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A REVIEW OF THE SATYRINE GENUS *NEOMINOIS*, WITH DESCRIPTIONS OF THREE NEW SUBSPECIES

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In recent years, revisions of several genera of satyrine butterflies have been undertaken (e. g., Miller 1972, 1974, 1976, 1978). To this, I wish to add a revision of the genus *Neominois*.

Neominois Scudder

TYPE SPECIES: *Satyrus ridingsii* W. H. Edwards by original designation (Scudder 1875b, p. 241)

Satyrus W. H. Edwards (1865, p. 201), Reakirt (1866, p. 145), W. H. Edwards (1872, p. 25), Strecker (1873, p. 29), W. H. Edwards (1874b, p. 26), W. H. Edwards (1874c, p. 542), Mead (1875, p. 774), W. H. Edwards (1875, p. 793), Scudder (1875a, p. 87), Strecker (1878a, p. 129), Strecker (1878b, p. 156), Brown (1964, p. 355)

Chionobas W. H. Edwards (1870, p. 192), W. H. Edwards (1872, p. 27), Elwes and Edwards (1893, p. 459), W. H. Edwards (1874b, p. 28), Brown (1964, p. 357)

Hipparchia Kirby (1871, p. 89), W. H. Edwards (1877, p. 35), Kirby (1877, p. 705), Brooklyn Ent. Soc. (1881, p. 3), W. H. Edwards (1884, p. [7]), Maynard (1891, p. 115), Cockerell (1893, p. 354), Elwes and Edwards (1893, p. 459), Hanham (1900, p. 366)

Neominois Scudder (1875b, p. 241), Strecker (1876, p. 118), Scudder (1878, p. 254), Elwes and Edwards (1893, p. 459), W. H. Edwards (1894, p. 64), W. H. Edwards, (1897, p. 267), Bruce (1898, p. 151), Skinner (1898, p. 36), Holland (1898, p. 213), Cary (1901, p. 309), Dyar (1902, p. 29), Smith (1903, p. 5), Skinner (1904, p. 14), Wright (1905, p. 192), Elrod (1906, p. 121), Cockerell (1907, p. 259), Barnes and McDunnough (1912, p. 7), Barnes and McDunnough (1917, p. 6), Skinner (1922, p. 74), Weymer in Seitz (1924, p. 227), Barnes and Benjamin (1926, p. 10), Comstock (1927, p. 69), Holland (1931, p. 187), Cross (1937, p. 9), Davenport and Dethier (1937, p. 167), Avinoff and Sweadner (1951, p. 39), DeFoliart (1956, p. 95), Brown *et al.* (1957, p. 15), Puckering and Post (1960, p. 27), Ehrlich and Ehrlich (1961, p. 94), Storer and Usinger (1963, p. 92), dos Passos (1964, p. 102), Newcomer (1964, p. 47), Brown (1964, p. 351), Emmel (1964, p. 365), Hemming (1967, p. 309), Johnson and Nixon (1967, p. 526), Brown (1967, p. 131), Pyle (1968, p. 172), Miller (1968, p. 119), Masters and Sorensen (1969, p. 155), Brodie (1970, p. 3), Ferris (1970, p. 8), Brown (1971, p. 6), Ferris (1971a, p. 44), Ferris (1971b, p. 59), Callaghan and Tidwell (1971, p. 202), Pyle (1971, p. 18), Johnson (1972, p. 10),

Leussler (1972, p. 10), Ritterbush (1972, p. 5), Hopper (1973, p. 187), Lewis (1973, p. 18), Scott (1973, p. 663), Scott (1974, p. 103), Holland (1974, p. 47), Gregory (1975, p. 29), Emmel *in* Howe (1975, p. 88), Smart (1975, p. 249), Scott (1975, p. 7), Tilden (1975, p. 28), Johnson (1975, p. 220), Ferris (1976, p. 48), McCabe and Post (1976, p. 98), Scott and Scott (1978, p. 91), Scott (1979, p. 189), Kondla (1979, p. 74), Thormin *et al.* (1980, p. 10), Dornfeld (1980, p. 53), Kohler (1980, p. 17), Kondla (1981, p. 9), Miller and Brown (1981, p. 200), Pyle (1981, p. 698), Christensen (1981, p. 54), Miller *in* Ferris and Brown (1981, p. 283), Stanford *in* Ferris and Brown (1981, p. 406), Thomas and Werner (1981, p. 22), Mueller (1982, p. 29), Gillette (1982, p. 48), Kondla (1983, p. 155), Gillette (1983a, p. 17), Gillette (1983b, p. 71), Johnson (1983, p. 54), Miller and Brown *in* Hodges (1983, p. 65), Klassen (1984, p. 37), Holland (1984, p. 233), Pinel and Kondla (1985, p. 220), Austin (1985, p. 110), Scott (1986, p. 9)

Eumenis McDunnough (1938, p. 12), Brooks (1942, p. 33), Burdick, (1942, p. 204), Clark (1948, p. 78), Garth (1950, p. 18), Bowman (1951, p. 130), Martin and Truxal (1955, p. 10), Tietz (1972, p. 574)

Neominois (Nymphalidae, Satyrinae) is a monotypic Nearctic genus proposed by Scudder (1875b) and closely related to a number of Eurasian genera, especially *Karanasa* (Avinoff and Sweadner 1951). The one included species is strikingly similar in color and pattern to several species of *Karanasa* such as *K. huebneri* (Felder) and *K. regeli* (Alpherakya) (see Lewis 1973, plates 172, 204). The characterization and relationships of *Neominois* were discussed by Scudder (1875b), Elwes and Edwards (1893), Holland (1931), Avinoff and Sweadner (1951) and Miller (1968). The genitalia were illustrated by Skinner (1922) and Avinoff and Sweadner (1951); the latter showed that the differences from *Karanasa* were generic. Holland (1931) and Miller (1968) illustrated the venation of *Neominois*. It is the only New World member of the largely Palearctic *Satyrus* series of genera. Its distribution is restricted to portions of the western United States and adjacent southern Canada (Fig. 6).

The identification of populations of *Neominois ridingsii* (W. H. Edwards) is in a state of flux and there have been numerous errors in the application of names over the years. The three currently recognized names, *Neominois ridingsii ridingsii* (W. H. Edwards), *Neominois ridingsii stretchii* (W. H. Edwards) and *Neominois ridingsii dionysus* Scudder, have been inconsistently and often incorrectly used for various populations. This study was originally initiated to reevaluate Nevada populations of this species and to describe a new subspecies occurring therein. Subsequent examination of over 1900 specimens (including the neotypes of *Satyrus ridingsii* and *Chionobas stretchii*, the "original type" [=holotype] of *Satyrus ashtaroth* and paratypes of *Neominois dionysus*) resulted in the recognition of still two other undescribed taxa and a better understanding of the general distribution and variation of the species as a whole.

Neominois ridingsii ridingsii (W. H. Edwards)

(Fig. 1, 4)

Satyrus ridingsii W. H. Edwards (1865, p. 201), Reakirt (1866, p. 145), W. H. Edwards (1872, p. 26), Strecker (1873, p. 29), W. H. Edwards (1874b, p. 26), W. H. Edwards (1874c, p. 542), Mead (1875, p. 774), W. H. Edwards (1875, p. 793), Strecker (1878a, p. 129), Strecker (1878b, p. 156), Brown (1964, p. 355)

Hipparchia ridingsii Kirby (1871, p. 89), W. H. Edwards (1877, p. 35), Kirby (1877, p. 705), Brooklyn Ent. Soc. (1881, p. 3), W. H. Edwards (1884, p. [7]), Maynard (1891, p. 115), Cockerell (1893, p. 354), Elwes and Edwards (1893, p. 459).

Neominois ridingsii Scudder (1875b, p. 241), Scudder (1878, p. 254), W. H. Edwards (1894, p. 64), W. H. Edwards (1897, p. 267), Bruce (1898, p. 151), Skinner (1898, p. 36), Cary (1901, p. 309), Dyar (1902, p. 29), Smith (1903, p. 5), Skinner (1904, p. 14), Elrod (1906, p. 121), Cockerell (1907, p. 159), Barnes and McDunnough (1912, p. 7), Weymer *in* Seitz (1924, p. 227), Barnes and Benjamin (1926, p. 10), Comstock (1927, p. 69), Avinoff and Sweadner (1951, p. 39), Cross (1937, p. 9), Davenport and Dethier (1937, p. 167),

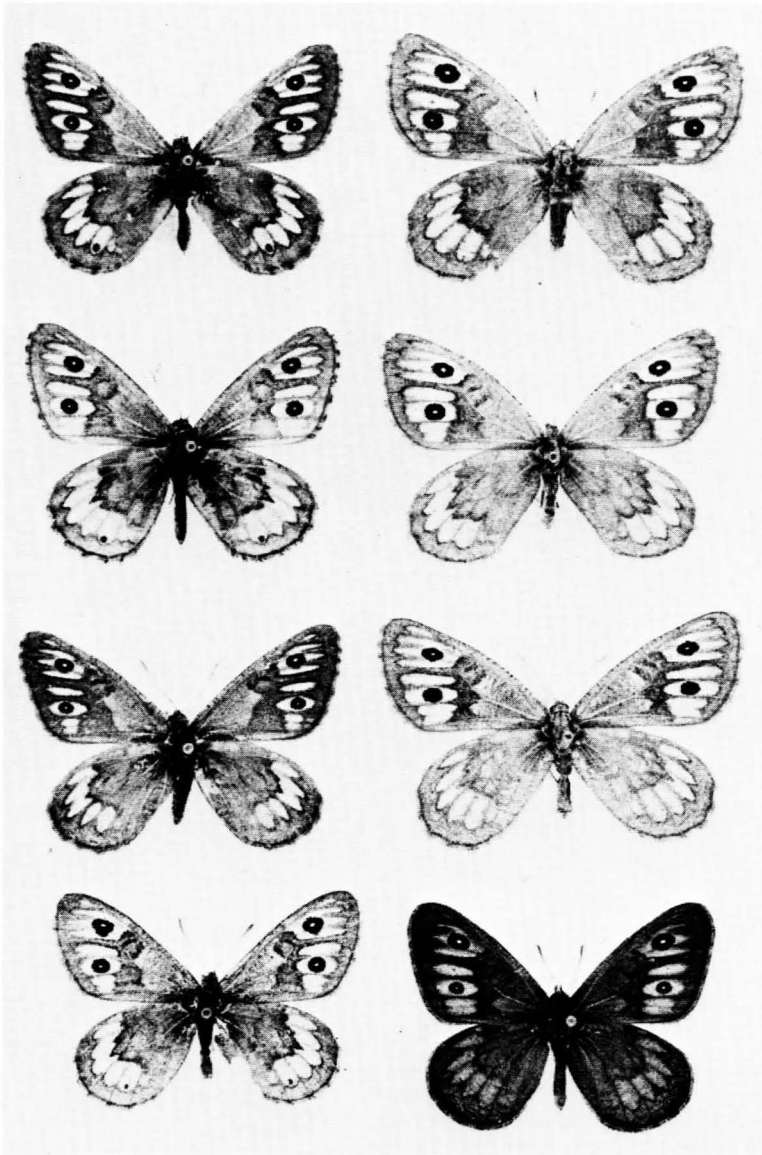


Figure 1a. *Neominois ridingsii ridingsii* from various areas (dorsal surface). Top left — male CO: Elbert Co.; Sandstrom Ranch, 6300', 15 June 1967, *leg.* M. Fisher. Top right — female same location, 6100', 18 June 1972, *leg.* M. Fisher. Second left — male CO: Sagauche Co.; Hayden Pass, 9000', 25 June 1971, *leg.* J. Scott. Second right — female CO: Sagauche Co.; Noland Gulch, 2 mi. S. Villa Grove, 19 June 1971, *leg.* J. Scott. Third left — male WY: Albany Co.; T15N, R73W, 7500', 20 June 1977, *leg.* C. D. Ferris. Third right — female, same location, 29 June 1980, *leg.* C. D. Ferris. Bottom left — male (intermediate towards *N. r. minimus*) MT: Madison Co.; 5 mi. W. Twin Bridges, 14 June 1981, *leg.* S. Kohler. Bottom right — male (very dark) CO: Gunnison Co.; cut of road, Lake City, 28 July 1984, *leg.* P. J. Savage.

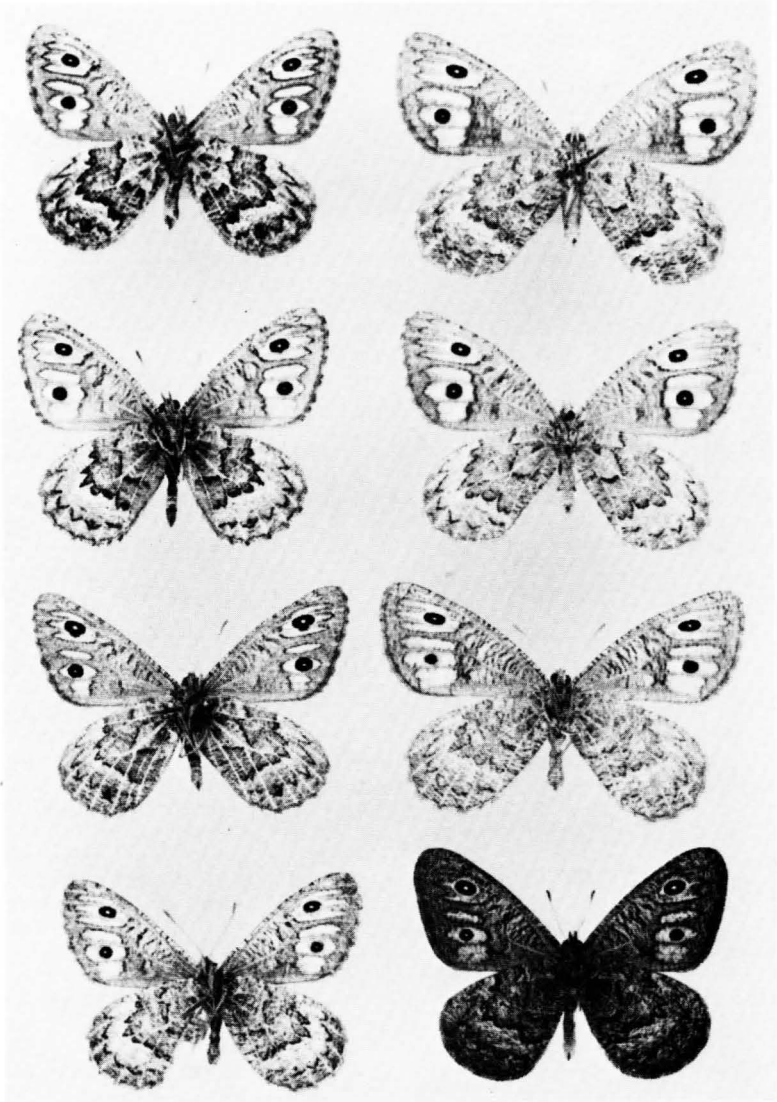


Figure 1b. *Neominois ridingsii ridingsii* from various areas (ventral surface). Same specimens as Fig. 1a.

- DeFoliart (1956, p. 94), Ehrlich and Ehrlich (1961, p. 94), Brown (1964, p. 351), Emmel (1964, p. 365), Hemming (1967, p. 309), Miller (1968, p. 121), Masters and Sorensen (1969, p. 155), Pyle (1971, p. 18), Ritterbush (1972, p. 5), Lewis (1973, p. 18), Scott (1973, p. 663), Scott (1974, p. 103), Scott (1975, p. 7), Smart (1975, p. 249), Johnson (1975, p. 220), Scott and Scott (1978, p. 91), Scott (1979, p. 189), Pyle (1981, p. 698), Thomas and Werner (1981, p. 33), Scott (1986, p. 9)
- Neominois ridingsi* Holland (1898, p. 213), Wright (1905, p. 192), Barnes and McDunnough (1917, p. 6), Skinner (1922, p. 74), Holland (1931, p. 187), Avinoff and Sweadner (1951, p. 247), Brown *et al.* (1957, p. 15), Leussler (1972, p. 10)
- Eumenis ridingsii ridingsii* McDunnough (1938, p. 12), Martin and Truxal (1955, p. 10)
- Eumenis ridingsii* Burdick (1942, p. 204), Brooks (1942, p. 33), Tietz (1972, p. 574)
- Neominois ridingsi ridingsi* Brown *et al.* (1957, p. 15)
- Neominois ridingsii ridingsii* Brown *et al.* (1957, p. 15), dos Passos (1964, p. 102), Johnson and Nixon (1967, p. 526), Ferris (1970, p. 8), Brown (1971, p. 6), Ferris (1971a, p. 44), Ferris (1971b, p. 59), Johnson (1972, p. 10), Emmel *in* Howe (1975, p. 88), Tilden (1975, p. 28), Dornfeld (1980, p. 53), Kohler (1980, p. 17), Miller and Brown (1981, p. 200), Miller *in* Ferris and Brown (1981, p. 283), Miller and Brown *in* Hodges (1983, p. 65)

The types of *Satyryx ridingsii* were taken in 1864 by James Ridings at Burlington (now Longmont), Boulder County, Colorado (Edwards 1865, Brown 1964) on the east slope of the Rocky Mountains. The four female paratypes were apparently lost and a female in the Strecker collection at the Field Museum of Natural History collected at Loveland, Larimer County, Colorado was designated as the neotype (Brown 1964). This specimen is now at the Allyn Museum of Entomology on loan from the Field Museum of Natural History. The concept currently applies to all populations east of the Continental Divide (Miller *in* Ferris and Brown 1981) except the most northern and southern populations described below. The general distribution is from northern New Mexico to southern Montana, east to Nebraska (Fig. 6). References to its or a similar phenotype occurring elsewhere, including Nevada (*e.g.*, Emmel *in* Howe 1975), are mostly incorrect.

Nominate *Neominois ridingsii* is characteristically smooth appearing, dark brown to dark grayish-brown butterfly with well defined, creamy-white and shallowly serrated submarginal bands on both wings. The basal area of the dorsal surface is nearly uniformly dark and the postmedian area is not notably darker (Table 1). Northern New Mexico material is closest to the nominate subspecies but tends slightly towards the smaller and paler phenotype further south. The most distinctive series that I have seen of nominate *N. ridingsii* is that collected by P. Savage near Lake City, Gunnison County, Colorado. Many of these are very dark brown with no hint of gray, the submarginal bands are heavily clouded with brown and the ventrum is very heavily overscaled with the same brown (Fig. 1). Some specimens from high elevation populations are very small. It is unknown if this is usual or following a poor growing season.

SPECIMENS EXAMINED: COLORADO (329 males, 132 females): Alamosa, Arapahoe, Archuleta, Chaffee, Costilla, Custer, Denver, Douglas, Elbert, El Paso, Gilpin, Grand, Gunnison, Jefferson, Lake, La Plata, Larimer, Park, Rio Grande, Sagauche, Teller, Weld counties (3 June-18 August). NEW MEXICO (33 males, 8 females): Colfax, Rio Arriba, San Miguel, Union counties (14-30 June). MONTANA (14 males, 5 females): Jefferson, Madison counties (19 June-15 August). NEBRASKA (25 males, 20 females): Kimball, Sioux counties (8 June-17 August). WYOMING (49 males, 30 females): Albany, Carbon, Fremont, Johnson, Yellowstone National Park counties (17 June-21 July).

Neominois ridingsii stretchii (W. H. Edwards)
(Fig. 2)

- Chionobas stretchii* W. H. Edwards (1870, p. 192), W. H. Edwards (1872, p. 28), W. H. Edwards (1874b, p. 28), Elwes and Edwards (1893, p. 459), Brown (1964, p. 357)
- Satyryx ridingsii* W. H. Edwards (1872, p. 6), Strecker (1873, p. 29), Mead (1875, p. 774), Strecker (1878b, p. 156)

TABLE 1. Color and pattern characters of *Neominois ridingsii* taxa.¹

Character	Subspecies				
	<i>N. r. ridingsii</i>	<i>N. r. stretchii</i>	<i>N. r. pallidus</i>	<i>N. r. minimus</i>	<i>N. r. neomexicanus</i>
MALE					
Dorsal surface					
color of discal/basal area	dark brown	yellow-brown	gray-brown	dark gray-brown	pale brown
contrast of postmedian dark band	weak	moderate/strong	moderate/strong	weak	weak
color of submarginal bands	creamy-white	yellowish	white	creamy	creamy
definition of submarginal band on secondaries	strong	weak/moderate	weak/moderate	strong	weak/moderate
degree of serration of submarginal band of secondaries	shallow	deep	moderate	shallow/deep	shallow
Ventral surface					
prevailing color	gray-brown	yellow-brown	gray	brown	brown
contrast of banding on secondaries	moderate/strong	weak/strong	weak/moderate	moderate	weak
Mean primary length (mm, range, N)	21.8(20.4-23.4, 46)	22.6(21.2-24.2, 51)	22.2(20.2-23.6, 46)	19.3(17.0-21.1, 79)	20.1(18.2-22.1, 20)
FEMALES					
Dorsal surface					
color of discal/basal area	dark brown	yellow-brown	gray-brown	pale brown	pale brown
contrast of postmedian dark band	weak	weak/moderate	moderate	weak	weak
color of submarginal bands	creamy-white	yellowish	white	creamy	creamy
definition of submarginal band on secondaries	strong	weak/moderate	weak/moderate	strong	weak/moderate
degree of serration of submarginal band of secondaries	shallow	shallow/deep	moderate	shallow/moderate	shallow
Ventral surface					
prevailing color	brown	yellow/gray-brown	gray-brown	brown	brown
contrast of banding on secondaries	moderate	weak/moderate	weak	weak/moderate	weak/moderate
Mean primary length (mm, range, N)	23.9(22.4-25.2, 23)	25.7(22.8-27.1, 16)	25.1(24.3-26.0, 9)	22.0(21.7-22.5, 5)	22.0(19.7-25.3, 13)

¹Measurements are from the following populations: *N. r. ridingsii* - COLORADO: Elbert and Jefferson counties; *N. r. stretchii* - NEVADA: Nye and Elko counties; *N. r. pallidus* - type series; *N. r. minimus* - type series; *N. r. neomexicanus* - type series.

- Neominois ridingsii* Scudder (1875b, p. 241), Scudder (1878, p. 254), Skinner (1898, p. 36), Dyar (1902, p. 29), Elrod (1906, p. 121), Barnes and McDunnough (1912, p. 7), Weymer in Seitz (1924, p. 227), Barnes and Benjamin (1926, p. 10), Ehrlich and Ehrlich (1961, p. 94), Newcomer (1964, p. 47), Pyle (1981, p. 698), Christensen (1981, p. 54), Thomas and Werner (1981, p. 33), Mueller (1982, p. 29), Johnson (1983, p. 54)
- Hipparchia dionysius* W. H. Edwards (1877, p. 35), W. H. Edwards (1884, p. [7]), Maynard (1891, p. 116)
- Neominois dionysus* Scudder (1878, p. 254), Cockerell (1907, p. 159), Skinner (1922, p. 74), Avinoff and Sweadner (1951, p. 230), Brown (1967, p. 131)
- Satyrus ashtaroth* Strecker (1878a, p. 129)
- Hipparchia ridingsii* Maynard (1891, p. 115)
- Neominois stretchii* W. H. Edwards (1894, p. 64), Cockerell (1907, p. 160), Brown (1964, p. 351)
- Neominois dionysius* W. H. Edwards (1894, p. 64), W. H. Edwards (1897, p. 273), Bruce (1898, p. 151), Holland (1898, p. 213), Skinner (1898, p. 36), Dyar (1902, p. 29), Smith (1903, p. 5), Skinner (1904, p. 14), Wright (1905, p. 192), Barnes and McDunnough (1917, p. 6), Holland (1931, p. 187), Lewis (1973, p. 217)
- Neominois ridingsii* Barnes and McDunnough (1917, p. 6), Skinner (1922, p. 74), Gillette (1983b, p. 71)
- Neominois ridingsii dionysius* Weymer in Seitz (1924, p. 227), Miller in Ferris and Brown (1981, p. 283)
- Neominois ridingsii dionysus* Barnes and Benjamin (1926, p. 10) dos Passos (1964, p. 102), Emmel in Howe (1975, p. 88), Tilden (1975, p. 28), Miller and Brown (1981, p. 200), Miller and Brown in Hodges (1983, p. 65), Austin (1985, p. 110)
- Eumenis ridingsii ridingsii* McDunnough (1938, p. 12)
- Eumenis ridingsii dionysus* McDunnough (1938, p. 12), Garth (1950, p. 18), Tietz (1972, p. 574)
- Eumenis ridingsii stretchii* Burdick (1942, p. 204)
- Eumenis ridingsii* Burdick (1942, p. 204), Tietz (1972, p. 574)
- Neominois ridingsii stretchii* Brown et al. (1957, p. 15), Pyle (1968, p. 172)
- Neominois ridingsii stretchii* dos Passos (1964, p. 102), Callaghan and Tidwell (1971, p. 202), Emmel in Howe (1975, p. 88), Dornfeld (1980, p. 53), Miller and Brown (1981, p. 200), Miller and Brown in Hodges (1983, p. 65), Austin (1985, p. 110)
- Neominois ridingsii stretchii* Miller in Ferris and Brown (1981, p. 283)
- Neominois ridingsii dionysus* Gillette (1982, p. 48), Gillette (1983a, p. 17)

This taxon was long known only from the pair of specimens upon which the original description was based (Edwards 1870). These were collected (possibly in 1869, Brown 1964) by Richard Harper Stretch somewhere in Nevada for H. H. Behr who in turn forwarded them to Edwards. In keeping with his practice, Edwards returned these to Behr and the specimens subsequently disappeared (Edwards 1894) or were destroyed in the San Francisco earthquake and fire in 1906 (Burdick 1942). It is unknown where these specimens were captured. Strecker (1873) said that they were taken in the vicinity of Virginia City. The species does not occur there today and the types may have come from elsewhere (see also Brown 1964).

There has been, and still is, much confusion over the identity of *Chionobas stretchii*. This was first reflected by Scudder's (1878) naming of *Neominois dionysus* from 7 males and 4 females collected by Edward Palmer in the Juniper Mountains (4 June 1877) and Mount Trumbull (7-10 June 1877), Mohave County, Arizona (not "Washington [?] — Kane [?] Co., Utah" as in Miller and Brown 1981, see also Brown 1967, Gillette 1982). Scudder differentiated *N. dionysus* from *N. ridingsii* by its larger size, its paler and more cinereous tints and by the stronger serrations of the submarginal band of the secondaries. He further stated that "Nevada specimens ... appear a true synonym of *N. ridingsii*...." The source and number of specimens from Nevada were not stated. The type of *N. dionysus* is apparently at the Musuem of Comparative Zoology, Harvard University. I have examined a male and female paratype from that collection. These are, in fact, within the range of

variation of Nevada material of *N. r. stretchii*. Later in 1878, Strecker (1878a) described *Satyrus ashtaroth* from a single female from "Arizona". This he characterized as a large, pale ochraceous butterfly with a "zigzag" submarginal line on the secondaries. He distinguished it from *N. ridingsii* as did Scudder (1878) for *N. dionysus* but did not mention *N. r. stretchii*. The type female, once at the Field Museum of Natural History, is now on loan to the Allyn Museum of Entomology. It is well within the range of variation of northern Arizona and southern Utah material and differs only in minor detail from a female paratype of *N. dionysus*. Cockerell (1907) briefly discussed the taxa, allied *N. r. stretchii* with nominate *N. ridingsii* and recognized *N. r. dionysus*. Skinner (1898, 1922), Dyar (1902), Barnes and McDunnough (1917) and McDunnough (1938) further synonymized *N. r. stretchii* with the nominate subspecies. Even Edwards (1874b), in an errata to his synopsis, thought that his *Chionobas stretchii* was *Satyrus ridingsii* and in 1877 and 1884 recognized only the names "*ridingsii*" and "*dionysus*".

In July 1935, William N. Burdick rediscovered *Neominois ridingsii stretchii* in the Toiyabe and Toquima mountains in central Nevada. He later affirmed that the name reflected a valid taxon, separate from *N. r. ridingsii* and characterized by its "ochrey-brown" aspect (Burdick 1942). He designated a pair of neotypes from his material which he placed in the Canadian National Collection. To take a different twist, Burdick (1942) went on to consider *N. dionysus* as synonymous with nominate *N. ridingsii*. Based on

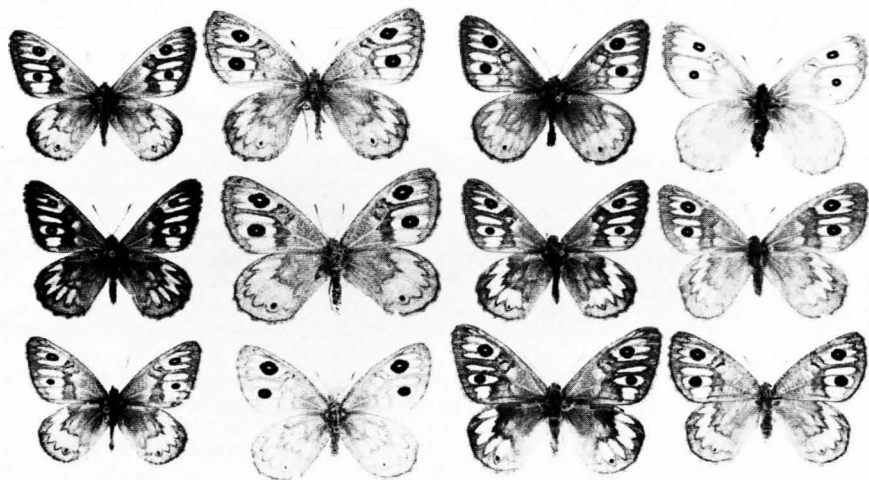


Figure 2a. *Neominois ridingsii stretchii* from various areas (dorsal surface). Right top — male NV: Nye Co.; Monitor Range, Dobbin Creek Rd., 7.2 mi. SE Potts, 19 June 1981, leg. G. T. Austin. Second top — female same data. Third top — male NV: Lander Co.; Toquima Range, Monitor Valley-Petes Summit Rd., 14.2 mi. SE Nev. 376, 30 May 1981, leg. G. T. Austin. Left top — female same data, 2.2 mi. E. Petes Summit, 18 July 1981, leg. G. T. Austin. Middle left — male NV: Elko Co.; Owyhee R. Valley, Wildhorse Cr. Campgr., 24 June 1981, leg. G. T. Austin. Middle third — female same location, 8 July 1978, leg. G. T. Austin. Middle right — male CO: Garfield Co.; hill just S. Glenwood Springs, 19 June 1972, leg. J. Scott. Middle right — female CO: Garfield Co.; 10 mi. up Coffee Pot Rd., from Rt. 301, 28 June 1963, leg. G. T. Austin. Bottom left — male UT: Garfield Co.; Panguitch Lake, 8000', 12 July 1983, leg. D. Young. Bottom second — female UT: Garfield Co.; 0.5 mi. S. Hatch, 18 June 1972, leg. J. Scott. Bottom third — male AZ: Coconino Co.; Rt. 89, 0.7 mi. N. Sunset Crater Rd., 7282', 19 June 1983, leg. D. & M. Mullins. Bottom right — female same location, 23 June 1984, leg. D. Mullins.

Burdick's collections, Brown (1964) again showed that *N. r. stretchii* was distinct. He restricted the type locality to Mount Jefferson [Toquima Range], Nye County, Nevada and [re]designated a male from the Burdick series at the Henderson Museum, University of Colorado as the neotype. The specimen, illustrated by Brown (1964) and now deposited at the Carnegie Museum of Natural History, is typical of central Nevada populations.

Despite this recognition of *Neominois ridingsii stretchii* as different from nominate *N. ridingsii*, the application of this name and of *N. ridingsii dionysus* has been inconsistent in geography and time. Brown *et al.* (1957) attributed much of western Colorado material to *N. r. stretchii* and Callaghan and Tidwell (1971) did likewise for Utah. Neither mentioned *N. r. dionysus* but Gillette (1983a) included the latter as part of the Utah fauna. Emmel (*in Howe* 1975) correctly referred to central Nevada populations as *N. r. stretchii*, yet the illustration (plate 2, fig. 25) is of an Inyo County, California specimen. He included Nevada, Utah and northwestern Arizona within the range of *N. r. dionysus*. Miller (*in Ferris and Brown* 1981) suggested that *N. r. stretchii* may enter western Utah, but the taxon was illustrated (p. 282) with specimens from Colorado. He included western Colorado populations in *N. r. dionysus* but illustrated it in the same work (p. 282) with a Jarbidge, Elko County, Nevada specimen from a population that should have been designated *N. r. stretchii*. Dornfeld's (1980) photograph (plate 10, fig. 1) of an Oregon specimen was correctly assigned to *N. r. stretchii*. Garth (1950) referred to Grand Canyon, Arizona specimens as *N. r. dionysus*. Austin (1985) placed most central and northern Nevada populations in *N. r. stretchii* but some extreme eastern Nevada populations were considered *N. r. dionysus*.

The problem of correctly applying *Neominois ridingsii stretchii* and *N. r. dionysus* is appreciated only after viewing numerous series from the western Rocky Mountains and the Great Basin. Variation within populations often equals interpopulational variation and there is considerable overlap in phenotype throughout this area (see also Skinner 1922, Johnson 1983, Gillette 1983b). There is a tendency for lower elevation populations to be smaller and paler than those from middle elevations but even this is not always consistent. Females from some populations are huge. Short series may lean one way or the other and make little sense either geographically or ecologically. Long series often show a large range of variation.

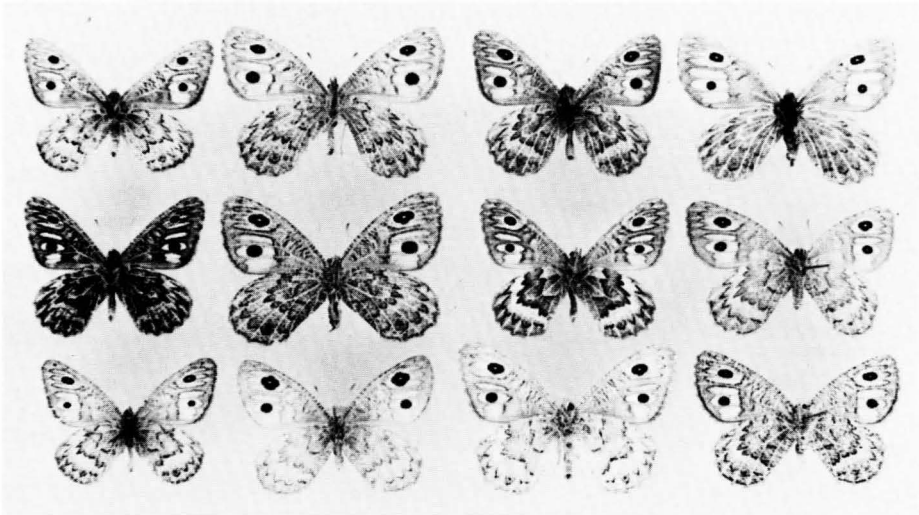


Figure 2b. *Neominois ridingsii stretchii* from various areas (ventral surface). Same specimens as in Fig. 2a.

In this vein, I consider *Neominois ridingsii dionysus* and its straight synonym, *N. r. ashtaroth*, as junior synonyms of *N. r. stretchii*. The taxon is distinguished from the nominate subspecies by its paler, warm yellowish gray-brown aspect (*vs.* the dark brown of *N. r. ridingsii*), strongly serrated, but weakly to moderately contrasting submarginal bands on the secondaries and its larger size (Table 1). These are the same characteristics used to distinguish *N. r. dionysus* from nominate *N. ridingsii* (Scudder 1878, Cockerell 1907, Skinner 1922). The basal area of the primaries of *N. r. stretchii* is pale and the darker postmedian area noticeably contrasts. The base of the primaries on nominate *N. ridingsii* is usually dark and contrasts little with the postmedian area.

The *Neominois ridingsii* of the San Francisco Mountains, Coconino County, Arizona is a curious isolate (Fig. 2), but one which I include as a population of *N. r. stretchii* (note that Skinner [1922] included this variation in nominate *N. ridingsii*). These are the only western Arizona populations south of the Colorado River. In size, males are large (\bar{x} primary length = 23.9, range = 22.0-25.8, N = 19) like many populations of *N. r. stretchii* but they tend to be darker than most and are somewhat intermediate towards the nominate subspecies in this respect. The submarginal pale bands, however, are broader and grade into the ground color posteriorly on the secondaries and are thus less sharply defined. The serrations of this band are generally deeper than on the nominate but average shallower than on most populations of *N. r. stretchii*. Females are also large (\bar{x} primary length = 25.5, range = 23.0-26.8, N = 8) and are a rather typical *N. r. stretchii* dorsally, being pale (including the wing bases), having broad submarginal bands and a slight yellowish cast. On the ventrum, specimens from these populations are generally pale and mottled as is typical for the species but some are nearly white with little mottling. Longer series from here may indicate that they are distinct enough to recognize taxonomically. With the little material now available and the extreme variation of the ventrum, I refrain from naming them here.

The distribution of *N. r. stretchii* is from the west slope of the Rocky Mountains, western Wyoming and eastern Idaho through Utah and northern Arizona to central Nevada north to extreme northeastern California, adjacent extreme southern Oregon and northern Nevada (Fig. 6).

SPECIMENS EXAMINED: ARIZONA (43 males, 16 females): Coconino, Mohave counties (4 June-12 July). CALIFORNIA (8 males, 6 females): Modoc County (14-24 July). COLORADO (102 males, 24 females): Eagle, Garfield, Mesa, Moffat, Montrose counties (8 June-20 July). IDAHO (21 males, 9 females): Lemhi County (23 July-2 August). NEVADA (116 males, 36 females): Elko, Eureka, Humboldt, Lander, Nye, Washoe, White Pine counties (30 May-29 July). OREGON (8 males, 1 female): Lake County (16 July-1 August). UTAH (105 males, 21 females): Daggett, Garfield, Kane, Salt Lake, Sevier, Toole, Uintah, Wayne counties (18 June-11 August). WYOMING (53 males, 26 females): Fremont, Sublette, Sweetwater, Teton counties (1-16 July).

Neominois ridingsii pallidus ssp. nov.

(Fig. 3)

Neominois ridingsii Weymer in Seitz (1924, p. 227), Comstock (1927, p. 69), Ehrlich and Ehrlich (1961, p. 94), Storer and Usinger (1963, p. 92), Scott (1975, p. 7), Scott (1979, p. 200), Miller in Ferris and Brown (1981, p. 282), Pyle (1981, p. 698), Scott (1986, p. 9)

Neominois ridingsii Wright (1905, p. 192), Holland (1931, p. 187)

Eumenis ridingsii dionysus Martin and Truxal (1955, p. 10)

Neominois stretchii Brown (1964, p. 354)

Neominois ridingsii ridingsii Emmel in Howe (1975, p. 88), Tilden (1975, p. 28)

Neominois ridingsii stretchii Emmel in Howe (1975, p. 88)

Neominois ridingsii ssp. Austin (1985, p. 110)

MALE. Dorsum of both wings pale (nearly whitish) gray. Marginal (especially anteriorly), discal and basal areas variously clouded with gray-brown. On primaries, this overscaling strongest on marginal, apical and, often, postmedian areas. Latter on many specimens,

a well defined postmedian dark band; on others, less heavily overscaled (especially centrally) and less well defined. Submarginal band of primaries strongly defined and of usual form for species as follows: a short, usually ill-defined streak in cell R_4-R_5 , a deeply serrated (distally) continuous spot across cells R_5-M_1 , M_1-M_2 , M_2-M_3 , an isolated (by gray-brown continuous with marginal area and postmedian area, broadly anteriorly and narrowly, often only of vein width, posteriorly) oblong spot in M_3-Cu_1 , another, but broader and longer, isolated spot in Cu_1-Cu_2 , an often rectangular, sometimes divided, spot in Cu_2-2A and an ill defined, often clouded, spot in anal cell. Spots of entire band narrowly, often indistinctly bordered with dark brown. A large, black, white-pupiled ocellus centered in cell M_1-M_2 , anterior and posterior portions of which usually in adjacent cells. A similar, but smaller, ocellus in spot of Cu_1-Cu_2 (this blind on some specimens). A usually small, black point in submarginal spot of M_3-Cu_1 on about half of specimens.

Overscaling of secondaries heaviest on apical, basal and anterior discal areas. Submarginal band moderately serrated, less distinct than on primaries and at least anteriorly bordered basally and distally with gray-brown, this usually fading posteriorly. The band seemingly continuous but divided by narrowly darkened veins R_5 , M_1 , M_3 , Cu_1 and Cu_2 . Occasionally all or part of M_2 also darkened. Spot in $Sc+R_1-R_5$ narrow and indistinct. Band fading into ground color posteriorly, nearly indistinguishable in Cu_2-2A and often lightly overscaled with dark, especially near veins and posteriorly. About half of specimens with a variable-sized, black, blind ocellus in Cu_1-Cu_2 . Distal portion of discal cell and basal portions of cells R_5-M_1 , M_1-M_2 , M_2-M_3 , M_3-Cu_1 often nearly as pale (lightly overscaled) as submarginal band. Terminal line dark brown and fringe pale gray checkered darker at veins on both wings.

Ventral ground color pale grayish-white as on dorsum. Submarginal band of primaries distinct and nearly identical in shape and marking to dorsum except black point in M_3-Cu_1 , absent on some specimens. Remainder of wing relatively uniformly overscaled with dark gray-brown. Discal cell (often other cells also of discal and median area) overscaling heavy in a series of irregular anterior-posterior lines. Anal cell and base of cell Cu_2-2A smudged with brown. No indication of postmedian band.

Secondaries entirely overscaled with gray-brown. Submarginal band indistinct, nearly as heavily overscaled as rest of wing, bordered distally and basally by thin, nearly continuous, dark brown lines. Similar, but less distinct line between discal cell and basal areas. Basal area more gray (less brown) than rest of wing. Secondaries thus with four-banded aspect. Ocellus in Cu_1-Cu_2 , usually lost in dark overscaling. Veins scaled with pale ground color and weakly contrasting.

FEMALE. General pattern and coloration of dorsum as on male but darker overscaling tends browner. Wings broader and more rounded and of larger size than male. Ventrum similar to male but tending slightly browner.

SIZE (primary length, mm). Holotype male = 22.0, male topoparatypes $x = 22.2$ (20.2-23.6, $N = 45$), allotype female = 25.8, female topoparatypes $x = 25.0$ (24.3-26.0, $N = 8$).

VARIATION. The low elevation populations examined are relatively constant. Higher elevation populations (White Mountains, Wassuk Range, Sierra Nevada) tend to have somewhat browner overscaling dorsally and ventrally than lower elevations ones (Fig. 3). There is also a tendency on these towards a greater contrast in the ventral banding and smaller size. Comstock's (1927) illustrations (plate 18, fig. 15-18) are of these latter. One Sonora Pass specimen (31 July 1964) and a series from Andrew's Camp have a slight yellowish cast dorsally and ventrally. In all other populations, the whitish ground color and overall grayness are obvious. The tendency towards a darker phenotype at higher elevations has been noted for other *Neominois ridingsii* (Brown 1964, Miller in Ferris and Brown 1981, above under *N. r. stretchii*).

TYPES. Holotype male: NEV: Mineral Co.; Alkali Valley, Larkin Dry Lake Rd., 4.8 mi. N Nv. 359, 6 June 1981, leg. G. T. Austin. Allotype female: same data as holotype. Topoparatypes (85 males, 8 females): same data as holotype.

DEPOSITION OF TYPE MATERIAL. The holotype, allotype, 15 male and 1 female topoparatypes will be deposited at the Nevada State Museum and three male

topoparatypes will be deposited at the Allyn Museum of Entomology. The remaining topoparatypes will be retained by the author for distribution to other collections.

TYPE LOCALITY. NEVADA: Mineral County; Alkali Valley, Larkin Dry Lake Road, 4.8 road miles north of Nevada State Route 359 (formerly State Route 31), 7000', R28E, T4N, S12 on Aurora Nev.-Calif, 15' quadrangle. The area is a sandy flat valley.

ADDITIONAL SPECIMENS EXAMINED. CALIFORNIA (184 males, 59 females): Alpine, Inyo, Mono, Tuolumne counties (22 June-9 August). **NEVADA** (type series plus 73 males, 24 females): Douglas, Esmeralda, Lyon, Mineral counties (19 June-21 August).

DISTRIBUTION AND PHENOLOGY. This western Great Basin taxon has a rather narrow distribution from the central Sierra Nevada (Carson Pass to the Bishop Creek drainage) on the west to the White Mountains, Wassuk Range, Pine Grove Hills and Sweetwater Mountains on the east (Fig. 4). Its habitat ranges from sandy flat valleys,

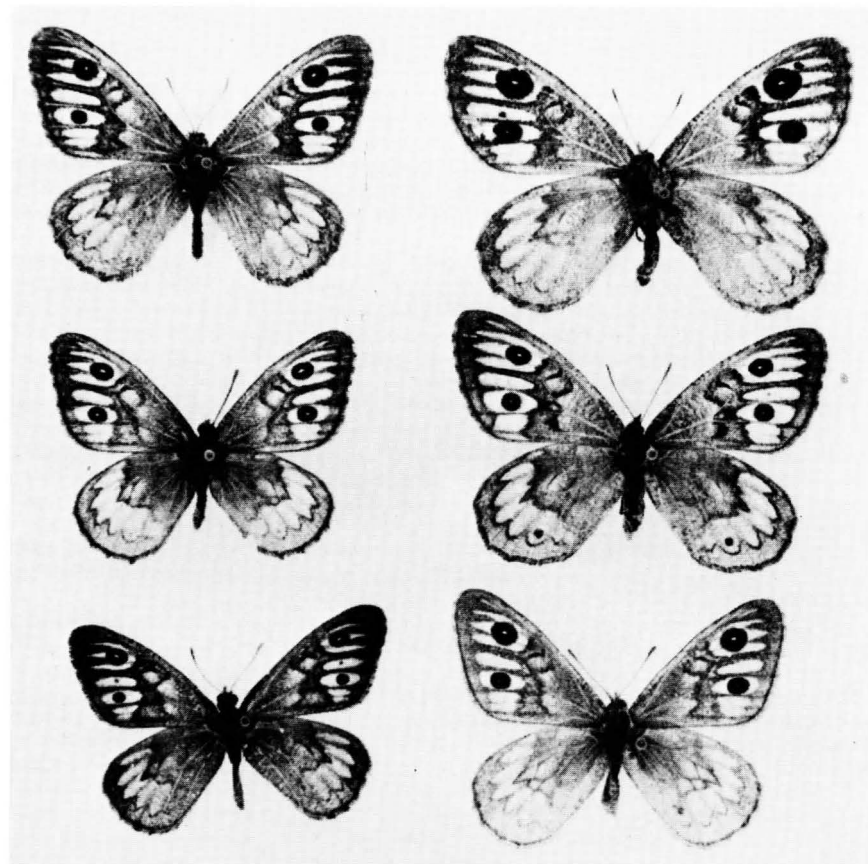


Figure 3a. *Neominois ridingsii pallidus* from various areas (dorsal surface). Top left — holotype male NV: Mineral Co.; Alkali Valley, Larkin Dry Lake Rd., 4.8 mi. N. Nev. 359, 6 June 1981, *leg.* G. T. Austin. Top right — allotype female same data. Middle left — male NV: Lyon Co., Sweetwater Mts., East Sister (west slope), 26 June 1985, *leg.* G. T. Austin. Middle left — female same data. Bottom left — male CA: Tuolumne Co.; Sonora Pass, 13 July 1974, *leg.* J. Scott. Bottom right — female NV: Esmeralda Co.; White Mts., Trail Canyon, 8600', 24 July 1980, *leg.* G. T. Austin.

sagebrush hillsides to high rocky ridges and elevations from 6700' to above 10000'. Populations tend to be local but the butterfly is often common where found. There is one brood with adults present from early June (low elevations) to early August (high elevations).

ETYMOLOGY. The name is derived from the obvious paleness of this taxon.

DIAGNOSIS AND DISCUSSION. The new subspecies is immediately distinguishable from other *Neominois ridingsii* by its pale gray aspect. Other Great Basin populations (*N. r. stretchii*) present a yellow-brown appearance while the nominate subspecies is dark brown. A number of additional characters differ in degree from those of other populations (Table 1).

California populations of *Neominois ridingsii* have been called all the heretofore proposed names except "ashtaroth". Comstock (1927) simply referred to these as *N. ridingsii* without assigning them to a subspecies. Martin and Truxal (1955) considered California specimens to be *N. r. dionysus*. Brown (1964) allied them to *N. r. stretchii* but noted their paleness. Emmel (*in* Howe 1975) included these with his discussion of nominate *N. ridingsii* but the illustrated specimen from this area was labeled as *N. r. stretchii*.

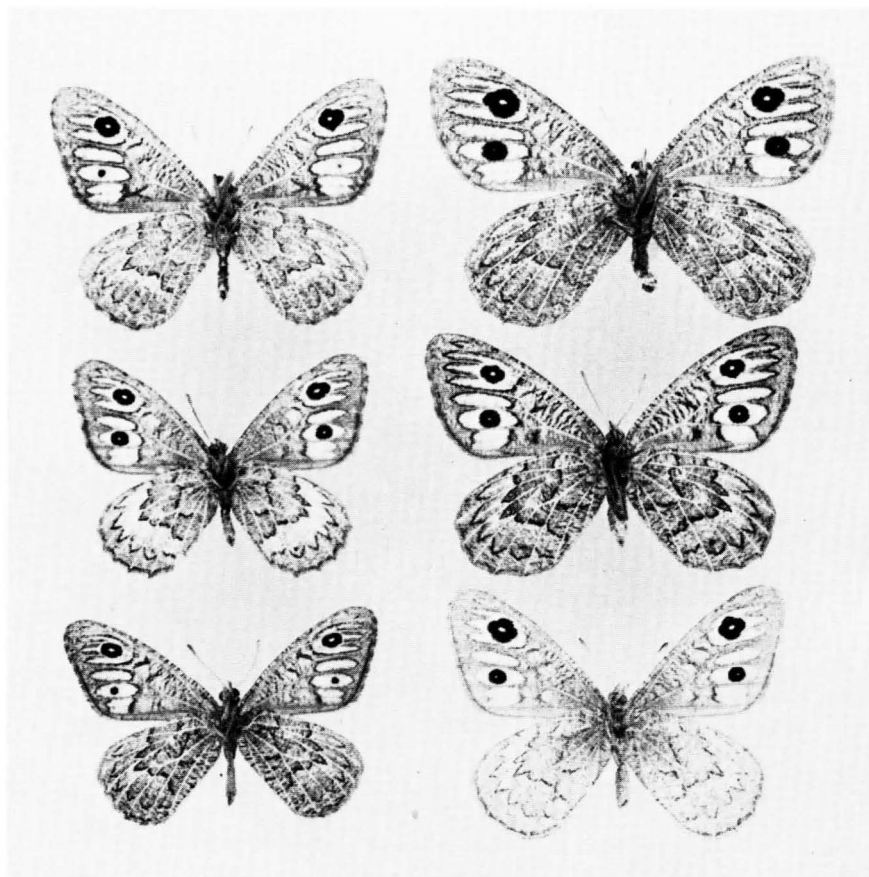


Figure 3b. *Neominois ridingsii pallidus* from various areas (ventral surface). Same specimens as Fig. 3a.

The nearest, geographically, known population of *Neominois ridingsii* is about 120 km to the east in the Toiyabe Mountains, Nye County, Nevada (Burdick 1942). These are typical *N. r. stretchii* with no tendency of phenotypic intermediacy towards *N. r. pallidus* and are similar to other populations of that taxon in the Toquima and Monitor mountains. Specimens from the Warner Mountains, Modoc County, California; Drake Peak, Lake County, Oregon and Granite Range, Washoe County, Nevada, over 300 km north of the range of *N. r. pallidus* and from the Santa Rosa Mountains, Humboldt County, Nevada are pale but show a tendency towards yellow rather than whitish and are considered extreme *N. r. stretchii*. This suggests, perhaps, that gene flow was (or is?) through this region in the northern Great Basin rather than via the central Nevada populations.

***Neominois ridingsii minimus* ssp. nov.**

(Fig. 4)

Satyris ridingsii Scudder (1875a, p. 87)

Hipparchia ridingsii Hanham (1900, p. 366)

Neominois ridingsii Elrod (1906, p. 121), Brodie (1970, p. 3), Pyle (1981, p. 698), Stanford in Ferris and Brown (1981, p. 406), Pinel and Kondla (1985, p. 220)

Eumenis ridingsii Brooks (1942, p. 33), Bowman (1951, p. 130)

Neominois ridingsii ridingsii Puckering and Post (1960, p. 27), Hooper (1973, p. 187), Gregory (1975, p. 29), McCabe and Post (1976, p. 98), Kondla (1979, p. 74), Kohler (1980, p. 17), Thormin *et al.* (1980, p. 10), Kondla (1981, p. 9), Kondla (1983, p. 155), Klassen (1984, p. 37)

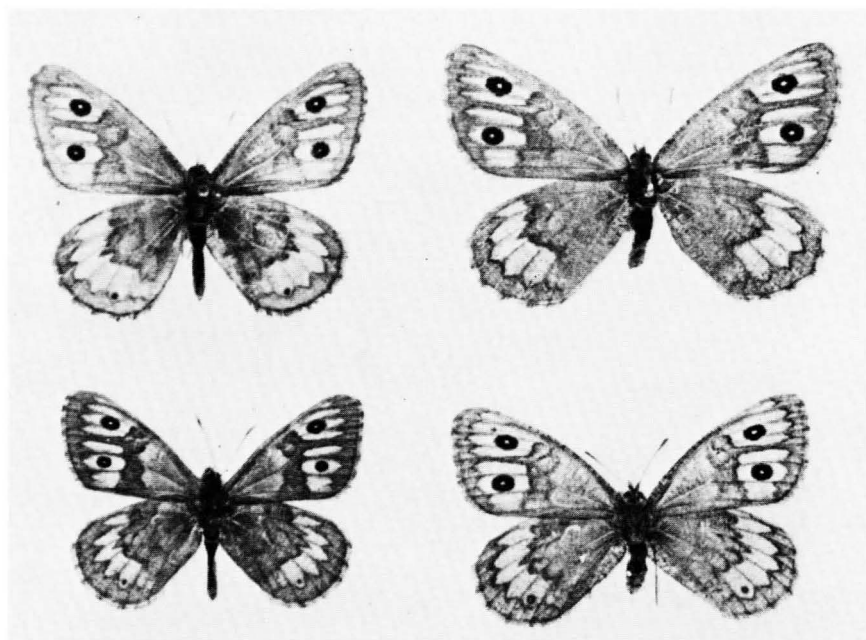


Figure 4a. *Neominois ridingsii* subspecies (dorsal surface). Top left — *N. r. ridingsii* male CO: Sagauche Co.; Hayden Pass Rd., 9000', 25 June 1971, leg. J. Scott. Top right — *N. r. ridingsii* female CO: Elbert Co.; Sandstrom Ranch, 6100', 18 June 1972, leg. M. Fisher. Bottom left — *N. r. minimus* holotype male CANADA: Saskatchewan, Moose Jaw, 18 June 1960. Bottom right — *N. r. minimus* allotype female same data.

MALE. Dorsal ground color gray-brown mottled with heavy dark brown overscaling, usually heaviest in postmedian and marginal areas. Submarginal band of primaries pale tan and as described for *N. r. pallidus*. Ocellus in Cu_1 - Cu_2 about same size as that in M_1 - M_2 and pupiled (except one specimen). Band usually partially overscaled with brown and not crisply defined.

Secondaries more uniformly colored with basal area almost as heavily overscaled as postmedian area. Submarginal band with ocellus (usually small) in Cu_1 - Cu_2 of nearly half of specimens, narrowly interrupted with brown at veins and mottled with brown overscaling.

Ground color of ventrum gray-brown. Submarginal band of primaries distinct and as on dorsum. Remainder of wing overscaled with dark brown mottling. Secondaries entirely overscaled with dark brown mottling, heaviest on postdiscal area, lightest on submarginal area, both areas outlined with irregular brown lines, thus a four-banded aspect.

FEMALE. Slightly larger than male with more rounded wings. Dorsum with color of male but with less heavy overscaling and a paler aspect. Postmedian band less distinct. Ventrum with less overscaling than on male appearing paler. Pattern as on male.

SIZE (primary length, mm). Holotype male = 18.7, male topoparatypes $x = 19.3$, (17.0-21.1, $N = 79$). Allotype female = 21.7, female topoparatypes $x = 22.1$ (21.8-22.5, $N = 4$).

VARIATION. The type series is remarkably constant as compared with series from other populations of *Neominois* examined. A few specimens are paler than most of the series but the overall distinctness is maintained by all.

TYPES. Holotype male: CANADA: Saskatchewan: Moose Jaw, 18 June 1960 (VI-18-60). Allotype female: same location as holotype, 24 June 1960. Topoparatypes (84 males, 4 females): same location as holotype, 17 June 1959 (11 males, 1 female), 4 June 1960 (1 male), 17 June 1960 (2 males), 18 June 1960 (14 males, 1 female), 19 June 1960 (22 males),

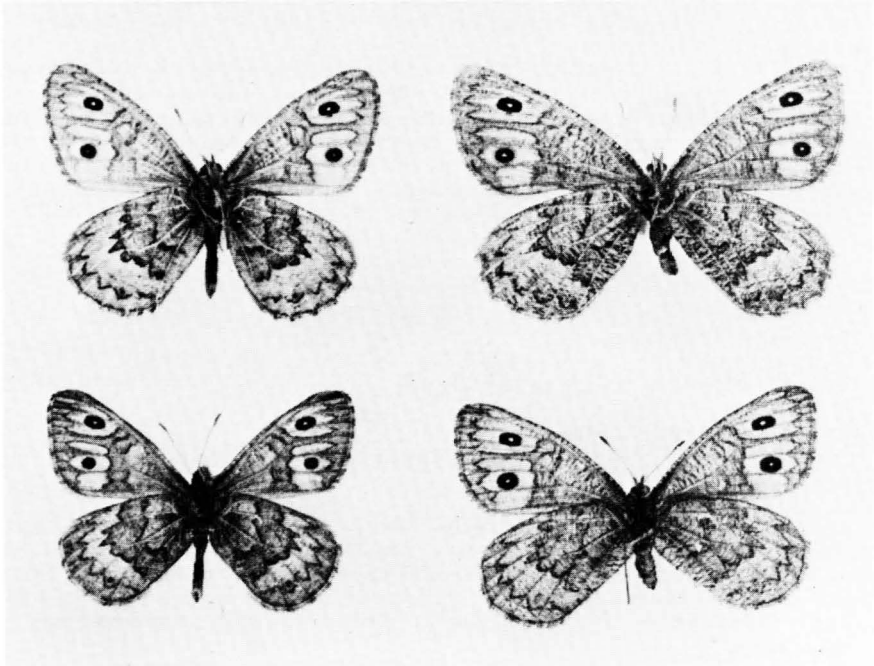


Figure 4b. *Neominois ridingsii* subspecies (ventral surface). Same specimens as Fig. 4a.

22 June 1960 (1 male), 23 June 1960 (9 males), 24 June 1960 (7 males, 1 female), 25 June 1960 (6 males, 1 female), 26 June 1960 (6 males), 28 June 1960 (2 males), 29 June 1960 (2 males) [the collector of this series is not noted on the labels except one taken by R. N. Holman on 17 June 1959], Moose Jaw, N side of city, 50 24'N, 105 30'W, 25 June 1981, *leg.* J. Reist (1 male).

DEPOSITION OF TYPE MATERIAL. The holotype, allotype and all topoparatypes except the last will be deposited in the Allyn Museum of Entomology. The last topoparatype is in the author's collection.

TYPE LOCALITY. CANADA: Saskatchewan: Moose Jaw, north side of city, 50 24'N, 105 30'W. This restriction is based on the sole specimen of the type series with rather precise location data. The area is short grass prairie (*vide* J. Reist).

ADDITIONAL SPECIMENS EXAMINED. CANADA (type series plus 24 males, 21 females): Alberta, Manitoba, Saskatchewan (13 June-10 August). **MONTANA** (18 males, 3 females): Blaine County (7 June-9 July). **NORTH DAKOTA** (6 males, 2 females): Dunn, Slope, Ward counties (23 May-23 July).

DISTRIBUTION AND PHENOLOGY. To date, *Neominois ridingsii minimus* is known from the extreme northern portion of the species' range from southern Alberta to southwestern Manitoba south to northern Montana (Fig. 6). Populations from North Dakota are also assigned to this taxon. There appears to be one brood, with adults present between late May and early August.

ETYMOLOGY. The name denotes the small size of this taxon compared to others of the species.

DIAGNOSIS AND DISCUSSION. This new subspecies is closest to nominate *Neominois ridingsii* in appearance. It is readily distinguished by its smaller size, somewhat darker gray-brown aspect and the more mottled look of the wings. Nominate *N. ridingsii* appears smooth while *N. r. minimus* appears granular with a coarser-grained pattern of overscaling on both surfaces. All other taxa of *N. ridingsii* are distinguished from *N. r. minimus* by those characters distinguishing them from the nominate subspecies and by their larger size (Table 1).

The full extent of the distribution of *Neominois ridingsii minimus* and its relationships and intergradation toward *N. r. ridingsii* are unknown at present. Specimens from Madison and Jefferson counties, Montana are large and closest to the nominate subspecies but are somewhat grayer with a suggestion of the mottling of *N. r. minimus* (Fig. 1). Additional intermediate populations are expected between here and northern Montana (see distribution in Kohler 1980). Eastern Idaho and western Wyoming populations are *N. r. dionysus*. I have not seen material from South Dakota and cannot comment on its phenotype.

***Neominois ridingsii neomexicanus* ssp. nov.**

(Fig. 5)

Neominois ridingsii ridingsii Holland (1974, p. 47), Emmel *in* Howe (1975, p. 88), Miller *in* Ferris and Brown (1981, p. 283), Miller and Brown (1981, p. 200), Miller and Brown *in* Hodges (1983, p. 65)

Neominois ridingsii ssp. Ferris (1976, p. 48)

Neominois ridingsii Pyle (1981, p. 698), Thomas and Werner (1981, p. 33), Holland (1984, p. 233)

MALE. Dorsum pale brown. Submarginal bands cream color, narrow on both wings, those on secondaries weakly to moderately serrated. Basal portion of wings not distinctly pale, postmedian area not contrasting. Ventral ground color pale creamy, submarginal bands repeated from upper surface, entire surface moderately overscaled with dark brown, submargin of secondaries not distinctly outlined, weakly contrasting and generally lacking banded aspect.

FEMALE. Similar to male, larger with broader and more rounded wings.

SIZE (primary length, mm). Holotype male = 20.2, male paratypes \bar{x} = 20.1 (18.2-22.1,

N = 19). Allotype female = female = 21.1, female paratypes \bar{x} = 22.0 (19.7-25.3, N = 12)

VARIATION. The majority of specimens are pale brown but range from rather dark brown (one specimen) to extremely pale on which there is little contrast of even the submarginal bands (Fig. 5).

TYPES. Holotype male — NEW MEXICO: Valencia Co.; Zuni Mts., Bluewater Canyon, 7800', 26 June 1977, *leg.* R. W. Holland. Allotype female — same location as holotype, 26 June 1976, *leg.* R. W. Holland. Paratypes (28 males, 12 females, all NEW MEXICO: Valencia Co.) — same date as holotype (6 males, 5 females); same data as allotype (10 males, 6 females); Zuni Mts., Zuni Canyon, Logging Chute, 7300' 27 June 1978, *leg.* R. W. Holland (1 male); Zuni Mts., Zuni Canyon, 7000', 18 June 1976, *leg.* R. W. Holland (1 male); same data, 31 May 1976, *leg.* R. W. Holland (3 males); Bluewater Lake, 20 June 1969, *leg.* R. W. Holland (1 female); Zuni Mts., Bluewater Creek at Diener Canyon, 7800', 26 June 1977, *leg.* C. D. Ferris (7 males).

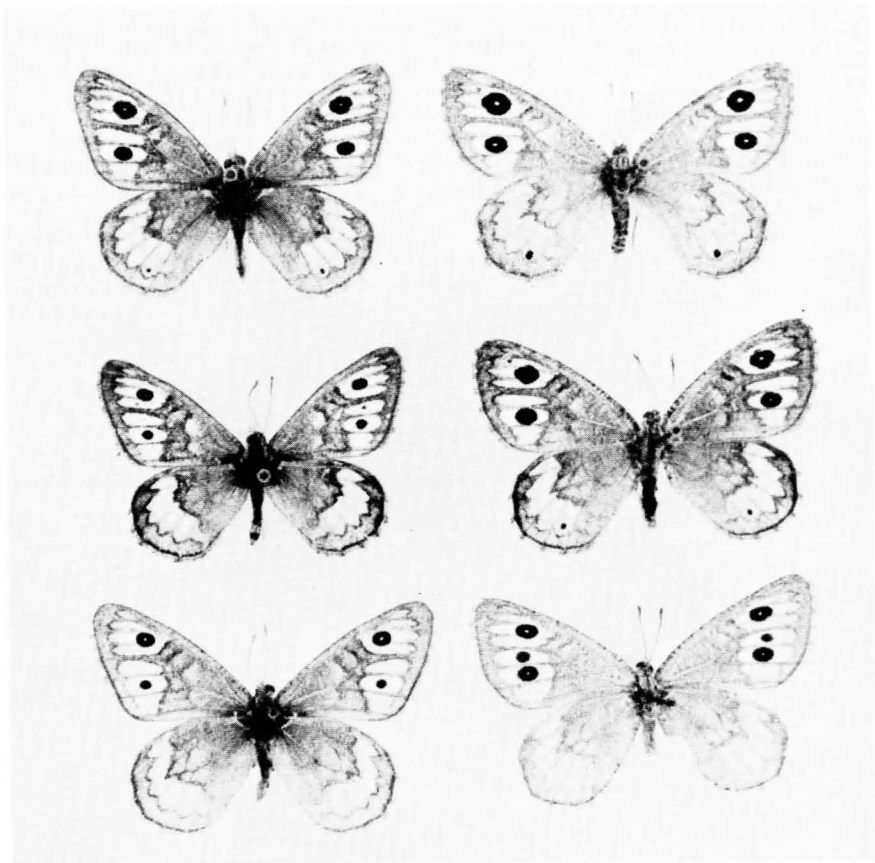


Figure 5a. *Neominois ridingsii neomexicanus* (dorsal surface). Top left — holotype male NM: Valencia (Cibola) Co.; Zuni Mts., Bluewater Canyon, 7800', 26 June 1977, *leg.* R. W. Holland. Top right — allotype female same location, 26 June 1976, *leg.* R. W. Holland. Middle left — dark male same data as holotype. Middle right — dark female same data as holotype. Bottom left — male NM: Valencia Co.; Mt. Taylor, 15 June 1966, *leg.* R. W. Holland, Bottom right — extreme pale female same data.

DEPOSITION OF TYPE MATERIAL. The holotype and allotype will be deposited at the Allyn Museum of Entomology, 21 male and 11 female paratypes will be deposited in the private collection of Richard W. Holland, Albuquerque, New Mexico and 7 male and one female paratypes are in the author's collection.

TYPE LOCALITY. NEW MEXICO: Cibola County; Cibola National Forest, Zuni Mountains, Bluewater Canyon, 7800'. This was formerly a part of Valencia County, changed by the New Mexico state legislature (Holland 1984).

ADDITIONAL SPECIMENS EXAMINED. ARIZONA (2 males, 1 female): Apache County (26-30 June). **NEW MEXICO** (type series plus 30 males, 9 females): McKinley, Valencia counties (9 June-8 July).

DISTRIBUTION AND PHENOLOGY. To date, this phenotype is known from a small area of east-central New Mexico and adjacent Arizona (Fig. 6). It flies in one brood from late May to early July. The population in the SS Basin, Catron County, New Mexico (Ferris 1976) may also be of this taxon.

ETYMOLOGY. The subspecies is named after the state of New Mexico, the type locality and most of the known range.

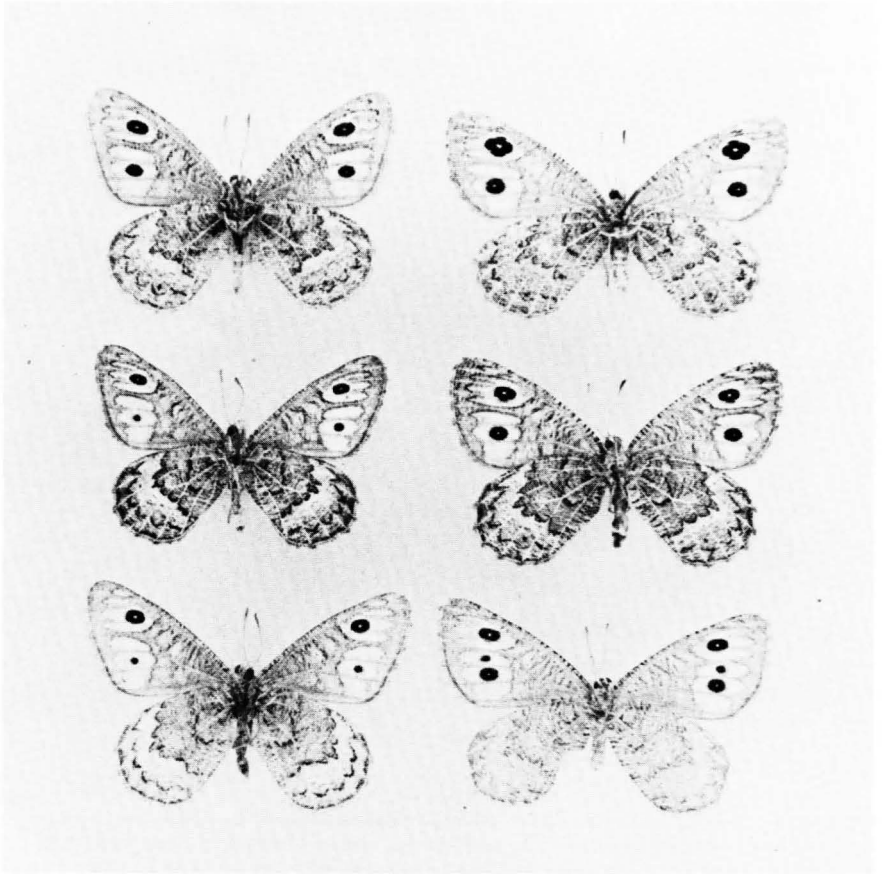


Figure 5b. *Neominois ridingsii neomexicanus* (ventral surface). Same specimens as Fig. 5a.

DIAGNOSIS AND DISCUSSION. *Neominois ridingsii neomexicanus* is at once recognized by its small size, its plain and pale brown aspect and its relatively weakly serrated submarginal bands on the secondaries (Table 1). The color lacks the richness and the pattern lacks the boldness of the other *N. ridingsii* subspecies. It is much paler and less gray than nominate *N. ridingsii* and *N. r. minimus*. The basal portion of the primaries is scarcely paler than the postmedian area but there is usually a touch of pale cream just distal to this. The submarginal bands are narrow as on the nominate subspecies but average slightly more serrated on the secondaries. Beneath, the overscaling is rather evenly distributed, there is little contrast between the various areas of the wings and thus there is no banded effect as on all other subspecies. The new subspecies additionally lacks the large size, yellow cast and broad and usually deeply serrated submarginal bands of *N. r. stretchii* and is not distinctly paler basally on the primaries. *Neominois r. pallidus* is larger and grayer with broader and more deeply serrated bands.

Neominois ridingsii neomexicanus seems to be somewhat of an isolate in west-central New Mexico and east-central Arizona. Further north and east in New Mexico, the populations average closer to nominate *N. ridingsii* in size, color and pattern although occasional specimens from here and south-central Colorado (e. g., Rio Grande County) approach *N. r. neomexicanus* in pallidity.

OTHER RECORDS

There are additional distributional records of *Neominois ridingsii* in the literature and those that I have received from a number of collectors. Those that do not duplicate county records included under specimens examined of the various subspecies above are listed here. Dates given extend those given above for the state in question. **CALIFORNIA:** Eldorado County (Langston 1984). **COLORADO:** Adams, Boulder, Cheyenne, Clear Creek, Conejas, Delta, Fremont, Huerfano, Jackson, Las Animas, Lincoln, Logan, Ouray, Pitkin, Pueblo, Rio Blanco, Routt, Washington counties (Stanford 1985a, 1986; *fide* J. A. Scott) (late May-6 September; Edwards 1897, Eff 1976). **MONTANA:** Beaverhead, Broadwater, Carbon, Chouteau, Dawson, Deerlodge, Fergus, Gallatin, Lewis & Clark, Park, Phillips, Sweet Grass, Wheatland counties (Kohler 1980, Stanford 1985a). **NEBRASKA:** (mid May; Johnson and Nixon 1967, Johnson 1972). **NEW MEXICO:** Catron, Mora, Taos counties (Ferris 1976, Stanford 1986). **NORTH DAKOTA:** Divide, Hettinger, Mountrail, Stark counties (Scudder 1875a, Stanford 1985a) (mid June-mid July; McCabe and Post 1976). **OREGON:** Harney County (Dornfeld 1980) (late June-August; Dornfeld 1980). **SOUTH DAKOTA:** Pennington County (Stanford 1985a). **UTAH:** Beaver, Carbon, Duchesne, Emery, Piute, Utah, Washington counties (Stanford 1985a) (8 June-30 August; Gillette 1983b). **WYOMING:** Campbell, Laramie, Lincoln, Natrona, Niobrara, Platte, Sheridan, Uinta, Washakie counties (Stanford 1985a, 1986) (13 June-2 September; DeFoliart 1956, Stanford 1985b, 1986; *fide* J. A. Scott).

Two records of *Neominois ridingsii* are dubious on distributional grounds: **TEXAS:** Bexar County; San Antonio, June 1957, *leg.* J. P. & G. C. Hubbard, 1 male, 1 female. This pair, in the United States National Museum, with a phenotype of nominate *Neominois ridingsii* are undoubtedly mislabeled as the location is far out of the known range of the species. **WASHINGTON:** Pierce County; Paradise Valley, Mt. Ranier, 5500', *leg.* Mrs. E. Graham, 30 June 1931, 1 male. This specimen, in the Carnegie Museum of Natural History, has a *N. r. stretchii*-like phenotype. It is considered doubtful because the location is out of the species' known distribution and there are no records in the latest list for the state (Hinchliff *et al.* 1980; note that Miller *in* Ferris and Brown [1981] included Washington in the distribution of the species).

DISCUSSION

The major variation of *Neominois ridingsii* consists of two widely distributed phenotypes and three distinct peripheral phenotypes (Fig. 6). In the southern part of its range, *Neominois*

ridingsii shows a geographical pattern of three segregates: east slope Rocky Mountains, west slope Rocky Mountains-central Great Basin and western Great Basin in addition to the isolate in New Mexico. Relatively similar patterns are known for other genera (Austin and Murphy 1986). *Neominois r. pallidus* is somewhat of an isolate but has undoubtedly had its origin from other Great Basin populations. This is consistent with the widely known biogeographical phenomenon that the Great Basin biota is overwhelmingly Rocky Mountain in character up to and including portions of the east slope of the Sierra Nevada (e.g., Behle 1978, Harper *et al.* 1978).

Some populations appear intermediate or show characters unlike those of nearby areas. The intermediacy towards *Neominois ridingsii pallidus* of populations of the northwestern

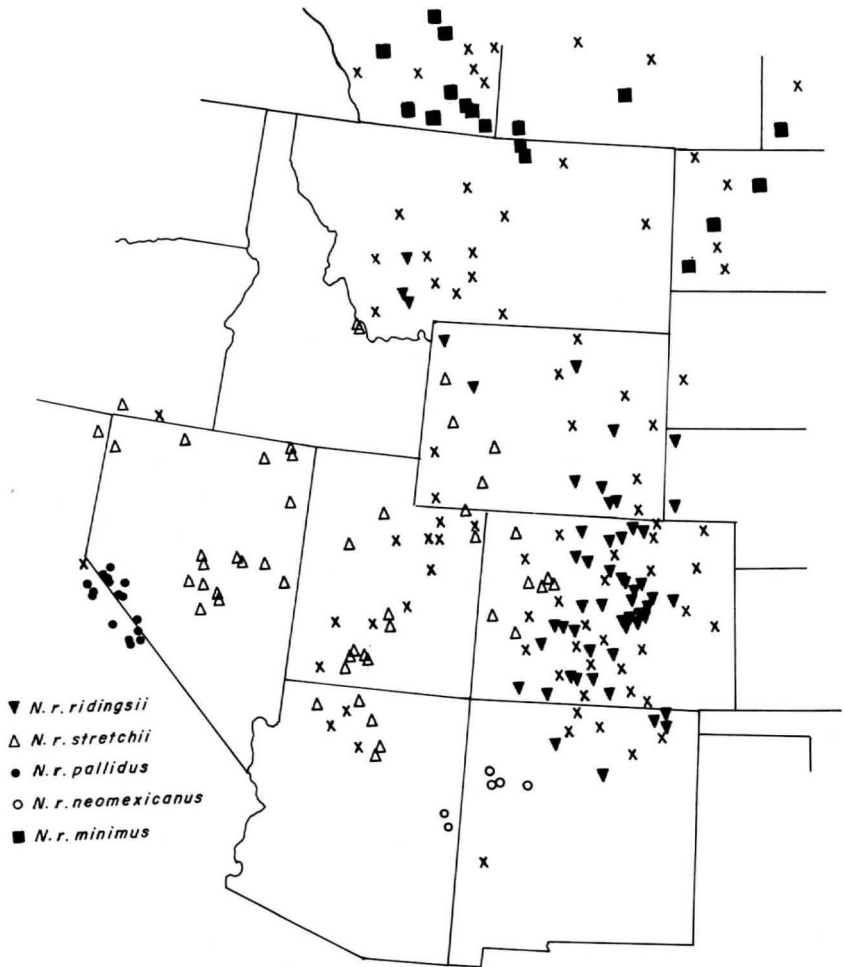


Figure 6. Distribution of *Neominois ridingsii* ("x" symbols indicate specimens not seen).

part of the range of *N. r. stretchii* has been noted above. Also mentioned were the possible intermediates between *N. r. minimus* and *N. r. ridingsii* in southwestern Montana. Short series from parts of central Colorado (Grand, Gunnison, Lake and Larimer counties) indicate intermediacy between *N. r. ridingsii* and *N. r. stretchii*. Four males from Wayne County, Utah appear closest to the nominate subspecies instead of nearby populations of *N. r. stretchii*. The series from Kane County, Utah examined includes specimens which match both *N. r. stretchii* and nominate *N. r. ridingsii*. Other anomalous populations examined were mentioned under *N. r. ridingsii*, *N. r. pallidus* and *N. r. stretchii* above. This further shows the necessity of series and knowledge of adjacent populations in dealing with the variation of this species.

Neominois inhabits a wide variety of habitats with one common ingredient, the presence of bunch grass. One hostplant has been determined to be *Bouteloua gracilis* (Poaceae) by Fisher (see Ferris 1971c), Scott and Scott (1978) and Scott (1986). In Nevada, the larval hostplant has not been definitely determined. At many localities, however, where the species has been collected, it is associated closely with *Stipa comata* (Poaceae). Scott (1986) noted oviposition on this grass and on *Sitanion hystrix* in Colorado. The species is found on short grass prairies in Alberta and Saskatchewan (Bowman 1951, Hooper 1975, *vide* J. Reist) preferring dry grasslands at elevations of 2500-3500' (*vide* N. Kondla), in grassy open areas in Wyoming (Ferris 1971b), on grassy plains at 5000' in Nebraska (Johnson 1972), in grasslands (sometimes piñon-juniper woodland) to the lower edge of Ponderosa Pine forests and on higher (to 13000') grassy ridges in the eastern half of Colorado (Brown *et al.* 1957, Brown 1964, Emmel 1964, Emmel *in* Howe 1975, Scott and Scott 1978), on sagebrush flats, on grassy slopes, in sandy valleys, in piñon-juniper woodland and on high elevation (to above 10000') ridges with low sagebrush in the western Rocky Mountains and Great Basin (Garth 1950, Emmel *in* Howe 1975, Christensen 1981, Johnson 1983, personal observation) and on rocky and wind swept summits in the Sierra Nevada (Comstock 1927). The species is often locally abundant, occurring in scattered colonies throughout its range (Mead 1875, DeFoliart 1956, Brown *et al.* 1957, Callaghan and Tidwell 1971, Johnson 1983, personal observation).

Mead (1875) aptly described the behavior of these butterflies as "...found hiding in the short, parched grass, and flying up when disturbed, exactly as in the habit of *Drasteria* among the moths. The color of these butterflies harmonizes excellently with that of the dry herbage, and renders them quite difficult of detection, even when near at hand." Further it "...has almost entirely the habits as well as the appearance of *Chionobas* [= *Oeneis*] rather than *Satyrus* [= *Cercyonis*]"'. *Neominois* usually flies only when disturbed and then rapidly and erratically close to the ground before quickly alighting again, often on bare ground. Here it may alternately open and close the wings or land with the wings closed and lean to one side. I have never observed the species to nectar and Emmel (1964) reported the same but Scott (1973) and Scott and Scott (1978) reported that they nectar rarely on yellow and white flowers in south central Colorado.

Scott (1973, see also Scott 1975) studied *Neominois* population biology and behavior in Colorado. It is a sedentary species that rarely moves more than 200 m and has an expected life span of about one week. He found this to be a perching species which hilltops and mates on low (3 m) hills. Mating was observed in the morning between 0750 and 1040. Similar behavior was noted in Mono County, California (Scott 1975). I have one record of a mating pair of *N. r. pallidus* on a flat, sandy, dry lake bed at its type locality on 6 June 1981. A male I flushed at 0830 was encountered by a female as he flew over her. They immediately dropped to the ground together and copulated within 2-3 sec. When flushed again, the female flew; this is the normal active partner among the Satyrinae (Miller and Clench 1968, Shields and Emmel 1973). Scott (1973) found that males intercept passing females and that there is usually (but not always) wing flicking prior to mating. Oviposition was indiscriminate on various grasses and other plants and between 0900 and 1500. The species is a dorsal basker at cool temperatures; when hot, it perches with closed wings, often off the ground or in the shade (Scott 1973).

Edwards (1897) described and illustrated the early stages of nominate *Neominois ridingsii*. Subsequent descriptions and illustrations (Elrod 1906, Comstock 1927, Holland

1931, Emmel *in* Howe 1975, Miller *in* Ferris and Brown 1981) are probably all based on this account.

Throughout most of its range, *Neominois ridingsii* appears to be univoltine. The apparent flight season is long with records extending from mid May to early September. Peak flight is from mid June to mid July (77% of location/date records). This is true even for the northernmost populations (*e.g.*, over half of *N. r. minimus* records are for late June and early July). There is, however, at least some elevational influence on flight dates (Brown *et al.* 1957, Scott and Scott 1978, Pyle 1981). In western Nevada and eastern California, lowland populations fly in June and early July while high elevation (above 8000') populations fly from mid July through early August.

Some data suggest a possible second brood in some areas. Edwards (1897) quoting David Bruce said that lowland populations fly "...by the end of May or beginning of June. Eggs produced from the early females produce a second brood of the imago in August and September, the examples of which are paler and slightly larger than the spring brood." Edwards (1897) illustrated supposed first and second brood specimens. Edwards received several batches of ova from Colorado but all surviving larvae diapaused in the second to fifth instar (Edwards 1897). Avinoff and Sweadner (1951) also illustrated "early" and "late" forms from Wyoming and Colorado. Brown *et al.* (1957, see also Eff 1950) reported *Neominois ridingsii* as at least occasionally double-brooded in Larimer County, Colorado but not elsewhere. Miller (*in* Ferris and Brown 1981) reported that the species is always double-brooded at some localities and that favorable years will produce at last partial second broods. Leussler (1972) found evidence of a second brood and seasonal variation in Nebraska. Pyle (1981) reported one brood with an occasional second brood. Scott (1973) and Scott and Scott (1978) found the species univoltine in south central Colorado as did Johnson (1972) in Nebraska. Utah records indicate a single brood (Callaghan and Tidwell 1971). I have not found more than one brood among Nevada populations. Jim Scott who has had considerable experience with the species in Colorado told me (*in litt.*) that August records represented "the late dregs". He did find *Neominois* fairly fresh and common in Fremont County, Wyoming in late August and early September (see also Stanford 1985b) but doubted that this was a second brood. The species was common in early September 1956 in Rocky Mountain National Park, Colorado (Ritterbush 1972). There may well be at least a partial second brood at some locations and in some years. At Sonora Pass, Mono County, California, the species was reported as biennial, flying during even-numbered years (Scott 1979) and, if so, cannot be anything except univoltine. There are, however, apparent odd year records for 1969 (Langston 1970) and 1975 (9 August 1975, 1 male, *leg.* J. Brock). This species certainly flies in abundance during odd-numbered years at other Sierra Nevada locations (*e.g.*, Carson Pass, Langston 1984). No other population seems to be biennial although Gillette (1983b) reported a possibility of this among some Utah populations.

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