

the collection of the author; the other 4 male and 1 female paratypes are in the collection of JOSEPH MULLER.

The larva is in general usual for *Papaipema* in color and markings. The dorsal line is unbroken. A black line on the side of the head extends along the thoracic shield. The foodplant is entered three inches above ground level, and the burrow extends to one inch below ground level. The larva causes no swelling of the plant. It leaves the plant for pupation in the ground. The adults emerge two weeks earlier than its nearest ally, *P. necopina*. The foodplants of *P. necopina* are *Helianthus divaricatus* L. and *Cacalia tuberosa* Nutt.

I am pleased to dedicate this species to my friend JOSEPH MULLER, of Lebanon, New Jersey, who did all the field work. My thanks go to Dr. FREDERICK H. RINDGE, Associate Curator of Insects, of the American Museum of Natural History, who studied the genitalia and prepared the entire description of the genitalia.

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INFRA-SUBSPECIFIC NAMES AMONG *PARNASSIUS*

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For nomenclatorial purists "form" names of lesser stature than subspecies are annoying synonymic parasites. Form names serve a purpose for the serious student of variation fully as great as species and subspecies names. Both types of names are useful only because they stand for an otherwise cumbersome description. When a type of variation from the normal pattern occurs throughout a group of species or even a group of genera — such as albinic females among *Pieridæ* — it is very much worth while calling attention to this phenomenon. Such albinism has been investigated and found to be genetic. Similar less conspicuous variation crosses specific lines among butterflies. In time we may learn if they, too, are genetic or physiologic reactions to environment that can occur within the strictures imposed by the genes. The darkening of some butterflies when exposed to cold during immature stages falls within physiologic reactions. Infra-subspecific names are useful in such genetic and physiologic studies.

Perhaps the greatest nomenclatorial furor among American taxonomists has been stirred up by the application of infra-subspecific names by European students of the genus *Parnassius*. Until recently I looked down my nose at such naming. My change of mind came about when I started to make a detailed study of variation among *Parnassius phœbus* Fabricius (the species best known

in North America as *P. smintheus*) as it occurs in the Rocky Mountains. Anyone who has collected several dozen specimens of this species at a single locality will realize the bewildering variation that occurs. The task I set myself is to bring some order to our understanding of this and to determine if any of it is geographically constant enough to be used as the basis for a better understanding of subspeciation in the Rocky Mountain fragment of the species.

OTTO BANG-HAAS (1915) first applied infra-subspecific names to *Parnassius* in such a way that these names crossed subspecific and specific lines. BRYK and EISNER expanded the system enormously in their various articles in *Parnassiana* and elsewhere. Recently EISNER (1955) has published a summary of these names. Since this article is not easily accessible to most American collectors, I here present the *nomina collectiva* used with a translation from German of the definitions:

1) Affecting all wings

- f. "magna" — markedly large.
- f. "minuscula" — markedly small.
- f. "nigricans" — wing basically darkened.
- f. "umbratilis" — hyaline, darkened overall.
- f. "albicans" — wing basically pale.
- f. "flavicans" — wing basically yellowish.
- f. "diaphana" — extraordinarily thinly scaled.
- f. "inversa" — female with male pattern.
- f. "perversa" — male with female pattern.

2) Forewing

- f. "marginata" — marginal band unusually wide.
- f. "immarginata" — without hyaline marginal band.
- f. "niphetois" — hyaline marginal band invaded by white scales.
- f. "seminiphetois" — the white scaling along the margin extending inward as wedges.
- f. "pura" — without the inner-margin spot on the forewing.
- f. "primopicta" — the first costal spot red-centered.
- f. "secundopicta" — the second costal spot red-centered.
- f. "tripicta" — three red-centered costal spots.
- f. "quadropicta" — four red-centered costal spots.
- f. "inpicta" — costal spots without red centers.
- f. "albopicta" — the red of the costal spots white-centered.
- f. "quincunx" — the spot at end of cell extends only to upper vein of cell (R_s).
- f. "antiquincunx" — the spot at end of cell extends beyond the upper vein of cell.
- f. "binaria" — the spot in the middle of the cell divided.
- f. "ernestinae" — the spot in the middle of the cell reduced to a point.
- f. "kitti" — the spots in the middle and at the end of the cell reduced to points.
- f. "halteres" — the cell spots joined by a black band.
- f. "orbifer" — the cell spots with a ring-shaped connection.
- f. "cellopura" — the cell spots absent.
- f. "fasciata" — costal spots and inner-margin spot joined by costal band of black.
- f. "ornata" — inner-margin spot red-centered.
- f. "inornata" — inner-margin spot without red center.
- f. "lunulata" — white spots in the dark ground of the margin.
- f. "elunulata" — lacking white spots in the dark ground of the margin.
- f. "grundi" — an additional spot between the cell spots.
- f. "fermata" — an additional spot between inner-margin spot and base of the wing.
- f. "basipunctata" — a black spot at the base of the wing.

3) Hind wing

- f. "rubroöcellata" — ocelli filled with red.
- f. "flavoöcellata" — ocelli yellow-colored.
- f. "ochreoöcellata" — ocelli orange-colored.
- f. "bruneoöcellata" — ocelli brown-colored.
- f. "alboöcellata" — ocelli white, without other color.
- f. "albopupillata" — white center within the colored part of the ocelli.
- f. "ocelloconjuncta" — ocelli joined by a black band.
- f. "ocellorubroconjuncta" — ocelli joined by a red-scaled band.
- f. "nigroöcellata" — ocelli entirely black.
- f. "nigrodivisoöcellata" — middle ocellus divided by a black line along the vein.
- f. "rubrodivisoöcellata" — the white center of the middle ocellus divided by red scaling along the vein.
- f. "ocelloëxtincta" — ocelli absent.
- f. "melanconica" — basal spot without red center.
- f. "excelsior" — first basal spot red.
- f. "biëxcelsior" — first and second basal spots red.
- f. "lacrimans" — costal ocellus connected with the base of the wing by a black band.
- f. "rubrolacrimans" — costal ocellus connected with base of wing by a red band.
- f. "discocircumcincta" — abdominal margin blackened to the cell and with an extension toward the middle of the costal margin.
- f. "rubroanalis" — anal spot red-centered.
- f. "ampliusanalis" — three anal spots.
- f. "analisconjuncta" — anal band joined with the middle ocellus.
- f. "exanalis" — anal spot absent.
- f. "dentata" — submarginal area well-depicted.
- f. "latecincta" — ocelli unusually boldly margined with black.
- f. "tenuicincta" — ocelli with very narrow black margins.
- f. "intertexta" — a yellow ring between black ocellus-margin and colored center.
- f. "excincta" — ocelli without black margin.
- f. "atroguttata" — black spot in the center of the cell.
- f. "siegei" — an additional black spot between costal ocellus and base of wing.
- f. "theiodes" — hyaline marginal band preserved.

The above names are purely descriptive and when used do not take an author's name. They have no nomenclatorial status. Their use should be limited to studies of variation until we understand much more about the characteristics they present. Many specimens will present several of the variants. For instance, I have before me a specimen of *P. phœbus catullius* Fruhstorfer from the Great Sand Dunes area in Colorado that combines these variations on the forewing: marginata, primopicta, antiquincunx, inornata, and lunata. On the hind wing of the same specimen these variations are combined: rubroöcellata, albopupillata, dentata, and theiodes. To include all of these in the citation of the specimen is nonsense. However, for tabulation of the variation found in a series, the names are very useful. They may prove to be the tools by which the geographic variation — subspecification — of the species is finally unraveled and put on a firm basis.

References

- Bang-Haas, O., 1915. *Deutsche entomologische Zeitschrift "Iris"* 29:181-185.
 Eisner, Curt, 1955. *Zoologische Mededelingen, Rijksmuseum van Natuurlijke Historie te Leiden* 33:177-179.

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