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# Energy sources of adult Lepidoptera

Observations on the floral preferences of winter-spring adult populations of Lycaenidae and Hesperiidae near Barcelona, Catalonia

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## Introduction

Much information is at present available as to the larval foodplants of many species of butterflies. This information is obviously important in the study of the ecology and evolution. However, on the contrary, very little information is available on another important aspect of the biology of butterflies, that is the adult's source of energy. This aspect of butterfly biology is only now beginning to receive more attention from authors such as SHIELDS (1972), GILBERT (1975) and NECK (1977).

As we know, the adults of some moths do not feed, as energy reserves are provided already in the larval stage, but this has not been observed in any species of butterfly. Not all the energy supplies of adult lepidoptera are obtained from fruit and flowers; DOWNES (1973) considered also the mud, carrion and dung from which butterflies are often seen imbibing. Just as the larvae seem to require particular foodplants, so the adults seem to require particular energy sources. It is logical to suppose that adults would have preferences for a kind of nectar, floral structure and flower colour, possibly a combination of all these three. The butterfly would have to consider its morphological characteristics, i.e. proboscis length, weight, size, flight capacity etc.

In the present study we have made basic observations as to the spectrum of flowers visited by each species of butterfly present in the area during the period of study. We realise, of course, that from only one small study, one can draw no definite ecological or evolutional conclusions, but it should nevertheless persuade other workers to conduct similar surveys. We believe that a serious and more general work, carried out in different habitats, with different flower species and other ecological factors, would increase considerably our knowledge of the evolutionary relationships between plants and butterflies.

# Details of the study and results

The study area was a field of 92000 m<sup>2</sup> situated 7 km from Barcelona city. We observed which species of flowers were visited by which species of butterflies between February 23rd. and June 21st. 1979. All of the 62 species of butterflies present in the area were observed, but only the nonquantitative data concerning the Lycaenidae and Hesperiidae (24 spp.) are presented here. The area has a typical mediterranean climate – it is only 6,5 km from the sea – and it consists largely of a highly degraded evergreen Oak forest with *Erica arborea*, *Ulex parviflorus* and *Cistus monspeliensis*.

We present our data in a table giving the known larval foodplants, extracted largely from the literature, alongside our own observations as to the adult foodplant at the study site. Only flowers from which the butterflies were seen to feed with certainty are listed. An arrow at the left side of a plant indicates that nectar was taken more frequently from it than the other plants given. It is important to keep in mind the season of study. Only hibernating populations and spring generations are represented. Likewise only plants that flower during this period are listed.

A closer look at the data suggests that tribes or species groups can be distinguished by the family of plants they prefer to feed from.

Lycaenidae – The sub-family Lycaenidae feeds preferentially on Compositae and Cruciferae. The sub-family Strymoninae can be split into two species groups. The Callophrys and Tomares group can be characterized by their feeding on Labiatae and occasionally Cruciferae and Papilionaceae. (It is interesting to underline that, in spite of having been for a long time in contact with the populations of Callophrys and Tomares, they have never been seen on Compositae flowers, while this family of flowers is generally prefered by the whole of other Rhopalocera families). The Nordmannia and Strymonidia group feeds on Compositae and Dipsacaceae. Both groups were observed feeding on Rosaceae and Oleaceae.

The sub-family *Polyommatinae* can be split into three groups. The *Polyommatini* feed preferentially on *Cruciferae*, the *Celastrini* and *Lampidini* on *Rosaceae* (*Rubus* spp.) and the *Scolitantidini* on *Labiatae*.

The Lycaenidae as a whole seem to prefer feeding on Compositae, Cruciferae, Labiatae, Rosaceae, Oleaceae and Dipsacaceae.

*Hesperiidae* – The *Pyrginae* were observed feeding preferentially on *Compositae* and *Labiatae*, whereas the *Hesperiinae* were observed feeding on *Compositae* and *Dipsacaceae*.

#### Summary

Very little information is available on the flower preferences of butterflies. The author has undertaken a study aimed at providing such information and hopes that his example will be followed by more comprehensive projects. He has observed the species of flower visited by each species of butterfly – the *Lycaenidae* and *Hesperiidae* are presented here – at a field near Barcelona between February and June 1979.

He concludes that in the case of the *Lycaenidae*, tribes or species groups may be characterized by the family of plants they prefer to feed from. As a whole, the *Lycaenidae* seemed to prefer the *Compositae*, *Cruciferae*, *Labiatae*, *Rosaceae*, *Oleaceae* and *Dipsacaceae*, whereas the *Hesperiidae* preferred the *Compositae*, *Labiatae* and *Dipsacaceae*.

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The $Lycaenidae$ and $Hesperiidae$ observed, the plants they were seen to feed from and a list of their known foodplants	Adult foodplants according to field observations 1979	Compositae Cruciferae Dipsacaceae Scrophulariaceae Labiatae Papilionaceae	<ul> <li>Oleaceae</li> <li>Compositae</li> <li>Papilionaceae</li> <li>Rosaceae</li> <li>Umbelliferae</li> <li>Dipsacaceae</li> </ul>
		Taraxacum officinale Callendula arvensis Crepis sp. Chrysanthemum sp. Galactites tomentosa Cirsium arvense Alyssum maritimum Espheldia insana Knautia arvensis Veronica persica Thymus vulgaris Medicago sativa	<ul> <li>Ligustrum vulgare Cirsium arvense Centaurea aspera Doricnium pentaphyllum Medicago sativa</li> <li>Rubus sp. Caucalis sp.</li> <li>Knautia arvensis</li> </ul>
	Larval foodplants according to literature	Rumex acetosa Rumex patientia Rumex montanus Polygonaceae 	Quercus sp.   Fagaceae
	Spec.	L. phlaeas L.	N. ilicis Esp.
	Subfam.	Lycaeninae	Strymoninae
	Famil.	Lycaenidae	

Table 1

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Cirsium arvense   Compositae Rubus sp.   Rosaceae (Higgins & Riley, 1973)	Capsella bursa- pastorisCruciferae truciferaeLavandula stoechesLabiatae-Laymular stoechesRobiataePotentilla reptansRosaceaeSorbus sulgareeOleaceaeLigustrum vulgareOleaceaeDoricniumPapilionaceae	iii	Thymus vulgaris } Labiatae Lavandula stoeches }
Ulmaceae Betulaceae Fagaceae Tiliaceae	Papilionaceae Scrophulariaceae Cornaceae Rosaceae Crassulaceae Vaccinaceae	Ericaceae Papilionaceae	Papilionaceae
Ulmus sp. Alnus glutinosa Quercus robur Tilia sp.	Medicago arborea Genista sp. Sarothamnus scoparius Hedysarum sp. Cytisus sp. Onobrychis sp. Trifolium sp. Ulex europaeus Veronica sp. Cornus sanguinea Rubus sp. Sedum sp.	Arbutus unedo Sarothamnus sp.	Lotus sp.
S.walbum Kn.	C. rubi L.	C. avis Chap.	T. ballus FAB.

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Adult foodplants according to field observations 1979	Rubus sp.   Rosaceae Veronica persica ?   Scrophulariaceae	Veronica persicaScrophulariaceaeKnautia arvensisDipsacaceaeEspheldia insanaDipsacaceaeAlyssum maritimumCruciferaeLycopsis sp.BorraginaceaeMedicago sativaPapilionaceaeGeranium molleGeraniaceae	Knautia arvensis   Dipsacaceae Espheldia insana   Cruciferae Cynoglossum pictum   Borraginaceae
Larval foodplants according to literature	Hedera helixAraliaceaeArctium lappaI CompositaeProsopis julifloraI CompositaeEvonymus sp.CelastraceaeGenista sp.PapilionaceaeAstragalus sp.PapilionaceaePyrus communisRosaceaeRubus sp.AquifoliaceaeCilluna vulgarisErica tetralixErica tetralixRhamnaceae	Helianthemum sp. )   Cistaceae Erodium sp.   Geraniaceae Centaurea sp.   Compositae Sarothamnus sp.   Papilionaceae Trifolium sp.	Trifolium sp.Ulex europaeusAstragalus sp.Astragalus sp.Ononis spinosaColutea arborescensSarothamnus scopariusGenista sp.Coronilla sp.Erica sp.Fragaria sp.Fragaria sp.RespectedFragaria sp.RespectedFragaria sp.Respected
Spec.	C. argiolus L.	A. cramera Eschsc.	P. argus L.
Subfam.	Polyommatinae		
Famil.	Lycaenidae		

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Cruciferae Compositae Geraniaceae Papilionaceae	-	Geraniaceae Oleaceae Rosaceae		Labiatae	<ul> <li>Labiatae</li> <li>Papilionaceae</li> </ul>
Alyssum maritimum Callendula arvensis Carduus tenuifloris Galactites tomentosa Geranium molle Medicago sativa	322	Geranium molle Ligustrum vulgare Rubus sp.	<i>iii</i>	Thymus vulgaris	Lavandula stoeches Thymus vulgaris Dorycnium pentaphyllum
Papilionaceae Rosaceae	Papilionaceae	Papilionaceae Ericaceae Lythraceae	Papilionaceae	Labiatae	Papilionaceae
Lotus corniculatus Medicago lupulina Ononis spinosa Astragalus sp. Genista sp. Fragaria sp.	Colutea arborescens Pisum sp. Sarothamnus sp. Ulex europaeus Lupinus luteus Genista sp. Astragalus sp. Lotus sp. Spartium sp. Medicago sp.	Medicago sp. Melilotus sp. Sarothamnus sp. Ulex sp. Tallum vulgaris Lythrum salicaria	Trifolium sp. Lotus corniculatus Medicago lupulina Ulex europaeus Colutea arborescens	Thymus sp.	Lygos sphaerocarpa Dorycnium sp. Lotus sp. Genista sp.
P. icarus Ror.	L. boeticus L.	S. pirithous L.	E. argiades PALL.	P. baton BER.	G. melanops Boısp.

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62						
Adult foodplants according to field observations 197	Labiatae   Rosaceae } Cruciferae   Compositae					<ul><li>} Labiatae</li><li>  Compositae</li></ul>
	Lavandula stoeches Potentilla reptans Espheldia insana Biscutella laevigata Carduus tenuifloris	<i>iii</i>		<i></i>		Lavandula stoeches Thymus vulgaris Carduus tenuifloris
Larval foodplants according to literature	Papilionaceae	Papilionaceae	Dipsacaceae	Rosaceae	Papilionaceae Malvaceae	Papilionaceae Umbelliferae
	Lygos sp. Medicago sp. Trifolium sp. Genista sp. Cytisus sp. Onobrychis sp. Melilotus sp. Astragalus sp.	Colutea arborescens	Dipsacus sp. Scabiosa sp. Asrimonia sn	Rubus sp. Fragaria sp. Potentilla sp.	Comarum pausurs Coronilla sp. Malva sp.	Lotus sp. Coronilla sp. Eryngium sp.
Spec.	G. alexis Pop.	I. iolas Och.	P. malvae			E. tages L.
Subfam.	Polyommatinae		Pyrginae			
Famil.	Lycaenidae		Hesperiidae			

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Labiatae Compositae Papilionaceae Dipsacaceae Borraginaceae	Compositae Papilionaceae Dipsacaceae	<ul> <li>Compositae</li> <li>Labiatae</li> <li>Geraniaceae</li> </ul>	Compositae Cruciferae Dipsacaceae Papilionaceae	. Compositae Dipsacaceae		
Lamium hybridum Thymus vulgaris Lavandula stoeches Taraxacum officinale Callendula arvensis Crepis sp. Soncus oleraceus Galactites tomentosa Cirsium arvense Espheldia insana Medicago sativa Knautia arvensis	Carduus tenuifloris Medicago sativa Knautia arvensis	Crepis sp. Taraxacum officinale Galactites tomentosa Thymus vulgaris Geranium molle	Carduus tenuifloris Galactites tomentosa Onopordon illyricum Espheldia insana Knautia arvensis Medicago sativa	-Carduus tenuifloris Onopordon illyricum Knautia arvensis		
Malvaceae Labiatae Gramineae	Rosaceae } Labiatae	Rosaceae	Gramineae	Gramineae		
Malva sp. Althaea sp. Marrubium sp. Hibiscis sp.	Alchemilla sp. Marrubium sp. Stachys sp.	Sanguisorba sp. Potentilla sp. Rubus sp.	Agropyrum repens Brachypodium silvaticum Bromus sp.	Agropyrum repens Holcus lanatus Poa sp. Festuca sp. Triticum sp.		
C. alceae L.	C. flocciferus Zeller	S. sertorius Hore.	T. acteon Ror.	O. venatus BRE. et GR.		
			Hesperiinae			

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