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Predation by Araneus cornutus CLERK on adult Pieris napi (L.) (Araneae, Araneidae, Lepidoptera, Pieridae)

by
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The causes of adult butterfly mortality have been a subject of controversy in the past. In particular the amount of predation by birds and other vertebrates has been extensively discussed in relation to the evolution of distastefulness and mimicry. KETTLEWELL (1958) also discussed the possible influences of spider predation on cryptic underside colouration. However a major problem in these arguments has proved to be the recording of actual attacks. Typically few instances of predation are seen, and butterfly corpses are rarely found in the field. For instance, in a study of the adult longevity and movements of *Anthocharis cardamines* at Durham during 1977-80, in a population where little emigration occurs, over 700 animals were marked, but only two were found as corpses. The two, both marked individuals, were found three and eighteen days after first capture – one had been killed by a motor vehicle, the other, lacking two wings and head, may have been predated. It is the purpose of this short note to record that, in at least some butterfly populations, predation is a regular and significant cause of death.

Populations of the Green-veined White, *Pieris napi* on the Pennine hills of northern England have been studied since 1977. These essentially univoltine populations fly during mid June-July and, like the populations of *Pontia protodice* studied by SHAPIRO (1979), seem to fluctuate in abundance depending on weather conditions. In this case adult abundance in any one year depends on the number of eggs laid the previous summer, which is determined primarily by the amount of sunshine allowing flight activity. In these upland heather moors, *P. napi* is associated with wet areas supporting large populations of its larval foodplant, *Cardamine pratensis*, which is almost the only nectar source available to adults, though wild thyme is also visited. Population levels following the two fine summers of 1975 and 1976 were very high. At Langdon Common, Co. Curham two persons caught over 250 *P. napi* in 45 minutes on 8.VII.77; mark-recapture estimates suggested a population of at least 3,000 in an area of 4 hat. Every summer from 1977 onwards has been poor and abundance has declined steadily since then. Marginal populations have become extinct, although within the main areas of *C. pratensis*, such as at Langdon Common, the butterfly maintains fair numbers.

Adults captured have routinely been examined for beak marks indicative of bird attack – these have not been found, although they occur in lowland *P. napi* and *R. rapae* populations in Co. Durham. Symmetrical wing damage, where gaps match on both wings, is common. However this may indicate damage cau-

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sed by roosting amongst wind-blown *Juncus* clumps rather than the predation attempts to which it is commonly ascribed.

In 1977 the corpse of an adult butterfly was discovered at Langdon Common woven into a silken retreat of the spider *Araneus cornutus*. This spider species inhabits damp places, particularly the thick *Juncus* clumps on moorland, and captures flying insects on a series of strands woven between clumps. Prey items are taken to the retreat after capture and fastened there for consumption. Gradually, as a season progresses, more and more corpses are accumulated to form a record of an individual spider's captures. Cursory examination in 1978 and 1979 revealed few *A. cornutus* and no caught *P. napi*. However in 1980, two *P. napi* were found entangled in a single web on moorland at Alston, Cumbria. One butterfly, a male which may have been attracted to the web by the second individual, a female managed to free itself. The female, which was already consumed, was woven into the retreat (Fig. 1). This find prompted a more detailed examination of what had been considered a chance event. The Langdon Common site was searched for *A. cornutus* webs and seventeen were found.

Fig. 1:
Female *A. napi* corpse in *A. cornutus* retreat.

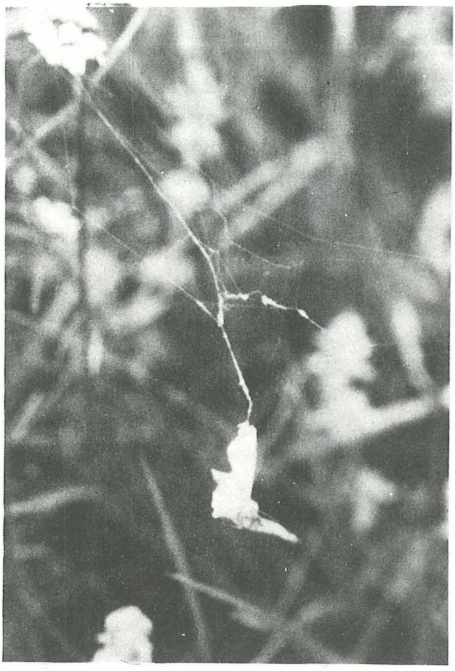

Fig. 2:
Male *A. napi* in *A. cornutus* web, about to break free

Table 1: The number of items of prey in individual *A. cornutus* retreats Langdon Common, 10.VII.1980

Spider No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Prey item																		
P. napi			1						1				1					3
Other Lepidoptera			1						1		1					1		4
Lepidoptera								1										1
Coleoptera			1															1
Tipulidae	3	1	2		1	1	4	5	4	3	2	3		1	4	3	4	41
Syrphidae	2	1					1	1				1	1		1			8
Other Diptera	4		3	1	2	1		2	1	1	4	2		3			1	25
Araneidae	1																	1
	10	2	8	1	3	2	5	9	7	4	7	6	2	4	5	4	5	84

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Collecting took place on the 10th of July 1980, after the main period of *P. napi* flight, so as to assess the number of butterflies taken. The retreats were dissected under a microscope, and the contents found are given in Table 1.

It is seen that *P. napi* adults form a very small part of the spiders' diet with craneflies (Tipulidae) and other Dipterans making up the bulk. Nevertheless the results do indicate that predation by spiders is a regular occurrence, even when butterfly numbers are low. The numbers taken may be small but are at a level which could have selective influence – if only for eternal vigilance on the butterfly's part.

Since writing the above I have been informed that predation by crab-spiders (Thomisidae) on butterflies in Central Sweden may reach high levels. OLA JENNERSTEN (Uppsala University) and CHRISTER WIKLUND (Stockholm University) have frequently seen predation of *Apanthopus hyperanthus* L. by such spiders. On one occasion CHRISTER WIKLUND has seen three successful attacks in less than an hour.

Dr. P. DUGAN identified spider specimens.

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