

DISCOVERY AND OBSERVATIONS OF *BOLORIA EUNOMIA*
(NYMPHALIDAE) IN MICHIGAN

By M. C. NIELSEN

3415 Overlea Dr., Lansing, Mich., U.S.A.

Since reading Klots' Field Guide (1951), I have been intrigued with the possibility of finding *Boloria eunomia* (Esper) in Michigan, especially in one of the many sphagnum bogs of the Upper Peninsula. The recent discovery of *B. frigga* (Thunberg) in a large sphagnum-heath bog north of Manistique, Michigan, by S. T. Hubbell (1957) merely intensified my desire to search for the former species, a subarctic butterfly. Then on June 13-15, 1963, I collected a long series of *B. eunomia* in Mackinac and Chippewa Counties, the first record of this species for Michigan. It appeared from my series that the northern peninsula's population represented the subspecies *dawsoni* (Barnes and McDunnough). Some of the specimens, especially the males, exhibit considerable black dusting on the dorsal side of the forewing, and to some extent on the hindwing, in the medial and terminal areas (Plate 1). There is very little variation in the markings on the ventral side of the wings. The determination of *B. eunomia dawsoni* was subsequently confirmed by Dr. A. B. Klots upon his examination of representative specimens of both sexes.

A total of forty-five specimens of *B. eunomia dawsoni* was collected in two counties situated in the extreme eastern part of the Upper Peninsula, between the 46 and 47 parallels of latitude. The first collecting site was a sphagnum bog, about 60 acres in area, located a mile north of the Village of Cedarville in Township 42 North, Range 1 East, Section 19, SW $\frac{1}{4}$, at an elevation of approximately 675 feet above sea level. On June 13 at 9:00 A.M. I stopped along Highway M-129 to investigate what looked like an interesting bog for diurnal lepidoptera. It was a sunny morning with a few clouds, and the temperature was near 65 degrees and rising; certainly suitable weather for most butterflies. After walking through the center and wettest part of the bog without seeing anything of great interest, I came to an area of scattered black spruce (*Picea marina*) and tamarack (*Larix laricina*) near the south perimeter of the bog. Suddenly, what appeared to be a small, dark *Boloria* was spotted flying very low and swiftly along a narrow zone of leatherleaf (*Chamaedaphne calyculata*). It was flying much faster and with a distinctive flickering flight than *B. selene atrocotalis* (Huard), which was expected to be here at this time. Within the next few minutes I collected the first *eunomia* for the state. I had no difficulty taking 25 additional specimens from 9:15 to 10:00 A.M., and others

were seen but not captured. Most of the butterflies were collected in two small openings, within the black spruce-tamarack area, in which a mixed cover of leatherleaf, bog rosemary (*Andromeda glaucophylla*), cranberry (*Vaccinium*) and sedges (*Carex*) formed a low growth above the wet sphagnum mat. It was easier to maneuver here and still net *eunomia* in numbers than elsewhere in the bog. Labrador tea (*Ledum groenlandicum*, in full bloom, was in abundance around the edges of these openings. Also, scattered in these openings were rose pogonia orchid (*Pogonia ophioglossoides*), sundew (*Drosera*), pitcher-plant (*Sarracenia purpurea*), cotton grass (*Eriophorum spissum*) and a few spruce and tamarack seedlings. *Boloria eunomia* did not appear to wander too far into the more open and wetter part of the bog where there was scattered clumps of shrubby cinquefoil (*Potentilla fruticosa*) and arbor vitae (*Thuja occidentalis*). Actually, the butterflies spent considerable time flying back and forth close to vegetation in these openings before moving, to new areas in the spruce-tamarack. Occasionally, a few would settle on the vegetation to catch the morning sun and dry their wings which were still somewhat limp from recent emergence; one individual was observed feeding on Labrador tea flowers.

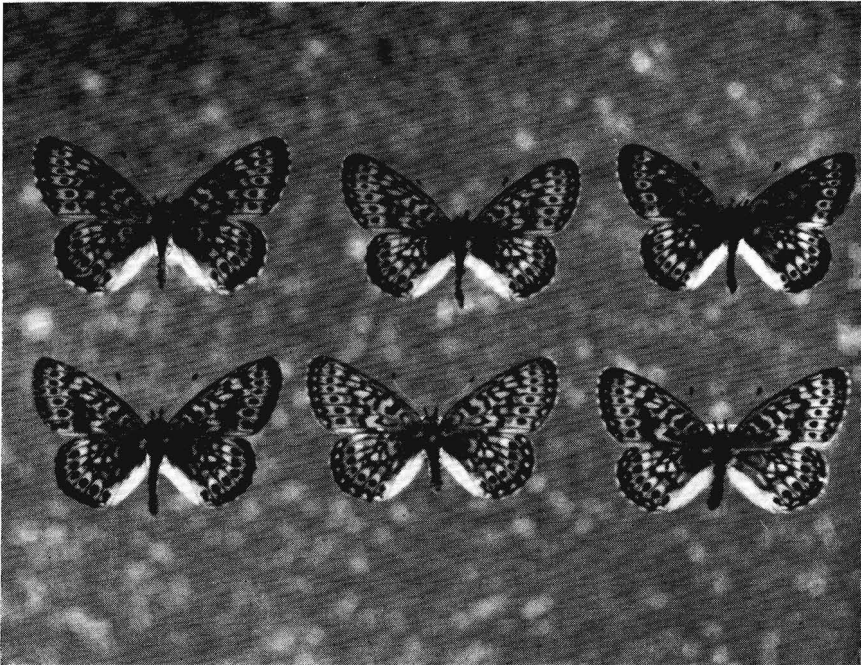
Males outnumbered females by five to one judging from specimens taken and observed at this location during my two rather brief visits on June 13 and 14. Most male specimens were in fresh condition, although some were slightly worn, suggesting at least a few days of prior flight. All females were perfect and were probably still emerging as indicated by their immaculate condition and relative scarcity. On June 14, another brief encounter was made with *eunomia* from 2:00 to 4:00 P.M. in this bog. The weather and results were comparable to that of the previous day, except that I was more selective in my collecting and released all worn males.

Several times I observed *B. eunomia* males aggressively flying at each other and performing aerial maneuvers – sometimes rising above the tallest spruce trees before disengaging and returning to normal flight. In one instance, a male successfully drove off a huge *Danaus plexippus* (L.) which happened to glide into one of these openings or “*eunomia*” territory. I have never observed this pugnacious character before with our other Michigan *Boloria* species.

Klots in Ehrlich's (1961) recent book states that violet and polygonum are foodplants for *B. eunomia* in Europe. These plants were not found in or near the openings described above, which would indicate that perhaps one of the heaths is the preferred foodplant here. I felt as if I was in the center of *eunomia*'s habitat judging from its relative abundance in this bog.

A few *Boloria selene atrocotalis* (Huard) (fresh) were flying in company with *eunomia*. Twice *Oeneis jutta* (Huebner) was flushed from black spruce — thus establishing a new county record for this species. *Callophrys augustinus* (Westwood) (badly worn) was also taken here, and occasionally *Papilio glaucus* L. sailed through the spruce. A fresh *Poanes hobomok* (Harris) was netted while feeding on a rose pogonia orchid in one of the openings where *eunomia* was plentiful.

On June 15 in Chippewa County, about seven miles northwest of the community of Paradise, I netted eight additional specimens of *B. eunomia dawsoni* in a large acid bog. The locality is in Township 49 North, Range 7 West, Sections 9, 10, 15, 16. This particular bog had long been on my list of potentially choice habitats for boreal species, and it was my first opportunity to collect here at this time of year. In viewing aerial photographs and the U. S. Department of Interior "Sheephead Lake Quadrangle", this bog covers some 10,000 acres easterly of Sheephead Lake



EXPLANATION OF PLATE

Boloria eunomia dawsoni (B. & McD.), dorsal views; collected in Mackinac County, Michigan, June 13-14, 1963. Upper row: males (left to right, 39, 37, 37 mm). Bottom row: Left, male (38 mm); middle and right, females (38, 38 mm). (All specimens in writer's collection).

and is situated approximately 700 feet above sea level. I felt very fortunate to establish this new butterfly record in another county within such a short time. The species was relatively scarce in the area sampled which centered around a pine-covered, sand ridge extending across the bog and providing easy access by way of a trail road. This new location is about 60 miles northwest from the aforementioned Mackinac County bog. The flora is similar to that encountered in the Mackinac bog, although it contains no arbor vitae or cinquefoil — at least in the area I collected. According to the Soil Survey of Chippewa County (Veatch, 1927), the soil in this bog is classified as Greenwood Peat, characterized by such plants as leatherleaf, Labrador tea, blueberry, cranberry and sphagnum moss. In some places stunted and open growth tamarack and black spruce occupies the bog, while in a large portion there is a dense stand of sedges. Once again I did not observe *eunomia* ovipositing or find violets or polygonum plants. I doubt if my collecting here was in the area of highest population density such as in the Mackinac bog.

Both sexes of *O. jutta* (a new Chippewa County record) were considerably more numerous here among the black spruce, and I observed some resting on Labrador tea flowers and cotton grass tufts. Frequently my attention was diverted from pursuing *eunomia* when *jutta* would take flight from spruce or sedges. A high water table, which formed small pools and gave the sphagnum more springiness, made collecting considerably more difficult in this bog. Two species of diurnal Noctuidae, *Anarta cordigera* Thunberg (worn) and *Autographa microgamma* Huebner (fresh) were flying and feeding on the blossoms of Labrador tea and swamp laurel (*Kalmia polifolia*) in the same area as *eunomia*. From 11:30 A.M. to 2:00 P.M., I observed approximately a dozen *B. eunomia dawsoni* in this huge bog; nevertheless it was a beautiful day with temperatures in the 80's, ideal weather for bog lepidoptera.

According to Macy and Shepard (1941), the type series of *Boloria eunomia dawsoni* was collected from June 15 to June 30 at Hymers, Ontario, Canada, which is some 240 miles northwest of the above Chippewa bog. Riotte (1959) records this subspecies from several locations in northern Ontario, with its flight peaking toward the end of June. His correspondence has indicated a habitat for *eunomia* comparable to what I found in the Chippewa and Mackinac bogs. Klots (1939) reports *Boloria aphirape* (Huebner) (*eunomia*) from the Klondike Basin in Maine occupying a somewhat similar habitat as the sphagnum-heath bogs described herein — except for the difference in elevation. He, too, did not find violets (or polygonum) where this species was collected.

In summary, judging from my brief experience with *B. eunomia dawsoni*, it would appear that this subspecies flies in the eastern Upper Peninsula during June, probably peaking around June 15. Moore (1960) did not record this butterfly from Michigan; however, it is doubtful if *eunomia* can be considered a recent arrival to our bog fauna — most likely the species was overlooked by previous collectors. In the future, I hope to spend more time in these two bogs in an attempt to discover the foodplant and more of its habits. It is my belief that *B. eunomia dawsoni* will eventually be discovered in other bogs across the Upper Peninsula, and that collectors in northern Wisconsin and Minnesota should definitely search for it in similar bogs in June. These northern bogs will undoubtedly yield other interesting lepidoptera with further diligent collecting. Possibly more of the boreal species such as *Boloria freija* (Thunberg) and *titania grandis* (B. & McD.) (May and July-August, respectively) can be collected in these and other bogs!

ACKNOWLEDGEMENTS

I wish to express my sincere appreciation to Dr. Alexander B. Klots for his examination and verification of my *Boloria* specimens. Also, I am greatly indebted to Julian P. Donahue for the excellent photograph.

Literature Cited

- Ehrlich, P. R. and A. H. Ehrlich, 1961, *How to Know the Butterflies*. Wm. C. Brown Co., Dubuque, Iowa. 262 pp.
- Hubbell, S. P., 1957. *Boloria frigga* (Nymphalidae) in Michigan. *Lepid. News*, 11: 37-38.
- Klots, A. B., 1939. *Brenthis aphirape* (Huebner) in North America, with a new record of the species from Maine (Lepidoptera, Nymphalidae). *Bull. Brooklyn Ent. Soc.* 34: 259-264.
-, 1951. *A Field Guide to the Butterflies of North America, East of the Great Plains*. Houghton Mifflin Co., Boston, xvi + 349 pp., 40 pls.
-, 1961, in Ehrlich, P. R., & A. H. Ehrlich. *How to Know the Butterflies*. Wm. C. Brown Co., Dubuque, Iowa, 119-127, 16 figs.
- Macy, R. W. and H. H. Shepard, 1941. *Butterflies*. Univ. Minnesota Press, Minneapolis, 247 pp., 42 pls., 7 figs.
- Moore, S., 1960. A Revised annotated list of the Butterflies of Michigan. *Occ. Papers Mus. Zool., Univ. Mich.*, 617: 39 pp., 1 pl., 1 fig.
- Riotte, J. C. E., 1959. Revision of C. J. S. Bethune's List of the Butterflies of the Eastern Provinces of Canada. *Ontario Field Biologist*, 13: 1-18, 1 fig.
- Veatch, J. O. (In Charge), 1927. *Soil Survey of Chippewa County, Michigan*. U. S. D. A., Washington, D. C. 44 pp., 4 tbls., 1 fig., 2 maps.

ARTHUR FRANCIS HEMMING (1893-1964)

Arthur Francis Hemming was born on February 9th, 1893. It was his mother, herself a discerning collector in other fields, who fostered and encouraged his early interest in butterflies; and it was with her that he made his first journeys abroad in pursuit of them. Educated at Rugby and Corpus Christi College, Oxford, like most young men of spirit he joined the forces on the outbreak of war and was commissioned in the Duke