

UNDER-WING OCELLI

Background

A paper published in the Entomologist in 1997 noted (via museum specimens) variation in ocelli pupillation of both Brown Argus and Common Blue butterflies. Two Tables are copied below and include both males and females.

Table 1: British *Aricia*

Locality	Min%	Max%	Av.%	Numbers	M S	%/mile
Perthshire	0	5	1.9	19	0	0
SW Scotland	0	10	2.6	22	0	0
N Lancs.	15	60	32	23	50	0.6
Peak dist.	20	55	46.5	18	145	0.15
I of Wight	30	70	53.4	22	315	(0.04)

M S is Miles from Scotland

The data show clearly how the black pupils are very low (but not zero) in Scotland and increase in size as the distance from Scotland increases. These were produced by a critical cool temperature coinciding with the start of pupation of the larvae over an area approximating to Scotland. The date was after the last ice-age – otherwise the Peak district would show much smaller pupils from *Aricia* which had been pushed down from Scotland.

Table 2: Common Blue

Locality	Min%	Max.%	Av%	M&F numbers
Ross-shire, Scotland	35	65	47	12
Ganton Wold	40	70	55	20
Doncaster	35	70	54	27
Hunts.	35	65	53	26
Kent	35	70	56	25

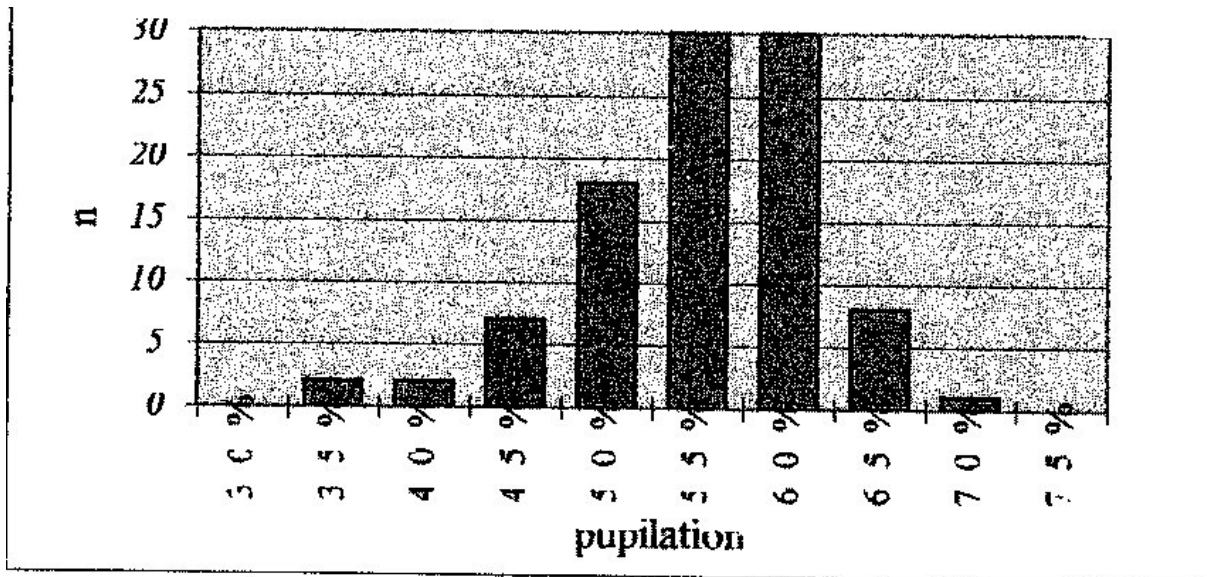
These figures show similarity, bearing in mind the relatively small numbers checked. The histogram on the next page is important. It shows an approximation to a sine curve and from the much smaller number of *Aricia* specimens there is a reasonably similar curve.

The Butterfly Conservation consensus – that in mainland Britain the genus *Aricia* occurred as a southern race, a northern race, and hybrids – was issued in 2009. As a result, one interpretation of a sine-wave histogram is that it can indicate a hybrid.

A further point is that the extremities of any sine wave will indicate the ancestors of the particular hybrid being examined. In the case of *Aricia*, cold spells over considerable periods of time in the last 1 million years or so led to species in Scotland being unable to maintain their previous rate of growth in more normal temperatures. Any physical changes- a general darkening of upper wing colours would be at a maximum at the glacial maximum in the last ice-age, because subsequently temperatures have returned to normal. This has allowed a slow diffusion of the northern race into the southern and vice-versa with a jumbling up of the different colours..

In the case of the Brown Argus, Table 1 shows the return of small black centres in some specimens – just after the event there would not have been any: the fact that there are still a large majority today with no black pupils indicates one of the present day ancestors which is gradually drifting down from the initial 100%. Another ancestor is indicated in the more general colouring of the upper wings, also more complex, by a rare all-black male set of upper wings. In between the wing-colour is complex and darker than the southern race, also complex due to a diffuse northern component.

Histogram of Common Blue specimens from Table 2



Values were taken from the 3rd ocellus down from the left-hand fore-wing tip.

The histogram has the form of a sine wave with maximum numbers near the middle. These reduce and spread out near the extremes. From smaller numbers the *Aricia* figures show the same general pattern of higher in the middle and low at the edges. A 50/50 hybrid would show a sine-wave histogram with the maximum numbers in the middle and tapering off at the extremes.