

The Dainty Sulphur Butterfly in Ohio¹

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ABSTRACT. In 1999 the pierid butterfly, the dainty sulphur, *Nathalis iole* appeared in Ohio in good numbers for the first time in 68 years. Ohio is at the extreme northern limit of its range (Scott 1986; Opler and Malikul 1998). Prior to 1999, the last record was a single adult captured on 11 July 1985 in Logan County. Most records during the summer of 1999 were also single adults. However, on 17 September a large localized colony was discovered at Pickerington Ponds Wildlife Refuge in Fairfield County. This was the first large population ever found in Ohio, and was the first opportunity to study bionomics of this species in Ohio. A modified Pollard transect was used as a baseline to visually record bionomic data at the site (Pollard and Yates 1993). Data was recorded from 17 September through 7 November, 1999. During this period a population census, adult reproductive behavior, and an unusual oviposition host, and probable larval host plant, carpetweed, *Mollugo verticellata*, (Voss 1985), was discovered. In addition the interesting dark adult form, *f. viridis*, (Whittaker and Stallings 1944) was recorded for the first time in Ohio. This dark form is usually found only during the winter in southern Florida and Texas where the species breeds yearlong, and in the fall in the Great Plains (Scott 1986).

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INTRODUCTION

The summer of 1999 produced remarkable records for migrant species of butterflies in Ohio. The usual migrant species such as, the variegated fritillary, *Euptoieta claudia*, the buckeye, *Jounia coenia*, the checkered skipper, *Prygus communis*, the sagem skipper, *Atalopdes campestris*, and the fiery skipper, *Hylephila phyleus*, were all found in greater than normal numbers. The most significant was the migrant, the dainty sulphur (*Nathalis iole*).

The dainty sulphur is a very small pierid butterfly that normally ranges from Florida and Texas, to southern California. In southern Texas and southern Florida it is a year round breeding resident (Scott 1986). Each spring and early summer individuals migrate north for reasons that are poorly understood (Douglas 1986) and by late summer, this butterfly often reaches as far north as the Great Plains, but only rarely as far as Ohio (Scott 1986; Opler and Malikul 1998). Until the summer of 1999, a total of 11 specimens had been recorded in Ohio from 6 counties (Fig. 1). Most of these records came from Hamilton County, near Cincinnati, during the dust bowl summer of 1931 (Iftner and others 1992).

In 1999, Jim Davidson and Guy Denny first recorded the dainty sulphur with the capture of a single male on 16 June at the "Denny Prairie" in Knox County. This was the first capture in Ohio since 11 July 85 when Parshall recorded a single male from a reverting cornfield at the Transportation Research Center in Logan County. On 17 September 99, Jim Davidson and David Parshall discovered a large population of the dainty sulphur at Pickerington Ponds Wildlife Refuge in Fairfield County. Due to the rarity of this butterfly in Ohio, nothing about the species' bionomics in Ohio has ever been recorded. The discovery of this large potentially breeding colony

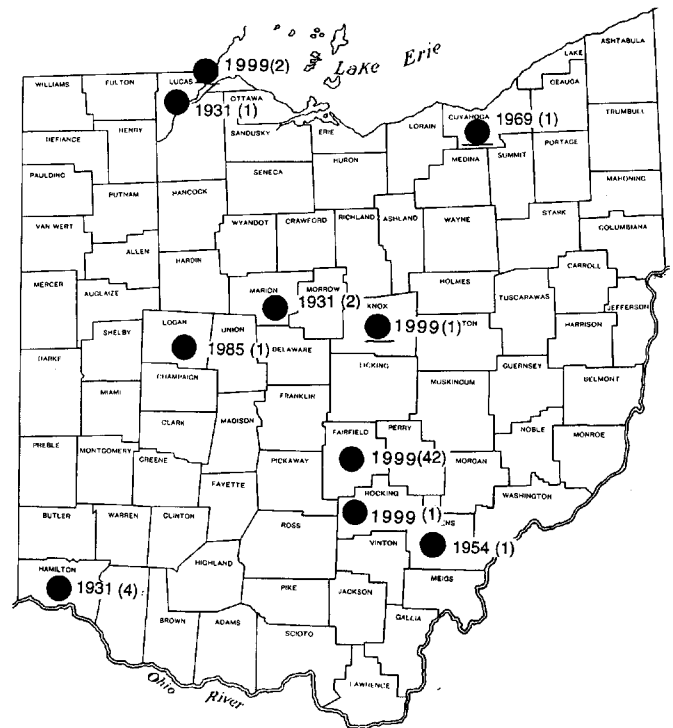


FIGURE 1. County records of *Nathalis iole* in Ohio with dates and numbers of adults recorded. (● = pre 1999; ● = 1999; ⊖ = number of records).

of the dainty sulphur presented the first opportunity to study the butterfly's bionomics in Ohio. A study was begun at Pickerington Ponds to record adult behavior and to determine for the first time, how the butterfly was using an Ohio biotope.

METHODS AND PROCEDURES

Study Site. The site of the colony at Pickerington Ponds was a 4.85 ha early successional field that had been treated with the herbicide, Round-up® during the spring of 1999. Due to the effects of the herbicide and

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drought-like conditions, the vegetation at the site was low and sparse with approximately 1/3 of the study site barren soil. Twenty-three plant species were identified from the site. Most abundant were the grass green fox-tail, *Setaria glaucus*, frost aster, *Aster pilosus*, and carpetweed, *Mollugo verticellata* (Voss 1985).

Methods: We selected a modified Pollard linear transect of 60.0 m long and 12.0 m wide, and 6.0 m on each side of the walking observer (Pollard and Yates 1993). The transect location was selected because it was in the middle of the area where most adults were found earlier by Parshall and Davidson. We walked the transect on days with weather favorable for butterfly flight: days with a predicted high temperature of at least 10° C with no precipitation. This temperature was selected as the accepted temperature at which butterfly flight begins (Douglas 1978, 1986). At or above 10° C, pierid butterflies can, through "shivering" and "lateral basking," generate enough thoracic heat for flight muscles to function (Douglas 1978). Visitations were timed between 1000 and 1800.

Procedures: Upon first arrival the transect was walked by a single observer counting adults to make a simple population census. After the census of adults was completed, the transect was repeatedly walked while we observed, photographed, and videotaped adult behavior. Special attention was given to recording reproductive behavior of both male and female adults. When females were present, they were individually followed in hopes of observing oviposition. Visits to the site began on 17 September and continued through 7 November. On 29 October the over-night temperature dropped to a -5° C. No adults were observed after this date.

RESULTS

Between 17 September and 7 November, twelve separate visitations were made to the study site. Eleven days with active adults were recorded during this time. From 17 September until 28 October, the number of adults ranged from a low of 2 on 28 October to a high of 42 on 5 October. (Fig. 2). Males were counted in a 10:1 ratio. Females were first observed on 17 September. Multiple females were observed from 26 September to 16 October. The greatest number of females was 4 on 26 September. Mated pairs were observed on 26 September, 5 October, and 12 October. During the study 3 females were observed with dark ventral wing surfaces, form *viridis* (Wittaker and Stallings 1944). The number of adults fell to a count of 3 males and 1 female on 21 October, and one male and one badly worn female on 28 October. These were the last adults observed. During the entire study period, only one adult was found outside the study site, and very few adults were ever observed away from the area of the transect.

Males spent about half of their time lateral basking, closed-winged, on the dry barren soil. Females were always less active than males, and spent even more time basking on the barren ground. Females visited flowers to nectar mainly early and late in the day. Females were observed ovipositing from 1100 to 1430 during

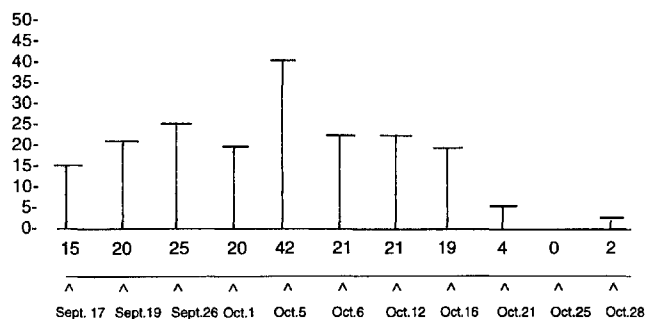


FIGURE 2. The number of adults recorded by field days.

the day on carpetweed, *Mollugo verticellata*. This was the only oviposition substrate used by female dainty sulphurs during the study. Females laid a single egg on the ventral leaf blade of carpetweed and then dropped down to patches of barren ground to lateral bask. They would also exhibit this behavior when the sun was clouded-over. A single female did not revisit a host where she had already placed an egg. However, one female was observed ovipositing on a plant already used by another female during the same field day. During the entire study, a total of 60 eggs were oviposited by 5 different females. Other known hosts of *Nathalis iole* such as beggar ticks, *Bidens vulgata*, and fited marigold, *Dyssodia papposa* (Scott 1986; Heitzman and Heitzman 1987) do not occur at the site and are rare plants in Ohio (Fisher 1988; Voss 1985). Sneezeweed, *Helenium autumnale*, is a recorded host (Scott 1985) and was present in the area. In addition, a possible host, nodding marigold, *Bidens cernua*, was also present. None of these plants were used as oviposition hosts during the study. Two eggs hatched at the site and the young larvae began to feed, but were apparently killed by an over-night freeze.

DISCUSSION

Bionics of the dainty sulphur *Nathalis iole* were recorded for the first time from an active colony in Ohio. The consistently large number of individuals in fresh condition over a six-week period with a high census count of 42 adults suggests that the colony was established sometime in early summer shortly after the field was treated with Round-up®. Of the previous records of this species in Ohio, most were single captures in late summer (Fig. 1). The 16 June Knox County record, the earliest known record for Ohio, is additional evidence that *Nathalis iole* reached central Ohio and most likely the Fairfield County study site in the early summer of 1999. The fact that dainty sulphurs migrate as single adults, along with the above evidence, further supports the conclusion that the colony at Pickerington Ponds in September represented at least a second brood and perhaps a third brood. It is unlikely that a July or August brood used a host different from that used in September and October. The presence of the dark form, *viridis*, which is produced by a shortened photoperiodism (Hoffman 1973; Douglas and Gula 1978), also suggests the adults at Pickerington Ponds

completed their metamorphoses there. All these facts lead to the conclusion that the oviposition host, *Mollugo verticellata*, was the larval host as well.

Nathalis iole is also a rare migrant to other states surrounding Ohio. There are a few records from Michigan, Indiana, Kentucky, and Pennsylvania (Opler and others 2000). It is possible that carpetweed is the host in the western Upper Peninsula and southern Michigan. The range of both the dainty sulphur and carpetweed are identical in southern Michigan, and in the western Upper Peninsula (Nielsen 1999, Voss 1985). Carpetweed occurs through much of the range of *Nathalis iole* (Britton and Brown 1970). Parshall has observed dainty sulphur colonies in Florida, Colorado, and Kansas, using very similar biotopes to the reverting fields at Pickerington Ponds. Carpetweed may rarely be a host plant in these states as well. *Mollugo verticellata* was thought to be only an accidental oviposition host by Scott (1986). The review of the species bionomics in Ohio contradicts this. Thus *Mollugo verticellata* should be regarded as an oviposition host and probable larval host in Ohio and perhaps in other states at the northern limits of the dainty sulphur.

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