

A new species of *Aleiodes* (Hymenoptera, Braconidae, Rogadinae) from Brazil, with biological notes

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ABSTRACT. *Aleiodes* Wesmael is the most diverse rogadine genus, with koinobiont endoparasitic development in Lepidoptera caterpillars resulting in mummification of the host remains. *Aleiodes japi* sp. nov. is described and illustrated. Type specimens of the new species were reared from *Physocleora grosica* and *Ischnopteris* sp. (Lepidoptera, Geometridae, Ennominae) larvae. Host larvae were collected on *Alchornea triplinervia* (Euphorbiaceae) at the Reserva Biológica Municipal da Serra do Japi, Jundiá, São Paulo, Brazil. This is the second species of *circumscriptus/gastritor* group described from Brazil.

KEYWORDS. Biodiversity, Geometridae, parasitoids, host.

RESUMO. Uma nova espécie de *Aleiodes* (Hymenoptera, Braconidae, Rogadinae) do Brasil, com notas biológicas. *Aleiodes* Wesmael é o gênero mais comum e diverso de Rogadinae, desenvolvendo-se como endoparasitóide cenobionte em larvas de Lepidoptera, resultando na mumificação de seu hospedeiro. *Aleiodes japi* sp. nov. é descrita e ilustrada. Os espécimes tipo da nova espécie foram obtidos de larvas de *Physocleora grosica* e *Ischnopteris* sp. (Lepidoptera, Geometridae, Ennominae). As larvas hospedeiras foram coletadas sobre *Alchornea triplinervia* (Euphorbiaceae) na Reserva Biológica Municipal da Serra do Japi, Jundiá, Estado de São Paulo, Brasil. Esta é a segunda espécie do grupo *circumscriptus/gastritor* descrita para o Brasil.

PALAVRAS-CHAVE. Biodiversidade, Geometridae, parasitoides, hospedeiro.

Rogadinae is a cosmopolitan subfamily of koinobiont endoparasitoids of Lepidoptera (SHAW, 1983; SHAW, 1997), well represented in the New World, with hundreds of important species due to its possible usage as biological controllers (SHAW, 2006). Although some of Rogadinae genera are very common, there are few studies developed in the Neotropical region (SHAW, 1997). All Rogadinae induce the hardening of the host larva before pupation, producing a “mummy” which conceals the parasitoid pupa. Within Rogadinae, *Aleiodes* Wesmael, 1838 is the most common and speciose genus worldwide. It is known to attack almost exclusively exposed-feeding macrolepidopterans, especially the superfamilies Noctuoidea and Geometroidea, and to a lesser extent, Sphingoidea and Papilionoidea (SHAW *et al.*, 1997; SHAW, 2006). In most cases, the mummified host associated with *Aleiodes* species can provide useful information about their hosts (JANZEN *et al.*, 1998; STIREMAN *et al.*, 2005).

In the Neotropical region there are 89 described species of *Aleiodes*, 41 of them with host records (FORTIER, 2009; TOWNSEND & SHAW, 2009; SHIMBORI & SHAW, 2014). The first division of *Aleiodes* into species-groups (SHAW *et al.*, 1997) accounts for fifteen different groups. After phylogenetic analyses three additional groups were proposed (FORTIER & SHAW, 1999). TOWNSEND & SHAW (2009) found the species of the closely-related *gastritor* and *circumscriptus* groups in Ecuador to be difficult to separate, and recommended treating these as one single group for Neotropical fauna. The *circumscriptus/gastritor* species-group is defined by the following combination

of characters: sinuate vein RS of hind wing, enclosing a marginal cell that is narrowest at middle; absence of comb of flattened setae at inner apex of hind tibia; ocelli moderate sized; metasomal tergite III sculpturing not smooth; antenna longer than body; medial length of pronotum relatively short (SHAW *et al.*, 1997; FORTIER & SHAW, 1999). The hosts for Neotropical *circumscriptus/gastritor* species are mainly Geometridae and Noctuidae caterpillars, with only one species reared from Pyralidae (TOWNSEND & SHAW, 2009). In the present study a new *Aleiodes* species of the *circumscriptus/gastritor* species-group is described.

MATERIAL AND METHODS

Specimens for this study were collected at Reserva Biológica Municipal da Serra do Japi (REBIO), Jundiá, São Paulo State, Brazil. The REBIO vegetation is composed mainly by seasonal semideciduous montane forest (LEITÃO-FILHO, 1992; CARDOSO-LEITE *et al.*, 2005)

Caterpillars were sampled by walking through trails, beating plants over a circular white cloth. Caterpillars were collected in clear plastic pots with their food plant, assigned identification codes, and transported to the rearing laboratory at Universidade Federal de São Carlos. Emerging parasitoid adults were preserved in alcohol and point mounted for identification.

Type specimens were deposited at the Coleção Entomológica do Departamento de Ecologia e Biologia Evolutiva da Universidade Federal de São Carlos (DCBU), São Carlos, Brazil.

The parasitoid genus was identified based on SHAW (1997). Species-group classification follows SHAW *et al.* (1997) and TOWNSEND & SHAW (2009). The figures were obtained with a stereomicroscope Leica M205C using the software Leica Application Suite (LAS) and Scanning Electronic Microscope FEI Quanta 250.

RESULTS AND DISCUSSION

Aleiodes japi Shimbori & Pentead-Dias sp. nov.

(Figs 1-5; 10-15)

Type material. BRASIL, **São Paulo**: Jundiá (Reserva Biológica Municipal da Serra do Japi, 23°14'19.1"S, 46°56'53"W), Holotype: ♂ (DCBU), 18.IV.2012, 1,138 m. C.I.V. Abreu col. Paratype: 1♂ (DCBU), same data as holotype, 7.IV.2012.

Holotype description ♂. Body length = 5.0 mm; fore wing length = 4.8 mm.

Color (Figs 1-5). Yellowish; dorsally mostly blackish with median yellowish stain at mesoscutum, scutellum and apex of metasomal tergum II; ocellar triangle black; palpi light yellow; mandibles yellow with dark brown apex; antenna black; propleuron, dorsal half and antero-dorsal corner of mesopleuron dark-brown; apical half of hind tibia and 5th tarsomeres brown; wings weakly infusate, veins dark brown; tegula yellow; propodeum lighter along mid-longitudinal carina; metasomal tergum IV brownish basally and yellowish apically, remainder apical terga yellowish.

Head (Figs 10-12). Surface granulate; antenna with 43 flagellomeres, about 2x longer than wide to slightly longer; malar space narrow, 1.3x the width of mandible base; occipital carina well defined, interrupted mid-dorsally, touching hypostomal carina; oral opening small and circular, its diameter about same length of mandible base; ocelli large, ocell-ocular distance 0.3x diameter of lateral ocelli.

Mesosoma (Figs 12-15). Surface mostly granulate; pronotum rugose laterally, otherwise finely granulate; notauli crenulate, ending in a depressed rugose area of mesoscutum; central disc of mesopleuron smooth and shining, rugose on antero-dorsal quarter, remainder mesopleuron shining coriaceous; propodeum mostly granulate, rugose antero-laterally; mid-longitudinal carina complete. Tarsal claws simple, not pectinate.

Wings (Fig. 5). Forewing: vein r about 0.5 times longer than vein 3RSa; vein RS+Mb about 0.7 times vein r; vein 1CUa 1.35x longer than 1CUB, and about 3x vein 1cu-a. Hind wing: vein RS slightly sinuate, marginal cell narrowest at middle; vein r-m about 0.6x vein 1M; vein M+CU about as long as vein 1M; vein m-cu present and pigmented.

Metasoma (Fig. 15). Tergum I about as long as apical width; apical width about 1.6x width at base; terga I and II costate, with complete longitudinal carina; tergum III costate with median longitudinal carina on basal 2/3.

Variation. No considerable variation in the paratype,

very similar to holotype.

Female. Unknown

Distribution. Known only from the type locality.

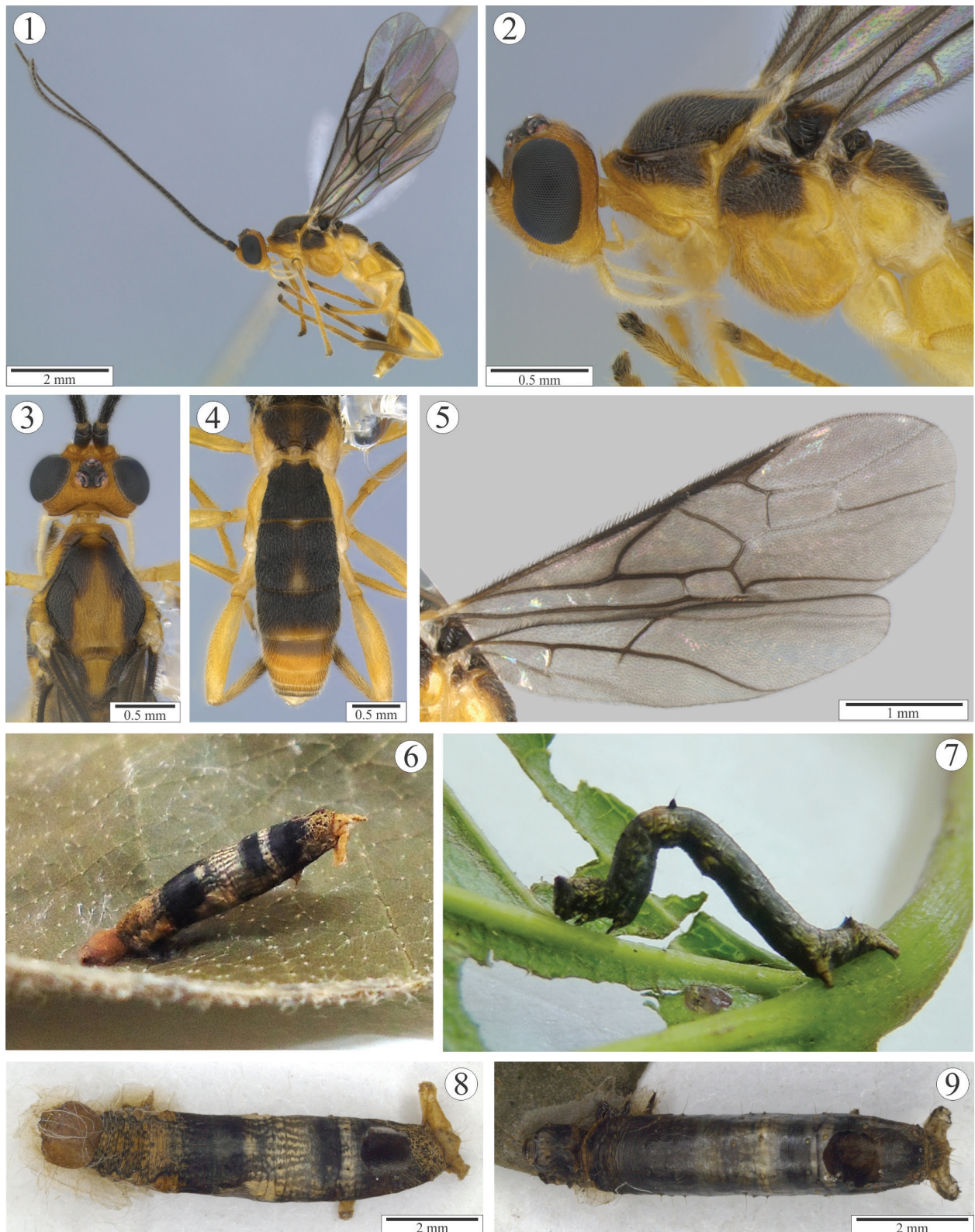
Biology. The specimens of *Aleiodes japi* sp. nov. were obtained from lepidopteran larvae of Ennominae (Geometridae) (Figs 6-9), feeding on *Alchornea triplinervia* Spreng (Euphorbiaceae). The holotype emerged from *Physocleora grosica* (Schaus, 1901) larva, and the paratype from *Ischnopteris* sp. larva. The parasitoid cuts a circular hole for emergence at the dorso-posterior region of the host mummy. Time span from host mummification until adult emergence was one week.

Comments. The morphology of *Aleiodes japi* sp. nov. fits well in the recent proposed *circumscriptus/gastritor* species group, e.g. the relatively large ocelli (diagnostic for *gastritor*) and the color of the metasoma (diagnostic for *circumscriptus*). There are only two species in this group recorded from Brazil. *Aleiodes gossypii* (Muesebeck, 1960), reared from *Alabama argilacea* (Hübner) and *Anomis* sp., both noctuid. It is likely that *Aleiodes laphygmae* (Viereck, 1912) occurs in Brazil; however, the only record in literature is not accurate, since MOLINA-OCHOA *et al.* (2003) cite results from CRUZ *et al.* (1997), which do not mention this species in their results. Therefore, *A. japi* sp. nov. is the second species of the group recorded from Brazil. It can be distinguished from *A. gossypii* and *A. laphygmae* by the mostly blackish dorsal body, which is entirely yellowish in *A. gossypii* and *A. laphygmae*, and the smooth central disc of mesopleuron, compared with finely granular in *A. gossypii* and *A. laphygmae*.

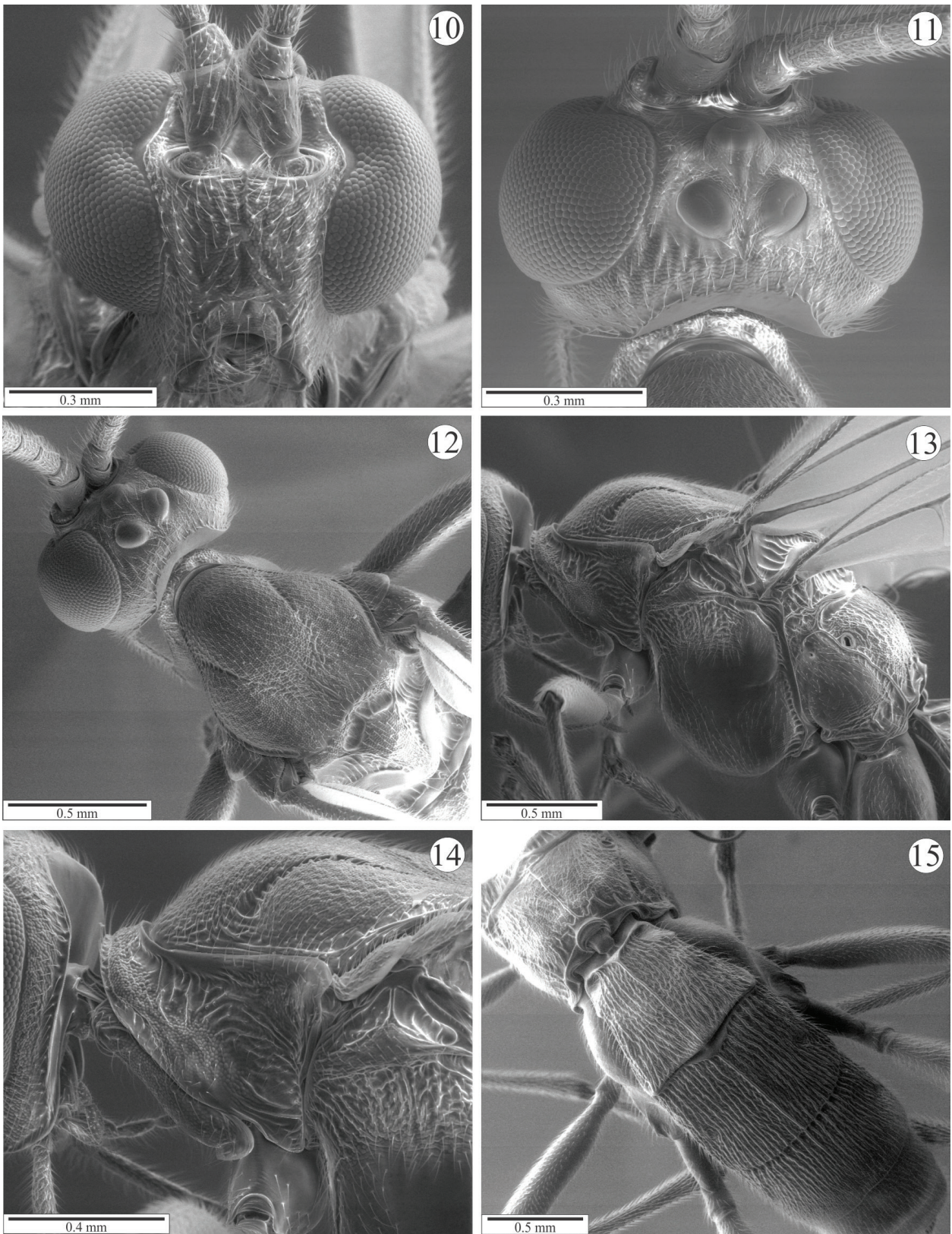
In the keys to species from Eastern Ecuadorian Andes (TOWNSEND & SHAW, 2009; SHIMBORI & SHAW, 2014), which contains all other previously described Neotropical species in *circumscriptus/gastritor* species-group, the new species will run to *Aleiodes speciosus* Townsend, 2009. The new species can be distinguished from *A. speciosus* mainly by the color pattern. Face, vertex except ocellar triangle and occiput are entirely yellowish in *A. japi* sp. nov., while presenting black stains in *A. speciosus*. The tergite I is dark brown in *A. japi* sp. nov., as compared with whitish in *A. speciosus*. The number of antennal segments is larger in *A. japi* sp. nov. than in *A. speciosus* (45 vs. 42 respectively). *A. japi* sp. nov. also has relatively larger ocelli, the ocell-ocular distance being about 0.3x diameter of lateral ocellus, as compared with 0.6 x in *A. speciosus*, and propodeum sculpturing granulate medially, while smooth with scattered punctuation in *A. speciosus*. Diagnostic characters in common to *A. japi* sp. nov. and *A. speciosus* includes the dorsally interrupted occipital carina, the smooth central disc of mesopleuron, vein 1CUa of forewing 1.35 times longer than 1CUB, and hind wing M+CU as long as 1M.

Etymology. The name refers to the collecting site of the new species.

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Figs 1-5, *Aleiodes japi* sp. nov., holotype, ♂: 1, habitus, left; 2, head and mesosoma, lateral; 3, head and mesoscutum, dorsal; 4, propodeum and metasoma, dorsal; 5, wings. Figs 6 and 8, *Physocleora grosica* (Geometridae): 6, mummified host larvae before parasitoid emergence, lateral; 8, host mummy after parasitoid emergence, dorsal. Figs 7 and 9, *Ischnopteris* sp. (Geometridae): 7, parasitized larvae, lateral; 9, host mummy after parasitoid emergence, dorsal.



Figs 10-15, *Aleiodes japi* sp. nov., holotype, ♂: 10, head, frontal; 11, head, dorsal; 12, head and mesoscutum, dorsal; 13, mesosoma, lateral; 14, pronotum, lateral; 15, propodeum and metasoma, dorsal.

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