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A THIRD SPECIES OF *BRONIA* GRAY, 1865 (REPTILIA, AMPHISBAENIA)

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ABSTRACT

Bronia bedai, sp. n., type locality Anastacio (20°29' S, 55°50' W), state of Mato Grosso do Sul, is close to *B. kraoh* Vanzolini, 1971, and differs from *B. brasiliana* Gray, 1865 in having well developed nasal scales meeting on top of the head. The new species has 272-284 body annuli (281 in kraoh, 213-229 in brasiliana), 22-23 tail annuli (13 and 11-15) and 18-20: 16-18 segments to a midbody annulus (34:36, 18-21:18-22). The literature on the genus is reviewed and its distribution is briefly discussed.

INTRODUCTION

Gray (1865: 448) described, in the Proceedings of the Zoological Society of London, *Bronia brasiliana*, gen. nov., spec. nov., based on one specimen in the British Museum, collected by Bates in Santarém, Pará. This paper was reprinted, *ipsis litteris*, in the same year, in the Annals and Magazine of Natural History. Two illustrations were provided, one lateral and one dorsal view of the head. The description and illustrations are perfectly satisfactory, and there has never been any doubt about the species. Gray (1872: 37) reprinted once more the original description and illustrations: in 1873 (p. 116) he mentioned two specimens in the British Museum, both alcoholics, one being the type, the other an example from "Brazil".

Sclater (1880: 714), in the list of additions to the London Zoo in 1880 mentioned one *Bronia brasiliensis* (sic) from "Parahyba do Norte", donated by W.A. Forster. This specimen is not mentioned again in the literature. I believe it died in captivity and was dissected by Beddard (1905), Prosector to the Zoological Society, who described aspects of the vascular and visceral anatomy. Beddard refers to the specimen as *Amphisbaena brasiliana*, and this tacit synonymy was accepted without discussion by later herpetologists. The locality will be discussed later.

Strauch (1881: 413) saw six specimens, including the type and an additional British Museum example from "Cupar River, 500 miles from sea". He discussed the relationships of the nasal with the rostral, described quite well the mental region and gave, for the first time, scale counts.

Bocourt (1882: 493) included *Amphisbaena brasiliana* in a list of the family. Instead of referring, as all authors before and since, to the paper by Gray in the Proceedings, he cited that in the Annals and Magazine.

Boulenger, in the second volume of the Catalogue (1885: 450) described the two British Museum specimens as *Amphisbaena brasiliana*, departing very little from Gray's original descrip-

tion (which argues for the good quality of the latter) and giving the locality of the second specimen as "River Cuparia" (actually Rio Cupari, a tributary of the Tapajós).

Goeldi (1902: 556) included *A. brasiliiana* (with Boulenger's data) in a compiled table of Brazilian amphisbaenids. Next come Beddard (1905), already commented upon, and Burt & Burt (1933), a checklist.

Vanzolini (1951: 114) revalidated *Bronia*, in a comprehensive paper on the amphisbaenid genera, using external morphology and cranial characters.

Gans (1967: 78), in his first list of amphisbaenids, cited the species, and mentioned one specimen from Belém in the S. Paulo collection (Departamento de Zoologia, now Museu de Zoologia, USP). Peters and Donoso-Barros (1970, 1986) included the genus and species in their Catalogue.

Gans (1971) revised the genus, then still monotypic, based on 14 specimens, ten of which have good localities (see Map 1). He adequately described and illustrated *B. brasiliiana*, with a table of measurements and scale counts.

In the same year Vanzolini (1971: 193) described the second species of the genus, *Bronia kraoh*, from Pedro Afonso, then in the state of Goiás, now in Tocantins.

Gans (1974: 273) cited *B. kraoh* from the original description. Gans & Mathers (1977: 38) included both species in a key to the New World amphisbaenians, in reality a good diagnosis. Hoogmoed (1979: 279) defined summarily the distribution of *B. brasiliiana* from the literature.

Finally, Cunha, Nascimento and Avila-Pires (1985: 39) cited the only specimen collected by herpetologists, at Serra dos Carajás, Pará; they gave scale counts and measurements and confirmed what could be surmised from the general literature, i.e., that the species inhabits forest.

I have now before me a third species of the genus, which I describe as

***Bronia bedai*, sp. n.**

Holotype, Brasil: Mato Grosso do Sul: Anastacio (20°29'S, 55°47'W), MZUSP 72988, A.F. Béda coll. 9 October 1989.

Paratypes, Brasil: Mato Grosso do Sul: Aquidauana (20°28'S, 55°47'W), MZUSP 73070, E.R. Silva coll. 23 February 1991, ex A.F. Béda; Aquidauana, MZUSP 73314, A.F. Béda coll. 2 May 1991; Guia Lopes da Laguna (21°26'S, 56°07'W), MZUSP 73069, A.F. Béda coll. 4 January 1991.

Etymology: named after A.F. Béda.

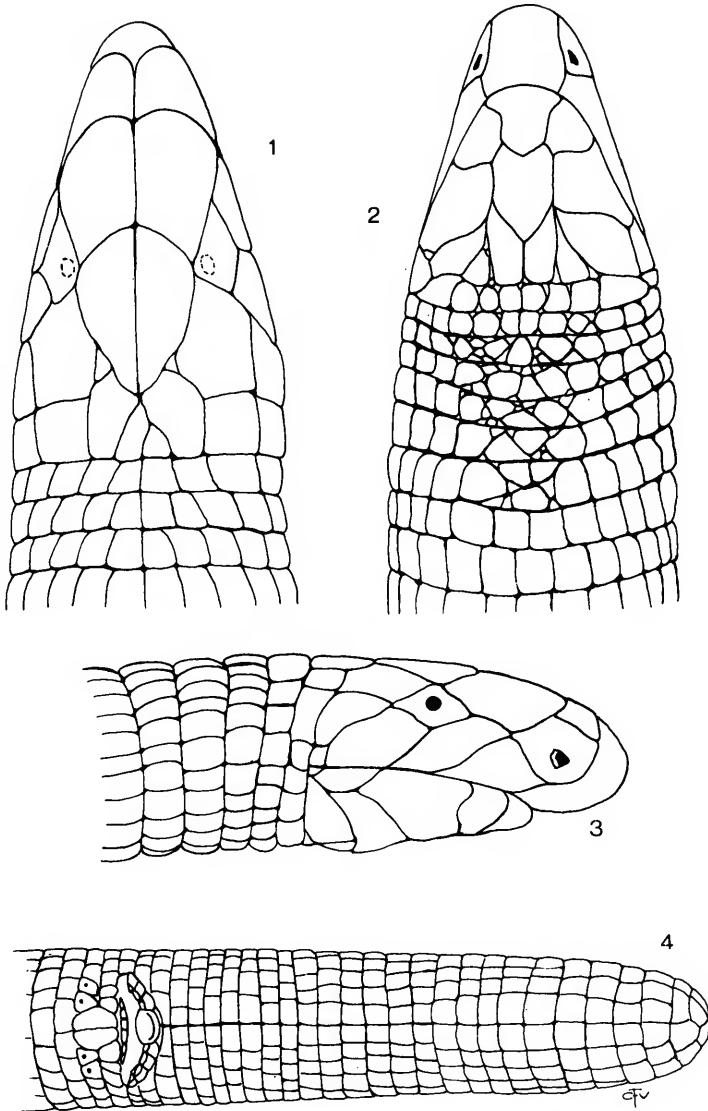
DIAGNOSIS

Tail slightly clavate. Nasals meeting on the midline. Parietals large. Four supralabials, fourth small. Four preanal pores, the pore-bearing scales separated on the middle by two large scales of the anal flap. Body annuli 272-284, tail annuli 22-23, segments to a midbody annulus 18-20 (total 34-36).

DESCRIPTION (Figs. 1-4)

Head triangular, narrower than the body, with strongly curved profile; snout prognathous. Lateral sulcus evident from the 25th - 30th body annulus, no dorsal or ventral sulci. Tail slightly clavate.

Rostral well visible from above. Nasals meeting on the midline, their suture the shortest on top of the head. Prefrontals large. Frontals forming together a rough diamond, narrower, rounded behind, their suture the longest on top of the head. Parietals large, in one case irregularly broken up, in another transversely split, sitting on the middle of an annulus of successively decreasing segments. Nostril near the front edge of the nasal. Four upper labials, the first with an upper point just failing to meet the prefrontal; the second and third large, irregularly trapezoidal; the fourth small, squarish. Ocular very irregular. A very large postocular, pentagonal, with unequal sides; between it and the fourth labial one trapezoid scale, narrower below. Symphyseal anvil-shaped, with large antero-lateral



Figs. 1-4. *Bronia bedai*, holotype, scutellation of head and tail.

processes, pointed or rounded behind. Postsymphysial shield-shaped, with arcuate front edge (receiving the symphysial) and rounded angles. Lateral genials large, irregular. Median genials four, the two median ones large, regular, the lateral ones reduced to slivers. Three lower labials, the first irregular, the second very large, the third small, elongate, irregular. Between the third labials eight irregular scales, the laterals large.

Dorsal segments a little longer than wide, poorly aligned, with many irregularities; many of them with a central round depression. Ventral segments more regular, better aligned, the median pair a little wider than long. Anal flap with two central scales, very large, separating the pore-bearing scales. Two pores on each side, small, well formed, on the middle of the scales. Tail with an autotomy level on the sixth annulus; point of tail slightly laterally compressed (higher than wide), with distinct sutures.

Dorsum brown, to the level of the lateral sulcus, occasionally 1-2 scales below it; many segments with darker markings, irregularly distributed; intersegmental sutures lighter. Ventral parts yellowish. Tail as body, but with large whitish irregular spots dorsally; ventrally with some light smudging on the sixth annulus and those immediately behind.

COMPARISONS

Bronia bedai shares with *B. brasiliiana* and *B. kraoh* a set of characters in common with *Amphisbaena*, the most species-rich genus in the family, from which they differ in having a strongly curved skull (Figs. 9 and 10), with a short but distinct vertical rostrum, as well as the pore-bearing scales of either side separated on the middle by a pair of large scales of the anal flap.

Bronia bedai is closest to *B. kraoh* (figs. 5-8); especially, both have the nasals meeting on the midline, a more primitive situation than that shown by *B. brasiliiana*, which has extremely reduced nasals, in some specimens partially or completely fused with the rostral. They also coincide in number of body annuli, 272-284 in the new species, 281 in *kraoh*, while *brasiliiana* does not exceed 229.

Bronia bedai has more tail annuli than *B. kraoh* (respectively 22-23 and 13) and fewer segments to a midbody annulus (34:36 against 18-20:16-18). It has four pores; there are six in *kraoh*. On the top of the head, *kraoh* has no parietals; on the side, the ocular of *kraoh* is much larger, and the postocular consequently smaller; the fourth labial of *kraoh* is much larger.

BIOMETRY

Gans's (1971) data on *B. brasiliiana*, complemented by our specimens, afford a backdrop against which to view some biometric aspects of *B. kraoh* and *B. bedai*. Using only ranges for the scale counts, we have

Body annuli	Tail annuli	Segments
<i>brasiliiana</i> 213-229	11-15	18-21:18-22
<i>kraoh</i> 281	13	34:36
<i>bedai</i> 272-284	22-23	18-20:16-18

The regression of tail length on body length (both in mm) in *brasiliiana* is described by the equation

$$y' = 3.9 + 0.054 x$$

with a rather low coefficient of determination, .7543. Plotting (Graph 1) all the available points and the *brasiliiana* line on one graph, one sees that *kraoh* agrees rather well with *brasiliiana*, while *bedai* has a much longer tail than either, in keeping with the higher number of tail annuli.

SKULL

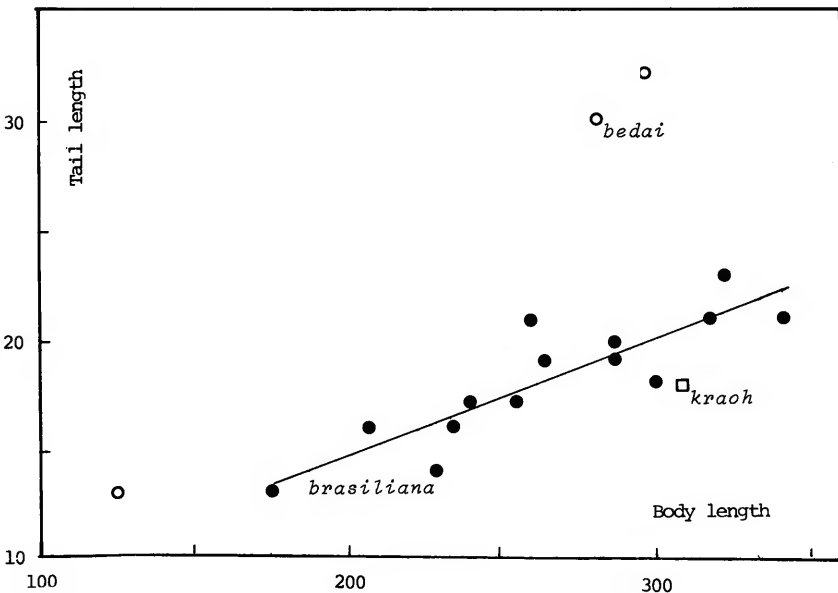
We had in the collection the skull of *Bronia brasiliiana*, MZUSP 378, from Santarém, Pará, which served in the revalidation of the genus. For the present paper I dissected the skull of *B. bedai* paratype MZUSP 73314, a small but well preserved specimen. I also tried to dissect the skull of the type and so far only specimen of *B. kraoh*: it is completely crushed (people in the back country are deadly afraid of amphisbaenians and will stomp on their heads); all I could get was a count of mandibular teeth.

The skull of *Bronia*, as already stressed, is rather strongly bent. In *brasiliiana* there is a definite angle on the frontoparietal suture; in *B. bedai* the angle is less sharp, and the outline of the skull more evenly curved. The curvature results, in both species, in the tip of the snout reaching below the level of the base of the braincase.

In both species the front edge of the premaxilla projects, not much but noticeably, beyond the front edge of the nasals, forming a narrow rim, which reaches forward well in front of the central premaxillary tooth. The nasal cavity is broad, oblong. Premaxillary teeth are one median, largest, followed by a row of three on each side, the second one inserted a little inward from the others.

Maxillary teeth differ: in *brasiliiana* there are five, the first much larger than all other teeth, the others progressively decreasing; in *bedai* there are but three teeth, decreasing behind.

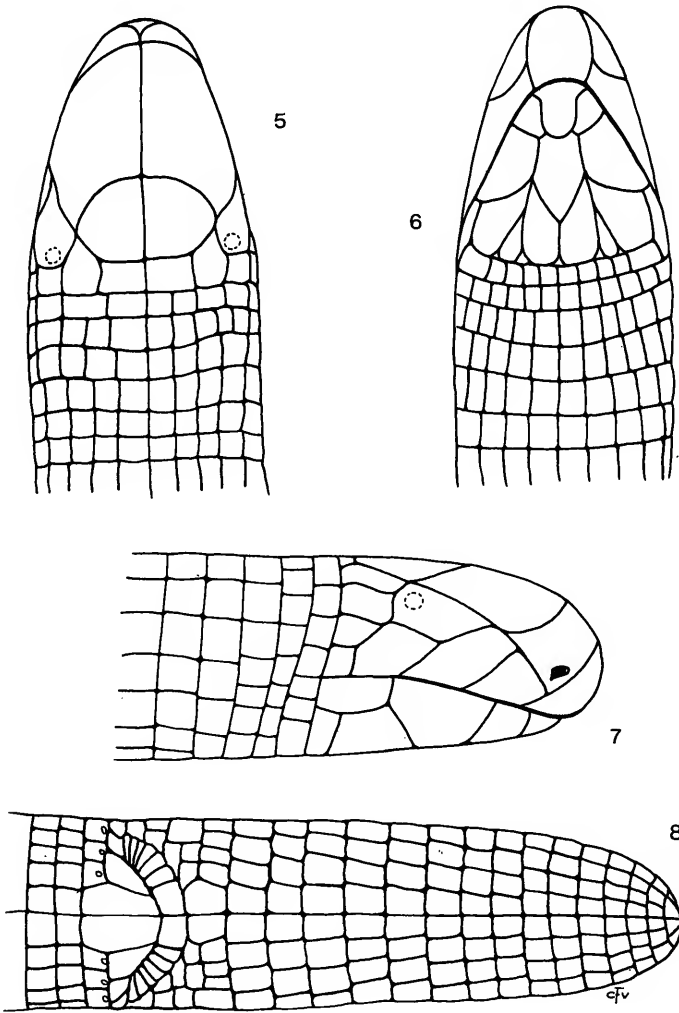
Mandibular teeth in *brasiliiana* are six: the anteriormost is procumbent, next come three very large ones, decreasing behind, then two small subequal teeth. In *bedai* there are seven teeth: the first is procumbent, the second, less so, next comes the largest tooth, which is erect, then four, decreasing. The mandibula of *B. kraoh* bears five teeth; the first is procumbent, the second, the largest, is erect, followed by three decreasing teeth, the second and third apparently closer together than the others.



Graph 1. Regression of tail length on body length, in mm.

DISTRIBUTION

Bronia brasiliiana (Map 1) occurs in eastern Amazonia, a not uncommon pattern of distribution. That the 12 specimens with definite locality come from this area makes it exceedingly probable that the pattern is real.



Figs. 5-8. *Bronia kraoh*, holotype, scutellation of head and tail.

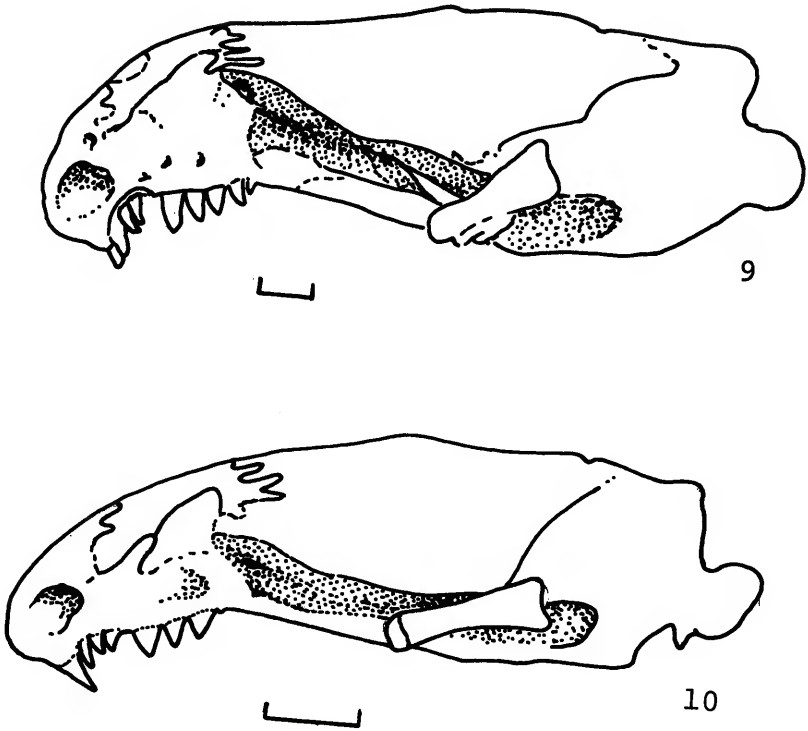


Fig. 9. *Bronia brasiliana*, MZUSP 378. Fig. 10. *Bronia bedai*, MZUSP 73314, paratype. Lateral views of the skull. Scale, 1 mm.

There is an interesting record (Sclater, 1880) from "Parahyba do Norte", at present the state of Paraiba. The specimen was not preserved, and Gans (1971) calls the record "questionable". That it certainly is, but I would hesitate in dismissing it too readily. There are many instances of eastern Amazonian species occurring in the northern Atlantic Forest. A herpetological example is the scincid lizard *Mabuya bistriata*. Among birds the curassow *Crax mitu* and, among mammals, monkeys of the genus *Alouatta* show this type of pattern. Paraiba has been reasonably well collected in recent years, and *Bronia* has not turned up, but collecting amphisbaenids is always a hazardous enterprise. The donor of the recorded specimen, W.A. Forster, certainly collected in northeastern Brasil: in the same issue of the Proceedings (Sclater, 1880: 713) he is noted as donating one specimen of *Leposternon grayi* from Pernambuco. I think the record must be kept in abeyance but not outright rejected.

The only locality of *Bronia kraoh* is in the core area of the cerrados (Ab'Saber, 1977), on the banks of the great Rio Tocantins. Cerrados typically include gallery forest and isolated wooded areas, so no generalization can be made.

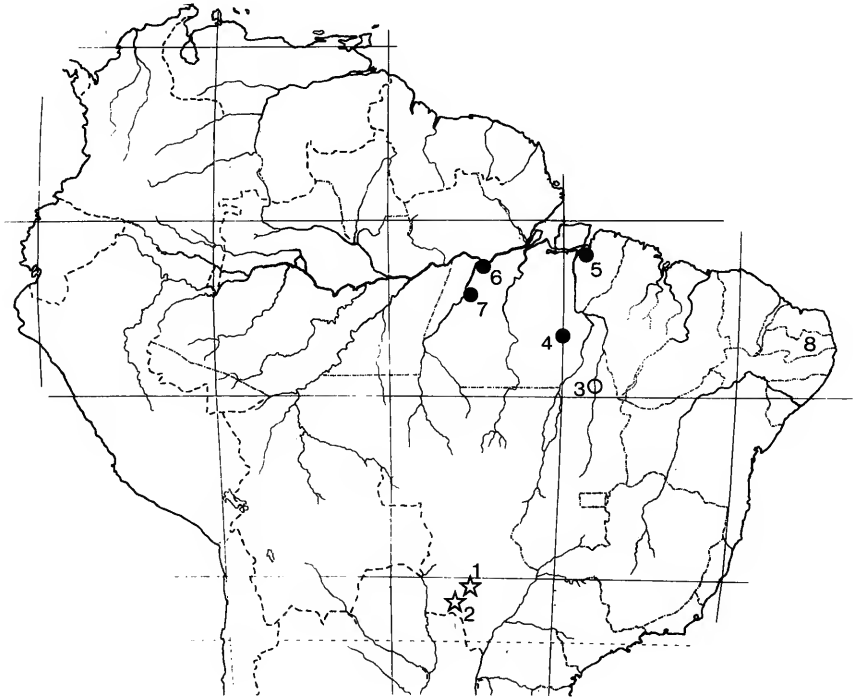
Finally, the three localities of *B. bedai* are in the pantanal of Mato Grosso. Aquidauana and Anastacio are on opposite banks of the Rio Aquidauana, a tributary of the Miranda, which runs into the Rio Paraguay. Guia Lopes da Laguna, a little to the south and west of Aquidauana, is on the

pantanal of the upper Miranda. "Pantanal" is a low area (a graben) of extensive yearly flooding, with fauna and flora of mixed and complex origin (Ab'Saber, 1988).

In the analysis of this pattern it must not be forgotten that the distributions of uncommon species of amphisbaenids are not ideal subjects; new collections may just as well corroborate as disprove precocious guesses. In the present case two major elements are to be discussed: the three species are allopatric; two of them are in open formations, the third in forest.

The latter is, on the surface, the more difficult case: ecologically vicariant distributions are not conducive to geographical speciation. In fact, an interface between open and forested formations may fluctuate and move all over the landscape, as the contrasting formations advance and retreat, but an interface it will always remain, with the attending opportunities for continued gene flow and so for the maintenance of a common gene pool. The only mechanism so far proposed to circumvent the difficulty is that of the "vanishing refuge" (Vanzolini and Williams, 1981).

This proposes (taking the forest environment as the primary one, but the reasoning is of course symmetrical) that as, during the dry leg of a climatic cycle, forests are reduced to refugia, some ecotonal populations of forest animals get progressively better adapted to open environments. Upon an eventual complete disappearance of the refugium, these populations would survive, stranded in the new environment — and would be geographically isolated from other survivors ensconced in standing refugia. This has been observed in some arboreal lizards (Vanzolini and Williams, loc. cit.), but never for fossorial species. However, the spotty distribution of most amphisbaenids, practically all but some



Map 1. Distribution of *Bronia*. *B. bedai*: 1, Anastacio and Aquidauana. 2, Guia Lopes da Laguna. *B. kraoh*: 3, Pedro Afonso. *B. brasiliiana*: 4, Carajás. 5, Belém. 6, Santarém and Taperinha. 7, Rio Cupari. 8, State of Paraíba.

wide ranging forms such as *Amphisbaena alba* (Gans, 1962; Vanzolini, 1968) and *A. fuliginosa* (Vanzolini, 1951), as well as the relationships of the small Amazonian forms with cerrado ones, afford indirect but suggestive support for such a scheme. I believe the dichotomy *brasiliensis* x (*bedai* + *kraoh*) can best be thus explained. The problem of one cerrado and one pantanal species is less amenable to analysis at present. The fauna of the pantanal has not been ecologically or zoogeographically studied — in fact it has not been fully listed yet. Besides, pantanal and cerrado are adjacent, interdigitating open formations, with many species in common. There are a few known endemic pantanal reptiles (*Dracaena paraguayensis*, *Eunectes notaeus*, e.g.), but none with cerrado vicariants. At present the differentiation of the two forms of open formation *Bronia* can be best explained by a straight refuge model — the isolation of open formation islands within a widespread forest ecosystem, such as must have existed during the recent contact between the hylaea and the Atlantic forest (Vanzolini, 1986). It should be said that the refuge model (as proposed by Haffer, 1969, and Vanzolini and Williams, 1970) is not time-limited, i.e., it is not restricted to the last glacial cycle or to the displacement of forests by open formations, but is supposed to operate whenever rapid and drastic climatic cycles are accompanied by parallel changes in plant cover, reflecting general ecology.

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