

Systematics and distribution of the genus *Johnsonius* Marsh (Hymenoptera, Braconidae, Doryctinae) with description of two new species from Brazil

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ABSTRACT. Systematics and distribution of the genus *Johnsonius* Marsh (Hymenoptera, Braconidae, Doryctinae) with description of two new species from Brazil. The genus *Johnsonius* Marsh includes five species, most of them known from Costa Rica and one known from Venezuela, Peru and Costa Rica. Two of these species and two new species were recently collected in Atlantic rain forest. Description of the new species, illustrations of some morphological characters, a key for identification of all known species and the new geographic records are presented.

KEYWORDS. Atlantic rain forest; neotropical; parasitoid.

RESUMO. Sistemática e distribuição do gênero *Johnsonius* Marsh (Hymenoptera, Braconidae, Doryctinae) com descrição de duas novas espécies do Brasil. O gênero *Johnsonius* Marsh inclui cinco espécies, a maioria delas conhecidas na Costa Rica e uma conhecida na Venezuela, Peru e Costa Rica; duas destas espécies e duas novas espécies foram recentemente coletadas na Floresta Atlântica ombrófila. Descrição das novas espécies, ilustrações de alguns caracteres morfológicos, uma chave para identificação de todas as espécies conhecidas e os novos registros geográficos são apresentados.

PALAVRAS-CHAVE. Mata Atlântica Ombrófila; neotropical; parasitóide.

Johnsonius Marsh, 1993 belongs to the subfamily Doryctinae, one of the largest and most diverse groups of cyclostome Braconidae (Hymenoptera). The Doryctinae differ from the other cyclostomes by the presence of a row of short spines on the anterior edge of fore tibia, by a flange on the apico-lateral edges of the propleuron and by the apex of the ovipositor with a double node dorsally (Marsh 1993).

This subfamily is distributed worldwide, with about 150 described genera (Marsh 1997), but as more studies are made on the Neotropical fauna, the number of World genera could reach 200 or more (Marsh 2002). Doryctinae show a wide range of biological habits, perhaps one of the most diverse in the family Braconidae. Most species, for which the biology is known, are idiobiont ectoparasitoids of wood-boring beetle larvae and a few, attack stem boring Lepidoptera and sawflies larvae (Marsh 1997). Although many doryctines attack beetle larvae in seeds, a few species are now known to be phytophagous in seeds (Macêdo & Monteiro 1989; Marsh 1991) or to be gall inducers in various tropical plants (Wharton & Hanson 2005).

The genus *Johnsonius* was described by Marsh (1993) with three species: *J. hansonii* Marsh, 1993, *J. tricolor* Marsh, 1993 known only from Costa Rica and *J. xanthus* Marsh, 1993 known from Venezuela, Peru and Costa Rica. Later, Marsh (2002) added two more species from Costa Rica: *J. costaricensis* Marsh, 2002 and *J. perknus* Marsh, 2002. Scatolini & Pentead-Dias (2003) recorded the genus from Brazil but did not indicate any species names.

The genus *Johnsonius* can be recognized by the following characters: hind wing vein m-cu curved at tip toward wing apex; propodeum usually with distinct median carina and areola; hind coxa with a distinct basal tubercle and the clypeus which is usually dorsally margined.

This contribution results from the study of Doryctinae fauna collected in Atlantic rain forest in Brazil and provides the description and illustrations of two new species of *Johnsonius* with new geographic records and includes a key for the identification of all Neotropical species.

MATERIAL AND METHODS

The Doryctinae fauna was surveyed in 18 localities in Brazil as part of (BIOTA/FAPESP Program) which is aimed at studying the biodiversity of the São Paulo State and of the Atlantic rain forest. Sampling methods used in this study include sweeping of vegetation with nets, yellow pan traps and Malaise traps. The material was sampled during six days always in the end of the rainy season, for avoiding the seasonal variation, during 2000 to 2002.

The Doryctinae specimens were mainly identified using the key provided by Wharton *et al.* (1997), and their genera and species following Marsh (1993, 1997, 2002).

The material was illustrated by Scanning Electronic Microscopy (SEM). The type specimens are deposited in DCBU collection (Departamento de Ecologia e Biologia Evolutiva, Universidade Federal de São Carlos, São Carlos, SP, Brazil)

and MZUSP (Museu de Zoologia da Universidade de São Paulo, São Paulo, SP, Brazil).

RESULTS

A total of 44 specimens were collected in 12 of 18 localities studied (Table I). Santa Luzia do Itanh, Sergipe State and Santa Maria Madalena, Rio de Janeiro State were the localities with more specimens collected, a total of 11 specimens, respectively.

Johnsonius atlanticus **n. sp.** was the more common and widely distributed with 20 specimens from five localities into four Brazilian States (Tab. I, Fig. 13) from 12°58'16"S to 26°13'40"S.

Six specimens of *Johnsonius marshi* **n. sp.** were collected in two localities of Southeast and South of Brazil; *J. costaricensis* was restricted to Northeast region of Brazil and 15 specimens of *J. xanthus* were collected in four localities of Southeast and Northeast of Brazil.

Sweeping of vegetation was the best method used, collecting 41 specimens; two specimens were caught using yellow pan traps and only one specimen by Malaise trap (Tab. I).

The distribution of *Johnsonius*, is restrict to New World from about 10° N to 26° S (Fig. 13).

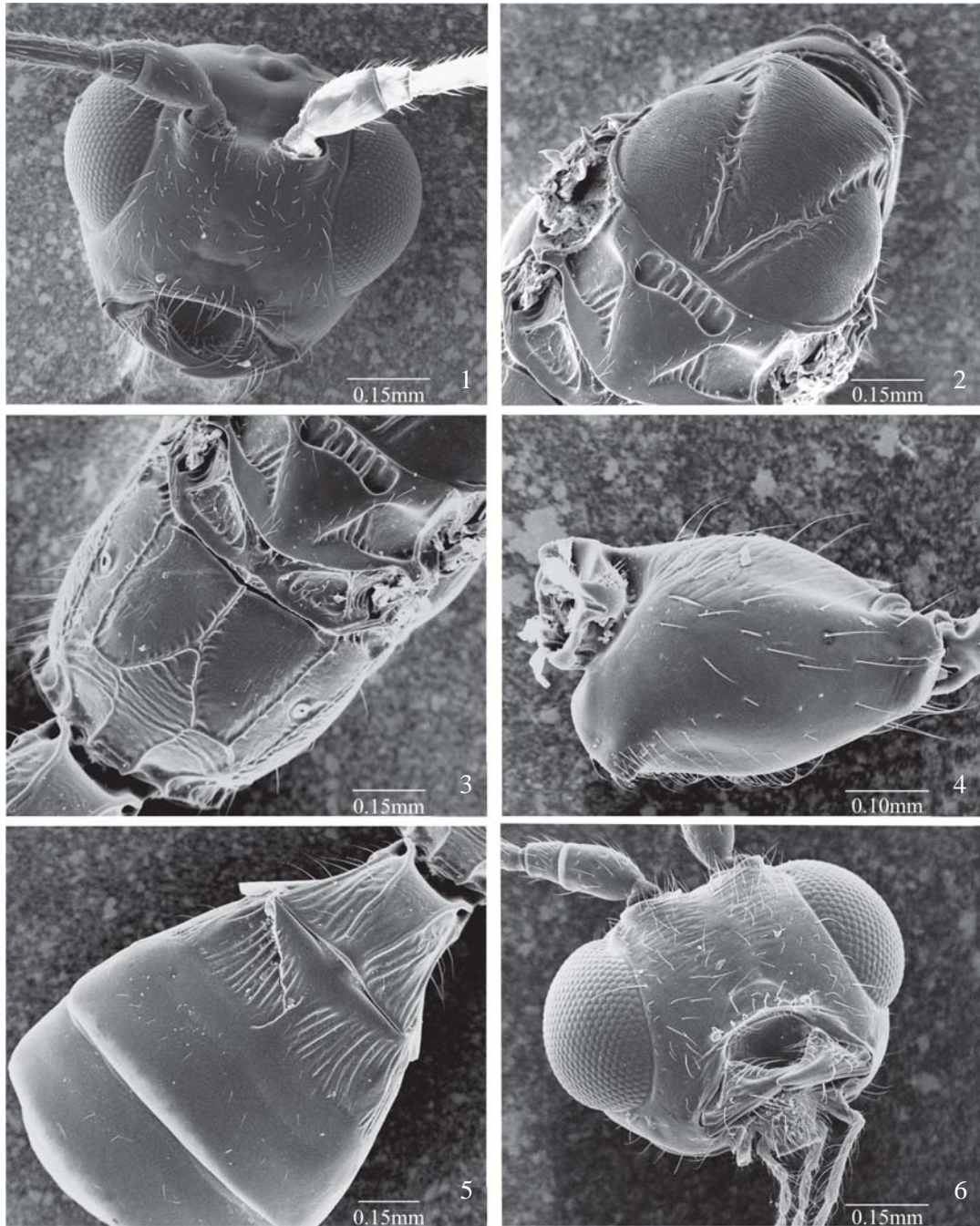
Key to the Neotropical species of *Johnsonius* Marsh

1. Fore wing vein 1CU swollen between veins 1M and 1cu-a (see Fig. 275 in Marsh 2002) *J. hansonii* Marsh

Fore wing vein 1CU not swollen	2
2(1). Body unicolored orange or yellowish .. <i>J. xanthus</i> Marsh	
Body often colored with black, brown, yellow and orange	3
3(2). Mesopleuron smooth	4
Mesopleuron coriaceous (Fig. 9)	6
4(3). <i>Sternaulus scrobiculate</i> (see Fig. 231 in Marsh 2002) ..	
..... <i>J. perknus</i> Marsh	
<i>Sternaulus</i> smooth	5
5(4). Areola on propodeum not distinctly defined, head orange, first metasomal tergum black	
..... <i>J. tricolor</i> Marsh	
Areola on propodeum distinctly defined (Fig. 3), head honey yellow with vertex brown, first metasomal tergum yellow	<i>J. marshi</i> n.sp
6(3). Notauli meeting before scutellum in longitudinal costate area, metanotum carinate (see Fig. 226 in Marsh 2002), head and mesosoma dark brown	
..... <i>J. costaricensis</i> Marsh	
Notauli meeting before scutellum in a large triangular rugose area, metanotum smooth (Fig. 8), head yellow, mesosoma mostly yellow or honey yellow	<i>J. atlanticus</i> n. sp

Table I. Identified species of *Johnsonius* from Atlantic rain forest with its sampling sites, geographical position and sampling methods used.

Place	Geographical coordinates	Species	Method/Specimens
Horto Dois Irmãos (Recife, PE)	08°03'14"S 34°52'52"W	<i>J. costaricensis</i>	Sweeping/1 male
Reserva Ecológica do Crasto (Santa Luzia do Itanh, SE)	11°21'03"S 37°26'54"W	<i>J. costaricensis</i> <i>J. xanthus</i>	Sweeping/1 female Malaise trap/1 female;Sweeping/ 1 female, 8 males
Reserva de Sapiroanga (Mata de São João, BA)	12°58'16"S 38°30'39"W	<i>J. atlanticus</i> n. sp. <i>J. xanthus</i>	Sweeping/1 female Sweeping/1 female, 2 males
Mata da Esperança (Ilhéus, BA)	15°00'54"S 39°00'10"W	<i>J. costaricensis</i>	Sweeping/1 male
Estação Ecológica Pau Brasil (Porto Seguro, BA)	16°23'33"S 39°11'39"W	<i>J. xanthus</i>	Sweeping/1 female
Reserva Biológica do Sooretama (Linhares, ES)	18°42'S 39°51'W	<i>J. xanthus</i>	Sweeping/1 male
Estação Biológica Santa Lúcia (Santa Teresa, ES)	19°56'08"S 40°36'01"W	<i>J. marshi</i> n.sp.	Sweeping/1 female, 4 males
Parque Estadual do Desengano (Santa Maria Madalena, RJ)	21°50'S 41°40'W	<i>J. atlanticus</i> n.sp.	Yellow pan traps/1 female; Sweeping/6 females, 4 males
Reserva Biológica do Tinguá (Nova Iguaçu, RJ)	22°45'33"S 43°27'04"W	<i>J. atlanticus</i> n.sp.	Yellow pan traps/1 male; Sweeping/3 males
Estação Ecológica de Juréia-Itatins (Peruíbe, SP)	25°00'53"S 47°55'36"W	<i>J. atlanticus</i> n.sp.	Sweeping/1 female, 2 males
Parque Estadual do Pau Oco (Morretes, PR)	25°28'37"S 48°59'28"W	<i>J. marshi</i> n.sp.	Sweeping/1 female
CEPA-Rugendas (São Francisco do Sul, SC)	26°13'40"S 48°40'49"W	<i>J. atlanticus</i> n.sp.	Sweeping/1 male

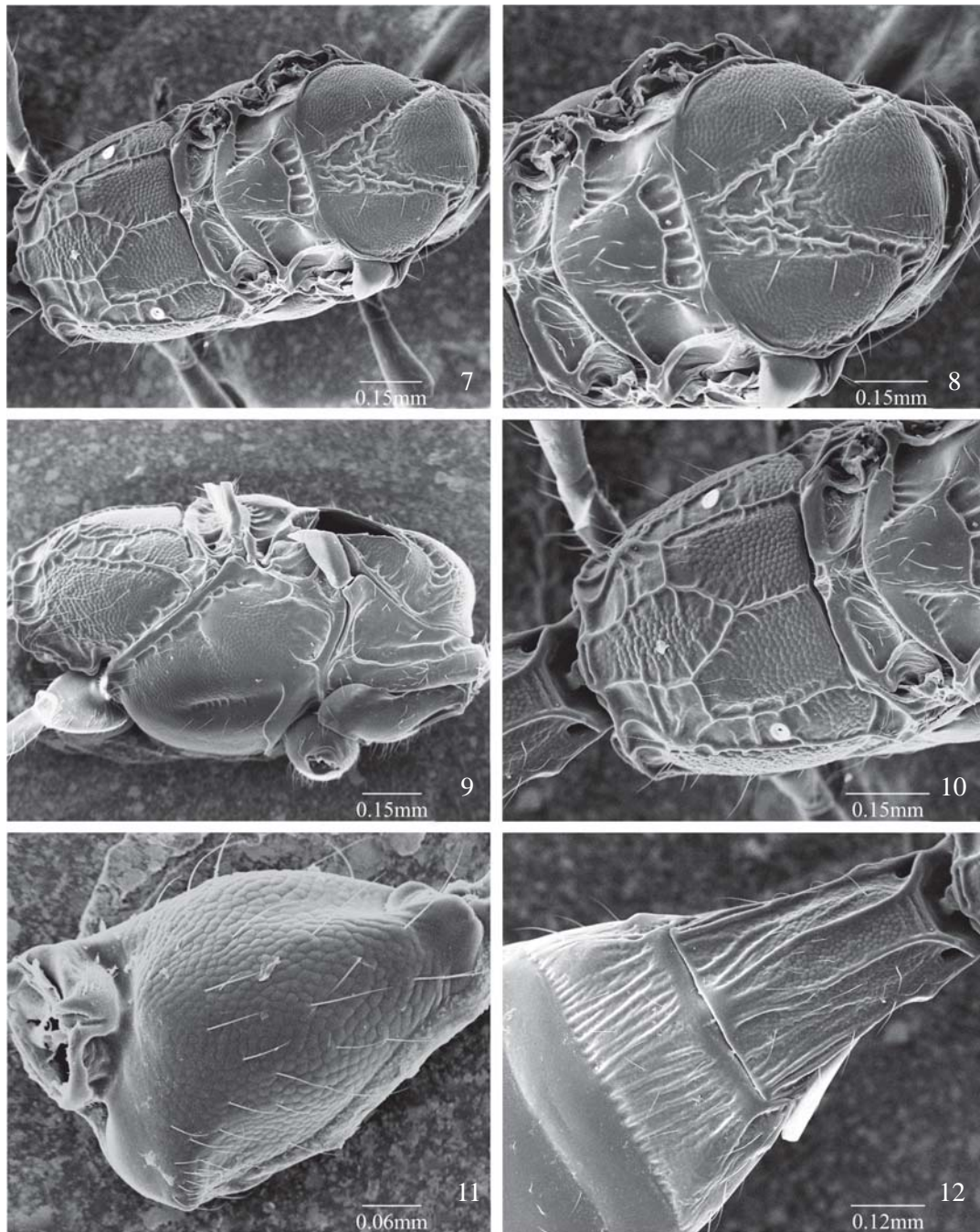


Figs. 1-5. *Johnsonius marshi* n. sp.: 1, head, frontal view; 2, mesonotum; 3, propodeum; 4, hind coxa; 5, metasoma, dorsal view. Fig. 6, *Johnsonius atlanticus* n. sp., head, frontal view.

Johnsonius marshi n. sp.
(Figs. 1-5)

Holotype, female. Body length: 3.5-5.0 mm. Color: head honey yellow with vertex brown, antenna black; pronotum brown, propleuron yellow; mesonotum dark brown or black, honey yellow on notauli region and scutellar disk; mesopleuron mostly brown dorsally and dark brown or black ventrally; tegula and propodeum yellow; metasomal terga I-III yellow, IV-VI black dorsally and yellow laterally, remainder of terga

and venter of metasoma yellow; legs yellow except apex of hind tibia and all tarsi brown; wings dusky, veins brown. Head: face smooth and shining, malar space 0.4 eye height, clypeus not margined by a distinct carina (Fig. 1), frons smooth, vertex weakly striate, gena smooth, occipital carina meeting hypostomal carina; antennae broken, with at least 31 antennomeres. Mesosoma: pronotum smooth with median longitudinal carina; mesoscutal lobes coriaceous, notauli scrobiculate anteriorly and meeting scutellum with a pair of carinae (Fig. 2); scutellum smooth except for carinae;



Figs. 7-12. *Johnsonius atlanticus* n. sp.: 7, mesosoma, dorsal view; 8, mesonotum; 9, mesosoma, lateral view; 10, propodeum; 11, hind coxa; 12, metasoma, dorsal view.

mesopleuron smooth, sternaulus deep and smooth; propodeum smooth or weakly acinose dorsal medially and striate-rugose apical laterally, distinct median and laterals carinae and areola (Fig. 3). Legs: hind coxa with basal tooth, finely striate-rugose dorsally, smooth laterally and basally (Fig. 4); fore and middle tibia with spines along anterior edge. Wings: fore wing vein r 0.5 times length of vein 3RSa; vein r -m present, vein m-cu distinctly basal to 2RS, vein 1cu-a distinctly apical to vein 1M, first subdiscal cell open and often with dark spot on 2cu-a region; hind wing vein M+CU 0.4 of

1M, m-cu curved at tip toward wing apex. Metasoma: first tergum equal to or slightly longer than apical width, longitudinally costate with a pair of carinae dorsally reaching apex of tergum; second tergum longitudinally costate, remainder of terga smooth and shining (Fig. 5); ovipositor about equal to length of metasoma.

Male. Essentially as in female; antenna dark brown, pronotum light brown; third tergum dorsally dark brown and seventh tergum light brown.

Holotype. ♀ (DCBU), BRAZIL, ES, Santa Teresa, Estação

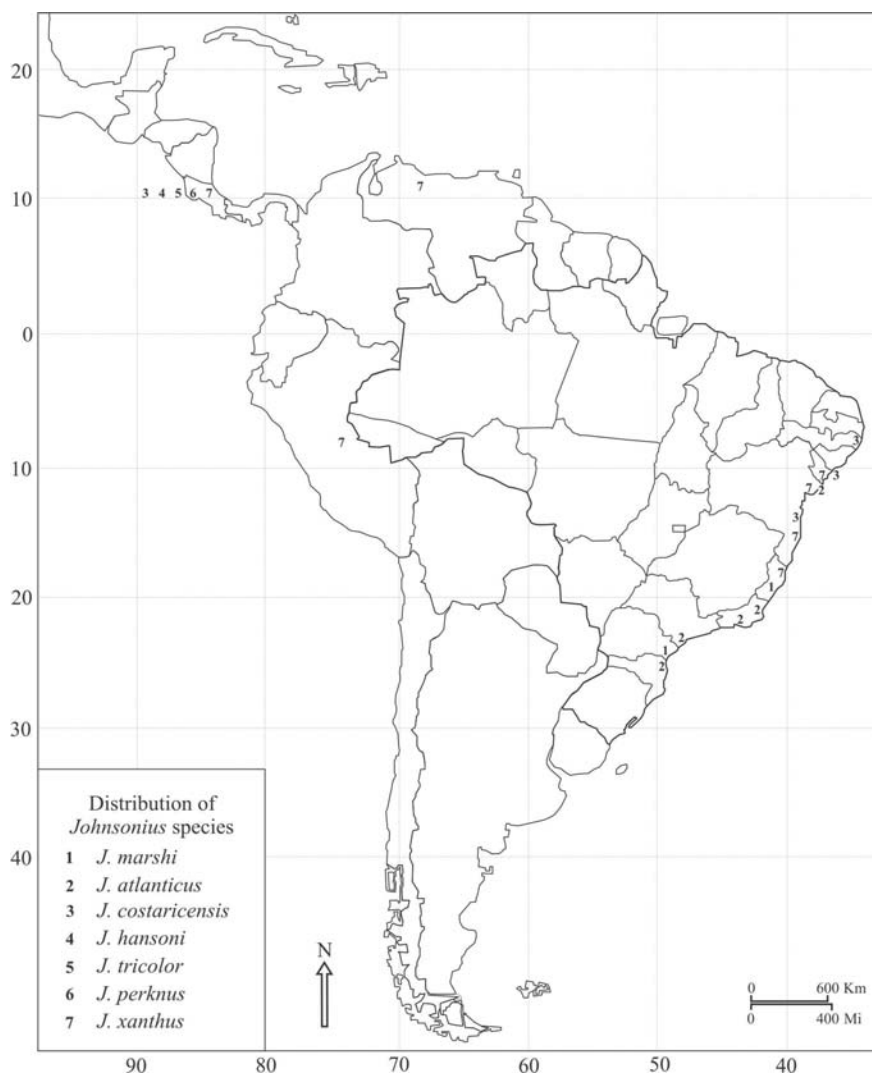


Fig. 13. Map indicating the distribution of *Johnsonius* species.

Biológica Santa Lúcia, sweeping, 7.iv.2001, C. O. Azevedo and team cols.

Paratypes. (DCBU, MZUSP), BRAZIL. ES, Santa Teresa, Estação Biológica Santa Lúcia: 3 ♂♂, sweeping of vegetation, 7.iv.2001, 1 ♂, sweeping of vegetation, 11.iv.2001 C. O. Azevedo and team cols. PR, Morretes, Parque Estadual do Pau Oco, 1 ♀, sweeping, 9.iv.2002, M. T. Tavares and team cols.

Etimology. The species was named in honour to Paul M. Marsh who has mostly works about the Doryctinae.

Johnsonius atlanticus n. sp
(Figs. 6–12)

Holotype, female. Body length: 2.5-5.0 mm. Color: head yellow, scape and pedicel honey yellow, flagellomeres dark brown; pronotum and propleuron yellow; median mesoscutal lobe and mostly scutellum brown, scutellar disk and lateral mesoscutal lobes honey yellow; mesopleuron and tegula yellow; propodeum yellow, except areola occasionally honey

yellow; wings slightly dusky, veins honey yellow; first metasomal tergum brown at least apically, terga III-V brown dorsally, yellow laterally, remainder of terga yellowish; legs yellow, hind tibia and tarsi often brown, ovipositor yellow. Head: face finely striate-rugose, clypeus margined by inconspicuous carina (Fig. 6); frons and vertex weakly striate, gena smooth, occipital carina meeting hypostomal carina; malar space 0.35 eye height; 32 antennomeres. Mesosoma: (Fig. 7) pronotum smooth, occasionally weakly acinose and with longitudinal carina; mesoscutal lobes coriaceous, notauli scrobiculate meeting before scutellum in a large triangular rugose area (Fig. 8); scutellum smooth, scutellar disk weakly acinose; metanotum smooth; mesopleuron and propodeum coriaceous, sternaulus scrobiculate (Fig. 9); propodeum with distinct median and laterals carinae and areola (Fig. 10). Legs: hind coxa acinose and with basal tubercle (Fig. 11); fore and middle tibia with spines along anterior edge. Wings: fore wing vein r 0.5 length of vein 3RSa; vein r-m present, vein m-cu distinctly basal to 2RS, vein 1cu-a distinctly apical to vein 1M, first subdiscal cell open and often with dark spot on 2cu-

a region; hind wing vein M+CU 0.5 of 1M, m-cu curved at tip toward wing apex. Metasoma: first tergum longer than apical width, longitudinally costate with a pair of carinae dorsally reaching apex of tergum, delimiting an acinose area; second tergum longitudinally costate, remainder of terga smooth and shining (Fig. 12); ovipositor about equal to length of metasoma.

Male. Essentially as in female; mesoscutum, scutellum and dorsal part of propodeum often dark brown, metasomal terga I-VII brown dorsally.

Holotype. ♀ (DCBU), BRAZIL, RJ, Santa Maria Madalena, Parque Estadual do Desengano, sweeping, 20.iv.2002, Pentead-Dias and team cols.

Paratypes. (DCBU, MZUSP), BRAZIL. BA, Mata de São João, Reserva de Sapiranga, 1 ♀, sweeping, 21.vii.2001, M. T. Tavares and team cols. RJ, Santa Maria Madalena, Parque Estadual do Desengano: 1 ♀ 3 ♂♂, sweeping, 18.iv.2002; 2 ♀♀, sweeping, 20.iv.2002; 2 ♀♀ 1 ♂, sweeping, 21.iv.2002; 1 ♀, yellow pan traps, 16-19.iv.2002, Pentead-Dias and team cols. RJ, Nova Iguaçu, Reserva Biológica do Tinguá: 3 ♂♂, sweeping, 7.iii.2002; 1 ♂, Yellow pan traps, 9-12.iii.2002, S. T. Amarante and team cols. SP, Peruíbe, Estação Ecológica de Juréia-Itatins: 1 ♀, sweeping, 30.iv.2002; 2 ♂♂, sweeping, 5.v.2002, N. W. Periotto and team cols. SC, São Francisco do Sul, CEPA-Rugendas, 1 ♂, Sweeping, 17.x.2001, Pentead-Dias and team cols.

Etymology. The species name refers to Atlantic forest where the material was collected.

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