

NATHALIS IOLE (PIERIDAE) IN THE SOUTHEASTERN  
UNITED STATES AND THE BAHAMAS

HARRY K. CLENCH

Carnegie Museum of Natural History, Pittsburgh, Pennsylvania 15213

In the *Lepidoptera of Florida* Kimball (1965: 36) devotes most of his brief discussion of *Nathalis iole* Boisduval 1836 to an unusual subject: the absence of early records of it from the state. He concludes, "Perhaps the species began to establish itself during the late 1920's," and adds that a search should be made in collections for pre-1930 records of *iole* from Florida.

Kimball based his contention chiefly on two points. First, Crossbeck (1917, see below) cited only a single Florida record of *iole*. Second, the late W. T. M. Forbes examined the collection of Harvard's Museum of Comparative Zoology and reported (*in litt.* to Kimball) that it contained no *iole* earlier than a 1924 Coconut Grove specimen that "looks suspicious" and an authentic series dated 1933-1934.

A survey of the Carnegie Museum Collection, which contains much old Florida material, shows that our oldest Florida specimens of *iole* are: a male from Dunedin [Pinellas Co.], 3 April 1921, *leg.* W. S. Blatchley, and two from Miami [Dade Co.], October 1921, *leg.* J. Harold Matteson. It is noteworthy that the W. H. Edwards Collection has none, although he received many butterflies from Dr. William Wittfeld, who lived and collected at Georgiana [Brevard Co.], on the Indian River, in the 1880's; nor are there any taken by G. Krautwurm, who collected extensively for the museum at Lutz [Hillsborough Co.] and nearby Stemper, notably in 1911.

In the American Museum of Natural History are the following pre-1930 records of *iole*: a male from Jupiter [Palm Beach Co.], 1-24 February 1920, *leg.* W. C. Wood; a male from Ft. Myers [Lee Co.], 22 April 1922, *leg.* F. M. Jones; two females, Punta Gorda [Charlotte Co.], 18-19 April 1922; and a female from Homestead [Dade Co.], 18 April 1923.

The older literature provides further interesting information. Scudder (1889: 1842) says of *iole*, ". . . not known in even southernmost Florida"; and farther on, ". . . does not appear to occur in the United States anywhere east of Louisiana, although it is found in Cuba and Jamaica." Skinner (1898: 63) gives the distribution of *iole* as "Ill., Mo. to Cal., N. Mex., Ariz., Tex., Mex. . . ." and his supplement ([1905]: 22) adds no further distributional data. Dyar (1901: 449) makes no mention of *iole*

in a list of winter (January and February) Lepidoptera taken near Lake Worth [Palm Beach Co.] in 1890 and 1900.

The earliest notice of Florida *iole* that I can find is the one Kimball mentions, Grossbeck (1917: 9), who gives a single record, "Big Pine Key, Sept. 20 (Ds.)." This specimen was taken by William T. Davis—"Ds."—in 1913, and is conserved in the Staten Island Institute.

Published evidence and that in available collections, therefore, support Kimball's basic contention completely. The fairly extensive information is all consistent with an hypothesis that *Nathalis iole* was formerly absent from Florida, and that it invaded the southern part of the state, probably from Cuba, sometime before 1913. (Davis's capture in the lower Florida keys could have been within a year or two of its first landfall and close to the original site.) It established itself and gradually extended its range northward. By 1920 it had reached Jupiter on the east coast, by 1921 the Tampa area (Dunedin) on the west coast, and in 1931 it was found in Atlanta, Georgia (Harris [1950]; 1972), about its present northern limit. If these dates are used, *iole* spread northward at an average rate of about 42 miles per year, possibly somewhat slower at first, faster later on. An important point (commented on by Klots, 1951) is that *iole* in the eastern part of its range is confined to the southernmost states (central Georgia southward). In the Mississippi Basin (see below) it ranges far to the north of this latitude.

*Nathalis iole* may also be a relative newcomer in the Bahamas. The species is now known from four islands, all in the northern part of the archipelago: Grand Bahama (Rindge, 1955); New Providence (West, 1966); North Bimini (Rindge, 1952) and North Andros (Nicolls Town, June 1973, *leg.* Clench; unpublished).

In the present connection New Providence is the most instructive because it is by far the most thoroughly collected island in the Bahamas, and collections from there date back to the 1880's at least. Charles J. Maynard made a large collection there in June 1897, conserved in the Museum of Comparative Zoology. *Nathalis iole* is not represented. J. L. Bonhote collected extensively on New Providence in 1898; his specimens are now in the British Museum. Sharpe (1900) published an account of them, but *N. iole* is not mentioned. W. W. Worthington collected a large lot of Bahama butterflies for Carnegie Museum in 1909–1910. He visited many islands and was on New Providence in January 1909. He took no *Nathalis iole*. The American Museum Collection contains New Providence material taken by various collectors in 1912, 1915, 1929 and 1930 (reported in Rindge, 1952). No *Nathalis iole* is represented in this material, but these collections appear not to have

been extensive so no particular significance can be attached to the absence of *iole* from them. The first known captures of *iole* on New Providence were the specimens taken by West in 1945, which he reported in 1966. Interestingly, *iole* is also represented in a small collection made on New Providence for Carnegie Museum in 1946.

In sum, *N. iole* was probably absent from New Providence in 1897 and 1898 and could have been absent as late as 1930; but it was present in 1945.

Nearly all species of Bahama butterflies have reached the islands from Hispaniola, Cuba or Florida. For the most part, each of these source areas generates a different, characteristic, pattern of distribution within the Bahamas, and most species from that source tend to follow the pattern. Unfortunately, the known distribution of *iole* is ambiguous. It is restricted to the northern islands, a pattern characteristic of invaders from Florida; but it also includes Andros. Invasion from Cuba to Andros to New Providence and other northern islands is both reasonable and in part substantiated by the ranges of other species.

At present all we can say about the arrival of *Nathalis iole* in the Bahamas is that it probably reached the islands sometime between 1898 and 1945. The chances are that it came in the period 1920–1940, but this is by no means certain. It may have arrived from Florida, where *iole* was by then established, or it could have come in directly from Cuba.

Now back to the mainland. *Nathalis iole* is divisible into three different geographical components which, for want of a better term, may be called *segregates*. At present, the chief discriminating attribute of these segregates is the northward limit of their ranges. This seems a slender thread on which to hang such a speculation, but two further points prompt me to suggest it: (1) the varied northward limits of their distributions suggest physiological differences in their tolerance to cold and a possible further difference in their migratory tendencies; and (2) each of the three segregates is associated with a different southern part of the species range. The three segregates are as follows:

1. *Southeastern*. In the United States this segregate is confined to Florida and southern Georgia, with no evidence of repetitive northward migration. It is probably not cold tolerant. As detailed above, this segregate is a probable recent arrival in the United States from Cuba. The southern limits of its range include the northern Bahamas (where it is also a probable recent arrival), Cuba, Jamaica and possibly Hispaniola (Brown & Heineman, 1972: 62 [“?” in table]).

2. *Central*. In America north of Mexico this segregate extends from

Mississippi to Arizona, and far northward to Ontario, Manitoba, North Dakota, southeastern Wyoming, nearly all of Utah, and perhaps as far west as the eastern slopes of the Sierra Nevada in California (Warren Creek, 9000–9500 ft., ca. 5 mi. W Lee Vining, Mono Co.: Garth & Tilden, 1963: 88). Whether it is resident northward or occurs there only as a result of repeated immigration is not known, but most authors believe that the latter is the correct explanation. This segregate can tolerate temperatures below freezing and has been found flying at Colorado Springs as late as early December (Brown *et al.*, 1956: 200; Brown, *in litt.*). Regardless of the nature of its northward occurrence, it differs conspicuously from the Southeastern segregate in being there at all. The southern limits of the range of this segregate include Guatemala (1 ♂, Carnegie Museum) and Mexico, where it is resident to altitudes of at least 7000 ft. (2150 m). The range appears to be old and probably has not changed significantly in historic times. Early authors did not mention it as occurring much north of the latitude of Illinois, but areas north of there were then poorly collected and in these areas *iole* is sporadic and generally uncommon.

3. *Pacific*. In the United States this segregate is confined to southern California (Emmel & Emmel, 1973: 22). The northernmost record that has come to my attention is Kennedy Meadows, Tulare Co. (anonymous reviewer), unless the Warren Creek record mentioned above should belong here. The occurrence of this segregate in California is spotty but it is locally common (as is true, *inter alia*, in Florida and the Bahamas), but nothing in its known range suggests that it is cold tolerant. Emmel & Emmel (*loc. cit.*) mention it as being found “occasionally . . . [at] high elevations in the mountains, especially in late summer,” so this segregate may have a limited tendency to migrate. Southward the range includes the whole of Baja California.

In summary, then, the Southeastern segregate does not range northward, is non-migratory and its southern limits are in the West Indies; the Central segregate ranges far northward, is probably migratory and its southern limits are in mainland Mexico and Guatemala; and the Pacific segregate does not range far northward, may be slightly migratory and its southern limit is in the peninsula of Baja California.

At present the United States portions of the ranges of the three segregates appear to be slightly disjunct. Whether or not *iole* occurs in Alabama (where the Southeastern and Central segregates might meet) or in western Arizona (where the Central and Pacific segregates could be in contact) is of little moment in establishing the thesis of three segregates.

It would be satisfying to be able to delineate their common boundaries (if they are indeed in contact) more precisely, but even with records from the intervening areas it would be no easy task. Despite careful comparison, the only difference among these segregates that I have been able to find in museum specimens is that in the Central segregate the hind wing upperside of the winter form female is usually yellow, less often pale orange; whereas at least in the Southeastern segregate, females of the winter form are as strongly orange as those of the summer form. In material available to me, adequate dated specimens of the winter forms of all three segregates are few, however, and even this difference is not certain.

Curiously, both the slight facies difference and the possible physiological differences seem to concern only the Central segregate. No evidence as yet would indicate any real intrinsic difference between the Southeastern and the Pacific segregates, even though they are widely separated geographically and the Central segregate intervenes.

#### ACKNOWLEDGMENTS

I am grateful to the following for their help in providing information on specimens in their care: Dr. Frederick H. Rindge, American Museum of Natural History, New York; Dr. George O. Pratt, Jr., director, and Mr. Joseph Burke, Staten Island Institute of Arts and Sciences, Staten Island, New York. I also thank an anonymous reviewer of an earlier version of this paper. He provided a northern locality record of *iole* in California and clarified the probable status of the Warren Creek record.

#### LITERATURE CITED

- BROWN, F. M., D. EFF & B. ROTGER. 1956 (1954-1956). Colorado butterflies. Proc. Denver Mus. Nat. Hist., nos. 3-7: viii + 368 p., ill.
- BROWN, F. M. & B. HEINEMAN. 1972. Jamaica and Its Butterflies. London (Classey): xv + 478 p., ill.
- DYAR, H. G. 1901. Notes on the winter Lepidoptera of Lake Worth, Florida. Proc. Ent. Soc. Washington 4: 446-485.
- EMMEL, T. C. & J. F. EMMEL. 1973. The butterflies of southern California. Nat. Hist. Mus. Los Angeles Co., Science Ser. 26: xi + 148 p., ill.
- GARTH, J. S. & J. W. TILDEN. 1963. Yosemite butterflies. J. Res. Lepid. 2: 1-95, ill.
- GROSSBECK, J. A. 1917. Insects of Florida. IV. Lepidoptera. Bull. Amer. Mus. Nat. Hist. 37: 1-147.
- HARRIS, L., JR. [1950]. The butterflies of Georgia. Revised. Georgia Soc. Nat., Bull. 5 (mimeographed): [3] + vii + 29 + [4] p.
- . 1972. Butterflies of Georgia. Norman, Oklahoma (Univ. Oklahoma Press): xvi + [6] + 326 p., ill.
- KIMBALL, C. P. 1965. The Lepidoptera of Florida, an annotated checklist. Gainesville (Florida Dept. Agr.): v + 363 p., ill.

- KLOTS, A. B. 1951. A field guide to the butterflies. Boston (Houghton Mifflin): xvi + 349 p., ill.
- RINDGE, F. H. 1952. The butterflies of the Bahama Islands. American Mus. Novit., #1563: 18 p.
- . 1955. The butterflies of the Van Voast—American Museum of Natural History expedition to the Bahama Islands, British West Indies. American Mus. Novit., #1715: 20 p., ill.
- SCUDDER, S. H. 1889. The butterflies of the eastern United States and Canada with special reference to New England. Cambridge, Mass. (author): xxiv + p. 1-766 (vol. I); xi + p. 767-1774 (vol. II); vii + p. 1775-1958 + 89 pls. maps (vol. III).
- SHARPE, E. M. 1900. On a collection of butterflies of the Bahamas. Proc. Zool. Soc. London 1900: 197-203, ill.
- SKINNER, H. 1898. A synonymic catalogue of the North American Rhopalocera. Philadelphia (American Ent. Soc.): xvi + 100 + xiv p.
- . 1905. Same, supplement no. 1. [i] + 34 p.
- WEST, B. K. 1966. Butterflies of New Providence Island, Bahamas. Ent. Rec. 78: 174-179, 206-210.

---

MASS HIBERNATION SITE FOR *NYMPHALIS VAU-ALBUM*  
(NYMPHALIDAE)

Hibernation is common in several genera of butterflies and especially among Nymphalidae. However, in most cases the literature on such hibernating is rather nebulous and repetitive, without specific observational support. One takes for granted that hibernation spots are found beneath debris, loose bark, in hollow trees, etc. Therefore I was interested to see fourteen Compton tortoise shells (*Nymphalis vau-album* (Denis & Schiffmüller)) actually entering a hibernation site.

The observations took place near a radio relay tower at the summit of Mohawk Mountain, Mohawk State Forest, near Cornwall, Connecticut on 15 October 1974 between 1300-1400 hrs. EST. During this still, warm period my attention was drawn to several butterflies fluttering about near the top of the tower some 20-30' about the ground. Viewing them with my binoculars I made them out to be *N. vau-album*. Several also rested on the dark green screening of the building windows 6' above the ground. In each case there seemed to be a concentration at one common area. Watching the junction at the corner of the building and the roof, I could see the butterflies alight, then walk to an opening between metal stripping and the wall. The opening, approximately 2" long and 3/4" wide, was the focal spot for the butterflies. The butterflies approached this opening, folded their wings and disappeared within. Some would stay inside for a short time, then re-emerge, fly about in a circle, return and re-enter. According to C. L. Remington (pers. comm.), in Autumn, nymphalines change their phototactic responses and are attracted to dark areas. This opening provided such a spot, appearing black against the white walls.

The greatest number of individuals seen at any one time was fourteen, and all seemed to be using the opening.

Although some individuals were seen to enter and re-emerge, most stayed inside. Therefore, it is felt that this area was a definite hibernation spot for this species.

NOBLE S. PROCTOR. *Biology Department, Southern Connecticut State College, 501 Crescent St., New Haven, Connecticut 06515.*