THE LEPIDOPTERISTS' NEWS

Volume 7 1953 Number 2

NOTES ON THE LIFE HISTORY OF *INCISALIA AUGUSTINUS* AND A NEW HOST PLANT RECORD (LYCAENIDAE)

by J. B. ZIEGLER

The host plants of *Incisalia augustinus* Westwood have been stated to be *Vaccinium vacillans* Solander and *Kalmia angustifolia* L. by DAVENPORT & DETHIER (1938) and KLOTS (1951). These records appear to be based upon papers by JOHN H. COOK (1904, 1906, 1907a), part of an excellent series on the biology and taxonomy of the genus *Incisalia* Scudder which appeared just after the turn of the century and which clarified many points of confusion which had existed with regard to this group of butterflies. *Vaccinium* spp. are well established as host plants of *I. augustinus* in the vicinity of Albany, New York, on the basis of COOK'S work, since he was apparently able to observe the female ovipositing on them in nature (1906), definitely found larvae in advanced stages feeding on them in nature (1904), and was entirely successful in rearing the insect through all of its transformations on them in the laboratory (1906). However, the status of *K. angustifolia* as a host plant seems much less certain. Although COOK was not entirely clear on this point, it is likely that his description (1906) of the site of oviposition on *Kalmia* was based on laboratory observations alone. More conclusively, he states definitely that he was never able to discover the larva on this plant in nature, and further, that he found it impossible to rear the insect on *Kalmia* in the laboratory (1906). Significantly, he also stated (1906) that larvae which had been feeding on *Vaccinium* refused to eat *Kalmia.* In addition, he himself pointed out (1906) that the larvae, normally green in color, would be rendered quite conspicuous while feeding on the rosy *Kalmia* flowers, the most likely site of attack. These considerations make it seem most unlikely that *Kalmia* is an actual host plant of *I. augustinus* in nature, and it should probably be removed from the host plant list of this butterfly, at least until such time as more conclusive evidence can be brought forward.

However, it now appears that this gap can be filled by the inclusion of a third plant. In collaboration with Dr. G. W. RAWSON, the author has been attempting to work out in detail the life history of *Incisalia polios* Cook & Watson, which is only very imperfectly known. As part of this project, a number of eggs were taken by the author in the spring of 1951 at Lakehurst, New Jersey, on Bearberry, *Arctostaphylos uva-ursi* Spreng., the known (Cook, 1907c) host plant of *I. polios.* The first was found on April 28 and a few others on May 5. Of these, the one taken on April 28 and one of those taken on May 5 were brought through on Bearberry to the adult stage, which emerged from the pupae at about the same time in the spring of 1952. In the confident expectation that both would prove to be *I. polios,* the two had been placed together and were in the same breeding cage at the

time of emergence. It was a great surprise to observe, therefore, that while one was indeed *I. polios,* the other was an undoubted specimen of *I. augustinus*! This observation, therefore, constitutes excellent evidence that *A. uva-ursi* is a natural host plant of *I. augustinus* in southern New Jersey.

Although a detailed set of notes was kept for each of the larvae, the unfortunate circumstance that segregation of the two was not maintained makes it impossible to refer either set of notes to the appropriate species with any degree of certainty. However, the major differences observed will be noted briefly, with the thought that they may be of interest to others who might rear either of these species. The first instar larva which emerged from the egg on May 7 possessed a rather large, dark brown spot on the dorsum in the anal region. This spot was not seen on the first instar larva which emerged on April 30. It may be noted that this spot was not mentioned by COOK (1907a) in his description of the first instar larva of *I. augustinus.* Late in the first instar, the April 30 larva had a dull, lemon-yellow ground color and was marked with a dorsal pair of closely set, dull reddish stripes and similar pairs of lateral stripes. Late in the first instar, the May 7 larva had similar ground color and stripes, except that the latter were of a bright rose color. The space between the lateral rows of stripes was partly occupied by indistinct, rosy shadings. Thus, the May 7 larva had, at this point, a considerably redder appearance. The dorsal, anal spot previously mentioned was still in evidence but was much reduced in size. The rosy markings of the May 7 larva persisted throughout the second instar and, on the posterior part of the body, throughout the third instar. This larva did not become completely green until the fourth instar. On the other hand, the corresponding (but originally dull reddish) markings of the April 30 larva had become a dull, olive green in color by the middle of the second instar. In this connection it is of interest to note that COOK (1907b) comments in a footnote to a paper on *I. henrici* that "The dorsum is red in *I. polios* during the second larval instar, —".

The pupa derived from the April 30 larva was somewhat larger than that from the May 7 larva, was lighter brown in color and had shorter hairs. COOK (1904) described the pupa of *I. augustinus* as being "sparsely clothed with short hairs".

The comparative notes given above, although admittedly very sketchy, engender the suspicion that the April 30 larva was *I. augustinus* and that the May 7 larva was *I. polios.* This supposition would be supported by the earlier flight period of *I. augustinus* in the New Jersey pine barrens.

In addition to these differences between the two individuals studied, certain similarities were noted. These similarities will be discussed in comparison with earlier observations made by COOK, in connection with *I. augustinus.*

First, the number of larval molts may be mentioned. COOK (1906) was able to detect only two in the case of two individuals after painstaking observation, although he states that this was quite unexpected since *I. irus, I. henrici,* and *I. niphon* molt three times. The total times in the larval stage for the two individuals studied by COOK were twenty-nine and twenty-three days. Although the observations upon which the present paper are based were perhaps not as detailed in this regard as were COOK'S, yet

definite evidence was obtained in both instances for the usual number of three molts. In the case of the egg hatching on April 30, the duration of each of the first three larval instars was four days, that of the fourth was ten days, and the total time in the larval stage was twenty-two days. In the case of the egg hatching on May 7, the duration of the first three instars was 4-6 days, that of the fourth instar was twelve days, and the total time in the larval stage was twenty-seven days.

The feeding habits of the larvae were quite similar to those of the *I. augustinus* larvae on *Vaccinium* as described by COOK (1906). The newborn larva crawled up the flower pedicel and entered the blossom either directly through the opening or by eating a small hole near the base. It then fed upon the inner part of the flower until late in the second or early in the third instar. During the first instar, the larva remained entirely concealed within the blossom; later, it lay along the pedicel or along the outside of the flower with the anterior extremity well within the blossom or, alternatively, was entirely within the flower but with the posterior extremity visible at the lip of the blossom. In this latter position, the pinkish color of the posterior tip of the larva matched very closely the color of the lip of the blossom. In this position, the larva cast the pellets of excreta outside of the flower. When the larva lay along the flower pedicel with the anterior extremity within the blossom, the interesting observation was made that it sometimes raised the pellets of excreta deliberately over its back and deposited them on a ball of similar pellets held between two flower pedicels by a silken net or alternatively, flipped them some distance away by means of the anal comb. From the third instar on, it ate the developing berries which were sometimes devoured completely and sometimes hollowed out, leaving only the skin intact.

COOK (1906) mentions that his larvae did not form "cocoons" prior to pupation. The earlier larva reared during the course of this study was given no opportunity to do so. The later of the two did form a rude shelter by binding together three or four leaves of the Bearberry with a few strands of silk on the floor of the breeding cage. It is, of course, not known whether this was *I. augustinus* or *I. polios,* although the considerations mentioned above lead to the suspicion that it may have been the latter.

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18 Baltusrol Place, Summit, New Jersey, U. S. A.