

A NEW SPECIES OF *YPHTHIMOIDES* (NYMPHALIDAE, SATYRINAE) FROM SOUTHEASTERN BRAZIL

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ABSTRACT. This paper describes a new species of *Ypthimoides* (Nymphalidae, Satyrinae) from the highlands of the Serra do Cipó, Minas Gerais, southeastern Brazil. The position of this species is still uncertain within the genus, but it is near to *Y. celmis* (Godart) based on the male genitalia. Early stages are very similar to those of other species of Euptychiini. Adults are most active from 10:00 to 14:00 h, mostly on slopes protected from direct winds. Males are territorial, and females wander through the area. Adults were observed feeding on six species of flowers.

Additional key words: *Campos rupestres*, Poaceae, Serra do Cipó, *Ypthimoides cipoensis*.

The Serra do Cipó is the southernmost part of a mountain system known as the “Serra do Espinhaço,” extending through the center of Minas Gerais State, in SE Brazil. Most of its area is included in the “Serra do Cipó National Park,” covering parts of the municipalities of Jaboticatubas, Santana do Riacho, Morro do Pilar and Itambé do Mato Dentro. The region is mostly covered by open vegetation, especially rocky montane fields (“campo rupestre”) and Cerrado, with narrow galley forests bordering some rivers in the valleys (King 1956, July 1970, Moreira & Camelier 1977).

The region has many endemic species of plants and animals (Vanzolini 1982, Giuliatti et al. 1987, Eterovick & Sazima 2000, Sawaya & Sazima 2003), but the knowledge of insects including butterflies is minimal. Preliminary lists for the region show that it is especially rich in endemic Hesperidae and Lycaenidae; within the Nymphalidae, the Satyrinae are the group best represented (E. G. de Oliveira, in prep.). Any biological information about this region is important, especially considering the need for protection of the entire area.

The species described here was first collected by the author in 1996 near the Serra do Cipó National Park, and also observed in three subsequent visits to this area (1997, 2001, 2002). Attempts to identify this species indicated that it was an undescribed taxon.

The present paper describes this new species and illustrates the morphological characters of adults and immature stages.

MATERIALS AND METHODS

The species was studied in the Serra do Cipó, Minas Gerais, SE Brazil. The mean annual temperature is 18°C (Nimer 1972, CETEC 1982). Annual rainfall averages 1600 mm, with a marked dry season from May to August. Observations were made in the “Juquinha” site, Santana do Riacho, Minas Gerais, on a hilltop with many rocky outcrops delimiting an area of about 300 m² where adults were usually abundant

(more than 60 marked in two days in 1996, and about 20–30 in 1997 and 2002). Adults were more common in the western section, where the slope was more protected from winds.

Fertile eggs were obtained from two wild-captured females confined in plastic bags. Larvae were reared in plastic containers cleaned daily, with fresh plant material provided every two or three days (following Freitas 1991). Data were recorded on behavior and development times for all stages, and dry head capsules and pupal castings were kept in small glass vials. When there was sufficient material, immatures were fixed in Kahle solution (AVLF collection). All measurements were made using a microscope fitted with a calibrated micrometric ocular. Egg size is presented as height and diameter, and head capsule size is the distance between the most external ocelli (as in Freitas 1991). Taxonomic nomenclature follows Miller (1968) modified by Harvey (1991), who treated the Satyrinae as a subfamily, downranking Miller’s subfamilies and tribes to tribes and subtribes, respectively. Nomenclature of wing veins follows Miller (1969), and of body setae follows Hinton (1946).

Ypthimoides cipoensis Freitas, new species

(Figs. 1–3)

Adults: Diagnosis. Eyes with minute sparse hairs, appearing naked without magnification; reddish brown with dark areas (varying in shape and position). Palpus length 1.5 times head height, brown with light brown hairs. Antenna (10–11 mm) extending to mid-costa; shaft dark brown, dorsally covered by dark brown scales, club with 16–17 segments, not conspicuously developed. Male wing venation shown in Fig. 2a. Forewing slightly elongated, hindwing outer margin wavy, especially in the males. Male foreleg with two elongated partially fused tarsomeres; female foreleg with five tarsomeres (Fig. 2c, d). The midleg and palpus are shown in Fig. 2b, e. Easily distinguished from other species of *Ypthimoides* by the lack of conspicu-

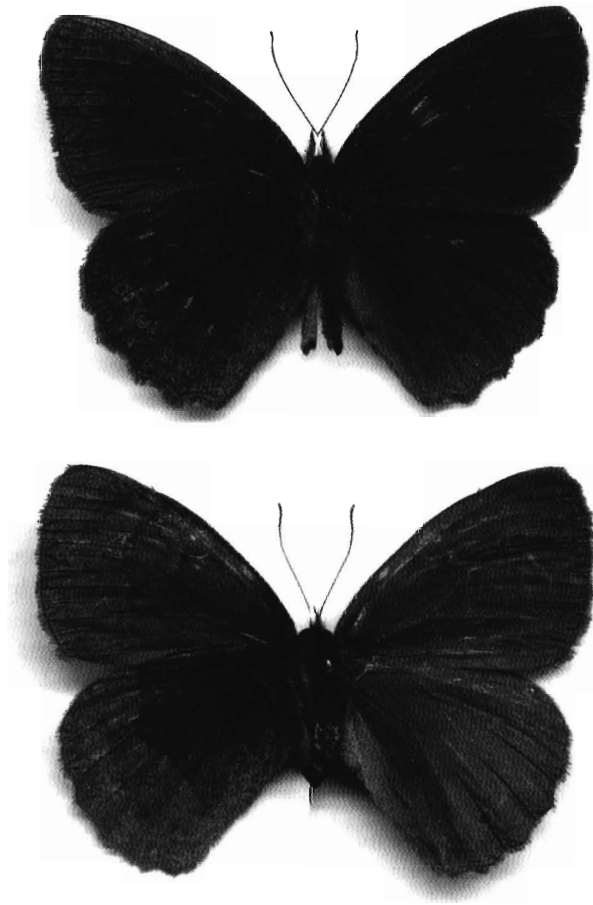


FIG. 1. *Ypthimoides cipoensis* from Serra do Cipó, Minas Gerais; adult male (top) and female (bottom). Left wings ventral, right wings dorsal.

ous ocelli on the wings and by the weakly marked lines crossing the wings: Fig. 3 compares *Y. cipoensis* with 15 other common species of *Ypthimoides* from Southern Brazil, showing that the general wing shape and color pattern of *Y. cipoensis* is quite different from those of the other species.

Description. Male (Fig. 1, top). Forewing length 21–22 mm; hindwing length 15–18 mm ($n = 10$). Body entirely dark brown. Dorsal ground color dark brown with no markings, except for a thin orange-brown marginal stripe on the hindwing; covered with hairs, longer and more abundant on the basal portion, especially on the hindwing. Ventral ground color of wings same as dorsal; forewing crossed by a dark brown concave irregular line extending from costa to CU1 at two thirds from base, delimiting a distal area with scattered pale pink scales giving a bluish tint, and with a minute black dot in the space M1–M2 one fifth from wing margin; a dark brown zigzag submarginal line and an orange brown marginal line extending from costa to 2A. Hindwing with many scattered pale pink scales giving a bluish tint; a dark brown concave irregular line from costa to anal margin, delimiting a distal area with bluish tint more pronounced; a series of five narrow white stripes over veins M1 to Cu2, the second (on M2) weaker; two minute black dots with white center, in spaces M1–M2 and Cu1–Cu2.

Male genitalia unusual in shape within the Satyrinae (Fig. 2f–i). Uncus forming a dorso-ventrally flattened process, in the form of a wide spatula (Fig. 2g). Tegumen slightly bilobed; saccus very short and small. Gnathos appearing as two long pointed processes almost the same size as uncus. Valvae elongated, ending in a single blunt point, with internal margin ornate bearing many well developed spines in three series: a basal rounded process with 6–8 small spines, an intermediate region with 2–3 long spines, and a terminal protuberance with 3–7 small spines (number, size and disposition of spines in each series different on the two valvae of the same individual and among different individuals) (Fig. 2i). Aedeagus elongated with a conspicuous shelf on the ventral surface (Fig. 2h).

Female (Fig. 1, bottom). Forewing length 22–24 mm; hindwing length 17–19 mm ($n = 5$). Body entirely dark brown. General color and pattern very similar to, but in general paler than that of males, with less bluish tint, and with the distal area paler than basal area on both wings.

Variation. Variation on the dorsal wing surfaces was absent in the sample studied, and differences in general darkness were inversely correlated with wing wear. The ventral surface of the wings can be weakly marked in some individuals of both sexes, and the white stripes on the hindwing usually disappear in old individuals. The ocelli can be absent in some individuals, and in one female an additional ocellus was seen in the space Cu2–1A in the hindwing.

Early stages: Egg (Fig. 4a). Spherical, beige, without ridges but with many small depressions in the chorion. Height 1.14–1.30 mm (mean = 1.197 mm, SD = 0.049, $n = 7$); diameter 1.14–1.24 mm (mean = 1.191 mm, SD = 0.041, $n = 7$). Duration 5–9 days ($N = 30$).

First instar (Fig. 4b–d). Head capsule black, with enlarged chazalae, bearing a pair of short scoli on vertex, each with two long narrow setae ending in a fine point (Fig. 4b). Third stemmata larger than the other stemmata. Head capsule width 0.76–0.82 mm (mean = 0.789 mm, SD = 0.016, $n = 25$); scoli 0.08–0.12 mm (mean = 0.095 mm, SD = 0.010, $n = 25$). Body beige, smooth, with red longitudinal stripes; caudal filaments very short. Setae XD, D, SD and L thickened with clubbed tips; body chaetotaxy illustrated in Fig. 5. Maximum length 7 mm. Duration 10–15 days.

Second instar. Head dark brown with two diverging short scoli on vertex. Head capsule width 1.14–1.30 mm (mean = 1.213 mm, SD = 0.042, $n = 19$); scoli 0.16–0.20 mm (mean = 0.184 mm, SD = 0.014, $n = 19$). Body brown with many longitudinal stripes; caudal filaments short. Maximum length 11 mm. Duration 6–13 days.

Third instar (Fig. 4e). Head medium brown, with two dorsal dark lines reaching bases of two diverging very short scoli on vertex. Head capsule width 1.84–2.00 mm (mean = 1.917 mm, SD = 0.051, $n = 19$); scoli 0.24–0.30 mm (mean = 0.264 mm, SD = 0.021, $n = 19$). Body brown with many longitudinal stripes; caudal filaments short. Maximum length 17 mm. Duration 7–10 days.

Fourth (last) instar (Fig. 4f, g). Head lighter brown, with two dorsal dark lines to bases of diverging short scoli on vertex, integrating head and body stripes. Head capsule width 2.81–3.39 mm (mean = 3.101 mm, SD = 0.190, $n = 10$); scoli 0.39–0.43 mm (mean = 0.409 mm, SD = 0.021, $n = 10$). Body brown with many longitudinal stripes; one dorsal stripe conspicuously dark; ventral region dark brown; legs and prolegs light brown; caudal filaments short. Maximum length 30 mm. Duration 17–20 days.

Pupa (Fig. 4h–j). Short and smooth; mostly beige, with short squared ocular caps; cremaster dark in ventral portion; dorsal abdomen with a paired series of short subdorsal white protuberances; alar caps light at the edge, with lightened visible tracheae. Total length 12–13 mm. Duration 20–25 days.

Etymology. The specific name refers to the distribution of this species, which apparently is restricted to the Serra do Cipó.

Holotype: adult male from “Juquinha” (19°15'S, 43°33'W), 1370 m, Serra do Cipó, Santana do Riacho, Minas Gerais, southeastern Brazil, collected by A. V. L. Freitas on May 6, 1996. In the collection of the Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Paraná, Brazil (collection reference number: DZ 5.132). Labels on the holotype (three labels, separated by transverse bars): /HOLOTIPO/ SERRA DO CIPÓ, JUQUINHA, SAN-

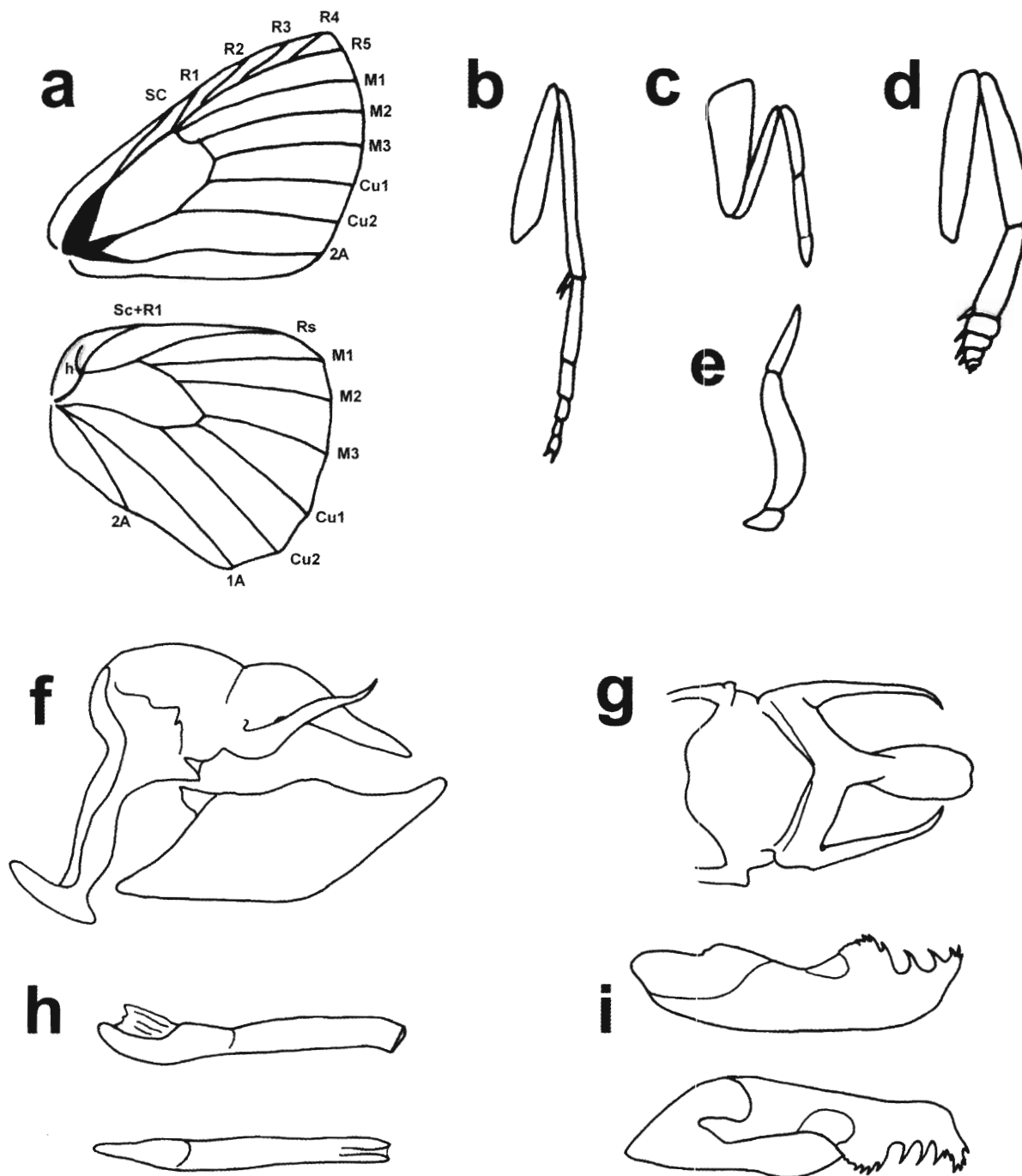


FIG. 2. Morphological characters of *Ypthimoides cipoensis*. **a**, Male wing venation, hindwing above and forewing below; **b**, Male midleg; **c**, Male foreleg; **d**, Female foreleg; **e**, Male palpus; **f**, Lateral view of male genitalia; **g**, Dorsal view of tegumen and uncus; **h**, Aedeagus (lateral above, ventral below); **i**, Right valva upper view (external above, internal below).

TANA DO RIACHO, MG, BRASIL, 19°15'S, 43°33'W, 1370 m, 6-V-1996, A.V. L. FREITAS leg./ DZ 5.132/

Paratypes: Three adult males and one adult female, same site as holotype, collected in May 2002, in the collection of the author.

Distribution. This species is very local, and was observed in only three sites in the Serra do Cipó. In addition to the population of “Juquinha,” a second

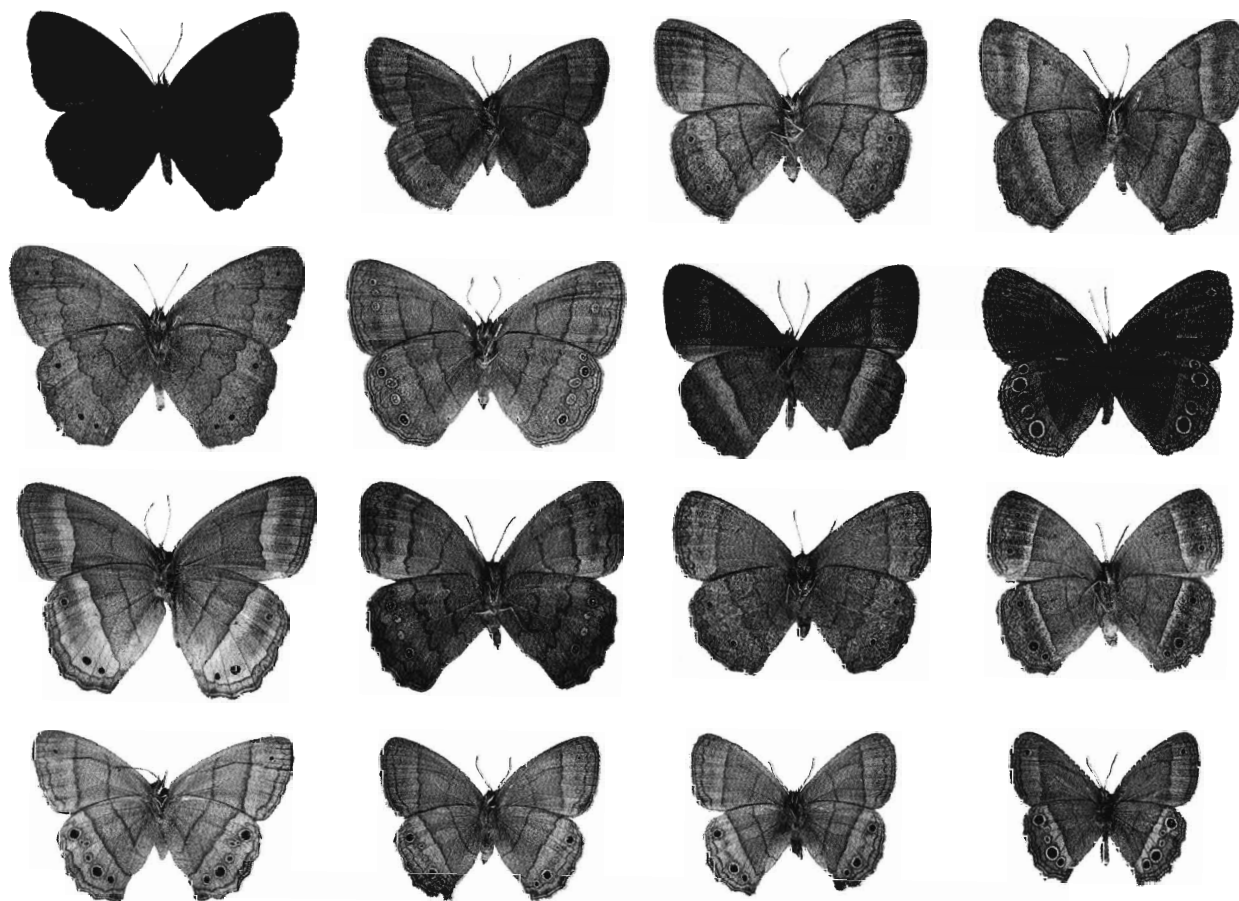


FIG. 3. Comparison of *Ypthimoides cipoensis* with another 15 species of *Ypthimoides* of Southern Brazil. Top to bottom, left to right; *Y. cipoensis* Freitas, Serra do Cipó, Minas Gerais; *Y. celmis* (Godart), Viamão, Rio Grande do Sul; *Y. renata* (Stoll), Mogi Guaçu, São Paulo; *Y. straminea* (Butler) (probably a dry season form of *Y. renata*), Luiz Antônio, São Paulo; *Ypthimoides* sp., Campinas, São Paulo; *Y. affinis* (Butler), Campinas, São Paulo; *Y. ochracea* (Butler), Campos do Jordão, São Paulo; *Y. ypthima* (C. & R. Felder), Campinas, São Paulo; *Y. borasta* (Schaus), Igaratá, São Paulo; *Y. grimon* (Godart), São Sebastião, São Paulo; *Ypthimoides* sp., Teodoro Sampaio, São Paulo; *Y. manasses* (C. & R. Felder), Itirapina, São Paulo; *Ypthimoides* sp., São Sebastião, São Paulo; *Ypthimoides* sp., Cotia, São Paulo; *Y. viviana* (Romieux), Santa Bárbara, Minas Gerais; *Ypthimoides* sp. (ca. *castrensis*), Maquiné, Rio Grande do Sul.

population was found by Marcio Uehara-Prado in “Travessão” (19°20’S, 43°31’W, elevation 1100 m), in July–August 2001, and W. W. Benson found a third population in a private area not far from the “Serrote” (19°17’S, 43°33’W, elevation 1200 m) in May 2002. The species probably occurs in other similar habitats in the region.

Behavior and Natural History. Oviposition behavior was not observed, and the host plant in the field is unknown. In the laboratory, larvae easily accepted Goosegrass *Eleusine indica* (L.) Gaertn. (Poaceae), a common introduced grass in Brazil. In plastic bags, eggs were usually laid singly on the plastic surface (suggesting that in nature eggs are also laid singly). Adult males are territorial, while females wander through the landscape (W. W. Benson & AVLF unpublished data). Adults were observed feeding on flowers

of *Declieuxia* sp. (Rubiaceae), *Leucothoe* sp. (Ericaceae), *Hyptis* sp. (Lamiaceae), *Piptolepis buxoides* Schultz-Bip and two unidentified species of *Vernonia* (Asteraceae).

DISCUSSION

The genus *Ypthimoides* was erected by Forster (1964) to include about 15 species of medium-sized predominantly brown Neotropical Satyrinae species. Because the diagnosis given by Forster was vague, about 22 species have been included in this genus until now (G. Lamas pers. com.). Preliminary studies on the immatures (AVLF unpublished results) suggest that this genus is an unnatural assemblage of several distinct groups (in the description of *Ypthimoides*, Forster already recognized two distinct groups of species), and needs a major reorganization into five or

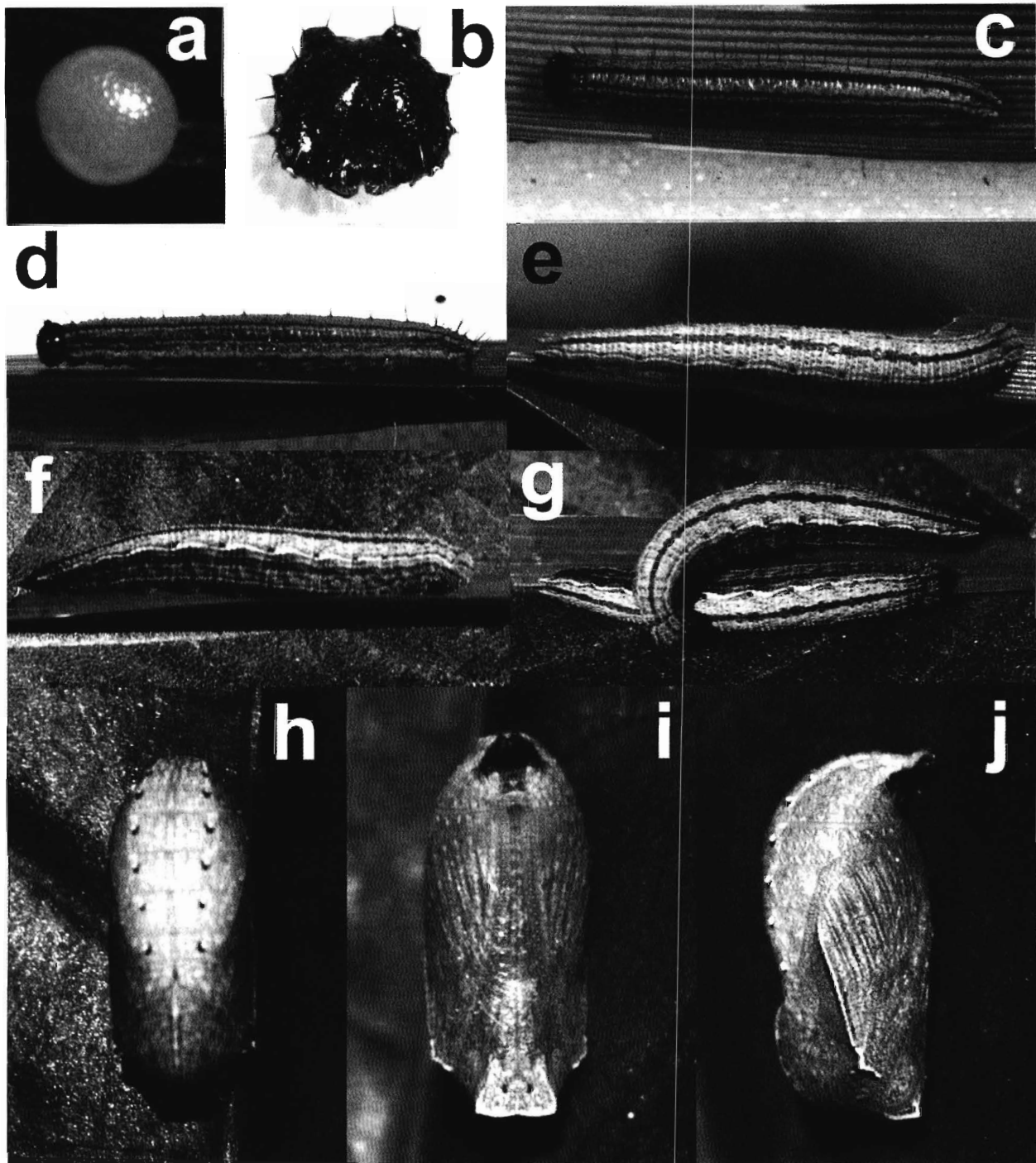


FIG. 4. Early stages of *Ypthimoides cipoensis*. **a**, Egg; **b**, First instar head capsule; **c**, **d**, First instar (dorsal, lateral); **e**, Third instar (dorsal); **f**, **g**, Last instar (lateral, two larvae dorsal); **h**, **i**, **j**, Pupa (dorsal, ventral, lateral).

more genera. The tentative placement of *Y. cipoensis* in *Ypthimoides* was based on the paper by Forster (1964), and by the similarity of the male genitalia with *Y. celmis* (Godart) (male genitalia figured in Forster 1964:100), a species very different from *Y. cipoensis*

(Fig. 3). However, this classification may require a re-assessment once our knowledge of *Ypthimoides* systematics is improved.

Based on current information, this species is considered endemic to the Serra do Cipó region, and dis-

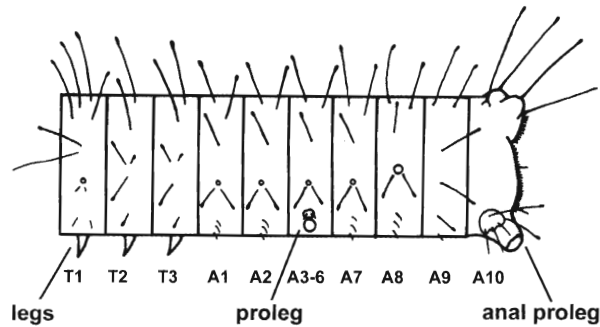


FIG. 5. Chaetotaxy of the first instar larva of *Ypthimoides cipoensis*.

tributed in few scattered local colonies. Like many other species endemic to this mountain system, it may be considered vulnerable to extinction due to habitat destruction. Only one colony is known from the area inside the National Park, and the colonies outside are threatened by destruction of surrounding habitat, fire and uncontrolled eco-tourism. Additional efforts to discover new colonies of this species and population studies of the adults could be important to help in the preservation of the species and of the whole Serra do Cipó system.

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LITERATURE CITED

- CETEC. 1982. Principais atividades realizadas para a implantação do Parque Estadual da Serra do Cipó. Relatório técnico. Belo Horizonte, MG.
- ETEROVICK, P. C. & I. SAZIMA. 2000. Structure of an anuran community in a montane meadow in southeastern Brazil: effect of seasonality, habitat, and predation. *Amphibia-Reptilia* 21:439–469.
- FORSTER, W. 1964. Beiträge zur Kenntnis der Insektenfauna Boliviens XIX. Lepidoptera III. Satyridae. *Veröffentlichungen der zoologischen Staatssammlung München* 8:51–188, pls. 27–35.
- FREITAS, A. V. L. 1991. Variação morfológica, ciclo de vida e sistemática de *Tegosa claudina* (Eschscholtz) (Lepidoptera, Nymphalidae, Melitaeinae) no Estado de São Paulo, Brasil. *Rev. bras. Entomol.* 35:301–306.
- GIULIETTI, A. M., N. L. MENEZES, J. R. PIRANI, M. MEGURO & M. G. L. WANDERLEY. 1987. Flora da Serra do Cipó: caracterização e lista das espécies. *Boletim de Botânica da Universidade de São Paulo* 9:1–151.
- HARVEY, D. J. 1991. Higher classification of the Nymphalidae (Appendix B). In Nijhout, H. F., *The development and evolution of butterfly wing patterns*. Smithsonian Press. Pp. 255–273.
- HINTON, H. E. 1946. On the homology and nomenclature of the setae of lepidopterous larvae, with some notes on the phylogeny of the Lepidoptera. *Trans. R. ent. Soc. London* 97:1–37.
- JOLY, A. B. 1970. *Conheça a vegetação brasileira*. Polígono, São Paulo, São Paulo, Brasil.
- KING, L. C. 1956. A Geomorfologia do Brasil Oriental. *Rev. Bras. Geogr.* 18:147–265.
- MILLER, L. D. 1968. The higher classification, phylogeny and zoogeography of the Satyridae (Lepidoptera). *Mem. Am. Entomol. Soc.* 24:iii + 174 pp.
- . 1969. Nomenclature of wing veins and cells. *J. Res. Lepid.* 8(2):37–48.
- MOREIRA, A. A. N. & C. CAMELIER. 1977. Geomorfologia do Brasil—Região Sudeste. Rio de Janeiro, IBGE vol. 3:1–50.
- NIMER, E. 1972. Climatologia da Região sudeste do Brasil. Introdução a climatologia dinâmica. *Rev. Bras. Geogr.* 34:3–48.
- SAWAYA, R. J. & I. SAZIMA. 2003. A new species of *Tantilla* (Serpentes: Colubridae) from southeastern Brazil. *Herpetologica* 59(1):119–126.
- VANZOLINI, P. E. 1982. A new *Gymnodactylus* from Minas Gerais, Brasil, with remarks on the genus, on the area and on montane endemisms in Brazil. *Papéis Avulsos de Zoologia* 34:403–413.

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