AN EXTREME PHENOTYPE OF PIERIS PROTODICE (PIERIDAE)

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Vernal phenotypes in Pieridae are described by Klots (1951) as “paler, with reduced dark borders or spots” relative to the summer phenotypes. This characterization applies only to the upper surface of the wings; beneath, the hindwing is generally more or less melanized in the vernal phenotype. This redistribution of black pigment may fulfill a thermo-regulatory function (Clench, 1966).

The “cold weather” phenotype of Pieris protodice Boisduval & LeConte (f. vern. vernalis Edwards) occurs in late autumn and early spring throughout the range of the species (Rawson, 1945; Bean, 1877). Lutz (1948) characterized it as possessing “so much greenish gray on the hind wings that the white is reduced to narrow triangular spots; spots on the upper side are much reduced, or even absent.” Shapiro (1968) has demonstrated

that the *vernalis* phenotype may be induced by exposure of the larvae to long nights, regardless of temperature. Specimens obtained by photoperiodic manipulation in the laboratory are similar to wild Philadelphia, Pennsylvania butterflies exposed to equivalent photoperiods in late larval life.

An extreme specimen of *vernalis* taken at the Tinicum Wildlife Preserve, Philadelphia County, Pennsylvania, March 30, 1968, is illustrated in figure 1, along with a normal *vernalis*. The Tinicum specimen, a female, is darker on the lower surface than the darkest female grade figured by Abbott, Dillon, and Shrode (1960). The dark vein-lines are even broader and more confluent than is usual in the spring phenotype (*calyce* Edwards) of the western, montane sibling species, *Pieris occidentalis* Reakirt. The specimen differs from *calyce* also in the intensity of the melanization, which obscures the underlying yellow pigment almost completely and presents a black, rather than a brownish green effect.

No photoperiod or photoperiod-temperature combination yet tested will induce such extreme melanization in the lower surface. In the Cornell culture of *P. protodice*, which has been maintained through seventeen generations for genetic studies, heritable variations in expression of the *vernalis* phenotype under standardized conditions have been observed. However, a brood of 39 reared from the Tinicum female (already mated to an unknown male) in an inducing photoperiod of fourteen hours darkness produced only normal *vernalis*.

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**Literature Cited**


