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TAXONOMIC OBSERVATIONS ON SOME NORTH AMERICAN *STRYMON* WITH DESCRIPTIONS OF NEW SUBSPECIES (LEPIDOPTERA: LYCAENIDAE)

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The Nearctic group of butterflies containing *Strymon calanus* Hübner and its relatives consists of moderate sized, dull colored species characterized by the presence of an androconial stigma on the upper surface of each forewing of the male, the rather short, bluntly pointed forewings, the dark under surfaces of the wings scarcely paler than the upper surfaces, and the presence of narrow to very broad bands or rows of spots, slightly darker than the ground color, on the under surfaces, these darker areas margined at least on one side by white. The best known species of this group are *falacer*, *edwardsii* and *strigosus*. As will be shown below, the last is very distinct morphologically from the others and should probably be placed in a separate group.

The generic name *Strymon* is in general use for these North American forms but may have to be replaced for the species here considered when the genera of the Theclinae are better understood.

The species of this group have been greatly confused, and it is almost impossible to determine to which species certain published records allude. The first species named was *calanus* Hübner (1809). Godart in 1822 named *falacer*. Most subsequent authors (e.g., Doubleday, 1844) until 1926 placed *falacer* as a synonym of *calanus*, but in that year Barnes and Benjamin (1926, Bull. So. Calif. Acad. Sci., XXV, p. 95) showed that *calanus* was the Florida species described in 1883 as *whitfeldi* by Edwards. As a result the wide-

spread form of the eastern United States is now called *falacer*.

The greatest difficulty, however, resulted from the confusion of *falacer* and *edwardsii*. Indeed, Grote and Robinson, misidentifying *edwardsii* as *calanus* (= *falacer*), renamed *falacer* as *inorata*. Scudder in 1870 pointed out the differences clearly, but, of course, called *falacer* by the name *calanus*. Finally, until 1942, *caryaevorus* McDunnough has no doubt been confused with *falacer*.

The even more difficult problem of the identity of *liparops* and its relation to *strigosus* will be discussed under the latter species.

KEY TO THE SPECIES OF THE *Strymon calanus* GROUP

- 1.—Blue spot near anal angle of posterior wing conspicuously capped with red; dark discal bands of under surfaces of wings very broad, the outer ones irregular, outer band of forewing indented by about its width behind M_3 and Cu_2 , that of hind wing with spot in cell R_1 in front of or slightly basad of bar at end of discal cell and spots on either side of vein 1A forming together a deep V; male with androconia on m-cu and first abscissa of Cu_1 of forewing..... *strigosus*.
Blue spot near anal angle without red scales or with only a few near basal margin; dark discal bands of under surfaces of wings narrow to moderately broad, outer band of forewing rarely indented by as much as its width at any point, that of hind wing with spot in cell R_1 almost always at least a little distad of bar at end of discal cell and spot in front of vein 1A not prolonged basally, so that no V is formed; male without conspicuous androconia except in the stigma..... 2.
- 2.—Submarginal row of black lunules of

¹ The authors wish to thank Dr. J. McDunnough and Mr. Nathan Banks for having photographs of certain types made for us, and Mr. L. P. Grey for some notes on the identity of *Strymon liparops* (Boisduval and Le Conte).

- under surface of posterior wing slanting progressively away from margin posteriorly so that those of cells Cu_1 and Cu_2 reach or nearly reach outer discal band; posterior tail more than twice as long as distance between tails. *calamus*.
- Submarginal row of black lunules of under surface of posterior wings closest to margin in region of cell M_3 , lunules of cells Cu_1 and Cu_2 well separated from outer discal band; posterior tails less than twice as long as distance between tails. 3.
- 3.—Outer discal band of under surfaces of both wings broken into a chain of separate spots, one in each cell; antennae with eighteen to twenty-one white annuli visible from above. *edwardsii*.
- Outer discal band of under surfaces of wings not broken into separate spots, or spots at least mostly contiguous, particularly in forewing; antennae with sixteen to eighteen white annuli visible from above. 4.
- 4.—Spots of outer discal band of forewing and anterior portion of hind wing rather broad, spot of cell R_1 of hind wing broad and inner margin scarcely distad of inner margin of bar at end of cell; male terminalia with a large, spiculate process arising basad of each falx. *caryaevorus*.
- Spots of outer discal band rarely broad, spot of cell R_1 of hind wing almost always markedly distad of inner margin of bar at end of cell; male terminalia without a process near the base of each falx. *falacer*.

Strymon strigosus (Harris)

In addition to the characters mentioned in the key, this species differs from all others here considered by the prolongation of the androconial stigma of the male along the veins both basally and apically; by the position of the stigma, its apex being beyond the middle of the wing; by the elongate antennae of the male, the middle segments being over five times as long as broad; by the presence of a small strongly spiculate sclerotization at the apex of the upper surface of the aedeagus; and by the presence of a large entire lobe a short distance basad of each falx.

This species has for several years gone under the name *liparops* (Boisduval and Le Conte), with the gray eastern form often being called subspecies *strigosa* (Harris). The form of this species most resembling

the figure of *liparops* given by Boisduval and Le Conte ([1835?], Hist. Générale Icon. Lepid. Chen. Am. Sept., p. 99, Pl. xxxi) is the Manitoba subspecies, having orange discal areas on the forewings, called *strigosa* variety *liparops* by Fletcher and *liparops liparops* by certain subsequent students. However, *liparops* was originally described from Georgia, and as the larvae and pupae were figured and the food plant known, there is little possibility that this locality could be incorrect. Therefore, Abbot's figure in Boisduval and Le Conte cannot represent the form from Manitoba, nor can it, of course, represent the gray eastern *strigosus* which was described from Massachusetts. The upper surface of the figure of *liparops*, however, agrees rather well with certain specimens of *Strymon favonius* (Abbot and Smith), having unusually large amounts of orange coloration above. *S. favonius*, like *liparops*, was originally described from Georgia. The under surface of the *liparops* figure does not agree with any butterfly known to the authors but resembles *favonius* as much as *strigosus*. The description does not help, apparently having been made from the figures. It is quite clear, then, that *liparops* (Boisduval and Le Conte) is not a member of the *calamus* group as restricted in this paper and is either a synonym of *favonius* or a species not collected in Georgia since the days of John Abbot, which is most unlikely. For the present we relegate *liparops* (Boisduval and Le Conte) to the synonymy of *favonius*. The species usually called *liparops* becomes *strigosus* (Harris).

Fletcher in 1903, realizing that the name *liparops* was not applicable to the eastern *strigosus*, disregarded the former as an unrecognizable species. However, with the remark that it seemed well to preserve the name, he called the Manitoba subspecies "*Thecla strigosa* Harr., var. *liparops*, n. var." and designated cotypes for this variety. Of course, *liparops* Fletcher is a homonym of *liparops* Boisduval and Le Conte and is renamed *fletcheri* Michener and dos Passos in this paper.

Strymon strigosus is divisible into at least three distinct subspecies.

***Strymon strigosus strigosus* (Harris)**

Thecla strigosa HARRIS, 1862, in Morris, Smithsonian Misc. Coll., p. 101.

Thecla liparops, SCUDDER, 1875, Bull. Buffalo Soc. Nat. Sci., III, p. 111.

Thecla liparops pruina SCUDDER, 1889, Butterflies of East. U. S. and Can., II, p. 879.

In this subspecies the upper surfaces of the wings are uniformly gray brown except for a small orange area sometimes present at the apex of the cell Cu_1 . Rarely a small ill-defined fulvous area may be seen on the disc of the forewings. White margins of the bands of the under surfaces of the wings are conspicuous, although rather narrow. The tail at the apex of Cu_2 of the posterior wing is longer than the interspace between the tails. In some specimens a weak purplish sheen may be seen on the under surface.

This form, although rather rare, occupies an extensive area from Quebec south to Illinois and, according to Field (1938, Bull. Univ. Kansas, Biol. Series, XXXIX, No. 10, p. 148), to Kansas. In the Rocky Mountains and in Manitoba it is replaced by other subspecies. The southern extremity of the distribution of *strigosus* in the east is usually given as Georgia, a statement based on the description of *liparops* from that state by Boisduval and Le Conte. We have shown that *liparops* is not the same as *strigosus*. The southernmost valid records of the latter which we have found are Virginia (Clark and Clark, 1937, Proc. Biol. Soc. Wash., L, p. 89) and Tennessee (Richards, 1931, Bull. Brooklyn Ent. Soc., XXVI, p. 249).

***Strymon strigosus aliparops*,
new subspecies**

Forewing with orange brown discal patch extending little basad of $m-cu$ and separated from outer margin of wing by a dark band often nearly as wide as the orange brown area; under surfaces of wings brown, usually somewhat darker and with more conspicuous purplish reflections than in *strigosus* in the strict sense, white streaks narrow and rather inconspicuous; tail at apex of Cu_2 of posterior wing longer than distance between the tails.

TYPE MATERIAL.—Holotype, male, Glenwood Springs, Colorado, July (Osler; collection of E. I. Huntington). Allotype, female, Aspen, Colorado, 8000 feet, July

24–27, 1919 (H. F. Schwarz). Paratypes, four males: one with data of holotype; one Plainview, Jefferson County, Colorado, 7000–8000 feet, July 9–14, 1922 (collection of E. I. Huntington); one, Meeker, Colorado, 6200 feet, July 20–21, 1919 (F. E. Lutz); one, Montana (collection of Hy. Edwards). All types are in the collection of The American Museum of Natural History.

In its characters this subspecies stands intermediate between *strigosus* in the strict sense and *fletcheri*, having long tails, as in the former, and undersurface coloration and upper discal maculation of the forewing intermediate between the two.

Were its range between the areas of *strigosus* and *fletcheri*, such specimens would be regarded as intermediates. However, it occurs in the mountains southwest of the range of *fletcheri*, while *strigosus* occurs east of that subspecies.

***Strymon strigosus fletcheri*, new name**

Thecla strigosa var. *liparops* FLETCHER (not Boisduval and Le Conte), 1903, Trans. Royal Soc. Can., (2) IX (Sect. 4), p. 211; 1904, Can. Ent., XXXVI, p. 124.

In this subspecies the upper surface of the forewing is provided with a large orange brown area on the disc. This area extends basally usually nearly to the fork of Cu and is separated from the outer margin of the wing by a dark band often less than half as wide as the orange brown area. The under surfaces of the wings are very dark brown with dark purplish or greenish metallic reflections and with the white streaks commonly faint and inconspicuous. Tail at end of Cu_2 of posterior wings usually shorter than distance between the tails.

This subspecies occurs in Manitoba, specimens at hand being from the Riding Mountains, Miniota and Sand Ridge.

The cotype (male) of *Thecla strigosa* var. *liparops* Fletcher in the United States National Museum is here designated lectotype. This specimen is, of course, the type of *fletcheri*.

***Strymon calanus* (Hübner)**

Rusticus calanus HÜBNER, [1809], Samml. exot. Schmett., I. Pl. c.

Thecla Whittfeldi EDWARDS, 1883, Can. Ent., XV, p. 136.

This species, except for its larger size and longer tails, is scarcely distinguishable morphologically from *falacer*, the terminalia being very similar to those of that species. It is, however, ordinarily quite distinct in pattern. Correlated with the course of the submarginal row of lunules of the under surface of the posterior wings, described in the key, the blue spot of that wing is much longer than broad. Red spots in cells Cu_1 , M_3 , etc., of the posterior wings beneath are fused, and the black beyond that in Cu_1 is in the form of a transverse bar, not a spot or lunule. Most females and many males exhibit an orange spot near the apex of cell Cu_1 on the upper surface.

This large species was formerly thought to be exceedingly rare if not extinct, but it is now known to be rather widespread although local in central and northern Florida; specimens at hand are from Indian River, Apopka, Ocoee, Roek Springs and Jacksonville.

One female and three male specimens in the W. H. Edwards' collection at the Carnegie Museum, bearing labels in Edwards' hand, are toptotypical and without doubt cotypes of *whittfeldi*, although not bearing type labels. Two of them have been referred to as "types" by Holland (1931, Butterfly Book, Second Edition, p. 236), and the female is here designated as the lectotype.

Strymon edwardsii
(Grote and Robinson)

Thecla Edwardsii GROTE AND ROBINSON, 1867, Trans. Am. Ent. Soc., I, p. 172; SAUNDERS, 1869, Can. Ent., I, p. 99; SCUDDER, 1870, Proc. Boston Soc. Nat. Hist., XIII, p. 276.

Thecla Fabricii KIRBY, 1871, Syn. Cat. Diurn. Lepid., p. 654.

This species closely resembles *S. falacer* in size and general appearance and in the structure of the terminalia. It differs from *falacer* by the characters mentioned in the key, and from typical *falacer*, in addition, by the presence of a conspicuous marginal orange red area in cell 1A of the posterior wing beneath. This red area is usually

reduced or even entirely wanting in eastern specimens of *falacer*.

This is a widely distributed species, ranging from Ontario to Florida and thence far beyond the Mississippi River. Apparently it becomes rare in the West, but specimens are at hand from the Riding Mountains, Manitoba, southern Colorado, and Kerr County, Texas. A single specimen bears the possibly incorrect label "Utah." A small series from Omaha, Nebraska, consists of unusually large individuals with more extensive orange areas than usual.

The specific name *edwardsii* has usually been credited to Saunders. Apparently it was first used in print by Grote and Robinson (1867) who credited it to Saunders, saying that it was to their knowledge previously unpublished, and placing it as a synonym of *calanus*. As shown by Scudder (1870) the *calanus* of Grote and Robinson was the species now called *edwardsii*. Their placement of the name *edwardsii* under their *calanus* is as definite an indication of the species involved as a bibliographic citation, and hence the name *edwardsii* was nomenclatorially validated by and must be credited to Grote and Robinson, as stated by Barnes and Benjamin (1926, Bull. So. Calif. Acad. Sci., XXV, p. 94).

Saunders in 1869 was the next to use his name *edwardsii*, and he also placed it as a synonym of the *calanus* of Grote and Robinson.

Finally Scudder in 1870 realized that *calanus* Grote and Robinson was not *calanus* Hübner and proposed to call the former *edwardsii* Saunders. It was Scudder who first clearly stated the characters of *edwardsii*, and the species might reasonably be credited to him.

In view of this unusual means of validating the name *edwardsii*, it is not surprising that no type specimens exist. We therefore designate as neotype a male from Queenstown, Ontario, July 11, 1904, from the collection of Mr. Wm. P. Comstock. This specimen is in the collection of The American Museum of Natural History.

Strymon falacer (Godart)

In this species, as in *edwardsii* and *calanus*, the male terminalia lack a process arising basad of each falx. There is considerable variation in the maculation of the under surface, so that a few individuals closely approach *caryaevorus* in appearance. The species is divisible into two subspecies.

Strymon falacer falacer (Godart)

Polyommatus falacer GODART, 1822, in Latreille and Godart, Ency. Méth., p. 633.

Thecla calanus, DOUBLEDAY, 1844, List. Spec. Lepid. Ins. Coll. Brit. Mus., II, p. 30.

Thecla lorata GROTE AND ROBINSON, 1868, Trans. Am. Ent. Soc., I, p. 171.

Thecla inorata GROTE AND ROBINSON, 1868, Trans. Am. Ent. Soc., I, p. 323.

? *Thecla heathii* FLETCHER, 1904, Can. Ent., XXXVI, p. 125.

In this subspecies there is rarely orange on the upper surfaces of the wings or on the under surfaces of the forewings; the orange line at the apex of cell 1A on the under surface of the posterior wing is reduced or absent, and orange or red lunuli rarely extend anterior to vein M_3 .

This subspecies occurs from Ontario and Quebec to northern Florida and westward to northern Texas, Kansas and the Riding Mountains of Manitoba.

Thecla lorata was based upon a specimen having an artificial dark line across the under surface of each wing near the base. *T. heathii* is known from a single specimen from southern Manitoba and is said (Field, 1938, Bull. Univ. Kansas, Biol. Series, XXXIX, No. 10, p. 146) to be an aberration of *falacer*. It was collected at a locality where *falacer* occurs and at the same season that the latter species flies.

Strymon falacer godarti Field

Strymon falacer godarti FIELD, 1938, Jour. Kansas Ent. Soc., XI, p. 129.

The orange markings in this subspecies are paler and more extensive than in typical *falacer*. The posterior wing above often bears an orange spot at the apex of cell Cu_1 , and the under surface usually shows a well developed orange area at the apex of cell 1A and at least traces of orange lunules in front of vein M_3 . The under surface of the forewing often exhibits faint

orange areas immediately distad of the submarginal row of dark crescents. The outer discal band is often narrower than in typical *falacer*.

This is a Rocky Mountain subspecies, occurring in Colorado and New Mexico. A long series from Jemez Springs, New Mexico, exhibits remarkable variability, some individuals being almost indistinguishable from typical *falacer*. Specimens from Omaha, Nebraska, are intermediate between *falacer* and *godarti*.

Strymon caryaevorus McDunnough

Strymon caryaevorus McDUNNOUGH, 1942, Can. Ent., LXXIV, p. 1.

This species is similar to *falacer falacer*, but the unusually large male terminalia are conspicuously distinct, being provided with a long spiculate heavily sclerotic process arising basad of each falx. The outer lobe of the base of each clasper is longer than in *falacer*. In pattern *caryaevorus* differs from most specimens of *falacer* in the slightly smaller and more elongate androconial stigma, broader outer discal band of the under surface of the wings with the spot in cell R_1 of the posterior wings usually but little distad of the spot at the end of the discal cell. The red lunules in cell Cu_1 are narrow and paler than in most specimens of *falacer falacer*.

A very few specimens of *falacer* can scarcely be distinguished from *caryaevorus*. This is especially true of females in which the rather constantly smaller stigma of *caryaevorus* is not available as a character. One male individual of *caryaevorus* which we have examined has the spot of cell R_1 of the under surface of the secondaries rather small and distad to the discal bar, as is usual in *falacer*, yet it has the slender stigma and terminalia of *caryaevorus*. A few specimens of a rather large series of *falacer* from Somers, New York, have the spot in cell R_1 of the secondaries broad and in front of the discal bar, as in *caryaevorus*. In other characters they agree with *falacer*. Even the size and shape of the stigma are not constant, since one male at hand has the terminal characters and maculation of *caryaevorus*, but the stigma is nearly of the same size and shape as in certain

falacer. Thus, while the large majority of the specimens may be placed unhesitatingly in one species or the other after a study of the color pattern, a few (about four per cent in a series of 125 specimens of *falacer*) cannot be placed without examination of the genitalia.

S. caryaevorus was described by McDunnough on the assumption that it was the species which generally feeds on hickory (*Carya*) as distinguished from *falacer* whose host he regarded as oak (*Quercus*). Through the courtesy of Mr. Wm. P. Comstock we have been allowed to study a very interesting series of *falacer* bred by Mr. Frank E. Watson on hickory, oak and butternut (*Juglans*). All of these specimens are *falacer*, quite distinct from the relatively rare *caryaevorus* which may also feed on several food plants.

Specimens of *caryaevorus*, previously known only from Ontario and Quebec, are

at hand from Lake Jefferson, Lesueur County, Minnesota, July 14, 1915 (R. A. Leussler; collection of E. I. Huntington) and Johnstown, New York, July 10, 1930 (D. Fraser).

The *calanus* group as here treated can be placed in check-list form as follows:

- edwardsii (Grote and Robinson)
- fabricii* (Kirby)
- calanus (Hübner)
- whittfeldi* (Edwards)
- falacer (Godart)
 - lorata* (Grote and Robinson)
 - inorata* (Grote and Robinson)
 - ab. *heathii* (Fletcher)
 - a. *godarti* Field
- caryaevorus McDunnough
- strigosus (Harris)
 - ab. *pruina* (Scudder)
 - a. *aliparops* Michener and dos Passos
 - b. *fletcheri* Michener and dos Passos

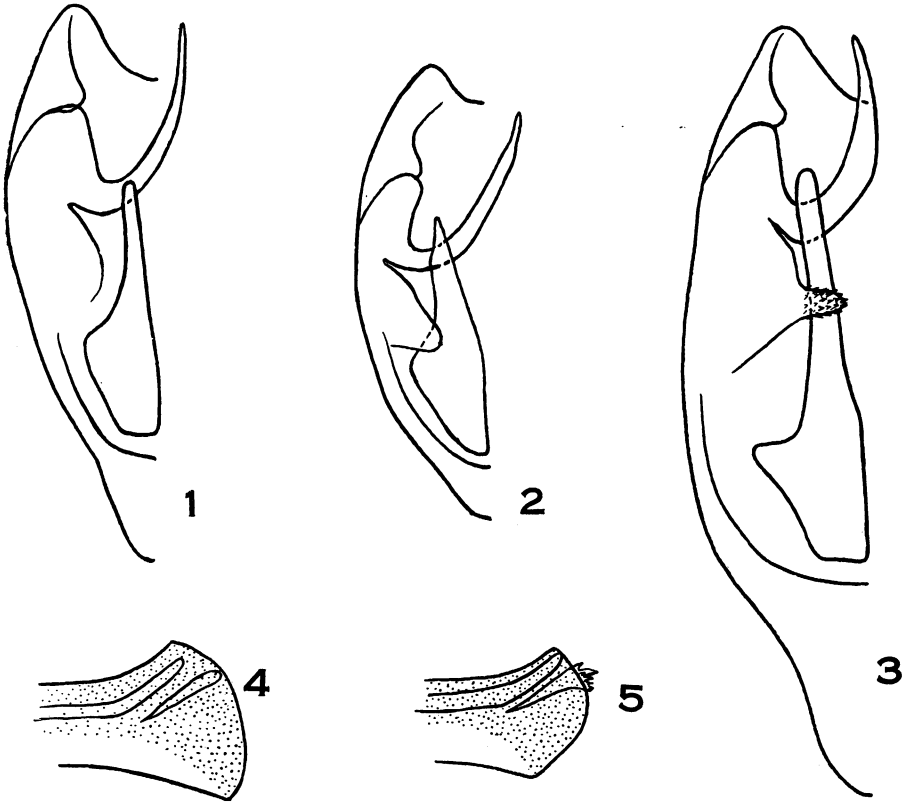


Fig. 1. Ventral view of terminalia (aedeagus and entire right-hand side omitted) of *Strymon falacer* (Hübner).
 Fig. 2. Same, *Strymon strigosus* (Harris).
 Fig. 3. Same, *Strymon caryaevorus* McDunnough.
 Fig. 4. Lateral view of apex of aedeagus of *Strymon falacer* (Hübner).
 Fig. 5. Same, *Strymon strigosus* (Harris).

