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## DISTRIBUTION AND HYBRIDIZATION OF *HYALOPHORA COLUMBIA* (LEPIDOPTERA: SATURNIIDAE) IN WISCONSIN

Leslie A. Ferge<sup>1</sup>

### ABSTRACT

*Hyalophora columbia* (Smith) has been collected in 12 Wisconsin counties, primarily in the north-central region. The adult flight season peaks during the second week of June. *Hyalophora cecropia* (L.) was found to occur in many of the *columbia* localities, and to be active at the same time as *columbia*. Despite this overlap, natural hybrids were very rarely seen.

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The *columbia* silkmoth, *Hyalophora columbia* (Smith), is unique among the Saturniidae due to its Canadian Zone distribution and its presumed dependence on a single larval host, the eastern larch or tamarack, *Larix laricina* (Du Roi) K. Koch (Ferguson 1972). Existing distributional data (Sweedner 1937, McGugan 1958, Collins and Weast 1961, Ferguson 1972, Kohalmi and Moens 1975) indicate that *columbia* occurs in a rather narrow band extending from Nova Scotia through Ontario to eastern Manitoba, ranging southward in boggy areas of Maine, Michigan, and Wisconsin. New distributional data obtained in Wisconsin since 1975 are presented here, along with records of adult flight activity, previously not available since relatively few specimens have been collected as adults (Ferguson 1972).

Historically, *columbia* may have been known from Wisconsin for at least 80 years. Holland (1903) briefly noted that the moth ranged from Maine to Wisconsin. The source of his information remains unknown, as do any specimens he may have seen. The Lincoln, Ozaukee, and Vilas County records cited by Collins and Weast (1961) and repeated by Ferguson (1972) were provided by the late William E. Sieker (W. E. Sieker, pers. comm.). Holdings of the Milwaukee Public Museum include one male from Eagle River, Vilas County, and five males from the Cedarburg Swamp, Ozaukee County. More recently, larvae of *columbia* were found on larch in a Douglas County bog by Mike Wagner (J. M. Scriber, pers. comm.).

### MATERIALS AND METHODS

The survey technique utilized the interspecific attractancy of the genus *Hyalophora* noted by Sweedner (1937) and subsequent workers. Virgin *cecropia* females were placed in specially designed moth traps and set out in tamarack bog habitats to attract *columbia* males. Two or sometimes three females were placed in each trap, and the traps were set out for one- or two-night intervals. The traps were usually placed near the edges of the bogs, such that the prevailing winds would carry the attractant pheromone into the bogs. Two types of moth trap have been used successfully. A box trap following the design of Collins and Weast (1961) was used initially in this survey. It consisted of a screened cage with an inward-slanting trough-like top made of clear plastic sheeting. A 16-mm horizontal slot between the top pieces allowed the male moths to enter. A less expensive, simplified version of the trap used by Collins (1973) was used extensively in the later course of this survey. The funnel in later versions was made from 203-mm diameter white

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polyethylene funnels, from which the tips were cut off to leave a 76-mm diameter hole in the bottom. A cylinder of nylon netting was fastened to the top rim of the funnel and tied shut at its bottom. The traps were hung from tree limbs approximately 1.8 m above the ground, using a string attached to the rim of the funnel. The female moths were simply placed inside the net bag without further confinement, unlike the Collins trap in which the females were suspended above the funnel in a small cage. This limited the catch of males in most instances; occasionally larger numbers of males were attracted. In one instance, seven *columbia* males were caught in a single trap containing two *cecropia* females. No female *cecropia* escaped from these traps; they usually rested quietly underneath the top edge of the funnel.

## RESULTS

*Hyalophora columbia* has been found in eight additional Wisconsin counties, and is presently known from 18 localities in 12 counties, predominantly in the north-central region. (Fig. 1) The pitted glacial outwash topography distinguishes this area from other parts of Wisconsin, as it is peppered with numerous lakes and potholes, favoring the development of numerous and often very large tamarack bogs. The large number, close proximity, and often great size of these bogs undoubtedly permit *columbia* to be found more frequently here than elsewhere in the northern half of Wisconsin. It is of interest that the subarctic Satyrid butterfly *Oeneis jutta ascerta* Masters and Sorensen (the *jutta* arctic) ranges further southward than *columbia*, occurring in bogs surveyed in Monroe and Wood counties. These areas are among the southernmost remnants of the Canadian Zone in Wisconsin. Abundant stands of tamarack exist there, as well as in isolated pockets in the southeastern section of the state, indicating that the range of *columbia* is not limited by the foodplant.

The emergence of *columbia* has been recorded as early as 17 May (1977), and its latest date of capture is 30 June (1948). The peak flight occurs during the second week of June in most years; the majority of captures have been made between 5 and 17 June. The May record given above is most unusual. The spring of 1977 was abnormally hot, causing many other species of Lepidoptera to emerge up to three weeks before normal. Data obtained in 1982 indicate the flight season extends up to 23 days; the dates ranging from 5 to 28 June. The first emergence of two common northern Sphingidae, *Sphinx poecila* (Stephens) and the big poplar sphinx, *Pachysphinx modesta* (Harris), may be used as an indicator of the onset of the *columbia* flight period.

The survey results indicate that both *columbia* and *cecropia* adults occur together in the same localities and at the same time. Data from the Oneida County locality, which has been surveyed fairly regularly for five consecutive years, indicate that *cecropia* emerges as much as two weeks before *columbia*. Although the two species often occur together, natural hybrids are apparently very rare. The occurrence of hybrids in zones of contact or overlap was discussed by Sweadner (1937), Collins and West (1961), and Ferguson (1972). The predominant characteristic of a *columbia-cecropia* hybrid is the presence of any red scaling beyond the white postmedian line on the upper surfaces of the wings. Pure *columbia* stock has no red scaling in that area, while *cecropia* often has a very striking solid red band. Hybrids reared in 1977 were intermediate to the parent species in size and appearance, with variation in red scaling ranging from a thin, well-defined line to a wide area of diffuse, scattered red scales, as seen in Figure 2, bottom row.

Nearly all of the 45 specimens of *columbia* examined appeared to be typical in pattern and coloration, as shown in Figure 2, top row. A few specimens from Vilas, Oneida, and Price counties are unusual in that the discal spot of the forewing is obsolete. Two of these appear in Figure 2, middle row. Only two specimens appeared to be of hybrid origin. The most striking of these is in the Milwaukee Public Museum, collected in the Cedarburg Swamp on 29 June 1935. This specimen has a thin but strong red band beyond the postmedian line on both the forewings and hindwings, indicating that it is very likely an F<sub>1</sub> hybrid. Another specimen, taken in Iron County on 14 June 1980, appears much like typical *columbia*, except for being a bit larger than usual and exhibiting diffuse red scaling postmedially. Its appearance suggests that it is a number of generations removed from its *cecropia* ancestry.

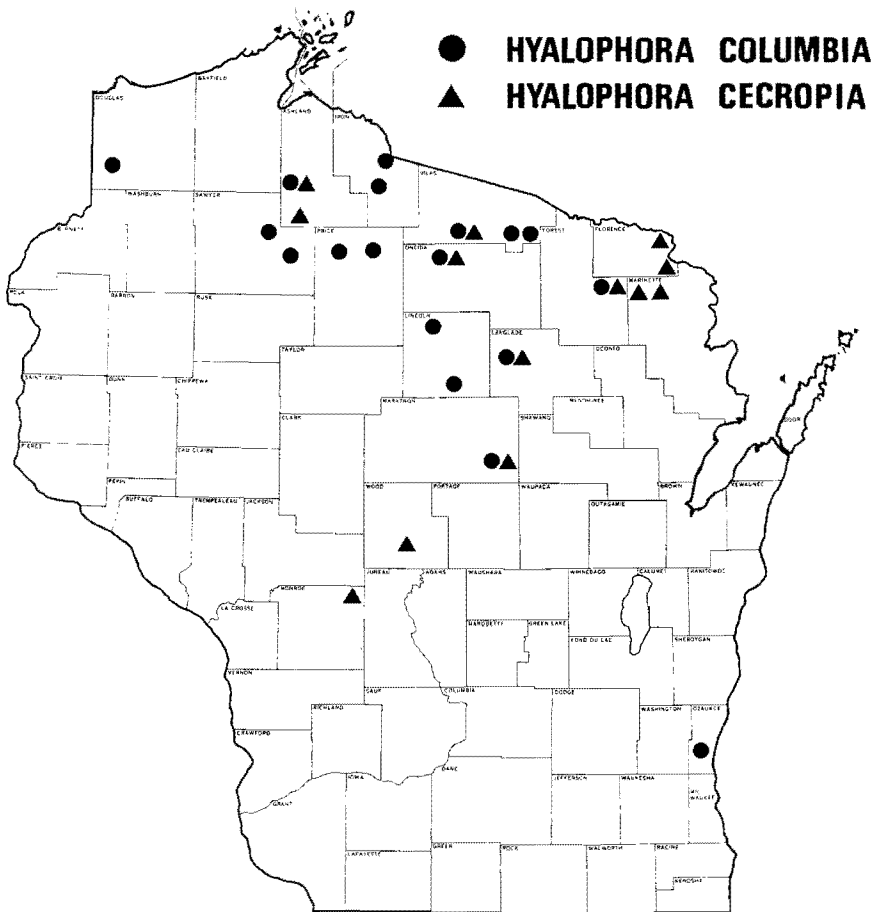


Fig. 1. Distribution of *H. columbia* and *H. cecropia* in Wisconsin.

The low incidence of natural hybrids indicates that some type of isolating mechanism is at work, but its nature remains unclear and speculative. The time of attraction and mating is reported to be the same in both species (Sweadner 1937, Collins and West 1961). Observations made in Oneida County in 1977 indicate that *columbia* males are attracted to *cecropia* females (and to ultraviolet collecting lights) in the hours just before sunrise, between 300 and 500 hrs, the same time period given in the literature for *cecropia*. Possibly attraction and mating occur at an unusual time in native northern Wisconsin *cecropia*, as observed on 3 June 1972, when five *cecropia* males were attracted to caged *cecropia* females from dusk to 2230 hrs in a boggy area in Tomahawk Township, Lincoln County. *H. columbia* females may have a greater low-temperature tolerance than *cecropia* females, allowing them to remain active in cold bog habitats too severe for *cecropia*. This variation in cold tolerance has been observed at 2000 m in the Rockies, where *Hyalophora gloveri* (Strecker) females remained active and mated, while midwestern *cecropia* females were immobilized by the cold (Michael M. Collins, pers. comm.).

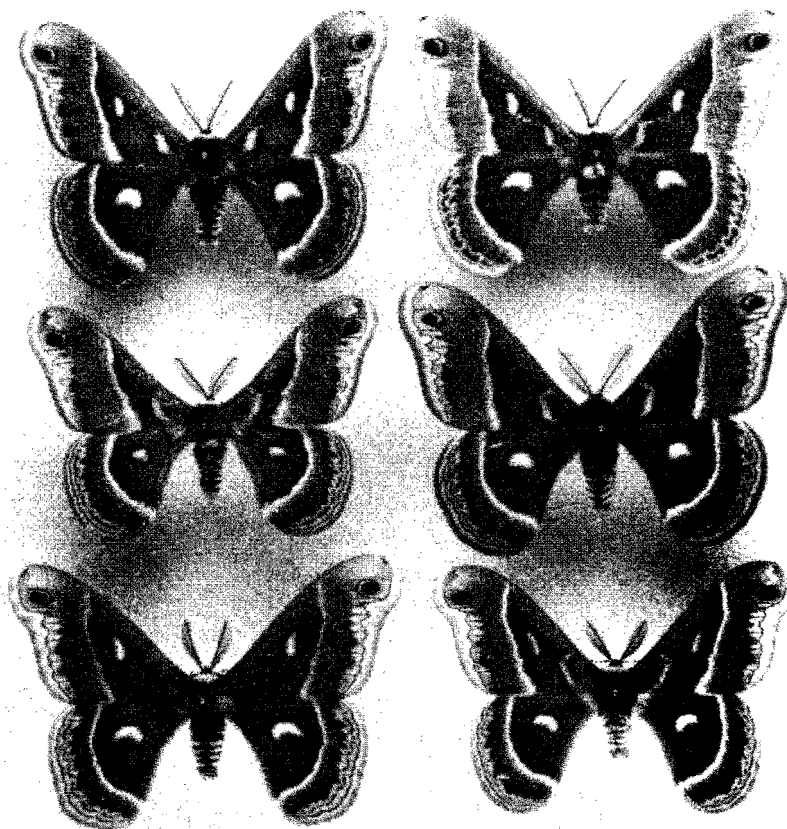


Fig. 2. Typical Wisconsin *Hyalophora columbia* (top), *H. columbia* with obsolete discal spot (middle), reared *H. columbia-cecropia* hybrids (bottom).

The evidence accumulated indicates that *columbia* should occur in many tamarack bogs in the northern third of Wisconsin, and that its populations remain quite viable in this area. The low number of previous records reflects a lack of collecting in the region, rather than actual rarity. The species has likely been little affected there by human activities or larch sawfly outbreaks. *H. columbia* has not been reported from the Cedarburg Swamp, its southernmost state locality, since 1935, and possibly may no longer occur there due to urban encroachment adversely affecting the remaining protected area. It is hoped this paper will encourage others to look for *columbia* in neighboring states, and to continue studying the species, to gain a better understanding of its isolating mechanisms and ecological needs.

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