

types: 17♂♂, 10♀♀, same data; 4♂♂, 1♀ Zailijski Ala-Too, Tian-Shan Mts., Tugok-su, 2500 m, 7 July 1968 (A. Kozubowski) (ex coll. D. S. Lastochkin).

All material deposited in the collection of Ukrainian Research Institute for Plant Protection, Kiev; 2♂♂ and 2♀♀ paratypes forwarded to Deutsches Entomologisches Institut, Eberswalde, D.D.R. (East Germany).

*Comparative notes.* As was stated, *G. rhamni tianshanica* occupies an intermediate position between *G. rhamni transiens* and *G. rhamni rhamni*. To the former it is closer by visible characters, to the second by characters of the hidden wing pattern. Taking this into account, we can see that *G. r. transiens* is a western form intermediate between *G. rhamni rhamni* and *G. rhamni meridionalis* Rüb., another described subspecies transitional between *G. rhamni rhamni*, or its Siberian form, and *rhamni nepalensis* Dbld. When material from the Pamir Mountains becomes available, the correct position of *tianshanica* in the system of West Palearctic forms of *G. rhamni* will become even clearer.

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### HOST-PLANT FINDING BY ODOR IN ADULT *CORYPHISTA MEADI* (GEOMETRIDAE)

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#### Introduction

The barberry geometer, *Coryphista meadi* (Packard), is a monophagous geometrid which completes its life cycle on *Berberis* L. (barberry) (Dyar, 1902; Comstock, 1967). Ranging across the U. S., it is locally common where barberry is common. The species is multivoltine and in the North-east occurs from June through September.

By day, the moths rest among the lower barberry canes, and become active shortly after sunset when large numbers can be observed fluttering above barberry shrubs. In the present study, I found that most of these

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## OLFACTOMETER

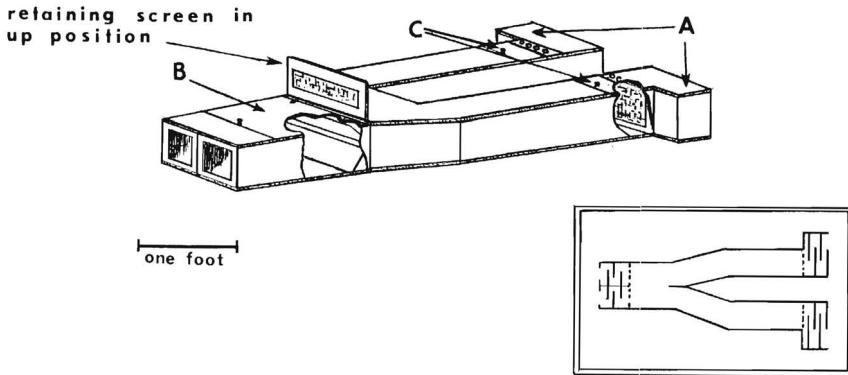


Fig. 1. "Y" olfactometer. Clippings of plants to be tested are placed at A; moths to be tested are introduced at B; selections are determined by collecting moths at C. Inset shows the placement of light baffles.

individuals were ovipositing females. Fluttering females were seen to alight for a few moments, lay a single egg, and then move to a different portion of the barberry hedge. This ovipositional behavior continued until approximately 2200 hrs. EST, when the moths presumably moved down among the barberry canes once again.

These behavioral observations clearly suggest that barberry foliage attracts ovipositing females. Previous studies have shown that the stimuli dictating host-plant selections in a variety of Lepidoptera are chemical in nature (Beck, 1956; Gupta and Thorsteinson, 1960a, 1960b; Shorey, 1964). It was suspected, therefore, that attraction of *C. meadi* to barberry was the result of some volatile chemical or chemicals emanating from barberry foliage.

## Materials and Methods

Moths collected by hand-netting shortly after sunset were placed into a Y-shaped olfactometer made of  $\frac{1}{4}$  inch plywood (Fig. 1). The olfactometer was placed in a window which opened into a 10- × 13-foot room. The window was blocked in a manner which allowed passage of air only through the apparatus. An exhaust fan situated at the opposite end of the room drew air slowly through the olfactometer. Recirculation of the air was prevented by finally exhausting the air out of the room. Holes drilled in the top of each arm of the "Y" admitted natural

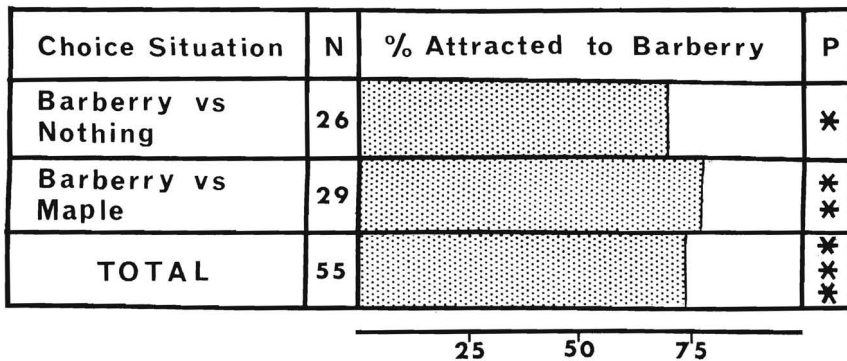


Fig. 2. Attraction of *C. meadi* to the source of some chemical or combination of chemicals emanating from barberrry foliage. "Total" represents the sum of the two choice situations. Significant deviations from a chance distribution are indicated by asterisks: one asterisk,  $P < 0.05$ ; two asterisks,  $P < 0.01$ ; three asterisks,  $P < 0.001$ .

light to the ends of the olfactometer. Two or three sprigs (three to four inches long) of the plants to be tested were placed at either (or both) of the ends marked "A". Moths to be tested (7-11 per trial) were introduced at "B". A removable wire screen separated the moths from the junction of the two arms of the "Y". After the moths were introduced into the olfactometer, the fan was started and air drawn through the apparatus. The wire screen was kept in place for 30 minutes and was then removed, allowing the moths access to either of the arms of the "Y". All trials were run for approximately five hours (0000-0500 hrs. EST). The choices were noted by removing the covers, "C", and collecting the moths at both ends of the "Y".

Two separate choice situations were tested: barberrry (*B. thunbergii* DC) vs. nothing, and barberrry vs. red maple (*Acer rubrum* L.). All tests were run for at least four consecutive nights, alternating the control and experimental ends of the "Y" each night.

#### Results and Discussion

The results are summarized in Figure 2. The distributions of the moths in the two ends of the olfactometer differed significantly from random (by chi-square tests) in both choice situations ( $P < 0.05$  for barberrry vs. nothing, and  $P < 0.01$  for barberrry vs. maple. Statistical analysis of the left-right distribution of the moths showed no significant deviations from random ( $P > 0.30$ ). The results clearly demonstrate that *C. meadi* may be attracted by a volatile substance (or substances) emanating from barberrry and is capable of orienting up-wind and flying along a concentra-

tion gradient to the source of this attractant. These experimental data support the suggestion from field observations that ovipositing females are attracted to the host plant by olfaction. More interesting, however, these data indicate that *C. meadi* may have the ability to locate its host plant over comparatively long distances. The ovipositional behavior of the species (flight between the laying of each egg) perhaps serves to reduce intraspecific competition by effecting greater larval dispersal. If this is true, then the ability to locate the host plant over relatively long distances would apparently be highly adaptive because barberry under natural conditions does not normally grow in dense thickets but is scattered in patches.

This study has also indicated that the problems encountered in attempting to investigate host-plant selections using olfactometers (Thorsteinson, 1960) can be overcome. Early designs of the apparatus used in this study did not contain the light baffles shown in Fig. 1. The moths failed to make selections in these devices, apparently showing only positive phototropic responses. When all light was excluded from the apparatus, the moths merely sat in the box where they were introduced. By adjusting the light intensity entering the ends of the arms, responses to the plant clippings could be obtained. The introduction of a retaining screen further improved the responses obtained. Without the screen many of the moths introduced into the olfactometer immediately flew, at random, to either of the two ends of the "Y". This was apparently an escape response which was thwarted by keeping the screen in place for approximately 30 minutes.

#### Acknowledgments

I wish to thank the Massachusetts Audubon Society for granting permission to use Arcadia Wildlife Sanctuary, Easthampton, Massachusetts for collecting the moths used in this study. I would also like to thank Dr. T. D. Sargent who provided helpful criticism in all phases of this work.

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A BILATERAL GYNANDROMORPH OF *PIERIS RAPAE*  
(PIERIDAE)

A bilateral gynandromorph of the Imported Cabbage Butterfly, *Pieris rapae* Linnaeus, was taken September 18, 1969 at the Ithaca, New York city dump (Tompkins Co.). It turned up in a large, randomly collected sample of *P. rapae* taken for other purposes, and was not recognized as a gynandromorph until already dead. There is thus no information available on its behavior. Nearly all of the butterflies in the sample were taken in flight or on blossoms of Great Burdock (*Arctium lappa* Linnaeus).

The specimen is female on the left side and male on the right, similar to one taken in Bedfordshire, England in 1938 (S. H. Kershaw, *Proc. S. Lond. ent. nat. Hist. Soc.* 1954-55, p. 33). All secondary sexual color and pattern characteristics, including the pteridine pigments, are normally developed on the half of appropriate sex. There is no irregular mosaicism. The external genitalia are also bilaterally asymmetrical, with a somewhat aborted clasper on the male side. The internal anatomy was not studied.

A quick survey of the British aberrational literature suggests that gynandromorphs are much rarer in *P. rapae* than in at least some populations of the *P. napi* complex. Bilateral gynandromorphs also seem to be very rare in *P. brassicae* Linnaeus, though irregular mosaics are rather frequent. My specimen is the first of its kind to appear among perhaps 75,000 wild and bred *Pieris* I have examined in recent years, including some 12,000 wild *P. rapae* from the northeastern United States.

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A NOTE ON THE SYSTEMATIC POSITION OF *PAPILIO*  
*ANTIMACHUS*

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Recently, the Honorable Miriam Rothschild and Professors J. von Euw, and T. Reichstein (1970) have been able to prove the presence of cardenolide heart poisons in *Papilio antimachus* Drury. *P. antimachus* is very unusual in its appearance, with very long wings and a pattern which makes it look something like a giant *Acraea*. The unusual appearance of the butterfly, and the presence of the cardenolides (heart poisons which also