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A MELANIC *PIERIS RAPAE* FROM MICHIGAN
(LEPIDOPTERA: PIERIDAE)

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The Arthur J. Yates collection of Michigan Lepidoptera, recently donated to Michigan State University (see Fischer, 1967), contained a striking melanic male cabbage butterfly [*Pieris rapae* (Linnaeus)] (Figs. 1, 2) now incorporated into the MSU series. Yates collected the specimen on 29 May 1934 in Roseville, Macomb County, near the western shore of Lake St. Clair in southeastern Michigan. An examination of the androconia and genitalia, using the characters described by Chang (1963), assured proper identification of the specimen.

Although we have found no record of a similar *rapae* taken in North America, there are some named European forms of various species of *Pieris* that resemble our specimen.

DESCRIPTION

Generally, the upperside of the specimen is uniformly smoky gray-brown, while most of the veins and marginal fringes are yellowish-gray. The underside is lighter than the upperside, with the apex of the forewing and the outer third of both wings washed with yellow. Two spots are located on the underside of the forewing, as in typical specimens.

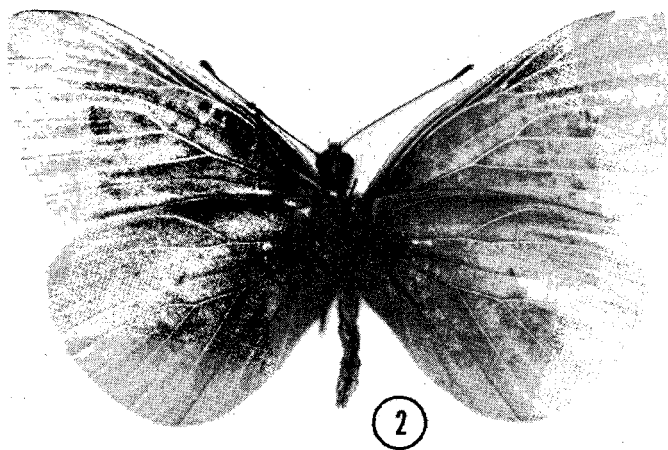
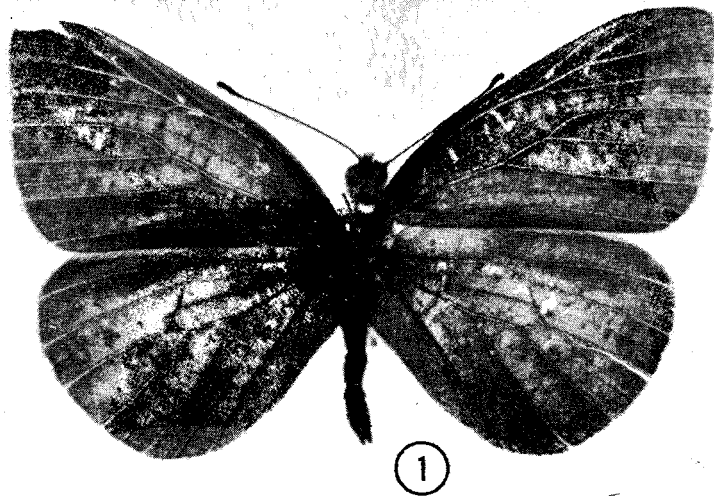
The detailed description below includes some characters visible only under magnification.

UPPERSIDE (Fig. 1), including basal two-thirds of the veins, uniformly and entirely smoky gray-brown except for the yellowish-gray marginal fringe on both wings. Distal third of all veins yellowish-gray, except at apex of the forewing, where the veins abruptly become concolorous with the ground color. This apical darkening is the only suggestion of the black apex of typical specimens. Uniform, diffuse, obscure speckling on both wings.

FOREWING UNDERSIDE (Fig. 2) lighter than upperside. Apex distinctly washed with yellow. Two faint dark spots parallel to outer margin, near the discal cell, in Median 3 and Cubitus 2 cells, as in typical specimens; anterior spot larger and more conspicuous. Broadly pale yellowish-gray from the spots to the outer margin. Costa narrowly pale.

HINDWING UNDERSIDE (Fig. 2) is broadly smoky gray-brown basally (concolorous with the upperside), this dark area diffusing into

a broad, dull yellowish area that extends to the outer margin from the end of the discal cell and from a point about midway on the anal margin. Costa bright yellow from a point above the end of the precostal vein to a point about two-thirds the length of the subcostal vein (best seen under magnification).



Figures 1 and 2. Dorsal and ventral views, respectively, of the melanic *Pieris rapae*. Photos by Julian P. Donahue.

ANTENNAE dorsally dark brown, tipped with yellow; ventrally gray, annulated with brown.

PALPI with mixed brown and blackish hairlike scales.

EYE dark brown, mottled with black. (Eye color possibly influenced by non-genetic factors, *i.e.*, changes occurring since the death of the specimen.) Hairs on dorsal and anterior periphery black; hairs on ventral periphery concolorous with the palpi.

PROBOSCIS basally yellow, becoming black distally.

THORAX above black, with dark brown hairlike scales; ventrally gray-scaled, clothed with dense light brown scales.

LEG (only one remains on the specimen) tan, becoming yellow on the tarsus. Two yellowish tibial spurs, each with a sharp black tip.

ABDOMEN above dark brown, becoming blackish anteriorly, with appressed dark brown hairlike scales; ventrally heavily clothed with gray-brown scales on first few segments, this scaling becoming more gray posteriorly. Vestiture on margin of valvae dull yellow.

The scales on the wings of the melanic specimen differ from those of typical specimens in that the scales are relatively narrow with a great variety of lobes and teeth on the distal end, while some are almost entire. The scales are arranged in irregular rows and have upturned lateral edges. In contrast, scales of normal specimens are broader and more uniform, usually have two to four teeth, and are arranged in more regular rows.

DISCUSSION

An amazing variety of "forms" and "aberrations" have been described in the genus *Pieris*, especially in the Palearctic Region. Lempke (1934), for example, discussed no less than 68 named races, forms, aberrations, and generations of *Pieris rapae* alone. Although our search in the European literature has not been exhaustive, several descriptions and illustrations from this chaotic collection of names have been found which bear a strong resemblance to the Michigan specimen.

One of the first of these dark forms to be described was *P. brassicae* form "obscurata" Oberthür (1896), based on a female from Paris. The specimen was described as being dark gray on both the upper- and undersides, except that the costa of each left wing is more broadly whitened on the underside than on the upperside.

Gillmer (1905) described and illustrated *P. napi* aberration "fumigata," also based on a female. The following description, which indicates a striking similarity between Gillmer's specimen and ours, has been translated from the German:

"*Pieris napi* Linn. ♀ (fig. 4). A beautiful evenly colored smoky gray species, formed both above and below in the same manner. The fringes and the anterior margin of the forewings (especially visible beneath) appear faintly pale yellow, the veins on the under side also have this pale yellow color on their outer half, while the basal half is black; the veins on the upper side are entirely black = aberration *fumigata* Gillmer."

In 1908 Verity (1905-1911, p. 150) described and figured (pl. xxxii, fig. 50) aberration "nigrans," assigning it to *P. napi*, but Lempke and Oberthür (Lempke, 1934) were convinced that the specimen was a form of *P. rapae*. The following original description of "nigrans" Verity is translated from the French:

"I propose this name for a melanotic form represented in the Oberthür collection by a ♂, of the summer generation, collected in Silesia, whose wings are both above and below a uniform gray, making the dark pattern on the upperside and the veins on the underside scarcely visible."

Further on in the text, in a supplement, Verity (1905-1911, p. 332) stated that his "nigrans" was perhaps identical to Gillmer's "fumigata." Bollow (1932) apparently agreed, for he made "nigrans" Verity a synonym of "fumigata" Gillmer. But, since Lempke (1934) assigned "nigrans" to *P. rapae*, the question remaining is: should the supposedly synonymous "fumigata" also be placed in *P. rapae*? Only a detailed examination of the specimen in question can solve the puzzle.

Lempke (1934) also mentioned a male specimen collected at Naarden, Netherlands, which he assigned to "nigrans" Verity.

Stauder (1913) described and figured (pl. 1, fig. 13) a melanic female *Pieris rapae*, calling it aberration "brunneoflavida." The following original description is translated from the German:

"The upper- and undersides are not the sulfur yellow or canary color of *flavescens* Röber, but the color of bright copper, which gives the insect a very remarkable appearance.

"Likewise the head, thorax, and the body, as well as the antennae, are copper colored; the apical mark is greatly reduced as in *leucotera* or *metra*, vague and intermingled with brown.

"Similarly the median area of the underside of the forewing is filled with brownish-yellow.

"The brown of the upperside closely approaches that of an aberrant ♂ described and figured by Wagner (*Jahresbericht des Wiener Ent. Ver.*, Volume XIV, 1903, p. 43-44, pl. I), and is similar to the color of the veins on the underside of the hindwing."

Stauder's specimen, illustrated by a photograph of the upperside, differs considerably from the Michigan specimen in that the black apex is clearly and sharply delimited from the background color, as are two spots on the forewing and one spot on the apex of the hindwing.

Finally, we draw attention to a melanic female aberration of the African *Pieris thysa*, originally described as subspecies *rimala* of *P. larima* by Suffert (1904).

Perhaps because of the extreme rarity of melanic specimens, nothing is known about the cause of melanism in *Pieris*. Two possibilities exist: some environmental factor may have a gross effect on one of the early stages of the insect, or the melanism is the expression of a rare genotype. Dr. H.B.D. Kettlewell of the Genetics Laboratory, Department of Zoology, University Museum, Oxford, who has undertaken distinguished research on industrial melanism in the Lepidoptera, has

examined photographs of the Michigan specimen and offered these comments on it (personal communication, 28 Nov. 1963):

"In the first place it can be definitely stated that the melanic form of this butterfly is in no way connected with normal Industrial Melanism. It is almost certainly inherited as a rare recessive and not as a dominant as is the case with nearly all industrial melanic species. The advantages conferred by blackness on a moth which spends its day at rest and motionless are quite different from those of a butterfly flying in the sunlight. I would think that this black *rapae* is at a considerable disadvantage physiologically, and it is difficult to see what visual advantage it would acquire from blackness. I think most of us are agreed that the colour 'white' is a warning colour suggesting distastefulness. By this means the white butterflies are largely freed from attacks by bird predators. This butterfly of yours, therefore, has given up such an advantage (if there is one). It would have been most interesting to have bred from this insect, and to have ascertained the true state of its genetics."

We are not, of course, naming this specimen, since "forms" and "aberrations" have no taxonomic validity. There is already a surfeit of such names to clutter the literature, and the only value of these names is to assist in locating descriptions of particularly interesting forms.

Although we found no references to similar forms having been collected in North America, there is still a chance that other specimens have not been reported. We would appreciate learning of any other captures of melanic *Pieris*.

ACKNOWLEDGMENTS

We wish to thank Dr. Roland L. Fischer, Curator of the Entomology Museum, Michigan State University, where the melanic specimen is deposited, for his assistance in the study of this insect and for his translations of German descriptions. Our thanks also to John H. Newman, who provided us with additional background information, and to Dr. H.B.D. Kettlewell for his interesting observations on the melanic specimen.

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FORTHCOMING PUBLICATIONS

One of the rarer nineteenth-century entomological publications is the first volume (1840-42) of *The Entomologist*. This key journal, founded by Edward Newman and still 'going strong' today, is of course found in most larger libraries, but Vol. 1 is usually missing. There was a long hiatus before the publication of Vol. 2 in 1864-65; after that date the journal appeared regularly, but Vol. 1 was already rare enough in 1865 to elicit Newman's comment that whoever needed it must "wait in vain; it reposes in peace on the shelves of the British Museum, the Universities, and the learned societies, but has long since disappeared from the bookseller's counter."

Librarians need no longer "wait in vain" to complete their series, and collectors who could never hope to own the original can have a substitute. A reprint is scheduled for publication late in March by Wm. Dawson & Sons, Ltd. and E. W. Classey, Ltd. The price will be £9.5.0. sterling (U.S. \$25.90).

Also of interest to American entomologists is the announcement that E. W. Classey Ltd. will continue to reprint *The Genitalia of the British Lepidoptera* by F. N. Pierce, J. W. Metcalfe and B. P. Beirne. The work is fundamental to genitalic study, and treats numerous genera that have North American species. The volumes for the Tortricidae and the female Noctuidae have already appeared; those for the male Noctuidae, the Geometridae, the Rhopalocera and larger moths are scheduled for 1967 at prices ranging from £3.10.0 to £6.0.0. sterling per volume.