

# Ichneumonidae (Hymenoptera) parasitoids of Lepidoptera caterpillars feeding on *Croton floribundus* Spreng (Euphorbiaceae)

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**ABSTRACT.** Ichneumonidae (Hymenoptera) parasitoids of Lepidoptera caterpillars feeding on *Croton floribundus* Spreng (Euphorbiaceae). Parasitoids of the family Ichneumonidae (Hymenoptera) were obtained during an inventory of Lepidoptera larvae caught feeding in the wild on *Croton floribundus* (Euphorbiaceae). The Lepidoptera larvae were collected from host plants along trails inside three preserved forest areas in the Brazilian state of São Paulo. Fifteen different species of Ichneumonidae belonging to five subfamilies (Banchinae, Campopleginae, Cremastinae, Mesochorinae and Metopiinae) were obtained. Seven species of Ichneumonidae were reared from leaf rollers: *Meniscomorpha* sp. (Banchinae) and *Leurus caeruliventris* (Cresson) (Metopiinae) from *Dichomeris* sp. (Gelechiidae); *Mesochorus* sp.1 (Mesochorinae) [as a parasitoid of *Hypomicrogaster* sp. (Braconidae, Microgastrinae)], *Campoplex* sp. (Campopleginae) and *Leurus* sp. from *Olethreutinae* sp. (Tortricidae); *Sphelodon annulicornis* Morley (Banchinae) and *Eutanygaster brevipennis* Cameron (Cremastinae) were also reared from two unidentified species of Gelechiidae. The other eight species were reared from the larvae of exposed feeders: *Diradops* sp. (Banchinae) from *Miselia albipuncta* Hampson (Noctuidae), *Casinaria* sp. (Campopleginae) from *Hymenomima conia* Prout (Geometridae), *Charops* sp. (Campopleginae) from *Bagisara paulensis* Schaus (Noctuidae) and *Oxydia vesulia* (Cramer) (Geometridae), two species of *Hyposoter* Förster (Campopleginae) from *Semaepopus* sp. (Geometridae) and *H. conia*, two species of *Microcharops* Roman (Campopleginae) from *B. paulensis* and an unidentified species of Limacodidae and *Mesochorus* sp. 2 [reared from what was probably *Aleiodes* sp. (Braconidae, Rogadinae)] from an unidentified species of Noctuidae.

**KEYWORDS.** Atlantic Forest; capixingui; cocoon; Neotropical; parasitoid.

**RESUMO.** Ichneumonidae (Hymenoptera) parasitoides de larvas de Lepidoptera associadas a *Croton floribundus* Spreng (Euphorbiaceae). Parasitoides da família Ichneumonidae (Hymenoptera) foram obtidos durante um inventário de larvas de Lepidoptera sobre *Croton floribundus* (Euphorbiaceae). As larvas de Lepidoptera foram coletadas sobre as plantas que ocorrem nas bordas de caminhos em três áreas preservadas de mata do Estado de São Paulo, Brasil. Quinze espécies pertencentes a cinco subfamílias (Banchinae, Campopleginae, Cremastinae, Mesochorinae and Metopiinae) foram registradas. Sete espécies de Ichneumonidae foram obtidas de larvas que elaboram abrigos: *Meniscomorpha* sp. (Banchinae) e *Leurus caeruliventris* (Cresson) (Metopiinae) parasitoides de *Dichomeris* sp. (Gelechiidae); *Mesochorus* sp.1 (Mesochorinae) [parasitóide de *Hypomicrogaster* sp. (Braconidae, Microgastrinae)], *Campoplex* sp. (Campopleginae) e *Leurus* sp. sobre *Olethreutinae* sp. (Tortricidae); *Sphelodon annulicornis* Morley (Banchinae) e *Eutanygaster brevipennis* Cameron (Cremastinae) parasitoides de duas espécies não identificadas de Gelechiidae. As outras oito espécies foram obtidas de larvas encontradas em situações expostas: *Diradops* sp. (Banchinae) sobre *Miselia albipuncta* Hampson (Noctuidae), *Casinaria* sp. (Campopleginae) sobre *Hymenomima conia* Prout (Geometridae), *Charops* sp. (Campopleginae) parasitóide de *Bagisara paulensis* Schaus (Noctuidae) e *Oxydia vesulia* (Cramer) (Geometridae), duas espécies de *Hyposoter* Förster (Campopleginae) sobre *Semaepopus* sp. (Geometridae) e *H. conia*, duas espécies de *Microcharops* Roman (Campopleginae) sobre *Bagisara paulensis* e Limacodidae sp., e *Mesochorus* sp. 2 [provavelmente parasitóide de *Aleiodes* sp. (Braconidae, Rogadinae)] sobre espécie não identificada de Noctuidae.

**PALAVRAS-CHAVE.** Capixingui; casulo; Mata Atlântica; Neotropical; parasitóide.

There are thousands of species of Ichneumonidae; they are among the main parasitoids of Lepidoptera, although the specific hosts are unknown for most Neotropical species. Biological data are provided by Townes (1969, 1970a, 1970b, 1971), Townes & Townes (1966, 1978), Gauld (1991, 1997, 2000), Gauld *et al.* (2002), Hanson & Gauld (1995, 2006) and Yu *et al.* (2005).

A great deal of research is devoted to the study of natural enemies of lepidopterans of economic interest. However, studies relating parasitoids to their hosts and the plants on which they feed in the wild are rare for the Neotropical region. In Brazil, biological data for Ichneumonidae reared from

Lepidoptera larvae are provided by Braga *et al.* (2001) and Marconato *et al.* (2008), for Geometridae larvae feeding on *Piper* spp. (Piperaceae) in a semideciduous forest at Canchim Farm, and for Geometridae on *Erythroxylum microphyllum* St.-Hilaire (Erythroxylaceae) in a cerrado area at São Carlos, São Paulo, respectively.

The Ichneumonidae obtained for this study were part of a biodiversity inventory of Lepidoptera caterpillars and their parasitoids found feeding on *Croton floribundus* Spreng (Euphorbiaceae), a native plant of Brazil. *C. floribundus* is a pioneer species, characteristic of secondary semideciduous forests, widely used in reforestation programs, and was chosen

to be common and abundant on the forest edges and to allow caterpillar collections. Occasional surveys prior to that of the present work also indicated that this plant hosts a wide range of Lepidoptera species and Hymenoptera parasitoids.

The aim of this paper is to investigate biological aspects and the biodiversity of Hymenoptera parasitoids, especially those from the Ichneumonidae family, and relate them to their hosts.

## MATERIAL AND METHODS

The specimens were collected from three preserved forest areas in the state of São Paulo (Table I) where *Croton floribundus* is frequently found growing as shrubs in light shade along trails, or as tall trees with fully insolated crowns up to ten meters in height at the edge of the forest.

In surveys made at São Carlos during 1995 to 1997, only Geometridae larvae were systematically collected, although Lepidoptera larvae from other families were occasionally reared; from 1999 to 2001, all caterpillars found on *C. floribundus* were collected, whereas lepidopteran leaf miners were not included.

The caterpillars were collected from host shrubs in the field using direct search, an entomological umbrella or a 3.3-m<sup>2</sup> white cloth on the ground under the taller plants, which were then shaken with a wooden stick. The caterpillars were reared individually in transparent plastic cages (250 or 500 ml) with a piece of paper on the bottom (changed daily). The cages were maintained at room temperature, and the caterpillars fed daily with fresh, moist leaves of *C. floribundus*. When parasitoids emerged from the caterpillars, they were left in the cages on a piece of paper, which was moistened daily until the adult emerged.

The remains of the host larvae were preserved in Dietrich's solution for two days and then in 70% alcohol; the adult parasitoids were pinned with their respective cocoons. The taxonomic identification of Ichneumonidae followed Townes & Townes (1966), Gupta (1987), Hanson & Gauld (1995), Gauld (2000) and Gauld *et al.* (2002). The specimens were deposited in the "Coleção Entomológica do Departamento de Ecologia e Biologia Evolutiva (DCBU)" of the Federal University of São Carlos (UFSCar). The images of Ichneumonidae (adults and cocoons) were obtained with a CCD camera using a stereomicroscope.

## RESULTS AND DISCUSSION

A total of 2.490 caterpillars of 65 Lepidoptera species were collected on *Croton floribundus* and reared in captivity; twenty seven larvae were parasitized by Ichneumonidae; from three of them the wasps failed to develop. Fifteen different koinobiont endoparasitoid species of Ichneumonidae were reared from eleven Lepidoptera species (Table II).

The specimen of *Dichomeris* sp. (Gelechiidae) and that of the Olethreutinae subfamily (Tortricidae) were not identified; they are probably new species (Vitor C. Becker, personal communication). Their caterpillars were collected from shelters made with rolled or tied parts of leaves. The

caterpillars of Geometridae, Noctuidae and Limacodidae are exposed feeders and are usually found on the underside of leaves.

The caterpillars which were parasitized by Ichneumonidae were collected from January to September and in December. The absence of Ichneumonidae during October and November coincides with the lowest density of host caterpillars and with the season when almost all the leaves of *Croton floribundus* become rust-colored and fall from the trees and shrubs.

Banchinae. Three species were reared from five caterpillars collected in São Carlos. The two species with long ovipositors - *Meniscomorpha* sp. and *Sphelodon annulicornis* Morley, 1914 - attacked microlepidopterous concealed hosts, while *Diradops* sp., which has a short ovipositor, attacked an exposed macrolepidopterous larvae (Noctuidae), confirming Gauld *et al.* (2002).

The *Diradops* sp. (Fig. 1) larva was reared from a *Miselia albipuncta* Hampson, 1911 (Noctuidae, Hadeninae) caterpillar, an exposed feeder, in the final instar stage; it spun a translucent brownish cocoon (12.6 x 3.7 mm; Fig. 2) next to the remains of the host larva; the pupal stage lasted 16 days.

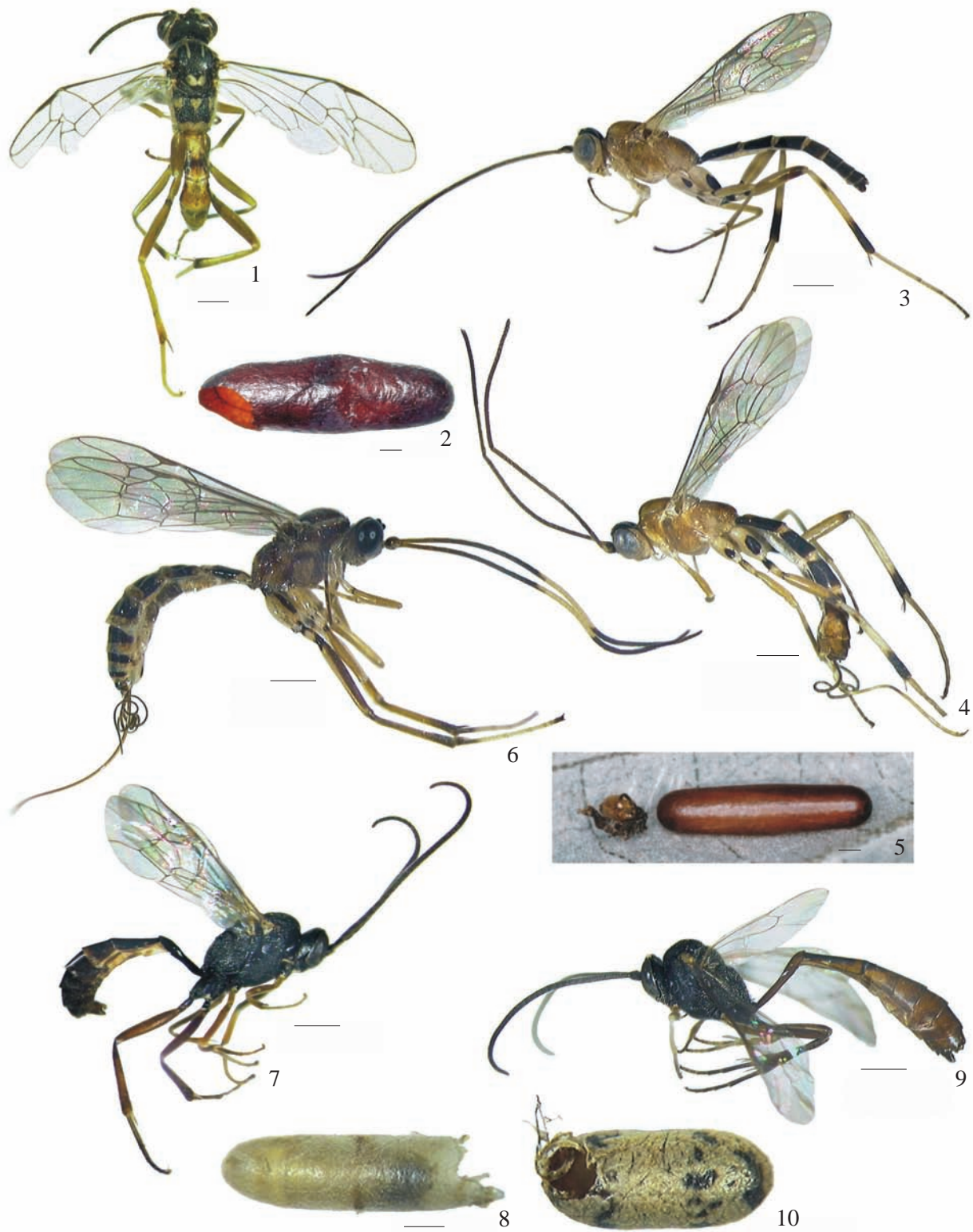
The *Meniscomorpha* sp. (Figs. 3–4) larvae were reared from *Dichomeris* sp. (Gelechiidae, Dichomeridinae) caterpillars, which were consumed in the prepupal stage. One specimen (female) left the shelter of the host and constructed a web of ash gray silk on the bottom of the cage, under which it pupated, without the elaboration of a cocoon; two male specimens spun brownish cocoons (8 x 2 mm; Fig. 5) inside the host's shelter; the pupal stage lasted 11 days. Gauld *et al.* (2002) consider *Meniscomorpha* Schmiedeknecht, 1907 a senior synonym of *Eudeleboea* López Cristóbal, 1935. Townes & Townes (1978) cite *Dichomeris ligulella* Hübner, 1818 as a host of *Eudeleboea mirabilis* (Cresson, 1870) and *Eudeleboea pleuralis* (Ashmead, 1890).

The *Sphelodon annulicornis* (Fig. 6) larva was reared from a non identified Gelechiidae caterpillar, consumed in the prepupal stage. The parasitoid larva then left the shelter of the host and constructed a translucent, elliptical cocoon; the pupal stage lasted 9 days.

Campopleginae. This was the most abundant subfamily, with seven species obtained from fifteen caterpillars. *Campoplex* sp. was reared from a concealed host and pupated in a soft cocoon inside the host's shelter. Excluding *Microcharops longiterebra* Gupta, 1987 which pupated inside of a mummified Limacodidae caterpillar, the species reared from exposed feeders spun hard camouflaged cocoons resembling bird faeces, attached to the leaf or suspended by a short thread, to pass the pupal stage.

The *Campoplex* sp. (Fig. 7) larva was reared from an Olethreutinae (Tortricidae) caterpillar, which was consumed during the prepupal stage; the parasitoid larva then constructed a yellowish, elliptical silk cocoon (7.8 x 2.0 mm; Fig. 8) inside the pupation site prepared by the host; the pupal stage lasted approximately 10 days. Many species of *Campoplex* Gravenhorst, 1829 are mentioned by Yu *et al.* (2005) as parasitoids of Olethreutinae larvae.

The *Casinaria* sp. (Fig. 9) larva was reared from a



Figs. 1–10. Ichneumonidae. 1–6, Banchinae. 1–2, *Diradops* sp.; 1, female, habitus; 2, cocoon. 3–5, *Meniscomorpha* sp.; 3, male, habitus; 4, female, habitus; 5, cocoon beside host remains (Gelechiidae: *Dichomeris* sp.). 6, *Sphelodon annulicornis*, female, habitus. 7–10, Campopleginae. 7–8, *Campoplex* sp.; 7, male, habitus; 8, cocoon. 9–10, *Casinaria* sp.; 9, female, habitus; 10, cocoon. Scale bar: 1 mm.

*Hymenomima conia* Prout, 1931 (Geometridae, Ennominae) caterpillar; the prepupal wasp emerged from the penultimate instar caterpillar and spun a very firm, beige silk cocoon with

black spots (Fig. 10), attached to the underside of the leaf near the remains of the host larva. These results confirm data from Jerman & Gauld (1988). The cocoon of the male measured

Table I. Sites location in São Paulo State, dates of sampling, number of Lepidoptera caterpillars collected (C) and number of caterpillars parasitized by Ichneumonidae (P).

City	Site	Vegetation	Date or Period	Periodicity	C	P
São Carlos	Canchim Farm (EMBRAPA/	Atlantic Forest	July/1995 to June/1996	Once a month	71	2
	Centro de Pesquisa de Pecuária	(Floresta Estacional	June/1997	One day*	14	1
	do Sudeste) (elev. 872m)	Semidecidual)	April/1999 to March/2000	Once a fortnight	981	12
	21°57'51.62"S 47°50'39.05"W					
Matão	Cambuhy Farm (elev. 575m)	Atlantic Forest (Floresta Estacional Semidecidual)	September/1999 to August/2000	Once a fortnight	1346	9
	21°37'21.66"S 48°31'49.58"W					
Ubatuba	Anchieta Island State Park (elev. 15m)	Atlantic Forest (Floresta Ombrófila)	March/2001	Three days*	78	3
	23°32'32.70"S 45°03'32.09"W					

\* sporadic / eventual

6.4 x 2.9 mm, whereas that of the female was 6.0 x 3.0 mm. The pupal stage lasted 8 days for the male (August,  $\pm 19^{\circ}\text{C}$ ) and 13 days for the female (June,  $\pm 18^{\circ}\text{C}$ ).

The *Charops* sp. (Fig. 11) larvae were reared from two different species of caterpillars; both were consumed halfway through development. The prepupal wasp that emerged from *Bagisara paulensis* Schaus, 1898 (Noctuidae, Bagisarinae), spun a very firm, black-mottled beige silk cocoon, far from the remains of the host larva; the pupal stage lasted 7 days. The specimen that emerged from *Oxydia vesulia* (Cramer, 1779) (Geometridae, Ennominae) spun a cocoon (4.5 mm) similar to that described above, but suspended by a short thread (Fig. 12). A third specimen (male) emerged from a similar cocoon (5.2 mm) found suspended from a *C. floribundus* leaf in the wild during February, but without the remains of the host. Three parasitoid larvae with cocoons resembling those of *Charops* sp. were raised from fourth instar *Fountainea ryphea phidile* (Geyer, 1834) and *Memphis appias* (Hübner, 1825) (Nymphalidae, Charaxinae) caterpillars found in Matão (June, July and September); however the parasitoid wasps failed to develop.

Two species of *Hyposoter* Förster, 1869 were reared from Geometridae caterpillars found at the São Carlos site. The prepupal larva of *Hyposoter* sp. 1 (Fig. 13) emerged from a fully grown (5<sup>th</sup> instar) *Semaepus* sp. (Sterrhinae) caterpillar; it spun a hard, black-mottled beige silk cocoon (7 mm), under the remains of the host larva (Figs. 14–15); attached to the leaf. The pupal stage lasted 9 days. The prepupal larva of *Hyposoter* sp. 2 (Fig. 16) emerged from a penultimate instar *Hymenomima conia* (Ennominae) caterpillar and spun a hard, brownish cocoon (4.1 mm; Fig. 17) near the remains of the host larva; the pupal stage lasted 12 days.

Two species of *Microcharops* Roman, 1910 were also found associated with *Croton floribundus*. The *Microcharops longiterebra* (Fig. 18) larvae pupated inside the shrunken and mummified remains (9 mm; Fig. 19) of an unidentified species of Limacodidae (sp. 3); the pupal stage lasted 7 days, with the adult wasp emerging through a circular hole at the posterior dorsal end of the caterpillar. The prepupal larva of *Microcharops* sp. (Fig. 20) emerged from a fully grown larva

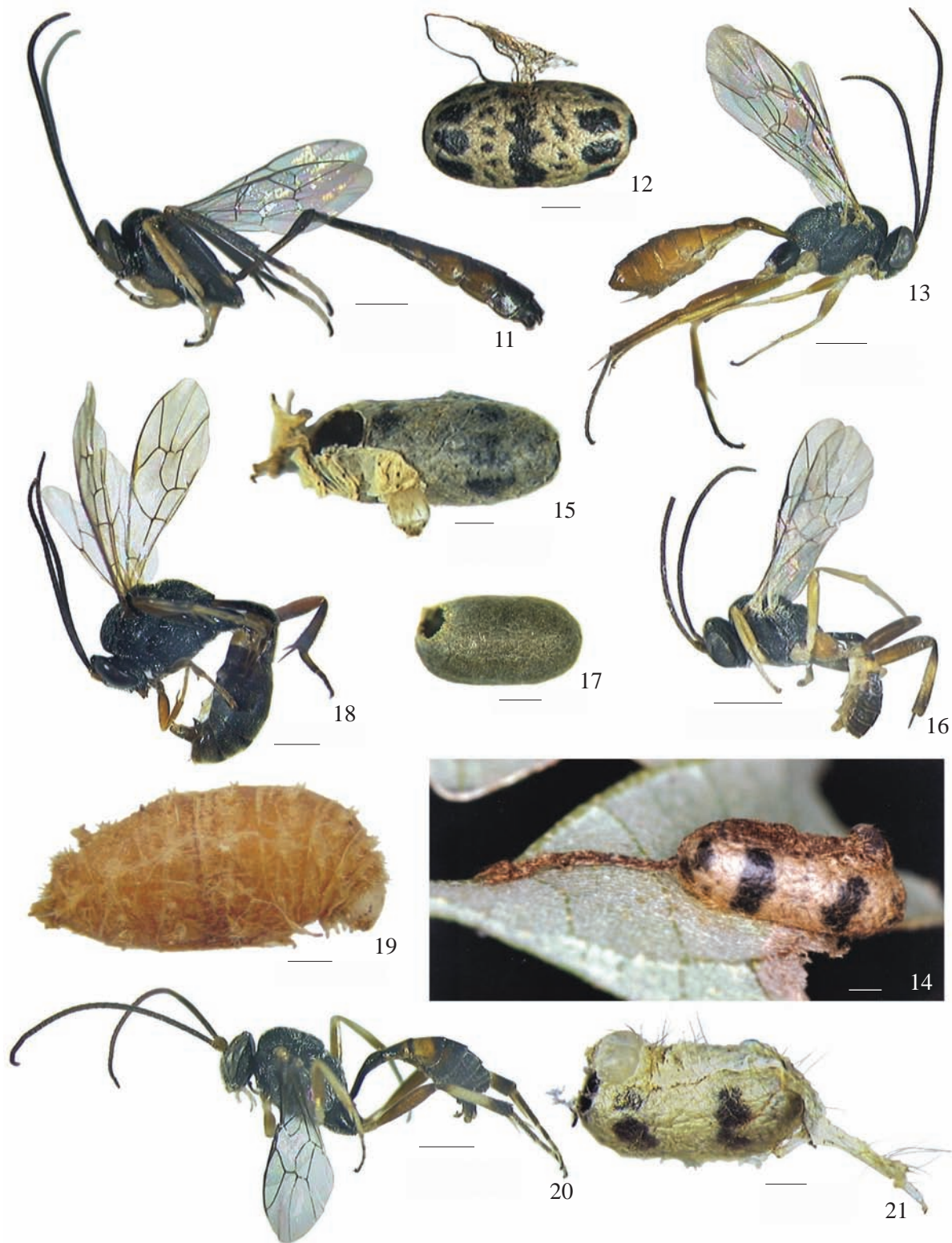
of *Bagisara paulensis* (Noctuidae, Bagisarinae) and spun a hard, black-mottled beige silk cocoon (5.3 mm) attached to the underside of the leaf under the remains of the host larva (Fig. 21); the pupal stage lasted 5 days. According to the key provided by Gupta (1987) this species of *Microcharops* belongs to the *Tibialis* Group, somewhat in between *M. rufoantennata* and *M. peronota*.

Cremastrinae. *Eutanygaster brevipennis* Cameron, 1911 (Fig. 22) was reared from an unidentified species of Gelechiidae collected in Ubatuba; the prepupal larva emerged from the prepupal caterpillar and spun a yellowish translucent cocoon (7.5 mm; Fig. 23) next to the remains of the host inside the rolled leaf coated with white silk prepared by the host caterpillar. These results confirm those reported by Hanson & Gauld (1995, 2006) for the subfamily; the pupal stage lasted 7 days.

Mesochorinae. Two hyperparasitoid species of *Mesochorus* Gravenhorst, 1829 were reared from Braconidae species collected in São Carlos; both killed their hosts after these had killed the caterpillar primary host and constructed a cocoon, confirming the report of Hanson & Gauld (1995, 2006).

The *Mesochorus* sp. 1 wasp (Fig. 24) emerged from a *Hypomicrogaster* sp. (Braconidae, Microgastrinae) cocoon. *Hypomicrogaster* sp. are solitary parasitoids and these specimens were reared from eleven caterpillars of Olethreutinae sp. (Tortricidae), *Dichomeris* sp. (Gelechiidae) and *Lygropia unicoloralis* (Guenée, 1854) (Pyralidae), all found in São Carlos. The prepupal larva of *Hypomicrogaster* sp. emerged from the fully grown Olethreutinae sp. caterpillar, and spun a white silk cocoon, with a cone-shaped end and a circular frontal operculate opening (4.9–6.7 mm; Fig. 25) inside the rolled leaf shelter of the host. The hyperparasitoid wasp emerged from the braconid cocoon, through the operculate opening, 20 days after *Hypomicrogaster* sp. spun its cocoon.

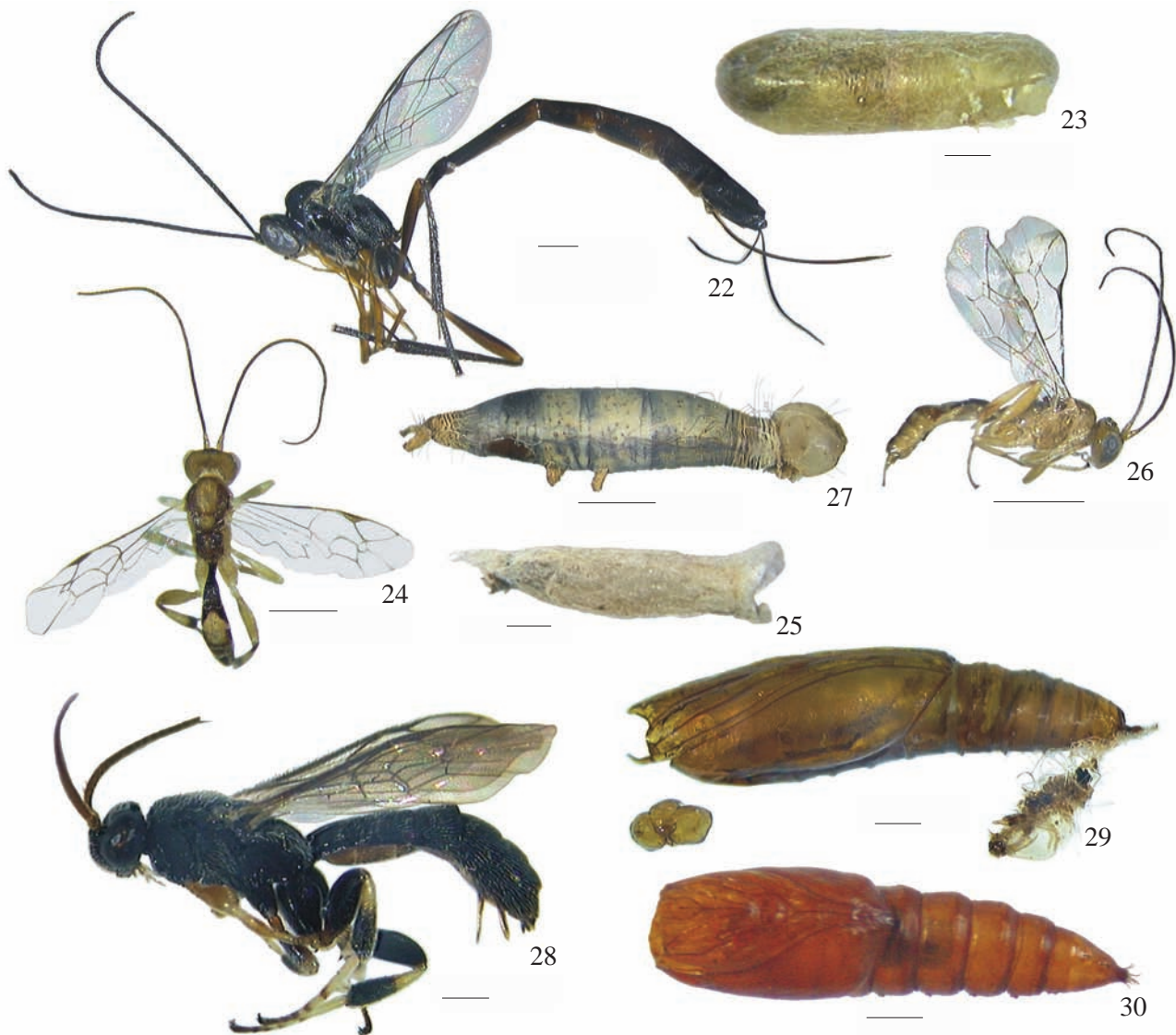
The *Mesochorus* sp. 2 (Fig. 26) wasp emerged from an unidentified Noctuidae (sp. 3) caterpillar mummified by Rogadinae (Braconidae; probably *Aleiodes* Wesm., 1838). The host mummy (5.7 mm; Fig. 27) was glued down to the



Figs. 11–21. Ichneumonidae: Campopleginae. 11–12, *Charops* sp.; 11, male, habitus; 12, cocoon. 13–15, *Hyposoter* sp. 1; 13, female, habitus; 14–15, cocoon under host remains (Geometridae: *Semaeopus* sp.); 16–17, *Hyposoter* sp. 2; 16, male, habitus; 17, cocoon. 18–19, *Microcharops longiterebra*; 18, male, habitus; 19, mummified caterpillar remains (Limacodidae sp. 3). 20–21, *Microcharops* sp.; 20, male, habitus; 21, cocoon under host remains (Noctuidae: *Bagisara paulensis*). Scale bar: 1 mm.

leaf by the Rogadinae larva through a hole chewed in the bottom of the host's prothorax, as *Aleiodes* usually does (Shaw 1997). The *Mesochorus* sp. 2 wasp emerged through a hole

at the posterior end of the mummified caterpillar. Specimens of *Aleiodes* sp. were also obtained from eight Geometridae caterpillars of four species [*Glena* sp., *Hymenomima amberia*



Figs. 22–30. Ichneumonidae. 22–23, *Eutanygaster brevipennis* (Cremastinae); 22, female, habitus; 23, cocoon. 24–27, Mesochorinae. 24–25, *Mesochorus* sp. 1; 24, female, habitus; 25, cocoon of *Hypomicrogaster acontes* (Braconidae). 26–27, *Mesochorus* sp. 2; 26, female, habitus; 27, Noctuidae caterpillar remains mummified by Rogadinae (Braconidae). 28–30, *Leurus* spp. (Metopiinae); 28, *L. caeruliventris*, female, habitus; 29, host pupa and last exuvia of *Dichomeris* sp. (Gelechiidae); 30, host pupa (Tortricidae: Olethreutinae sp.) of *Leurus* sp.. Scale bar: 1 mm.

(Schaus, 1901), *Melanolophia* sp. and *Physocleora junctilinea* (Warren, 1901)], found on *Croton floribundus* at São Carlos and Matão districts.

Metopiinae. Two species of *Leurus* Townes, 1946 were reared from three microlepidoptera caterpillars sheltered within rolled leaves, confirming the data reported by Gauld *et al.* (2002) for this subfamily. The adult female wasp of *Leurus caeruliventris* (Cresson, 1868) (Fig. 28) emerged from the pupae of *Dichomeris* sp. (Gelechiidae) (Fig. 29) and two adult males of *Leurus* sp. eclosed from the pupae of Olethreutinae sp. (Tortricidae) (Fig. 30). The hosts were collected when they were still growing larvae. Both species emerged from the host through the pupal head 16 days after host pupation.

All of these genera of Ichneumonidae were found for the

first time in association with caterpillars feeding on *Croton floribundus* and all the non-identified Ichneumonidae species are probably new taxa and are not yet formally described.

There have been no previous reports of *Eutanygaster brevipennis* occurring in Brazil, nor of *Leurus* and *Sphelodon annulicornis* in the state of São Paulo, Brazil. *Mesochorus* is also being reported for the first time as a hyperparasitoid of *Hypomicrogaster* sp. (Braconidae, Microgastrinae), reared from an Olethreutinae (Tortricidae) caterpillar; new Lepidoptera host relationships have also been found for *Diradops*, *Casinaria*, *Charops*, *Microcharops*, *Hyposoter*, *Leurus* and *Leurus caeruliventris*; no hosts were previously known for *Sphelodon annulicornis* and *Eutanygaster brevipennis* which were reared from Gelechiidae caterpillars, nor for *Microcharops longiterebra*, which was reared from a Limacodidae caterpillar.

Table II. Ichneumonidae reared from Lepidoptera caterpillars feeding on *Croton floribundus* (Euphorbiaceae) in São Carlos, Matão and Ubatuba (São Paulo State, Brazil). The column "P" represents the percentage number of caterpillars parasitized by its respective parasitoid wasp (Ichneumonidae species).

Ichneumonidae	Number of rearings		Occurrence		Lepidoptera (primary host)	Month of occurrence	Number of specimens	p (%)		
	♂	♀	Site	Month(s)						
Banchinae	<i>Diradops</i> sp.	0	1	São Carlos	VIII	Noctuidae	<i>Miselia albipuncta</i>	VII-IX, XI	10	10.0
	<i>Meniscomorpha</i> sp.	2	1		I, III-IV	Gelechiidae	<i>Dichomeris</i> sp.	I-X, XII	45	6.7
	<i>Sphelodon annulicornis</i>	0	1		VII	Gelechiidae	sp. 1	VII	1***	-
Campopleginae	<i>Campoplex</i> sp.	1	0	São Carlos	VII	Tortricidae	Olethreutinae sp.	II-VIII, X	31	3.2
	<i>Casinarina</i> sp.	1	1		VI, VIII	Geometridae	<i>Hymenomima conia</i>	I, IV-X	21	9.5
	<i>Charops</i> sp.	1	0	Matão	XII	Noctuidae	<i>Bagisara paulensis</i>	I-III, XII	49	2.0
		0	1		VI	Geometridae	<i>Oxydia vesulia</i>	II-VI	7	14.3
	<i>Hyposoter</i> sp. 1	1	2	São Carlos	VI, XII	Geometridae	<i>Semaepus</i> sp.	I-XII	240	1.2
	<i>Hyposoter</i> sp. 2	1	0		IX	Geometridae	<i>Hymenomima conia</i>	I, IV-X	21	4.8
	<i>Microcharops longiterebra</i>	1	0	Matão	I	Limacodidae	sp. 3	I	1***	-
Cre mastinae	<i>Eutanygaster brevipennis</i>	0	1	Ubatuba	III	Noctuidae	<i>Bagisara paulensis</i>	III	8	25.0
		0	1	Ubatuba	III	Gelechiidae	sp. 2	III	1***	-
Mesochorinae	<i>Mesochorus</i> sp. 1*	1	1	São Carlos	V-VI	Tortricidae	Olethreutinae sp.	II-VIII, X	31	6.5
	<i>Mesochorus</i> sp. 2**	0	1		XII	Noctuidae	sp. 3	XII	1***	-
Metopiinae	<i>Leurus caeruliventris</i>	0	1	Matão	II	Gelechiidae	<i>Dichomeris</i> sp.	I-II, IV-VII, IX	40	2.5
	<i>Leurus</i> sp.	2	0		IV	Tortricidae	Olethreutinae sp.	I-VIII	24	8.3

\* Reared from *Hypomicrogaster* sp. (Braconidae, Microgastrinae)

\*\* Reared from Braconidae, Rogadinae (probably *Aleiodes* sp.)

\*\*\* The host larva was not precisely identified due to the bad condition of its remains.

Despite the representative number of samples, the caterpillars parasitized by Ichneumonidae represented only 1% of the total collected. The non-occurrence of these parasitoid species in subsequent samples may indicate that the use of the Lepidoptera species on *Croton floribundus* as hosts can be casual. Further studies will probably increase the amount of Ichneumonidae species associated with caterpillars feeding on *C. floribundus*.

Acknowledgments. To Vitor C. Becker, who identified the Gelechiidae, Pyralidae, Tortricidae and Noctuidae species, Ian D. Gauld (*in memoriam*) for assistance in identification of Ichneumonidae, Carolina Rodrigues de Araújo for identification of *Leurus caeruliventris* and the anonymous reviewers for important suggestions and comments. We also thank the staff of the Canchim Farm (EMBRAPA/CCPSE), and that of the "Cambuhy Agrícola Ltda." Farm for permission to work in these areas, as well as the "Secretaria do Meio Ambiente" for permission to work in the "Parque Estadual da Ilha Anchieta", and Luís A. Joaquim for the help during the collections. This study was supported by the Brazilian Government through a CNPq doctoral fellowship granted to the senior author and by the graduate program in Ecology and Natural Resources (PPG-ERN) of UFSCar.

## REFERENCES

- Braga, S. M. P.; M. M. Dias & A. M. Penteado-Dias. 2001. Aspectos bionômicos de *Eois tegularia* (Gueneé) e *Eois glauculata* (Walker) (Lepidoptera, Geometridae, Larentiinae) e seus parasitoides. **Revista Brasileira de Zoologia** 18: 837-840.
- Gauld, I. D. 1991. The Ichneumonidae of Costa Rica, 1. **Memoirs of the American Entomological Institute** 47: 1-589.
- Gauld, I. D. 1997. The Ichneumonidae of Costa Rica, 2. **Memoirs of the American Entomological Institute** 57: 1-485.
- Gauld, I. D. 2000. The Ichneumonidae of Costa Rica, 3. **Memoirs of the American Entomological Institute** 63: 1-453.
- Gauld, I. D.; C. Godoy; R. Sithole & J. U. Gómez. 2002. The Ichneumonidae of Costa Rica, 4. **Memoirs of the American Entomological Institute** 66: 1-768.
- Gupta, V. K. 1987. A revision of the genus *Microcharops* (Hymenoptera: Ichneumonidae). **Contributions of the American Entomological Institute** 23: 1-42.
- Hanson, P. E. & I. D. Gauld. 1995. **The Hymenoptera of Costa Rica**. London, Oxford University Press, xx + 893 p.
- Hanson, P. E. & I. D. Gauld. 2006. Hymenoptera de la Región Neotropical. **Memoirs of the American Entomological Institute** 77: 1-994.
- Jerman, E. J. & I. D. Gauld. 1988. *Casinarina*, a paraphyletic ichneumonid genus (Hymenoptera) and a revision of the Australian species. **Journal of Natural History** 22: 589-609.
- Marconato, G.; M. M. Dias & A. M. Penteado-Dias. 2008. Larvas de Geometridae (Lepidoptera) e seus parasitoides, associadas a *Erythroxyllum microphyllum* St.-Hilaire (Erythroxyllaceae). **Revista Brasileira de Entomologia** 52: 296-299.
- Shaw, S. R. 1997. Subfamily Rogadinae, p. 403-412. In: R. A. Wharton; P. M. Marsh & M. J. Sharkey (eds.). **Manual of the New World Genera of the family Braconidae (Hymenoptera)**. Washington, The International Society of Hymenopterists. Special Publication 1, 439 p.
- Townes, H. K. 1969. The genera of Ichneumonidae 1. **Memoirs of the American Entomological Institute** 11: 1-300.
- Townes, H. K. 1970a. The genera of Ichneumonidae 2. **Memoirs of the American Entomological Institute** 12: 1-537.
- Townes, H. K. 1970b. The genera of Ichneumonidae 3. **Memoirs of the American Entomological Institute** 13: 1-307.
- Townes, H. K. 1971. The genera of Ichneumonidae 4. **Memoirs of the American Entomological Institute** 17: 1-372.
- Townes, H. K. & M. Townes. 1966. A catalogue and reclassification of the Neotropical Ichneumonidae. **Memoirs of the American Entomological Institute** 8: 1-367.
- Townes, H. K. & M. Townes. 1978. Ichneumon-flies of America North of Mexico: 7. Subfamily Banchinae, tribes Lissonotini and Banchini. **Memoirs of the American Entomological Institute** 26: 1-614.
- Yu, D. S.; K. van Achterberg & K. Horstmann 2005. World Ichneumonidae. CD Rom **Taxapad**.