abdomen, female; (I) abdomen, male.

According to Gordon (1971) the dorsal pubescence, elongate legs, sexual and intrasexual dimorphism in the form of the claws, the divergent carina on the epipleuron, a form of the postcoxal line, and type o male genitalia set *Zenoria* apart from any other described Coccinellidae genus.

The species of *Zenoria* are distinguished by the ventrite 6 shapes and size of the notch in males and, by the pattern of genitalia. Some species have females that can be identified by the emargination of the posterior margin of ventrite 5 (*Z. emarginata* Gordon) or by the presence of carina medially along the posterior margin of ventrite 5 (*Z. carinata* Gordon).

[Clade B + (Clade C)]

The clade B (RBS=100) is based on the unambiguous transformations: ocular inner orbits parallel, the same distance along the frons (6, 0) (in part); prosternum not prominent (37, 0); tendons of metendosternite placed close to the middle (44, 1); tarsi trimerous (60, 0); spiculum gastrale complex at apex (90, 1); penis apex complex, with additional sclerotized process (99, 1); coxites transverse (101, 2) and retangularly (102, 3); laterotergite IX (paraprocts) not more than 1.5 times as long as coxites (105, 1).

The morphological characters by Seago *et al.* (2011) for Ortaliini are the non-recurved abdominal post-coxal lines, parallel and distinctly separated from the posterior margin (vs. non-recurved, parallel and joined posterior margin in Diomini or recurved in Coccidulini). The postcoxal lines in *Amida* and *Ortalia* are wide, distinctly separated from the posterior margin, but recurved and incomplete (except in *Ortalia punctata*-group). The tendons of metendosternite placed close to the middle, coxites transverse and retangularly (Szawaryn *et al.*, 2015) have been corroborated, although the sperm duct and spermatheca are present (vs. absent) (Szawaryn *et al.*, 2015).

The results were not conclusive regarding the relationship hypotheses between the clades D, E and F (Fig. 1).

Clade D - *Species included*. *O. oculata*, *O. punctata duodecimmaculata*, *O. pallens*, *O. ochracea*, *O. duponti*, *O. calliops* and *O. variata* (type species).

The terminals grouped in clade D exhibit two unambiguous transformations: pronotum, lateroposterior angles rounded (34, 0) and parameres inflated (96, 2).

Fürsch (2006) divided African and Madagascan *Ortalia* into three species groups and an additional group to Madagascan species: placed *Ortalia punctata* Weise, 1888; *O. punctata duodecimmaculata* Weise, 1900; *O. femorata* Weise, 1917; *O. oculata* Weise, 1888; *O.*

kraatzi Weise, 1895 and *O. superba* (Mader, 1955) in *punctata*-group based on the body size (~7 mm), color pattern black with yellow and/ or red spots, the complete postcoxal lines and male genitalia with parameres and penis apex simple.

The *punctata*-group (Fürsch, 2006) was recovered in our analyses as supported (RBS=100) group of *Ortalia* species, which has, among other characters, the fore and mid trochanters rounded or angulated produced (56, 1); femur not or slightly visible from above (57, 1); protibial flattened (58, 1); ventrite 5 in males about as long or slightly longer than 4 (80, 0) and in females (81, 0); penis apex simple, but with additional weakly sclerotized process (99, 2) and infundibulum present (107, 0).

In *ochracea*-group Fürsch (2006) placed *Ortalia ochracea ochracea* Weise, 1910; *O. ochracea garambensis* Fürsch, 2006; *O. pallens* Mulsant, 1850; *O. prosternalis* Fürsch, 1960; *O. rufa* Fürsch, 2006; *O. rudepunctata* Fürsch, 2006; *O. similis* Mader, 1954; *O. sjoestedti* Weise, 1910; *O. camerunensis* Fürsch, 2006 and *O. ovulum* Weise, 1898 based on the color pattern yellowish, body size (~5 mm), incomplete postcoxal lines and distinctive male genitalia pattern.

The remaining species are embedded in a clade which have elytra with single sized punctures (45, 0) and spermatheca with the weakly sclerotized area (111, 0).

Ortalia ochracea (RBS=100) form a group with laterotergites IX in males well sclerotized and completely visible from above (89, 2) and parameres with a small internal tooth (95, 0).

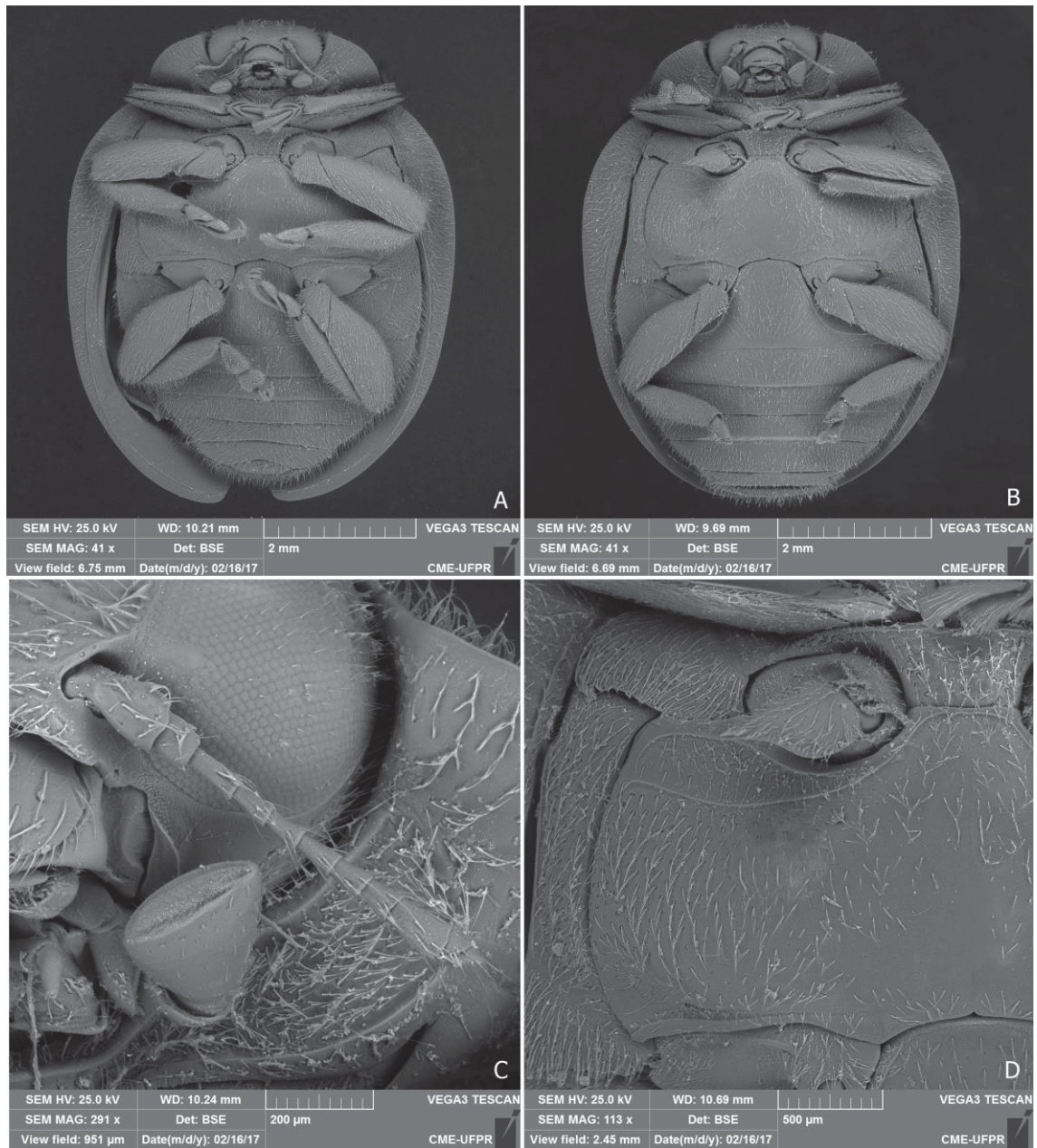


Fig. 3. *Ortalia punctata duodecimmaculata*: (A) habitus, ventral, male; (B) habitus, ventral, female; (C) antenna; (D) meso-metaventrite.

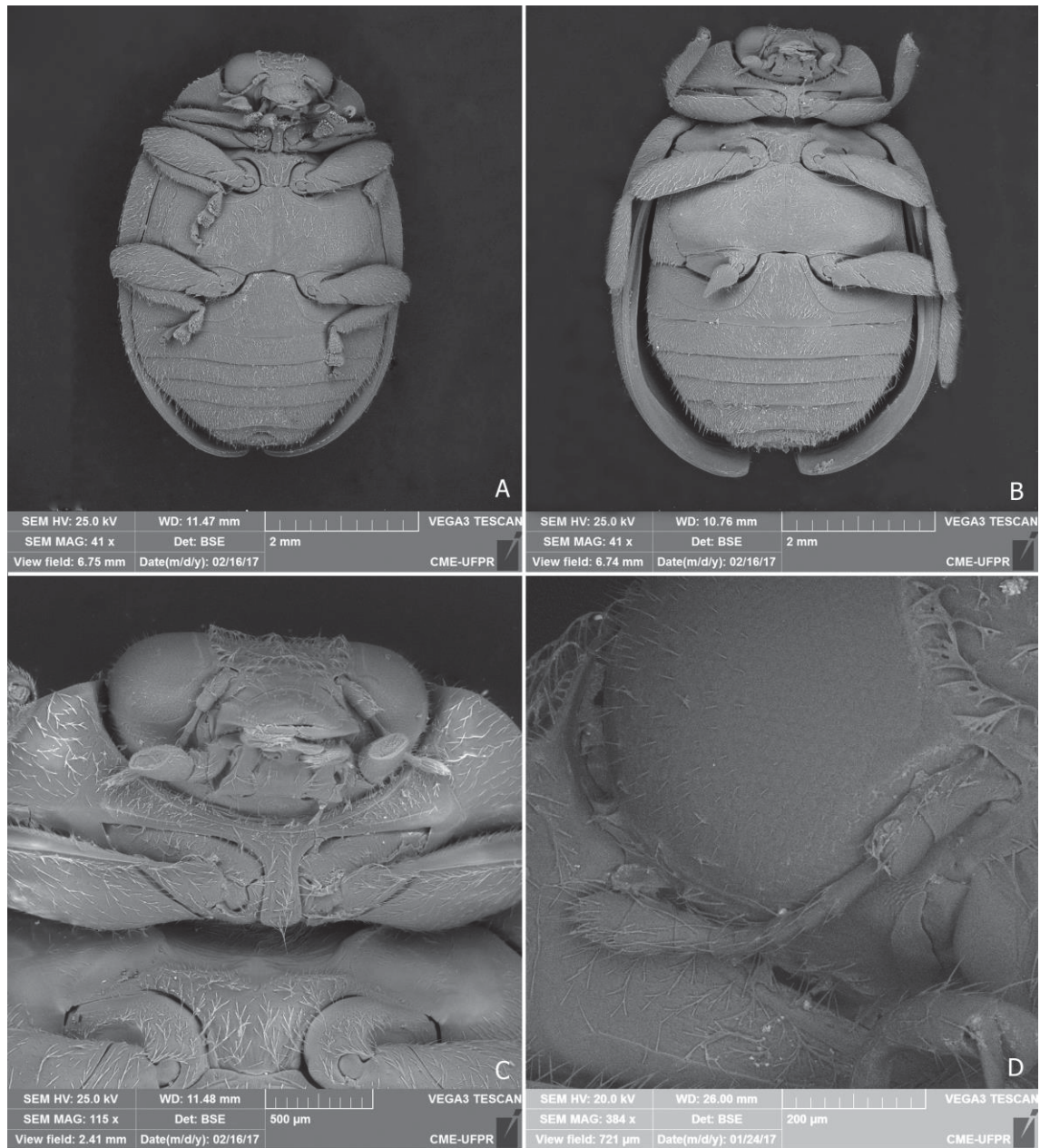


Fig. 4. *Ortalia pallens*: (A) habitus, ventral, male; (B) habitus, ventral, female; (C) prosternum and meso-metaventricle, detail; (D) antennae.

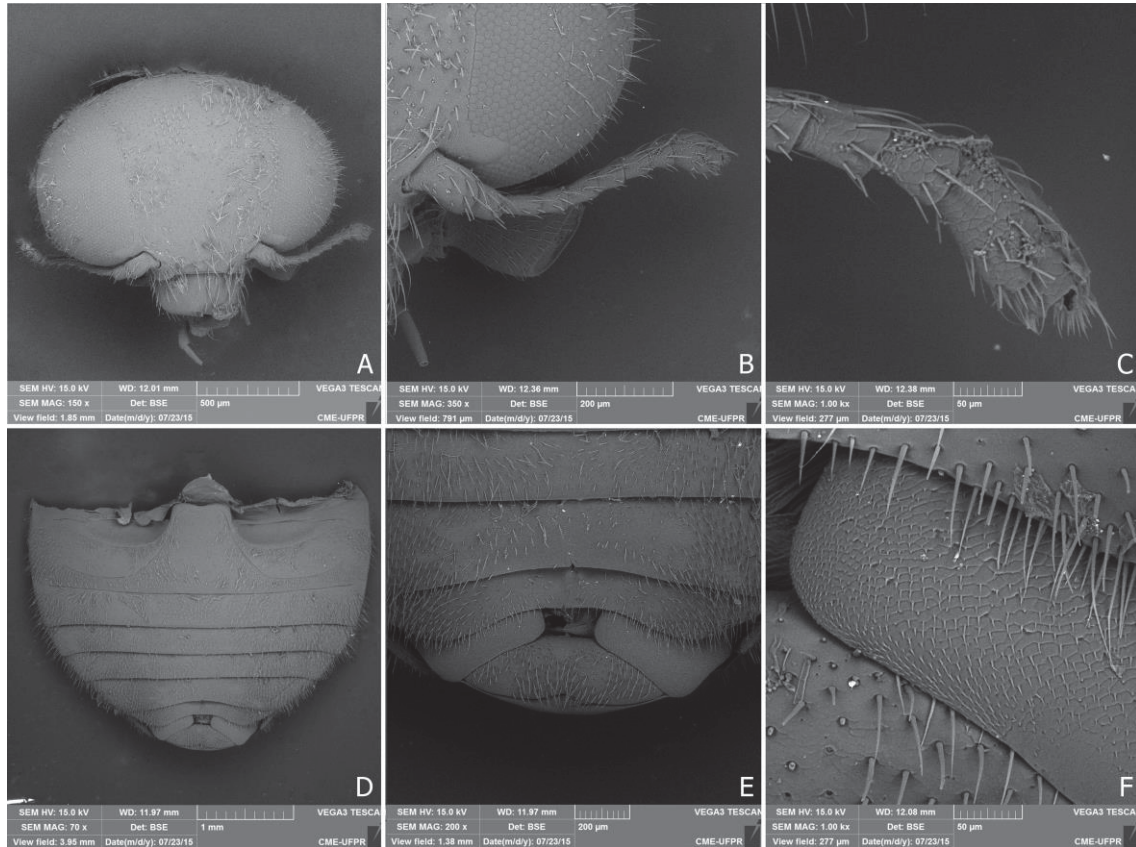


Fig. 5. *Ortalía ochracea*: (A) head, dorsal; (B) antennae; (C) antennal club; (D) abdomen, male; (E) abdominal apex, male; (F) laterotegite IX.

Madagascan species of *Ortalía* (RBS=100) forming a group by having the ventrite 5 in males with setose fovea (78, 1), the ventrite 5 in females with median tubercle, glandular opening (84, 0); ventrite 6 in males with setose fovea (85, 1).

The type-species of the genus and most of the Madagascan species of *Ortalía* are defined (RBS=100) by the prosternal process entirely concave (41, 1); ventrite 2 hind margin at middle with a small tooth in males (75, 1); ventrite 3 and 4 in males with setose fovea medially (76, 1) and (77, 1) and laterotergites IX in males visible just apically (89, 1).

In the last group, composed of the specimens from Madagascar, Fürsch (2006) allocated *Ortalía flaveola* (Klug, 1833); *O. edentulosa* Fürsch, 2006; *O. modesta* Weise, 1909; *O. globosa* Fürsch, 2006 and *O. calliops* (Güerin-Meneville, 1842) based on the color pattern yellowish and cylindrical body shape and other admittedly variable characters among the species grouped.



Fig. 6. *Ortalía duponti*: (A) antennae; (B) prosternum; (C) meso-metaventricle; (D) abdomen, male.

The results obtained here are congruent and support in part the hypothesis of grouping proposed by Försch (2006), except in part for the *ochracea*- and *flaveola*- groups, which was recovered in our analyses as well distinctive group with unique transformations. The other species in the *ochracea*-group appear to be related to different groups established here or the new groups close related.

Ortalía edentulosa Försch, 2006 and *O. globosa* Försch, 2006 probably related but do not belong to the *flaveola*-group specifically because of the absence of spine in ventrite 2 and the abdominal divergent median fovea extending to the ventrites 3 to 6.

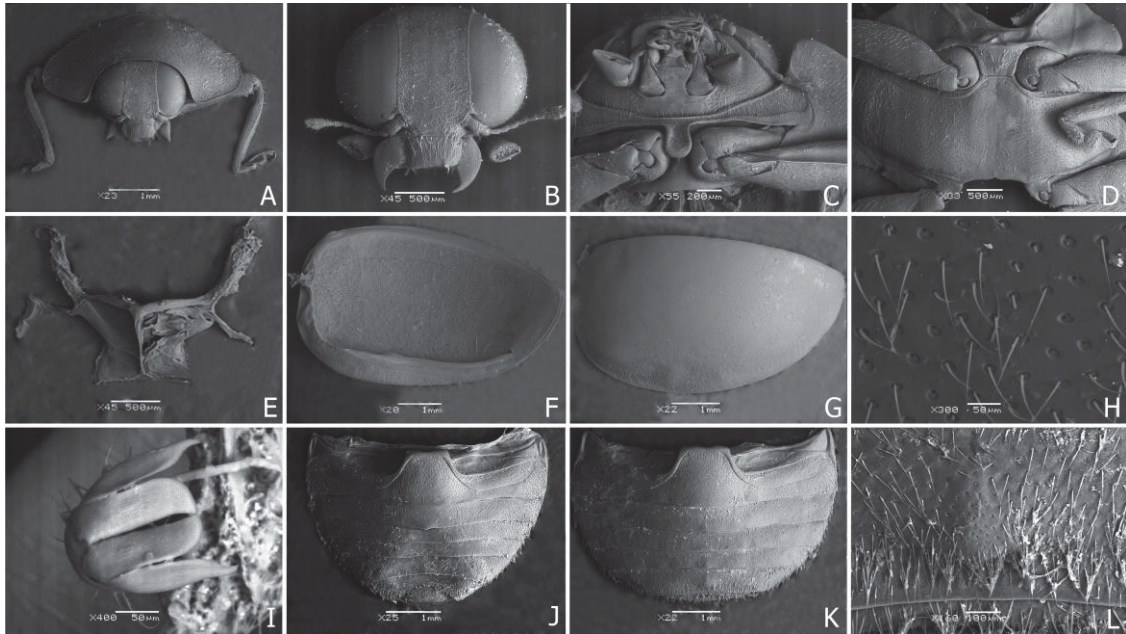


Fig. 7. *Ortalia variata*: (A) head, dorsal; (B) head, dorsal; (C) prosternum; (D) meso-metaventricle; (E) metendosternite; (F) elytra, ventral; (G) elytra, lateral; (H) elytra, punctures; (I) tarsal claws, male; (J) abdomen, male; (K) abdomen, female; (L) ventrite 5, female, glandular opening.

Ortalia x-signata-group in which the author allocated four species, *Ortalia basinigra* Mader, 1954 *Ortalia minima* Fürsch, 2001; *Ortalia x-signata* Sicard, 1912 and *Ortalia brunneocincta* Fürsch, 2001; based on the body size small, less than 4 mm, color pattern yellow or with brown markings or rings and male genitalia pattern with penis guide forked. However, *Ortalia x-signata* and *O. brunneocincta* do not have known males and only an *O. x-signata* specimen from the Sicard Collection was studied and do not included in our analyses.

Ortalia Mulsant is the largest genus of Ortaliini with ~50 species known with distribution in Africa, Madagascar, tropical Asia, including Malaysian regions (Pope, 1979; Fürsch, 2006). The African species of *Ortalia* had a poor taxonomic treatment since Mulsant (1850) and many species were described in the genus later, until Fürsch (2006) review when most of the African and some from Madagascar species were considered.

The genus is here treated for the first time including the type-species, *O. variata*. The clade including, exclusively African and Madagascan comprises species of former *Ortalia* mainly those classified in groups by Fürsch (2006).

Morphological evidence confirms that *Ortalia* type-species and related taxa are a distinct genus, most unique transformations occur in species of Ethiopian and Madagascan

regions. *Ortalia sensu lato* is para- and polyphyletic as now constituted and may be split into at least two genera in the future.

Similar modification of male ventrites 5-6 and, sometimes with ventrites 3-6 medially depressed, take different forms within Coccinellinae – Hyperaspidini Brèthes (=Brachiacanthini Duverger) genera or groups of species (Gordon *et al.*, 2013, 2014).

Some species have tubercles or similar structures (setal tuft, cusps) on one or more of the ventrites. Some *Brachiacantha* species have projections on abdominal ventrite 2. In addition to 6 visible abdominal ventrites, males apparently with 7 visible ventrites, the 7th “ventrite” is actually a modified tergite. This apical tergite varies somewhat in shape, the degree of punctuation, and the presence or absence of surface pubescence (Gordon *et al.*, 2013).

The abdominal glandular opening is present on ventrites 5 in the male of some *Scymnomorphus* Weise, 1897 species (recently been classified within the subfamily Microweiseinae) (Szawaryn, 2018). The presence and number were used to distinguish species. The homology of these structures was never tested by phylogenetic analysis and need further investigation.

Clade E - *Species included*. *Elnidortalia bipunctata*, *Ortalia horni*, *O. bruneiana*, *O. dohrni* and *Amida mirifica*.

The species embedded in clade E have the ocular canthus prominent, broad and bent in front antennal insertions (4, 1); the eyes inner orbits arcuate before the middle (6, 5); the distance between the antennal insertions equal or greater than the inner orbits (9,1); the meso-metaventral process very broad, one coxal diameter or more (51, 2); hind tarsal claws in males sexually dimorphic, with a subquadrate tooth (67, 2) and penis capsule distinctly T-shaped (100, 1). This group comprises small species (2.0 to 3.5 mm) with prosternal process completely crenate, long and slender legs and ventrite 5 in males distinctly longer than 4 (80, 1).

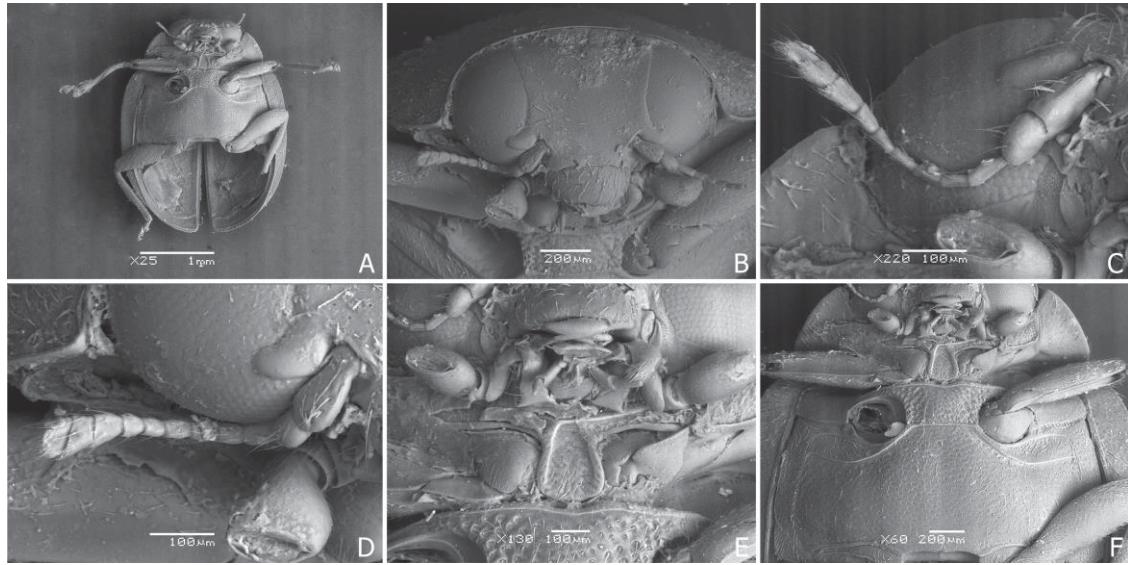


Fig. 8. *Elnidortalia bipunctata*: (A) habitus, ventral; (B) head, dorsal; (C) antennae; (D) ocular canthus; (E) prosternum; (F) meso-metaventrite.

Clade F - *Species included*. *Ortalia pectoralis*, *O. kandyana*, *Amida quinquefasciata*, *Anortalia fleutiauxi*, *Amida tricolor*, *O. quadripunctata*,

The species belong to the clade F have the ventrite 5 in males about as long than 4 (80, 0) and paired additional projections at the base of the spermatheca (113, 0). Its another mixed clade with two groups. The first group has the ocular canthus prominent small, somewhat triangular (4, 2); it's resembling Ethiopian and Madagascan *Ortalia* species in which has the pronotum lateroposterior angle rounded (34, 0) and differs by the parameres not inflated (96, 0), with an internal margin subapical tooth (94, 1).

The second group distinguished by the fore and mid trochanters angulate or roundly produced (56, 1); legs short, robust, not visible dorsally (57, 1) and protibial flattened (58, 1).

Anortalia is embedded as sister to *Amida* and have some distinctive characters: (scape slightly asymmetrical (13,1) clypeal apical margin straight (21, 1); pronotum apical margin emarginate (32, 1); prosternum weakly raised anteriorly (37, 1); prosternal process apical edge acute or narrowly rounded (42, 0); elytra with single sized punctures (45, 0); protibial angulate (59, 1); hind tarsal claws in males sexually dimorphic, with a subquadrate tooth (67, 2).

Anortalia fleutiauxi Weise, 1902 and the variation *Anortalia fleutiauxi maculata* Weise, 1902 were described to Vietnam. A taxonomic problem involves this taxons.

Ortalia jingghongiensis Pang & Mao, 1979 was described to Yunnan, China. Yu (2000) transferred it to *Amida*. *A. platycephus* Hoàng, 1982 was described to Vietnam and

synonymized to *Amida jingghongiensis* (Pang & Mao) by Yu (2000). *Amida novempunctata* Hoàng, 1982 is a female described to Vietnam. The female described as *A. novempunctata* is just a color variation of *Amida jingghongiensis* (Pang & Mao, 1979) as illustrated by Shungxiang *et al.* (2009). And also, all the species mentioned and *Anortalia fleutiauxi* Weise, 1902 and the variation *Anortalia fleutiauxi maculata* Weise, 1902 are the same species.

Variations have been described for many species of *Ortalia*, some synonymized to the species (e.g. *Ortalia flaveola* (Klug, 1833) and the variations *Ortalia flaveola binotata* Sicard, 1909 and *Ortalia flaveola quadrinotata* Sicard, 1909).

Amida, type species of the genus has differed by the meso-metaventral process very broad (51,2), as a common transformation together *Ortalia quadripunctata*.

Amida is para- and polyphyletic as now constituted and may be split into at least two genera in the future, but proper comparison is impossible now due to a lack of global revisionary work on genus level.

Amida was erected by Lewis (1896) and the new species were described only 83 years later by Pang & Mao (1979), and after Hoàng (1982, 1983, 1990), Yu (2000) and recently Recuenco-Adorada (2009) from the Philippines.

Since the works of Sasaji (1968, 1971) it was believed that *Amida* and *Ortalia* were distinct genera. *Amida* has 11-segment antennae (Sasaji, 1971; Yu, 2000) and smaller size (Yu, 2000) and *Ortalia*, which has antennae of 10-segmented and large size.

Thus, new combinations were proposed by Yu (2000) for Chinese *Ortalia* species with 11-segment antennae to *Amida*. Dr. Roger Booth had already mentioned in Poorani's checklist (2002) that a generic distinction requires other supporting characters.

Our study revealed that among the terminals, only *O. pallens* has 10-segmented antennae. And that Mulsant (1850) correctly defined the Ortaliens, despite *O. pallens*. It was Weise (1895), who redefined *Ortalia* with 10-segmented antennae. This was perfectly conceivable since this character in Ortaliini is often difficult to see.

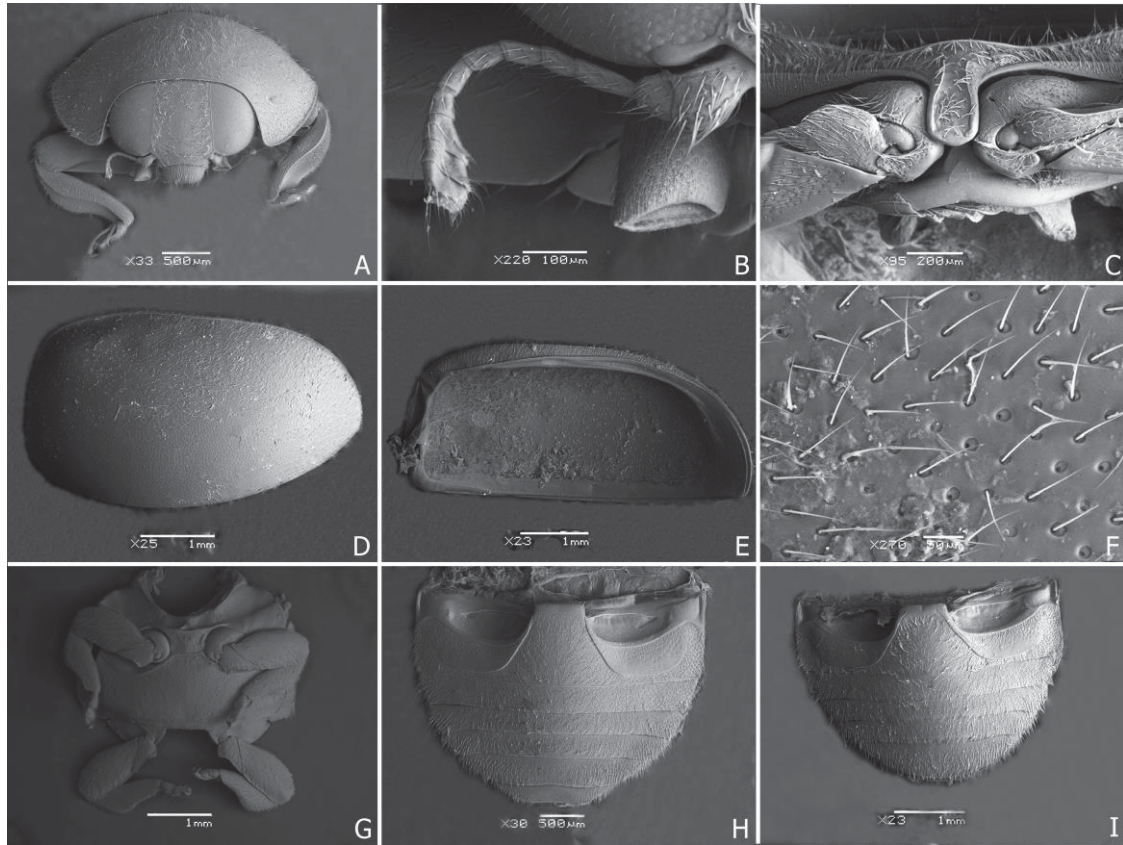


Fig. 9. *Anortalia fleutiauxi*: (A) head, dorsal; (B) antennae; (C) prosternum; (D) elytra, dorsal; (E) elytra, ventral; (F) elytral punctures; (G) meso-metaventricle; (H) abdomen, male; (I) abdomen, female.

Additionally, analyses reveal that *Amida* differs to *Ortalia* by having double size punctures, a meso-metaventral process very broad, one coxal diameter or more, metaventral postcoxal lines joined at the metacoxal process, fore and mid trochanters angulate and intercoxal process straight (Seago *et al.*, 2011; Szawaryn & Tomaszewska, 2015).

Our results also suggest that, although revealed that the *Anortalia* have a single-sized punctures (45, 0); the meso-metaventral process is broad in *Amida quinquefasciata*, *Ortalia kandyana*, *Ortalia pectoralis* and *Anortalia fleutiauxi* (51, 2); the metaventral postcoxal lines widely separated on the metaventral process (54, 0) is a condition not found in all *Ortalia* species, but only in *O. pallens* and *O. ochracea*, while *Ortalia punctata*-group have fore and mid fore and mid trochanters angulate (56, 1). The intercoxal process (73, 0) is straight both in *Amida*, *Ortalia*, *Anortalia* and *Elnidortalia* species in clade E. This character was coded here considering *Ortalistes pexus* and some outgroup terminals in which the intercoxal process is distinctly deeply emarginated.

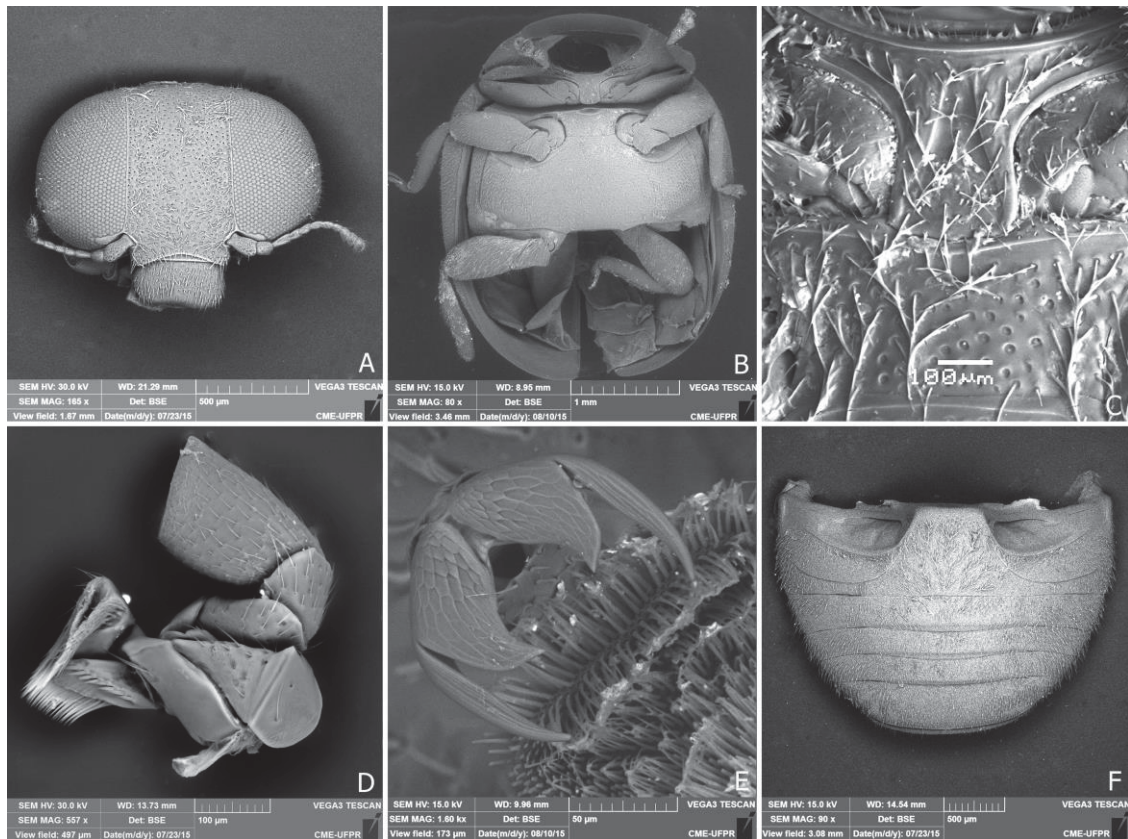


Fig. 10. *Amida tricolor*: (A) head, dorsal; (B) habitus, ventral; (C) prothorax; (D) maxillary palp; (E) tarsal claw; (F) abdomen, female.

Another difference, cited by the authors, between *Amida* and *Ortalia*, is the prosternal process crenate. All Palearctic and Oriental species of *Amida*, *Ortalia*, *Anortalia*, *Elnidortalia* and Neotropical *Zenoria* have this condition but in different states.

The character that seemed decisive in distinguished species the clade C was the tergite X not visible from above (91, 0).

The tergite X prominent in males (91, 1), projecting outside and closer with the last abdominal ventrite, is a common transformation of *Cryptolaemus*, *Poria*, *Rhynchortalia*, *Zenoria* and Ethiopian and Madagascan *Ortalia* species. Unfortunately, this character was not used in the previous analyses but described in the revision works of Australian and Papuan *Cryptolaemus* and *Rhynchortalia* by Poorani & Ślipiński (2010) and Poorani *et al.* (2014). The affinities among *Cryptolaemus*, *Rhynchortalia*, and *Ortalia* were briefly discussed by Poorani & Ślipiński (2010). All these genera and *Zenoria*, have the abdominal apex and subgenital plate in males highly modified.

Recent phylogenetic studies on Coccinellidae using both morphological and molecular analyses have also indicated that *Cryptolaemus* and *Rhynchortalia* form a significantly

supported clade and placed as a sister taxon to ‘Azyini’ (Seago *et al.*, 2011) in the same polytomy as Ortaliini, sister to Diomini.

Analyses conducted by Giorgi *et al.* (2009), Magro *et al.* (2010), Aruggoda *et al.* (2010), Szawaryn *et al.* (2015) and Robertson *et al.* (2015) suggested the Ortaliini relationship with the different and currently recognized Coccidulini (*Stethorus*, *Sumnius*, *Rhyzobius*, *Scymnus*). The Coccidulini constitute a polyphyletic group (Vandenberg, 2002), difficult to characterize as it includes many diverse taxa (Ślipiński, 2007), and form an unresolved backbone of the Coccinellidae tree and could not be conclusively divided into monophyletic groups (Seago *et al.*, 2011). These analyses supported the monophyly of Coccinellidae as well as clades comprising Coccinellinae and Epilachninae in the traditional sense (Seago *et al.*, 2011).

Classification

The summary of a generic classification of the tribe that currently includes 5 genera. Genera for which monophyly or position are still uncertain are left unchanged.

Diagnosis.

Ortaliini n.s. can be distinguished from all coccinellids by the following combination of characters: eyes longer than 0.75 times head length, finely faceted, densely setose, with ocular canthus extending slightly into the eyes, prominent, interocular distance narrow (less than 0.5 times the head width), antennal insertions exposed, antenna long, 10 or 11-segmented, distinctly clubbed, compactly articulated, labrum elongate, truncate at apex, prosternum short in front of coxae with a well-developed line or carina fading on notosternal suture, elytra epipleuron with line or carinae nearly complete, ventrite 5 in females longer than 4, penis guide asymmetrical.

Ortalia* Mulsant, 1850 *n.s.

Type species. *Ortalia variata* Mulsant, 1850

Distribution. Ethiopic and Madagascar

***Zenoria* Mulsant, 1850**

Type species. *Zenoria revestita* Mulsant, 1850

Distribution. Neotropical

Elnidortalia* Recuenco–Adorada, 2011 *n. s.

Type species. Elnidortalia bipunctata Recuenco–Adorada, 2011

= part of *Ortalia* Mulsant, 1850

Distribution. Oriental and Palearctic

***Amida* Lewis, 1896 n. s.**

Type species. Scymnus (Nephus) tricolor Harold, 1878

= part of *Ortalia* Mulsant, 1850

Distribution. Oriental and Palearctic

***Anortalia* Weise, 1902**

Type species: *Anortalia fleutiauxi* Weise, 1902

= *Amida jinghongiensis* (Pang & Mao, 1979) (= *Ortalia jinghongiensis* Pang & Mao, 1979 = *Amida platyceps* Hoàng, 1982: 187) **new synonym**

= *Amida novempunctata* Hoàng, 1982: 185 **new synonym**

Distribution. Oriental and Palearctic

The results were not conclusive as to the relationship hypotheses among the clades D, E and F, and their internal relationships. *Amida* and *Ortalia* need to be revised, one or more species-groups may become new genera.

Furthermore, six genera and 13 species belong to the recognized tribes and do not remain nested in *Ortaliini n.s.* based on the distinctive character set.

Genera excluded from Ortaliini n.s.

The following genera do not belong to *Ortaliini* and should be placed in other tribes based on our phylogenetics results:

***Azoria* Mulsant, 1850**

Azoria Mulsant, 1850: 902; Lacordaire in Chapuis, 1876: 206 (key), 208; Gemminger & Harold, 1876: 3800; Korschefsky, 1931:109; Fürsch, 1990: 7-18; Nedvěd & Kovář, 2012: 530. Type-species. *Azoria subviolacea* Mulsant, 1850.

***A. subviolacea* Mulsant, 1850 (Figs 11A, B)**

Azoria subviolacea Mulsant, 1850: 902; Lacordaire in Chapuis, 1876: 206 (key), 208; Gemminger & Harold, 1876: 3800; Korschefsky, 1931:109; Fürsch, 1990: 7-18. Holotype. Type-locality. Unknown in MNHN.

Distr.: Unknown.



Fig. 11. *Azoria subviolacea*: (A) habitus, dorsal; (B) label data.

Comments. A single specimen found in the Mulsant Collection is almost certainly an unmarked type. That specimen bearing the labels “243” “*Azoria/subviolacea*/Aut det.” “Museum Paris/1943/col. É. Mulsant” is the Holotype fixed by monotypy of *Azoria subviolacea* Mulsant, 1850 (ICZN 73.1.2.).

Despite the specimen was not dissected and damage, it is being indicated here provisionally to Coccidulini Mulsant, 1846. The following characters justify this change: the eyes emarginate with ocular canthus lobe-like; interocular distance broad, 0.50–0.75 width of head; antenna with 11 articles, loosely articulated with weakly developed saw-toothed club, terminal antennomere truncate; labrum transverse; terminal maxillar palpus strongly securiform; tarsi cryptotetramerous; abdomen with 6 ventrites; abdominal post-coxal lines recurved, rounded and complete.

***Ortalistes* Gorham, 1897**

Ortalistes Gorham, 1897 Gorham, 1897: 224; Korschefsky, 1931:106; Blackwelder, 1945: 443; Oman, 1934: 73–74 (biol.); Fürsch, 1990: 7–18; Nedvěd & Kovář, 2012: 530. Type species. *Ortalistes obesus* Gorham, 1897.

***O. germanus* Gorham, 1897 (Figs 12C, D)**

Ortalistes germanus Gorham, 1897: 224 (habitus fig.); Korschefsky, 1931: 106. Lectotype, male. Type–locality. Guatemala (San Juan, Vera Paz) in BMNH.

Ortalistes germana: Blackwelder, 1945: 443.

Distr.: Guatemala (Verapaz: Cubilguitz, Sinanja, Tamahu, San Juan). [Neotropical Region]

Comments. The specimen which was indicated by Gordon (not published) and bearing the following labels (1) “San Juan/Vera Paz/Champion” “*Ortalistes/germanus* Gorh” “B.C.A. Col. VII” “SYNTYPE” “LECTOTYPE/*Ortalistes/germanus*/Gorham/Gordon 1970” is a Lectotype by present designation.

One specimen from Panama (Volcan Chiriqui) with a small variation on the color pattern than the others was not included in the paralectotype series.

Ortalistes germanus Gorham, 1897 is being indicated here provisionally to Diomini Gordon, 1999. The following characters justify this change: eye large, finely faceted, with interfacetal setae, distinctly notched near antennal insertion by small triangular ocular canthus; inner orbits arcuate; tarsi trimerous; abdominal postcoxal lines not recurved, reaching the hind margin of ventrite 1, fading laterally, incomplete; female genitalia with coxites broad, triangular plates.

Booth (2006) recorded other specimens from four different localities in MNHN, but it was not found.

Examined material. GUATEMALA. (1) “San Juan/Vera Paz/Champion” “*Ortalistes/germanus* Gorh” “B.C.A. Col. VII” “SYNTYPE” “LECTOTYPE/*Ortalistes/germanus*/Gorham/Gordon 1970” [BMNH] (1) “Sinanja/Vera Paz/Champion” “B.C.A. Col. VII./*Ortalistes/germanus* Gorh” “SYNTYPE” [BMNH, female dissected]. (1) “Tamahu/Vera Paz/Champion” “*Ortalistes/germanus* Gorh” “sp. figured” “Type” “B.C.A. Col. VII” “SYNTYPE” [BMNH].



Fig. 12. *Ortalistes obesus*: (A) habitus, dorsal; (B) habitus, ventral; *Ortalistes germanus*: (C) habitus, dorsal; (D) habitus, ventral; *Ortalistes immersus*: (E) habitus, dorsal; (F) habitus, ventral; *Ortalistes rubidus*: (G) habitus, dorsal; (H) habitus, ventral; *Ortalistes pexus*: (I) habitus, dorsal; (J) habitus, lateral; (K) habitus, ventral.

***O. immersus* Gorham, 1897 (Figs 12E, F)**

Ortalistes immersus Gorham, 1897: 225 (habitus fig.); Korschefsky, 1931: 106. Lectotype, male. Type-locality. Mexico (Tabasco: Teapa) in BMNH.

Ortalistes imersa: Blackwelder, 1945: 443.

Distr.: Mexico (Tabasco: Teapa), Panama (Bugaba). [Nearctic and Neotropical (Panameian) Region]

Comments. The specimen which was indicated by Gordon (not published) and bearing the following labels “Teapa/Tabasco/Feb. H.H.S.” “*Ortalistes/immersus*/Gorham” “Type” “B.C.A. Col. VII” “SYNTYPE” “LECTOTYPE/*Ortalistes/immersus*/Gorham/Gordon 1970” is a Lectotype by present designation.

Ortalistes immersus Gorham, 1897 is being indicated here provisionally to Diomini Gordon, 1999. The following characters justify this change: eye large, finely faceted, with interfacetal setae, distinctly notched near antennal insertion by small triangular ocular

canthus; inner orbits arcuate; prosternal process short, broad, with convergent carinae extending to, merging near apex; mesoventrite, short, meso-metaventral process arcuate anteriorly; tarsi trimerous; abdominal postcoxal lines not recurved, reaching the hind margin of ventrite, fading laterally, incomplete; female genitalia with coxites broad, triangular plates.

Examined material. MEXICO. (1) “Teapa/Tabasco/Feb. H.H.S.”
 “*Ortalistes/immersus*/Gorham” “Type” “B.C.A. Col. VII” “SYNTYPE”
 “LECTOTYPE/*Ortalistes/immersus*/Gorham/Gordon 1970” [BMNH].

PANAMA. (1) “David/Panama/Champion” “*Ortalistes/immersus*/Gorham” “Syntype”
 [BMNH, female dissected]. (1) “David/800–1500 ft./Champion”
 “*Ortalistes/immersus*/Gorham” “SYNTYPE” [BMNH, exemplar lost, only labels]

***O. obesus* Gorham, 1897 (Figs 12A, B)**

Ortalistes obesus Gorham, 1897: 224; Korschevsky, 1931: 106; Fürsch, 1990: 7–18.

Lectotype, female. Type-locality. Panama (Bugaba) in BMNH.

Ortalistes obesa: Blackwelder, 1945: 443.

Distr.: Panama (Bugaba) [Neotropical (Panamaian) Region]

Comments. The specimen which was indicated by Gordon (not published) and bearing the following labels “Buagaba/Panama/Champion” “sp. figured” “*Ortalistes/obesus* Gorh” “B.C.A. coll VII” “LECTOTYPE/*Ortalistes/obesus*/Gorham/Gordon 1970” is a Lectotype by present designation.

Ortalistes obesus Gorham, 1897 is being indicated here provisionally to Diomini Gordon, 1999. The following characters justify this change: eye large, finely faceted, with interfacetal setae, distinctly notched near antennal insertion by small triangular ocular canthus; inner orbits arcuate; prosternal process short, broad, with convergent carinae extending to, merging near apex; mesoventrite, short, meso-metaventral process arcuate anteriorly; tarsi trimerous; abdominal postcoxal lines not recurved, reaching the hind margin of ventrite, fading laterally, incomplete; female genitalia with coxites broad, triangular plates.

Examined material. PANAMA. (1) “Buagaba/Panama/Champion” “sp. figured”
 “*Ortalistes/obesus* Gorh” “B.C.A. coll VII”
 “LECTOTYPE/*Ortalistes/obesus*/Gorham/Gordon 1970” [BMNH, female] (1)

“David/Chiriqui/Champion” “B.C.A. coll VII/ *Ortalistes/obesus* Gorh” “*Oralistes*” “Type” [BMNH, female].

***Acanthoscymnus* gen. nov. (Figs 12I-K)**

Type-species. *Ortalistes pexus* Gorham, 1897

***Acanthoscymnus pexus* (Gorham, 1897)**

Ortalistes pexus Gorham, 1897: 225; Korschefsky, 1931: 106 Lectotype, male. Type–locality. Guatemala (Senahú, Vera Paz) in BMNH.

Ortalistes pexa: Blackwelder, 1945: 443.

Distr.: Guatemala (Verapaz: Senahú,) [Neotropical Region]

Comments. The specimen which was indicated by Gordon (not published) and bearing the following labels “TYPE” “Senahu/Vera Paz/Champion” “*Ortalistes/pexus* Gorham/type” Champion “B.C.A. Col. VII” “LECTOTYPE/*Ortalistes/pexus*/Gorham/Gordon 1970” “SYNTYPE” is a Lectotype by present designation.

The more numerous series described by Gorham (24 specimens), however its a mixed series with the different genera.

Ortalistes pexus Gorham, 1897 is being indicated here provisionally to Coccidulini. The new generic name is proposed *Acanthoscymnus* (latin *acanthos*) related to the median spiniform projection on metasternum and the affinities with *Scymnus*.

The following characters justify this change: eyes emarginate, ocular canthus triangular, not prominent; inner orbits convex; antenna long with 11 antennomeres; frons wide; labrum short, transverse, rounded apically; prosternal process with a parallel carina, joined to the anterior margin of the prosternum; metasternum with a discrien and median spiniform projection on posterior margin; tarsi cryptotetramerous; tarsal claws bifid in both sex; abdominal intercoxal process deeply emarginate; abdominal postcoxal lines recurved, rounded and complete as *Scymnus* type.

The conspicuous spiniform projection (Figs 12J, K) and the intercoxal process emarginate are present both in males than in females, but in females are somewhat less developed.

Examined material. GUATEMALA. (1) “TYPE” “Senahu/Vera Paz/Champion” “*Ortalistes/pexus* Gorham/type” Champion “B.C.A. Col. VII”

“LECTOTYPE/*Ortalistes/pexus*/Gorham/Gordon 1970” “SYNTYPE” [BMNH, male]. (2) “Senahu/Vera Paz/Champion” “B.C.A. Col. VII/*Ortalistes/pexus* Gorh” “SYNTYPE” [BMNH, male] (1) “Atoyac/Vera Cruz/May. H.H.S.” “*O. pexus*” “B.C.A. Col. VII” “SYNTYPE” [BMNH, female] (1) “San Juan,/Vera Paz/Champion” “B.C.A. Col. VII/*Ortalistes/pexus* Gorh” “SYNTYPE” [BMNH, male] (1) “San Juan,/Vera Paz/Champion” “*Ortalistes/pexus* Gorh” “B.C.A. Col. VII” “SYNTYPE” [BMNH, male] (1) “San Juan,/Vera Paz/Champion” “*Ortalistes/pexus* Gorh” “SYNTYPE” [BMNH, male] (1) “69435” “Type” “Gmatin” “Senahu,/Vera Paz/Champion” “Fry Coll/1905–100” “*Ortalistes/pexus* Gorh” “B.C.A. Col. VII/*Ortalistes/pexus* Gorh” “SYNTYPE”

***O. rubidus* Gorham, 1897 (Figs 12G, H)**

Ortalistes rubidus Gorham, 1897: 224; Korschefsky, 1931: 106; Böving & Craighead, 1931: 38; Oman, 1934: 73–74 (biol.); 73–74. Lectotype, female. Type-locality. Panama in BMNH. Distr.: Panama (Chiriqui). [Neotropical Region]

Comments. The specimen which was indicated by Gordon (not published) and bearing the following labels (1) “David/Panama/Champion” “B.C.A. coll VII” “LECTOTYPE /*Ortalistes/ rubidus/* Gorham/Gordon 1970” is a Lectotype by present designation.

Ortalistes rubidus Gorham, 1897 is being indicated here provisionally to Diomini Gordon, 1999.

The following characters justify this change: body elongate, nearly parallel sided; eye large, finely faceted, with interfacetal setae, distinctly notched near antennal insertion by small triangular ocular canthus; inner orbits arcuate; prosternal process short, broad, with convergent carinae extending to, merging near apex; meso–metaventral process straight; tarsi trimerous; abdominal postcoxal lines not recurved, reaching the hind margin of ventrite, fading laterally, incomplete; female genitalia with coxites broad, triangular plates.

Examined material. PANAMA. (1) “David/Panama/Champion” “B.C.A. coll VII” “LECTOTYPE /*Ortalistes/ rubidus/* Gorham/Gordon 1970” [BMNH, female] (1) “David/Chiriqui/Champion” “*Ortalistes/rubidus* Gorh” “Type” [BMNH, male].

***Paramida* Sicard, 1909**

Paramida Sicard, 1909: 134, 135; Korschefsky, 1931: 105; Mader, 1954: 37; Fürsch, 1990: 7–18; Nedvěd & Kovář, 2012: 530. Type-species. *Paramida griseipennis* Sicard, 1909.

***P. griseipennis* Sicard, 1909 (Figs 13A, B, C, D)**

Paramida griseipennis Sicard, 1909: 134, 135-136; Korschefsky, 1931: 105; Fürsch, 1990: 7-18. Lectotype, male. Type-locality. Madagascar (Ambohimombo) in MNHN.

Distr.: Madagascar (Ambohimombo) [Fianarantsoa]. [Madagascan Region]

Comments. Lectotype by present designation. *Paramida griseipennis* Sicard, 1909 is being indicated here to Epilachnini Mulsant, 1846.

The following characters justify this change: the eyes less than 0.5 times length of head capsule; inner orbits of eyes not emarginate in anterior view, emarginate anteromedially, closer near vertex than near mouthparts; frons wide; labrum transverse, truncate apically; antenna with 11 articles; mandible with multidentate apex; prementum oval; mentum widest at base; prosternal process without carina; abdominal postcoxal lines recurved, rounded and complete; tarsal claws multidentate.

According to phylogenetic analyses (Szawaryn *et al.* 2015), the tribe Epilachnini is strongly supported as monophyletic group embedded in the subfamily Coccinellinae *sensu* Ślipiński (2007). Morphological synapomorphies of the tribe include the inner orbits of eyes emarginate anteromedially, closer near vertex than near mouthparts (except *Megatela*), mandible with multidentate apex and without a molar part, and labial prementum oval (Tomaszewska & Szawaryn, 2016).

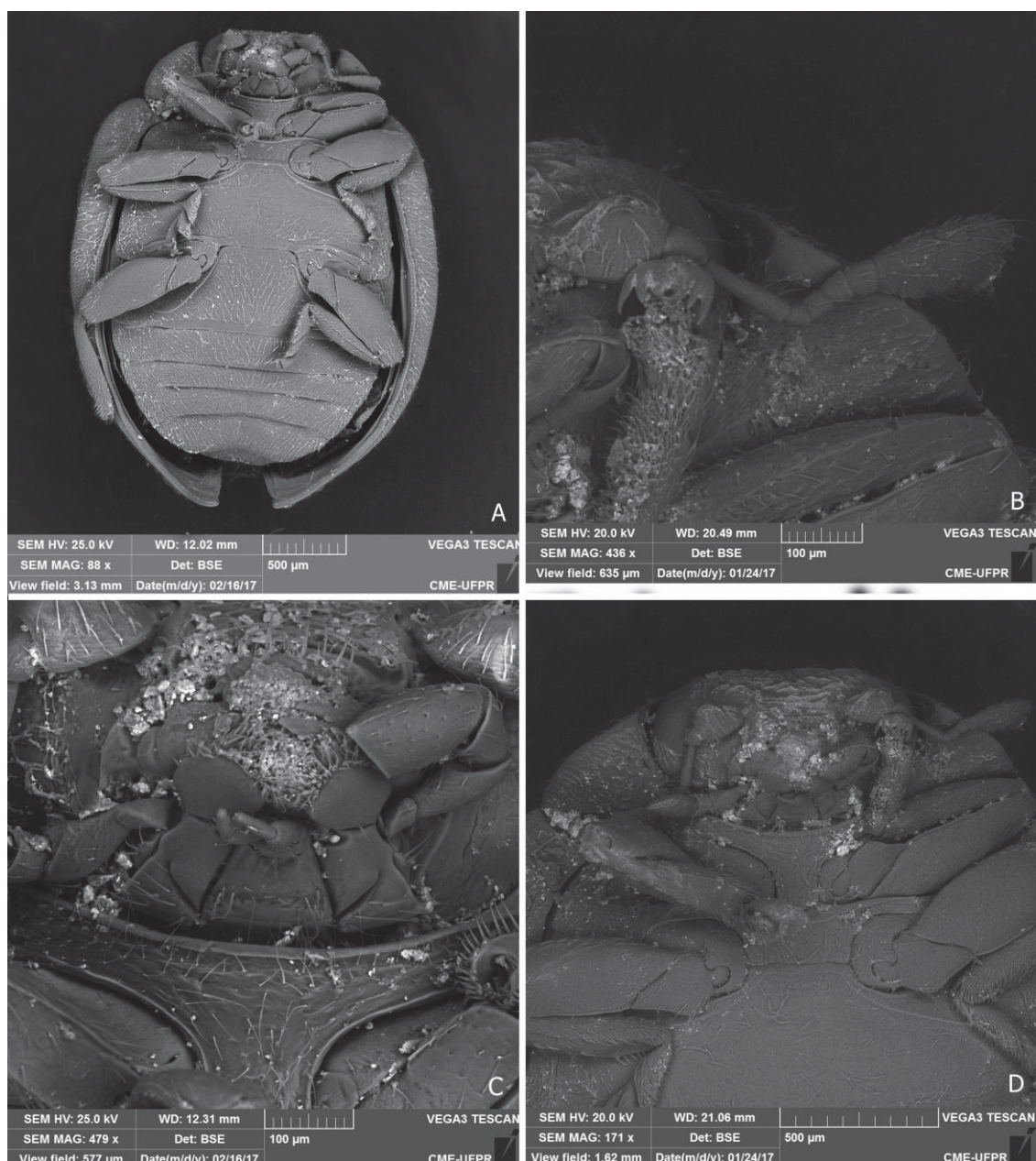


Fig. 13. *Paramida griseipennis*: (A) habitus, ventral; (B) antennae; (C) mouth parts; (D) habitus, ventral, details.

Examined material. MADAGASCAR. (2) “Type” [MNHN Sicard Collection, one male, one female].

Pseudoladoria Crotch, 1874

Pseudoladoria Crotch, 1874: 278; Gemminger & Harold, 1876: 3800; Korschefsky, 1931:108; Blackwelder, 1945: 443. Gordon, 1987: 33. Type-species. *Pseudoladoria simulans* Crotch, 1874.

Zenoria peruviana Kirsh, 1876: 125; Weise, 1910: 60; Blackwelder, 1945: 443.

***P. simulans* Crotch, 1874 (Figs 14A, B)**

Pseudoladonia simulans Crotch, 1874: 278; Gemminger & Harold, 1876: 3800; Korschevsky, 1931:108; Blackwelder, 1945: 443. Holotype, male. Type-locality. Brasil, Ega in CAMZM. Distr.: Brasil (Ega) [Tefé].

Comments. *Pseudoladonia* is being indicated here provisionally to Cephaloscymnini Gordon, 1985. The following characters justify this change: head deflected ventrally; eye large, narrow, elongate, finely faceted; apex of clypeus truncate; frons wide, anterolateral angle raised around antennal insertion, slightly concealing basal antennal article; antenna short, with 9 articles, club compact with 3 articles; maxillary palpus large, elongate, sides parallel, apex obliquely truncate; pronotum deeply excavated for reception of head; prosternal process very broad; abdominal postcoxal line complete; male genitalia simple, of basal coccinellid type, symmetrical.

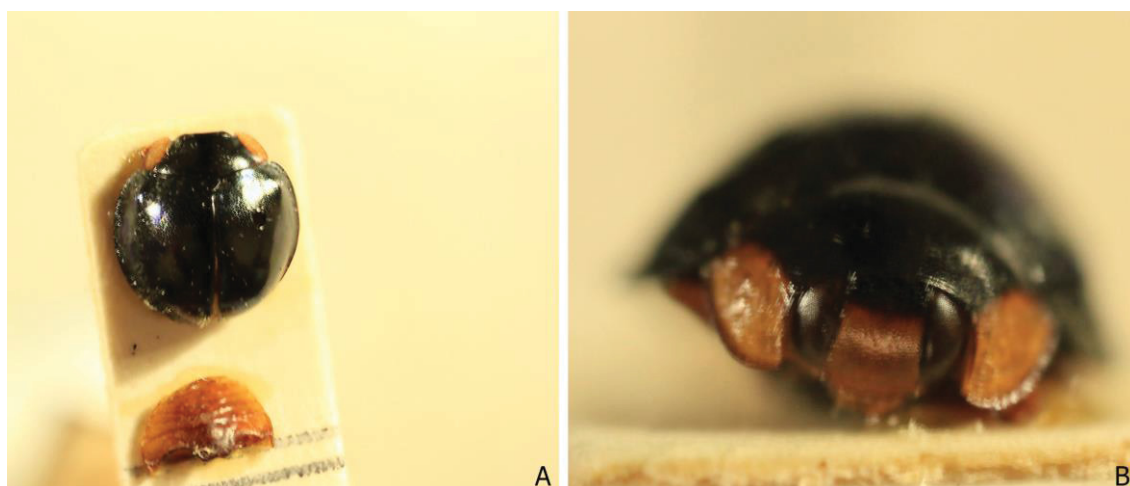


Fig. 14. *Pseudoladonia simulans*: (A) habitus, dorsal, abdomen; (B) habitus, frontal.

***Scymnhova* Sicard, 1909**

Scymnhova Sicard, 1909: 134 (key), 136–139; Korschevsky, 1931: 105 (cat.); Mader, 1954: 37; Fürsch, 1990: 27 (list); Nedvěd & Kovář, 2012: 530. Type-species. *Scymnhova ornatipennis* Sicard, 1909. Type-locality. Port St. John, Pondoland, Madagascar

According to phylogenetic analyses (Seago *et al.* 2011), the tribe Coccidulini (including Stethorini, Scymnini, Selvadini, Cranophorini, Poriini) form an unresolved backbone of the tree and could not be conclusively divided into monophyletic groups. The genus *Rhyzobius* appears to be polyphyletic and the authors suggested a revisionary work. The Australian genera *Apolinus* Pope & Lawrence and *Scymnodes* Blackburn do not form a

monophyletic group as suggested by Pope and Lawrence (1990) and Poorani and Slipinski (2009) (Seago *et al.*, 2011). The former clusters with South American *Poria* Mulsant (Poriini); the latter is placed in the polytomy subtending (*Apolinus* + *Poria*), Aspidimerini, Hyperaspini, Platynaspini, Epilachnini, Old World *Rhyzobius*, and *Cranophorus*; and Australian and Papuan *Cryptolaemus* Mulsant and *Rhynchortalia* Crotch form a significantly supported clade placed as a sister taxon to ‘Azyini’ and ‘Scymnini’ form a clade except for the removed *Horniolus* Weise (sister to Noviini) (Seago *et al.*, 2011).

***S. inornata* Sicard, 1931 (Figs 15A-F)**

Scymnhova inornata Sicard, 1931: 509-510. Lectotype, male. Type-locality. Port St. John, Pondoland in BMNH.

Distr.: South Africa (Port St. Johns, Pondoland) [Ethiopian Region]

Comments. Lectotype by present designation. *Scymnhova inornata* Sicard, 1931 is being indicated here provisionally to Coccidulini Mulsant, 1846.

The following characters justify this change: the body elongate oval; eyes finely faceted, rounded, not emarginate; antennae composed of 11 antennomeres, club distinct; clypeus truncate anteriorly; labrum transverse, apical margin rounded; mentum with an invert U-shaped impression; prosternal process with an inverted Y-shaped carina; femur broad and flattened; tarsi cryptotetramerous; abdominal postcoxal lines recurved, rounded and complete; abdomen with six ventrites in both sex; male genitalia simple, symmetrical; female genitalia with coxites elongate and paired longitudinal struts or baculi.



Fig. 15. *Scymnhova inornata*: (A) habitus, dorsal; (B) habitus, frontal; (C) habitus, ventral, male; (D) habitus, ventral, female; (E) habitus, ventral, female, details; (F) habitus, ventral, male, details.

Examined material. MADAGASCAR. (1) “Type RED” “S. Africa” “R.E. Turner/Brit. Mus./1923–286” “Port St. John,/Pondoland/April 5–30 1923” ‘*Scymnhova/ inornata*/n.sp. type’[BMNH, male]. (1) “S. Africa” “R.E. Turner/Brit. Mus./1923–363” “Port St. John,/Pondoland/April 12–30 1923” ‘syntype BLUE’[BMNH, female].

***S. ornatipennis* Sicard, 1909 (Fig. 16A)**

Scymnhova ornatipennis Sicard, 1909: 136-137, 138 (key); Korschefsky, 1931: 105. Holotype, male. Type-locality. Mt. d’Ambre, Madagascar. Holotype, male. Type-locality. Madagascar (Mt. d’Ambre) in MNHN.

Distr.: Madagascar (Mt. d’Ambre). [Madagascan Region]

Comments. A single specimen found in the Sicard Collection is a type. The specimen bearing the labels “Mt d’Ambre/Madagascar” “Type” is the Holotype fixed by monotypy of *Scymnhova ornatipennis* Sicard, 1909 (ICZN 73.1.2.).

Scymnhova ornatipennis Sicard, 1909 is being indicated here provisionally to Coccidulini Mulsant, 1846. The following characters justify this change: the frons wide, eyes coarsely faceted, emarginate; antennae composed of 11 antennomeres; anterior clypeal margin straight medially with lateral rounded lobes; prothoracic hypomera without anterior C-shaped cavities; mentum with an invert U-shaped impression; prosternum in front of coxa about as long as coxal longitudinal longitudinal diameter; prosternal process with an inverted V-shaped carina, flat; meso–metaventral process straight, metaventral postcoxal lines not joined at middle, femur broad and flattened; tarsi cryptotetramerous; tarsal claws simple or swollen at base; abdominal postcoxal lines recurved, rounded and complete; abdomen with six ventrites in male and female; male genitalia simple symmetrical.

***S. quadriguttata* Sicard, 1909 (Fig. 16B)**

Scymnhova quadriguttata Sicard, 1909: 138-139 (key); Korschefsky, 1931: 105. Lectotype, male. Type-locality. Ambovambé in MNHN.

Distr.: Madagascar (l’Androy, Ambovambé) [Madagascan Region]

Comments.

Scymnhova quadriguttata Sicard, 1909 is being indicated here provisionally to Coccidulini Mulsant, 1846. The following characters justify this change: the frons wide, eyes small, coarsely faceted, emarginate, inner orbits convergent, closer near vertex than anteriorly; antennae composed of 11 antennomeres; anterior clypeal margin straight medially with lateral rounded lobes; prothoracic hypomera with anterior C-shaped cavities; mentum with an invert U-shaped impression; prosternum in front of coxa about as long as coxal longitudinal diameter; prosternal process with an inverted V-shaped carina, flat; meso–metaventral process straight, metaventral post-coxal lines not joined at middle, femur broad and flattened; tarsi cryptotetramerous; tarsal claws simple or swollen at base; abdominal postcoxal lines recurved, rounded and complete; abdomen with six ventrites in both sex; male genitalia simple, of basic coccinellid type, symmetrical.

Examined material. MADAGASCAR. (2) “Ambovambé/Madagascar” “Type” [MNHN]. (1) “Plateau de l'Androy/ Rég. D' Ambovombé” [MNHN].

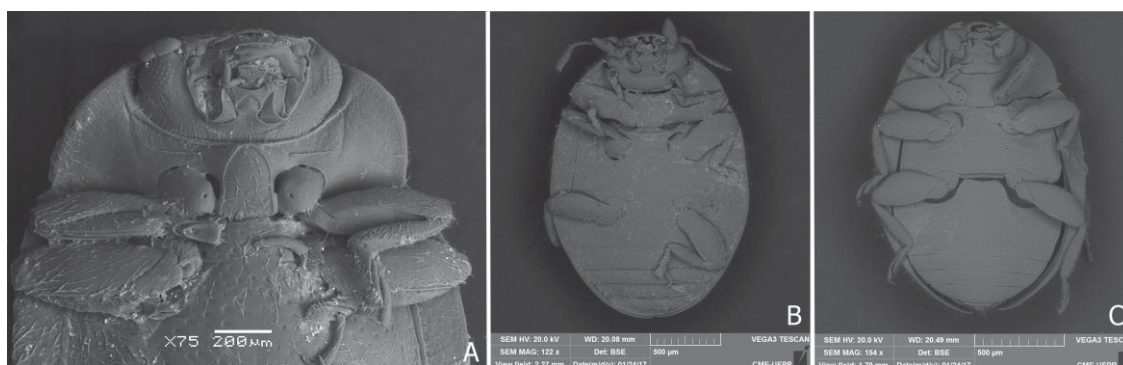


Fig. 16. *Scymnhova ornatipennis*: (A) habitus, ventral; *Scymnhova quadriguttata*: (B) habitus, ventral; *Scymnhova quadrimaculata*: (C) habitus, ventral.

***S. quadrimaculata* Sicard, 1909 (Fig. 16C)**

Scymnhova quadrimaculata Sicard, 1909: 137-138 (key); Korschevsky, 1931: 105. Lectotype, male. Type-locality. Mt. d'Ambre, Madagascar in MNHN.

Distr.: Madagascar (Mt. d'Ambre) [Madagascan Region]

Comments. Lectotype by present designation. *Scymnhova quadrimaculata* Sicard, 1909 is being indicated here provisionally to Coccidulini Mulsant, 1846.

The following characters justify this change: the frons wide, eyes small, coarsely faceted, emarginate, inner orbits convergent, closer near vertex than anteriorly; antennae composed of 11 antennomeres; anterior clypeal margin straight medially with lateral rounded lobes; prothoracic hypomera with anterior C-shaped cavities; mentum with an invert U-shaped impression; prosternum in front of coxa about as long as coxal longitudinal longitudinal diameter; prosternal process with an inverted V-shaped carina, flat; meso-metaventral process straight, metaventral post-coxal lines not joined at middle, femur broad and flattened; tarsi cryptotetramerous; tarsal claws simple or swollen at base; abdominal postcoxal lines recurved, rounded and complete; abdomen with six ventrites in both sex; male genitalia simple, of basic coccinellid type, symmetrical.

Examined material. MADAGASCAR. (5) “Mt. d’Ambre/Madagascar” “Type” [MNHN Sicard Collection]. (14) “Mt. d’Ambre/Madagascar” [MNHN Sicard Collection]. (1) “Cotype YELLOW” “Mt. d’Ambre/Madagascar” [BMNH]. (1) “Cotype” “Mt. d’Ambre/Madagascar” “*Scymnhova/4 maculata/ex type*” [BMNH].

***Semra* Özdikmen, 2007**

Semra Özdikmen, 2007: 25-26; Nedvěd & Kovář, 2012: 530.

Cinachyra Gorham, 1899: 263; Korschefsky, 1931:109; Blackwelder, 1945: 443. (BMNH, syntype); Özdikmen, 2007: 25-26; Fürsch, 1990: 7-18 (list); Nedvěd & Kovář, 2012: 530. Type-species. *Cinachyra picta* Gorham, 1899.

***S. picta* (Gorham, 1899) (Figs 16A-D)**

Semra picta (Gorham, 1899) Özdikmen, 2007: 25-26; Nedvěd & Kovář, 2012: 530.

Cinachyra picta Gorham, 1899: 263; Korschefsky, 1931: 109; Blackwelder, 1945: 443; Fürsch, 1990: 7-18 (list). Holotype, male. Type-locality. Mexico (Chilpancingo) in BMNH. Distr.: Mexico (Chilpancingo).

Comments. The specimen bearing the labels “Type” “Chilpancingo/Guerrero/4600 ft./June H.H. Smith” “*Cinachyra/picta* Gorh” “HOLOTYPE/ *Cinachyra/picta* Gorham/1899:263/det. R.G. Booth 2006” is the Holotype fixed by monotypy of *Cynachyra picta* Gorham, 1899 (ICZN 73.1.2.).

Semra picta (Gorham, 1899) is being indicated here to Hyperaspidini Brèthes, 1923 because of a sister-group relationship between then and *Hyperaspis*.

Justified by the following characters: the eyes large, entire, not emarginate by eye canthus, which is smoothly rounded, finely faceted, without pubescence; mentum cordiform, deeply emarginate; antenna short, with 11 articles, club elongate, fusiform, antepenultimate antennomere more than twice longer than penultimate one, apical article small, recessed in the preceding article; epipleuron narrow, excavated for reception of mid- and hind femoral apices; tarsi cryptotetramerous; abdomen with six ventrites in male, lacking openings between ventrites; male genitalia with penis guide asymmetrical apically.



Fig. 17. *Semra picta*: (A) habitus, dorsal; (B) habitus, ventral; (C) habitus, frontal, male; (D) habitus, ventral, male, details.

3.4 Conclusion

This analysis constitutes the most comprehensive phylogeny of the tribe Ortaliini, and tentative phylogenetic diagnoses and presumably monophyletic clades of Ortaliini are provided.

The classification proposed is, in many respects, highly concordant with previous ones (Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.* 2010; Seago *et al.*, 2011; Szawaryn *et al.*, 2015).

Six genera and 13 species are removed from Orталиini *Azoria*, *Ortalistes*, *Paramida*, *Scymnhova*, *Pseudoladonia* and *Semra*.

Orталиini as a monophyletic group is composed as follows: *Zenoria* + (*Ortalia* + (*Elnidortalia* + *Amida* + *Anortalia*)). Genera for which monophyly or position are still uncertain remain unchanged.

The precise placement of Orталиini in the phylogeny tree of Coccinellidae however, is still uncertain, although our results suggest that Orталиini is possibly closely related to Coccidulini.

Supporting Information

Additional Supporting Information may be found in the online version of this article under the DOI reference:

Acknowledgments

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4 CONSIDERAÇÕES FINAIS E RECOMENDAÇÕES PARA TRABALHOS FUTUROS

Este é o primeiro trabalho com uma análise cladística envolvendo todos os gêneros de Ortaliini a fim de testar sua monofilia e inferir hipóteses sobre o relacionamento entre os gêneros que a compõe. Até então, a maioria das hipóteses envolvendo a tribo foram mais abrangentes, sem o uso de metodologia cladística ou utilizando um número não significativo de táxons terminais e/ou sem considerar a espécie-tipo de cada gênero.

Apesar das ambiguidades entre as hipóteses filogenéticas geradas, alguns clados foram recuperados em ambas as análises, dando maior confiança aos relacionamentos encontrados. Os relacionamentos aqui recuperados encontram suporte em hipóteses dos principais trabalhos com a filogenia e morfologia de Ortaliini (Giorgi *et al.*, 2009; Aruggoda *et al.*, 2010; Magro *et al.* 2010; Seago *et al.*, 2011; Szawaryn *et al.*, 2015).

Apesar dos esforços empregados, a dificuldade na obtenção de material de adicional de adultos de ambos os sexos fez com que diversos terminais tivessem pouca informação. A falta destes dados pode ter influenciando caracteres relevantes sob um ponto de vista filogenético. Porém, ressalta-se que os relacionamentos aqui encontrados esclarecem algumas questões importantes tanto a respeito da morfologia dos gêneros quanto das relações filogenéticas entre eles.

Os conhecimentos obtidos através do desenvolvimento desta Tese podem ser consideravelmente ampliados através da inclusão de outros táxons terminais. A amostragem utilizada neste trabalho é a mais abrangente e completa utilizada até o momento para Ortaliini, e a filogenia resultante poderá ser utilizada como base para estudos filogenéticos mais específicos.

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APÊNDICE A Supporting information

Appendix S1. List of examined material for Ortaliini analysis

Genus *Amida* Lewis, 1896

Amida mirifica Hoàng, 1983

CHINA. (3) “Yunnan” [MNHN, Sicard Collection box 309]

MYANMAR. (2) “Doherty” “Tenasserim/Javoy” “Fry Coll./1915–100” [BMNH]. (1) “62623” “Doherty” “Margli” “Fry Coll./1915–100” [BMNH].

MALAYSIA. (1) Malay Penin/West Coast/Langkawi Is./April 25 1928” “Pres. by/Comm. Inst. Ent./B.M. 1981–315” [BMNH].

SINGAPORE. (1) “Ress. 8/4/22/jungle” “Singapore/C.J. Saunders/B.M.1929–369” [BMNH]. (1) “Scott land/1.2.23” “Singapore/C.J. Saunders/B.M.1929–369” [BMNH].

Ortalia quinquefasciata Hoàng, 1982

CHINA. (1) “on *Ligustrum*” “China:/Guangxi/near Vietnam borders/18. x.2000/R. Shaw” “*Amida/quinquefasciata* Hoang/det. R.G. Booth 2005” [BMNH, male dissected]. (1) “Yunnan” [MNHN Sicard Collection, Box 309, indet., male fig.].

VIETNAM. (1) “Holotypus/ *Amida/quinquefasciata*/Hg 82” “Betnau Ulam/15.I.64 (Kabakov)” [ZIN, male dissected] (1) “Tonkin/Thai Mei/ 2.IV.1918/Jeanvoine” [MNHN Sicard Collection, Box 309, indet., female dissec].

Amida tricolor (Harold, 1878)

JAPAN. (3) “Japan/S. Hiller” “*Amida/ tricolor* (Harold)/Museum f. Naturkunde/Berlin” [MFN BERLIN]. (2) “Japan/G. Lewis/1910–320” “Nara/25.vi–1.vii.81” “*Amida/tricolor*/Harold” “Photographiert/4. x.1930/Scheerpeltz” [BMNH]. (2) “Japan/G. Lewis/1910–320” “*tricolor*/Harold” [BMNH]. (2) “Japan/G. Lewis/1910–320” “Nara/25.vi–1.vii.81” “*tricolor*/Harold” [BMNH]. (1) “*Scymnus/tricolor*/Japan Lewis” “Sharp Coll./1905–313” [BMNH]. (1) “Japan/Lewis 1900” “*Amida/ tricolor*” [NMB Basel]. (1) ‘Japan’ [NMB Basel female MEV]. (2) “Japan/(Hiller)” [MNHN, Sicard Collection]. (4) ‘Japan/Harold’ [MNHN, Sicard Collection] (4) ‘*Scymnus/tricolor*/Harold/Japan’ [MNHN, Sicard Collection].

Amida tricolor formosana (Kurisaki, 1920)

REPUBLIC OF CHINA. TAIWAN. (1) “Kankau (Koshun)” “H. Sauter V. 1912” “Weise det.” “typus” “*Amida tricolor/v. formosana*/det. R. Korshefsky 19” [NMB Basel male MEV]. (1) “Kankau (Kohun)” “H. Sauter V. 1912” “paratype” “Formosa/H. Sauter/B.M. 1926–172” “*Amida tricolor/v. formosana*” [NMB Basel]. (1) “Paratype” “Cotypus” “Formosa/H. Sauter/B.M. 1926–172” “IV” “Kankau (Koshun)/Formosa/H.Sauter 1912” “*Amida/tricolor/var. formosana* Wse” [BMNH]. (1) “Paratype” “Formosa/H. Sauter/B.M. 1926–172” “Kankau (Koshun)/Formosa/H.Sauter v. 1912” [BMNH]. (1) “Formosa:/Koshun/iii.1906/Hans Sauter/1919–234” [BMNH]. (2) ‘Caihorenisho/Formosa’ [MNHN, Sicard Collection]. (1) ‘Kankau (Koshun)/Formosa/H. Sauter 1912’ ‘7.IV’ [MNHN, Sicard Collection].

Genus *Anortalia* Weise, 1902

***Anortalia fleutiauxi* Weise, 1902**

VIETNAM. (3) “Lao–Key/(Tonkin)” “*Anortalia/fleutiauxi*/Collection Fleutiaux” “Muéum Paris/1951/ coll. E. Fleutiaux” [MNHN, Sicard Collection, male]. (1) “Eouten” “comparé au type” “se type/le corselet/sans tache” [MNHN, Sicard Collection, female]. (1) “Lao–Key/(Tonkin)” “*Anortalia/fleutiauxi*/Collection Fleutiaux” “Muéum Paris/1951/ coll. E. Fleutiaux” [MNHN, Sicard Collection].

CHINA. (1) “Yunnan” “compare/au type” [MNHN, Sicard Collection, female].

***Elnidortalia* Recuenco–Adorada, 2011**

***Elnidortalia bipunctata* Recuenco–Adorada, 2011**

PHILIPPINES. (1) “P. Princesa/Palawan/Baker” “4862” “Muséum Paris/1930/coll. A. Sicard” [MNHN, Sicard Collection female]. (1) “P. Princesa/Palawan/Baker” “4862” “*Ortalia/bimaculata*/m.” [NHRS–JLKB000027549].

***Ortalia* Mulsant, 1850**

***Ortalia bruneiana* Bielawski, 1965**

BRUNEI. (1) “Brunei” [MNHN, Sicard Collection] (1) “Brunei/Borneo” [MNHN, Sicard Collection] (2) “Martapura/S.E. Borneo/Doherty 1891” [MNHN, Sicard Collection] (1) “Mt Marapok/Dante Province/Br North Borneo/(Collector G.)” [MNHN, Sicard Collection]

MALAYSIA. (3) “Perak/Malacca” [MNHN, Sicard Collection] (10) “Banguey” [MNHN, Sicard Collection dissected male and female, the same locality of the type fig. MEV] (4)

“Banguet I./Staudinger” [MNHN, Sicard Collection, *Ortalia pusilla* v. *moesta* id error *O. bruneiana*]

***Ortalia calliops* (Guérin-Méneville, 1844)**

MADAGASCAR. (1) “Type” “type/*calliops*/Madag Guér” ‘LECTOTYPE/ *Ortalia/calliops* Guér/Gordon 1987” [CMAZM]. (1) “Type/*flaveola*” [CMAZM]. (1) “Deyr.” [CMAZM]. (1) “5771” “*Ortalia/calliops* Muls” “*Ortalia/flaveola* Kir/Madag” “*Ortalia/calliops* Muls/det R.G. Booth 1986” [BMNH]. (1) “Ft. Dauphin/91–96” “*Ortalia/calliops* Muls/det R.G. Booth 1986” [BMNH]. (1) “Madagascar” “*Ortalia/calliops* Muls/det Fürsch 2003” [BMNH]. (1) “Madaga” [MNHN, Sicard Collection box 308] (1) “Mt d’Ambre/Madagascar” [MNHN, Sicard Collection] (2) ‘Madagascar’ [MNHN, Sicard Collection box 308] (4) ‘Madagascar/Baie d’Antongil/A. Mocquerys 1897” [MNHN] (2) “Didy” [MNHN, Sicard Collection box 308] (1) “Tamatave” [MNHN, Sicard Collection] (1) “Analalava/N.W.Madag.” [MNHN, Sicard Collection box 308] (1) “Madagascar Sud/Fort Dauphin/Alluaud 1900” “*Ortalia/calliops*/Guérin’ [MNHN, Sicard Collection box 308] (1) “Museum Paris/Madagascar/Baie de Antongil/A. Mocquerys 1898” “*Ortalia/calliops* Guér” [MNHN box types Sicard] (1) “Antongil/(Mocq.96)” [MNHN box types Sicard, male]. (1) “Madag/Rapay” “*Coccinella/aphiaralerum*” “Museum de Paris/Madagascar/Collection Léon Fairmaire/1906” [MNHN, Fairmaire Collection box types Sicard, male]. (1) “Majunga” “Museum de Paris/Madagascar/Collection Léon Fairmaire/1906” [MNHN, Fairmaire Collection box types Sicard]

***Ortalia dohrni* Gorham, 1901**

SUMATRA. (1) “Type” “*Ortalia/dohrni* Gorh” “Dhorn/Sumatra/Soekaranda” [MNHN, Sicard Collection, male] (2) ‘Dohrn/Sumatra/Liangagas’ [MNHN, Sicard Collection, female]

***Ortalia duponti* Mulsant, 1850**

MADAGASCAR. (1) “*Hyperaspis/dupontii/cinctipennis* Dupont/Madagascar Dupont” “nov. sp.” [MNHL, female] (1) “Type/*duponti*” [CAMZM dissected and without abdomen and genitalia.] (1) “Deyr.” [CAMZM dissect and without abdomen and genitalia]. (1) “Mad” “Sharp Coll/1905 313” ‘Madagascar’ *Ortalia/duponti*/det. R.G. Booth, 1986” [BMNH without head and pronotum].

- (1) "Museum Paris/Madagascar/Goudot 1834" "241" "*Ortalia/duponti* Muls/auct.det" [MNHN, Sicard Collection Box Coccinellidae Madagascar Types Sicard det. only elytra] (1) "477/34" [MNHN Box Coccinellidae Madagascar Types Sicard det.]
- (3) 'Madagascar/Ex. coll. Dupont' "type" [MNHN, Dupont Collection box 308]
- (1) "Madagascar/Baie d'Antogil/A. Moquerys 1897" [MNHN box 311] (5) "Madagascar/Forêts de Fito/Perrot Frères/VI–VII 1897" "*Ortalia/duponti*/Mulsant" "comparé/au type" "Dr Sicard/vidit 1907" [MNHN, Oberthur Collection box 311 dissected male and female] (1) "Madagascar/ Fenèrife/E. Perrot" "*Ortalia/duponti*/Mulsant" "comparé/au type" "Dr Sicard/vidit 1907" [MNHN, Oberthur Collection box 311] (3) "Madagascar/Antisianaka/Perrot Frères/2^o semester 1893" "Dr Sicard/vidit 1907" [MNHN, Oberthur Collection box 311]
- (1) "Madagascar/Antisianaka/Perrot Frères/2^o semester 1893" "*Ortalia/duponti*/Muls" [MNHN, Oberthur Collection Box Coccinellidae Madagascar Types Sicard det.] (1) "Museum Paris/Madagascar/Baia d'Antongil/A. Mocquerys 1898" "*Ortalia/duponti*/Dej." [MNHN Box Coccinellidae Madagascar Types Sicard det.] (1) "Amboanio/ (Gaiffe 97)" [MNHN, Sicard Collection Box Coccinellidae Madagascar Types Sicard det.]

***Ortalia duponti exsanguis* Sicard, 1909**

- (2) "Madagascar/Atanambé " "type" [MNHN, Sicard Collection, female box 308] (1) "Madagascar/Atanambé" "type" [MNHN, Sicard Collection, female box 311]

***Ortalia duponti fragmentata* Sicard, 1909**

- (1) "Madagascar/Atanambé " "type" [MNHN, Sicard Collection, female box 308] (1) 'Madagascar' [MNHN, Sicard Collection, female box 308]

***Ortalia horni* Weise, 1901**

- SRI LANKA. (1) "Cotype GREEN" "Belgaum/Bombay" "Belgaum" "Andrewes/Bequest/B.M. 1922–221" "Cotypes of/ Gorham's/redescription" "*Jauravia limbata*/sens. Gorham 1894/? =*Ortalia horni* Ws 1900/det. R.G. Booth 1986" [BMNH **lost**].
- (1) "Ceylon/G.E. Bryant/Kandy vi.1908" "*Ortalia* sp./*horni* Wse. / R. D. Pope det 1986" "*Ortalia/horni* Ws./det R. G. Booth 2006" [BMNH]. (1) "Ceylon/G. Lewis/1910–320" "Galle/on coast level/27.xi.–4.xii.81" "*Jauravia/limabata*/Motsch.?" [BMNH female dissected]. (2) "Ceylon/ G. Lewis/1910–330" "Galle/on coast level/27.xi.–4.xii.81" [BMNH male dissected].

INDIA. (2) “Cotype GREEN” “Kanara/S. India” “Kanara” “Andrewes/Bequest/B.M. 1922–221” [BMNH]. (4) “Kanara” “Cotype” “*Jauravia/limabata/Gorh*” [MNHN, Sicard Collection one male]. (2) “beating undergrowth/evergreen forest” “Assam/Sibsagei Oistrict/350/5.ii.1952” “India 1952/T. Clay/B.M. 1952–143” “*Ortalia/horni* Ws. /det. R.G. Booth 2006” [BMNH male dissected]. (1) “60622” “Assam/Sudiya” “Doherty” “Fry Coll./1905–100” “*Ortalia/horni* Ws. /det. R.G. Booth 2006” [BMNH male dissected]. (1) “Assam/Patkai Mts” “Doherty” “Fry Coll./1905–100” “*Ortalia/horni* Ws. /det. R.G. Booth 2006” [BMNH1 male dissected]. (2) “Doherty” “Assam/Nagas” “Fry Coll./1905–100” [BMNH].

(1) “Bowring/63 47” [BMNH]. (6) “Teuasserim/Javay” “Doherty” “Fry Coll./1905–100” “*Ortalia/horni* Ws. /det. R.G. Booth 2006” [BMNH1 male dissected]. (2) “Tiam/Remong” “Doherty” “Fry Coll./1905–100” “*Ortalia/horni* Ws. /det. R.G. Booth 2006” [BMNH1 male dissected]. (1) “Doherty” “Birmah/ Ruby Med” “Fry Coll./1905–100” [BMNH].

(1) “India/Tamil Nadu (pto)” “resting on/*Ficus hispida*” “pres by CABI Biosciences/BMNH (E) 2000–171” [BMNH]. (1) “resting on *Homonoia/riparia*” “Ayyanarkoil (TM)/Grizzled giant/squirrel sanctuary/21.vii.99; Suresh” “Pres by/CABI Biosciences/BMNH(E) 2000–172” [BMNH]. (2) “resting on/*Ficus hispida*” “Ayyanarkoil (TM)/Grizzled giant/squirrel sanctuary/21.vii.99; KGR” “Pres by/CABI Biosciences/BMNH(E) 2000–172” [BMNH]. (4) “resting on/*Ficus hispida*” “Ayyanarkoil (TM)/Grizzled giant/squirrel sanctuary/21.vii.99; JP” “Pres by/CABI Biosciences/BMNH(E) 2000–172” [BMNH].

THAILAND. (1) “W. Thailand: 300m, /Thung Yai Wildlife/Sanctuary/15°28’N 98°48’E” “Tak Province/Umphang District/Song Bae Stream/18–27.iv.1988” “evergreen/rainforest/M.J.D. Brendell/B.M. 1988–183” [BMNH]. (1) “W. Thailand/Uthai Thani Dist./Khao Nang Rum/August 1987/Coll. M.G. Allen” “BMNH(E)/1989–274/M.G.Allen” [BMNH].

***Ortalia kandyana* Bielawski, 1957**

SRI LANKA. (2) “Kandy/Ceylon/G.E. Bryant/vi.1908” “G. Bryant Coll./1919–147” “*Ortalia/kandyana* Biel. /det R. G. Booth 2000/ex. orig. desc.” [BMNH female dissected].

INDIA. (2) “Assam/Sudiya” “Fry Coll./1905–100” “Doherty” “*Ortalia/kandyana* Biel. /det R. G. Booth 2000” [BMNH male dissected].

MALAYSIA. (1) “Perak/9.13” “Doherty” “Fry Coll./1905–100” “*Ortalia/kandyana* Biel. /det R. G. Booth 2000” [BMNH male dissected]. (1) “Perak/L.C” “Doherty” “Fry Coll./1905–100” “*Ortalia/kandyana* Biel. /det R. G. Booth 2000” [BMNH male dissected]. (1)

“Perak/L.C” “Doherty” “Fry Coll./1905–100” [BMNH]. (1) “Penang/(Lamb.)/Pascoe Coll.” “*Ortalia/kandyana* Biel. /det R. G. Booth 2000” [BMNH male dissected]. (1) “Penang/ G.E. Bryant/x.1913” “G. Bryant Coll/1919–147” [BMNH].

***Ortalia ochracea garambensis* Fürsch, 2002**

DRC. (2) “Congo Belga P.N.G./Miss H. De Saeger/2/fd/17, 4.iv.1951/réc. H. de Saeger 1494” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “ex coll. H. Fürsch” “BMNH (E)/2003–163/H. Fürsch” (1) “Congo Belga P.N.G./Miss H. De Saeger II/gd/4, 27.ix.1951/réc. H. de Saeger 2480” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM]. (1) “Congo Belga P.N.G./Miss H. De Saeger II/hd/8, 25.ix.1951/réc. H. de Saeger 2475” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM]. (1) “Congo Belga P.N.G./Miss H. De Saeger/Ndelele/K.117/27.iii.1952/ H. de Saeger 3267” “ex. coll/Fürsch” “*Ortalia/ochracea*/det. H. Fürsch 70” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM]. (1) “Congo Belga P.N.G./Miss H. De Saeger II/gd/4, 16.iii.1951/réc. J. Verschuren 1511” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM]. (1) “Congo Belga P.N.G./Miss H. De Saeger II/gd/6, 2.ix.1952/réc. H. de Saeger 4023” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM]. (1) “Congo Belga P.N.G./Miss H. De Saeger II/fd/18, 21.xii.1951/réc. H. de Saeger 2939” “PARATYPE/*Ortalia ochracea*/ssp. *garambensis*/Fürsch, 2002” “H. Fürsch 2002” [ZSM].

***Ortalia ochracea ochracea* Weise, 1910**

TANZANIA. (1) “Tanga” “*Ortalia/ochracea*” [MNHN, Sicard Collection box 311] (1) “Tosamagam/ja” “*Ortalia/ochracea*/Wse/det. H. Fürsch 58 [ZSM].

DEMOCRATIC REPUBLIC OF CONGO. (1) “Belgian Congo/18 m S.W. of/Elizabeth ville/28.ii.1928/Dr. H.S. Evans/Pres by/ Imp. Inst. Ent. /Brit. Mus./1932–147” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “Belgian Congo/18 m S.W. of/Elizabeth ville/16.xi.1927/Dr. H.S. Evans/Pres by/ Imp. Inst. Ent. /Brit. Mus./1932–147” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH].

MOZAMBIQUE. (1) “Beira Port. E.A./i.6.1900/G.A.K.Marshall/1908–212” [BMNH]. (1) “Beira Port E. A./1.6.1900/G.A.K.Marshall/1908–212” [BMNH]. (1) “Mont^o” “Mozamb. /Del^a B.” “Fry Coll./1905–100” [BMNH]. (2) “Delagoa/Bay” [MNHN, Sicard Collection box 311]

MALAWI. (1) “N. W. Rhodesia/Mwengwa/18.iii.1914/H.C. Dolman” “H.C. Dolman/Coll. 1919–79” [BMNH]. (1) “H.C. Dolman/Coll. 1919–79” “N.W. Rhodesia/Mwengwa/47°40'E 13°S/23.vii.1903/H. C. Dolman” [BMNH]. (1) “N.W. Rhodesia/Mumbwa/27°40'E 13°S/28.vii.1913/H.C. Dollman” “H.C. Dollman/ Coll. 1919–70” [BMNH]. (1) “N.W. Rhodesia/Mumbwa/27°40'E 13°S/28.iii.1914/H.C. Dollman” “H.C. Dollman/ Coll. 1919–70” “*Ortalia/ochracea*/Wse” [BMNH]. (1) “N.W. Rhodesia/Kashitu/N of Broken Hill/vi.1915/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (2) “N. Rhodesia/N. Changa/C.T. Macnamara/B.M. 1931–179” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH]. (1) “N.W. Rhodesia/Kashitu/N of Broken Hill/vi.1915/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH].

ZAMBIA. (1) “N.W. Rhodesia/Mumbwa/27.ix.1913/H.C. Dollman” [BMNH]. (1) “Zambia/Copperbelt Chati/9.2.1980/K. Löyttiniemi leg.” “89” “CIE A187” “Windows traps/baited with *Julbernardia* and *Brachystegia* logs” “*Ortalia/ochracea*/det. R.G. Booth 1987” “Pres by/Comm. Inst. Ent. /B.M. 1987–1” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “N.W. Rhodesia/Mwengwa/27°40'E 13°S/6.viii.1913/H.C. Dollman” “H.C. Dollman Coll./1919–79” [MNHN, Sicard Collection box 311]

ZIMBABWE. (1) “Mashonal'd/G.A.K. Marsahall/1908–212” “*Ortalia/ochracea*/Ws” “Salisbury/Mashonaland/G.A.K. Marshall/1912–95” [BMNH]. (1) “Mashonaland/6 miles E. of Odzi R./29.10.97/G.A.K. Marshall/1903–212” [BMNH]. (1) “Salisbury/Mashonaland/G.A.K. Marshall/1912–95” [BMNH]. (1) “Salisbury/Mashonal'd/ G.A.K. Marshall/1908–212” [BMNH]. (1) “Kopjes W. of Lesapi R./Mashonal'd/4–5.11.97/G.A.K. Marshall/1903–212” [BMNH]. (1) “Brit. E. Africa/Lusunga I./E. Vic. Nyanza/April. 25–26, 1911/S.A. Neave” “1912–193” [BMNH]. (1) “Mashonaland/Odizi R./28.10.97/G.A.K. Marshall/1903–212” [BMNH]. (2) “Chirinda/Mashonal'd Dec 01/ G.A.K. Marshall/1903–212” [BMNH]. (1) “Mpudzi R./Manica B.S. A/26.10.05 G.A.K. Marshall/1908–212” [BMNH]. (1) “New Umtali B.S.A./26.10.97/G.A.K.Marshall/1908–212” [BMNH]. (1) “Salisbury/Mashonaland/G.A.K. Marshall” “Brit. Mus./1922–431” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH]. (1) “Salisbury/Mashonaland/G.A.K. Marshall/1908–212/*Ortalia/ochracea* W.” [MNHN, Sicard Collection box 311] (2) “Mashonal'd/J.A.K Marshall/1908–212” [MNHN, Sicard Collection box 311] (1) “N.W. Rhodesia/Kashitu/N of Brocken Hill/vi.1915/H.C. Dollman” “H. C. Dollman/Coll. 1919–79” “*Ortalia*” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH, very small specimen].

REPUBLIC OF SOUTH AFRICA. (1) “Ungeni/n 7.97/308” “Natal 97/ G.A.K. Marshall/1908–212” [BMNH]. (1) “Neave Coll./11.5.07/2500–4000 ft” [BMNH]. (1) “Estcourt/Natal/G.A.K. Marshall/1908–212” [BMNH]. (1) “Natal/Durhan/J.P. Cregoe/1904–46” [BMNH]. (1) “F. Toppin/Zululand” “Natal Mus./Matriz burg/1913–330” [BMNH]. (1) “St. Lucia Est./S. Africa/5–16.xi.70/H & M Townes” “Brit. Mus./1987–171” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “Pretoria/Transvaal” “*Ortalia/ochracea*” “Distant Coll. /1911–383” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH]. (1) “Durban/Natal” “Distant Coll./1911–383” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH] (1) “Ivanyadzi Valley/Gazal’d 24.10.05/ G.A.K. Marshall/1903–212” [BMNH]. (1) “Südafrika: Transvaal/ 24°05’S / 30°15’E/Lekgalameetse Nat. Res./21.xii.1995/leg. F. Koch” “*Ortalia/ochracea* Wse/ det. H. Fürsch 1999” [MFN BERLIN]. (1) “Südafrika: 29.xi.1995/KwaZulu–Natal: Mkuze Game Res./ 27°36’S / 32°13’E/ leg. F. Koch” “*Ortalia/ochracea* Weise/ det. H. Fürsch 1999” [MFN BERLIN]. (1) “S. Afr. Transvaal/Waterberg/Leg. N. Persson/ Coll. Malmö Museum” “*Ortalia/ochracea* Wse/ Det. R. D. Pope 1955” “MZLU/239/2013” [MZLU, male dissected, fig.].

BOTSWANA. (1) “Okavango/D.O. afr” [MNHN, Sicard Collection box 311].

NAMIBIA. (1) “Namibia: b. Gobabis/Fara Boxhagen/ 1. –3 X 1991/leg. U. Göllner” “Zool. Mus./Berlin” “*Ortalia/ochracea* Wse/ det. H. Fürsch 1993” [MFN BERLIN, very small specimen].

UGANDA REPUBLIC. (1) “Uganda Port/Entebbe Forest/3800 ft/July 5–11, 1911/S.A. Neave” [BMNH].

SOMALIA FEDERAL REPUBLIC. (1) “Somali” [MNHN, Sicard Collection box 311]

ETHIOPIA. (1) “M Joy/abyssina” [MNHN, Sicard Collection box 311]

UNDETERMINED LOCALITIES. (1) “V.G.L. van Someren/collection/Brit. Mus. 1959–468” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “Jefler y Vulclis/v.44” “*Ortalia* sp./var. *ochracea*/not in B.M. Wse/ R.D. Pope det. 1950” “V.G.L. van Someren/collection/Brit. Mus. 1959–468” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “Juyrhée” [MNHN, Sicard Collection box 311]

Comments. Appearance is been a mixed series (det. R.G. Booth 2006)

***Ortalia ochracea rosea* Sicard, 1912**

DEMOCRATIC REPUBLIC OF CONGO. (1) “Congo” [MNHN, Sicard Collection box 311]

(1) “Marienhof/Wugiri D.O.A.” [MNHN, Sicard Collection box 311].

MALAWI. (6) “Malawi/Makoka/Res.Stn./Thöndwe/25.viii.86” “spM24on /*Thespezia/azanza/infest*” “with *Phaurocephala/gossypii*/ CIE 18257” “*Ortalia/ochracea* Ws/*var rosea* Sic det. R.G. Booth 1986” “Press by/Comm. Inst. Ent. /B.M. 1986–1” [BMNH two males].

ZIMBABWE. (1) “Salisbury/G.A.K. Marshall/1908–212” “*Ortalia/ochracea/var rosea* J.i./v. n” [BMNH]. (1) “Salisbury/G.A.K. Marshall/1908–212” [BMNH]. (1) “Uniferli/oct 95” “Marshall Coll./1912–95” “*Ortalia/calliops* M.?” [BMNH]. (1) “E. Ruwenzori/6–1300 ft/1906/1906–153” “Coll by/Hon. G. Legge & A.F.R. Wollaston” [BMNH]. (1) “G.A.K. Marshall/1908–212” [BMNH]. (3) “N.W. Rhodesia/Mwengwa/27°40'E 13°S/26.ix.1914/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia/ochracea/var rosea* Sic [BMNH].

(1) “Salisbury/Mashonaland” [MNHN, Sicard Collection box 311] (1) “Salisbury/G.A.K. Marshall/1908–212” “*Ortalia/ochracea var. rosea*” [MNHN, Sicard Collection box 311] (1) “Umfuli/oct. 95” “Mashonaland” [MNHN, Sicard Collection box 311] (1) “N.W. Rhodesia/Kashitu/N of Brocken Hill/6.ix.1915/H.C. Dollman” “H. C. Dollman/Coll. 1919–79” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH *v rosea*].

(1) “Congo Belge, P. N. G./Miss H. De Saeger/II/gc/4, 16–III–1951/Réc. J. Verschuren, 1511” “H. Fürsch det., 1965/*Ortalia/ochracea*” “ex. coll. H. Fürsch” “MZLU/236/2013” [MZLU, female dissected fig.].

KENYA. (1) “Kenya, 1360 m/Swan, 25/1–79/leg. T. Palm” “*Ortalia/ochracea* Wse/ det. H. Fürsch 1988” “MZLU/237/2013” [MZLU].

SIERRA LEONE. (1) “Sierra Leone: Freetown, /Cape Sierra Hotel area/13°17'W,8°31'N, /23.XI.1993 loc.2/swept along roads” “Lund University Sierra/Leone Expedition 1993/leg. L. Cederholm –/R. Danielsson–R. Hall” “*Ortalia/ochracea* Wse/ det. H. Fürsch 1995” “MZLU/238/2013” [MZLU, fig.].

CENTRAL AFRICA REPUBLIC. (1) “Nyasaland/Chiromo/Ruo/R.C. Wood/1338” “Pres by/ Imp. Ins. Ent. /B.M. 1936–27” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH]. (1) “Nyasaland/Lower Shire Valley/n.r. Chikawa 600 ft/12–16 Apl 1910/S.A. Neave” “1910–353” [BMNH]. (1) “Nyasaland/ Rd. btwn. S. Rukuru/& Florence Bay/28–29 June 1910 4500 ft/S.A. Neave” “1916–353” “*Ortalia/ochracea* Weise/det. H. Fürsch 2003” [BMNH]. (1) “1338/Chiamo Ruu” “Nyasaland/R.C. Wood” “*Ortalia/ochracea*/Weise/det. G.E. Bryant” “Pres by/ Imp. Ins. Ent. /B.M. 1936–27” “*Ortalia/ochracea* Weise/det. H. Fürsch 2002” [BMNH].

NIGERIA. (1) “Nigeria/Ibadan/28.July.1954” “reared from/fully grown/larva” R.G. Donald/C1300” “Com. Inst. Ent. /Coll. n° 14470” “*Ortalia/ochracea*/Wse/det. R.D. Pope 1955” “Press by/Com. Inst. Ent. /B.M. 1955–49” [BMNH].

CAMEROON. (5) “Yaounde” [MNHN, Sicard Collection box 311]

GABON REPUBLIC. (1) “Bas Ogoowé/Gabon” [MNHN, Sicard Collection box 311]

***Ortalia oculata* Weise, 1888**

DEMOCRATIC REPUBLIC OF CONGO. (1) “Congo/Mechow” “*Ortalia/oculata* Wse/det. H. Fürsch 68” [MfN Berlin, paralectotype female] (4) “Kapiri/Congo” [MNHN, Sicard Collection box 311, dissected male]. (3) “Kapiri/Congo” [MNHN, Sicard Collection box 311, dissected female]. (1) “Musée du Congo/Katanga: Kansema/VI.1925/G.F. de Witte” “*Ortalia/oculata*” [MNHN, Sicard Collection box 311]

***Ortalia pallens* Mulsant, 1850**

(1) “type” “type/*argillacea*/Reiche” “LECTOTYPE/*Ortalia/argillacea* Muls/1850/1850/Gordon” [CAMZM]. (1) “Type/*pallens*” [CAMZM]. (7) “Gold/coast” [CAMZM]. (3) “Natal” [CAMZM]. (1) “148” “Chevrolat” [CAMZM]. (5) no labelled [CAMZM]. (1) “Type” “57/71” “*pallens*/Senegal” “named by/Mulsant” [BMNH]. (1) “802” [BMNH]. (1) “38/11.8/137” [BMNH]. (1) “W Africa/2068” [BMNH]. (1) “57/71” “*Verania? abyssinica* Gehim” [BMNH]. (1) “W. Africa/Ivory Coast/1946” “Press by/Com. Inst. Ent. /B.M.1948–525” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH].

GAMBIA. (1) “Gambia/ Bathurst/jan. 68” “*Ortalia /pallens* Mul/det H. Fürsch 86” [MZLU 240]

GUINEA. (1) “Guinée” “*Ortalia/pallens*” [MNHN, Mulsant Collection box 311] (1) “Guinée/A. Nanti” [MNHN box 311, Sicard Collection]

SIERRA LEONE. (1) “58166” “S. Leone” [BMNH]. (1) “Sierra Leone/ J.J. Simpson/1912–440” “Kondondou/Sierra Leone/19.vi.1912/Jas. J. Simpson” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH]. (1) “Sierra Leone/ J.J. Simpson/1912–440” “Kurubum/Sierra Leone/12.vi.1912/Jas J. Simpson” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH]. (1) “Sierra/Leone” [MNHN box 311, Sicard Collection]

NIGERIA. (1) “Zaria/1930” “C.E. Torttenham/collection/B.M. 1974–587” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH].

CAMEROON. (1) “Kamerum/Ebolow 5.v.1912/ v. Rothkirsch S.G.” “*Ortalia/pallens* Mulsant/ Museum f. Naturkunde/Berlin” [MfN Berlin] (1) “Kamerum/Joko” “*Ortalia/pallens*

Mulsant/ Museum f. Naturkunde/Berlin" [MfN Berlin] (1) "Kamerum/L. Kolin iv.12" "*Ortalia/pallens* Mulsant/ Museum f. Naturkunde/Berlin" [MfN Berlin] (39) "Yamde" [MNHN box 311, Sicard Collection] (1) "Joko/Kamerum" [MNHN box 311, Sicard Collection] (1) "Joko VII.12/Kamerum" [MNHN box 311, Sicard Collection]. (5) "Yaumde" [MNHN box 311, Sicard Collection]

KENYA. (1) "Brit. E. Africa/Mfungano I./E. Vic. Nyanza/Apl. 27,1911/S.A. Neave" "1912–193" [BMNH]. (1) "1912–193" "Brit. E. Africa/ E. shore Vic. Nyanza/near Karungu/Apl. 28–29, 1911/ S.A. Neave" [BMNH]. (1) Abyssin Raf" [MNHN box 311, Sicard Collection]

UGANDA. (1) "Entebbe/Uganda/8.8.11/C.C. gowdey/1912–101" [BMNH]. (1) "Uganda Prot./S.E.Ankole/4.400–4.800 ft/4–8, oct,1911/S.A. Neave" "1912–193" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002" [BMNH]. (1) "Uganda Port/Koki Country/S.W. Buddu, 4100 ft/1–3, oct 1911/S.A.Neave" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002" [BMNH]. (1) "Entebbe/Uganda/26.8.11/C.G.Gowdey/1912–100" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002" [BMNH]. (1) "Uganda/Mahyoro/20.xi.1920/846/Dr. G.D.H. Carpenter" "press by/Imp. Bur. Ent. Brit. Mus./1921–114" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Anglo–Egyptian/sudd/28.iv.1909/H.H. King" "Press by/Imp. Brit. Ent. /Brit. Mus./1922–230" "Ent. Coll./4374" "*Ortalia/pallens*/Muls/Det. G. E. Bryant" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Uganda Prot./Banks of/ Victoria Nile/near Masindi Port" "3400 ft 20–22 dec 1911/S.A. Neave" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH] (1) "Entebbe/Uganda/9.x.13/C.C.Gowdey/1914–324" "n° 3680" "*Ortalia/pallens*/Muls" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Uganda/Kamwezi/1911/C.H. Marshall/1913–440" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Uganda Prot./Banks of Nile/Near Kakindu/3400 ft" "1912–163" 'Aug 24–25, 1911/S.A. Neaves" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Uganda Prot./ S.E. Ankole/4400–4800 ft/4–8, oct. 1911/S.A. Neaves" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Uganda/ Kampara/10–14.vi.1916/C.C. Gowdey" "press by/Imp. Bur. Ent." "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (1) "Entebbe Uganda/F.J. Jackson" "F.J. Jackson Coll./Brit. Mus./1939–393" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003" [BMNH]. (3) "Gondokoro/Uganda/Dr. Christy/1912–366" [BMNH two adults and one pupa]. (1) "Uganda/Ruwenzori Range/Semliki Forest/2850 ft 3.ix.1952/D.S. Fletcher" "Buwenzori Exped. /B.M. 1922–566" "*Ortalia/pallens* Muls/ R. D. Pope det. 1954" "*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002" [BMNH].

DEMOCRATIC REPUBLIC OF CONGO. (1) "Congo Belge, P.N.G./Miss. H. De Saeger/ II/fc/17, 25.ix.1951/réc. H. De Saeger 2471" "H. Fürsch det. 1958/*Ortalia/pallens* Mls."

[ZSM] (1) “Congo Belge, P.N.G./Miss. H. De Saeger/ II/fd/17, 3.i.1952/réc. H. De Saeger 2991” “H. Fürsch det. 1958/*Ortalia/pallens* Mls.” [ZSM]

TANZANIA. (1) D.O. Afr./Hohenfriedebg/Usambara” [ZSM]

MALAWI. (1) “Nyasaland/Mlanje/Jul.12,1913/S.A. Neave” “1913–140” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “Nyasaland/Mlanje/4. x.13, 2300ft/S.A. Neave/1914–75” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “Nyasaland/Rd. btwn. S. Runkuru Vy/& Florence Bay/28–29 June 1910, 4500ft/S.A. Neave” “1910–353” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “Nyasaland/Lingadzi/NR Domira Bav/1700 ft 26.7.15/Dr. W.A. Lamborn” “*Ortalia/pallens*” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “Nyasaland/Cholo/R.C. Wood” “2237/Cholo” “Press by/Imp. Inst. Ent. /B.M. 1936–27” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (8) “N. Rhodesia/Lake Bangweulu/N’Chiti Island/14. x.1946” “M. Steele/B.M.1947–351” “*Ortalia/pallens* Muls/ R. D. Pope det. 1953” [BMNH one male dissected]. (1) “N. Rhodesia/Lake Bangweulu/Chilwi Island/26.xi.1946” “M. Steele/B.M.1947–351” [BMNH]. (3) “N. Rhodesia/Lake Bangweulu/Mbawala Island/x–xi.1946” “M. Steele/B.M.1947–351” [BMNH]. (1) “Brit. E. Africa/Lusinga I./E. Vic. Nyanza/Apl. 25–26,1911/S.A. Neave” “1912–193” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH].

ANGOLA. (4) “at light” “Angola (A35)/12 mts SW Luimbale/c. 5500 ft/20–21.iii.1972” “Southern/African Exp./1972–1” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “Angola/76.28” [BMNH]. (1) “Lagos/93–61” [BMNH]. (1) “Dr. Smith/S. Afr. 44–6” [BMNH].

REPUBLIC OF SOUTH AFRICA. (1) “Natal/G.A.K. Marshall/ 1912–95” “*Acacia giraffae*/color yellow/Eleph. Tkruch” “*Ortalia/pallens*/Mul” [BMNH]. (1) “Estcourt/Natal/G.A.K. Marshall/1908–212” [BMNH]. (1) “Natal” “Andrewes/Bequest/B.M. 1922–221” “*Ortalia/pallens*” “Natal” [BMNH]. (1) “Estcourt/Natal/G.A.K. Marshall/1903–212” “*Ortalia/pallens*/Mul” [BMNH]. (1) “Estcourt/Natal/G.A.K. Marshall” “*Ortalia/guillebawti*” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2002” [BMNH]. (1) “New Ranovar/Natal Aug.1916/C.B.Hardenberg” “press by/Imp. Bur. Ent. Brit. Mus./1921–329” “*Ortalia/guillebeau*/ det. G.E. Bryant” “*Ortalia/pallens* Mulsant/det. R. G. Booth, 2003” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH]. (1) “Barberton/ (P. Rendall)” “Distant Coll./1911–383” “*Ortalia/pallens* Mulsant/det. H. Fürsch, 2003” [BMNH]. (1) “S. Afr. Transvaal/Blouberg/Leipsig M.S./Nov. 1954 C. Rudebeck” “*Ortalia/argillacea* Muls./R.D. Pope det./ from descr. 1955” [MZLU 199, very small specimen] (2)

“Tranvaal/Argent/7–10.xii.1953/leg. A.L. Capener” “*Ortalia/pallens* Mls/det. H. Fürsch 58”
 “Zool. Staatssig./München” [ZSM] (1) “Tranvaal/Argent/4.x.1948/leg. A.L. Capener”
 “*Ortalia/pallens* Mls/det. Mader” [ZSM MEV fig.] (5) “Natal” [MNHN box 311, Sicard
 Collection] (1) “Natal” “Coll./Mniszech” [MNHN box 311, Sicard Collection] (1)
 “Isturnt/Natal 9.96” [MNHN, Sicard Collection, female] (1) “Grahamstown/S. Afr.” [MNHN
 box 311, Sicard Collection]

EGYPT. (1) “Egypt” “white Nile/April 1900/S.S. Flower/1900–189” [BMNH].

ZIMBABWE. (1) “Salisbury/G.A.K. Marshall/1903–212” “Salisbury/sept. 98/on mosasa”
 [BMNH]. (1) “19012–193” “Uganda Port. /near M pumu/4000 ft./july 14–15, 1911/S.A.
 Neave” [BMNH]. (1) “Salisbury/Mashonaland/G.A.K. Marshall/1908–212” [BMNH].

ERITREA. (1) “Eritrea/Asmara/Dorfas Valley/13. v.1948/G de Lotto/00694”
 “*Ortalia/pallens*/Muls/A.F. Kapur det.” [BMNH].

GABON. (1) “Gabon” “*Ortalia/pallens*” [MNHN, Sicard Collection box 311, male]

SENEGAL. (2) “Sénégal” [MNHN, Mulsant Collection box 311, females]

BENIN. (1) “Dahovey” [MNHN, Sicard Collection box 311, male]

***Ortalia argillacea* Mulsant, 1850**

CAMERRON. (1) “Yaumde” [MNHN box 311, Sicard Collection]

DEMOCRATIC REPUBLIC OF CONGO. (5) “Bénitto/Congo Franç” [MNHN box 311,
 Sicard Collection] (1) “Bakoro/Congo” [MNHN box 311, Sicard Collection].

REPUBLIC OF SOUTH AFRICA. (1) “Natal” [MNHN box 311, Sicard Collection]

SIERRA LEONE. (1) “Sierra Leone/Clements 1892” [MNHN box 311, Sicard Collection]

ERITREA. (1) “Asmara/Eritrea VI” [MNHN, Sicard Collection box 311]

***Ortalia pectoralis* Weise, 1901**

INDE. (1) “Ossam/Patkai Mts” “Doherty” “Fry Coll./1905–100” “*Ortalia/pectoralis* Ws/det.
 R.G. Booth, 2000” [BMNH male dissected]. (5) “Doherty” “Ossam/Patkai Mts” “Fry
 Coll./1905–100” [BMNH]. (1) “Doherty” “Ossam/Nayas” “Fry Coll./1905–100” [BMNH].
 (1) “Sylank [Sri Lanka]” “Bowring/6347” [BMNH].

MYANMAR. (1) “Doherty” “Birmah/Momeit” “Fry Coll./1905–100” [BMNH]. (1)
 “Maymyo vi.10/H.L. Andrewes” “H. E. Andrewes/Bequest/B.M. 1922–221”
 “*Ortalia/mäklini*/Mulst.” “*Ortalia/pectoralis* Ws/det R. G. Booth 2000” [BMNH]. (1)
 “Maymyo/Burma/H.L. Andrewes” “*Ortalia/mäklini*/Mulst.” “Maymyo vi.10/H.L. Andrewes”
 [BMNH]. (1) “Upper Burma/Maymyo 800m/xii.1937/leg. G. Heinrich” “Brit Mus. 1951–

337” “*Ortalia/pectoralis* Ws/det R. G. Booth 2000” [BMNH Male dissected]. (6) “Upper Burma/Maymyo 800m/xii.1937/leg. G. Heinrich” “Brit Mus. 1951–337” [BMNH]. (2) “Upper Burma/Maymyo 800m/xii.1937/leg. G. Heinrich” “Brit Mus. 1951–337” “*pectoralis* ♂” [BMNH]. (1) “Burma” “*Ortalia/mäklini*/Mulst.” [BMNH]. (1) “Tharawassady [Irrawaddy]/Brumah [Burma]/1905–191” “*Ortalia/mäklini*” [BMNH].

INDONESIA. (1) “Teuasserin/Javoy” “Doherty” “*Ortalia/pectoralis* Ws/det R. G. Booth 2000” [BMNH Male dissected]. (1) “Doherty” “Teuasserim/Javoy” “Fry Coll./1905–100” [BMNH].

LAO PEOPLE'S DEMOCRATIC REPUBLIC. (1) “Laos/Vien Parklan/le 10.v.1918/R. Vitalis de Salvaza” “*pectoralis* ♂” [BMNH].

VIETNAM. (4) “Tonkin/Than Moi/3.ii.1918/R.V. de Salvaza” “*Ortalia/pectoralis* Ws/det R. G. Booth 2000” [BMNH Male dissected]. (8) “Tonkin/Than Moi/Apl.1917/R.V. de Salvaza” “*Ortalia/maeklini* Muls/C.J.Arrow det.” “1918–1” [BMNH]. (1) “Tonkin/Hoabinh/Aug.1918/R.V. de Salvaza” [BMNH]. (1) “Hoabinh, Tonkin/A. de Cooman/B.M.1930–369” [BMNH]. (8) “*Ortalia mäklini* Muls/1010 We” “H. Swale/1913–117” “*O. pectoralis* Ws/det R. G. Booth 2000” [BMNH]. (1) “*pectoralis* Ws/Tuyên Quang” [MNH, Sicard Collection box 310 dissected female]

MALAYSIA. (1) “Samlung/C. Müller” “Malakka” “*Ortalia/pectoralis* Ws/det. H. Fürsh 85” [ZSM].

***Ortalia punctata duodecimmaculata* Weise, 1900**

REPUBLIC OF CAMEROON. (2) “Kamerun, Joko” “Sammlung/Moser” “*Ortalia/punctata/duodecimmaculata* Weise 1900/ H. Fürsch det 2003” [ZSM, male and female MEV]. (1) “Kamerun, Joko” “*Ortalia/punctata* Weise/ det. H. Fürsch 1982” [MFN BERLIN]. (1) “Uamgabet/Bosum 1.–10.6. /14 Tessmann S.” “*Ortalia/punctata* Weise/ det. H. Fürsch 1982” [MFN BERLIN, dissected]. (1) “Joko, Kamerun” “*Ortalia/punctata/duodecimmaculata* Weise 1900/ H. Fürsch det 2003” [ZSM].

SIERRA LEONE. (1) “Sierra Leone/J.J. Simpson/1912–440” “Kurubum/Sierra Leone/12.vi.1912/Jas J Simpson” “*Ortalia/punctata/12–maculata* Weise/H. Fürsch det 2003” [BMNH FOTO].

(1) “D.|O. Africa” “*Ortalia/punctata/12–maculata* Weise 1900/ H. Fürsch det 2003” [ZSM].

(1) “D.|O. Africa” “*Ortalia/punctata/12–maculata* Weise 1900/ H. Fürsch det 1958” [ZSM].

(1) “Africa” [MNH, Sicard Collection box 311 dissected female]

MOZAMBIQUE. (2) “Thelwall” “Mozamb/Nyassa” “Fry coll/1905–100” “*Ortalia/12-maculata*” [MNHN, Sicard Collection box 311]

DEMOCRATIC REPUBLIC OF CONGO. (5) “The Sanga/Carnot” [MNHN, Sicard Collection box 311] (1) “Ponté nuvi/magen Congo” [MNHN, Sicard Collection box 311] (1) “Manomo/D.O. Africa” [MNHN, Sicard Collection box 311 dissected male]

***Ortalia punctata* Weise, 1888**

(1) “Manjoni/ D.O. Africa” “*egena* Ws.” “*Ortalia/egena* Weise/det. H Fürsch, 2002” [MfN, male dissected]

KENYA–UGANDA. (3) “Mt. Elgon O.A./2200 m 2.iv.25/leg. Alinder” “*Ort. punctata/ f. 8-notata* Sic./det. Fürsch 58” “*Ortalia/punctata/ det. Fürsch 2003*” “Zoo. Staatssig. München” [ZSM]. (1) “Mt. Elgon O.A./2200 m 11.iv.25/leg. Alinder” “*Ort. punctata/ f. 8-notata* Sic./det. Fürsch 58” “*Ortalia/punctata/ det. Fürsch 2003*” “Zoo. Staatssig. München” [ZSM].

SOUTH AFRICA. (1) “N.W. Rhodesia/Mwengwa/27°40'E 13°S/11. i.1914/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Mwengwa/27°40'E 13°S/5. i.1914/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Kashitu/N of Broken Hill/i.1915/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Solwezi Dist./Mukuramba/6.xi.1916/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Solwezi Dist./Mukuramba/19. i.1914/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Nama-ula/2.ix.1914/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “N.W. Rhodesia/Kashitu/N of Broken Hill/xii.1915/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) Marsh “Umcheki R./Maalil 11.97” “Mashonal'd/G.A.K. Marshall/1908–212” “*Ortalia/punctata Wse*” “in *O. punctata* Ws/the lateral spots/reach the margin” [BMNH]. (1) “Salisbury/G.A.K. Marshall/1908–212” [BMNH]. (1) “Salisbury/G.A.K. Marshall/1908–212” “*Ortalia/variata* Mul” [BMNH]. (1) N.W. Rhodesia/Solwezi Dist./06.xi.1916/H.C. Dollman” “H.C. Dollman/Coll. 1919–79” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH male dissected]. (1) “791/Salisbury/24 12 11” “R.W. Jack/1916–109” “*Ortalia/punctata* Weise” “*Ortalia punctata p. Weise/det H. Fürsch 2003*” [BMNH]. (1) “Salisbury/Mashonaland/G.A.K. Marshall/13 xi 1893” “Brit. Mus./1922–431” [BMNH]. (1)

“Salisbury/Mashonaland” [MNHN, Sicard Collection box 311] (5) “Mashonaland” [MNHN, Sicard Collection box 311 dissected female] (1) “Mashonal’d/G.A.K. Marshall/1908–212” [MNHN, Sicard Collection box 311 female]

ZIMBABWE. (1) “Matopo Hills/Rhodesia/Jan 1904” “Marshall Coll./1908–212” [BMNH]. (1) “Matopo Hills/Rhodesia/Jan 1904” “Marshall Coll./1908–212” [BMNH]. (1) “Matopos/Rhodesia/Jan 1904/GAKM” [BMNH]. (1) “Matabeleland/Jan 1904/G.A.K. Marshall/1908–212” “*Ortalia punctata* p. Weise/det H. Fürsch 2003” [BMNH].

DRC. (1) “150–200 miles/W of Kambove/3500–4500 ft/26.10.07” “v. 8 *notata* Sic/svn” “*Ortalia/punctata* /Wse” “Neave Coll./1909–230” [BMNH]. (1) “150–200 miles/W of Kambove/3500–4500 ft/27–30.10.07” “standing as/*var.* 8 *notata* Sic/det R.G. Booth 2003” “*Ortalia/punctata* /Wse” “Neave Coll./1909–230” [BMNH]. (1) “S.E. Katanga/10411 1207/4000 ft” “Neave Coll./1909–230” [BMNH].

***Ortalia punctata octonotata* Sicard, 1912**

ZIMBABWE. (1) “Matopo Hills/Rhodesia/Jan 1904” “Marshall Coll./1908–212” [MNHN, Sicard Collection box 311]

RWANDA. (1) “Musée du Congo/Nyangwe/20.III.1918/R. Mayné” “*Ortalia/ab* 8 *notata*” [MNHN, Sicard Collection box 311 dissected male]

DEMOCRATIC REPUBLIC OF CONGO (1) “Katanga” “*Ortalia/punctata* Ws/v.8 *notata* Sic/cotype” [MNHN, Sicard Collection box 311] (1) “Musée du Congo/Elisabethville/XI.1911/Miss. Agric.” [MNHN, Sicard Collection box 311] [Elisabethville, now Lubumbashi]

Comments. All specimens female.

***Ortalia punctata sexnotata* Sicard, 1930**

UGANDA. (1) “Musée du Congo/Kapiri/X.1912/Miss. Agric.” [MNHN, Sicard Collection box 311] (1) “Musée du Congo/Kapiri/X.1912/Miss. Agric.” “*Ortalia/punctata/ab.* 6 *notata* Sic” [MNHN, Sicard Collection box 311]

DEMOCRATIC REPUBLIC OF CONGO. (1) “Congo/Bukavu” [MNHN, Sicard Collection box 311 dissected male] (1) “Bukavu/Congo” “*Ortalia/punctata/v.* 6 *notata* Sic” [MNHN, Sicard Collection box 311]

Comments. No specimens bearing the type-locality were found.

***Ortalia quadripunctata* Gorham, 1894**

INDIA. (1) “Type RED” “Belgaum/Bombay” “Andreweres/Bequest/B.M. 1922–221” “Belgaum” “1341” “*Ortalia/4 punctata*/Type Gorh” “Cotype RED” “syntype BLUE” [BMNH, male]. (1) “Cotype GREEN” “Belgaum/Bombay” “Andreweres/Bequest/B.M. 1922–221” “Belgaum” “syntype BLUE” “Syntype/*Ortalia/quadripunctata*/Gorham,1894/det. R.G. Booth 2006” [BMNH, male]. (1) “Belgaum” “India/88–40” [BMNH]. (1) ‘Belgaum’ ‘type’ ‘*Ortalia/quadripunctata*/Gorham’ [MNHN, Sicard Collection box 309, female]

SRI LANKA. (4) “Olumadu/Ceylon/C.F.S. Baker/1914–448” “Olumadu/i–1913 KI” [BMNH, male]. (1) “Ceylon/W. Morton” [MNHN, Sicard Collection box 309]

***Ortalia variata* Mulsant, 1850**

MADAGASCAR. (1) “type” “type/*variata*/Reiche” “LECTOTYPE/*Ortalia/variata* Muls./1850/ Gordon, 1987” [CAMZM, female] (1) “Madagascar/Fénérife/F. Perrot” “*Ortalia/variata* Muls/Lec Weise” “*Ortalia/variata*/Mulsant” “Dr. Sicard/vidir 1907” [MNHN, Oberthur Collection (see Sicard), female] (2) ‘Tamatave/Madagascar’ [MNHN, Sicard Collection female] (1) “Madagascar Est/presqu’ île Masoala/Hiaraka xii.1968 /Vandon et Peyrieras” “Museum Paris” “*Ortalia*/sp./det. A.S. Ślipiński” [MNHN, female **dissected**] (1) “Madagascar Est/Dist. Mananara–N./Mont Antampona/Vandon–Peyrieras/I 1966” [MNHN, male dissected]

***Ortalia x-signata* Sicard, 1912**

ZIMBABWE. (1) “Type” “Mpudzi R.B.S.A/21.9.05/G.A.K.Marshall/1909–212” “*Ortalia/x-signata* Sic” [BMNH, female] HOLOTYPE designated by Fürsch (2006).

SOUTH AFRICA. (1) “Natal/Dr. Martin” “Dessous/roux” “*Ortalia/x-signata*Sic/cotype” “Muséum Paris/1930/Dr. Sicard” [MNHN, Sicard Collection box 311, female]

Genus *Zenoria* Mulsant, 1850

***Zenoria crotchi* Gordon, 1971**

FRENCH GUIANA. (1) “French Guyane, Roura / Montagne des Chevaux, / RN2PK22, vitre / 22/VIII/2010 / SEAG leg.” “*Zenoria crotchi* / Gordon, 1971 / Santos, P.B. det 2014” “♀” “DZUP / 145233”. (1) “French Guyane, Roura / Montagne des Chevaux, / RN2PK22, vitre / 10/XI/2013 / SEAG leg.” “*Zenoria crotchi* / Gordon, 1971 / Santos, P.B. det 2014” “♂” “DZUP / 192154”. (1) “French Guyane, Roura / Montagne des Chevaux, / RN2PK22, vitre / 21/XII/2013 / SEAG leg.” “*Zenoria crotchi* / Gordon, 1971 / Santos, P.B. det 2014” “♂” “DZUP / 192190”.

BRAZIL. PARÁ. (1) “Itaituba” “♀” [MFN BERLIN]. (1) “ex. coll J. Weise” “♀”. (2) “Pará / Brazil / Acc. N° 2966” “June” G. H. Dieke / Coll'n. 1965” “PARATYPE / *Zenoria / crotchii* / Gordon” [USNM]. (1) “Tiriós, Alto Peru / d'Oeste, PA, Brasil / I.II.1963 / Machado & Pereira col.” “♂” “DZUP / 188426” “*Zenoria delicatula* / Weise, 1910 / L.M. Almeida det.”. AMAZONAS. (1) “Brazil:/Manaós/August 1935/G.V.Vredenburg.” “*Zenoria/crotchii* Gordon/det. R.G.Booth, 1987” [BMNH]. (1) “Brasil, Amazonas, Tabatinga/13-17/IV1992/malaise/J.F. Vidal & Lilian (leg.)” “♂” [INPA]]. MATO GROSSO. (2) “Brasil, MT, Novo Mundo,/Pq. Est. Do Cristalino,/09.4517°S 55.8396°W/240 m, sweep, 21-25.vi.2017, A.C. Domahovski” “DZUP/282342, 282284” “*Zenoria crotchii* / Gordon, 1971 / Santos, P.B. det ”

***Zenoria luciae* González & Honour, 2012**

BRAZIL. AMAZONAS. (1) “♂ 302” “Brasil, Amazonas, / Tabatinga, 50 m, / 27-II-2009 leg. R. / Westerduijn. / Secondary scrub” “HOLOTIPO / *Zenoria luciae* / González & Honour / 2012” “DZUP / 245984”. (1) “♀ 306” “Brasil, Amazonas, / Tabatinga, 50 m, / 27-II-2009 leg. R. / Westerduijn. / Secondary scrub” “PARÁTIPO / *Zenoria luciae* / González & Honour / 2012” “DZUP / 245982”. (1) “♀ 768” “Brasil, Amazonas, / Tabatinga, 50 m, / 30-VIII-2006 leg. R. / Westerduijn. Open / weedy vegetation” “PARÁTIPO / *Zenoria luciae* / González & Honour / 2012” “DZUP / 245983”.

***Zenoria paprzyckii* Gordon, 1971**

PERU (1) “Peru, Satipo / X, 1942 / Paprzycki” “HOLOTYPE / *Zenoria / paprzyckii* / Gordon” [USNM 2073420]. (1) (1) “Peru, Satipo / X, 1942 / Paprzycki” “PARATYPE / *Zenoria / paprzyckii* / Gordon” “Brit Mus/1977-74” [BMNH]. (1) “Peru, San Martin, / Morro de Calzada, / 1100 m, 27-I-2009 Leg. / R. Westerduijn. / Understory of altered / forest” “*Zenoria* cf. *paprzyckii* / det. G. Gonzalez 2011” “♂” [CPGG]. (1) “Peru, Loreto, Padre / Isla, 100 m, 23-III-2006, / leg. R. Westerduijn, / understory altered forest /Road behind airport” “*Zenoria* cf. *paprzyckii* / det. G. Gonzalez 2011” “♂” [CPGG]. BOLIVIA. (1) ‘*Xylopia sericea*/ Fogging; 25.vii.97/Tree 1B-trav 4’ ‘Oquiriquia forest/ Tierra Prometida/N.E. Bolivia/J.G. Davies’ ‘312’ ‘BMNH (E)/1998-69’ [BMNH]. (1) “Forested eastern/foothills of the/Andes, 2000 ft.” “*Zenoria / paprzyckii* / Gordon/ det R. Gordon 1980” [BMNH]. (1) “Bolivia III.1950 / Peia Sara / Nueva Maka / A. Martinez leg..” ♀ [MZSP].

***Zenoria revestita* Mulsant, 1850**

BRAZIL. (1) "Type" "*revestita*" "LECTOTYPE/*Zenoria/revestita*/Muls/by R. Gordon 70" "LECTOTYPE/*Zenoria/revestita*/Muls/Gordon 1971" [CAMZM Crotch Collection].

PERNAMBUCO. (1) "Brasil, PE, Camaragibe, / Aldeia km 8.5 / II-2016 P. Grossi" "DZUP / 289889".

MINAS GERAIS. (1) "Brasil, MG, / Volta Grande / 1-II-2008, Leg. / L. C. Torres *Citrus*" "*Zenoria / revestita* /Mulsant / Det. G. González 2008" "♂" 954" [CPGG].

RIO DE JANEIRO. (1) "Coleção / M. Alvarenga" "Corcovado / Guanabara Brasil / IX.1961 / Alvarenga & Seabra" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♀" "DZUP / 188421". (1) "Coleção / M. Alvarenga" "Corcovado / Guanabara Brasil / X.1966 / Alvarenga & Seabra" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♂" "DZUP / 188430". (2) "Coleção / M. Alvarenga" "Corcovado / Guanabara Brasil / VIII.1963 / Alvarenga & Seabra" "*Zenoria / revestita* / Mulsant / det. R. Gordon 85" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♀" "♂" "DZUP 188420 – 288360". (1) "Corcovado G8 Brasil / Guanabara Brasil / 18-IX.61 J. S. Moure / Alvarenga & Seabra" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♀" "DZUP / 188429". (1) "Brasil Rio de Janeiro / D. F. Corcovado / V.1960 / Seabra & Alvarenga" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♀" "DZUP / 228920". (1) "Coleção / M. Alvarenga" "Corcovado / Guanabara Brasil / X.1967 / Alvarenga & Seabra" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♂" "DZUP / 188431". (1) "Corcovado / RJ / Brasil / 15. X.1976 / M.A. Monné / C.A. Campos Seabra" "♀" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" [MNRJ]. (1) "Santa Tereza - D. F. / 15-VII-59 / Peracechi leg." "♂" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013". [MNRJ]. (2) "Santa Tereza - D. F. / 15-VII-59 / Peracechi leg." "♀" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" [MNRJ]. (1) "Dpto Zool / UF-Paraná" "Represa R. Grande / GB - 20/10/1967 / Brasil – F. Oliveira" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "♀" "DZUP / 188428". (1) "Dpto Zool / UF-Paraná" "Represa R. Grande - GB / Brasil - 20/5/1967 / F. M. Oliveira leg" "*Zenoria revestita* / Mulsant, 1850 / L. M. Almeida det." "DZUP / 188419". (1) "Rio de Janeiro / Jardim Botânico" "Dr. F. C. / Camargo" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" "♀" [MZSP]. (1) "Deodoro / Dist. Federal / 25-VIII-34 / W. Zikán" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" [MZSP]. (1) "Def. San. Veg. / *Azya* sp." "♀" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" [MZSP]. (1) "Manguinhos (D.F.) / 28.XI.938 / Dr. F. Camargo" "♂" "*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013" [FIOC]. (1) "Rio de Janeiro" "*Zenoria / revestita* / Mulsant, 1850 /det. R. Gordon 71" [MFN BERLIN]. (1) "Maromba, Itatiaia / E. do Rio Brasil / J. F. Zikan / 18.I.48" "Coleção /

J.F. Zikan” “♂” “*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013” [FIOC]. (1) “Itatiaia / E. do Rio-Brasil / J. F. Zikan / 24-27. X. 23” “Coleção / J.F. Zikan” “*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013” [FIOC]. (1) “Coleção / J. F. Zikan” “Itatiaia 700 m / Est. do Rio / 18.XI.1947 / J. F. Zikan” “♀” “*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013” [FIOC]. (1) “Ilha Grande – RJ / (Vila Dois Rios) / Trilha Parnaioca / 06/09/2008 / Proj. Coleop. col.” “Doação UFRJ Ilha do / Fundão, 2010, J. R. / Memudes” “♀” “DZUP / 145765” (1) “Corcovado, /Rio de Janeiro/G.E.Bravant/10.v.1912” “G. Bryant Coll/1919147” “*Ladoria/rudepunctata* Crotch” [BMNH]. (1) “11541” “Type” “Fry/Rio Jan” “type de *Ladoria/rudepunctata* Crotch/C.R. Simith det. 1976/see R.D. Gordon 1972” [BMNH]. SÃO PAULO. (1) “Caraguatatuba - SP / (Res. Flor. – 40 m / 2-IV-962 - Martins / Reichardt & Silva” “*Zenoria revestita* / Mulsant, 1850 / L.M. Almeida det.” “♀” [MZSP]. (1) “Caraguatatuba - SP / (Res. Flor. – 40 m / 2-IV-962 Martins / Reichardt & Silva / “*Zenoria revestita* / Mulsant, 1850 / L. M. de Almeida det.” “♀” [MZSP]. (2) “Brazil/ São Paulo/F. Camargo” “Brit. Mus./1937-468” [BMNH] (1) “Brazil/ São Paulo/F. Camargo” “Brit. Mus./1937-468” “*Ladoria/rudepunctata* Crotch/F.Camargo det./H Scott confirm” [BMNH] (1) “Brazil/ São Paulo/F. Camargo” “Brit. Mus./1937-468” “*Zenoria/revestita* Muls/det R.G. Booth 1986” [BMNH]. PARANÁ. (1) “Morretes PR / 23-III-1995 / Santos, P.T.R.” “♂” “*Zenoria revestita* / Mulsant, 1850 / det. P. B. Santos 2013” “DZUP / 131904”. (1) “Brasil, Paraná, Morretes / 25°26’45”S 48°53’22”W / Estrada da Estação / 28.XI.2016 / Santos, Churata-Salcedo & Domahovski leg.” “♂” “*Zenoria revestita* / Mulsant, 1850 / Santos, P. B. det. 2016” “DZUP / 404542”. (1) “Depto Zool / UF-Paraná” “Morretes-PR Brasil / (IAPAR) / 17.v.1985 / C.I.I.F. (luminosa)” “DZUP / 187438” “♀” [DZUP].

Genera do not belong to Ortaliini

Genus *Azoria* Mulsant, 1850

Azoria subviolacea

Type-material. (1) “243” “*Azoria/subviolacea*/Aut det.” “Museum Paris/1943/col. É. Mulsant” is the Holotype fixed by monotypy of *Azoria subviolacea* Mulsant, 1850 (ICZN 73.1.2.). [MNHN]

Genus *Ortalistes* Gorham, 1897

Ortalistes germanus Gorham, 1897

Type-material. GUATEMALA. (1) “San Juan,/Vera Paz/Champion” “*Ortalistes/germanus* Gorh” “B.C.A. Col. VII” “SYNTYPE” “LECTOTYPE/*Ortalistes/germanus*/Gorham/Gordon

1970" [BMNH] (1) "Sinanja/Vera Paz/Champion" "B.C.A. Col. VII./*Ortalistes/germanus* Gorh" "SYNTYPE" [BMNH, female dissected]. (1) "Tamahu/Vera Paz/Champion" "*Ortalistes/germanus* Gorh" "sp. figured" "Type" "B.C.A. Col. VII" "SYNTYPE" [BMNH].

***Ortalistes immersus* Gorham, 1897**

Type-material. MEXICO. (1) "Teapa/Tabasco/Feb. H.H.S." "*Ortalistes/immersus*/Gorham" "Type" "B.C.A. Col. VII" "SYNTYPE" "LECTOTYPE/*Ortalistes/immersus*/Gorham/Gordon 1970" [BMNH].

PANAMA. (1) "David/Panama/Champion" "*Ortalistes/immersus*/Gorham" "Syntype" [BMNH, female dissected]. (1) "David/800–1500 ft./Champion" "*Ortalistes/immersus*/Gorham" "SYNTYPE" [BMNH, exemplar lost, only labels]

***Ortalistes obesus* Gorham, 1897**

Type-material. PANAMA. (1) "Buagaba/Panama/Champion" "sp. figured" "*Ortalistes/obesus* Gorh" "B.C.A. coll VII" "LECTOTYPE/*Ortalistes/obesus*/Gorham/Gordon 1970" [BMNH, female] (1) "David/Chiriqui/Champion" "B.C.A. coll VII/ *Ortalistes/obesus* Gorh" "*Ortalistes*" "Type" [BMNH, female].

***Ortalistes pexus* Gorham, 1897**

Type-material. GUATEMALA. (1) "TYPE" "Senahu/Vera Paz/Champion" "*Ortalistes/pevus* Gorham/type" Champion "B.C.A. Col. VII" "LECTOTYPE/*Ortalistes/pevus*/Gorham/Gordon 1970" "SYNTYPE" [BMNH, male]. (2) "Senahu/Vera Paz/Champion" "B.C.A. Col. VII/*Ortalistes/pevus* Gorh" "SYNTYPE" [BMNH, male] (1) "Atoyac/Vera Cruz/May. H.H.S." "*O. pexus*" "B.C.A. Col. VII" "SYNTYPE" [BMNH, female] (1) "San Juan/Vera Paz/Champion" "B.C.A. Col. VII/*Ortalistes/pevus* Gorh" "SYNTYPE" [BMNH, male] (1) "San Juan/Vera Paz/Champion" "*Ortalistes/pevus* Gorh" "B.C.A. Col. VII" "SYNTYPE" [BMNH, male] (1) "San Juan/Vera Paz/Champion" "*Ortalistes/pevus* Gorh" "SYNTYPE" [BMNH, male] (1) "69435" "Type" "Gmatin" "Senahu/Vera Paz/Champion" "Fry Coll/1905–100" "*Ortalistes/pevus* Gorh" "B.C.A. Col. VII/*Ortalistes/pevus* Gorh" "SYNTYPE"

***Ortalistes rubidus* Gorham, 1897**

Type-material.. PANAMA. (1) “David/Panama/Champion” “B.C.A.collVII” “LECTOTYPE /*Ortalistes/ rubidus/* Gorham/Gordon 1970” [BMNH, female] (1) “David/Chiriqui/Champion” “*Ortalistes/rubidus* Gorh” “Type” [BMNH, male].

Genus *Paramida* Sicard, 1909

***Paramida griseipennis* Sicard, 1909**

Type-material. MADAGASCAR. (2) “Type” [MNHN Sicard Collection, one male, one female].

Genus *Pseudoladoria* Crotch, 1874

***Pseudoladoria simlans* Crotch, 1874**

Type-material. BRASIL “Ega” [Tefé] [CAMZM].

Genus *Scymnhova* Sicard, 1909

***Scymnhova inornata* Sicard, 1931**

Type-material. MADAGASCAR. (1) “Type RED” “S. Africa” “R.E. Turner/Brit. Mus./1923–286” “Port St. John,/Pondoland/April 5–30 1923” ‘*Scymnhova/ inornata/n.sp.* type’[BMNH, male]. (1) “S. Africa” “R.E. Turner/Brit. Mus./1923–363” “Port St. John,/Pondoland/April 12–30 1923” ‘syntype BLUE’[BMNH, female].

***Scymnhova ornatipennis* Sicard, 1909**

Type-material. MADAGASCAR. (1) “Mt d’Ambre/Madagascar” “Type” is the Holotype fixed by monotypy of *Scymnhova ornatipennis* Sicard, 1909 (ICZN 73.1.2.). [BMNH].

***Scymnhova quadriguttata* Sicard, 1909**

Type-material. MADAGASCAR. (2) “Ambovambé/Madagascar” “Type” [MNHN]. (1) “Plateau de l’Androy/ Rég. D’ Ambovombé” [MNHN].

***Scymnhova quadrimaculata* Sicard, 1909**

Type-material. MADAGASCAR. (5) “Mt. d’Ambre/Madagascar” “Type” [MNHN Sicard Collection]. (14) “Mt. d’Ambre/Madagascar” [MNHN Sicard Collection]. (1) “Cotype YELLOW” “Mt. d’Ambre/Madagascar” [BMNH]. (1) “Cotype” “Mt. d’Ambre/Madagascar” “*Scymnhova/4 maculata/ex type*” [BMNH].

Genus *Semra* Özdikmen, 2007

***Semra picta* (Gorham, 1899)**

Type-material. MEXICO. (1) “Type” “Chilpancingo/Guerrero/4600 ft./June H.H. Smith” “*Cinachyra/picta* Gorh” “HOLOTYPE/ *Cinachyra/picta* Gorham/1899:263/det. R.G. Booth 2006” [BMNH].

Table S1. Taxa terminals included in the cladistic analysis of Ortaliini Mulsant, 1850 (Coleoptera, Coccinellidae). *: primary type; §, genus type species; £ additional material; sex.

Taxa terminals	Author			Tribe	Author
<i>Azya luteipes</i>	Mulsant, 1850	£	♂♀	Coccidulini	Mulsant, 1846
<i>Chnoodes chaudoiri</i>	Mulsant, 1850	£	♂♀	Coccidulini	Mulsant, 1846
<i>Coccinella</i> sp.	Linnaeus, 1758	£	♂♀	Coccinellini	Mulsant, 1846
<i>Cryptolaemus montrouzieri</i>	Mulsant, 1853	£	♂♀	Coccidulini	Mulsant, 1846
<i>Diomus</i> sp.	Mulsant, 1850	£	♂♀	Diomini	Gordon, 1999
<i>Epilachna cacica</i>	(Guérin-Meneville, 1844)	£	♂♀	Epilachnini	Mulsant, 1846
<i>Hyperaspis</i> sp.	Chevrolat in Dejean, 1833	£	♂♀	Hyperaspidini	Mulsant, 1846
<i>Microweisea</i> sp.	Cockerell, 1903	£	♂♀	Microweiseini	Leng, 1920
<i>Poria cyanea</i>	Mulsant, 1850	£	♂♀	Coccidulini	Mulsant, 1846
<i>Prodilis</i> sp.	Mulsant, 1850	£	♂♀	Cephaloscymnini	Gordon, 1985
<i>Rhynchortalia insueta</i>	Crotch, 1874	£	♂♀	Coccidulini	Mulsant, 1846
<i>Rhyzobius lophantae</i>	(Blaisdell, 1892)	£	♂♀	Coccidulini	Mulsant, 1846
<i>Rodolia cardinalis</i>	(Mulsant, 1850)	£	♂♀	Noviini	Mulsant, 1846
<i>Scymnodes difficilis</i>	Blackburn, 1889	£	♂♀	Coccidulini	Mulsant, 1846
<i>Scymnus</i> sp.	Kugelann, 1794	£	♂♀	Coccidulini	Mulsant, 1846
<i>Sticholotis</i> sp.	Crotch, 1874	£	♂♀	Sticholotidini	Weise, 1901
<i>Amida quinquefasciata</i>	Hoàng, 1982	£	♂♀	Ortaliini	Mulsant, 1850
<i>Amida tricolor</i>	(Harold, 1878)	§£	♂♀	Ortaliini	Mulsant, 1850
<i>Amida mirifica</i>	Hoàng, 1983	£	♂♀	Ortaliini	Mulsant, 1850
<i>Anortalia fleutiauxi</i>	Weise, 1902	*§£	♂♀	Ortaliini	Mulsant, 1850
<i>Azoria subviolacea</i>	Mulsant, 1850	*§£		Ortaliini	Mulsant, 1850
<i>Elnidortalia bipunctata</i>	Recuenco-Adorada, 2011	§£	♀	Ortaliini	Mulsant, 1850
<i>Ortalia bruneiana</i>	Bielawski, 1965	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia calliops</i>	(Guérin, 1846)	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia dohrni</i>	Gorham, 1901	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia duponti</i>	Mulsant, 1850	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia horni</i>	Weise, 1900	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia kandyana</i>	Bielawski, 1957	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia ochracea</i>	Weise, 1910	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia oculata</i>	Weise, 1888	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia pallens</i>	Mulsant, 1850	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia pectoralis</i>	Weise, 1901	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia punctata duodecimmaculata</i>	Weise, 1900	£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia quadripunctata</i>	Gorham, 1894	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalia variata</i>	Mulsant, 1850	*§£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalistes germanus</i>	Gorham, 1897	*£	♀	Ortaliini	Mulsant, 1850
<i>Ortalistes immersus</i>	Gorham, 1897	*£	♀	Ortaliini	Mulsant, 1850
<i>Ortalistes obesus</i>	Gorham, 1897	*§£	♀	Ortaliini	Mulsant, 1850
<i>Ortalistes pexus</i>	Gorham, 1897	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Ortalistes rubidus</i>	Gorham, 1897	*£	♀	Ortaliini	Mulsant, 1850
<i>Paramida griseipennis</i>	Sicard, 1909	*§£	♂♀	Ortaliini	Mulsant, 1850
<i>Pseudoladonia similans</i>	Crotch, 1874	*§£	♂	Ortaliini	Mulsant, 1850
<i>Scymnhova inornata</i>	Sicard, 1931	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Scymnhova ornatipennis</i>	Sicard, 1909	*§£	♂	Ortaliini	Mulsant, 1850
<i>Scymnhova quadriguttata</i>	Sicard, 1909	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Scymnhova quadrimaculata</i>	Sicard, 1909	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Semra picta</i>	(Gorham, 1899)	*§£	♂	Ortaliini	Mulsant, 1850
<i>Zenoria crotchii</i>	Gordon, 1971	£	♂♀	Ortaliini	Mulsant, 1850
<i>Zenoria luciae</i>	González & Honour, 2012	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Zenoria paprzyckii</i>	Gordon, 1971	*£	♂♀	Ortaliini	Mulsant, 1850
<i>Zenoria revestita</i>	Mulsant, 1850	*§£	♂♀	Ortaliini	Mulsant, 1850

Table S2. Morphological matrix data used in the cladistic analysis of *Ortaliini* Mulsant, 1850 (Coleoptera, Coccinellidae). ?, characters not observed; _ characters not applied.

	0	10	20	30	40	50	60	70	80	90	100	110
<i>Microlesia</i> sp.	1 0 1 0 -	1 1 1 0 0 0	2 1 3 0 0 1	1 0 0 0 0 0	1 0 0 0 0 0	2 0 1 0 2 1	0 1 0 1 1 0	1 0 1 0 1 2	1 0 1 0 1 2	1 0 1 0 1 2	1 0 1 0 1 2	1 0 1 0 1 2
<i>Amida miflita</i>	1 2 0 1 1	0 5 0 0 1	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Amida quinquefasciata</i>	1 2 0 1 2	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Anarta tricolor</i>	1 2 0 1 0	0 0 0 0 0 0	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Anarta fleuveauxi</i>	1 2 0 1 0	0 0 0 0 0 0	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Azaria subulacea</i>	1 1 0 1 4	1 1 0 0 0 1	2 1 3 0 0 0	0 0 0 1 0 0	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Azya kireipes</i>	1 1 0 1 4	1 1 0 1 1	2 1 3 0 0 0	0 0 0 1 0 0	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Chnoades chaudiari</i>	1 1 0 2 3	1 1 0 1 1	2 1 2 2 1 0	0 0 0 1 0 0	1 0 0 1 1 0	0 0 0 0 1 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Coccinella</i> sp.	0 1 0 0 1	1 1 1 0 0	2 1 3 0 1 0	1 0 0 0 1 0	1 0 1 1 0 1	0 0 0 0 1 0	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Cryptodemus montauzeri</i>	1 1 0 1 4	1 1 0 0 0 1	2 1 2 0 0 0	1 0 0 0 1 0	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Damius</i> sp.	1 1 0 1 2	1 1 3 0 0 1	1 0 0 0 1 2	1 0 0 0 1 0	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Elmidae bipunctata</i>	1 2 0 1 1	0 5 0 0 1	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Epilachna cacia</i>	1 0 0 0 -	1 3 1 0 0	2 1 3 0 1 0	0 0 0 0 1 0	1 0 1 1 0 1	0 0 0 0 1 0	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Hyperaspis</i> sp.	0 1 0 0 -	1 1 1 0 0	2 1 3 0 1 0	0 0 0 0 1 0	1 0 1 1 0 1	0 0 0 0 1 0	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia brunnea</i>	1 2 0 1 1	0 5 0 0 1	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia callopes</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia dahlmani</i>	1 2 0 1 1	0 5 0 0 1	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia dupontii</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia hanni</i>	1 2 0 1 1	0 5 0 0 1	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 1 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia kenyanana</i>	1 2 0 1 2	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia ochryaea</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia oculata</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia pallens</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia pectoralis</i>	1 2 0 1 2	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia punctata duodecimmaculata</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia quadripunctata</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalia variata</i>	1 2 0 1 0	0 0 0 0 0 2	2 1 3 0 0 1	1 1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalistes germanus</i>	1 1 0 1 2	1 1 0 1 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalistes immersus</i>	1 1 0 1 2	1 1 0 1 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalistes obsus</i>	1 1 0 1 4	1 1 0 1 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalistes pexus</i>	1 1 0 1 4	1 1 0 1 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Ortalistes rubidus</i>	1 1 0 1 2	1 1 0 1 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Paranida grisepennis</i>	1 0 0 0 -	1 3 1 0 0	2 1 3 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Paria cyanea</i>	1 1 0 1 4	1 0 0 0 1	2 1 3 0 0 0	1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Protilis</i> sp.	1 2 0 1 4	1 0 0 0 1	1 1 1 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Pseudodonia similans</i>	1 2 0 1 4	1 0 0 0 1	1 1 1 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Rhyzarchalia isueta</i>	1 1 0 0 -	1 1 0 0 0	2 1 3 0 0 0	1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Rhyzarchalia lophanthae</i>	1 1 1 0 4	1 2 0 1 1	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Rodolia cardinalis</i>	1 1 0 0 -	1 1 0 1 1	2 0 3 0 0 0	1 0 0 0 1	1 0 0 2 0 0	0 0 0 1 0 0	0 0 2 0 1 1	1 1 2 0 0 1	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnobia innata</i>	1 1 1 0 4	1 2 0 1 1	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnobia ornaticornis</i>	0 0 1 1 0	1 0 4 1 0	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnobia quadriguttata</i>	1 1 1 0 4	1 2 0 1 1	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnobia quadrimaculata</i>	1 1 1 0 4	1 2 0 1 1	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnoides affinis</i>	1 1 0 1 4	1 1 0 0 1	2 1 2 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Scymnus</i> sp.	1 1 0 0 -	1 1 0 1 1	2 0 3 0 0 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Semra picta</i>	1 0 0 0 -	1 1 1 0 0	2 1 3 0 1 0	1 0 0 0 1	1 0 1 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Sicholalis</i> sp.	0 0 1 1 0	1 0 4 1 0	2 1 3 0 1 0	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Zenaria crotchii</i>	1 2 0 1 0	1 0 0 0 0	2 1 3 0 0 1	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Zenaria luciae</i>	1 2 0 1 0	1 0 0 0 0	2 1 3 0 0 1	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Zenaria paprzyckii</i>	1 2 0 1 0	1 0 0 0 0	2 1 3 0 0 1	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1
<i>Zenaria revestita</i>	1 2 0 1 0	1 0 0 0 0	2 1 3 0 0 1	1 0 0 0 1	1 0 0 1 0	1 0 0 1	0 0 0 0 2 1	1 2 0 0 1 0	1 0 0 0 1 0	0 0 0 0 0 0	1 0 0 1 0 0	0 0 1 0 1 1

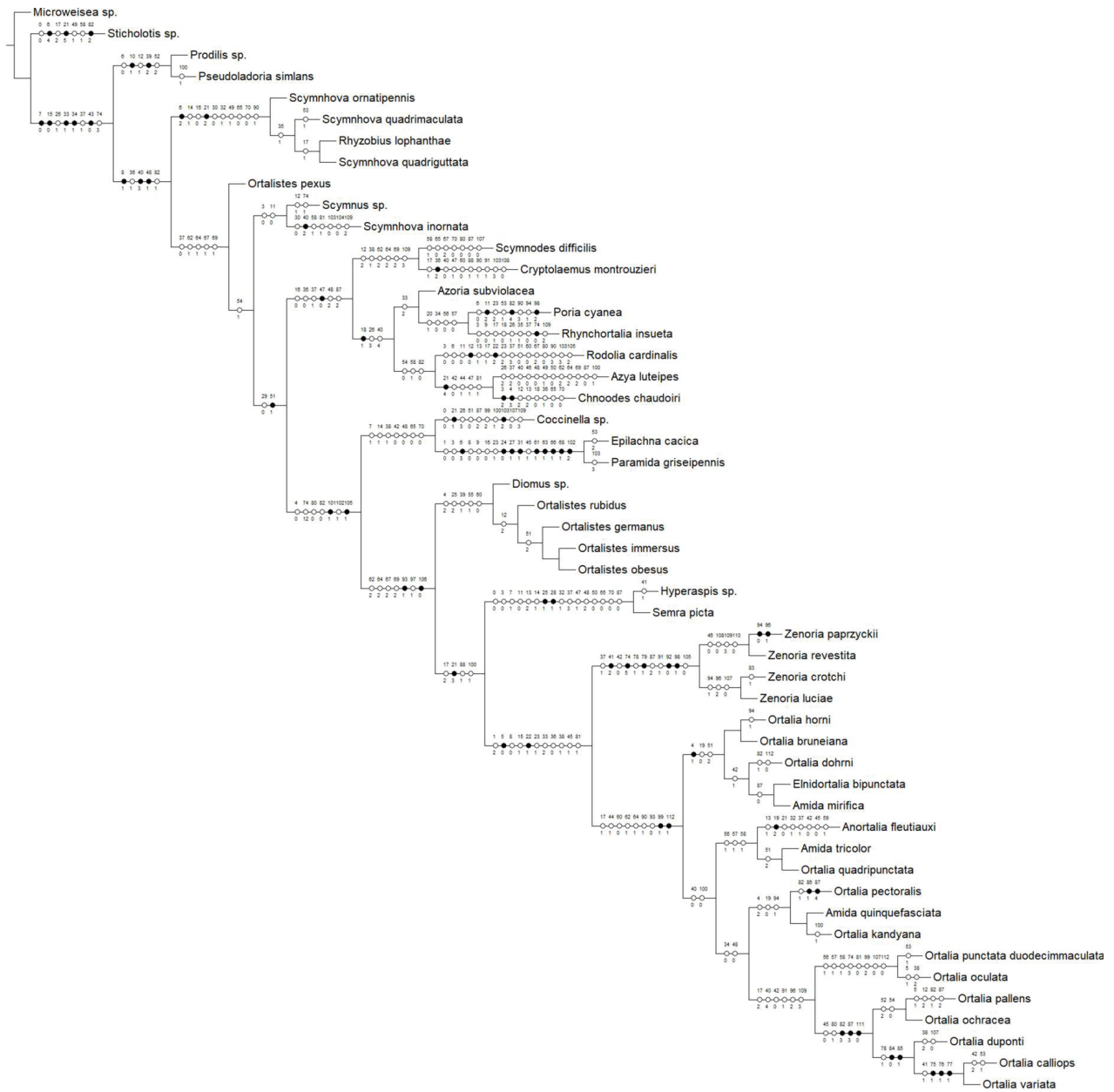


Figure S1. Equal weights analysis – one of four most parsimonious trees (Length=451, CI=41; RI=78) based on morphological data of Orkaliini Mulsant, 1850 (Coleoptera, Coccinellidae) – tree one



Figure S2. Equal weights analysis – one of four most parsimonious trees (Length=451; CI=41; RI=78) based on morphological data of Ortaliini Mulsant, 1850 (Coleoptera, Coccinellidae) – tree two.

Figure S3. Equal weights analysis – one of four most parsimonious trees (Length=451, CI=41; RI=78) based on morphological data of Ortaliini Mulsant, 1850 (Coleoptera, Coccinellidae) – tree three.

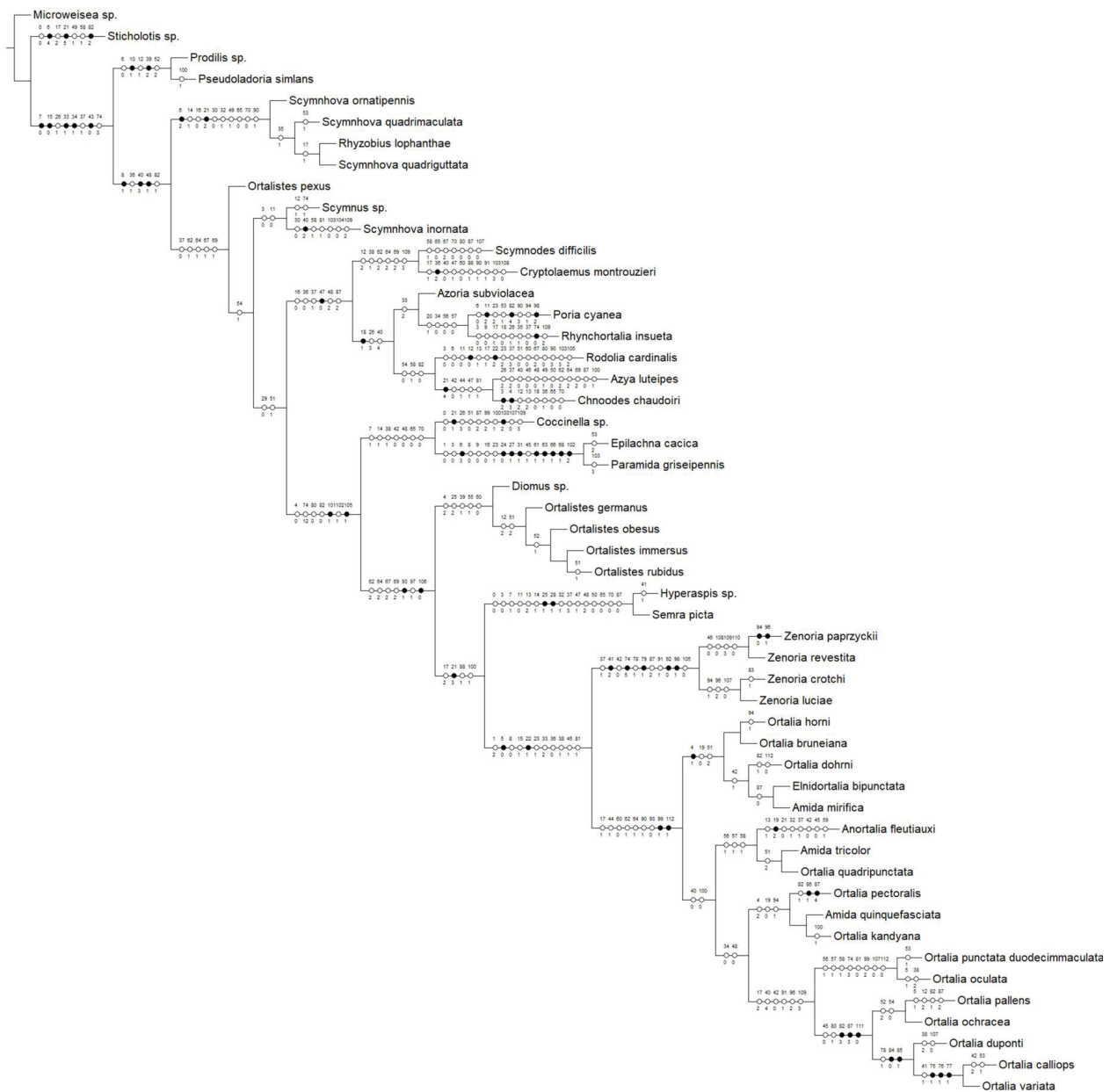


Figure S4. Equal weights analysis – one of four most parsimonious trees (Length=451, CI=41; RI=78) based on morphological data of Ortaliini Mulsant, 1850 (Coleoptera, Coccinellidae) – tree four.

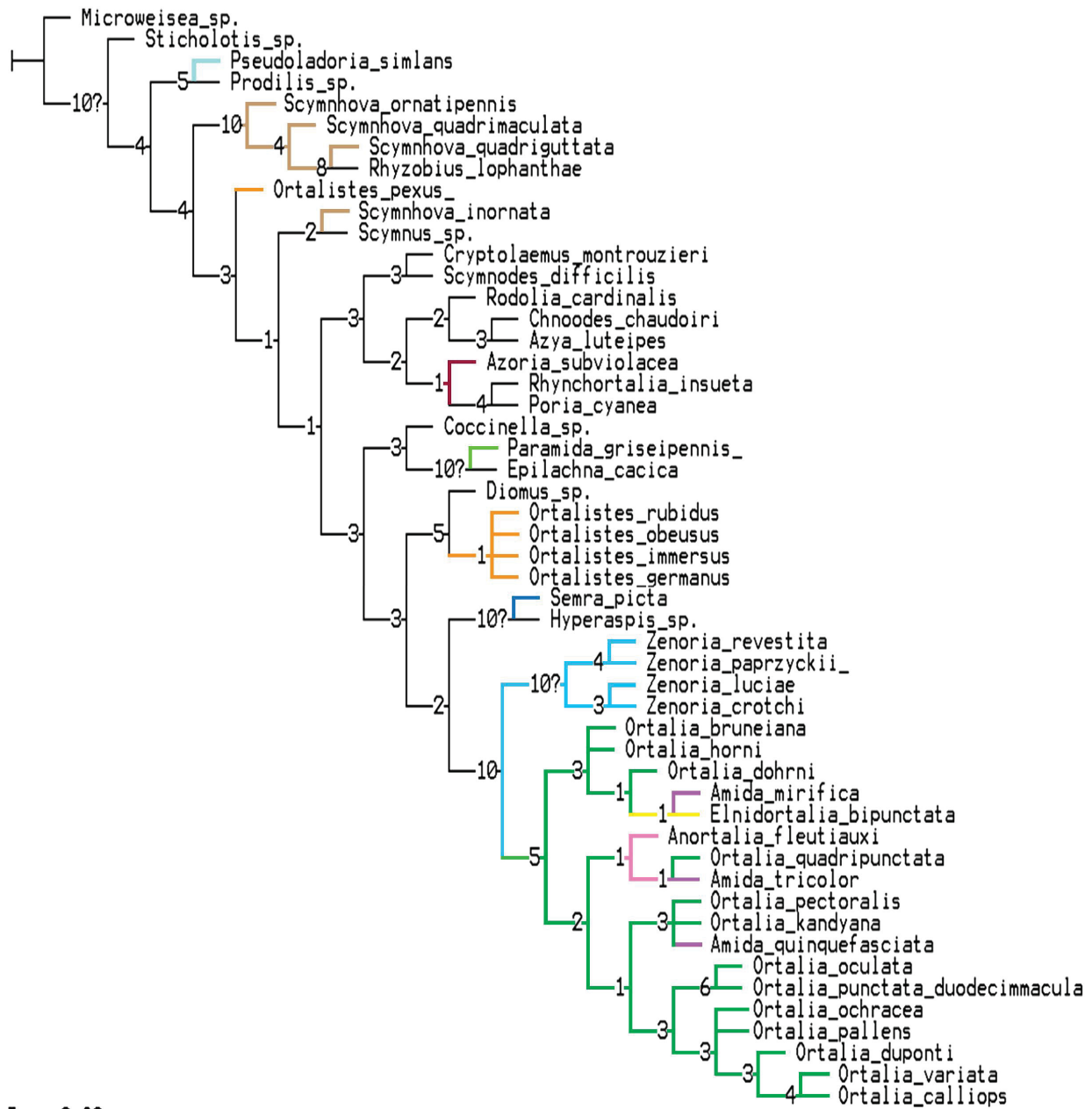


Figure S5. Equal weights analysis – Absolute Bremer Support (ABS) of four most parsimonious tree (Length=465, CI=40 RI=77) based on morphological data of Ortaliini Mulsant, 1850 (Coleoptera, Coccinellidae).

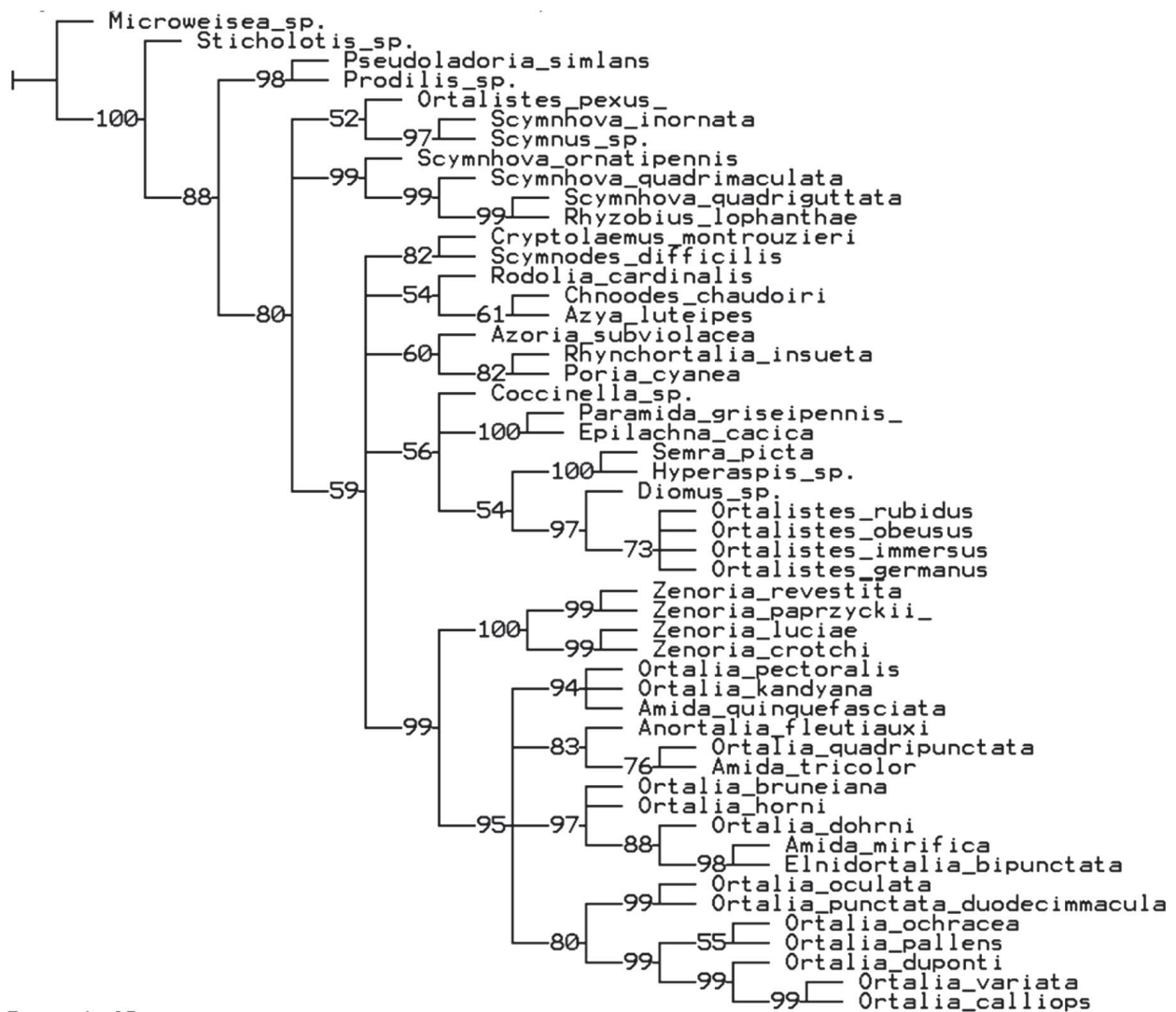


Figure S6. Equal weights analysis – Majority-rule consensus tree of most parsimonious trees (Length=451, CI=41; RI=78) based on morphological data of Ortiini Mulsant, 1850 (Coleoptera, Coccinellidae).

Figure S7. The most parsimonious tree (Length=465, CI=40; RI=77) of TNT implied weights analysis of morphological data (implied K=2), Relative Bremer Support (RBS) of *Ortaliini* Mulsant, 1850 (Coleoptera, Coccinellidae).