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OVERVIEW OF *CLOSSIANA IMPROBA* (BUTLER) IN NORTH AMERICA WITH A DESCRIPTION OF A NEW SUBSPECIES FROM WYOMING (NYMPHALIDAE: ARGYNNINAE)[1]

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INTRODUCTION

Clossiana improba (Butler) was formerly thought to be restricted to arctic regions, but during the past decade, it has been found in the northern Rocky Mountains on Pink Mtn., south of the town of Pink Mountain, British Columbia, and in Alberta on Prospect Mtn. and in the Willmore Wilderness Park north of Jasper National Park. In 1982 Jack L. Harry of Salt Lake City, Utah, discovered a colony in the Wind River Mts. in Fremont Co., Wyoming.

The nominate species was described by Butler in 1877 from specimens taken at Winter Cove and Cambridge Bay in the Northwest Territories. The syntypes are in the British Museum (N.H.). In 1900 W. J. Holland described *youngi* from a single female collected in the mountains between Forty-Mile and Mission Creeks in northeastern Alaska. The holotype is in the collection of the Carnegie Museum, Pittsburgh, PA. Holland noted in his description of the new taxon that "the upper side of both wings is pale fulvous,..." He further remarked: "This interesting form is so thoroughly distinct, from the character of the markings on the under side, that I do not hesitate to describe it as a new species. I cannot bring myself to regard it as a mere aberration..."

Many specialists regard Holland's specimen as an aberration, and *youngi* as a weak subspecies at best. While some material from northeastern Alaska, the central Yukon Territory, and Baker Lake in the Northwest Territories is somewhat lighter in color than typical *improba*, most phenotypes fall within the variation normally observed in long series of *improba* from the arctic. Specimens from the Steele Glacier area in the

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southern Yukon are as dark as any material from the High Arctic. Holland's specimen is a fairly typical aberrational form found on an individual basis in other arctic Bolorians, and probably produced by environmental factors such as pupal burn. Since *youngi* cannot be separated from *improba* on a geographical basis and this phenotype occurs within populations of typical *improba*, I am lumping it as a junior synonym of *improba*. Based upon today's knowledge of arctic Bolorians, Holland's holotype would simply be considered as a aberrant specimen.

One additional subspecies of *improba, improbula* was described from Fennoscandia by Bryk in 1921, but Higgins & Riley (1975) recognized only *improba* for the entire Old World. In Europe this species occurs in Fennoscandia and the northern portions of European Russia. Korshunov (1972) noted the distribution of *improba* elsewhere in the U.S.S.R. as Novaya Zemlya, Polar Ural Mts., Yamal, and north of eastern Siberia. In view of the action taken above and contemporary literature, this butterfly is presently represented by a single subspecies *improba*.

Our knowledge of the distribution of *improba* in North America is sketchy. It generally occurs in remote areas infrequently penetrated by collectors, and it is easily overlooked in the field owing to its dark color, small size, and flight close to the ground. The butterfly is found in both wet and dry tundra regions and is probably widely distributed throughout the North American arctic in local colonies. Yukon Territory records were published by Ferris *et al.* (1983). Records for Alaska, the Northwest Territories and British Columbia have been obtained from specimens in the author's collection, and gleaned from the annual summary reports that have appeared over the past decade in the *NEWS* of the Lepidopterists' Society. Alberta records were provided by E. M. Pike of Fairview, Alberta. Gregory (1983) records this species from Manitoba, but gives no exact locality. To my knowledge, it has not been taken at Churchill, which is the popular arctic collecting site in Manitoba. This butterfly is poorly represented in most museum collections in North America.

Fig. 1 shows the distribution of *improba* in North America based upon data currently available to the author. Specimens from Pink Mtn., B.C. (designated A in Fig. 1) fall within the phenotypic variation associated with *improba*. Alberta specimens are intermediate between the Pink Mtn. population and the very distinctive population found in the Wind River Mts. of Wyoming. This latter population is now described as a new subspecies.

Clossiana improba harryi, new subspecies

Types and Location: This subspecies is described from 34 ♂ and 34 ♀ collected by Jack L. Harry near the summit of Bears Ears Trail, 0.5 mi. (0.8 km) NW of Mt. Chauvenet, 11,750' (3583 m), Shoshone National Forest, Fremont Co., Wyoming on 7-8 August, 1982. The holotype, allotype and three paratype pairs are deposited in the collection of the Allyn Museum of Entomology/Florida State Museum, Sarasota, Florida. Four paratype pairs each are deposited in the Los Angeles County Museum of Natural History, the San Francisco Academy of Sciences, the National Museum of Natural History-Smithsonian Institution, and the American Museum of Natural History. Ten pairs are in the Jack L. Harry collection, and four pairs are in the C. D. Ferris collection.

Diagnosis and Description: This subspecies is the most strongly marked and the most brightly colored of any known *improba*. Figs. 2-5 illustrate the holotype and allotype.

Holotype male. Forewing costa 16 mm. WINGS. Dorsal ground color Amber (Smithe #36) distally blending through Tawny (#38) into Cinnamon (#39) in the discal areas. Dark markings vary from Fuscous (#21) to black. Ventrally the FW display Chestnut (#32) shading apically with a general ground color between Tawny and Cinnamon. There is a paler area distad of the cell and in space M_1. The dark color basad and distad of the VHW mesial band is a blend of Maroon and Chestnut (#31,32). The spots in the mesial band are pale grayish-white overscaled with Clay Color (#26) in spaces 2V, Cu_2, Cu_1, M_3, M_1, RS. Space M_2 is very lightly dusted with color and space Sc + R_1 is virtually un-

dusted. The VHW submarginal region is basically a very pale version of Maroon (#31) with some Cinnamon around the cell spots in M_2 and M_3. The spots distad of the mesial band are moderately inconspicuous. The spot in M_1 has a pale center, while the remaining spots are generally dark with only a suggestion of a paler center in some. The fringes vary from white to off-white and are checkered with dark hairs at the vein ends, which vary in color from black to Antique Brown (#37). HEAD. Antennae approximately 56% of FW costa length; shaft Amber ventrally, checkered black-and-white dorsally; club black with Amber tip. Palpi and frons Amber to Raw Umber (#23) interspersed with darker hairs. Eyes smooth and Chestnut. THORAX. Dusky Brown (#19) dorsally with some interspersed paler hairs; Burnt Umber (#22) ventrally. ABDOMEN. Dusky Brown dorsally; ventrally Burnt Umber rostrad blending through Amber into off-white

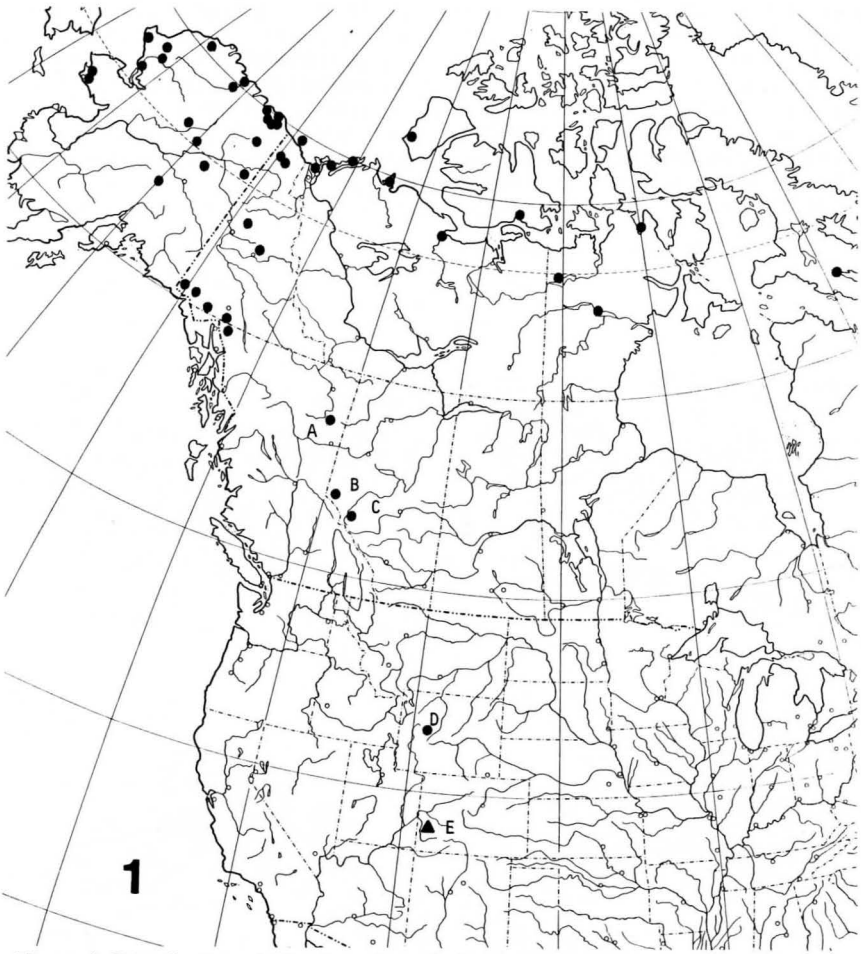


Figure 1: Distribution of *Clossiana improba* in North America based upon literature citations and contemporary collection records. Alaskan records for the Brooks Range and North Slope are more extensive in regard to colonies than the number of dots indicates. Gregory's Manitoba record is not shown. A=Pink Mtn., B.C. population. B=Willmore Wilderness Park, Alta. populations. C=Prospect Mtn., Alta. population. D=Fremont Co., Wyoming population. E=*Clossiana acrocnema* in SW Colorado.

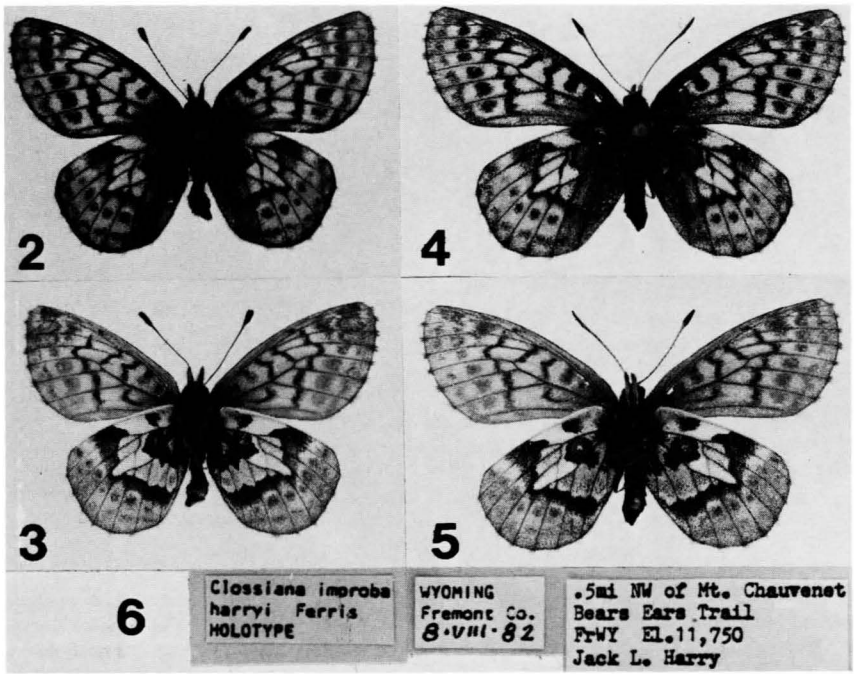
caudad. LEGS. Femur, tibia and tarsomeres pale grayish-brown and not particularly hirsute; hairs Burnt Umber. The Holotype was collected on 8 August, 1982. The pin labels are illustrated in Fig. 6. All labels are inscribed in black. The Holotype label is red; the other two labels are white.

Allotype female. Forewing costa 19 mm. Except for size, in most respects the Allotype is similar to the holotype. There are numerous whitish hairs in the frons, palpi and ventrally on the abdomen. The antennae are generally paler than in the male. The allotype was collected on 7 August, 1982. The pin labels are similar to those of the holotype, except that the allotype label is yellow. The paratype labels are blue inscribed in black.

Variation: This subspecies is remarkably uniform in facies, but the adults do vary to some extent in size. The average FW costa length is 16.7 mm (15.5-17.5 mm) in the males based upon 64 specimens, and 18.0 mm (17.0-19.0 mm) in the females based upon 37 specimens. Dorsally in both sexes, the main pattern differences lie in the intensity of the dark markings, the size of the post-discal and submarginal spots, and the widths of the narrow dark transverse bands. There is some color variation (paler and darker) about the median color represented by the holotype and allotype. Ventral variation is considerably less than dorsal variation, and generally relates to slight color variations and the intensity and extent of the dark maculation.

Flight Period: First and second weeks of August based upon 1982 and 1983 observations.

Distribution: Eleven colonies of varying size are currently known which extend about 4.75 mi. (7.7 km) along a line roughly north and south of the type locality.



Figures 2-6: *Clossiana improba harryi*, new subspecies. 2-3. Holotype ♂, D (2) and V (3). 4-5. Allotype ♀, D (4) and V (5). 6. Specimen labels for holotype ♂.

Bionomics: Adult flight has been observed from 0800 h to 1900 h, weather permitting. In 1983, a population estimate of adults in the eleven colonies indicated 10,000 individuals. Oviposition has been recorded five times on *Salix arctica* Pall, which forms ground mats in the habitat area.

Comparison with Nominate Subspecies: As noted previously, *harryi* is more brightly colored and more strongly marked than the adults in other known *improba* colonies. Figs. **7-10** illustrate typical examples from the Pink Mtn. colony and clearly show the more subdued and diffuse patterns associated with northern populations of *improba*. Arctic *improba* are very melanic in aspect when compared with the crisply marked *harryi*. Figs. **11-12** show ventral reflected ultraviolet light patterns. Note the crisper reflectance of *harryi* as compared to the Pink Mtn. specimens. The VFW maculation is also more clearly defined in *harryi*. The Wyoming population is annual, while the Alberta populations are apparently biennial on even-numbered years (*fide* E. M. Pike *in litt.*). The Pink Mtn. population is annual.

Comparison with Other Species: The closest relative to *improba* in North America is the relict species *Clossiana acrocnema* (Gall & Sperling) from the San Juan Mts. in SW Colorado, and represented by the triangle in Fig. **1**. *C. acrocnema* produces a different UV reflectance pattern from *improba* as illustrated in Fig. **13**. In *improba*, several dark (non-reflective) transverse striations appear in the VFW photographs. These are stronger in *harryi* than in the more northern Pink Mtn. population. The VFW of *acrocnema* generally reflect more UV light than *improba*, and the transverse striations do not appear. The entire VHW mesial band reflects strongly in *acrocnema*, while in *improba* only the upper four cell interspaces reflect strongly (M_1 and RS less so than the other two). As shown in Fig. **14**, the form of the uncus in the male genitalia differs between these two species. Detailed comparison of these two species will be found in Gall & Sperling (1980).

Etymology: The subspecific epithet *harryi* is derived from the Latin genitive singular form of the collector's surname.

ACKNOWLEDGMENTS

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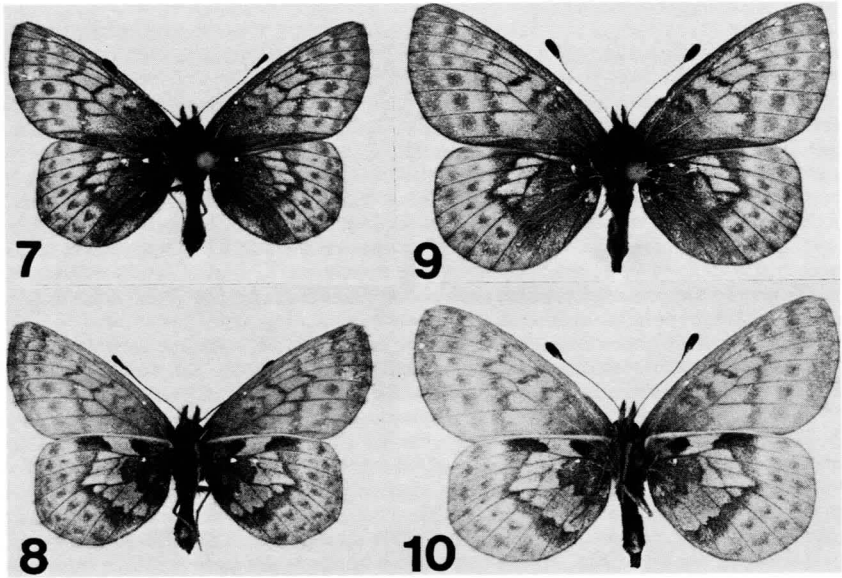
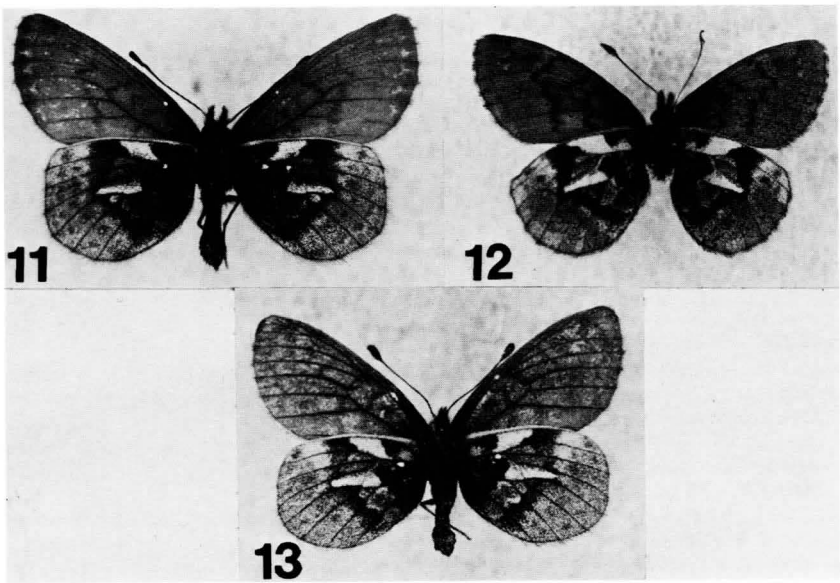


Figures 7-10: *Clossiana improba improba*, Pink Mtn. population. 7-8. Typical ♂, D (7) and V (8). 9-10. Typical ♀, D (9) and V (10).



Figures 11-13: Ventral ultraviolet light reflectance patterns in males of two species of *Clossiana*. 11. *C. i. improba*, Pink Mtn., B.C. 12. *C. improba harryi*, Fremont Co., Wyoming. 13. *C. acrocnema*, Hinsdale Co., Colorado.

APPENDIX

The author's collection contains voucher specimens of *Clossiana improba* from the following localities: ALASKA. Eagle Summit. BRITISH COLUMBIA. Pink Mtn. NORTHWEST TERRITORIES. Baker Lake; Coppermine; Frobisher Bay. WYOMING. Fremont Co. YUKON TERRITORY. Keno Hill; Steele Glacier. NORWAY. Salvasskaret near Altevatnet.

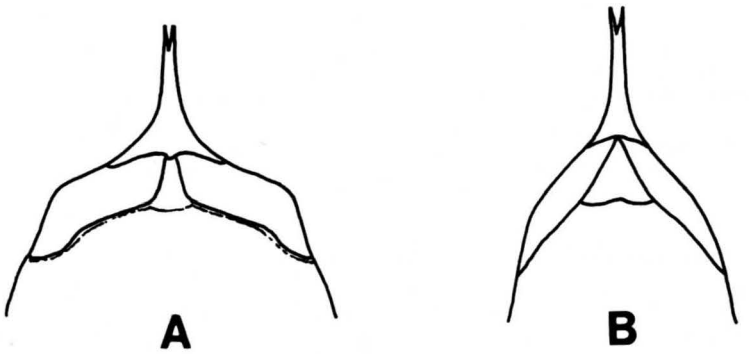


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Figure 14: Caudad dorsal views of the structure of the male uncus in two species of *Clossiana*. **A.** *C. acrocnema*. **B.** *C. improba harryi*.

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