THE NEARCTIC FORMS OF LYCÆIDES HÜB. (LYCÆNIDÆ, LEPIDOPTERA) [1]

By V. Nabokov

Museum of Comparative Zoölogy

What follows is a brief summary of some conclusions mainly relative to the classification of the American forms of *Lycœides* Hübner, 1823 (Plebejinæ). This genus comprises at least half-a-dozen structural (genitalic) unities which may be termed species, and a full account of its morphology will be published in due time. Except in one inevitable case, no new names are introduced, as it is felt that further study might result in some equilibrium of the variational scheme in *Lycœides*, so as to avoid a chaotic accumulation of poorly balanced "subspecies."

Owing to the abundant Holarctic material in the Museum of Comparative Zoölogy, and thanks to generous loans from the American Museum of Natural History and from private collections (I have especially to thank Mr. H. K. Clench and Mr. Don B. Stallings), a considerable number of specimens could be examined; of these, some 350 were dissected and measured.

Three specific categories may be distinguished as affecting the classification of the Nearctic forms:

argyrognomon Bergsträsser, 1779, Nomencl. 2:76 (Tutt, 1909, Brit. Butt. 3 pl. 50, fig. 2, male genit.; *argus* [L.] Hübner, [1800], Samml. europ. Schmett. fig. 316, male; Scudder, 1872, 4th Ann. Rep. Peabody Acad. Sci. 1871:54; Reverdin, 1917, *in* Oberthur, Et. Lép. Comp. 14 pl. 1, 2, fig. 1, 1a, male genit.; *idas* L [*nom. præocc*], *auct., pro part.; non argyrognomon* Beuret, 1935, Forster, 1936).

scudderi Edwards, 1861, Proc. Acad. Nat. Sci. Philadelphia, 1861:164 male; Scudder, 1889, Butt. N. Engl. 2:967, line 22; Stempffer, 1933, Bull. Soc. Ent. France 102:110, 111, fig. 1, male genit.; *non scudderi auct.* [nec female *scudderi* Edw., 1861, l.c. = (*Agriades*) *aquilo* Boisduval, 1832]

melissa Edwards, 1873, Trans. Amer. Ent. Soc. 4:346 (Mead, 1875, Rep. Lep. Colorado etc.:783, pl. 36, fig. 5, 6, male, 7, 8, female; Chapman, 1917, *in* Oberthur, Et. Lép. Comp. 14, pl. 9, fig. 25, male genit.).

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Besides being dissimilar both in specific expression of generic external variation and in the basic shape of the male armature (e.g., the "retroussé" spur [processus superior of the valve] in *argyrognomon*, the spare tapering weakly hooked falx in *melissa*) these three unities are separated throughout the numerous forms that cluster around the three peaks of speciation by constant relations between certain parts of that organ when its dorsum is viewed from below. If F ("forearm") denotes the length of the falx from its distal point to its elbow; H ("humerulus") the length of the falx from elbow to shoulder point; and U the length of the uncus lobe from its tip to the shoulder of the falx, then the following three categories can be formulated:

(1) argyrognomon:	H greater than U, F/H smaller than in (2)
(2) scudderi:	H equal to U, F/H smaller than in (3)
(3) melissa:	H smaller than U.

The Palearctic and Nearctic forms of *argyrognomon* are not only absolutely conspecific, but in one or two cases are strikingly alike exteriorly. *Argyrognomon* was presumably derived from a form of which the Central Asiatic *agnata* Staudinger, 1889, is the closest image to-day. *Scudderi* and the Asiatic *cleobis* Bremer, 1861 (?*subsolanus* Eversmann, 1851 [2]) are, except for a more robust build in the *cleobis* organ, practically identical in genitalic structure (and share at least two peculiar underside characters), but either have not been in touch for a longer time or are coincident species *i.e.*, separately evolved from initial *argyrognomon*-like structures (*scudderi* decreasing in the *argyrognomon* H while *cleobis* arrived at the same proportional result by an increase in the *argyrognomon* U). We find these two on parallel lines which after passing through two coincident stages have widely diverged to produce *melissa* on one hand and *ismenias* Meigen, 1830 (Heydemann, 1931; *insularis* Leech, Verity, 1921, *nec* Leech) on the other. This scheme of course is not a phylogenetic tree but merely its shadow on a plane surface, since a sequence in time is not really deducible from a synchronous series. What seems certain, however, is that *scudderi* in its actual structure stands about

[2] Eversmann's type of *subsolanus*, if it still exists, should be examined: his lucid description (grotesquely mistranslated by Rühl and thus copied by Seitz) seems to me to fit quite exactly the species known as *cleobis* Bremer.

midway between *argyrognomon* and *melissa* — somewhat closer perhaps to the former than to the latter.

The *Lycœides* variation in color and pattern as expressed in more or less constant races of each species can only be briefly alluded to here. Its scope in regard to the male upperside does not seem so wide in the American *argyrognomon* and *scudderi* as it is in the palearctic *argyrognomon* and *cleobis*, in both of which the upperside may be, racially, almost or totally devoid of optical scales, thus leaving the richly pigmented fuscous surface intact. In the nearctic groups, both in *argyrognomon* and in *scudderi*, the optical spread transcends at least the subterminal limit so that the insulæ of the secondaries (the silhouetted in fuscous pigment counterparts of the underside præterminal spots), if not circumviated more or less completely by the violet blue, are left sometimes encased in a slightly less compact fuscous which the eye sees as a thick, sometimes crenulated, "black border." The effect of crenulation may be enhanced by the strong development of terminal triangles and cilian markings in both these species as well as in *ismenias*. In *melissa* the blue extends at least to the circumviating stage but more often swamps the insulæ to reach a terminal limit (that last bulwark of tenuous fuscous which is not crossed in any Blue) so that on the upperside the male *melissa* may be said to be (as far as is known) the least variable of the polymorphic Lycæides species.

On the underside, however, all three pass through a gamut of coloration just as wide as in the palearctic forms. Each of them goes racially from the nearest approach to the basic pigmentation of the upper surface, namely from brown or brownish fawn, through fawn, pale fawn and greyish fawn, to greyish and almost pure white. If a combination of characters does not produce in both sexes some striking and constant aspect in a more or less extensive population, and insofar as tangible objects, and not ecological or other causalities, should receive systematic names, it seems to me quite useless to separate a series of, say, pale underside Yakima *melissa* from equally pale Nevada series, or a darkish underside Texas series from a similar one collected in Saskatchewan.

The rhythms in the pigmentation of the spots, in the spread of the underside optical scaling and in the structure of the mar-

ginal ornamentation [3] cannot be treated here; but a few words in regard to the disposition of the extradiscal series as I understand it may be of use. What we see as a transverse, more or less sinuous "line" or "row" of spots seems to me to be the outcome of two unrelated phylogenetic phenomena. The "upper" part of the "row" (from the last radial interspace to the last median one) is formed by spots having radiated fanwise from the discoidal owing to an apicoid extension of the wing texture; the "lower" part (spot in Cu_1 and the two Cu_2 spots, separated by the memory of an A_1 nervule) have been pulled out from a subcellular position (in the proximal corners of their respective interspaces) presumably by a cubitoid extension which did not necessarily occur at the same time as the other. Had not a third phenomenon taken place — namely the appearance and expansion of subterminal ornamental markings ("caudæ pavonis") which held the advancing spots at bay — the latter might have gained the practically prætерminal position which they reach in some *Glaucopsychinæ*. This is why the classical conception of a row of ocelli as the result of a statically placed line or band having broken up into spots, seems to me absolutely irrelevant to the understanding of the Lycænidæ pattern. Insofar as spots have been evolved in this family, they occupy different positions in different species or genera, and what we see is not the remnants of a definite band in a definite place, but this or that stage of a more or less coordinated longitudinal movement of spots distad along the interspaces (certain comet-tail traces of this progress are sometimes caught and fixed aberrationally). In a word it is not a row of squares on a chessboard, but a shifting line of attacking pawns.

Lycæides argyrognomon Bergsträsser

As represented by my material, the nearctic *argyrognomon* forms, contrary to those of *melissa*, may be for convenience's sake divided into groups A and B ("white underside" and "fawn underside") and each may be subdivided again into 1 and 2 ("weakly marked" and "strongly marked"). A1 to A2 is expressed by *argyrognomon anna* Edwards, 1861 (Proc. Ac.

[3] The latter shows a tendency towards obliteration throughout the Nearctic *Lycæides* — a feature unknown racially (except perhaps in the case of the Corsican *argyrognomon bellieri* Obthr) among western Palæarctic forms and paralleled only by certain Central Asiatic ones.

Nat. Sci. Phil. 1861: 163; Strecker, 1874, Lep.: 88, pl. 10, fig. 4, male, fig. 5., female; Stempffer, 1933, Bull. Soc. Ent. France 102: 111, fig. 2, male genit.).[4]

"Typical" fairly weak *anna* is represented by series from California (seven stations), Nevada and Oregon. A stronger *anna* comes from "Glacier Pt." (it is figured by Wright, 1906, Butt. W. Cst, fig. 384, *anna*), and a form of *anna* with all markings as well developed as in any *Lycœides* is provided by a pair from "Pt. Arena," Mendocino Co. What I suppose is *ricei* Cross (1937, Pan-Pacific Ent. 13:88) is represented by a small, very weak underside *anna* form with a uniformly brown female from Oregon ("Kirk") and by a series without locality data mislabeled "*annetta*." A form from "Yakima R." and another from "Vancouver Isl." may be also placed under *anna*.

The other, B group with fawn or whitish fawn underside, represented by long series, has apparently never been detected before and may eventually require a subspecific name to counterbalance the *anna* group. Of B1 I have a series from Washington ("Brewster"): these specimens, if I am American-minded, look like unusually dingy or dusty underside "*anna*" and if I am European-minded, curiously resemble certain weak Swiss forms. Of B2 I have series from Brit. Col. ("B.C.," "Fernie," "Cranbrook," "Michel," "Landsdowne") and from Alberta ("Calgary," "Didsbury," "Carbon," "Laggan"), darkish "black-border" specimens (see above, discussion of *Lycœides* pattern), with an underside resembling series of *argyrognomon singularis* Heydemann, 1932, and other strong W. European races.

Lycæides argyrognomon, trans. ad **scudderi** Edwards

I have not yet examined Edwards' specimens of *kodiak* Edwards (1870, Trans. Am. Ent. Soc. 3:20). Judging by its O.D. and the colored photographs professing to illustrate it (Wright, 1906, *op. cit.*, fig. 365; Holland, 1930, Butt. Bk. pl. 66, fig. 14, 15), it seems somewhat similar to what I have as "*kodiak*" from Alaska ("McKinley").

In this series a twofold individual variation (on the general basis of a dingy underside tone with faint dull fulvous lunules)

[4] In the case of this form, as in that of the *nom. sp. argyrognomon* and *melissa*, I give only the most pertinent bibliographic data. A fuller synonymy, as well as complete data and acknowledgments in regard to the series of specimens mentioned here, will be given in the main work.

easily allows the eye to sort out the "*argyrognomon*" and the "*scudderi*" specimens. Genitalically they do represent these two species but the twofold variation mentioned is shared by examples of structural *argyrognomon* and structural *scudderi* in such a way as not to correspond to the definite specific differences in the valve and the falx; so that not only are they inseparable by the shuttling external characters, but all the examples look as if they belonged on the whole to one "arctic" race of one and the same species. Here we put our finger on something very like the actual evolution of *scudderi* from *argyrognomon*, and I have discovered an analogical case in the Palearctic, where *cleobis kenteana* Staudinger, 1892, (*?ida* Grum Grshmaïlo, 1891)[5] is linked up with a most interesting (undescribed) "black" form of *argyrognomon* from North-Eastern Asia. Otherwise, throughout their nearctic distribution wherever a *scudderi* form comes from the same locality as an *argyrognomon* one, both series are correctly separable at a glance. On the other hand in the case of forms from widely separate regions, such as the distinctly marked Glacier Pt. form of *argyrognomon anna* and the ridiculously similar talcum white underside *scudderi* from Riding Mts., Manitoba (kindly loaned me by Dr. Gertsch of the Am. Mus. Nat. Hist. and by Don B. Stallings), the two can be distinguished externally only by the wider terminal space in the former.

Lycæides scudderi Edwards

scudderi Edwards.

The types are lost. The name is precariously poised on the brink of synonymity into which it is drawn by the alien *aquilo* female. The type locality is not the vague "Lake Winnipeg" as given by Edwards, but the more Western "mouth of the Saskatchewan" mentioned by Scudder who took the type specimen there in 1860. I find it just possible however to save the name by applying it to the *Lycæides* species the organ of which was figured by Stempffer in 1933 (from a Brit. Col. specimen). Up to now it has been confused by all authors with the Eastern subspecies of *melissa*, Ontario specimens of which Edwards misidentified as his *scudderi* in 1862 (Proc. Acad. Nat. Sci. Philadelphia 1862:225).

[5] I question the accepted identity of *kenteana* Staudinger with Grum Grshmaïlo's *ida* from Amdo.

Most of the Northern specimens are greyish, whitish-grey or white on the underside, but in some cases, when sympathetically examined, or when the whitish bloom has worn off, may be said to fit in with the "dark grey" of Edwards' very poor description.

scudderi scudderi Edw.

Male. Upperside: rather strong terminal line; discernable insulæ in secondaries. Underside: greyish; fuscous spotting delicate but fairly distinct; white arches ray-like in secondaries, i.e. separated throughout by the greyish ground along the vein (a character not represented in my *melissa* material) and fused with the extradiscal halos; fuscous arches on both wings fairly strong, though not distinctly pointed; fulvous arches weak, thin, disconnected from præterminal spots (a character found also in "weak" specimens of *argyrognomon anna* and in some *melissa annetta*) by the ground which is quite whitish towards the termen; præterminal spots in secondaries touched up with ("aquamarine") optical scales conspicuous only in Cu_1 and annally; quite strong terminal line with well-developed triangles and cilian points. [Extradiscal spot in Cu_1 aberrationally distended as it was in Edwards' type specimen.]

Male, neotype, "Saskatchewan. Kennicott." Slide No. 168. Mus. Comp. Zool.

This description holds good for most Northern individuals of *scudderi scudderi* (except that the iridescence may develop in a greater number of spots and that the ground may be quite white throughout with a pale blue dusting of basal optical scaling). Northern females are generally "blue" with, if at all, weakly developed fulvous arches, upperside. My material comes from: Saskatchewan ("Narlan"); Manitoba ("McCreary," "Beulah," "Riding Mts."); Minnesota ("Pequot," "Arrowhead Trail"); Brit. Col. ("B.C.," "Atlin," "Heffley Ck."); Alberta ("Foothills," "Banff," "Jasper"); and Yukon ("White Horse," "Mayo"). If, as I believe, the Yukon insect figured by Gibson (1920, Rep. Can. Arct. Exp. 3, pl. 3, fig. 15, male) is a specimen of *scudderi scudderi*, then it is its first and only representation.

From "Mt. Rainier," Washington, I have a series of remarkable *scudderi* specimens expressing the same variation as *annetta* does for *melissa* and as *ricei* (if correctly identified)

does for *argyrognomon anna*. Underside: shiny pale greyish white with conspicuous pale blue basal scaling in secondaries and quite distinct extradiscal spotting in primaries, but with an almost total lack of all other markings so that except for a gleam of aquamarine and a hint of fulvous in the cubital interspaces the secondaries seem quite spotless to the naked eye.

Eastward from Manitoba, presumably through Northern Ontario and Quebec, *scudderi scudderi* intergrades into a Labrador form which differs from the typical mainly in a reduction of size. This is probably the *scudderi* of Möschler (1874, Ent. Zeit. Stettin 35:155–156) which judging by that author's naive but clear description is not the "*scudderi*" of Scudder although of course the latter form may reach much further North than is so far authentically known. Of this small *scudderi* (generally labelled "*aster*" in collections) I have Labrador specimens from "Hopedale" and "Sawbill." Whatever may be the "*aster*" from "Labrador" the armature of which is figured by Chapman (1917, *op. cit.* pl. 15, fig. 45–46), it belongs to *melissa*. The Newfoundland *aster* Edwards, 1882, Can. Ent. 14:194–195 (1898 Holland, *op. cit.*: 266, pl. 30, fig. 40, 46, 47) is presumably the same Little Blue Argus that had been discovered on Carbonear Isl. by Gosse in 1834. Of this I have only two (white, sparsely but distinctly spotted underside) females ("Salmonier") which until I see the types I cannot assign to *scudderi*. Of the Nova Scotian *empetri* Freeman (1938, Can. Ent. 70:62; et 1943, *ibid.*, 75:37), which shows in the underside a striking development of the fuscous spotting upon a greyish-fawn ground, I have as yet only dissected one paratype (Clench Coll.) and in this specimen one important genitalic character seems about to slip out of the *scudderi* specific series.[6]

scudderi lotis Lintner.

(1878, 30th Rep. N. Y. St. Mus. Nat. Hist. 1876:169; *non lotis* Lintn. *auct.*)

Under this name I propose to group various integrading forms of the Southern *scudderi* section. They all disclose on the underside a neater development of the *caudæ pavonis* and, in some cases, an inclination to fawn in the ground color. In

[6] Dr. T. N. Freeman has very kindly provided me now with a number of specimens of *empetri*. Although connected specifically with *scudderi*, it exhibits certain curious (reversional?) characters echoed by the most primitive of the Central Asiatic forms.

other words they approach nearer to the conventional type of the Lycæides, although generally the exiguity of the ornamental band and the *scudderi* character of the white arches give them away. *Lotis* Lintner, which has nothing to do with the *"lotis"* figured by Wright, Barnes-McDunnough, Comstock and Holland (in the case of Wright, 1906, *op. cit.*, fig. 387, it is a male *anna* coupled with the female of a not even congeneric species, and in the case of Holland, 1930, *op. cit.*, pl. 66, fig. 18–20, a fairly typical *melissa*), seems to be known only in two specimens: a female labelled "L. Lota Lintn. 5668 Type" in the Lintner coll., which is an unquestionable *scudderi* female of the more Southern "brown" sort, and a male labelled "4878 Mendocino, California" and "No. 6139 coll. Hy. Edwards Lyc. Lotis Lintn." in the Amer. Mus. Nat. Hist. This unique male, except for showing a trace of fulvous subterminally, in the primaries underside, fits in exactly with Lintner's really admirable description. The data he gives is: "Mendocino, California. Two examples. Coll. of W. H. Edwards." The male type is apparently lost. The Hy. Edwards specimen is the one mentioned (but not figured) by Barnes and McDunnough (1916, *op. cit.*: 169, lin. 12, 13), and having dissected it I found as expected from its appearance, that it was conspecific with *scudderi.*

I have various forms of *scudderi lotis*, from Idaho ("Heyburn Pk"), Montana ("Martina," "Uranus Peak"), Wyoming ("Yellowstone," "Jackson Lake," "Jackson Hole"), Colorado ("Telluride," "San Isabel Forest") and "?N.M." The Jackson and Telluride series have a curious increase in the F suggestive of a slight approach to *melissa* though otherwise typical *scudderi.*

"Black border" (see p. 89) specimens (i.e. similar in this to the Alberta and B. C. *argyrognomon*) are referable to *atrapræ-textus* Field (1939, Journ. Kansas Ent. Soc. 12(4):135). I have such dark specimens from Idaho ("Priest R.") and Montana ("King's Hill"), with intergrades. In the case of *scudderi* the interest of this variation lies in its producing the nearest approach known to a lightish form of the normally very dark *cleobis* Bremer (from Sayan Mts.).[7]

[7] Other Palearctic forms (all from Turkestan) which reveal a *scudderi* armature (but have been assigned to *ismenias*) are: *dschagatai* (? Grum Grsh., 1890) Stempffer, 1931; *ægina* (? Grum Grsh., 1891; *nec* Leech, 1894, *nec* Seitz, 1909, *nec* Oberthur, 1910) Forster, 1936, and *buchara* Forster, 1936 (? *dschagatai* Grum Grsh.).

Lycæides melissa Edwards

Melissa is the commonest and most widely distributed nearctic Lycæides, or more exactly its structure seems to be the most popular achievement in the genus. There is some indication that in some form or other it reaches Labrador in the North-East. For the Palearctic, it has been reported from the Lower Volga (as *sareptensis* Chapman, 1917, *in* Oberthur, *op. cit.*, 14, pl. 12, male genit., *et* 1918, Ent. Rec. 30:2–5) on the basis of specimens collected by Sheldon and Jones (Sheldon, 1914, Ent. 47:273); the authenticity of the locality data has been criticised by Stempffer, 1931, who however was only aware of the brief mention of *sareptensis* in the 1917 paper. A pair of specimens has also been reported from Kamchatka by Forster (1936, Mitt. München. Ent. Ges. 26:81, slide 418, male genit.) and this might seem fairly plausible had not Forster's work been full of the most preposterous blunders.[8]

melissa melissa Edw.

Although different shades of underside coloration can be racially perceived, the intergradation is so complete and geographically so intricate that I do not hesitate to group all such specimens which only differ in the shade of fawn, from brownish fawn through greyish to almost white, under *melissa melissa*. I have series of this from nineteen stations in Colorado, eleven in California, six in Utah, five each in Idaho, Montana and Manitoba, four each in Washington and British Columbia, two each in Nevada and Wyoming, and from single localities in Saskatchewan, Alberta, Oregon, Arizona, Texas and Kansas.

My material shows that at four points of its extensive Western range *melissa* produces four striking local races embossed as it were on its rather monotonous morphological texture. These are:

1. A curious Colorado form from Pitkin Co. and Lake Co. which, owing to the narrowness of the underside ornamental band, bears a false resemblance to *scudderi*. Possibly referred to by Barnes and McDunnough *op. cit.*: 110.

2. A darkish form with discernible insulæ and a peculiar underside: hoary greyish fawn with a generous spread of pale

[8] Such as assigning an alien *Lycœides* organ (Mitt. Münchner Ent. Ges. 26, slide 493) to *Plebejus argus* ssp. *tancrei* Græser (l.c. fig. 27) or confusing *Lycœna anna* Edwards with *Thecla anna* Druce (l.c.:141), etc.

greenish-blue dusting from base in secondaries and very large golden-green præterminal blotches. From Gold Lake and Mammoth Lake, California. Figured by Comstock, 1927 (Butt. Calif., Pl. 53, Fig. 21, *melissa* female).

3. A showy, rather light lilac blue form with a white underside, well developed and sometimes quite separate orange lunules, and a florid female. From several districts in California ("Bouquet Cn," "Owens Lake," "Tehachapi"; also apparently "Arrowhead," "Olancha," "Lebec"). This race is the "*lotis*" of authors (Barnes and McDunnough, 1916, *op. cit.*, pl. 11, fig. 12, male; Comstock, 1927, *op. cit.*, pl. 53, fig. 23, 24, male, 25, female; Stempffer, 1933, Bull. Soc. Ent. France 102:110).

4. *melissa annetta* [Mead in litt.] Edwards, 1882 (Papilio 2:48–49; Holland, 1898, *op. cit.*: 266–267, pl. 32, fig. 13, male, 14, female; et 1930, *ibid.* pl. 66, fig. 16, male). Sparse, weak or obsolescent markings on white ground of underside; pale greyish blue female. In 1943 I travelled to Utah with the express object of obtaining this little known form and found it in fair numbers, though very local, on lupine among firs at 9,000 ft. near Alta in the Wasatch Mts. A full account of its habits will be given later. The male armature is quite similar to that of the typical *melissa* which occurred at about 6,500 ft., some ten miles nearer to Salt Lake City (with intergrades especially in females cropping up among the *annetta* population). In some of the *annetta*, however, there is a slight increase above the *melissa* average in the H of the otherwise typical *melissa* organ, and this, together with a *scudderi lotis* aspect of some of the specimens, tends to diminish the hiatus between *melissa* and the Wyoming form of *scudderi*.

The production of such local forms with more or less fluid edges is characteristic of the other species too, but in one respect *melissa* seems to be unique among its American congeners, and, namely, in that it is completely replaced East of the Mississippi (from at least Southern N. Carolina to at least Ontario) by a remarkably constant form which might serve as an example of how a really good subspecies ought to behave. It is the best known *Lycœides* in America, but lacks a name.

Lycæides melissa subsp. **samuelis** nom. nov.

(*scudderi* Edwards, Scudder, 1889, Butt. N. Engl. 3, pl. 6, fig. 6, male, pl. 34, fig. 29, male genit., *non scudderi* Edw.;

Holland, 1898, Butt. Book, pl. 30, fig. 48, male, fig. 49, female, *et* 1930, *op. cit.* pl. 66, fig. 12, male,[9] *non scudderi* Edwards, *nec* "type"; *melissa* Edwards, Chapman, 1917 *in* Oberthur, *Et. Lep. Comp.* 14, pl. 9, fig. 26, male, genit.; *et* 1918, Ent. Rec. 30:4).

Distinguished from all *melissa* forms by the following combination of characters: ampler (cubitoid) termen, especially noticeable in female. Upperside: optical scaling producing a duller violet effect in both sexes. Fulvous arches in female generally restricted to the secondaries and to the strong interspaces. Underside: colder tone of greyish fawn coloration which produces, in spite of the pronounced halos around the well-pigmented extradiscal spots, a uniform effect (recalling certain palearctic *Plebejus* species), this effect being due both to the broader wing space and to a peculiar reduction of the white arches which form mere rims to the thin fuscous arches (this distinguishes it also from *scudderi*); narrowness of subterminal ornamentation in contrast to spacious disc; spot in Cu_1 generally placed in a more distad advanced position due presumably to cubitoid wing shape, and thus not forming with the discoidal and the $Cu_2+(A_1)$ spots a regularly slanting line as it does in most individuals of other *melissa* forms. Genitalically shows the highest differentiation of the *melissa* male organ from that of *scudderi*, in all specimens measured the fraction H/U being even smaller than is usual for most *melissa* forms (see p. 88).

Male, holotype, labelled "Orig. Pl. 6, fig. 6, Butt. N. Engl. Cab. S. H. Scudder, 306," Mus. Comp. Zool. Slide No. 338. Genitalia measurements: F=0, 57mm., H=0, 35mm., U=0, 44mm. Female, allotype, labelled "Albany N.Y." ex coll. Scudder, Mus. Comp. Zool. Paratypes: 5 males, 1 female, "Albany N.Y."; 1 male, 1 female "Centre N.Y."; and 1 female "Canada, Saunders." [London, Ont.], all these ex coll. Scudder, Mus. Comp. Zool.; 2 males, 1 female "Centre N.Y.," 1 female "Detroit, Mich."; 1 male, 1 female "Pa." and 2 males, 1 female "N.Y. State," all these in Mus. Comp. Zool.; 22 males, 12 females "Albany N.Y." coll. H. K. Clench; 1 male "Albany, N.Y.," 6 males "Sylvania, Ohio" and two pairs "Toronto, Ont."

[9] Dr. W. R. Sweadner of the Carnegie Museum, where this specimen (coll. Edwards) is preserved, obligingly sent me a replica of the locality wiggle. It reads: "N. York."

coll. Don B. Stallings; four pairs "Albany, N.Y.," two pairs "Karner, N.Y., 1 male "Massach ex coll. Angus," and 2 females "Mass. ex coll Hy. Edwards ["from W. H. Edwards" — W. P. Comstock *in litt.*], Am. Mus. Nat. Hist.; one pair each "Sylvania, Ohio," "Ness Lake, Mich." and "Toronto, Ont." coll. T. N. Freeman and one male, two females "Nashua, N. H." coll. W. P. Comstock.