# Theclinae of Rondônia, Brazil: *Strymon* Hübner, with descriptions of new species (Lepidoptera: Lycaenidae)

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**Abstract:** Twenty-two species of *Strymon* are known from the vicinity of Cacaulândia in Rondônia, Brazil, of which 14 are new species. These belong to 5 species groups: the "*oreala*" group [*Strymon megarus* (Godart)]; the "*ziba*" group [*Strymon ziba* (Hewitson), *Strymon thulia* (Hewitson), *Strymon spinatus* new species, *Strymon latamaculus* new species, *Strymon pallidulus* new species, *Strymon tholus* new species]; "*valentina*" group [*Strymon rotundum* new species]; "*crossoea*" group [*Strymon crossoea* (Hewitson), *Strymon crambusa* (Hewitson), *Strymon germana* new species, *Strymon novasignum* new species, *Strymon clavus* new species, *Strymon implexus* new species, *Strymon inmirum* new species, *Strymon incanus* new species, *Strymon faunalia* (Hewitson), *Strymon halos* new species, *Strymon conspergus* new species, *Strymon bazochii* (Godart), *Strymon diagonalis* new species]; and "*eurytulus*" group [*Strymon bubastus* (Stoll)]. Tentative subgroups of species are suggested for the "*crossoea*" group as they occur in Rondônia. A neotype is designated for *Tmolus basilides* and the name synonymized with *Strymon megarus*. The "*basilides*" group of Johnson *et al.* (1990) is renamed the "*ziba*" group. Based on lectotype designations and superficial and genital differences, *S. ziba* and *S. thulia* are elevated to specific status.

**Key words:** Brazil, hairstreaks, Lepidoptera, Lycaenidae, *Strymon*, Theclinae, tropical.

## Introduction

This continues a series of papers on the Theclinae (Lepidoptera: Lycaenidae) from the vicinity of Cacaulândia in central Rondônia, Brazil (Austin and Johnson 1995, 1996). This region is partially disturbed typical lowland tropical rainforest with a strikingly seasonal climate (Austin and Johnson 1995, Austin *et al.*, ms) where about 4000 ha have been studied since 1989 (Emmel 1989, Emmel and Austin 1990). The butterfly fauna of over 1700 recorded species (Austin *et al.*, ms) is the richest known. In this paper we discuss the genus *Strymon* Hübner.

This investigation reemphasizes the importance of careful study of large local samples in elaborating the diversity of Neotropical faunas of Eumaeini. Central Rondônia is particularly rich in *Strymon* species, well above that known for other local Neotropical regions which represent a range of areas sampled and ecological and topographical diversity.

## Methods and Materials

We treat previously described and new species using species groups modified after those erected by Johnson *et al.* (1990) and conforming to those in a forthcoming treatment of the *Strymon* of Colombia (LeCrom and Johnson 1997). This new species group scheme, defined here by combinations of wing and genitalic characters of both sexes, has been badly needed to embrace the increased diversity now recognized in *Strymon* and can serve as a baseline for consistency in future studies of the genus. Johnson and Kroenlein (1993) have referred to the entire worldwide monophyletic group, of which *Strymon* is a part, as the infratribe "Strymonina", and we will use this term in discussion as appropriate. Consistent with the above studies, we use DFW/DHW and VFW/VHW for dorsal fore- and hindwing and ventral fore- and hindwing, respectively. For well known species, we incorporate ranges of FW length from the larger samples treated by Johnson *et al.* (1990). We refer to the usually prominent cluster of androconial (= pheromonal) scales on the male DFW of some *Strymon* species as the "brand" consistent with long-term common usage and Eliot (1973). Numbers associated with types and other specimens refer to genitalia vial numbers. Type localities are considered to be the locality of capture of the holotype.

Wing characters of *Strymon* are extremely divergent. In fact, Johnson and Kroenlein (1993) called special attention to species that would not be readily associated with the genus except by genitalia. Dorsal surfaces range from brightly iridescent

blue to concolorous gray or brown, brands on males occur differently, and ventral wing markings include lineate and spotted bands as well as cryptic patterns. Thus, genitalia are particularly important in recognizing and distinguishing members of the genus. In the taxonomic entries, the phrase "typical of the genus" refers to the genital habitus of *Strymon* described in Johnson *et al.* (1990, 1992a) and Johnson and Salazar E. (1993). We have found the female genitalia of *Strymon* to be particularly diagnostic in defining species groups and often to have the most useful characters for distinguishing taxa. The form of the ductus bursae and its juncture with the corpus bursae are especially instructive. Although most groups of Theclinae have a relatively straight ductal tube, the ductus bursae of all examined *Strymon* exhibits some modification towards its anterior end. We describe and categorize the several configurations of the ductus bursae of the *Strymon* treated here to standardize description and facilitate discussion of these structures as follows:

1) deflexed (Figs. 51-56; also Figs. 14, 15 in Johnson *et al.* 1990): The ductus bursae curves slightly to moderately ventrad and then dorsad before the cervix bursae. On many such species, the ductus is also twisted (up to a half turn) at or near the deflexion. All species examined with a deflexed ductus bursae also have a prominently sclerotized hood-like structure at the cervix bursae.

2) sigmoidal (Figs. 57-59; also Fig. 17 in Johnson *et al.* 1990): The ductus bursae is twisted with prominent curves both laterad and ventrad and appearing "S"-shaped in both lateral and ventral views.

3) horizontally looped (Figs. 60-66; also Figs. 16, 18 in Johnson *et al.* 1990): The ductus bursae is curved back on itself in a horizontal plane parallel to the venter of the abdomen and appears as a loop in ventral view and as an extreme sigmoidal in lateral view.

4) vertically looped (Fig. 67; also Fig. 27 in Johnson *et al.* 1990): The ductus bursae is curved back on itself in a vertical plane parallel to the sides of the abdomen and appears as a loop in lateral view and as an extreme sigmoidal in ventral view.

Other useful characters of the female genitalia include modification of the cervix bursae, modification of the caudal end on the corpus bursae, and the shape of the lamellae, especially in ventral view. These characters have shown particular utility in differentiating *Strymon* species which show either complex orbiculate wing patterns (as in some of the members of the "*crossoea*" group which morphology shows to be far more diverse than anticipated) or peculiar ventral wing patterns (as shown by *S. bazochii* or *S. crambusa* which might be of unclear phylogenetic affinity without reference to morphology).

Male genitalia of *Strymon* are characterized by their long and narrowly tapered valvae, but do not usually show obvious differentiating features as seen on the genitalia of females. Such features as length and robustness of the valvae; orientation, length, and shape of the saccus; shape of the vinculum; and length and shape of the aedeagus are useful characters. These are often difficult to interpret without comparative material. In the present paper, consistent with cited prior treatments of *Strymon*, male genitalia are illustrated both ventrally and laterally. The ventral view assesses overall genital symmetry (which varies between *Strymon* species groups) along with valval shape (which is distinctly sculptured in some groups). The lateral view emphasizes differences in dorsal shape of the vinculum where brush organs attach in many species. Since characters of females are more obvious than those of males and more useful in distinguishing species, this sex is designated as the holotype of new species in many instances.

Males and females of a species were associated largely by the near identity of their ventral patterns. Due to the many superficially similar species of *Strymon* encountered, this method, however, may not be infallable. Whenever there was doubt on the correct association of the sexes, we used only one sex as types to avoid potential future taxonomic problems. In these cases, specimens of the presumed opposite sex are listed as additional material. Collections of pairs in copula and rearing series from individual females will eventually allow unequivocal association of males and females.

In our study of the *Strymon* of Rondônia, we have been further guided by results of a companion study by us involving elaboration of all new Neotropical *Strymon* species noted in collections surveyed or supplied by other curators or field workers. This parallel effort has provided significant insight into the consistency of characters among various assemblages of *Strymon* and the geographic distributions of such characters. It has also given us confidence in the validity of describing as species entities which, despite appearing similar in a general array of superficial characters, exhibit distinctive genitalia in both sexes, unique secondary sexual characters, and consistently occurring unique char-

acters among various details of the dorsal and ventral wing patterns. In this regard, we are particularly grateful to workers who have called our attention to biological data paralleling such distinctions. Such biological distinctions lead us to believe that it is more likely than not that entities so defined will prove, in the long run, to represent reproductively distinct species.

Voucher specimens from this study are to be deposited as follows: primary types and other specimens — Departamento de Zoologia, Universidade Federal do Paraná, Curitiba, Brazil (UFPC); paratypes and other material — American Museum of Natural History (AMNH), The Natural History Museum (London) (NHM), and the Nevada State Museum (NSM).

### *Strymon* Hübner

*Strymon* is one of the largest of the Eumaeini genera, with some 50 Neotropical species critically examined and now associated (Schwartz and Miller 1985, Johnson and Matusik 1988, Johnson *et al.* 1990, Smith *et al.* 1991, Johnson and Salazar E. 1993, Johnson and Kroenlein 1993). Fortunately for the purposes of the present paper, much of the type material for Neotropical *Strymon* and the closely allied *Eiseliana* Ajmat de Toledo and *Heoda* Johnson, Miller, and Herrera has been reviewed (Johnson *et al.* 1990, 1992a, 1992b; Johnson and Salazar E. 1993; Johnson and Kroenlein 1993, and studies in progress involving the present authors). Twenty-two species of *Strymon* were encountered in central Rondônia of which fourteen represented undescribed species. Herein, we review this fauna and describe the new taxa.

### *Tmolus basilides* and associated taxa

The identity of *Tmolus basilides* Geyer [1837] has been a long-standing nemesis to students of Neotropical Eumaeini. The type is not known to be extant, and the original editions of Hübner's 1832-1837 "Zuträge zur Sammlunge exotischer Schmetterlinge" (in which the description attributed to Geyer appears, with a hand-colored illustration) are difficult to locate. Johnson *et al.* (1990) pointed out that a diverse assemblage of phenotypes had been included with the name. They attempted to resolve this with the identification of a species from Argentina with a hooded cervix bursae as *Tmolus basilides* and defined a species group with similar morphology as the "*basilides*" group. Our studies indicated that this was incorrect and only further complicated the confusion. This issue needs to be addressed once again in conjunction with our studies of *Strymon* from Rondônia. Through the courtesy of rare book archivists at the AMNH library, we were able to examine an original edition of Geyer [1837] including an original hand-colored plate of *T. basilides* and compare this to type specimens of two putative synonyms (Bridges 1988): *Thecla ziba* Hewitson 1868 and *Thecla thulia* Hewitson 1868. Our resolution of this problem, based upon designation of a neotype for *T. basilides* and lectotypes of *T. ziba* and *T. thulia* follows below in our discussions of the "*oreala*" and "*ziba*" groups of *Strymon*.

### "*oreala*" group

### *Strymon megarus* (Godart)

Fig. 1

*Polyommatus megarus* Godart [1824].

*Tmolus basilides* Geyer [1837], **new synonymy,** neotype designated below.

*Strymon megarus*: Johnson *et al.* 1990.

**Diagnosis.** Wings. Medium in size (11-14.5 mm); male dorsum black with prominent bright blue basad on FW and on posterior half of HW; FW with relatively prominent black brand; HW with 2 tails; female gray without blue; venter of both sexes tan with prominent postmedian and postbasal orbicular macules on HW. Morphology. Male and female genitalia illustrated by Johnson *et al.* (1990); female distinguished from superficially similar "*ziba*" group species by the vertically looped ductus bursae without cervical hood.

**Remarks.** Characters and Affinities. This species was discussed and illustrated by Johnson *et al.* (1990). This is the only relatively large species of *Strymon* encountered in central Rondônia with prominent blue on both the DFW and DHW. The single male known from the area is virtually identical to that illustrated by Johnson *et al.* (1990). The female, without blue, superficially resembles females of the following "*ziba*" group, but is recognizable by the looped ductus bursae and lack of a hooded cervix bursae. Types. Type information for *S. megarus* was presented by Johnson *et al.* (1990) and Johnson (1991), but, as noted above, the identity of *Tmolus basilides* had historically remained unresolved. The type of *T. basilides* (and indeed much of the material representing Geyer's smaller butterfly taxa) is considered lost (Miller and Brown 1981, P. Ackery, *in litt.* to the present authors,

1995). Determination of the identity of *T. basilides* and designation of a neotype is crucial to *Strymon* taxonomy for at least three reasons: (1) previous views of it have proven incorrect vis-a-vis its original description, (2) a number of superficially similar phenotypes have historically been associated with the name, and (3) these phenotypes actually represent a number of distinctive species each requiring either proper association with historical names or descriptions as new species. Johnson *et al.* (1990) considered *T. basilides* to be one of the species with a deflexed ductus bursae and a hooded cervix bursae, including one such phenotype from Argentina. Examination of the figures of *T. basilides* accompanying its original description (which illustrated a male) indicated an insect virtually identical with *Strymon megarus*. Specimens matching this phenotype were found among the holdings of the American Museum of Natural History and the genitalia of both sexes are as shown for *S. megarus* by Johnson *et al.* (1990). We thus designate a male in the collection of the American Museum of Natural History as the neotype of *Tmolus basilides* Geyer [1837]. This specimen has the following labels: "Rolandia, IV 48" [Brazil: Paraná; Rolandia, coll. Mahler]. An appropriate label will be added to its pin. *Tmolus basilides* Geyer [1837] thus falls into synonymy with *S. megarus*.

The name *Strymon basilides* has been used in numerous regional works (*e.g.*, Lamas 1983, de la Maza *et al.* 1989, Johnson *et al.* 1990, Emmel and Austin 1990, and numerous others). These designations must be viewed as suspect until specimens upon which the determinations were based are critically examined. Any one or more of a number of superficially similar (or dissimilar) species may have been involved. Similarly, the identifications of those butterflies feeding as larvae on various monocots (*e.g.*, Robbins and Aiello 1982 and several citations therein) remain unknown. Robbins and Aiello (1982) recognized the existence of sibling species of *S. "basilides"* and their material from Panama was attributed to a species "clearly" with "a close relationship with *melinus* Hbn." based on behavior and genital morphology of both sexes. This indicates a species having a looped or sigmoidal ductus bursae and no "hood" on the female genitalia. Thus those specimens are not of the *"ziba"* group (see below), but of the *"oreala"* or other species group. The species considered to be *S. basilides* by Johnson *et al.* (1990) is obviously not of this concept, but was an undescribed species of the *"ziba"* group. In the interest of resolving as quickly as possible matters involving the misidentification of *Strymon basilides*, this problem pertaining to the Argentine fauna is being treated simultaneously by Johnson *et al.* (in press).

Previously in common usage, the name *T. basilides* was widely used for any entity with both sexes gray or gray-brown above and with macules occurring across the postbasal area of the ventral hindwing. This generalization not only led to a number of species (of both the *"ziba"* and the *"oreala"* groups) being misidentified as *T. basilides* but apparently accounts for the frequent misspelling of this latter name as *"basalides"* (as in "post*basal*" [emphasis ours])(Bridges 1988, see also comments by Robbins and Aiello 1982).

**Distribution in study area.** A single male (GTA #5853) was taken on 18 September 1994 at Linha C-10, 5 km S of Cacaulândia.

### *"ziba"* group

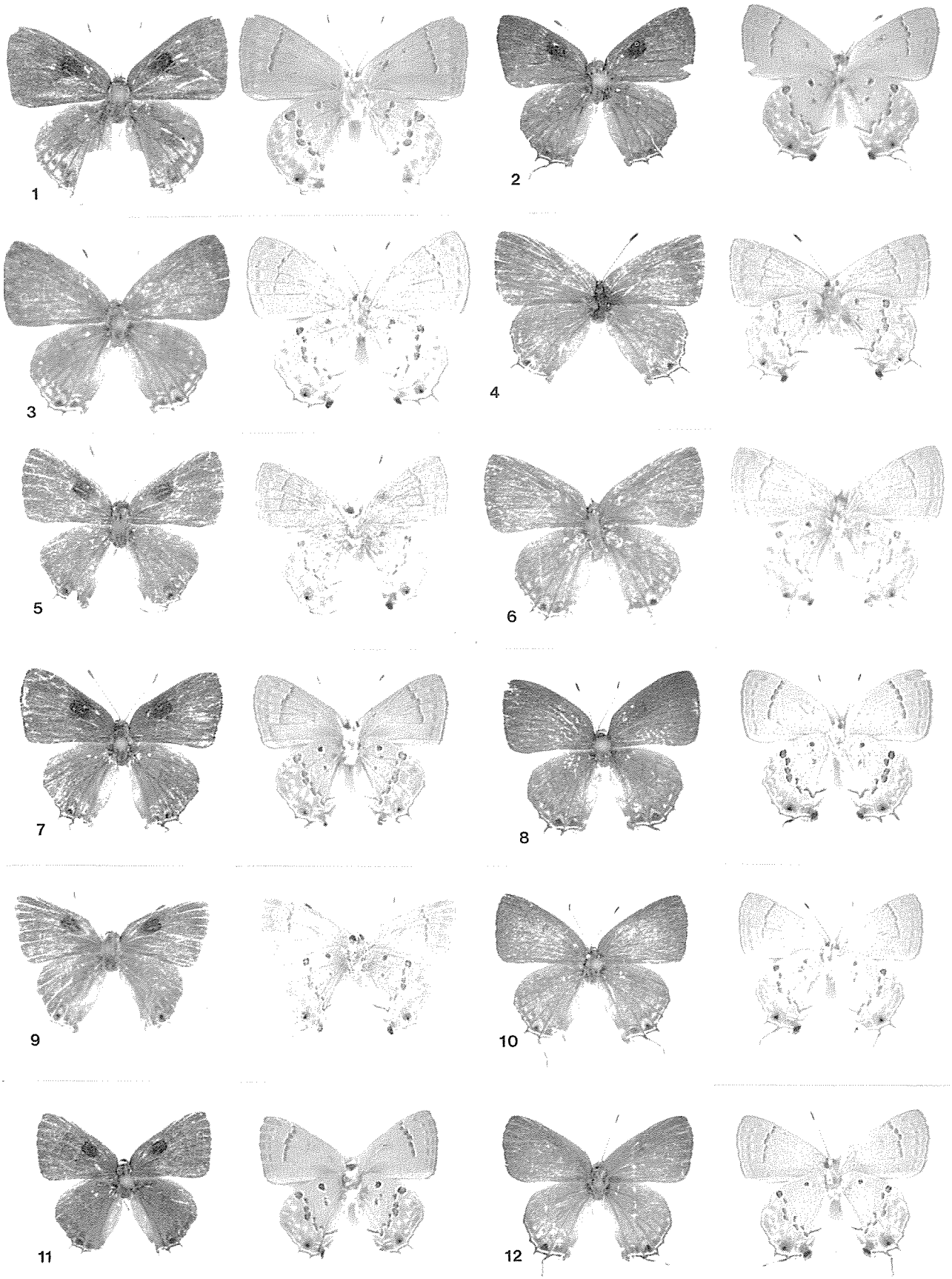
Our studies showed that *Tmolus basilides* Hewitson 1868, does not refer to a species with a hooded cervix bursae (see above under *"oreala"* group). The *"basilides"* group of Johnson *et al.* (1990) is therefore renamed here as the *"ziba"* group after the apparently first named species with a hooded cervix bursae; this character readily distinguishes the group. The species of this group lack dorsal structural color, but their ventral wing pattern resembles that of the *"oreala"* group.

### *Strymon ziba* (Hewitson), revised status

Figs. 2, 3, 38, 51

*Thecla ziba* Hewitson 1868. TL: unknown; lectotype female in NHM designated here, labeled "Hewitson Coll. / 79-69 / Thecia ziba 4.", "ziba", "thulia", "R. 1953 / N. H. B. / 1076", "Type", "B.M. TYPE / No. Rh. 1028."

**Figs. 1-12 (facing page).** *Strymon "oreala"* and *Strymon "ziba"* groups. All from Brazil: Rondônia; vicinity of Cacaulândia, dorsal surface on left and ventral surface on right. Fig. 1. *Strymon megarus*, male, 18 Sept. 1994; Fig. 2. *Strymon ziba*, male, 20 Nov. 1995; Fig. 3. *S. ziba*, female, 25 Apr. 1995; Fig. 4. *Strymon thulia*, female, 16 Nov. 1991; Fig. 5. *Strymon spinatus*, male, 17 Apr. 1995; Fig. 6. *Strymon spinatus*, holotype female; Fig. 7. *Strymon latamaculus*, male, 1 May 1995; Fig. 8. *Strymon latamaculus*, holotype female; Fig. 9. *Strymon pallidulus*, male, 15 Nov. 1991; Fig. 10. *Strymon pallidulus*, holotype female; Fig. 11. *Strymon tholus*, male, 3 Mar. 1994; Fig. 12. *Strymon tholus*, holotype female.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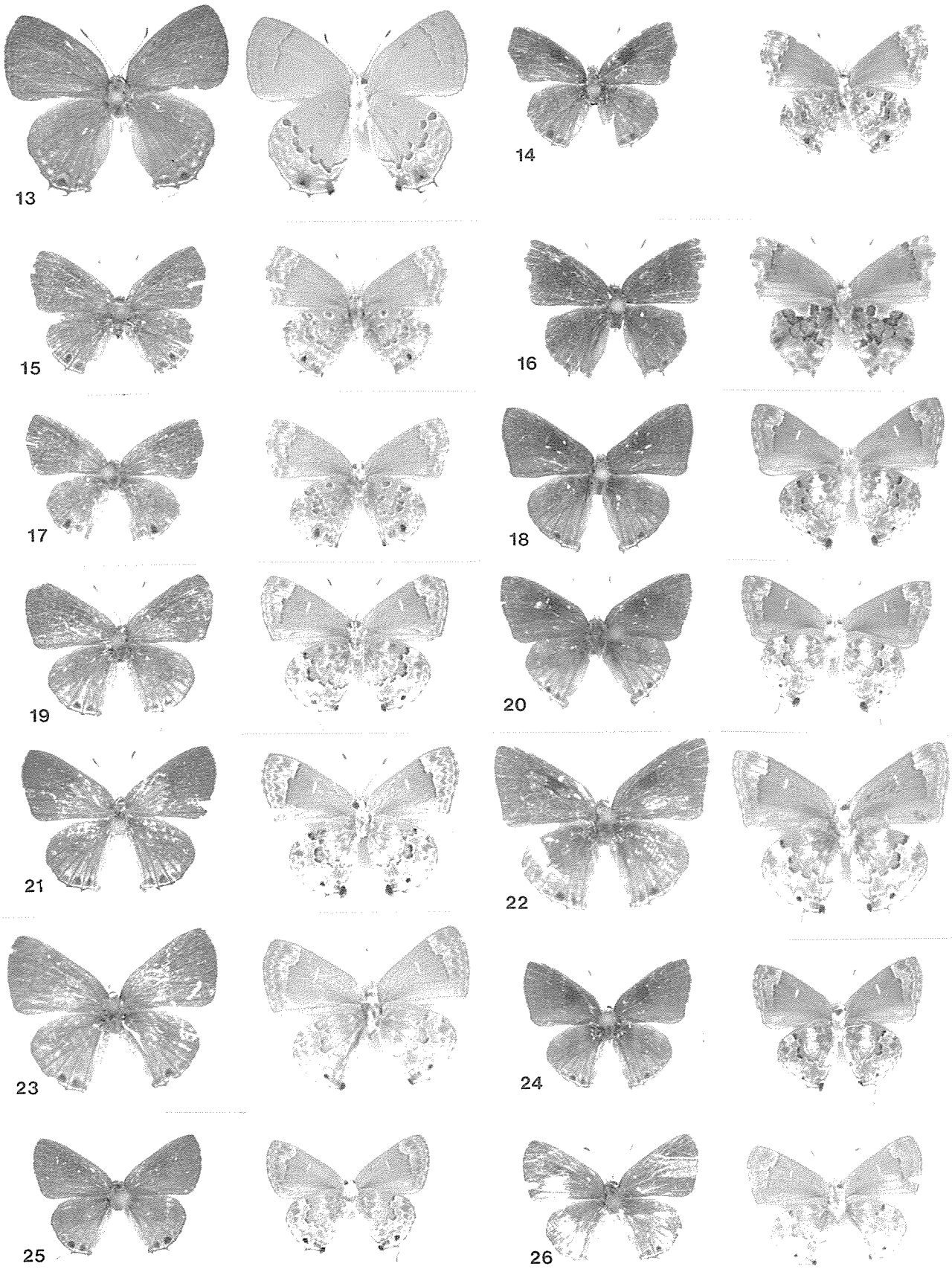
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**Diagnosis.** Wings. Medium in size (male FW length = 12.9 mm [11.6-13.7, N = 4], female FW length = 14.0 mm [13.0-15.8, N = 7], sample from Rondônia, Brazil, FW length of lectotype = 15 mm) with 2 HW tails and little sexual dimorphism aside from size and absence of brand on female (females with broader and more rounded wings than males). Wing upper surface dark gray on both sexes, male FW with large black (2.5 mm) oblong brand. HW with small (male) or medium-sized (female) orange "thecla-spot". Ventral surface medium gray-tan, crossed on HW with postbasal and postmedian series of orange orb-like macules; very similar to other species of "*ziba*" group, ventral ground color somewhat darker with VHW submarginal pale macules distinctly contrasting, best distinguished by female genitalia (see below). Morphology. Male genital capsule slender, angled; saccus broad; valvae short; aedeagus stout, relatively short; female genitalia with slender and twisted ductus bursae deflexed before robust hood at cervix bursae.

**Description.** Male. FW termen slightly convex; dorsal color dark gray; FW uniform except for large (2.5 mm), oblong, and prominent black brand; HW with small "thecla-spot" crescent-shaped dull orange macule over vague black macule; vague blue-white submarginal macules in $M_2$ and/or $M_3$ and $CuA_2$; anal angle red-brown margined proximad with white; white marginal line from $M_3$ or $CuA_1$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter gray-tan; FW with very vaguely darker marginal and somewhat more prominent submarginal macules, latter vaguely edged proximad and distad with white; postmedian band tripartite (white distad, black, orange; orange as broad as white and black combined), extending to $CuA_2$ as variously offset bars; vague (or absent) chevron-shaped mark in $CuA_2$; HW with similarly-colored postmedian band, orange redder, anterior 4 macules orb-like, first especially broad, more or less in straight line, postmedian line becoming irregular posteriorly; "thecla-spot" bright red-orange with triangular black pupil, red-orange margined proximad with orange; anal angle red-orange divided by white slash, margin with relatively large black circular macule; submargin with macules vaguely darker than ground color outlined proximad and distad with white; postbasal orbs near base of $Sc+R_1$ and in mid discal cell (occasionally doubled), black with vague deep red-orange distad and nearly completely encircled with white. Female. Similar to male, no brand, somewhat paler gray, bright orange "thecla-spot" larger, wings broader and more rounded; venter slightly paler gray, markings similar. Male Genitalia. Overall genital capsule relatively slender for genus, gradually expanding caudad from broad parabolic saccus of moderate length; vinculum angled as typical of "*ziba*" group; valvae relatively short and slender with ellipitical bilobes and thinly tapered, somewhat inwardly recurvate caudal extensions only slightly longer than bilobes, aedeagus short (only about 20% longer than genital capsule), stouter than usually seen in other groups of *Strymon*, caecum arched and comprising nearly 1/3 aedeagus length, shaft straight with robust cornuti in terminal 1/4. Female Genitalia. Ductus bursae moderately deflexed, rather robust caudad, very thin at deflexion, tubular, and elongate, prominently twisted (*ca.* 90°) before recurvate cephalad after which joining centro-ventral surface of robust sclerotized hood, hood exceeding 1/3 length of rest of genital capsule, broadest cephalad, narrowing gradually caudad before curving ventrad to narrow caudal projection, lamellae prominent, ellipitical, pointed caudad, and separated by wide central fissure; corpus bursae bulbous with pair of moderately-sized signa typical of genus; apophysis papillae anales elongate, extending anteriorly to beyond mid-point of cervix bursae hood.

**Remarks.** Characters and Affinities. *Thecla ziba* has either been considered synonymous with *S. basilides* (*e.g.*, Bridges 1988) or as a name in common usage for several phenotypes of gray Neotropical *Strymon* with red orbicular ventral macules (*e.g.*, Lamas *et al.* 1991). As discussed fully above (under *S. megarus*), *S. basilides* refers to a phenotype with dorsal blue and a cervix bursae without a hood. The *S. basilides* of Johnson *et al.* (1990) is not *Tmolus basilides* Hewitson, but refers to a species of the "*ziba*" group with a hooded female cervix bursae. Types. Material from Rondônia (upon

**Figs. 13-26 (facing page).** *Strymon* "*valentina*" and *Strymon* "*crossoea*" groups. All from Brazil: Rondônia; vicinity of Cacaulândia, dorsal surface on left and ventral surface on right. Fig. 13. *Strymon rotundum*, holotype female; Fig. 14. *Strymon crossoea*, male, 20 Oct. 1989; Fig. 15. *Strymon crossoea*, female, 27 Oct. 1990; Fig. 16. *Strymon crambusa*, male, 3 Nov. 1989; Fig. 17. *Strymon germana*, holotype female; Fig. 18. *Strymon novasignum*, male, 5 Oct. 1994; Fig. 19. *Strymon novasignum*, holotype female; Fig. 20. *Strymon clavus*, male, 22 Nov. 1991; Fig. 21. *Strymon clavus*, holotype female; Fig. 22. *Strymon implexus*, male, 31 Aug. 1993; Fig. 23. *Strymon implexus*, holotype female; Fig. 24. *Strymon inmirum*, male, 5 Aug. 1993; Fig. 25. *Strymon inmirum*, holotype female; Fig. 26. *Strymon incanus*, holotype female.

which the above detailed description is based) is virtually identical in wing characters (photograph examined) and genitalic characters (slide examined) with the type of *Thecla ziba*. The above designated lectotype in the NHM has the following additional label added: Lectotype / *Thecla ziba* Hewitson / designated by / Austin and Johnson 1995.

**Distribution in study area.** This is one of the commoner species of *Strymon* in the vicinity of Cacaulândia, with records from April, May, and early July to late November (GTA #4982, 5054, 5055, 5057-5061, 5064, 5236, 5997-5999, 6211).

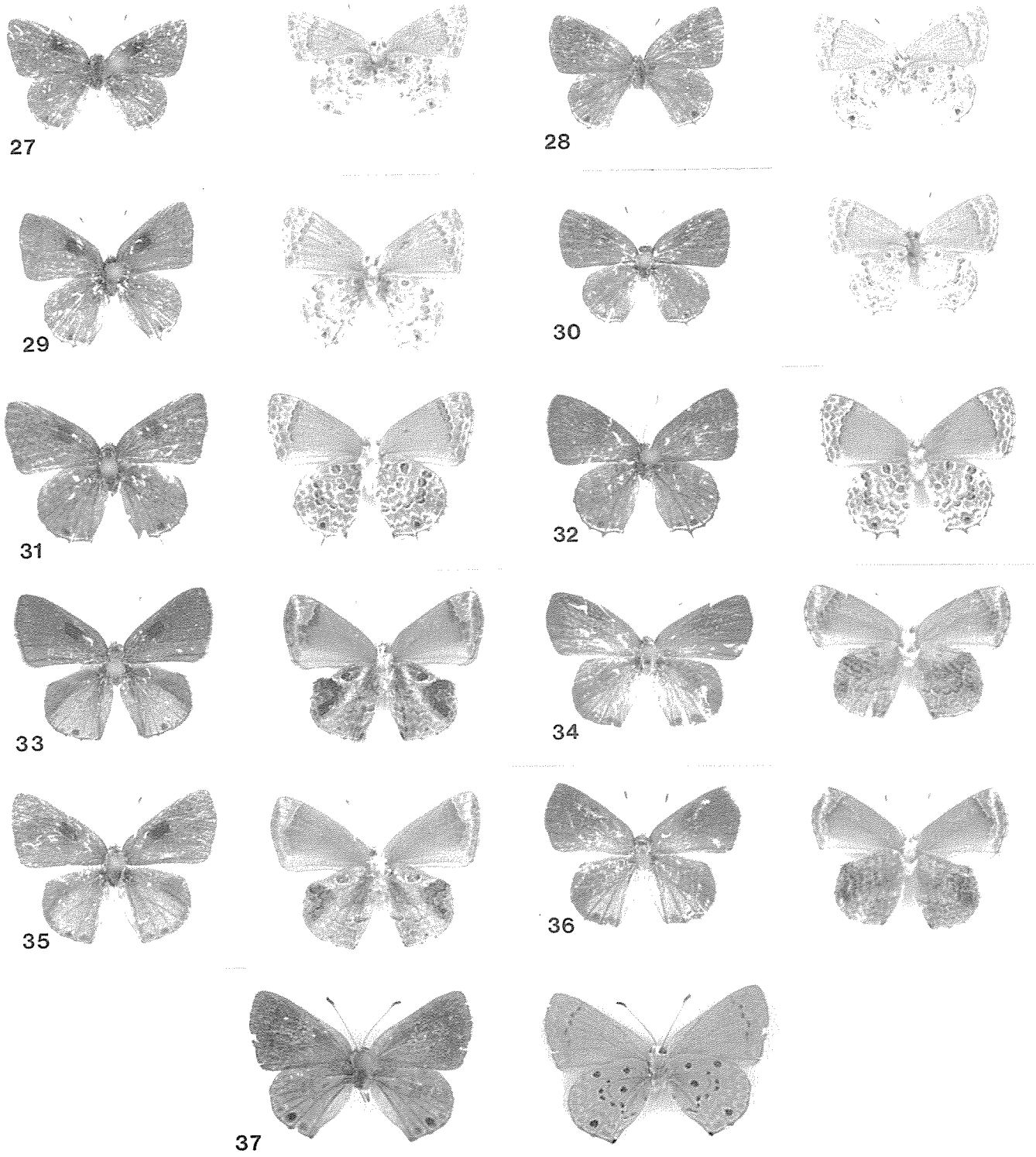
### *Strymon thulia* (Hewitson), revised status

Figs. 4, 39, 52

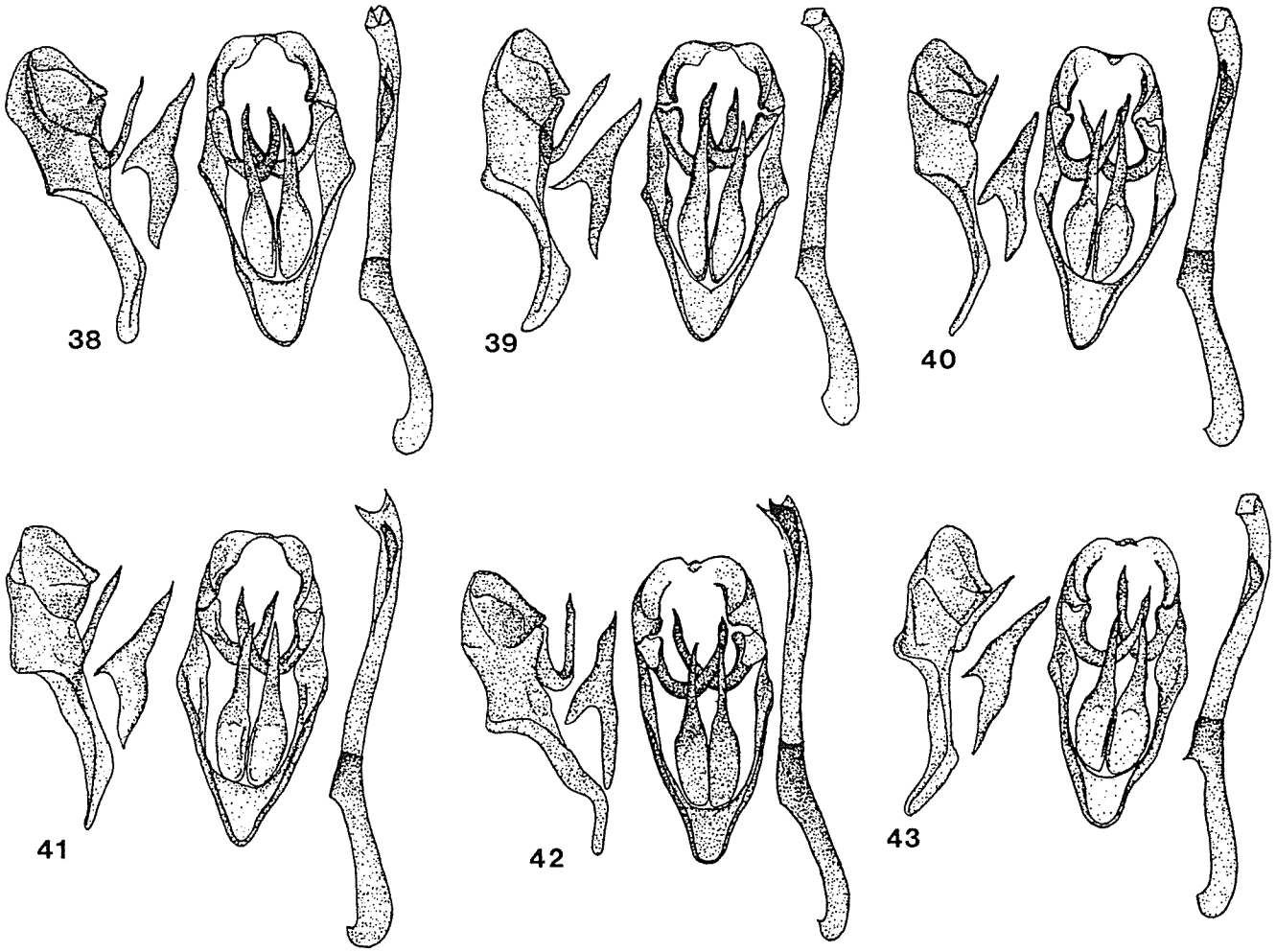
*Thecla thulia* Hewitson 1868. TL: Amazons; lectotype female in NHM designated here, labeled "Godman-Salvin / Coll. 1912-23 / B.C.A. Lep. Rhop. / Thecla / basilides / Geyer", "Amazons / H. W. Bates", "ziba", "R 1953 / N. H. B. / 1078", "B.M. TYPE / No. Rh. 1078", "Type", "B".

**Diagnosis.** Wings. Medium in size (female FW length = 12.7 mm; male FW length = 14.5 mm, sample from Ecuador; FW length of lectotype female = 13.5 mm) and prominently tailed; similar to other "*ziba*" group species; dorsal ground dark gray; male FW with prominent, large black brand; HW with small "thecla-spot", orange over vague black macule; vague blue-white submarginal macules on either side of "thecla-spot"; ventral ground gray-tan; wings with tripartite postmedian lines, that on FW as quadrate macules, that on HW as broad, subquadrate macules anteriorly; 2-4 postbasal orange macules. The anterior macules on the VHW are more prominent and orbicular on *S. ziba*. Overall wing pattern on *S. thulia* might be confused with that of the Argentine endemic *Strymon diaguita* (Hayward) from black and white photographs or by those unfamiliar with the latter first-hand. The taxa are easily distinguished by the genitalia and *S. diaguita* is ventrally of a far "browner" habitus than any of its northern congeners (see Remarks). Morphology. Genital capsule of male rather robust, vinculum strongly angled in ventral and lateral views, saccus short and broad, valvae relatively short for "*ziba*" group, but broad in lateral view; female genitalia with hood less robust than on *S. ziba* and in horizontal plane, ductus bursae relatively short, prominently twisted. The male is distinguished from *S. ziba* and the superficially similar *S. diaguita* by strongly angulate vinculum and short valvae; females differ by more slender ductus bursae and less robust cervix bursae.

**Description.** Male. FW termen slightly convex; dorsal color dark gray; FW uniform except for large (2.5 mm) and prominent black brand; HW with small "thecla-spot" crescent-shaped orange macule over oval black macule; vague blue-white submarginal macules in $M_2$, $M_3$, and $CuA_2$; anal angle red-orange; white marginal line from $M_3$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter gray-tan; FW with vaguely darker submarginal macules, these vaguely edged distad and proximad with whitish; postmedian band tripartite (white distad, black, orange; orange very broad), macules quadrate especially anteriorly, extending to $CuA_2$ as offset bars; vague mark in $CuA_2$ anteriorly; HW with similarly-colored postmedian band, anterior 4 macules orb-like, first offset distad, line irregular posteriorly; "thecla-spot" small, red-orange and orange with oval black pupil; anal angle red-orange divided by white slash, margin with black circular macule; submargin with macules very vaguely darker than ground color outlined proximad (broadly) and distad (narrowly) with whitish; postbasal orbs near base of $Sc+R_1$, mid discal cell (doubled), and base of $CuA_2$ forming curved line, orange with some marginal black and encircled vaguely with white. Female. Similar to male, no brand, slightly paler gray, wings broader and more rounded; venter as on male, postbasal macules only at costa and one in discal cell. Male Genitalia. Overall genital capsule relatively broad; vinculum strongly angled in both ventral and lateral views; saccus short and broad, nearly symmetrical; valvae broad laterad, relatively short and slender with ellipitical bilobes and thinly tapered caudal extensions about same length of bilobes in ventral view; aedeagus stout, of medium length (about 1.4x genital capsule length), caecum slightly arched and 30% aedeagus length, shaft recurved at caudal end, robust cornuti in terminal 1/4. Female Genitalia. Ductus bursae prominently deflexed, rather short and slender, prominently twisted (*ca.* 90°) before deeply recurvate cephalad, joining centro-ventral surface of robust sclerotized hood; hood in horizontal plane, of about equal width throughout, narrowing abruptly caudad with pointed and upcurved caudal projection at attachment of ductus seminalis; lamellae broader than ductus bursae, ellipitical, and separated by narrow central fissure; corpus bursae bulbous with pair of moderately-sized signa typical of genus; apophysis papillae anales short, not extending anteriorly to mid-point of hood.



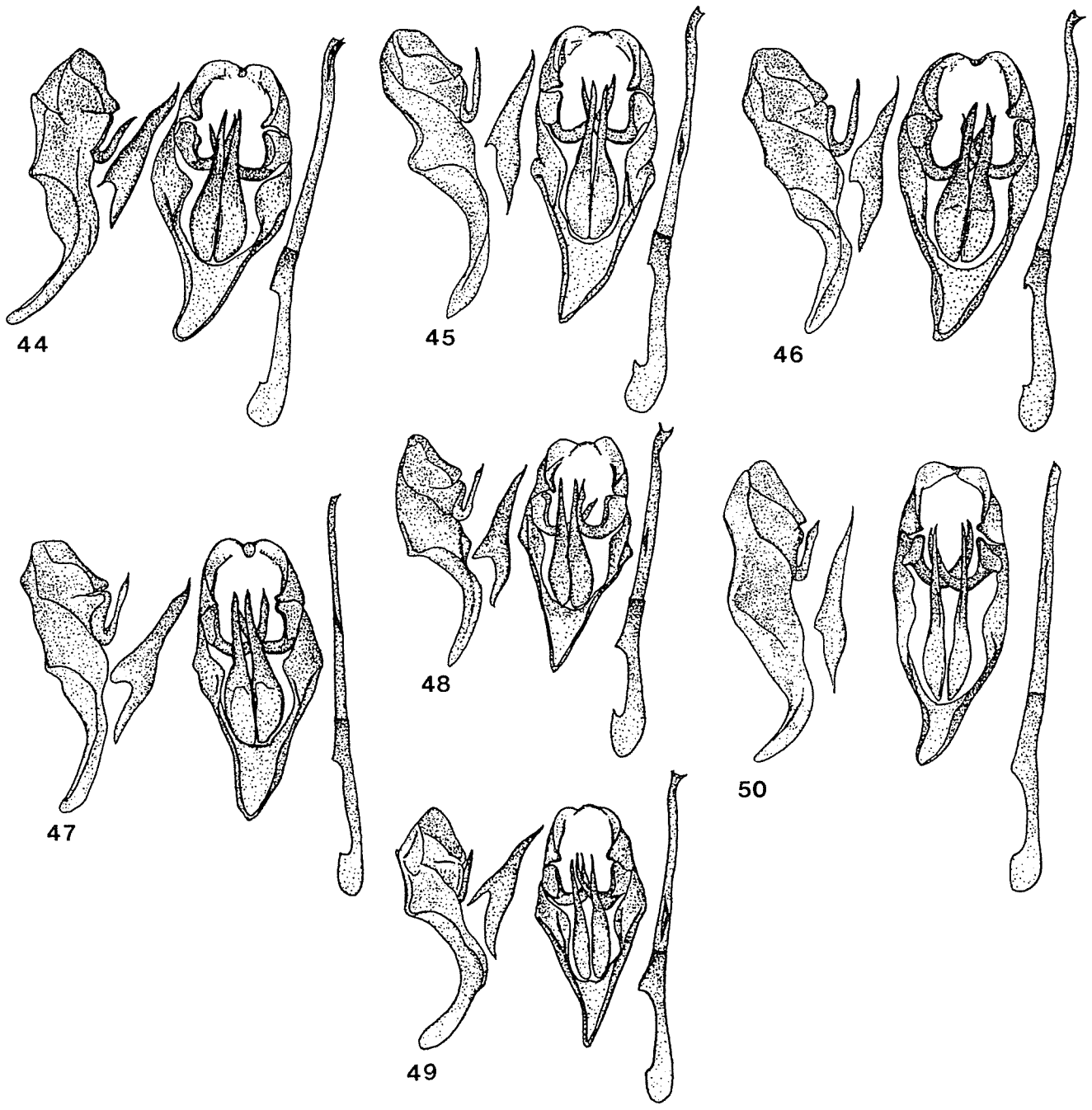

**Figs. 27-37.** *Strymon "crossoea"* and *Strymon "eurytulus"* groups. All from Brazil: Rondônia; vicinity of Cacaulândia, dorsal surface on left and ventral surface on right. Fig. 27. *Strymon faunalia*, male, 26 Oct. 1990; Fig. 28. *Strymon faunalia*, female, 21 Oct. 1989; Fig. 29. *Strymon halos*, holotype male; Fig. 30. *Strymon halos*, female, 12 Nov. 1991; Fig. 31. *Strymon conspergus*, holotype male; Fig. 32. *Strymon conspergus*, female, 15 July 1994; Fig. 33. *Strymon bazochii*, male, 3 July 1994; Fig. 34. *Strymon bazochii*, female, 4 Apr. 1993; Fig. 35. *Strymon diagonalis*, holotype male; Fig. 36. *Strymon diagonalis*, female, 16 June 1994; Fig. 37. *Strymon bubastus*, female, 2 Nov. 1989.




**Figs. 38-43.** Male genitalia of *Strymon "ziba"* group including lateral view of genital capsule with valva detatched and aedeagus removed, ventral view of genital capsule with aedeagus removed, and lateral view of aedeagus. Fig. 38. *Strymon ziba*, Brazil: Rondônia (GTA #5054); Fig. 39. *Strymon thulia*, Ecuador, Pichincha (GTA #4799); Fig. 40. *Strymon spinatus*, Brazil: Rondônia (GTA #6001); Fig. 41. *Strymon latamaculus*, Brazil: Rondônia (GTA #6000); Fig. 42. *Strymon pallidulus*, Brazil: Rondônia (GTA #6089); Fig. 43. *Strymon tholus*, Brazil: Rondônia (GTA #6002).

**Remarks.** Characters and Affinities. This species with quadrate postmedian macules on the FW is reminiscent, particularly in black and white photographs, of *S. diaguita* known from Argentina. The genitalia of both sexes, however, are very different (male of *S. thulia* with a prominently angled vinculum and short valvae, female with a twisted and slender ductus bursae). The junior author (who has collected *S. diaguita* in numbers) would have not considered these species similar. The overall character of the ventral colors of *S. diaguita* is brown and, in more pallid or worn individuals, confusion might result with members of the temperate South American "*eremica*" group of *Strymon* (Johnson *et al.* 1990) and not northern congeners. In north and central Argentina, *S. diaguita* is primarily found in warm temperate grasslands and adjacent disturbed areas and is not generally associated with the scattered (and generally more northern) tropical and subtropical habitats of that region.

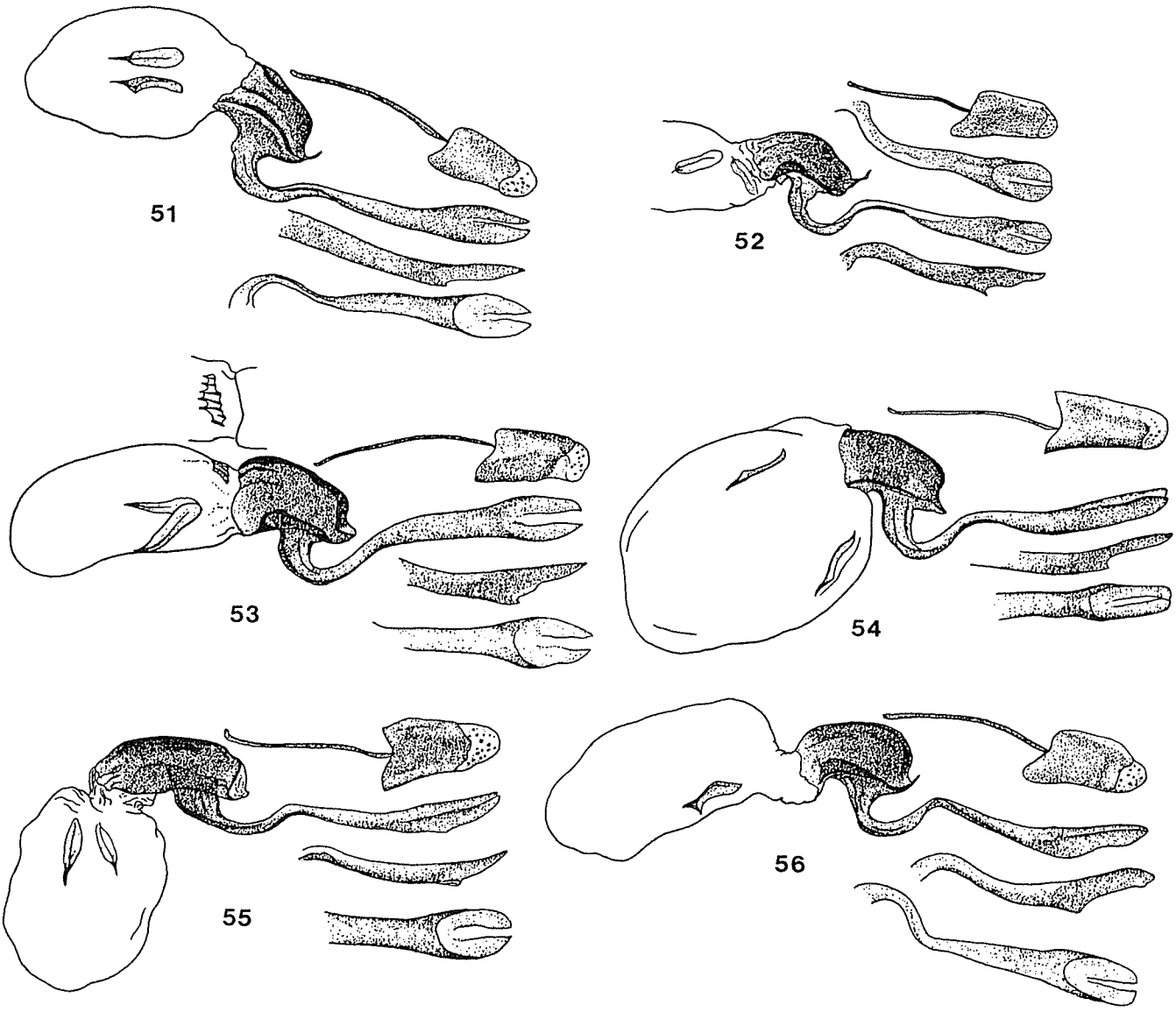
*Thecla thulia* has languished in synonymy with *S. basilides* (*e.g.*, Bridges 1988) or, with the recognition that *S. basilides* is blue, then *S. ziba*. *S. thulia* is superficially similar to *S. ziba* with its gray dorsum and orbicular ventral markings. It differs from *S. ziba* in its smaller size, more angular (less rounded) wing shape, and finer and more




**Figs. 44-50.** Male genitalia of *Strymon "crossoea"* group including lateral view of genital capsule with valva detatched and aedeagus removed, ventral view of genital capsule with aedeagus removed, and lateral view of aedeagus. Fig. 44. *Strymon novasignum*, Brazil: Rondônia (GTA #5994); Fig. 45. *Strymon clavus*, Brazil: Rondônia (GTA #6006); Fig. 46. *Strymon implexus*, Brazil: Rondônia (GTA #5991); Fig. 47. *Strymon inmirum*, Brazil: Rondônia (GTA #6012); Fig. 48. *Strymon halos* Brazil: Rondônia (GTA #4867, holotype); Fig. 49. *Strymon conspergus*, Brazil: Rondônia (GTA #6016, holotype); Fig. 50. *Strymon diagonalis*, Brazil: Rondônia (GTA #4991, paratype).

quadrate postmedian ventral macules. The above detailed description is based upon 2 males and a female from Ecuador: Pichincha Province. The female is virtually identical in both wing characters (photograph examined) and genitalic characters (slide examined) of the lectotype of *S. thulia*. Types. The above designated lectotype in the NHM has the following additional label added: Lectotype / *Thecla thulia* Hewitson / designated by / Austin and Johnson 1995.

**Distribution in study area.** A female taken at Fazenda Rancho Grande on 16 November 1991 lacks an abdomen, but superficially more closely resembles the type and other material of *S. thulia*

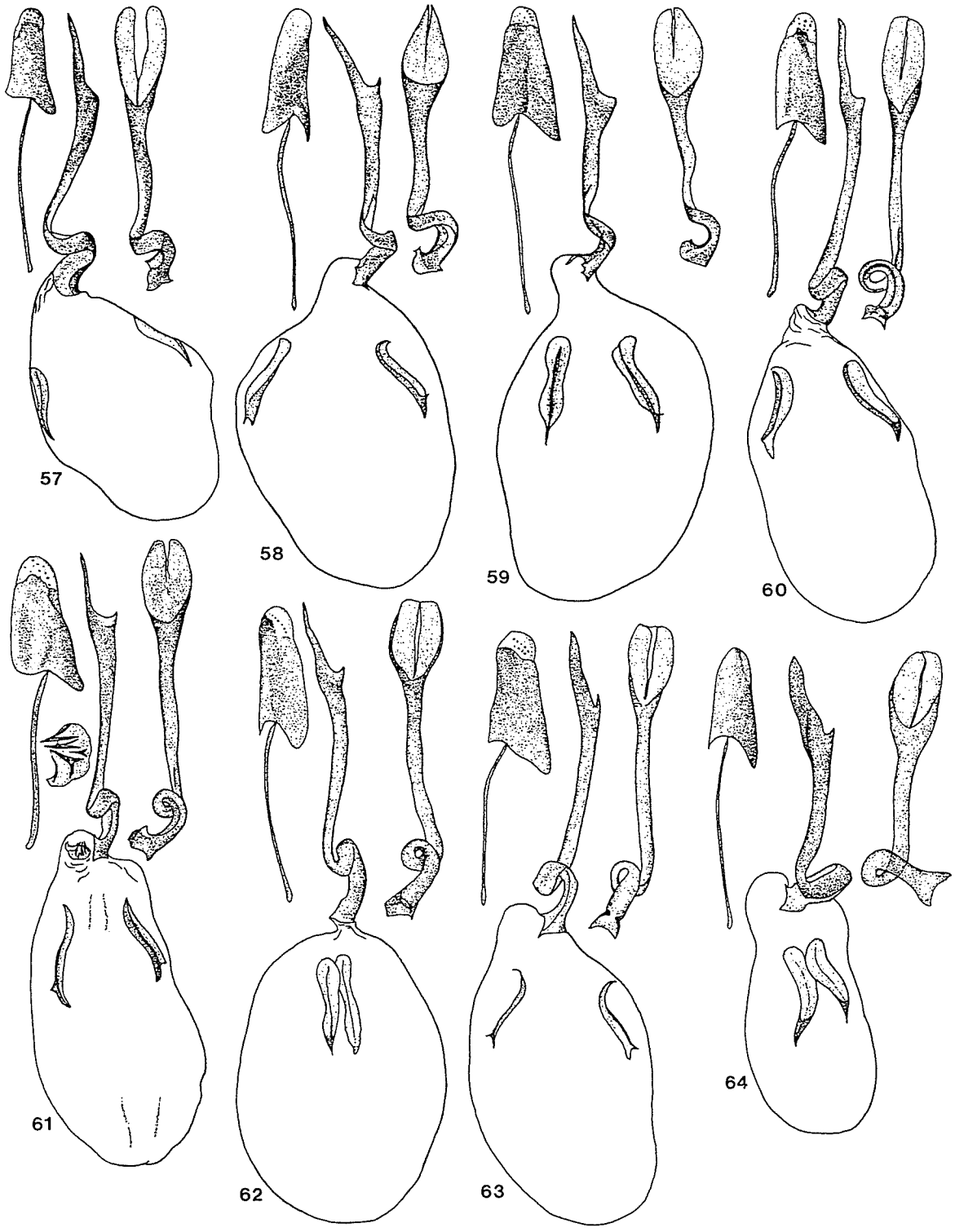



**Figs. 51-56.** Female genitalia of *Strymon "ziba"* group including lateral view of genital capsule, lateral and ventral views of lamella and ductus bursae, and lateral view of papillae and apophysis. Fig. 51. *Strymon ziba*, Brazil: Rondônia (GTA #5060); Fig. 52. *Strymon thulia*, Ecuador: Pichincha (GTA #4800); Fig. 53. *Strymon spinatus*, Brazil: Rondônia (GTA #4989, holotype); Fig. 54. *Strymon latamaculus*, Brazil: Rondônia (GTA #5056, holotype); Fig. 55. *Strymon pallidulus*, Brazil: Rondônia (GTA #5272, holotype); Fig. 56. *Strymon tholus*, Brazil: Rondônia (GTA #5062, holotype).

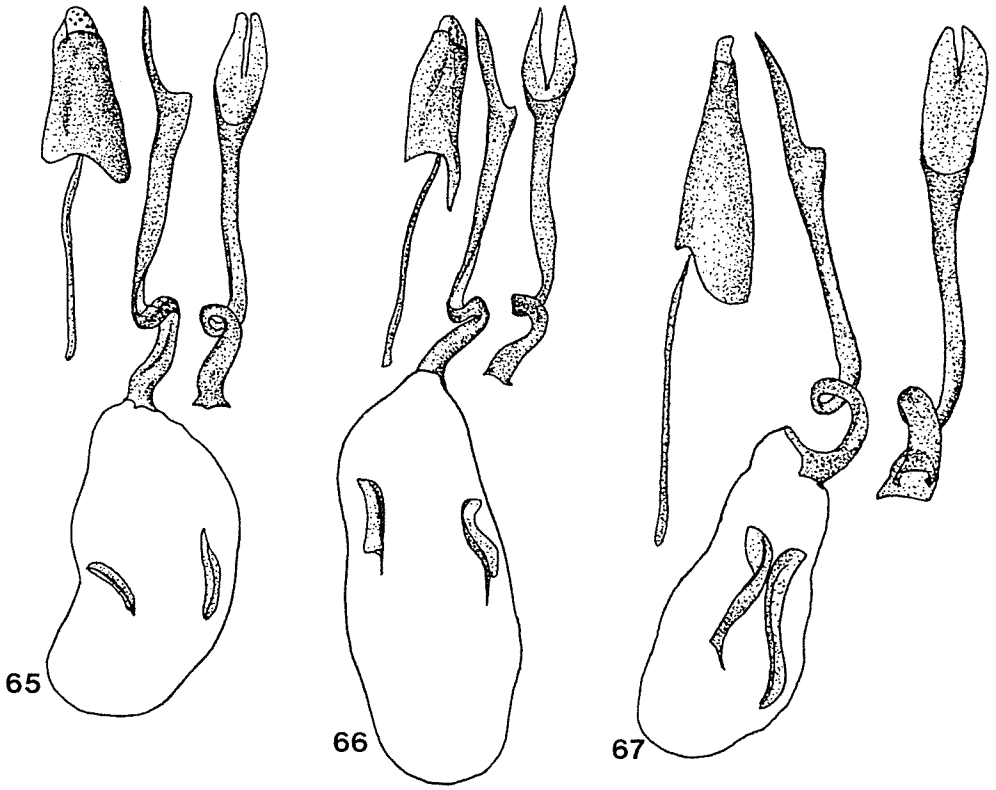
than any other known species and is so included until additional material becomes available.

### *Strymon spinatus*, new species
Figs. 5, 6, 40, 53

**Diagnosis.** Wings. Large in size (FW length holotype female=15.5 mm, male FW length=14.0 mm) and prominently tailed; dorsal ground gray; male FW with prominent, large black brand; HW prominent "thecla-spot", orange over black macule; vague blue-white submarginal macules on either side of "thecla-spot"; ventral ground gray-tan; wings with thin tripartite postmedian lines, that on HW as orb-like macule costad; 3 blackish postbasal macules with vague orange. Slightly larger in size than *S. ziba* and of that general phenotype; differs from all known species of the *"ziba"* group by the very thin postmedian band macules of both wings with only the anteriormost macule of the HW orbicular in shape. Morphology. Male genitalia similar to other "*ziba*" group species, differing by the caudal extensions of the valvae being somewhat more serrate on their




**Figs. 57-64.** Female genitalia of *Strymon "valentina"* and *Strymon "crossoea"* groups including lateral view of genital capsule, ventral view of lamella and ductus bursae, and lateral view of papillae and apophysis. Fig. 57. *Strymon rotundum*, Brazil: Rondônia (GTA #4962, holotype); Fig. 58. *Strymon germana*, Brazil: Rondônia (GTA #4987, holotype); Fig. 59. *Strymon cestri*, Costa Rica: Limon Province (GTA #4996); Fig. 60. *Strymon novasignum*, Brazil: Rondônia (GTA #4869, paratype); Fig. 61. *Strymon clavus*, Brazil: Rondônia (GTA #4870, holotype); Fig. 62. *Strymon implexus*, Brazil: Rondônia (GTA #4984, holotype); Fig. 63. *Strymon inmirum*, Brazil: Rondônia (GTA #6685, holotype); Fig. 64. *Strymon incanus*, Brazil: Rondônia (GTA #4985, holotype).




**Figs. 65-67.** Female genitalia of *Strymon "crossoea"* group including lateral view of genital capsule, ventral view of lamella and ductus bursae, and lateral view of papillae and apophysis. Fig. 65. *Strymon halos*, Brazil: Rondônia (GTA #4868, paratype); Fig. 66. *Strymon conspergus*, Bolivia: Prov. Sud Yungas (GTA # 7181); Fig. 67. *Strymon diagonalis*, Brazil: Rondônia (GTA #5255, paratype).

outer edges. Female genitalia with ductus bursae deflexed and a very robust hood before cervix bursae beyond which is a sclerotized, spinate plate on the dorsum of the corpus bursae, a character nearly unique in the genus (see Remarks).

**Description.** Male. As female (following), single example worn, but with less broadly rounded wings, large (3 mm) and prominent brand; narrower "thecla-spot". Female. Wings broad; FW termen slightly convex; dorsal color medium gray; FW uniform; HW with prominent "thecla-spot" crescent-shaped orange macule over distinct black macule; vague blue-white submarginal macules in $M_2$, $M_3$, and $CuA_2$; anal angle red-orange; white marginal line from $M_3$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter gray-tan; FW with vaguely darker submarginal macules, these vaguely edged proximad and distad with white; postmedian band tripartite (white distad, black, orange; orange as broad as white and black combined), extending to $CuA_2$ as offset bars; HW with similarly-colored postmedian band, anterior macule orb-like, line then thin as on FW becoming irregular posteriorly; "thecla-spot" orange with triangular black pupil; anal angle red-orange divided by white slash, margin with small black circular macule; submargin with macules vaguely darker than ground color outlined proximad and distad with white; postbasal orbs near base of $Sc+R_1$ and in mid discal cell, black with vague deep red-orange and nearly completely encircled with white. Male Genitalia. Genital capsule slender as characteristic of "*ziba*" group; saccus relatively narrow, parabolic; vinculum angled, but somewhat less so than on *S. ziba* and *S. thulia*; valvae slender, somewhat elongate, bilobes ellipitical, caudal extensions thin, tapered, serrate on outer edges; aedeagus rather long (about 1.5x genital capsule length), caudal end slightly curved, caecum slightly arched, about 1/3 aedeagus length, cornuti robust. Female Genitalia. Ductus bursae deflexed, robust, tubular, and elongate, prominently twisted (*ca.* 90°) before recurvate cephalad after which joining centro-ventral surface of robust sclerotized hood, hood exceeding 1/3 length

of rest of genital capsule, broadest cephalad, narrowing gradually caudad before curving ventrad to narrow caudal projection, lamellae prominent, ellipitical, pointed caudad, and separated by wide central fissure; corpus bursae bulbous with pair of moderately-sized signa typical of genus, dorsal surface of bursae between cervix bursae and position of signa with narrow, ribbed, sclerotized plate, ribs extending cephalad as short spines; apophysis papillae anales elongate, extending anteriorly to near mid-point of cervix bursae hood.

**Type.** Holotype female, Brazil, Rondônia, Linha 10, 5 km S of Cacaulândia, 5 April 1994, *leg.* O. Gomes (GTA#4989). Deposited at UFPC. Additional material, 1 male, same location as holotype, 17 April 1995 (GTA #6001).

**Remarks.** Characters and Affinities. Our assignment of *S. spinatus* to the "*ziba*" group is based upon the clear affinities of the genitalia: the lack of a looped or sigmoidal ductal configuration and presence of a hooded cervix bursae on the female. Also, as typical of the group (as the "*basilides*" group) defined by Johnson *et al.* (1990), *S. spinatus* lacks structural color and shows, in the VHW maculation, orb-like elements in the postmedian band and postbasally. The female genitalia, while typical in overall form to members of the "*ziba*" group with a deflexed ductus and a prominent hood, possesses a sclerotized spinate innovation at the dorso-caudal surface of the corpus bursae not seen heretofore in *Strymon* except for a species of the "*crossoea*" group described as new below.

The species is similar to sympatric *S. ziba* and *S. thulia*, but is immediately distinguished by the thin (except for the anteriormost macule) postmedian line on the VHW.

**Etymology.** The species is named for the spinate plate on the dorsum of the corpus bursae.

### *Strymon latamaculus*, new species

Figs. 7, 8, 41, 54

**Diagnosis.** Wings. Large in size (holotype female FW length = 15.2 mm, paratype females = 15.0, 15.6 mm; male FW length = 14.0, 14.7 mm) and prominently tailed; dorsal ground dark gray; male FW with prominent, large black brand; HW with relatively small "thecla-spot", orange over black macule; blue-white submarginal macules on either side of "thecla-spot"; ventral ground gray; wings with tripartite postmedian lines, that on HW represented by orb-like macules anteriorly; 2 to 3 blackish postbasal macules with vague orange. Similar to *S. ziba, S. thulia,* and *S. spinatus*, but larger than *S. ziba* and *S. thulia*; postmedian of both wings broader, anterior postmedian macules of HW particularly broad and richly colored. Morphology. Male genital capsule slender as typical of group, vinculum prominently angled in lateral view, valvae similar to *S. ziba* and *S. thulia*, but bilobes more gradually narrowing to caudal extensions, aedeagus robust with sculptured caudal end. Female genitalia with ductus bursae strongly deflexed and with a moderately robust hood before cervix bursae, hood similar to, but more elongate than, that of *S. ziba* and ductus bursae more robust.

**Description.** Male. FW termen slightly convex; dorsal color dark gray; FW uniform except for large (2.5 mm) black brand; HW with small "thecla-spot" crescent-shaped orange macule over black macule; faint blue-white submarginal macules in $M_1$, $M_2$, $M_3$, and $CuA_2$; anal angle red-orange margined proximad with white; white marginal line from $M_2$ to 2A; tail at $CuA_2$ long, that at $CuA_1$ shorter. Venter pale gray-brown; FW with darker gray marginal (faint) and submarginal (more prominent) macules, latter vaguely edged proximad with white; postmedian band macular, tripartite (white distad, black, red-brown; red-brown broader than white and black combined), extending to $CuA_2$; HW with similarly-colored postmedian band, anterior 4 macules orb-like, more or less in straight line, these also margined proximad with black and white, line becoming narrow and irregular posteriorly; "thecla-spot" red-orange with triangular black pupil, red-orange margined proximad with yellow-orange; anal angle red-orange distad divided by white slash from yellow-orange proximad, margin with black circular macule; submargin with macules darker gray than ground color vaguely outlined proximad and distad with white; postbasal orbs near base of $Sc+R_1$ and mid discal cell of same color as postmedian orbs. Female. Similar to male; wings more rounded; no brand; "thecla-spot" larger; whitish submarginal macules somewhat more prominent; venter slightly paler and grayer; 2 specimens with chevron-shaped macule in FW cell $CuA_2$; orb near base of $Sc+R_1$ doubled on one specimen. Male Genitalia. Genital capsule slender; saccus triangular gradually expanding to vinculum; vinculum not prominently angled in ventral view, but prominently so in lateral view; valvae relatively short with ellipitical bilobes, narrowing gradually to tapered caudal extensions; aedeagus robust (about 1.4x genital capsule length), shaft

curved especially caudad to sculptured terminus, caecum slightly arched, 29% of aedeagus length, cornuti robust. Female Genitalia. Ductus bursae deflexed, rather robust, tubular, and elongate, slightly twisted before recurvate cephalad after which joining centro-ventral surface of robust sclerotized hood, hood exceeding 1/3 length of rest of genital capsule, broad throughout, narrowing caudad before narrow caudal projection, lamellae prominent, elongate, rectangular, and separated by central fissure; corpus bursae bulbous with pair of moderately-sized signa typical of genus; apophysis papillae anales very elongate, extending anteriorly well beyond mid point of cervix bursae hood.

**Types.** Holotype female, Brazil, Rondônia, Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 20 Aug. 1993, *leg.* G. T. Austin (GTA #5056). Deposited at UFPC. Paratype females, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 22 Sept. 1994 (GTA #5271); Linha C-20, 10 km E of B-65, lot 18, 15 Aug. 1993 (GTA #5063). Additional material, 1 male, Fazenda Rancho Grande, 11 Nov. 1991 (GTA #5395); 1 male, Linha C-10, 5 km S of Cacaulândia, 1 May 1995 (GTA #6000).

**Remarks.** Characters and Affinities. This is yet another species which lacks a looped or sigmoidal ductal configuration and has a hooded cervix bursae on the female. The overall structure of the genital capsule of the male, including the angled (in lateral view) vinculum, simple valvae, and general aspect of the vinculum and aedeagus is common to the "*ziba*" group. Also, as typical of the group defined by Johnson *et al.* (1990), *S. latamaculus* lacks structural color and shows, in the ventral maculation, bands comprised of orb-like elements.

**Etymology.** The species is named for the broad postmedian bands on the venter.

### *Strymon pallidulus*, new species
Figs. 9, 10, 42, 55

**Diagnosis.** Wings. Large in size (holotype female FW length = 15.5 mm; paratype female = 15.1 mm, male FW length = 15.2 mm) and prominently tailed; dorsal ground medium gray; HW with "thecla-spot", orange over black macule; vague blue-white submarginal macules on either side of "thecla-spot" on female; ventral ground pale gray; wings with tripartite postmedian lines, that on HW as orb-like macules anteriorly; 2 orange postbasal macules with vague orange. Similar to *S. ziba*; venter with washed-out aspect; orange colors paler and/or yellower; orbs on VHW less broad and much paler than on *S. latamaculus*; grayer and with broader postmedian lines than *S. spinatus*. Morphology. Male genitalia most similar to those of *S. latamaculus*, saccus less triangular, caudal extensions of valvae thinner, aedeagus less curved and sculptured caudad. Female genitalia with ductus bursae thin, weakly deflexed and with hood at cervix bursae more elongate and less broad than seen on any other "*ziba*" group species.

**Description.** Male. FW termen nearly straight; dorsal color medium gray; FW uniform except for prominent large (3.5 mm) black brand; HW with large "thecla-spot" crescent-shaped pale orange macule over black macule; anal angle yellow-orange margined proximad with white; white marginal line from $M_3$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter very pale gray; FW with vaguely darker gray submarginal macules; postmedian band tripartite (white distad, black, orange; orange as broad as white and black combined), extending to $CuA_2$ as slightly offset bars; HW with similarly-colored postmedian band, orange somewhat redder, anterior macule orb-like, next 3 as relatively broad bars, line becoming irregular posteriorly; "thecla-spot" orange with oval black pupil, orange margined proximad with yellow; anal angle orange divided by white slash, margin with relatively large black circular macule; submargin with macules darker gray than ground color outlined proximad and distad with white; small postbasal orbs near base of $Sc+R_1$ and in mid discal cell, orange outlined with black. Female. Similar to male; no brand; forewing termen slightly convex; vague blue-white submarginal macules in $M_1$, $M_2$, $M_3$, and $CuA_2$; white marginal line on HW from $M_3$ to 2A. Male Genitalia. Genital capsule very slender; saccus parabolic, gradually expanding into vinculum, vinculum prominently angled in lateral view; valvae with bilobes thinly ovate, caudal extensions very slender; aedeagus robust (1.4x genital capsule length), shaft curved near caudal end, caecum moderately arched, about 30% of aedeagus length, cornuti robust. Female Genitalia. Ductus bursae weakly deflexed, thin, tubular, and elongate, slightly twisted before recurvate cephalad after which joining centro-ventral surface of elongate and narrow sclerotized hood, hood about 1/2 length of rest of ductus bursae, equally broad throughout before narrowing caudad, lamellae prominent, ellipitical, and separated by wide central fissure; corpus bursae bulbous with pair of signa typical of genus; apophysis papillae anales

relatively short, extending anteriorly to anterior portion of cervix bursae hood.

**Types.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 20 Sept. 1994, *leg.* O. Gomes (GTA #5272). Deposited at UFPC. Paratype female, same location as holotype, 25 April 1995 (GTA #6001). Additional material: 1 male, Brazil: Rondônia; Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 15 Nov. 1991 (GTA#6089).

**Remarks.** Characters and Affinities. This species is typical of the overall phenotype among "*ziba*" group species. The hood at the cervix bursae is longer and less broad than on any species yet examined.

**Etymology.** The species is named for the pale and washed-out aspect of the venter.

### *Strymon tholus*, new species

Figs. 11, 12, 43, 56

**Diagnosis.** Wings. Large in size (holotype female FW length = 15.1 mm, paratype females = 15.4, 14.9, 12.4 mm, male FW length = 14.7, 13.6 mm) and prominently tailed; dorsal ground dark gray; male FW with prominent, large black brand; HW with medium-sized "thecla-spot", orange over black macule; vague blue-white submarginal macules on either side of "thecla-spot"; ventral ground pale gray-tan; wings with tripartite postmedian lines, as quadrate macules on FW, as orb-like macules anteriorly on HW; 2 orange postbasal macules. Similar to *S. ziba*, larger, venter more tan, postmedian broader on both wings and somewhat more richly colored; much darker than *S. pallidulus*. Most similar to *S. latamaculus*, but venter paler, red macules less richly colored and with different female genitalia. Morphology. Male genitalia with capsule slender and prominently angled, bilobes stouter (broader and shorter) than seen on other "*ziba*" group species, caudal extensions long and thin, and aedeagus with shaft prominently curved caudad. Female genitalia with ductus bursae deflexed and with a very robust hood at cervix bursae, this dome-shaped unlike any other known congener.

**Description.** Male. FW termen very slightly convex; dorsal color dark gray; FW uniform except for large (3 mm) and prominent black brand; HW with medium-sized "thecla-spot" crescent-shaped orange macule over black macule; vague blue-white submarginal macules in $M_3$, and $CuA_2$; anal angle red-orange; white marginal line from $CuA_1$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter pale gray-tan; FW with vaguely darker submarginal macules, these vaguely edged proximad with white; postmedian band with white distad, then black, orange, and black; orange as broad as white and black combined, macules quadrate (especially first 4), extending to $CuA_2$; HW with similarly-colored postmedian band, anterior 4 macules orb-like, also margined proximad with white, line becoming irregular posteriorly and without black or white proximad; "thecla-spot" red-orange turning yellow-orange proximad with small triangular black pupil; anal angle red-orange distad of white slash, margin with relatively large black circular macule; submargin with macules vaguely darker than ground color outlined proximad and distad with white; postbasal orbs near base of $Sc+R_1$ and in mid discal cell, colored as anterior orbs of postmedian band. Female. Similar to male, no brand, paler gray, orange of "thecla-spot" more extensive, additional marginal macule in $M_2$; marginal white line from $M_3$ to 2A; wings broader and more rounded; venter paler gray, marked as male, but with "thecla-spot" larger and more extensive orange at anal angle, postbasal macule in discal cell very small on holotype. Male Genitalia. Genital capsule slender; saccus parabolic, gradually expanding into vinculum; vinculum angled in both ventral and lateral views; valvae with notably short and broadly ovate bilobes, caudal extensions relatively long and thin, somewhat recurvate; aedeagus relatively long (1.5x genital capsule length), robust, shaft curved, caecum very slightly arched, nearly 1/3 aedeagus length, cornuti robust. Female Genitalia. Ductus bursae strongly deflexed, rather thin, tubular, and elongate, slightly twisted before recurvate cephalad after which joining centro-ventral surface of robust sclerotized hood, hood exceeding 1/3 length of rest of ductus bursae, broadest caudad and dome-shaped, narrowing gradually cephalad and with narrow caudal projection, lamellae prominent, ellipitical, and separated by wide central fissure; corpus bursae bulbous with pair of small signa typical of genus; apophysis papillae anales moderately elongate, extending anteriorly almost to mid-point of cervix bursae hood.

**Types.** Holotype female, Brazil, Rondônia, Linha C-0 off B-65, 15 km S of Cacaulândia, 11 Nov. 1990, *leg.* G. T. Austin (GTA #5062). Deposited at UFPC. Paratype females, Brazil: Rondônia, Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 13 Nov. 1991 (no abdomen); Linha C-10, 5 km S of Cacaulândia, 25 April 1995 (GTA #6005), 2 May 1995 (GTA #6004). Additional material: 1 male,

same location as first paratype, 16 Sept. 1992 (no abdomen); 2 males, same location as other paratypes, 28 April 1995 (GTA #6002), 3 Mar. 1994 (GTA #6210).

**Remarks.** Characters and Affinities. As for other species of the "*ziba*" group, *S. tholus* is distinguished from related species by wing characters and especially the form of the female genitalia.

**Etymology.** The species name means dome, for the greatly expanded and dome-shaped hood at the cervix bursae.

### *Discussion of* "ziba" Group

As noted above, the "*ziba*" group of *Strymon* has been long misunderstood from the misidentification of its former titular species (*S. basilides*), to an underestimate of its diversity. With the identification of the phenotype of *Tmolus basilides* and examination of the types of 2 taxa often thought of as synonyms, the group may now be properly elaborated in studies of Neotropical Eumaeini. As we have seen among numerous other groups when studied in depth, the "*ziba*" group is more species rich than previously recognized. The validity of species first noted by "minor" superficial characters in initial samples, has been reinforced by the continuing utility of morphological characters of the genitalia in both sexes in allowing assembly of consistent and larger series of the entities as sampling continues. Thus in central Rondônia, we have identified 6 species of the "*ziba*" group, 2 represented by previously described species and 4 new species. Yet, as noted in our introductory comments, additional undescribed species of this group have been seen by us from other Neotropical locales.

The various species, as generally for *Strymon*, are most reliably determined by the configuration of the female genitalia, especially in the form of the ductus bursae, its degree of deflexion, the shape of the lamellae, and the size and form of the hood at the cervix bursae. One species, *S. spinatus*, has a spinose, sclerotized plate on the dorsum of the corpus bursae. The most readily seen external characters include overall ventral color and the color, width, and configuration of the postmedian band on the VHW.

Character details of the VHW band appear remarkably unimportant at the species group level; for instance, in various "*ziba*-like" specimens from Rondônia (as well as other tropical forest areas of South America), we have been unable to predict by the VHW band shape whether female specimens will show the deflexed ductus bursae characterizing the "*ziba*" group or one of the fully spiralled ductus shapes typifying other *Strymon* groups. Given such dramatic differences in the female genitalia, there is obviously a high degree of parallelism involving the minor differences in the VHW band detail and such homoplasies occur among *Strymon* species which are not even close phylogenetic relatives.

### "*valentina*" group

### *Strymon rotundum*, new species

Figs. 13, 57

**Diagnosis.** Wings. Large in size (holotype female FW length = 16.2 mm, paratype females = 13.1, 16.5 mm) and prominently tailed, dorsum uniform dark gray except for large orange "thecla-spot" and submarginal whitish lunules on HW; venter gray-tan ground; FW with tripartite white, black, and orange postmedian band; VHW with similarly-colored postmedian band, macules orb-like anteriorly; prominent red-orange "thecla-spot" and anal angle; postbasal orange orb near base of $Sc+R_1$. Ventral pattern with postbasal orbs like "*ziba*" group species and certain members of the "*oreala*" group, but the female genitalia are like *S. valentina*. Morphology. Slender female ductus bursae shows a robust sigmoidal configuration just before the corpus bursae; elongate lamellae (comprising nearly 1/3 genital length) separated by wide central fissure.

**Description.** Male. Unknown. Female. Wings broadly and prominently rounded; dorsal ground uniform dark gray; FW unmarked; HW with prominent "thecla-spot" large crescent-shaped orange macule over black macule; vague whitish submarginal macules in $M_1$, $M_2$, $M_3$, and $CuA_2$; anal angle narrowly orange; white marginal line from $M_3$ to 2A; tail at $CuA_2$ very long, that at $CuA_1$ much shorter. Venter dark gray-tan; FW with vaguely darker marginal and submarginal macules; slightly curved postmedian band composed of continuous series of tripartite (white distad, black, orange) curved lines extending into upper portion of $CuA_2$; HW with irregular postmedian of same colors, broader than on FW, anterior lunules orb-like, orange of postmedian bands very prominent; small postbasal orangish orb near base of $Sc+R_1$ (absent on one paratype); very vague pale bar at distal end of discal cell; "thecla-spot" large and prominent, red-orange with small black pupil; anal angle red-orange divided by white slash, prominent black mark at fringe; submargin with macules vaguely

darker than ground color outlined vaguely with white. Female Genitalia. Ductus bursae slender with a robust sigmoidal configuration, immediately adjacent to cervix bursae, posterior ductus less than 5x diameter of sigmoid; cervix bursae not hooded; corpus bursae with pair of lateral signa, curvate in lateral view, narrow in ventral view with thin, arrowhead shape cephalad; lamella long about 30% of combined lamella/ductus bursae length, caudal end bluntly rounded in ventral view, thin with broad central fissure; papillae anales typical for genus, apophysis extending to cervix bursae.

**Types.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 4 July 1994, *leg.* O. Gomes (GTA#4962). Deposited at UFPC. Paratypes, 2 females, same location, 14 July 1994 (GTA#8000), 24 July 1995 (GTA #6264).

**Remarks.** Characters and Affinities. This species, with its orange orbs on the VHW, has superficial similarities to members of the "*oreola*" and "*ziba*" (as "*basilides*" group) groups of Johnson *et al.* (1990). Our placement of *S. rotundum* in the "*valentina*" group is based upon its lack of structural color, the sigmoid configuration of the ductus bursae, and especially the location of sigmoid of the ductus bursae close to the cervix bursae. This is the only identified species of the "*valentina*" group with postbasal orbs on the VHW, a character common in both the "*ziba*" and "*oreola*" groups.

The ductus bursae with a slender caudal end is rather similar in form to that of *Strymon valentina* (Berg), but the spiral is more robust, resembling that of *Strymon montevagus* Johnson, Eisele, and MacPherson. Since the latter species is endemic to the "Monte" biome of the northern Patagonian steppe, such resemblance is typical of the kind of homoplasy occurring in *Strymon* due to its simple morphological ground plan. As noted by Johnson *et al.* (1990), the "*valentina*" group (employed by the latter authors for a southern South American cluster of *Strymon*) may be a phenetic grade based simply on ventral wing pattern similarities. Whether such taxa form a pan-Neotropical phylogenetic group within *Strymon* should be more apparent when additional northern *Strymon* species are studied and described. One such species is a new *Strymon* described from Colombia in LeCrom and Johnson (1997); it also shows the ringed and orbiculate VHW pattern originally associated only with *Thecla valentina* (Berg 1882). In fact, our ongoing studies of Neotropical *Strymon* indicates much overlap in characters among "*oreala*" and "*valentina*" group species and suggests rearrangement may eventually be necessary once the larger overall diversity of *Strymon* has been elaborated.

**Etymology.** The name refers to the prominently rounded wings of this species.

### *"crossoea"* group

### *Strymon crossoea* (Hewitson)

Figs. 14, 15

*Thecla crossoea* Hewitson [1874]. The holotype of this name was elaborated by Johnson *et al.* (1990).

**Diagnosis.** Wings. Because of uncertainty about type specimens, this species was confused with *S. canitus* (Hewitson) and *S. mulucha* (Hewitson) prior to recent work by the junior author (Johnson *et al.* 1990). The 3 species, all of medium size (FW length = 9-15.5 mm), differ in wing shape, dorsal color, condition of the HW tails, and ventral pattern. Both sexes of *S. crossoea* have the FW apices produced and "squared-off" unlike the evenly convex FW apices of *S. canitus* and *S. mulucha*. *S. canitus*, and to a lesser extent *S. crossoea*, have silvery blue across the distal area of the DHW (reduced on some *S. crossoea* males). *S. mulucha* is generally completely brown on the dorsum with bright white HW fringes. On the HW, *S. crossoea* shows only a short tail-tuft (slightly longer on females) while *S. mulucha* and *S. canitus* have prominent HW tails on both sexes. Of the 3 species, only *S. crossoea* is known from central Rondônia.

**Remarks.** Characters and Affinities. The common usage of *S. crossoea* (often misspelled as "*crossaea*"), *S. canitus*, and *S. mulucha* has been much confused, the latter species (the most distinctive of all) having sometimes been considered a synonym of *S. crossoea* (Bridges 1988). Johnson *et al.* (1990) distinguished these species based on their type specimens and showed that they differ distinctively in the wings and genitalia. It can sometimes be confusing when males of *S. crossoea* are mostly brown on the wing dorsum, a condition apparent in Rondônian specimens. Aside from this dark DHW color, specimens from Rondônia do not differ from the characterization of *S. crossoea* in Johnson *et al.* (1990). Type. Johnson *et al.* (1990) identified the holotype female of *S. crossoea* and discussed the taxonomic confusion of this with other species.

**Distribution in study area.** There are 3 specimens from central Rondônia, 2 males from Fazenda Rancho Grande and a female from Linha

20 near Rio Pardo taken in October and November (GTA #5988, 6015, 8001).

### *Strymon crambusa* (Hewitson)
Fig. 16

*Thecla crambusa* Hewitson 1874. The holotype of this name was elaborated by Johnson *et al.* (1990).

**Diagnosis.** Wings. Dorsally brown species of medium size (FW length = 10.5-12.5 mm) with irregular wing margins and a single thickened HW tail; little sexual dimorphism except for black (1-1.5 mm) circular brand on male FW. Widespread, but never common, some color differences appear to correlate with climate: dorsally light brown (xeric) or dark brown (mesic). Ventrad, the HW shows a highly mottled pattern of "block-like" brown patches over paler ground; xerophiles have these elements paler, particularly in a white patch median in HW cell $Sc+R_1$, mesophiles (as in Rondônia) are darker brown with brown patches most fully filling the HW basal disc.

**Remarks.** Characters and Affinities. The most recent treatment of this species in South America was by Johnson *et al.* (1990). These authors placed *S. crambusa* in the "*crossoea*" group of *Strymon*. Dissection of a male and female in the Rondônian samples showed no significant variation from the species elsewhere in South America. Recent examination of *S. crambusa* samples at the NHM revealed additional Amazon Basin material of the species with the darker wing facies as seen in Rondônia. This further strengthens the view that Rondônian specimens do not warrant taxonomic distinction from *S. crambusa*. Type. Johnson *et al.* (1990) identified the holotype male of this species.

**Distribution in study area.** A male and female are from Fazenda Rancho Grande, 180 m, both taken on 3 November 1989; another female is from second growth on Linha C-10, 5 km S of Cacaulândia and taken on 4 September 1993 (GTA #5987, 7182, 7183).

### *Strymon germana*, new species
Figs. 17, 58

**Diagnosis.** Wings. Medium in size (holotype female FW length = 12.2 mm) and with very short and thickened tail, dorsal ground nearly concolorous brown, but with dusting of pale blue scales especially on HW, "thecla-spot" large and prominent, ventral pattern of black, brown, and gray. Venter with postmedian line and other macules as relatively large orbs suggestive of such taxa as *S. crossoea* and *S. faunalia*. FW not produced as on *S. crossoea* and pattern elements more distinct; FW squared-off as also seen on the smaller *S. faunalia*, but wing shorter and postmedian orbs larger. Especially resembles *Strymon cestri* (Reakirt) of Central America (see Remarks). Morphology. Ductus bursae with sigmoidal configuration, very similar to *S. cestri* differing in spade shape of lamellae (much broader throughout on *S. cestri*).

**Description.** Male. Unknown. Female. Dorsal ground concolorous dark brown except dusted with pale blue scales at wing bases and distad on posterior third of DHW, HW with very short and somewhat thickened tail at terminus of vein $CuA_2$, submargin in cell $CuA_1$ with large black dot and vague dot in $CuA_2$, no orange at anal lobe. VFW tan becoming grayer distad, postmedian band (costa to cell $CuA_1$) narrowly white distad, blackish basad, paler gray band distad; submargins and margins of each cell with vague blocks of dark gray-brown, more diminutive at margin. VHW tan, postbasal area with large brown orb near base of $Sc+R_1$ and in mid discal cell, undulate postmedian band composed of series of dark brown orbs, inside this at end of discal cell is a paler brown bar, all darker elements thinly margined distad and proximad with white; limbal area mottled gray and white, large black "thecla-spot" marginad in cell $CuA_1$, anal lobe narrowly black. Female Genitalia. Ductus bursae of moderate width with sigmoidal configuration of anterior ductus, posterior ductus relatively short (less than 6x diameter of sigmoidal portion); lamellae spade-shaped, sharply pointed caudad; corpus bursae with pair of curvate signa; papillae anales typical of genus, apophysis long, extending cephalad well beyond cervix bursae.

**Type.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 24 January 1994, *leg.* O. Gomes (GTA #4987). Deposited at UFPC.

**Remarks.** Characters and Affinities. Our first thought, upon seeing the holotype of *S. germana* with its elongate FW having a squared-off apex and the ventral orbicular pattern, was that it was *Strymon cestri* (Reakirt [1867]), but lacking the blue of Central American populations (we noted above that *S. crossoea* was browner in Rondônia than in more xeric areas). Female *S. cestri* in Central America has extensive pale blue on the posterior half of the DHW, this variably extending to the DFW. The ground color is also darker, more blackish than on *S. germana*. The "thecla-spot" on both the dorsum and venter is much larger and more prominent on *S. germana*, and *S. cestri* lacks all

trace of a tail and the ventral pattern appears more mottled. The overall form of the female genitalia of *S. germana*, with its sigmoidal ductus, is nearly identical to that of *S. cestri* (Fig. 59), but the lamellae are triangular and sharply pointed on *S. germana*, but parabolic and blunt-ended on *S. cestri* (this same general configuration also occurs in the Central American species *Strymon yojoa* [Reakirt]). It will be interesting to obtain a male of *S. germana* to see if the species has the marked sexual dimorphism of *S. cestri*.

The known distribution of *S. cestri* is from southern United States through Costa Rica (Opler and Malikal 1992). Numerous groups of Theclinae well-known from Central America have recently been shown to have South American sister species, although, in many cases, as yet poorly known. Constantino *et al.* (1993) described *Atlides browni* from Colombia, noting the single known specimen as the sister species of the Central American *Atlides carpasia* (Hewitson). Subsequently, *A. browni* was collected in larger series (AMNH) and, in fact, was well-known to other Colombian workers not collaborating on the original description (C. Callaghan, pers. comm. to Johnson 1994). Johnson and Amarillo (1997) treated 2 species, one described as new, of the "brown *Cyanophrys*" (*Antephrys* Johnson, Eisele, and MacPherson 1993), a group represented by 3 far more well-known species in Central America. Johnson and Kruse (1997) described the first South American sister species of *Cyanophrys miserabilis* Clench, the latter, like *S. cestri*, noted in the literature as distributed from Mexico to Costa Rica. In a near reverse situation, Johnson and Kruse (1997) also described a Central American sister species of *Cyanophrys detesta* Clench, a species known only from Colombia. It is obvious that sampling error has played a role in the lack of such discoveries hitherto. Also, as with *S. cestri* and *S. germana*, it is apparent that such Central America/South American species disjunctions reflect the tectonic history of the Panamanian isthmus where there have been two separate disjunctions and rebuildings (late Mesozoic and Pliocene). Type. It is unknown if a type of *Thecla cestri* (Reakirt) exists and, if so, where (Miller and Brown 1981) and thus it remains to critically identify the taxon. The species is, however, well known and illustrated (Scott 1986, Opler and Malikal 1992).

**Etymology.** The name means "having the same parents" and refers to the possible sister species relationship with *S. cestri*.

### *Strymon novasignum*, new species

Figs. 18, 19, 44, 60

**Diagnosis.** Wings. Medium in size [female FW length = 13.1 mm (10.0-14.5 mm, N = 9, types), male FW length = 13.1, 13.6, 13.7 mm] and prominently tailed, with concolorous brown dorsal ground and ventral pattern of black, brown, and gray. In size and pattern suggestive of *S. mulucha*. Like *S. mulucha*, showing succinct white discal slash in VFW discal cell, but, unlike *S. mulucha*, VHW postmedian band comprised of concise brownish black elements, more like tailless *S. crossoea* (see above), but particularly continuous toward the costa. *S. mulucha* shows disjunctive dull suffusive patches in the postmedian band; *S. crossoea* shows concise patches in postmedian and postbasal bands and both sexes generally with silvery blue on the DHW. Morphology. Male genitalia with capsule rather robust like *S. crossoea*, but saccus elongate and asymmetrical as on *S. crambusa*, bilobes not shouldered, but tapering gradually to thinly pointed caudal extensions. Compared to many of the "*crossoea*" group (Johnson *et al.* 1990, figs. 20-27), female genitalia with ductus bursae horizontally looped, as typical of several new species herein, but previously not seen in the "*crossoea*" group except for the superficially distinct Chilean *S. peristictos* Johnson, Eisele, and MacPherson (see Remarks); differing from all known *Strymon* species by the corpus bursae showing extremely enlarged and distally located signa which "balloon" the corpus bursae in the vicinity of the ductus seminalis (see Remarks below). Otherwise similar to *S. mulucha*, but with loop nearer to cervix bursae and horizontal rather than vertical.

**Description.** Male. Forewing with rather pointed apex, termen very slightly convex, distinct black brand (2 mm) in FW discal cell; dorsal ground nearly concolorous dark brown, but with relatively prominent gray overscaling on posterior HW, HW with prominent tail at terminus of vein $CuA_2$, submargins in cells $CuA_1$ and $CuA_2$ with distinct black dots, less prominent dot in $M_3$, small macule of orange at anal lobe, HW with prominent white fringe. VFW gray-brown postmedian band (costa to cell $CuA_1$) slightly offset anteriorly, white distad, blackish basad with a few orange scales anteriorly, paler gray band distad; submargins and margins of each cell with blocks of dark gray-brown, more diminutive at margins; gray-brown ground of disc broken by white mark at apex of discal cell. VHW with mottled gray and white ground basad, post-

basal area with succinct dark gray-brown orbs; median areas with distinct white, this nearly invariably with a dark macule within discal cell; prominent and undulate postmedian band (comprised of nearly continuous blackish brown elements edged thinly with white distad and with orange scales basad); limbal area mottled gray and white, darker gray costad, showing small black "thecla-spot" marginad in cell $CuA_1$ capped with very pale orange, anal lobe black with vague orange basad and along vein 2A. Female. Similar to male; wings somewhat broader and more rounded; no brand. Male Genitalia. Genital capsule broad; saccus long, broad, asymmetrical; vinculum angled in lateral view; valvae slender, bilobes ellipitical, not shouldered, gradually narrowing to thinly pointed caudal extensions; aedeagus slender (1.4x genital capsule length), slightly sinuate, caecum 24% of aedeagus length. Female Genitalia. Showing spiral ductus bursae configuration typical of genus, but horizontally looped. Ductus posterior of loop elongate (exceeding 8x diameter of loop), loop closely proximate to cervix bursae. Cervix bursae with slight dorsal hood, as typical of many *Strymon*, but differing from all by having extremely large sigmoid-shaped signa directly anterior to cervix bursae so as to "balloon" the corpus bursae before the emanation of the ductus seminalis (however, not showing any additional component surrounding the distal end of the corpus bursae as on the species to be described next); papillae anales typical of genus, apophysis extending anterior to the ductal loop.

**Types.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 20 August 1994, *leg.* O. Gomes (GTA #6019). Deposited at UFPC. Paratype females, 62 km S of Ariquemes, Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 4 Nov. 1990 (GTA #4869); Linha C-10, 5 km S of Cacaulândia, 15 Feb. 1994 (GTA #4986); 17 Mar. 1994 (GTA #4988); 7 Sept. 1993 (GTA #6008); 2 July 1994 (GTA #6212); 11 July 1995 (GTA #6266); 2 Aug. 1994 (GTA #6010); 4 Aug. 1993 (GTA #5993). Additional material, males, same location as holotype, 5 Oct. 1994 (GTA #5065); 3 Aug. 1993 (GTA #5994); 31 Aug. 1993 (GTA #6007).

**Remarks.** Characters and Affinities. Johnson *et al.* (1990) defined the "*crossoea*" group by a shared overall ventral wing pattern, clearly shown by all the new species of that group described herein. Those authors stated that the group might not be monophyletic (see also group discussion below), but did serve to cluster numerous similar-looking species for the seminal study of *Strymon* in Argentina. Several of the new "*crossoea*" group taxa from Rondônia show the ductal spiral of the female genitalia in the horizontal plane. This trait was previously known in the "*crossoea*" group only for Chilean *S. peristictos* (Johnson *et al.* 1990: fig. 27) and was generally rare in *Strymon* previously examined. Among the new Rondônian species, and compared to all *Strymon*, *S. novasignum* shows a unique configuration of the corpus bursae, an enlarged signa forming a "balloon" closely adjacent to the point of attachment of the cervix bursae. As discussed further below, previous students of *Strymon* have noted the frequency of autapomorphies occurring at the cervix bursae. In a variety of species, authors have noted "cap-", "fan-", or "cupola-like" structures at the cervix bursae, near or surrounding the point of attachment of the ductus seminalis. The innovation in *S. novasignum* is unique in that it appears on the corpus bursae, behind and detached from the cervix bursae itself. Most interestingly, another new Rondônian species described immediately below shows a very different innovation at this location, a large signa-like component (separate and distinct from the 2 signa common to the corpus bursae in the genus) forming a "dome" over the distal end of the cervix bursae.

**Etymology.** The name is derived by adding the prefix "nova" (unusual) to "signum", and refers to unique size and location of the signa in this species.

### *Strymon clavus*, new species

Figs. 20, 21, 45, 61

**Diagnosis.** Wings. Medium in size (holotype female FW length = 13.0 mm; male FW length = 12.7 mm) and tailed, with dark gray-brown dorsal ground and distinct gray submarginal scaling on HW, ventral pattern of black, brown, and gray and a VFW white discal slash as on several species similar to *S. mulucha*. Ventral color paler than preceding species and at once distinguished from other species with this general morphotype by the more distinct gray on the DHW. Morphology. Male genitalia with capsule slender; prominently angled in ventral and lateral views; saccus broad, long, and slightly asymmetrical; and caudal extensions of valvae very thin. The female shows a unique large "signa"-like sclerotized element atop the cervix bursae in addition to the 2 elongate lateral signa typical of the genus in the corpus bursae.

**Description.** Male. Forewing apex pointed, termen slightly convex; dorsal ground concolorous

dark gray-brown except submargin on posterior 1/2 of HW with prominent gray; HW with prominent tail at terminus of vein $CuA_2$, submargins of cells $CuA_1$ and $CuA_2$ with black dots prominently contrasting with surrounding gray, submargin in cell $M_3$ with vague black macule, anal angle with small orange macule. Venter with complex pattern of black, brown, and gray; FW ground relatively pale gray-brown basad, postmedian band (costa to cell $CuA_1$) slightly offset anteriorly, white distad, black proximad, vague orange proximad of black, pale gray distad of band with submargin and margin of each cell also marked with a small chevron of gray-black; discal area of brown FW ground marked with prominent white slash across apex of discal cell. HW with mottled pattern of white, gray, and brown, marked most prominently by postmedian band of brownish black bars, edged rather vaguely distad with white, most prominent at end of discal cell and with $Sc+R_1$ element slightly displaced basad, a few orange scales on proximal edge of band especially at end of discal cell; median white area rather diffuse; postbasal area more or less distinctly brown; limbal area mottled white, "thecla-spot" submarginad in cell $CuA_1$ black-centered with slight corona of yellow-orange; base of anal lobe with prominent black patch and bright orange along vein 2A, paler orange along anal margin. Female. Similar to male with more rounded wings; no brand. Male Genitalia. Genital capsule rather slender, sides more or less parallel on anterior 1/2 in ventral view; saccus long, broad, triangular, somewhat asymmetrical; vinculum prominently angled in ventral and lateral views; valvae with ellipitical bilobes, not shouldered, but narrowing abruptly to very thin caudal extensions; aedeagus thin (1.4x genital capsule length), nearly straight except for slight bend at caudal end, caecum 24% of aedeagus length. Female Genitalia. Showing spiral ductus bursae configuration typical of genus, but with plane of loop horizontal. Ductus posterior of loop elongate (8x diameter of loop), loop closely proximate to cervix bursae. Differing from all known congeners except *S. spinatus* of the "*ziba*" group by a large "signa"-like sclerotized element atop the cervix bursae closely adjacent to elongate, narrow, and sigmoid-shaped signa which together "balloon" the corpus bursae before the emanation of the ductus seminalis. Papillae anales typical of genus, but robust, apophysis extending anterior to the ductal spiral.

**Types.** Holotype female, Brazil, Rondônia, 67 km S of Ariquemes, Linha C-10, 5 km S of Cacaulândia, Station 19, forest, 19 September 1993, *leg.* O. Gomes (GTA #4870). Deposited at UFPC. Paratype female, 62 km S of Ariquemes, Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 26 Aug. 1992. Additional material, male, same location as paratype, 22 Nov. 1991 (GTA #6006).

**Remarks.** Characters and Affinities. Remarks under *S. novasignum* described immediately above pertain here. As noted therein, the signum-like sclerotization covering the distal portion of the corpus bursae in *S. clavus* is unlike anything seen heretofore in *Strymon* except on *S. spinatus* described above. This innovation on *S. clavus* has the spinate ribs directed caudad whereas these extend cephalad on *S. spinatus*.

**Etymology.** The Latin "clavus" means "spike" and refers to the unique structure on the distal end of the corpus bursae in females of this species.

### *Strymon implexus*, new species

Figs. 22, 23, 46, 62

**Diagnosis.** Wings. Medium in size (female FW length = 13.2 mm [12.0-14.0, N = 6, types]; male FW length = 13.8, 14.9 mm) and prominently tailed, with concolorous relatively pale gray-brown dorsal ground and ventral pattern of brown and gray. In size and pattern suggestive of *S. mulucha*, *S. clavus*, and *S. novasignum*. Like these species showing white discal slash across VFW discal cell, but this is less succinct; unlike *S. mulucha* and *S. novasignum* with paler ventral ground, but browner (not as gray) as *S. clavus*; VHW postmedian band of dark gray-brown elements, these not strongly contrasting as on *S. mulucha*, *S. novasignum*, and *S. clavus*. Morphology. Male genitalia similar to *S. novasignum* with broad genital capsule; saccus shorter, broader, and less asymmetrical; vinculum less angulate; and valvae longer. Female genitalia generally similar to 2 preceding species with ductus bursae horizontally looped, but with no special innovations of the signa, lamellae more robust than on any of the similar taxa above and below.

**Description.** Male. FW apex somewhat rounded, termen convex, dorsal ground nearly concolorous dark brown, slightly paler towards tornus of HW, FW with relatively distinct black brand (2 mm) in discal cell; HW with prominent tail at terminus of vein $CuA_2$, submargins in cells $CuA_1$ and $CuA_2$ with distinct black dot, small vague macule of dull orange at anal lobe, HW with mostly white fringe. VFW pale brown, postmedian band (costa to cell $CuA_1$) strongly offset anteriorly, white distad, brown basad with a few orange scales ante-

riorly, paler gray band distad; submargins and margins of each cell with blocks of dark gray-brown, more diminutive at margins; gray-brown ground of disc broken by white mark at apex of discal cell. VHW with mottled gray and white ground, postbasal area pale brown, median area relatively heavily white scaled, this diffuse, postmedian band undulate, not particularly sharp and contrasting, composed of somewhat disjunct dark gray-brown elements edged thinly with white distad and a few orange scales basad; limbal area gray, mottled with much white, darker gray costad, showing small black "thecla-spot" marginad in cell $CuA_1$ capped faintly with pale orange, anal lobe black with orange basad and vague pale orange along anal margin. Female. Similar to male; wings broader and more rounded; no brand. Male Genitalia. Genital capsule broad; saccus rather long, broadly triangular, slightly asymmetrical; vinculum weakly angulate; valvae slender, bilobes ellipitical, not shouldered, gradually tapering to thin and pointed caudal extensions; aedeagus slender (1.5x genital capsule length), shaft slightly curved, caudal end more abruptly curved, caecum 24% aedeagus length. Female Genitalia. Ductus bursae very slender, with simple, tight, evenly curved horizontal loop at cephalad end, ductus elongate (about 7x diameter of loop); lamellae very broad comprising less than 1/4 ductal length, quadrate caudad; corpus bursae with pair of moderately-sized signa; papillae anales elongate, but otherwise typical of genus, apophysis long, extending to cervix bursae.

**Types.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 18 June 1994, *leg.* O. Gomes (GTA #4984). Deposited at UFPC. Paratype females, same location, 18 July 1994 (GTA #4983); 26 Sept. 1993 (GTA #5996); Linha C-20, Fazenda Rancho Grande, 15 Nov. 1990 (GTA #5995); 18 Nov. 1995 (GTA #6265); 30 Oct. 1990 (GTA #6009). Additional material, males, same location as holotype, 31 Aug. 1993 (GTA #5992); Fazenda Rancho Grande, 8 Nov. 1989 (GTA #5991).

**Remarks.** Characters and Affinities. This species is another which shows a horizontally looped ductus bursae. It differs from the 2 preceding species with this configuration in having no unique innovations of the signa. The rounded FW shape contrasts with those of *S. novasignum* and *S. clavus* which have rather pointed FW apices. The pale, washed out appearing venter distinguishes it from *S. novasignum*.

**Etymology.** The name means "involved", referring to the complex of similar species within the "*crossoea*" group of *Strymon*.

### *Strymon inmirum*, new species

Figs. 24, 25, 47, 63

**Diagnosis.** Wings. Small in size (holotype female FW length = 10.5 mm, paratype females = 10.7, 10.8, 10.9, 11.3 mm; male FW length = 11.0 mm) and prominently tailed, with nearly concolorous brown dorsal ground and ventral pattern of black, brown, and gray. Aside from *S. faunalia* and related species, it is the smallest known "*crossoea*" group species. Venter similar to preceding 3 species, but generally darker and browner than *S. clavus* and *S. implexus* and about the color of *S. novasignum*, differing from the latter by the less distinctly defined white median area on the VHW, especially on the male. Morphology. Male genitalia with capsule slender; saccus broad, weakly asymmetrical; vinculum prominently angulate, but less so than on *S. clavus*; and caudal extensions of valvae long and thin throughout. Female genitalia similar to other new "*crossoea*" group species described above with loop of ductus bursae horizontal, most similar in form to *S. novasignum*, but with smaller signa not expanding corpus bursae caudad and *S. implexus*, but with broader loop and less quadrate lamellae.

**Description.** Male. FW relatively short, apex pointed, termen slightly convex, indistinct black brand (1.5 mm) in FW discal cell; dorsal ground concolorous dark gray-brown except paler with gray overscaling on tornal quarter of HW, HW with prominent tail at terminus of vein $CuA_2$, submargins in cells $CuA_1$ and $CuA_2$ with distinct black dots, less pronounced dot in $M_3$, a few bright orange scales at anal lobe, HW with fringe largely white. VFW gray-brown, postmedian band (costa to cell $CuA_1$) slightly offset anteriorly, white distad, blackish basad with a few indistinct orange scales anteriorly, paler gray band distad; submargins and margins of each cell with blocks of dark gray-brown, more diminutive at margins; gray-brown ground of disc broken by white mark at apex of discal cell. VHW with mottled gray and white ground, median area prominently whitish, postmedian band undulate (but somewhat less so than on many similar species), comprised of nearly continuous blackish brown elements edged about equally with white distad; limbal area mottled gray and white, darker gray costad, showing very prominent black "thecla-spot" marginad in cell $CuA_1$ capped narrowly with orange, anal lobe black with indistinct orange along

vein 2A and anal margin. Female. Similar to male; wings broader and more rounded; no brand; dots on DHW margin larger, more distinct; VHW median white area more diffuse; one individual with orange basad of VHW postmedian band. Male Genitalia. Genital capsule slender; saccus broad, triangular, slightly asymmetrical; vinculum prominently angulate; valvae long with broadly ovate bilobes and long and thin caudal extensions; aedeagus thin (1.4x genital capsule length), straight, caecum 24% aedeagus length. Female Genitalia. Ductus bursae slender, horizontally looped, loop open and evenly curved, ductus posterior to loop elongate (about 7x diameter of loop); lamellae nearly quadrate, of almost equal width throughout and blunt-ended, separated by central fissure; cervix bursae with moderate lateral sclerotization forming bursae into a sac at base of ductus seminalis; corpus bursae with pair of curved signa of moderate size; papillae anales robust, but otherwise typical of genus, apophysis long extending beyond cervix bursae.

**Types.** Holotype female, Brazil, Rondônia, Fazenda Rancho Grande, rd C-20, 7 km S of B-65, 62 km S of Ariquemes, *leg.* J. P. Brock, Deposited at UFPC. Paratype females, same location as holotype, 8 Nov. 1995 (GTA #6268); 9 Nov. 1990 (GTA #6011); Linha C-10, 5 km S of Cacaulândia, 29 July 1995 (GTA #6267); 21 Aug. 1993 (GTA #6013). Additional material, male, Linha 10, 5 km S of Cacaulândia, 5 Aug. 1993 (GTA #6012).

**Remarks.** Characters and Affinities. This is another species of a common morphotype in central Rondônia with a white discal slash on the VFW, mottled aspect on the VHW, and female genitalia with a horizontally looped ductus bursae. It is most similar to *S. novasignum*, but is notably smaller, lacks the dark macule in the median white area of the VHW, has a somewhat stouter loop in the ductus bursae, and the signa does not expand the corpus bursae caudad. *S. implexus* is paler, with a more diffuse ventral pattern.

**Etymology.** This is one of several similar species occurring in Rondônia without a single outstanding character; the name means unremarkable.

### *Strymon incanus*, new species
### Figs. 26, 64

**Diagnosis.** Wings. Small in size (holotype female FW length = 11.0 mm) and prominently tailed, with concolorous brown dorsal ground and ventral pattern of black, brown, and gray. In size and pattern comparable with *S. inmirum* and having a white discal slash on the VFW, but having the VHW pattern fainter. Morphology. Differs from similar congeners by the very short ductus bursae horizontally looped immediately adjacent to cervix bursae.

**Description.** Male. Unknown. Female. Dorsal ground concolorous brown, HW with prominent tail at terminus of vein $CuA_2$, submargins in cells $CuA_1$ and $CuA_2$ with black dot, vague orange at anal lobe. VFW pale gray-brown, postmedian band (costa to cell $CuA_1$) white distad, blackish basad, vaguely paler gray band distad; submargins and margins of each cell with blocks of dark gray-brown, more diminutive at margins, nowhere prominent; disc with white mark at apex of discal cell. VHW with mottled gray and white ground, basal area whitish, vaguely divided into proximal and distal portions by gray ground, postmedian band undulate, composed of disjunct blackish brown elements edged vaguely with white distad; limbal area pale gray with white overscaling, darker gray costad, showing small black "thecla-spot" marginad in cell $CuA_1$ capped with a few orange scales, anal lobe with similar orange. Female Genitalia. Ductus bursae with horizontally looped configuration, loop robust, proximate to cervix bursae, ductus posterior very short (less than 5x diameter of loop); lamella parabolic, rather sharply inclined from ductus in terminal 1/3; corpus bursae with pair of typical moderate-sized signa, papillae anales with apophysis long, extending well cephalad of cervix bursae.

**Type.** Holotype female, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 21 February 1994, *leg.* O. Gomes (GTA #4985). Deposited at UFPC.

**Remarks.** Characters and Affinities. *S. incanus* is similar in size and pattern to *S. inmirum*, but is distinguished by its paler aspect, the vague VHW pattern and the distinct genitalia with the very short ductus bursae with its loop immediately adjacent to the cervix bursae.

**Etymology.** The name means "quite gray" and refers to the ventral aspect of this species.

### *Strymon faunalia* (Hewitson)
### Figs. 27, 28

*Thecla faunalia* Hewitson 1868. Johnson *et al.* (1990) discussed the type of this name.

**Diagnosis.** Wings. Historically, this brown species has stood out by its small size (FW length = 8.5-10.5 mm). However, several other recently described *Strymon* are small (Johnson *et al.* 1990,

Johnson and Kroenlein 1993, this paper). Contrasting with these species and other *Strymon* known from Rondônia, *S. faunalia* shows a single short HW tail and, on the venter, an entire (usually very orderly) postbasal band of suffusive brown orbs paralleled distad by an orderly postmedian band of disjunct suffusive brown orbs, elements of which appear more prominently "edged" distally and basally with white and black rather than concentrically circled as on *S. thius* (Geyer) and a new species described below.

**Remarks.** Characters and Affinities. We find no differences between typical *S. faunalia* as diagnosed and illustrated by Johnson *et al.* (1990) and specimens from Rondônia. Type. Johnson *et al.* (1990:13-14, fig. 23) clarified the type of *Thecla faunalia* Hewitson and treated typical *S. faunalia* from the Argentine fauna.

**Distribution in study area.** Rondônia records are from several locales near Cacaulândia in September and October (GTA #5989, 5990, 6014).

### *Strymon halos*, new species

Figs. 29, 30, 48, 65

**Diagnosis.** Wings. Small in size (male FW length = 10.5, 10.8 mm; female FW length = 9.2 mm) and relatively short-tailed; dorsal ground concolorous dark gray-brown, ventral pattern of black, brown, and gray, male with FW showing diffuse black brand, both sexes with prominent submarginal black macules on DHW on either side of tail. In size and pattern requiring comparison to 2 other small *Strymon*, *S. faunalia* and *S. thius*. *S. halos* differs markedly from *S. faunalia* on the VHW with the postmedian and postbasal band macules larger, more prominent, extremely lunulate, and encompassed by crisp "halos", the costal orb of the postbasal band usually the largest and most prominent and the FW postmedian band broader and comprised of quadrate elements and more distinctly defined. *S. faunalia* shows an entire postbasal band of suffusive brown lunulate elements; its postmedian HW band is comparatively more disjunct and with elements smaller and more distally- and basally-edged and not concentrically circled. Although the VHW pattern of *S. halos* also somewhat resembles the tailess species *S. thius* (FW length = 10.0-12.5 mm, see "Types" under Remarks below), this latter species is bright silvery to pewter blue across the entire HW. Morphology. Male genital valvae elongate, tapered; saccus elongate, funnel-shaped (0.5x length of elongate valvae); slight apodeme at point of attachment of brush organs to vinculum (see Remarks). Female ductus bursae of moderate length and cervix bursae with no specialized sclerotizations surrounding distal end of corpus bursae (see Remarks).

**Description.** Male. Dorsal color dark gray-brown, FW with broad (1.5 mm) suffusive black brand across distal one-half of discal cell, HW with black macules in cells $CuA_1$ and $CuA_2$, the latter usually faint. VFW with pale gray-brown ground from wing base to apical submargin, latter area crossed by 5 or more darker brown and nearly quadrate macules from costa, margins thereafter slightly suffused darker gray-brown with a few macules continuing along submargin to cell $CuA_2$. HW with mottled pattern of white and gray dominated by large white-ringed gray-brown orb postbasal along the costa, prominent postmedian band of well-defined orbs (pronounced costad and distad of discal cell, more diminutive thereafter to anal margin), and prominent gray-black "thecla-spot" appearing somewhat elliptic in shape over light tan limbal ground, narrowly capped with very pale orange. Other than these emphatic elements, remaining HW ground color showing some mottling with darker tan marks across the postbasal area, along margin towards apex, and between "thecla-spot" and anal lobe. There is no prominent black mark at the base of the anal lobe as on the preceding species. Female. Similar to male except for lack of dark FW brand and wings more rounded. Male Genitalia. Generally typical of genus and most similar to genitalia illustrated for *S. mulucha* and *S. faunalia* (Johnson *et al.* 1990: figs. 22, 23) except for broad, funnel-shaped, saccus and more basal and pronounced dorsal apodeme at point of attachment of the brush organs (see Remarks). Female Genitalia. Ductus bursae with horizontally looped configuration. Ductus posterior of loop moderately long (6x diameter of loop), loop comparatively distant from cervix bursae (about 3x diameter of loop); cervix bursae without notable sclerotal elements (see Remarks), area surrounding emanation of ductus seminalis entirely membranous; corpus bursae with 2 narrow and pencilate signa located at about midpoint of sac; papillae anales typical of genus, apophysis not particularly elongate, extending cephalad nearly to cervix bursae.

**Types.** Holotype male, Brazil, Rondônia, 62 km S of Ariquemes off B-65, vicinity Fazenda Rancho Grande, 180 m, 25 October 1989, *leg.* G. T. Austin (GTA#4867). Deposited at UFPC. Paratypes, 1 female, same location, 12 Nov. 1991 (GTA#4868);

2 males, same data as holotype; 1 female, same data as holotype; 1 male, Linha C-10, 5 km S of Cacaulândia, 1 Sept. 1993 (GTA #6017).

**Remarks.** Characters and Affinities. Considering described species of *Strymon*, *S. halos* appears to be a sister of *S. faunalia*, a species with which it has more in common in the genitalia than in wing pattern. Interestingly, there is a new Colombian species of *Strymon* (being described by the junior author and Colombian colleagues) which is closer in wing pattern to *S. halos* than *S. faunalia*, but also shows an additional HW band. One autapomorphy of the genitalia in *S. halos*, the pronouced and basally located apodeme for anchorage of the brush organs, is more like the structures seen in larger-sized *Strymon* species of the "*ziba*" and "*oreala*" groups (Johnson *et al.* 1990: figs. 14-19). Also distinctive in *S. halos* is the marked reduction of sclerotal innovation at the cervix bursae. This condition contrasts with the marked sclerotal elements at this location in the 2 other new species described herein and parallels a trait noted as common to all species of a high Andean and austral lineage of worldwide *Strymon* sens. lat. — *Heoda* Johnson, Miller, and Herrera 1992 (for various species treatments and genitalic figures see Johnson *et al.* 1992a, 1992b; Johnson and Miller 1992; Benyamini and Johnson 1996). *S. halos*, however, shares with all the new species of the "*crossoea*" group described above, the horizontal orientation of the ductal loop. The appearance of various morphological parallelisms in these new species of *Strymon* from Rondônia emphasizes the importance of ascertaining more about their geographic distributions. To date, most morphologically innovative autapomorphies reported in *Strymon* taxa have been from species with very remote or localized distributions. Types. The location of the type of *Thyreus thius* Geyer is unknown (Bridges 1988). Because of this, the species has been confused with *Polyommatus bazochii* Godart (Draudt 1919, Bridges 1988). Johnson (1991) located and illustrated the type of *P. bazochii*. *Strymon bazochii* occurs in Rondônia as noted in a subsequent entry. The need for diagnostic distinction above between *S. halos* and *T. thius* reinforces the view that *T. thius* and *P. bazochii* are distinct species, as does the appearance of the apparent sister species being described from Colombia. Specimens of *T. thius* matching its original description (which we also examined from an original edition, see above under *S. megarus*) and studied by the junior author in 1994 at the NHM, are the basis for comparisons herein.

**Etymology.** The Latin "halos" refers to the haloed lunules of the VHW on this species.

### *Strymon conspergus*, new species

Figs. 31, 32, 49, 66

**Diagnosis.** Wings. Small in size (holotype male FW length = 11.2 mm, paratypes male = 10.0, 11.1, 11.1 mm; female = 11.2 mm from Rondônia, 12.5 mm from Bolivia) with distinctive short tail (appearing "fuzzy" on unworn individuals because of elongation of adjacent fringe scales), dorsum nearly concolorous brown, and, like no other congener, the VHW is covered with numerous lunulate marks (pale brown orbs encircled by black then white), white blotches, and arcs of white chevrons such that hardly any underlying ground color is visible. Pattern is most suggestive of *S. halos*, but *S. halos* is paler and grayer and has longer tails. Morphology. Male genitalia with moderately slender capsule especially cephalad, vinculum distinctly angled in ventral view, saccus narrow, and valvae with no sharp division between bilobes and caudal extensions. Female genitalia with weak, compact, horizontal loop adjacent to cervix bursae, terminal lamellae pointed.

**Description.** Male. FW relatively short, broad, termen very slightly convex; FW with indistinct black brand (1.5 mm); dorsal ground color dark gray-brown; HW with vivid white fringe with black at vein tips, black macules marginad in cells $CuA_1$ and $CuA_2$, and white marginal line from $M_3$ to tornus; HW with short tail at terminus of vein $CuA_2$, appearing broad on fresh specimens due to adjacent elongate, dark fringe scales. VFW gray-brown from base to median area, postmedian band (costa to cell $CuA_1$), narrow, white distad, blackish basad (vague orange basad of black), gray-brown crescents outlined with white along the submargin and gray-brown surrounded by vivid white along the margins; anal margin pale gray. VHW is bespeckled with orbs and white marks so as to nearly obscure any ground color; pattern with all orbs described below basically gray-brown, surrounded by prominent halos of first black and then white, basal area with 2 orbs; postbasal area with 4 or 5 orbs, apex of discal cell with 2 orbs followed by whitish ground and postmedian band of prominent disjunctive orbs; median area immediately adjacent postmedian band with white chevrons adjacent to brown orbs along the submargin; limbal

area breaking the submarginal orb pattern only with a chevron-shaped black, capped with very pale orange "thecla-spot" marginal in cell $CuA_1$, tornus with minute black macule with very pale orange basad. Female. Similar to male; no brand; wings broader and more rounded. Male Genitalia. Genital capsule relatively slender especially cephalad; saccus asymmetrical, narrow, becoming gradually broader to narrow cephalad end of vinculum; vinculum prominently angled especially in ventral view; valvae very slender, bilobes narrowly ellipitical, gradually narrowing to very thin and pointed caudal extensions, no clear separation of caudal extensions from bilobes; aedeagus relatively thin (1.4x genital capsule length), slightly curved caudad, caecum 25% of aedeagus length. Female Genitalia. Ductus bursae with horizontal loop, this compact and nearly of sigmoidal configuration, loop relatively close to cervix bursae; lamella broad, caudal end prominently divided and pointed, papillae anales typical of genus, apophysis extending to cervix bursae.

**Types.** Holotype male, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 23 Sept: 1993, *leg.* O. Gomes (GTA #6016). Deposited at UFPC. Paratype males, same location as holotype, 14 July 1995 (GTA #8002); 20 July 1994 (GTA #6213); 24 Sept. 1994 (GTA #5556); paratype female, same location as holotype, 15 July 1994 (GTA #6214). Additional material, female, BOLIVIA, Rio Taquesta Uma near Puente Villa, Prov. Sud Yungas, Dept. La Paz, 4500', 21 May 1989, *leg.* D. Matusik (AMNH, GTA #7181).

**Remarks.** The overall habitus of this species is like that of the somewhat smaller *S. halos*, but the size and extent of the ventral macules on *S. conspergus* are immediately diagnostic.

**Etymology.** From a Latin word meaning "bespeckled", referring to the profusely orbed pattern covering the entire VHW.

### *Strymon bazochii* (Godart)

Figs. 33, 34

*Thecla bazochii* Godart [1824]. Johnson *et al.* (1990) discussed the holotype of this species.

**Diagnosis.** Wings. Small in size (FW length = 9.0-13.5 mm), tailless and with marked sexual dimorphism. Wing dorsum dark brown variously strewn with silvery blue on FW, generally suffused silvery blue over median to submarginal areas of HW; male FW with black (1 mm) circular brand, both wings of female with much more blue than males. Under surface with distinct, finely mottled, pattern compared to congeners, HW with mottled brown and/or yellow-white markings variously coalescing into median and/or postmedian bands or occasional transverse bars and usually a distinct pale ray across mid wing.

**Remarks.** Characters and Affinities. The most recent treatment of this species in South America was by Johnson *et al.* (1990) including examination of the type specimen. These authors placed this species in the "*crossoea*" group. Dissection of males and females of the "*S. bazochii*" series from Rondônia indicated 2 phenotypes were present. One showed no significant variation from the genitalia illustrated by Johnson *et al.* (1990: fig. 24). The second, described below, differed in genital characters of both sexes; these were reinforced by subtle differences on the wings. *S. bazochii* is generally a xerophile. Type. Johnson (1991; see also Johnson *et al.* 1990) identified the holotype male of this species.

**Distribution in study area.** The short series of 3 males and 1 female are all from Linha C-10, 5 km S of Cacaulândia taken in January, April, May, and July, in 1993 and 1994 (GTA #4992-4994, 6018).

### *Strymon diagonalis*, new species

Figs. 35, 36, 50, 67

**Diagnosis.** Wings. Virtually identical to sympatric *S. bazochii*; relatively small in size; (male FW length = 9.6, 11 3, 11.8, 11.8 mm, female FW length = 10.3 mm); FW termen shorter and this wing less broad; dorsal ground slightly paler, more brown than black; blue of HW not quite extending fully to margin, especially on male; VHW variable and mottled with pale and dark areas, distinct pale diagonal area from base of costa to mid termen, and distinct mid costal orbicular macule; VFW postmedian dark macules somewhat less distinctly offset distad at $M_3$ than on *S. bazochii*. Morphology. Compared to *S. bazochii*, male genital capsule notably more slender as are valvae (in both ventral and lateral views), falces, and saccus; vinculum laterally tapered without prominent angle of *S. bazochii* at cephalad end of brush organ attachment. Female genitalia with ductus bursae showing vertical loop configuration (*S. bazochii* with sigmoidal ductus bursae) and much longer lamellae than on *S. bazochii*.

**Description.** Male. Of small size (9.5-12 mm); FW broad at termen which curves slightly before apex; HW termen convex, obviously produced in

middle, no tails; dorsal ground dark brown; FW uniform with distinct black brand at distal end of discal cell; HW with purple-blue from $M_1$ to 2A including all or posterior 1/2 of discal cell, ending short of margin which has distinct dark macules, largest in $CuA_1$; FW fringe of ground color becoming whitish towards tornus; HW fringe white. Ventral ground color gray-brown; FW with postmedian series of blackish macules, offset slightly distad at $M_3$, outlined distad by white line and then gray band anterior to $M_3$, diffuse submarginal white band from costa to $CuA_2$, outer margin dark brown, anal margin pale gray; VHW mottled with shades of brown and gray, large orbicular macule at mid costa, usually distinct pale diagonal area from near base of costa to termen, dark smudges at wing base and apically, postmedian line obvious posteriorly, composed of series of gray-brown lunules outlined distally by white, "thecla-spot" a small black dot. Female. Similar to male; no brand; broader and more rounded wings; blue of HW less extensive. Male Genitalia. Genital capsule very slender for genus; valvae slender with long, very thin, and sharply pointed caudal extensions; falces thin; saccus narrow, asymmetrical; vinculum tapered laterally, weakly angled; aedeagus thin, nearly straight. Female Genitalia. Ductus bursae with broad vertical loop configuration near the cervix bursae, posterior ductus straight, narrow throughout, terminating in long, broadly ovate lamellae; corpus bursae globular with signa of typical *Strymon* configuration, but much larger than usual, papillae anales long and slender, apophysis long, extending well cephalad of cervix bursae.

**Types.** Holotype male, Brazil, Rondônia, Linha C-10, 5 km S of Cacaulândia, 5 July 1994, *leg.* O. Gomes (GTA#4990). Deposited at UFPC. Paratypes, same location as holotype, 1 male, 12 July 1994 (GTA #4963); 1 male, 13 July 1994 (GTA #4991); 1 female, 16 June 1994 (GTA #5255); 1 male, Brazil: Rondônia; Linha C-20, 7 km E of B-65, Fazenda Rancho Grande, 18 Nov. 1995 (GTA #7184).

**Remarks.** Characters and Affinities. This species is so similar to its sympatric congener *S. bazochii* at the Rondônia study site that it was originally included in the series of that species. Slight variation in wing shape and color prompted dissection of the series; this indicated 2 genitalic phenotypes corroborating the variation seen in the wings. One of these phenotypes matched that shown for *S. bazochii* illustrated by Johnson *et al.* (1990) and this species appears to be widespread northward to Mexico. The second has not been seen from elsewhere and is different yet from a third similar species (undescribed) from the Yucatan region of Mexico and northern Guatemala. Our observation of apparent diversity within "*bazochii*-like" *Strymon* taxa comes simultaneously with a recent communication to us from Dr. Matthew Cock concerning discovery of a distinctive sister species of *S. bazochii* in Trinidad. As with other groups of *Strymon* already mentioned, the *S. bazochii* assemblage appears to be another harbinger of significant sibling species diversity. The eventual elaboration of biological distinctions among species of these groups of *Strymon* will be extremely important to our understanding of speciation in the genus within the Neotropical Realm and niche segregation among *Strymon* species at the local level.

**Etymology.** The name refers to the pale area from the costa to the termen of the VHW.

### Discussion of "*crossoea*" Group

The "*crossoea*" group is recognized by its predominently brown to gray-brown dorsum and mottled VHW pattern of brown, gray, and white. Johnson *et al.* (1990) identified 8 species of the "*crossoea*" group from Argentina and additional previously described species, *S. cestri* and *S. thius* mentioned above, appear to belong here. Thirteen species of this group occur in the central Rondônia fauna, of which 9 are new species. The number of similar sympatric species requires a more thorough discussion than usual.

As noted above, most species are very similar in their superficial and genital characters, but close study reveals unique combinations of characters which readily separate them. These appear as various sublineages as suggested by Johnson *et al.* (1990). Because of these obvious character states, we propose 4 tentative subgroups among the Rondônia fauna as discussed below. In addition, a key is provided to all the Rondônia species of *Strymon* at the end of the general discussion.

The "*crossoea*" subgroup is characterized by well-marked sexual dimorphism in wing shape (male with truncated FW apex, female with more rounded FW apex), the large macules on the VHW, and the hindwing has very short or no tails. This group includes *S. crossoea*, *S. crambusa*, and *S. germana* in Rondônia, plus *S. cestri* of Mexico and Central America. The species from Rondônia are readily separated by wing pattern.

The "*mulucha*" subgroup has no striking sexual dimorphism in wing shape, the VHW pattern consists of a thin, black and white, and undulate

postmedian line, usually has considerable white ventral overscaling, and has a white mark at the distal end of the discal cell on the VFW. Included are *S. novasignum*, *S. clavus*, *S. implexus*, *S. inmirum*, and *S. incanus* in Rondônia and at least *S. mulucha* known from elsewhere. This is a group of very similar taxa, best distinguished by a combination of superficial and morphological characters seen in a series of individuals. The apparent absence of the widely distributed *S. mulucha* in the Cacaulândia area is surprising, as it has been identified in samples from both north and south of this region.

The "*faunalia*" subgroup also has no striking sexual dimorphism in wing shape, the VHW pattern consists of distinctly orbicular macules, and the HW has relatively short tails. Species of this subgroup in Rondônia are *S. faunalia*, *S. halos*, and *S. conspergus*, all relatively easily distinguished by wing pattern.

The "*bazochii*" subgroup is characterized by a relatively prominent sexual dimorphism in wing shape (females with considerably more rounded forewings than males), a VHW pattern usually dominated by a finely mottled pattern and a pale ray from the base of the costa to the mid termen, relatively intense blue on the DHW, and no tail. Two very similar species, *S. bazochii* and *S. diagonalis*, occur in Rondônia, these may usually be separated by wing pattern as noted in our key.

### "*eurytulus*" group

### *Strymon bubastus* (Stoll)

Fig. 37

*Papilio bubastus* Stoll [1780]. Types of this name have not been located (Johnson *et al.* 1990)

**Diagnosis.** Wings. Small to medium in size (FW length = 8.5-14.0 mm), brown on dorsum and venter (DHW hued blue distad in some xeric samples), HW outer margin rounded and tailless; otherwise readily recognized by prominent postmedian band of large and disjunct blackish brown orbs paralleled in the postbasal area by 2 similar large orbs. In addition, the DHW shows a prominent blackish brown orb marginad in cell $CuA_1$.

**Remarks.** Characters and Affinities. Along with *S. bazochii*, *S. bubastus* is a familiar and widespread *Strymon* species needing little additional elaboration here. This species, with the most northerly distribution of "*eurytulus*" group members, was most recently treated by Johnson *et al.* (1990). *Strymon bubastus* appears to be predominently a xerophile and this may explain its apparent rarity in the Rondônian study area. The female from Rondônia matches in all respects the Johnson *et al.* (1990) concept of the species. Type. The type of this species is yet to be located or elaborated (Bridges 1988, Johnson *et al.* 1990).

**Distribution in study area.** A single female from Fazenda Rancho Grande was taken on 2 November 1989 (GTA #5986).

## Discussion

**Characters.** The new taxa described here, although recognizable (especially in series) by wing pattern characters, are typical of *Strymon* species elsewhere in showing various autapomorphic genitalic characters as corroborative evidence of their specificity. As noted in recent studies of *Strymon* (Johnson *et al.* 1990, 1992a, 1992b; Johnson and Salazar E. 1993; Johnson and Kroenlein 1993), the basic morphological ground plan of the genus is so simple that structural differentation appears to occur only in innovations of the male valval and penial apparatus or the female ductus bursae and cervix bursae. Three of the new species described herein show autapomorphies in the region of the female cervix bursae, 2 with a sclerotized structure not resembling anything noted heretofore for the genus. Numerous species of *Strymon* exhibiting extremely odd structural innovations also appear to have very localized geographic distributions (*e.g.*, *S. amonensis* Smith, Johnson, J. Y. Miller, and McKenzie [Mona Island, Puerto Rico]; *S. rhaptos* Johnson, Eisele, and MacPherson, *S. golbachi* Johnson, Eisele, and MacPherson [both shrub-steppe, austral South American]; *S. peristictos* Johnson, Eisele, and MacPherson [coastal dunes, northern Chile], and *S. barbara* Johnson, Eisele, and MacPherson [to date one quebrada in remnant subtropical forest, Salta, Argentina]). It will therefore be of interest to further elaborate the geographic distributions of the new species from Rondônia. It is possible that they occur in other Neotropical samples, but simply have not been recognized, a matter complicated by the aforementioned historical confusion surrounding identification of *S. crossoea* and *S. mulucha*.

Research in the present study reemphasizes the importance of morphological characters in identifying *Strymon* species. As noted in our treatment of the "*ziba*" group, previous views of very generalized wing patterns proved inadequate for accurately identifying members of species groups which show either a spiral or deflexed ductus bursae in

females. Components of both ductus and corpus bursae differ dramatically between certain species groups, and far more precise definitions of the ventral wing pattern (particularly in the postbasal markings) have proved necessary to give accurate external clues to the species. Such discoveries ostentatiously affect views of species diversity among *Strymon*.

**Diversity.** *Strymon* is unusual among Neotropical Eumaeini in having a Nearctic type species (*Strymon melinus* Hübner). The fact that this species has a spiral ductus bursae in the females raises some question regarding the monophyly of "*Strymon*" in Latin America. High Andean and austral lineages of the Strymonia (*Heoda* Johnson, Miller and Herrera; *Eiseliana* Ajmat de Toledo) have already been noted as autochthonous South American entities (see, most recently, Benjamini and Johnson 1996). Certainly members of the "*ziba*" group, lacking the ductal spiral of other *Strymon* and exhibiting a hooded corpus bursae, must also be considered as possibly another distinctive Neotropical entity within the larger worldwide Strymonina infratribe.

Concerning diversity in Latin America, we have discussed previously taxonomic concepts in relation to local species diversities and the recognition of numerous superficially similar sympatric species readily separated by morphological and subtle but consistent external characters (Austin and Johnson 1995, 1996). The well-studied central Rondônia study area has the highest species richness of butterflies known, and many genera studied in detail have been found to contain undescribed species (Austin 1993, 1994, 1995, 1996; Austin and Mielke 1993; Austin and Johnson 1995, 1996; Austin and Steinhauser, 1996). Fortunately for the present study, *Strymon* is one of the many eumaeine genera that, in at least most species, shows clusters of modified pheromonal scales ("brands") on the FW of males. As we have noted previously (Austin and Johnson 1995), distinctive differences in size, shape, and/or placement of such brands are often both a reliable first clue, and eventual independent data set, regarding recognition of otherwise externally similar sister species. The same has proven true concerning different patterns of sexual dimorphism in *Strymon* species, a character not greatly used in the past.

As noted above and in Remarks concerning various *Strymon* species groups, our studies of the samples from Rondônia have indicated that far more precise views of characters are required in order to accurately address diversity. For instance, if we had abided by traditional and misleading views of the "*basilides*" group (generally referring only to dorsally gray-brown individuals with various ventral markings on the hindwing), we would not have differentiated those species with or without spiral ductus bursae in their females. Similarly, the fine-grained taxonomic approach required by these discoveries, particularly among the series available from the study area, allowed identification of numerous additional species in the "*crossoea*" group (and "*mulucha*" subgroup) as well. The challenge now is to study these taxa biologically and discern what biological and/or ecological parameters may further distinguish them in the field. For instance, in studies of Strymonina in Chile (Benyamini 1995), 2 entities described solely from unique morphologies and male scent brands were shown also to have distinctive life histories and field behaviors compared to their superficially similar congeners.

Comparison of taxa numbers among various regional faunal studies lacks real usefulness unless correlated with some biogeographic, ecological, or conservation-related baseline. Disparity in methods and geographic definitions among faunal studies of Neotropical butterflies, particularly of poorly known groups like Eumaeini, makes such comparisons even more problemmatic (Ackery 1984). However, because *Strymon* is a well-known genus and often collected and identified by field workers, some commentary concerning *Strymon* species numbers and general ecology at Cacaulândia appears warranted here.

Twenty-two species of *Strymon* have been documented in the sample from Cacaulândia. The 14 new species are as yet unknown or poorly known elsewhere and the overall number of *Strymon* species near Cacaulândia is greater than reported from variously studied Neotropical regions. Comparatively large numbers of *Strymon* species have been noted from areas of Colombia and Argentina. For instance, Johnson *et al.* (1990) documented 25 species in northwestern Argentina (La Rioja/Cordoba provinces northwestward), 13 of which appeared regionally endemic. The most diverse local faunas, however, included only 10 to 12 species. The species richness and endemism at Cacaulândia appear outstanding, since the area studied is a rather uniform (but variously disturbed) lowland tropical rainforest. The richness parallels the overall species richness of the butterfly fauna there (Austin *et al.*, ms) and may reflect the intensity of

sampling at that site. In contrast, samples from other regional studies of *Strymon* included specimens from more diverse and contrasting biomes.

Other regions also seem to have a comparatively smaller *Strymon* fauna than the Rondônia site. Twelve species occur in the Tikal National Park region, Petén, Guatemala (Austin *et al.* 1996). Eleven *Strymon* species have been recorded in Jalisco, Mexico, but the maximum known from one site is 7 (Vargas *et al.* 1996). Eight species were found at each of the following: Pocus de Caldas, Minas Gerais, Brazil (Ebert 1969), Sierra de Tuxtla, Veracruz, Mexico (Ross 1976), and Guerrero, Mexico (Vargas *et al.* 1991). Other studies encountered fewer species: 6 species on the Central Brazilian Plateau (Brown and Mielke 1967, 1968), 4 species in Oaxaca, Mexico (Luis *et al.* 1991), 3 species at Explorer's Inn Reserve, Tambopata, Peru (Lamas 1994) and at Pakitze, Parque Nacional del Manu, Peru (Lamas *et al.* 1991, Robbins *et al.* 1996), and 2 species at Boca del Chajul, Chiapas, Mexico (de la Maza and de la Maza 1985). Whether this disparity in *Strymon* species richness is real or a function of sampling intensity and/or the result of lumping a suite of very similar species needs to be documented.

The Argentine study, as well as those recently documenting or describing *Strymon* species from Colombia (Johnson and Salazar E. 1993, Johnson and Kroenlein, in press, LeCrom and Johnson 1997), included significant montane and xeric, along with tropical forest components. Also, in the Argentine study, the greatest richness of *Strymon* species was noted either in ecotones or in "hilltop" samples. Physiography of the Rondônia study area is uniformly lowland and, although there has been considerable disturbance of the primary forest habitat in the last 20 years, typical "weedy" butterfly species (*e.g.*, *Danaus* [Nymphalidae: Danainae], *Anartia* [Nymphalidae: Nymphalinae], *Hylephila phyleus* [Hesperiidae: Pyrginae], and *Strymon bubastus* and *S. bazochii* of the present study) do not appear well-established. Thus, we might conclude that regional diversity in *Strymon* may or may not correlate directly with habitat diversity and possibly long-term disturbance. This contrasts with some other groups of Eumaeini (like the "*strephon*" group of Draudt 1919) which are well known among field workers for their great variety within primary rainforest habitats. Mention of the brilliantly colored "*strephon*" group is also relevant here for another comparison. All of the *Strymon* of Cacaulândia, except *S. megarus* (and to some extent *S. bazochii* and *S. diagonalis*), are basically brown, gray, and white in color; this is in contrast to the many brightly-colored *Strymon* species known from throughout the New World tropics and certainly well-represented among the Argentine and Colombian studies mentioned above. This observation appears worthy of field and biological study and may relate to the "strata" within the rainforest occupied by these *Strymon* species.

## Key to the known *Strymon* of central Rondônia, Brazil

The following key will allow the determination of most *Strymon* species, especially females (males are often most easily identified by comparing their ventral pattern with that of determined females) known from the Cacaulândia area and should be used in conjunction with the text and figures herein.

1. VHW pattern with prominent red in post median bands often expanded into orbs ..... 2
—VHW pattern without prominent red in postmedian bands ..... 9

2. Ductus bursae without prominent hood at cervix bursae ..... 3
—Ductus bursae with prominent hood at cervix bursae ..... "*ziba*" group, 4

3. Male with dorsal blue, loop of female ductus bursae distant from cervix bursae ..... "*oreala*" group, *megarus*
—Male unknown, loop of female ductus bursae adjacent to cervix bursae ..... "*valentina*" group, *rotundum*

4. Ductus bursae prominently twisted (nearly 90°) ... 5
—Ductus bursae slightly twisted (much < 90°) ..... 7

5. Corpus bursae with dorsal spinate structure ..... *spinatus*
—Corpus bursae without dorsal spinate structure .... 6

6. Ventral color dark, VHW with submarginal white chevrons distinctly contrasting, postmedian macules bold and distinctly orbicular, hood at cervix bursae robust ..... *ziba*
—Ventral color paler, VHW with submarginal white chevrons weakly contrasting, postmedian macules less bold and more quadrate than orbicular, hood at cervix bursae less robust ... *thulia*

7. Venter pallid, ductus bursae weakly deflexed, hood at cervix bursae elongate and thin ..... *pallidulus*
—Venter darker and more richly colored, ductus bursae strongly deflexed, hood at cervix bursae not elongate, but robust ..... 8

8. Venter very richly colored, postmedian macules on both wings usually very broad, hood at cervix bursae not dome-shaped ..... *latamaculus*

—Venter less richly colored, postmedian macules usually narrower, hood at cervix bursae dome-shaped ..... *tholus*

9. Ventral pattern of descrete dark dots defining postmedian band ..... "*eurytulus*" group, *bubastus*
—Ventral pattern of dark lines or relatively vague orbs defining postmedian bands ..... "*crossoea*" group, 10

10. DHW with intense blue ..... 11
—DHW without intense blue ..... 12

11. Dorsal ground color brownish, wings relatively narrow, male genital capsule slender, female ductus bursae vertically looped, lamellae robust ..... *diagonalis*
—Dorsal ground color blackish, wings broader, male genital capsule more robust, female ductus bursae sigmoidal, lamellae smaller .. *bazochii*

12. VHW with orbicular macules ..... 13
—VHW with linear macules ..... 15

13. VHW macules large ..... *conspergus*
—VHW macules small ..... 14

14. VHW macules distinctly outlined in white and black, costal macule in postbasal band usually very prominent, male genitalia with distinct apodeme at brush organ attachment ..... *halos*
—VHW macules less distinctly outlined, costal macule of postbasal band not prominent, male genitalia without apodeme at brush organ attachment ..... *faunalia*

15. FW termen distinctly angled or produced apically, no white mark in VFW discal cell ..... 16
—FW termen straight or evenly curved apically, white mark in VFW discal cel ..... 18

16. VHW macules very broad, VHW with distinct pale area at mid costa ..... *crambusa*
—VHW macules less broad, VHW without distinct pale area at mid costa ..... 17

17. FW apex produced ..... *crossoea*
—FW apex angled ..... *germana*

18. Generally larger in size (FW > 12 mm) ..... 19
—Generally smaller in size (FW < 12 mm) ..... 21

19. Female corpus bursae with dorsal spinate structure, dorsum dark, venter pale, VFW postmedian band slightly offset ..... *clavus*
—Female corpus bursae without dorsal spinate structure, dorsum and venter pale or dark, VFW postmedian band prominently offset ..... 20

20. Dorsum and venter dark, white of VHW median area distinct and usually with dark dot in discal cell, FW apex pointed, female with signa "ballooning" corpus bursae caudad ..... *novasignum*
—Dorsum and venter pale, white of VHW median area diffuse and without dark dot in discal cell, FW apex more rounded, female with signa not "ballooning" corpus bursae ..... *implexus*

21. Dorsum and venter dark, white of VHW median area distinct, FW apex pointed, loop of ductus bursae distant from cervix bursae ..... *inmirum*
—Dorsum and venter pale, white of VHW median area diffuse, FW apex more rounded, loop of ductus bursae adjacent to cervix bursae ..... *incanus*

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