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PIERIS NAPI L. (PIERIDAE) AND THE SUPERSPECIES CONCEPT

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This is a subject to be treated at greater length on some future occasion: the present note is intended to draw attention to unresolved taxonomic questions, which particularly affect the North American populations.

When the European collector enquires, "Is *bryoniae* Ochsenheimer a separate species?" he may mean either of two different things. He may be asking whether ssp. *bryoniae* is reproductively separate from the other *Pieris napi* L. flying in the same country, or he may want to know whether *bryoniae* + *flavescens* Wagner + *neobryoniae* Sheljuzhko and perhaps *adalwinda* Fruhstorfer + *hulda* Edwards + ... are reproductively isolated, severally, from *napi* + *britannica* Verity + *meridionalis* Heyne + *oleracea* Harris + *venosa* Scudder + ... The answers are likely to be different, and only that to the simpler question can be unequivocal.

Dobzhansky (1970), quoting Mayr and also Amadon, defines a superspecies as a monophyletic group of closely related and largely or entirely allopatric species, or as a group of . . . . . essentially allopatric taxa that were once races of a single species but which have now achieved specific status. The components of the superspecies are semispecies or allospecies; gene-exchange is still possible among semispecies but not as freely as among conspecific populations. Thus the Holarctic *Pieris napi-bryoniae* complex is a perfect example of a superspecies.

The definition involves "species," which can itself be defined in many different ways. For butterflies, a formally new, though quite theoretical, criterion of species status has been given (Bowden, 1972):

> Where the taxa have come into contact, if sympatry is leading to increased genetic and sexual barriers between them, the populations are to be taken as already belonging to distinct species; if not, not.

This fixes speciation at a rather earlier stage than the "full speciation" of many systematists, and transfers a number of supposed semispecies to the

species category. But of course it still gives no assistance with populations which have remained apart geographically, except in so far as captive pairings provide evidence of the probable results of cross-breeding in the wild.

The usual tests decide readily enough that *Pieris virginiensis* Edwards is specifically separated from *P. napi oleracea*, and experiments (Bowden, 1966, 1972) leave no doubt that it is also distinct from *P. n. napi.*

We can be nearly as certain that, in Switzerland, wild *bryoniae* is reproductively almost completely isolated from *napi*, though fertile hybrids are easily obtained in captivity. Experimentally, fertile *oleracea* × *bryoniae* F_1 pairings are obtained as easily as *napi* × *bryoniae*, but thereafter fertility crashes (Bowden, 1972). On the other hand *oleracea* × *napi* can be carried to the direct F_3 at least. These results permit the conclusion that *P. n. napi* and *P. n. oleracea* are still conspecific, and will interbreed if the Atlantic Ocean is abolished next year. But it is not necessary to wait so long to conclude that reproductive barriers would in fact go up rapidly—*oleracea* and European *napi* are very different insects.

The writer has appreciable breeding experience of only three Nearctic subspecies of *napi*, including *virginiensis*, the third being *marginalis* Scudder. None of these can be raised on *Alliaria*, a plant which the European subspecies eat readily (Bowden, 1971a, 1971c). The larvae all differ from European *napi* and *bryoniae*, most conspicuously by the absence of bright yellow rings round the spiracles. The pupae vary in shape: *P. n. marginalis* is fairly close to *P. n. napi*, but *virginiensis* is radically different; *P. n. oleracea* is intermediate, but tending towards *virginiensis* (Bowden, unpublished). Pupae of the various European *napi* and *bryoniae* subspecies are, on the other hand, practically indistinguishable from one another. The relative length of the antennae also can be used to differentiate subspecies (Bowden, 1971b). The antennae of *P. n. oleracea* are conspicuously shorter than those of four European taxa measured, between which no statistically significant difference is found. *P. virginiensis* is perhaps slightly closer to the European proportion, but the difference from *oleracea* was not significant as measured. *P. n. venosa* shows a "European" antenna/wing ratio, as does *P. n. hulda*. *P. n. marginalis* (Oregon) is intermediate between *oleracea* and European, and differs significantly from both.

It is clear that phenotypic differences at three stages combine to separate *oleracea* from *napi*, even if one disregards the genetically determined melanic patterns above and below the wings. The name *Pieris*

oleracea could almost certainly be used in that form without error. But the status of other taxa is not so readily determinable.

Lorković (1970) describes a confusing case in south-eastern Europe. In parts of Jugoslavia resides a population *balcana* Lork., which is phenotypically like *P. napi meridionalis* with some characters of ssp. *pseudorapae* Verity, but which karyologically resembles *bryoniae* and also pairs much more willingly with *bryoniae* than with *P. n. napi.* In the northern Caucasus is another population, *balcarica* Wojtusiak & Niesiolowski, which karyotypically rather approaches *balcana* but shows no reproductive isolation from *P. n. napi*; morphologically it resembles *P. n. pseudorapae* (Lebanon). Now there is as yet no sufficient evidence on which to determine whether Lebanon *pseudorapae* is specifically or only subspecifically distinct from *P. napi napi*, and its karyotype is unknown; hence one cannot decide whether ssp. *balcarica* is a subspecies of *napi s.s.* or of *pseudorapae.*

Where the limits of true species should fall among the groups of subspecies will become better known as the relations between subspecies are explored in search of the evolutionary paths. But at present only scraps of the necessary knowledge are available, and we deceive ourselves if we pretend to have more.

One concludes that for most of the taxa which have ever been included in *Pieris napi* we should continue to use a binomial or a trinomial nomenclature, *Genus species subspecies*, but that when there is still insufficient evidence to decide to what species a particular subspecies belongs, we should instead use the superspecies name in parentheses: *Genus (superspecies) subspecies.*

If the subspecies in question constitutes what Kiriakoff (1948) and Lorković (1953) call a semispecies, this style is identical with theirs. Its adoption should imply that a semispecies (while it is considered such) cannot be allowed to have its own subspecies, even under the inappropriate guise of "forms." Indeed, while we are unable to allot a given semispecies to a species, we are unlikely to be able to allot further subspecies to that semispecies with any degree of certainty.

If, however, the subspecies is not considered to be a semispecies, but is merely a taxon of still uncertain affinities, the same style may be used. The resulting slight ambiguity is justified by the rather temporary taxonomic status of the semispecies: in either case the aim must be final reversion to the conventional trinomial.

Nevertheless, in the *Pieris napi* group we find a continuous range of differentiation, from local populations through subspecies to species, which nomenclature cannot fully reflect. The adoption of an arbitrary

criterion for specific status will not change this. Names are labels, and the amount of biological information that they can be expected to hold is limited.

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NOTES ON *URODUS PARVULA* (HENRY EDWARDS) (YPONOMEUTIDAE)

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Urodus parvula (Henry Edwards) is a common species in Florida and has been recorded from many localities from Miami north to Jacksonville. R. B. Dominick states that the species is also common from March to November at McClellanville, South Carolina. A single specimen in the Cornell University collection from Okefinokee Swamp, Georgia, is apparently the only record from that state. This species may occur along the Gulf coast towards Texas and northward along the Atlantic coast. Forbes (1923) stated, "The northern record (District of Columbia) is based on a single specimen which may have been a stray."

Edwards (1881) referred this species to the genus *Penthetria*, Dyar (1898) placed it in *Trichostibas*, and Forbes (1923) assigned it to *Urodus*. Although only one species of *Urodus* is known from North America, this