

## THE CHRYSOMELIDAE OF MADEIRA.

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With 3 figures and 2 tables

**SUMMARY.** At present 36 species of Chrysomelidae are known from the Madeira archipelago; four of these have not been recorded before on the islands: *Phyllotreta consobrina* Curt., *Chaetocnema* sp., *Psylliodes laticollis* Kutsch. and *Psylliodes pyritosa* Kutsch. Eleven of the total number are endemic, two occur also on the Canary Islands, 17 are members of European and Mediterranean Faunas; at least three species were able to survive on Madeira only temporarily. While some species are widely distributed on the archipelago, others are strictly confined to their local range; the occurrence of a few species is based on sparse records.

The tabulation on the seasonal occurrence as well as on the plant food sources of individual species show that our knowledge on the biology of most members of this insect family leaves much to be desired.

**SUMÁRIO.** Até à data foram assinaladas para o Arquipélago da Madeira 36 espécies de Chrysomelidae. Quatro delas são novas para as ilhas: *Phyllotreta consobrina* Curt., *Chaetocnema* sp., *Psylliodes laticollis* Kutsch. and *Psylliodes pyritosa* Kutsch. Do total 11 são endémicas, duas ocorrem também nas Canárias, 17 pertencem às faunas Europeia e Mediterrânica; pelo menos três espécies conseguiram sobreviver temporariamente na Madeira. Enquanto que algumas espécies estão largamente distribuídas no arquipélago, outras têm distribuições estritamente limitadas; a ocorrência de algumas espécies é baseada em poucos assinalamentos.

O quadro da ocorrência sazonal bem como das plantas fontes de alimento das várias espécies, mostra que o nosso conhecimento da biologia da maior parte dos elementos desta família de insectos, deixa ainda muito a desejar.

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## INTRODUCTION

Since Jansson 1940 and Lundblad 1958 provided a check list for the beetles of Madeira several taxonomic changes have been made and new information has been discovered concerning the family Chrysomelidae. These are to be discussed here. Also, in addition to the information from the literature, observations and locality records made by the author on four visits to Madeira (March 1981, March 1982, August 1983, September 1985) have been utilized. Further finds by W. Hinterseher, who collected on Madeira in February 1973 and in March 1982 (the latter jointly with the author) as well as finds by E. Weinreich in August 1963, by K. Groh in July 1983 and by J. Gerber, K. Groh and J. Hemmen in July/August 1985 have been considered here.

The designation Madeira is used for the entire archipelago by some and by others is applied only to the main island. In order to avoid all confusion, the main island will always here referred to as Madeira proper while the collective group will be designated as Madeira Archipelago, consisting of Madeira proper, Porto Santo, the three Deserta Islands (Ilhéu Chão, Deserta Grande and Bugio) as well as some small rocks off shore to the larger islands. The Salvage Islands will not be considered here, since they lie closer to the Canary Islands than to the Madeira Archipelago.

An outline map showing the localities is provided.

SURVEY OF THE CHRYSOMELIDAE (ACCORDING TO WINKLER, 1924-32)  
RECORDED ON THE MADEIRA ARCHIPELAGO

(? = doubtful wether a permanent part of the Archipelago fauna;  
( ) = presumably not a member of the Archipelago fauna)

## Criocerinae

*Chrysolina americana* (L.)  
? *Gastrophysa polygoni* (L.)

*Oulema melanopus* (L.)  
? *Crioceris asparagi* L.

## Halticinae

## Cryptocephalinae

*Phyllotreta consobrina* Curt.  
*Phyllotreta procer*a (Redtb.)  
*Longitarsus ochroleucus lindbergi* Mad.  
? *Longitarsus ochroleucus* Marsh.  
(*Longitarsus foudrasi* Wse.)

*Cryptocephalus nitidicollis* Woll.

*Cryptocephalus crenatus* Woll.

## Chrysomelinae

*Longitarsus nigrofasciatus* Goeze  
*Longitarsus lycopi* Foudr.  
? *Longitarsus nubigena* Woll.  
*Longitarsus nervosus* Woll.  
*Longitarsus isoplexidis* Woll.

*Chrysolina banksi* (F.)  
*Chrysolina hyperici* (Forst.)  
*Chrysolina fragariae* (Woll.)

<i>Longitarsus echii excurvus</i> Woll.	<i>Psylliodes pyritosa</i> Kutsch.
<i>Longitarsus parvulus</i> Payk.	<i>Psylliodes hospes</i> Woll.
<i>Longitarsus maderensis</i> All.	<i>Psylliodes amplicollis</i> Woll.
<i>Ochrosis ventralis</i> (Ill.)	<i>Psylliodes umbratilis</i> Woll.
? <i>Podagrira fuscicornis</i> L.	<i>Psylliodes tarsata</i> Woll.
<i>Mantura chrysanthemi diluta</i> Ab.	
<i>Mniophilosoma laeve</i> Woll.	Cassidinae
<i>Chaetocnema</i> spec.	
<i>Psylliodes vehemens</i> Woll.	<i>Cassida hemisphaerica</i> Hbst.
<i>Psylliodes chrysocephala</i> (L.)	? <i>Cassida nebulosa</i> L.
<i>Psylliodes laticollis</i> Kutsch.	

## SUMMARY OF INDIVIDUAL SPECIES CONSIDERED

## Criocerinae

***Oulema (Lema) melanopus* (Linnaeus, 1758)**

Distribution: Asia Minor, Europe, Mediterranean Region, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande, Salvages.

The species appears to be relatively rare on the Madeira Archipelago. For the locality records given here as follows we have mostly only one specimen:

Madeira proper: General area of Funchal (Monte and in deep valleys), Ribeira de Santa Luzia, Cural dos Romeiros, Ribeiro Frio (Wollaston, 1854); Porto Novo, May 1937, 3 specimens (Uyttenboogaart, 1947); Porto Moniz, Serra de Agua, Ribeira Brava, Valparaíso, Caniço, Garajau (Lindberg, 1963); above Ribeira da Janela, March 1981 (Erber).

Porto Santo: behind the beach among *Arundo donax* (Wollaston, 1854); Vila Baleira, Serra de Dentro, Pico de Juliana (Lindberg, 1963).

Deserta Grande: (Wollaston, 1857).

All collecting was done in the spring and in the summer (March to July).

**? *Crioceris asparagi* (Linnaeus, 1758)**

Distribution: Siberia, Europe.

Only two specimens were found on Madeira proper in the first half of the 19th Century near Funchal. Already Wollaston (1865) supposed that the creatures, which undoubtedly had been introduced from Europe, could not survive permanently there even though several species of *Asparagus* are found in the region (Hansen, 1969).

### C r y p t o c e p h a l i n a e

#### **Cryptocephalus nitidicollis** Wollaston, 1864

Distribution: Canaries, Madeira proper.

This species occurring on the Canaries at all elevations evidently arrived on Madeira proper recently. It was collected by Lindberg on 1.-2. VII.1957 (2 specimens) and on 24.IV.1959 (1 specimen) at São Vicente on the north coast of the island (Lindberg, 1963).

#### **Cryptocephalus crenatus** Wollaston, 1854

Distribution: Madeira proper, Ilheu da Cevada, Porto Santo.

The species ranges over all of Madeira proper. Particulary Lindberg (1963) collected it at numerous localities, sometimes large numbers. He was the first who recorded it from Porto Santo, in June 1959 at the highest elevations.

The collections of Lindberg were made in April to July, those of Wollaston (1854) and Uyttenboogaart (1947) in May, and those of Cameron (1973) already in February. Hinterseher found two individuals on 2.II.1972 near Caniçal (under bark), one individual on 21.III.1981 at Encumeada. In the Museu Municipal do Funchal I found one specimen with the following data: Barreiros (Funchal), 9.VII.1979 (MMF 1018).

Wollaston (1871) cites *Sempervivum* as the host plant, while Lindberg (1963) cites *Erica*.

### C h r y s o m e l i n a e

#### **Chrysolina (Chrysomela) banksi** (Fabricius, 1775)

Syn.: *C. banksi* ssp. *maderensis* Jolivet, 1951

Distribution: Western Europe, North Europe, Mediterranean Region, North Africa, Madeira proper, Ilheu da Cevada, Porto Santo, Deserta Grande.

The species was collected for the first time in July/Aug. 1935 by Lundblad (Jansson, 1940) near Rabaçal (6 specimens). Liebmann collected it in Feb. 1939 between Machico and Santa Cruz. Since then numerous localities from all parts of Madeira proper have been recorded (Lindberg, 1936). The author also found the species at numerous places at elevations up to 1500 m (Paul da Serra - Estanquinhos). Lindberg (1963) was able to extend the range to Ilheu da Cevada and Deserta Grande. On Porto Santo the author found one specimen on 17.III.1981 on the Pico do Facho at 300 m; in addition to this Groh, Gerber and Hemmen collected numerous specimens in several localities of Porto Santo in August 1985.

All collections have been made from February to August. Most animals were found under rocks.

In the collection made by the author one animal differs from all others in its size and blue coloration (locality: east of Encumeada, 1200 m, 22.III.1983). Such a form had been described already by Jolivet (1951) as ab. *coerulea* from Madeira; he recognizes the *Chrysolina banksi* of Madeira as a ssp. *maderensis* at that. Lundblad (1958) has followed this usage by including the ssp. *maderensis* in addition to the nominate form.

Jolivet (1951) notes the larvae to be feeding on Labiatae, such as *Marrubium vulgare* L., *Teucrium fruticans* L. and *Ballota foetida* Lam.. Representatives of all three genera occur on Madeira Archipelago (Hansen, 1969).

### ***Chrysolina (Chrysomela) hyperici* (Forster, 1771)**

Distribution: Europe, Madeira proper.

This species was recorded for the first time by Lundblad in July/Aug. 1939. He found one individual and a fragment at Rabaçal. (Jansson, 1940). The species seems to be rare on Madeira proper. Lindberg (1963) found it in Apr./May 1957 near Serra de Água, at Vasco Gil, Portela and Queimadas and in June 1957 at Queimadas and Pico Ruivo. The author collected one specimen in March 1982 and three specimens in Sept. 1985 at Paul da Serra — Estanquinhos (1500 m). In his collection he also has one specimen, which Weinreich collected in Aug. 1963 at Rabaçal.

Uyttenboogaart (1947) recorded one specimen of *Chrysomela quadrigemina* Suffrian, 1851 (May 1947 at Rabaçal); presumably this animal should have been identified as *Chrysomela hyperici* too, because *C. quadrigemina* is not known from the Madeira Archipelago.

### ***Chrysolina (Chrysomela) fragariae* (Wollaston, 1854)**

Syn.: *Chrysomela onychina* Woll., 1860

Distribution: Madeira proper.

The species was recorded for the first time in Aug. 1850 by Wollaston (1854). Since then the author was the first to rediscover it at the type locality (Aug. 1983 and Sept. 1985).

Its occurrence is limited to a relatively small area, i.e. the steep slopes of the central mountains at Ribeiro Frio. The adults appear in the middle of August and feed on *Bystropogon*, an endemic shrub-like labiate. The larvae also feed on the leaves of this plant. *Chrysolina fragariae* is unable to fly and it is presumably ovoviviparous (Erber, 1984).

### ***Chrysolina (Chrysomela) americana* (Linnaeus, 1758)**

Distribution: Mediterranean Region, North Africa, Madeira proper.

This seems to be the most recent *Chrysolina* species discovered

on Madeira proper. It was recorded for the first time by Lindberg (1963), who found it in May/June 1959 at different localities (with number of individuals): Serra de Água (3), Ribeiro Frio (2), Garajau (59), always on labiates. In July 1963 Weinreich collected 31 specimens at Ribeiro Frio. Though no further specimens were recorded, one can assume that the species is still extant on Madeira proper, especially since *Rosmarinus officinalis* L., the food plant of *Chrysolina americana* occurs on the island (Hansen, 1969).

**? *Gastrophysa (Gastroidea) polygoni* (Linnaeus, 1758)**

Distribution: Siberia, Turkestan, Europe.

Only one specimen of this species has been found and that by Heineken near Funchal in the first half of the 19th Century. Wollaston referred to the record in his «*Insecta Mederensia*» of 1854, but in 1865 he expressed doubt in listing it again since obviously it was an introduced animal.

**Alticinae**

In view of the confused taxonomy of the Alticinae and for better orientation prior to going through the list with more detailed comments we give a summary in table form. (See table I on opposite page)

***Phyllotreta consobrina* Curtis, 1837**

Distribution: Western Europe, western Mediterranean Region, North Africa, Madeira proper.

The species has not been previously recorded from the Madeira Archipelago. Probably it was introduced very recently. The author found three specimens on 13.III.1982 near Camacha (800 m) under a small wooden trunk. He collected an additional 22 specimens on 25.VII.1983 above Calheta at an elevation of 680 m and in Sept. 1985 12 specimens between Machico and Caniçal as well as 10 specimens at Garajau; all these were feeding on cultivated cabbage (*Brassica oleracea* L.). Gerber, Groh and Hemmen collected 6 specimens at Pedreira da Cal near São Vicente on 7.VIII.1985.

***Phyllotreta procera* (Redtenbacher, 1849)**

Distribution: Asia Minor, central Europe, Mediterranean Region, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande.

When Wollaston described the species in 1854 as *Haltica subtilis* it was already known from Madeira proper, Porto Santo and Deserta Grande;

	WOLLASTON 1854	WOLLASTON 1857	WOLLASTON 1860	WOLLASTON 1862	WOLLASTON 1865	WOLLASTON 1871	FAUVEL 1897	SCHMITZ 1898	CAMERON 1901	LIEBERMANN 1939	JANSSON 1940	LYTTENBERG 1947	LINDBLAD 1948	MEDUR 1963	new records here
<i>Phyllotreta consobrina</i> CURT.															X
<i>procera</i> REDTB.	XD	<i>Haltica subtilis</i>			corr.: <i>P. procera</i>									X	X
<i>Longitarsus ochroleucus</i> MARSH.															
<i>linobergi</i> MAD.	XD	<i>L. lutescens</i> GVL. 1813			corr.: <i>L. atricapillus</i> DUFF.		= <i>atricapillus</i> WOLL. = <i>senecionis</i> BRIS.?				<i>L. melanocephalus</i> DE GEER			X RC	X
<i>foudrasi</i> WSE.											<i>L. foudrasi</i> WOLL.				
<i>nigrofasciatus</i> GOEZE	XD	<i>L. saltator</i>					<i>L. ventralis</i> PHOZ. var. <i>nigrofasciatus</i> = <i>sisyrochii</i> F.				<i>L. nigrofasciatus</i>				
<i>lycopi</i> FOU DR.		XD	<i>L. fructus</i>		retracted J										
<i>nubigena</i> WOLL.	XD			XD	<i>L. abdominalis</i> DUFF.		<i>L. lycopi</i> = <i>abdominalis</i> ALL.						<i>L. lycopi</i> WOLL.		
<i>nervosus</i> WOLL.	XD						<i>L. exoleta</i> L. = <i>feroralis</i> MA.				<i>L. nervosus</i>	X		X	X
<i>isoplexidis</i> WOLL.	XD				renamed: <i>L. Mansoni</i>		<i>L. isoplexidis</i>								X
<i>cinerearia</i> WOLL.	XD										X	X		X	X
<i>occhii</i> KOCH f. <i>excurvus</i> WOLL.		XD	<i>L. sanguinolenta</i>		retracted J										
<i>parvulus</i> PAYK.		XD	<i>L. excurvus</i>		corr.: <i>L. occhii</i> JLL. 1807		<i>L. occhii</i> KOCH								X
<i>maderensis</i> ALL.				XD	without name	named: <i>L. maderensis</i> WOLL.						X			
<i>Ochrosia ventralis</i> JLL.	XD	<i>Haltica salicariae</i> PAYK.				<i>Haltica ventralis</i> JLL.	<i>O. ventralis</i> JLL. = <i>salicariae</i> WOLL.				X	<i>Lythraea salicariae</i>	<i>O. ventralis</i>	X	X
<i>Padagrica fuscicornis</i> L.								X							
<i>Mantura chrysanthemii diluta</i> AB.															
<i>Mnicophlosoma laeve</i> WOLL.	XD						var. <i>O. obscurum</i>				X				X
<i>Chaetocnema spec.</i>															
<i>Psylliodes vehemens</i> WOLL.	XD							X	X			X		X	X
<i>chrysocephala</i> L.	XD						<i>P. atlantica</i> FAUV. = <i>chrysocephala</i> WOLL.				<i>L. chrysocephala</i>				X
<i>laricollis</i> KUTSCH.															
<i>pyritosa</i> KUTSCH.															
<i>hospes</i> WOLL.	XD							X	X					X	X
<i>amplicollis</i> WOLL.					XD		(dubious)							X	X
<i>umbratilis</i> WOLL.	XD									X					X
<i>tarsata</i> WOLL.	XD														X

Table 1. Taxonomy of the Alticinae of the Madeira Archipelago

in 1865 he recognized that it was identical with the *Haltica procera* of Redtenbacher. In spite of this we have only two records: two specimens from the Paul da Serra and eight specimens from Terreiro da Luta, all collected by Lindberg in July 1957 (Madar, 1963). The author collected three animals on 10.III.1981 sweeping grass at the Levada da Serra do Faial near Cabeço da Madeira (820 m).

**Longitarsus ochroleucus lindbergi** Madar, 1963

Distribution: Madeira proper, Ilheu da Cevada, Ilheu Chão, Deserta Grande, Porto Santo, Ilheu de Baixo.

The taxonomy of this species is rather confused: Wollaston cited it in 1854 and 1857 as *Longitarsus lutescens* (Gyllenhal, 1913). Since the description by Gyllenhal was actually that of *Aphthona*, Wollaston in 1865 changed it to *Longitarsus atricapillus* (Duftschmidt, 1825). Fauvel (1897) followed this usage and synonymised it provisionally with *L. senecionis* Brisout, 1873. *L. atricapillus*, however, is identical with *L. melanocephalus* De Geer, 1875 (Winkler, 1924-32); the name also used by Jansson (1940) and Lundblad (1958). Madar (1963) examined many specimens from the collection of Lindberg and established that this species is not identical with the species mentioned above, but that on the basis of examination of the male copulatory organs it is closely related to *L. ochroleucus* Marshani, 1802 and it probably constitutes a geographic subspecies. He gives a new description.

In addition to the above listed Islands the species has been recorded until now from numerous localities on Madeira proper. The following records are in the author's collection (with number of individuals): Camacha, 800 m (22) on *Cineraria aurita*; Levada da Serra do Faial — Lombo da Raiz, 800 m (1); Levada da Serra do Faial — Curral Velho, 800 m (7) (leg. Hinterseher); Paul da Serra — Estanquinhos, 1500 m (1) on the surface of a small waterpool; Encumeada, 1000 m (12) (leg. Hinterseher); Calheta between Pico Areeiro and Pico das Torres, 1500 (3) on *Cineraria aurita*; Deserta Grande — western coast (39) (some leg. Hinterseher) on flowers of *Senecio* spec.; Deserta Grande — southern part, 400 m (2). All of our findings here were made in March 1982; Lindberg collected his animals in Apr./May. In the collection of the author there are three more individuals, which Groh collected on Porto Santo in July 1983. In Sept. 1985 the author was able to brush seven specimens out of lichens at Ponta de São Lourenço near Casa do Sardinha. Probably the animals had sought refuge in these plants during the dry period of summer.

? **Longitarsus ochroleucus** Marsham, 1802

Distribution: Mediterranean Region, North Africa, Canaries, Madeira proper ?, Deserta Grande ?.



Madar (1963) gave the following localities: Funchal, June 1957, one specimen; Deserta Grande, May 1959, without number of individuals; all collected by Lindberg. But he remarked that the determination was not proved by examination of male copulatory organs; probably all specimens were females.

**(*Longitarsus foudrasi* Weise, 1893)**

Distribution: Caucasus, central and southern Europe, North Africa.

Winkler (1924-32) records this species from Madeira, but it is not clear from where he had got his information. Jansson (1940) included the species in his checklist, following Winkler, yet he used «Wollaston» (erroneously?), instead of Weise, as author.

This species presumably does not belong to the fauna of the Madeira Archipelago (see also Lundblad 1958).

***Longitarsus nigrofasciatus* Goeze, 1777**

Syn.: *L. saltator* Woll., 1854; *L. fractus* Woll., 1857

Distribution: Central Europe, Mediterranean Region, North Africa, Canaries, Madeira proper.

Wollaston (1854) described the species as *Longitarsus saltator*. He had only a few individuals for examination collected in autumn and early winter beneath rocks near Funchal — Monte. In 1857 he described a similar animal as *Longitarsus fractus*, which Bewicke had found at Ribeiro Frio. Yet in 1865 he retracted this name since he considered the specimen a variant of *L. saltator*.

Further specimens were found by Wollaston from Jan. to March 1870 again near Funchal — Monte as well as at Santo António da Serra. Since he found the animals on a Figwort (Scrophulariaceae) he supposed this to be the food plant (Wollaston 1871).

The species is presumably extremely rare. All other authors only listed the records of Wollaston. Fauvel (1897) cited it, strangely enough, as *L. verbasci* Panz. var. *nigrofasciatus* and gave the following synonyms: *L. sisymbrii* F., *L. saltata* Woll., *L. fracta* Woll. Jansson (1940) and Lundblad (1958) cited the species, following Winkler (1924-32), as *L. nigrofasciatus* Goeze. Both authors in addition listed *L. fractus* Woll. as a separate species, this also following Winkler (1924-32).

**Longitarsus lycopi** Foudras, 1860 (2)

Distribution: Siberia, Europe, Mediterranean Region, North Africa, Madeira proper.

The species was discovered by Wollaston in summer 1855; he brushed three specimens off the grass in the Ribeira de Santa Luzia near Funchal. At first he gave the animals to Allard, who identified them as *L. abdominalis* Duftschmidt, 1825 (Allard, 1860). Wollaston, however, identified them in 1865 as *L. lycopi* Foud., which closely resembles *L. abdominalis*. He considered it a very scarce species confined to higher elevations. Indeed, it has not been recorded again since Wollaston.

**? Longitarsus nubigena** Wollaston, 1854

Distribution: Canaries, Madeira proper.

Presumably only two specimens of this species have been found. Wollaston (1854) captured one animal each in July 1850 at the highest point of the Ribeira de João Delgado (1500 m) and at the Lombo dos Pecegueiros. (3) Probably only a few individuals had drifted from the Canaries to Madeira proper but could not gain a foothold.

**Longitarsus nervosus** Wollaston, 1854

Distribution: Central Europe, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande, Ilheu Chão.

Wollaston (1854) discovered the species in the spring and autumn in the surroundings of Funchal as well as in the Ribeira de Santa Luzia in the Curral dos Romeiros. On Deserta Grande and Porto Santo he collected it in April. Further records (with number of individuals) were given by Uyttenboogaart (1947): Porto Novo (6), collected in May and by Lindberg: Rabaçal (1), Paul da Serra (5), Funchal — Monte (7), all collected in June/July 1957; Corujeira (1), Garajau (5), Caniçal (1), all collected in Apr./May 1959 (Madar, 1963). Hinterseher collected 15 specimens at the Encumeada in March 1982. He and the author were able to provide the first record for the Ilheu Chão: three specimens at 21.III.1982.

**Longitarsus isoplexidis** Wollaston, 1854

Syn.: *L. mansoni* Woll. 1857.

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- (2) Winkler (1924-32) cites «Foudras 1868»; yet Wollaston (1865) cites «Foudras 1859»; Lundblad (1958) cites — erroneously? — «*lycopi* Woll.».
- (3) It is not clear whether he meant the Montado dos Pecegueiros near the Ribeira de João Delgado or the Lombo dos Pecegueiros near Casa das Queimadas.

Distribution: Madeira proper.

Wollaston (1854) found this species the first time in the beginning of Aug. 1850 near Fajã da Corte. As he supposed that *Isoplexis sceptrum* Lindl. was the food plant, he named the species for this Figwort (Scrophulariaceae). Actually, the species lives on *Echium*. Wollaston therefore renamed it in 1857 as *L. Mansoni*; *L. isoplexidis*, however, has priority.

Though the species is rather abundant, there are no further records in the literature. The author found numerous individuals in March 1982 (together with Hinterseher) as well as in Aug. 1983 and Sept. 1985, always on *Echium candicans* L. at the following localities: Ribeiro Frio at 860 m, Calheta (between Pico Areeiro and Pico das Torres) at 1500 m, below Pico do Coelho at 1600 m, Encumeada at 1000 m and Encumeada — Lapa do Sul at 1200 m. In Aug./Sept. many of the animals were in copulation. Individuals, which the author took alive, laid eggs singly or in small clutches between the hairs of the leaves of *Echium candicans* on the first days of Oct. 1985.

*L. isoplexidis* Woll. is known only from Madeira proper; on the Canaries the ssp. *persimilis* Woll., 1860 and on the Cap Verde Islands the ssp. *stenolophon* Woll. 1867 occur.

#### **Longitarsus cinerariae** Wollaston, 1854

Syn.: *L. consanguineus* Woll., 1857

Distribution: Madeira proper.

This species was also discovered and described by Wollaston (1854). He found it near Funchal but more often at higher elevations wherever *Cineraria aurita* l'Herit. (= *Senecio maderensis* D C.), its food plant, grows.

In 1857 Wollaston described animals, which differed in form and colour from the others, as *L. consanguineus*, but in 1865 he retractet this name because he supposed it to be only a variant in colour of *L. cinerariae*.

Since Wollaston's time the species has been recorded by collectors as follows (number of individuals): Lundblad, at Rabaçal (11) in June/July 1935 (Jansson, 1940); Uyttenboogaart (1947), near Funchal (1) and at Rabaçal (14) in May 1947; Lindberg, at Queimadas (1) in June 1957 (Madar, 1963).

The author collected specimens at different localities in March 1982 (together with Hinterseher) as well as in Aug. 1983 and in Sept. 1985: Ribeiro Frio at 860 m, Calheta (between Pico Areeiro and Pico das Torres) at 1500 m, below Pico do Coelho at 1600 m, Encumeada at 1000 m, Ribeira do João Fernandes above Boaventura at 500 m, Ribeiro dos Cedros (near Casa Queimadas) at 900 m, Rabaçal at 980 m, Lombo das Uveiras (above Prazeres) at 1000 m. Most of the animals were brushed from *Cineraria aurita*. In September most of them were in copulation.

**Longitarsus echii** Koch, 1803 f. **excurvus** Wollaston, 1857

Syn.: *L. excurvus* Woll., 1987

Distribution: Armenia, central Europe, Mediterranean Region, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande.

This species was described by Wollaston in 1857 as *Longitarsus excurvus*. In 1865 he changed the name to *L. echii* Illig, 1807. Fauvel (1897) cited the species as *Thyamis echii* Koch *excurvus* Woll.; Jansson (1940) and Lundblad (1958) listed it as *L. echii* Koch. According to Mohr (personal communication), in the case of *excurvus* we are dealing only with a form of *L. echii*, which, however, can be distinguished readily from the nominate form; the latter does not occur on the Madeira Archipelago.

The first records cited by Wollaston (1857) he got from Bewicke, who had made collections on Porto Santo in Dec. 1856. In 1865 Wollaston recorded also Madeira proper as a locality. All other authors repeated these records.

*Longitarsus echii* f. *excurvus* seems to be very rare on the Madeira Archipelago. The author collected (together with Hinterseher) three specimens in March 1982: One male at Encumeada (21.III.) and two females on the southern part of Deserta Grande at 400 m (16.III.).

**Longitarsus parvulus** Paykull, 1799

Distribution: Turkestan, Japan, Europe, North Africa, Mauritania, Madeira proper.

The species was first cited by Fauvel (1897) for the Madeira Archipelago, but it is not clear from what source. Jansson (1940) and Lundblad (1958) also listed it; the latter, referring to Winkler (1924-32), emphasized, however, that the species was not mentioned in the *Catalogus Coleopterorum* of Junk-Schenkling. He considered the occurrence of *L. parvulus* on the Madeira Archipelago doubtful. Lindberg recorded the species on 12.VI.1957 at Funchal — Monte (1) and on 22.IV.1959 near Prazeres (2) (Madar, 1963).

**Longitarsus maderensis** Allard, 1863

Distribution: Madeira proper.

Until now only few records have been given for this species. Wollaston (1865) cited Palheiro (8 km east of Funchal) as a locality, where Anderson had brushed three or four individuals from grass. Wollaston had mentioned these animals in 1862, but had not named them. He had sent them to Allard to obtain his opinion and had received the information that they resembled on the one hand *L. obliteratus* Rosenh. and on the other *L. parvulus* Gyll.

Two additional specimens were recorded by Uyttenboogaart (1947) at Porto Novo in May.

### **Ochrosis ventralis** (Hiliger, 1807)

Syn.: *Haltica salicariae* Wollaston, 1854

Distribution: Central Europe, Mediterranean Region, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande.

Wollaston identified the species in 1854 as *Haltica salicariae*, referring to the description of *Galeruca salicariae* Paykull, 1800. Since he later discovered that the two forms are not the same species he referred it to *Haltica ventralis* Ill. (Wollaston, 1865). In the list of Jansson (1940) it appears again as *Lythreria salicariae* Payk., erroneously, though in the text this author used the correct name *Ochrosis ventralis* Ill.

The species had already been recorded from Madeira proper and Porto Santo by Wollaston. On Madeira proper he had captured only one specimen in a garden near Funchal on sugar cane. On Porto Santo, however, he had collected a great number of individuals from *Arundo donax* L. in spring. Later it was recorded as follows (number of individuals): by Lundblad near Machico on 12.III.1935 (3) (Jansson 1940); by Lindberg at Rosário, Porto Moniz, Serra de Água, all in July 1957 (1 each) near Caniçal in Apr. 1959 (1), on Porto Santo in July 1957 (33) and in Apr. 1959 (2) (Madar, 1963). This confirms the claim of Wollaston (1854) that the species is more abundant on Porto Santo.

The author collected six specimens on 8.IX.1985 at Ponta de São Lourenço near Casa do Sardinha; two of these he brushed from a labiate, the others he found between lichens on volcanic rocks. Further specimens (number of individuals) were collected by Groh on Porto Santo in July 1983 (2), by Gerber, Groh and Hemmen on Deserta Grande on 4.VIII.1985 (1; first record from this island), and by Pieper at Caniço de Baixo, 80 m picked from a window pane, on 12.IX.1985 (1).

### **? Podagrica fuscicornis** Linnaeus, 1766

Distribution: Europe, North Africa, Canaries, Madeira proper.

Regarding its occurrence on Madeira proper this species has hitherto only been listed by Fauvel (1897) and by Schmitz (1898). From Schmitz it was taken over by Lundblad (1958). Neither Fauvel nor Schmitz gave any information about locality, date or number of animals collected.

Since the species has not been recorded by any other author, its present existence on Madeira proper seems to be doubtful.

**Mantura chrysanthemi** (Koch, 1803) var. **difluta** Abeille de Perrin, 1895

Distribution: Northwest Africa, Madeira proper.

The species was recorded by Lindberg in June 1957 at Queimadas and in Apr./May 1959 at Ribeiro Frio, Terreiro da Luta, Valparaiso and Queimadas (Madar, 1963). On account of the great distances between the localities Madar supposed that the species is abundant on Madeira proper.

The ancestral form *Mantura chrysanthemi* Koch is distributed in the western Mediterranean Region (Winkler, 1924-32).

**Mniophilosoma laeve** Wollaston, 1854

Distribution: Madeira proper.

Though this endemic species of Madeira proper lives secretively under moss, in litter, under bark and between lichens, it was characterized already by Wollaston (1854) as widely ranging and to be found over the whole year. In 1871 Wollaston described a variant  $\beta$ , which has black (not metallic) elytra and darkened legs and antennae.

Numerous specimens were found by Lundblad (Jansson, 1940) as well as by Lindberg and Mateu (Madar, 1963) between April and August. Hinterseher collected two animals on 1.II.1973 at Pico Jorge, at 1500 m, from a rotten trunk and Groh and Hemmen found one specimen between Eira do Serrado and Curral das Freiras, at about 900 m, on 27.VII.1985.

**Chaetocnema** sp.

This genus has not been recorded from the Madeira Archipelago.

The author swept one female from grass vegetation on the bottom of an empty water basin at Cabeço das Águas das Becas (between Poiso and Pico Areeiro), at 1425 m, on 12.IX.1985.

The species is very similar to *Chaetocnema hortensis* Geoffroy, 1785, even in the spermatheca; it only differs in the eye grooves, which are more distinct than in *Ch. hortensis* (M. Döberl, personal communication). An exact identification can only be made, if more individuals are found. Probably the *Ch. tarsalis* Wollaston, 1860 from the Canaries belongs also to *Ch. hortensis*; Heikertinger (1951), at any rate, doubts the validity of the species.

**Psylliodes vehemens** Wollaston, 1854

Distribution: Madeira proper, Porto Santo, Deserta Grande.

Numerous records are given for this widely ranging species on the Madeira Archipelago. Wollaston (1854) already found it at all elevations throughout Madeira proper as well as on Porto Santo. The specimens of Porto Santo he described as a variant  $\gamma$ . In 1857 he added Deserta Grande as

a locality. Other collectors, such as Lundblad (Jansson, 1940), Uyttenboogaart (1947) and Lindberg (Madar, 1963), also found the species at numerous localities. All records were made between April and August. The author collected the species at the following places (number of individuals): Levada da Serra do Faial — Queimada Chã, 820 m, March 1982 (1) and Aug. 1983 (10); Curral das Freiras, 900 m, Aug. 1983 (1); Calheta between Pico Areeiro and Pico das Torres, 1500 m (4), Torrinhãs, 1500 m (8) and Rabaçal, 1250 m (1), Sept. 1985. In the collection of the Museu Municipal do Funchal there are two specimens from Choupana, SE of Funchal — Monte, 400 m, collected on 24.V.1953 (MMF 2253/54). Gerber, Groh and Hemmen captured one specimen on Deserta Grande on 4.VIII.1985.

*Psylliodes vehemens* Woll. s. str. is endemic on the Madeira Archipelago; on the Canaries and in North Africa the ssp. *normandi* Heikert. is found, and on the Azores the representative is the ssp. *azorica* Jacob (Lundblad, 1958).

#### ***Psylliodes chrysocephala* (Linnaeus, 1758)**

Syn.: *P. atlantica* Fauvel, 1897

Distribution: Siberia, Caucasus, Asia Minor, Europe (northward to southern Scandinavia), Mediterranean Region, Azores, Madeira proper, Deserta Grande.

Wollaston (1854) captured only a few individuals, all in the summer of 1850 in a vineyard near Santana. Since that time no further records have been referred to from the Archipelago until Gerber, Groh and Hemmen collected three specimens on 4.VIII.1985 on Deserta Grande.

#### ***Psylliodes laticollis* Kutschera, 1864**

Distribution: Mediterranean Region, North Africa, Madeira proper.

The species had not been recorded before from the Madeira Archipelago. The author discovered it in Sept. 1985. He brushed 21 animals from the vegetation in the area of a trickling fountain at Calheta between Pico Areeiro and Pico das Torres at 1500 m (3 on 14.IX; 18 on 24.IX.). In addition to these, he collected one individual each at Pico do Facho near Machico on cabbage (*Brassica oleracea*), at 300 m, on 7.IX. and at Rabaçal — 25 Fontes, at 1000 m, on 19.IX. One male the author had already captured on 9.III.1981 at the Levada da Serra do Faial near Curral Velho at 800 m. This specimen could now also be identified as *P. laticollis*. The two latter specimens were found on marshy vegetation.

#### ***Psylliodes pyritosa* Kutschera, 1864**

Distribution: Mediterranean Region, North Africa, Madeira proper, Porto Santo.

In the collection of the Museu Municipal do Funchal the author found two specimens of this species, which had not been recorded for the Madeira Archipelago before. Both were collected by Figueira at Funchal — São Roque — Lombo do João Boieiro, one (MMF 1387) on 7.XII.1952 on sweet potato plants, the other (MMF 1386) on 8.III.1953 on a wall. In recent times Gerber, Groh and Hemmen found one individual on Porto Santo at Porto dos Frades on 12.VIII.1985.

***Psylliodes hospes* Wollaston, 1854**

Distribution: Western Palearctic, Mediterranean Region, North Africa, Canaries, Madeira proper, Porto Santo, Deserta Grande.

Wollaston (1854) already supposed the species to be introduced on the Madeira Archipelago, because he found it only in and around villages: at Funchal in vineyards and on fields; on Porto Santo near the town. Cameron (1901) and Liebmann (1939) found it also near Funchal. From there it has obviously extended its range. Wollaston recorded it in 1857 on Deserta Grande, Lindberg (Madar, 1963) in April 1959 at Porto Moniz and at Garajau as well as on Porto Santo near Vila Baleira and at Pico Castelo / Pico do Facho. The author found three specimens in the Museu Municipal do Funchal, one (MMF 2150) from Funchal — São Roque — Lombo do João Boieiro, at 400 m, on 22.V.1953, collected by Figueira; the localities of the two others (MMF 1667/68) are unknown. Gerber, Groh and Hemmen collected two individuals on Porto Santo at Porto dos Frades on 12.VIII.1985.

Wollaston (1854) and Liebmann (1939) indicated Crucifers to be food plants of this species.

***Psylliodes amplicollis* Wollaston, 1865**

Distribution: Madeira proper.

When Wollaston in 1865 described this species he had only one specimen for examination from the collection of Bewicke. He emphasized that this species looked intermediate between *P. umbratilis* and *P. vehemens*. On that ground, probably, Fauvel (1897) designated it as dubious.

In recent times this obviously very rare species was recorded by Lindberg on 3.V.1959 between Poiso and Pico Areeiro with two individuals (Madar, 1963).

***Psylliodes umbratilis* Wollaston, 1854**

Distribution: Madeira proper.

This extremely rare species, found at higher elevations, was recorded for the first time by Wollaston (1854) in July 1850. He captured a few



specimens at the Lombo dos Pecegueiros <sup>(4)</sup> and at the highest point of the Ribeira de João Delgado at 1500 m. In 1865 he supposed that the species might actually be a geographical form of *Psylliodes napi* F.

Since Wollaston's time the species has been recorded only once, by Lundblad with one specimen from Caramujo, at 1250 m, in August 1935. This specimen differed slightly in colour from those of Wollaston (Jansson, 1940).

Hinterseher and the author collected it in March 1981 and in March 1982 at the Paul da Serra near Estanquinhos and at Achada dos Láparos. At the latter locality numerous specimens were found on the surface of small water pools.

Since the description of the male copulatory organ and of the female spermatheca have not been published hitherto, outline drawings of them are given here (fig. 1).

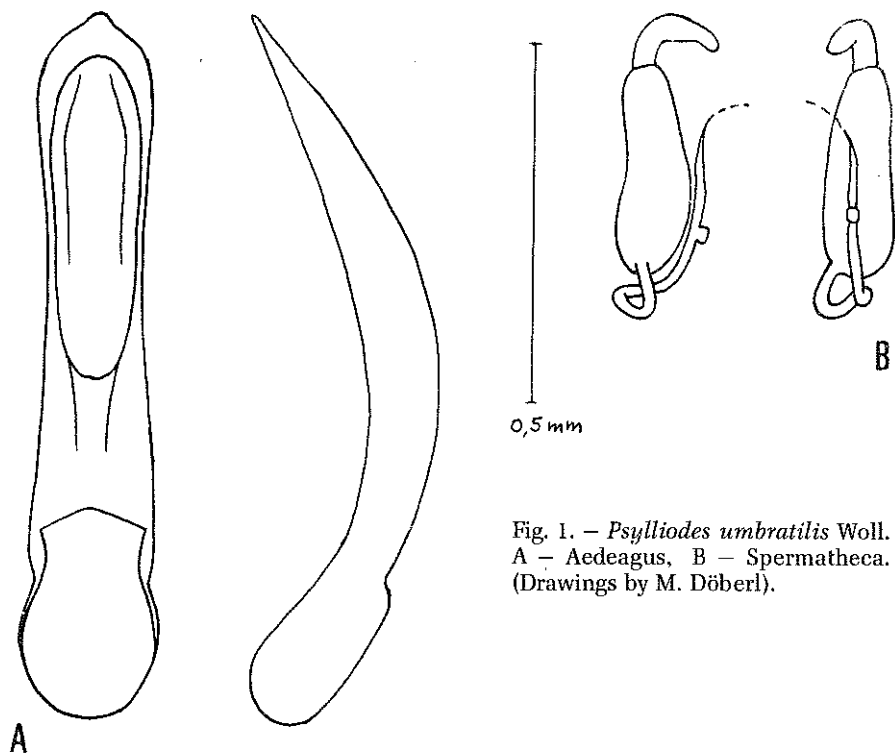


Fig. 1. — *Psylliodes umbratilis* Woll.  
A — Aedeagus, B — Spermatheca.  
(Drawings by M. Döberl).

<sup>(4)</sup> see footnote <sup>(3)</sup>

***Psylliodes tarsata* Wollaston, 1854**

Distribution: Madeira proper.

Wollaston (1854) noticed that this species appears only in the dense forest vegetation in the north of the island. He collected a large number in July 1850 at median elevations of the Lombo dos Pecegueiros<sup>(5)</sup> and he supposed that the species might be abundant everywhere between the Ribeira do Inferno and the Ribeira de João Delgado — however only in the summer because the animals captured in July were still immature.

My find here, the first record since Wollaston, is one female brushed from dusty vegetation at Rabaçal — Vinte e Cinco Fontes (1000 m) on 19.IX.1985. An outline drawing of the spermatheca is given here (fig. 2).

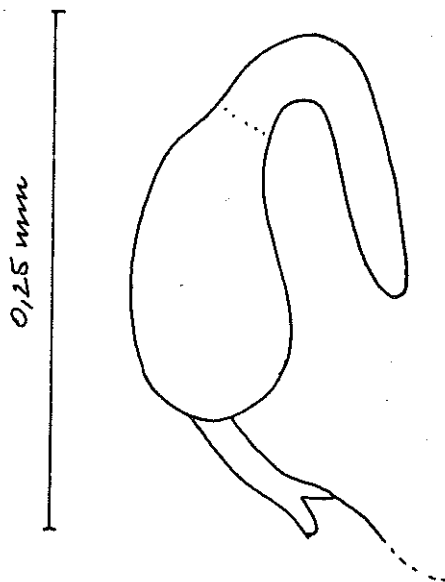


Fig. 2. — *Psylliodes tarsata* Woll. Spermatheca. (Drawing by M. Döberl).

***Cassida hemisphaerica* Herbst, 1799**

Syn.: *C. rossii* Wollaston, 1857

Distribution: Europe, North Africa, Canaries, Madeira proper.

The species seems to be very rare on Madeira proper. Only four specimens have been captured: Wollaston (1854) brushed off one individual

<sup>(5)</sup> see footnote (3)

in May 1849 near a waterfall in the Ribeira de Santa Luzia. A second individual was found by Ross near Funchal described by Wollaston in 1857 as a new species *C. Rossii*. In 1865, however, he expressed doubt and thought it might be only an abnormal form of *C. hemisphaerica*. Two more specimens were collected by Lindberg, one in July 1957 at Rabaçal and one in May 1959 near Faial (Madar, 1963).

**? *Cassida nebulosa* Linnaeus, 1761**

Distribution: Palearctic.

Only one specimen is known of this species; Wollaston (1854) received it from Heinecken, who had found it near Funchal. As there were no further records Wollaston already in 1865 was tempted to remove this species from the fauna of the Madeira Archipelago.

DISCUSSION

According to the present state of our knowledge the chrysomelids of the Madeira Archipelago can be subdivided into the following distributional subgroups (see table 2):

a) species confined to Madeira proper:

<i>Chrysolina fragariae</i>	<i>Mniophilosoma laeve</i>
<i>Longitarsus isoplexidis</i>	<i>Psylliodes amplicollis</i>
<i>Longitarsus cinerariae</i>	<i>Psylliodes umbratilis</i>
<i>Longitarsus maderensis</i>	<i>Psylliodes tarsata</i>

b) species confined to the Madeira Archipelago:

<i>Cryptocephalus crenatus</i>	<i>Longitarsus echii excurvus</i>
<i>Longitarsus ochroleucus lindbergi</i>	<i>Psylliodes vehemens</i>

c) species that occur on the Madeira Archipelago and the Canaries:

<i>Cryptocephalus nitidicollis</i>
<i>Longitarsus nubigena</i>

	D I S T R I B U T I O N											S E A S O N A L O C C U R R E N C E												P O S S I B L E F O O D P L A N T S				
	Madeira Island	Ilheu d. Cevada	Ilheu. Chao	Deserta Grande	Bugio	Porto Santo	Salvage Islands	Canaries	Cape Verdes	Azores	Central Europe	Western Europe	Mediterranean Region	North Africa	extensive distribution	J	F	M	A	M	J	J	A	S	O	N	D	(genus or family), so far as known from the Madeira Archipelago (HANSEN, 1969).
<i>Oulema melanopus</i>	X		X		X	X	X			X	X	X	X	X				X	X	X	X	X						Gramineae
<i>Cryptcephalus nitidicollis</i>	X						X											X									Pinus?	
" <i>crenatus</i>	X	X				X												X	X	X	X	X					Erica? Sempervivum?	
<i>Chrysolina banksi</i>	X	X	X		X				X		X	X	X					X	X	X	X	X	X				Ballota, Mesissa, Mentha, Salvia	
" <i>hyperici</i>	X									X	X							X	X	X	X	X	X				Hypericum	
" <i>fragariae</i>	X																						X	X	X		Bystropogon!	
" <i>americana</i>	X											X	X						X	X							Lavandula, Mentha, Rosmarinus a.o. Labiatae	
<i>Phyllotreta consobrina</i>	X									X	X	X	X										X	X			Brassic!	
" <i>procera</i>	X		X		X		X			X		X	X	X				X									Reseda	
<i>Longitarsus ochroleucus</i>	?		?				X					X	X						X	X								
" <i>lindbergi</i>	X	X	X	X	X					X	X	X	X	X	X				X	X	X	X		X				
" <i>nigrofasciatus</i>	X									X	X	X	X	X	X	X											Verbascum, Scrophularia	
" <i>lycopi</i>	X									X	X	X	X	X													Mentha	
" <i>nubigena</i>	X						X															X						
" <i>nervosus</i>	X	X	X		X					X	X							X	X	X	X		X	X				
" <i>isoplexidis</i>	X						s 1	s 2										X				X	X	X			Echium!	
" <i>cinerariae</i>	X																	X	X	X	X	X	X				Cineraria!	
" <i>echii excurvus</i>	X	X	X				X, 2 af 1			af	af	af	af					X							X		Anchusa, Echium	
" <i>parvulus</i>	X						X			X									X								Linum	
" <i>maderensis</i>	X																		X									
<i>Ochrosia ventralis</i>	X		X		X	X				X	X	X	X					X	X			X	X	X			Solanum? Anagallis?	
<i>Podagrica fuscicornis</i>	X						X			X																	Althaea, Malva, Lavatera	
<i>Mantura chrysanthemi diluta</i>	X						X											X	X	X							Rumex?	
<i>Mniophilosoma laeve</i>	X														X	X	X	X	X	X	X	X	X	X	X	X		
<i>Chaetocnema spec.</i>	X																							X				
<i>Psylliodes vehemens</i>	X		X	X	X	s 1		s 2				s 1						X	X	X	X	X						
" <i>chrysocephala</i>	X		X						X	X	X	X										X	X				Sisymbrium, Brassica	
" <i>laticollis</i>	X									X	X													X			Cruciferae	
" <i>pyritosa</i>	X				X													X				X						
" <i>hospes</i>	X		X	X	X	X				X	X	X						X	X			X					Cruciferae	
" <i>amplicollis</i>	X																		X									
" <i>umbratilis</i>	X																		X			X	X					
" <i>tarsata</i>	X																					X						
<i>Cassida hemisphaerica</i>	X					X			X	X	X	X							X		X						Silene, Gypsophila	

TABLE 2 : Distribution, seasonal occurrence and food plants of the Chrysomelidae of the Madeira Archipelago.  
s = subspecies; af = ancestral form.

- d) species that are distributed also on the European continent and/or in North Africa:

<i>Oulema melanopus</i>	<i>Longitarsus parvulus</i>
<i>Chrysolina banksi</i>	<i>Ochrosis ventralis</i>
<i>Chrysolina hyperici</i>	<i>Mantura chrysanthemii diluta</i>
<i>Chrysolina americana</i>	<i>Psylliodes chrysocephala</i>
<i>Phyllotreta consobrina</i>	<i>Psylliodes laticollis</i>
<i>Phyllotreta procera</i>	<i>Psylliodes hospes</i>
<i>Longitarsus nigrofasciatus</i>	<i>Psylliodes pyritosa</i>
<i>Longitarsus lycopi</i>	<i>Cassida hemisphaerica</i>
<i>Longitarsus nervosus</i>	

- e) species that were not able to survive on the Madeira Archipelago:

*Crioceris asparagi*  
*Gastrophysa polygoni*  
*Cassida nebulosa*

On the subject of the colonization of the Madeira Archipelago by chrysomelids and their subsequent extension throughout the islands we can only speculate, especially since the family is but poorly represented there. The earliest arrivals on the Madeira Archipelago were probably the species listed under a), with *Mniophilosoma laeve* as the sole endemic genus of chrysomelids. With the exception of *Longitarsus isoplexidis*, which is represented on the Canaries and the Cape Verdes with one different subspecies each, no close relationship to species on nearby areas can be indicated for these species. It is remarkable that these species have not extended themselves from Madeira proper even to the neighbouring islands within the archipelago, in spite of their presence on the island probably for a long period. In even more extreme cases we have good reasons to believe that *Chrysolina fragariae* only occurs in very confined areas on the island (Erber 1985). The same may also be true for *Psylliodes tarsata*.

Among the reasons for this sedentary behaviour we may consider various factors. Three of the species listed under a) are flightless. *Chrysolina fragariae* has highly reduced alae; in *Longitarsus cinerariae* and *Mniophilosoma laeve* they are virtually absent. (Reduction of the alae is, however, also found, in species which have extended their distribution beyond Madeira proper, e.g. *Psylliodes vehemens*). A further confining factor may be the dependency of animals on specific food plant species. Thus *Chrysolina fragariae* is completely dependent on the labiate *Bystropogon*, which cannot exist on the arid neighbouring islands. For *Longitarsus isoplexidis* and *Longitarsus cinerariae* on the other hand this factor does not apply since the food plants *Echium candicans* and *Cineraria aurita*,

respectively, occur at least also on Porto Santo. Finally, the secretive mode of life may play a roll. Thus *Mniophilosoma laeve* has always been found under leaves or bark, among moss or lichens or in mold.

The following species recorded only recently suggest that the process of colonisation continues:

<i>Chrysolina banksi</i>	1935
<i>Chrysolina hyperici</i>	1935
<i>Mantura chrysanthemi diluta</i>	1957
<i>Chrysolina americana</i>	1959
<i>Psylliodes pyritosa</i>	1970
<i>Psylliodes laticollis</i>	1981
<i>Phyllotreta consobrina</i>	1982

*Chrysolina banksi* has been especially successful in extending its distribution on the Archipelago, possibly because the diversity of labiates available, their food source occurring on the islands. This species is found to day, with exception of Ilheu Chão and Bugio, on all the islands of the archipelago and on Madeira proper throughout the island and at all elevations. *Chrysolina hyperici* by comparison appears to have encountered considerable difficulties for it has been found to date only as single individuals.

Not every arrival of a new form leads to a successful colonization. This is shown by the species listed under e). Since all chrysolimelids feed on plants and for the most part are highly dependent on specific plants they can sustain themselves in a new area only where the essential plant species is present. But this cannot apply to the three species just named, since Madeira proper has four species of *Asparagus* (*Crioceris*), several *Rumex* and *Polygonum* species (*Gastrophysa*) and several *Chenopodiaceae* (*Cassida*) (Hansen, 1969). Probably not enough individuals of each of these three chrysolimelid species have arrived on Madeira Island to reproduce themselves. Possibly *Longitarsus nubigena* and *Podagrira fuscicornis* should be added to this group; but this cannot be decided on the basis of our current state of knowledge.

Concerning the means used by the individual species to find the Madeira Archipelago we can only speculate. Fortuitous transport through air currents or through floating objects across the ocean suggest themselves — if one does not believe in land bridges — for most of the species belonging to the Mediterranean (including the North African) fauna as well as for the endemic and/or their ancestral forms. A land connection as has been suggested for example by Lundblad (1958), who considers fortuitous dispersal exceptional, is highly improbable geologically (Mitchell-Thomé, 1976).

Possibly comparative investigations with *Longitarsus isoplexidis* and its ssp. *persimilis* (Canaries) and ssp. *stenocyphon* (Cape Verdes) as well as with *Psylliodes vehemens* and its ssp. *normandi* (Canaries and North

Africa) and *azorica* (Azores) may at some time in the future provide hints as to the means of distribution for these species.

Some species have been transported to Madeira most likely on cultivated plants. Wollaston suggested this for *Psylliodes hospes* already in 1884. It is very likely that the same can be said of the most recent immigrant *Phyllotreta consobrina*. Both species live on cruciferous plants; species of cabbage, which harbour these animals, are cultivated extensively in Madeira proper.

It is interesting to note that only two species are endemic to both the Madeira and Canary Archipelagos: *Longitarsus nubigena* and *Chrysocephalus nitidicollis*. *Longitarsus nubigena* is based on so few specimens from Madeira that it is doubtful whether the species can be considered legitimately as belonging to the Madeiran fauna. *Cryptocephalus nitidicollis* was discovered in 1957 and found a second time in 1959 on the north coast of Madeira proper. A chance dispersal to there from the Canaries is difficult to conceive. Even so, this appears more probable than introduction by man, since for one thing there is no greatly active intercourse between the island groups, for another *Pinus canariensis*, the putative host plant of *Chrysocephalus nitidicollis*, is not commercially transported to Madeira. Since up to the present time only three specimens have been found we must be cautious before we consider the species a permanent member of the Madeiran coleopterous fauna.

Very little is known about the developmental biology of the Madeiran chrysomelids. The data on the distribution of the individual species summarized in table 2 show that most species are collected from May to August. This does not necessarily reflect the seasonal period of the imaginal stages, more likely, it is representative of the activity cycle of the collectors. Since the Madeira Archipelago has a relatively moderate climate, without a marked frost and without a clearly defined dry spell, theoretically we should expect adult chrysomelids throughout the year. The latter has been shown only for *Mniophilosoma laeve* in the case of which Wollaston (1845) expressly says that they are found all the year round. It is possible, nevertheless, that the food plants may influence the developmental rhythm; but these are known with certainty for only a few species (see table 2).

Two species are definitely not active throughout the year. *Chrysolina fragariae* first appears around the middle of August, then copulates and, beginning at the end of August, deposits larvae, probably ovoviviparously (Erber 1984). The specimens of *Psylliodes tarsata* captured by Wollaston (1854) in July were still immature. Evidently this species also makes its first appearance in the second half of the year; however, this probably represents already the second generation. For *Phyllotreta consobrina*, *Phyllotreta procera* and *Longitarsus isoplexidis* the missing collecting records between March and July/August are notable. Here too we may be dealing with species having two generations.

The questions put demonstrate how poor our current knowledge is and how necessary it is to conduct further investigations on the fauna and on the entire biology of the beetles of the Madeira Archipelago.

## LOCALITIES

1 Porto Moniz	30 Vasco Gil
2 Ribeira da Janela	31 Funchal
3 Prazeres	32 Ribeira de Santa Luzia
4 Prazeres — Lombo das Uveiras	33 Terreiro da Luta
5 Calheta	34 Corujeira
6 Rabaçal	35 Curral dos Romeiros
7 Montado dos Pecegueiros	36 Palheiro Ferreiro
8 Ribeira de João Delgado	37 Garajau
9 Paul da Serra — Achada dos Láparos	38 Caniço
10 Paul da Serra — Estanquinhos	39 Valparaíso
11 Caramujo	40 Camacha
12 São Vicente	41 Poiso
13 Rosário	42 Ribeiro Frio
14 Encumeada — Lapa do Sul	43 Levada da Serra do Faial — Queimada Chã
15 Encumeada	44 Levada da Serra do Faial — Lombo da Raiz
16 Serra de Água	45 Levada da Serra do Faial — Cabeço da Madeira
17 Ribeira Brava	46 Levada da Serra do Faial — Curral Velho
18 Curral das Freiras	47 Portela
19 Pico Jorge	48 Santo da Serra
20 Torrinhãs	49 Porto Novo
21 Pico Coelho	50 Santa Cruz
22 Pico Ruivo	51 Machico
23 Pico das Torres	52 Caniçal
24 Pico Areeiro	53 Ponta de São Lourenço
25 Ribeiro do João Fernandes	54 Ilheu da Cevada
26 Lombo dos Pecegueiros	
27 Queimadas	
28 Santana	
29 Faial	

Fajã da Corte (= Feijãa de Córte in Wollaston 1854) exact position unknown, perhaps between Pico Ruivo and Curral das Freiras; or a typing error of Fajã da Corça between S. Jorge and Santana.



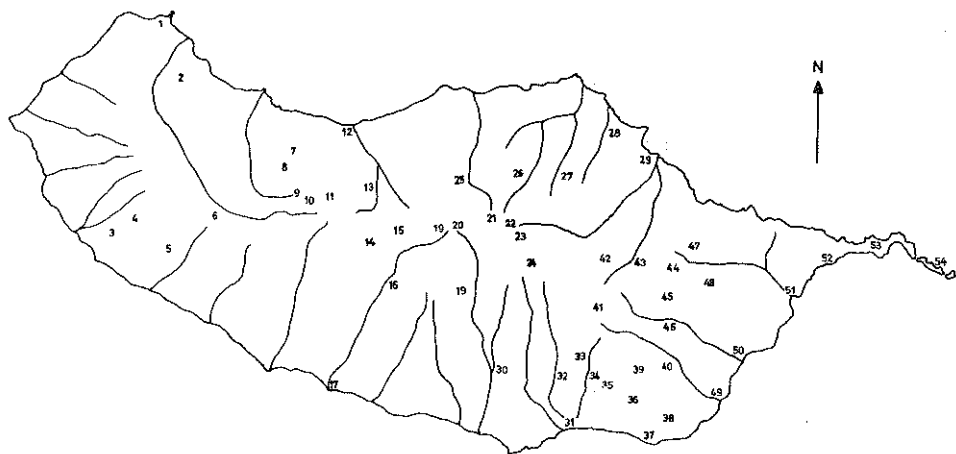


Fig. 3.—Outline map of Madeira with localities.

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