

DYTISCIDAE AND GYRINIDAE (COLEOPTERA) FROM THE AZORES AND MADEIRA¹

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With 21 figures and 1 table

The beetle fauna of the Macaronesian Islands is fairly well known. This seems especially true for Madeira, where T. V. Wollaston collected in the 1850 - 1860's, recording almost 700 species of Coleoptera (Wollaston 1857, 1865). Since then some other entomologists have worked there, viz. Lundblad 1935, H. Lindberg 1957 and 1959 and Classey 1966, and they added about 130 species to the Madeira list. The Azores were early investigated. Results of collecting trips have been dealt with by Crotch (1867), Drouët (1861), and Godman (1870), and in more recent times (Marsden 1969, Mequignon 1942 and Uyttenboogaart (1947).

In 1957 Drs P. Brinck and E. Dahl lead an expedition to Madeira and the Azores. A great number of fresh water bodies were investigated and the beetle material, dealt with in this paper, consists of 124 specimens of 6 species of Dytiscidae and 1 species of Gyrinidae. All recorded species had been found on the islands before, but two of them were found to be conspecific with previously described taxa.

Dytiscidae

Coelambus confluens (F., 1787)

Azores. São Miguel: Charco do Madeira, 6 km N of Ponta Delgada, 1.3.57. Loc. 4 (1 specimen).

Santa Maria: 1 km W of Praia. Pond I. 20.3.57. Loc. 46 (29). — Ditto. Pond II. 20.3.57. Loc. 46 (3). — Limestone area 20.3.57. Loc. 48 (4).

Distribution

Recorded by Mequignon (1942) from the Azores but not by Uyttenboogaart (1947) and Marsden (1969). Known by Wollaston (1857) from Madeira, in great numbers on Porto Santo and Desertas.

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Hydroporus guernei Régimbart, 1891

Azores. São Miguel: Charco do Madeira, 6 km N of Ponta Delgada. 1.3.57. Loc. 4 (2). — Lagoa do Pau pique. 7.3.57. Loc. 15 (11). — Pond 500 m E of Lagoa do Pau pique. 7.3.57. Loc. 16 (1). — Caldeira das Sete Cidades. 8.3.57. Loc. 18 (9). — Lagoa das Furnas, in the lake. 10.3.57. Loc. 22 (1). — Tanque (pond) 1 km SE Lagoa do Congro. 16.3.57. Loc. 33 (2). — Fonte at Casas Telhadas, SW of Ribeira Grande. 18.3.57. Loc. 36 (2) (under stone, grassy ground).

Santa Maria: 1 km W of Praia. Pond I. 20.3.57. Loc. 46 (1).

Flores: Central Plateau Sand SE of Caldeira Comprida. 14.4.57. Loc. 109 (5).

Distribution

Endemic to the Azores and probably the most widely spread dytiscid species. Recorded by Crotch (1867) as *H. planus* F.

Potamonectes dubius (Aubé, 1838)

Madeira: Arieiro Mts., ca 1700 m (stream). 21.4.57. Loc. 114 (4). — Ribeiro Frio, 860 m, 7 km SW of Faial. 21.4.57. Loc. 115 (1). — Casa das Queimadas, 880 m, (stream). 24.4.57. Loc. 122 (7).

Distribution

Endemic to Madeira. Recorded by Wollaston (1857) and Falkenström (1938) as *Deronectes vigilans* (Wollaston, 1854).

Agabus wollastoni Sharp, 1880-82

Synonym *A. (Gaurodytes) dissimilis* Falkenström, 1938.

Madeira. Casa das Queimadas, 880 m 24.4.57. Loc. 122 (4 ♂♂, 2 ♀♀). — Ribeira da Lapa, E. of Pico do Serrado, 900 m, 27.4.57. Loc. 132 (4 ♀♀).

Falkenström (1938) among many specimens of *A. wollastoni* separated the largest male and described it as *Gaurodytes dissimilis*. It is said to be distinguished from *wollastoni* by its (transl.) «shape, size, lack of glossiness, longer antennae, elytral reticulation and differences in genital structures». Only the type has ever been recorded. The characters, distinguishing *dissimilis* from *wollastoni* are, however, vague.

The length of the present four *A. wollastoni* males is 10.2, 10.8, 11.3 and 11.5 mm (front to tip of elytra). The width of the pronotum of the largest male is 4.9 mm and the maximum body breadth 5.8 mm. The type specimen of *dissimilis* measures 12.0 mm (not 12.5, as given by Falkenström) and the width of pronotum is 4.9 mm. The maximum body breadth of the type specimen is difficult to measure since the insect has become somewhat flattened at the preparation. The breadth given by Falkenström was 5.75 mm.

As for other *Agabus* species, the reticulation and glossiness of the elytra of *wollastoni* vary in details, but two specimens agree closely with *dissimilis*. Body shape, colour and markings of the *wollastoni* specimens agree well with *dissimilis*, as do shape and relative size of the antennae.

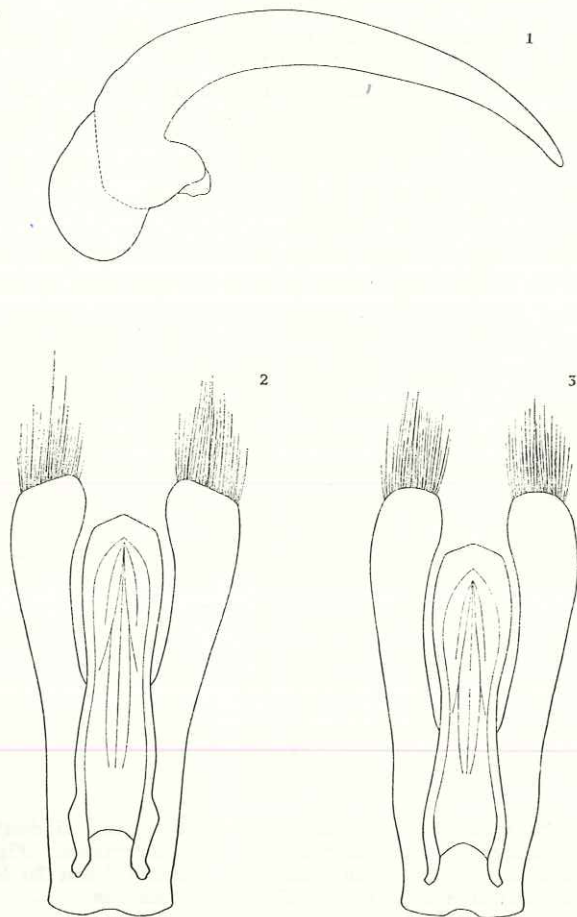


Fig. 1. — Aedeagus in lateral view of *Agabus wollastoni* Sharp. Azores. Fig. 2. — Aedeagus in dorsal view of *Gyrinus distinctus* Aubé. Azores. Fig. 3. — Aedeagus in dorsal view of *G. distinctus*. Sweden. Taken at random from 30 males.

The shape of aedeagus and parameres of *wollastoni* show only a minute variation and so far as I can see, there is no specific difference in comparison with *dissimilis*. In fact the figures given by Falken-

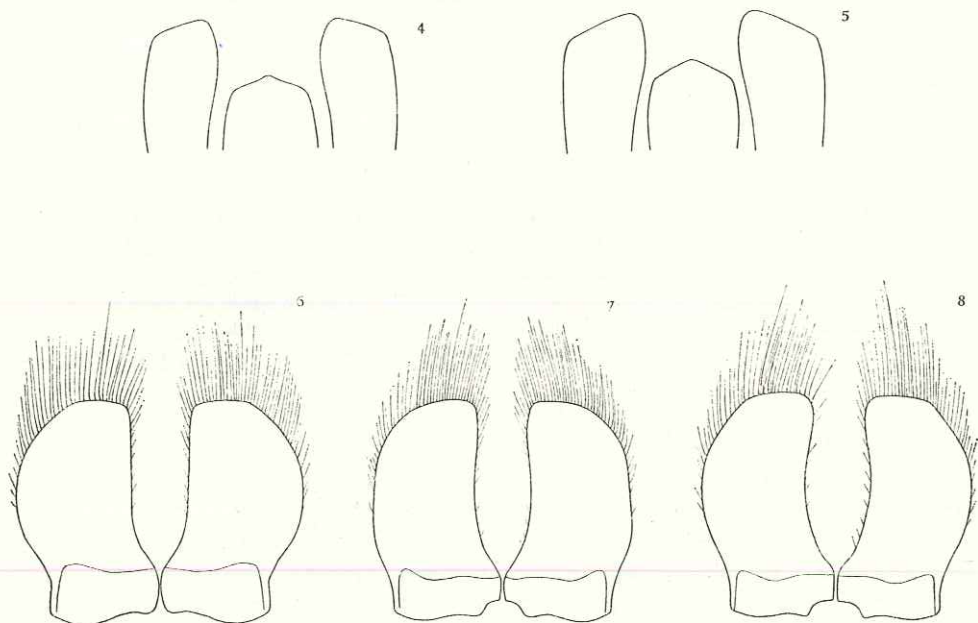
ström do not show any such differences (Figs. 3A-F, Falkenström; Fig. 1 this publication). No doubt *dissimilis* and *wollastoni* are conspecific.

A. wollastoni is endemic to Madeira. It was misidentified by Wollaston (1857) as *A. (Gaurodytes) bipustulatus* (L. 1767).

Rhantus pulverosus (Stephens, 1828)

Azores. São Miguel: Lagoa das Furnas (freshwater lake). 10.3.57. Loc. 22 (4 ♂♂, 2 ♀♀).

Santa Maria: 1 km W of Praia. Pond I. 20.3.57. Loc. 46. (2 ♂♂). — Ditto. Pond II. 20.3.57. Loc. 46 (6 ♂♂, 1 ♀).



Figs. 4-5. — Tip of the middle lobe and the parameres of two *G. distinctus* of a four specimen sample taken at random from 30 Swedish males. Figs. 6-7. — Female genital sclerites of two *G. distinctus* taken at random from 20 Swedish females. Fig. 8. — Female genital sclerites of *G. distinctus*. Azores.

Faial: 3 km WNW of Pedro Miguel, 5.4.57. Loc. 92 (1 ♂, 1 ♀).

Distribution

Known to Crotch (1867) from the Azores.

Meladema lanio (F., 1775)

Madeira. Casa das Queimadas, 880 m (stream). 24.4.57. Loc. 122 (9 ♂♂, 7 ♀♀).

Distribution

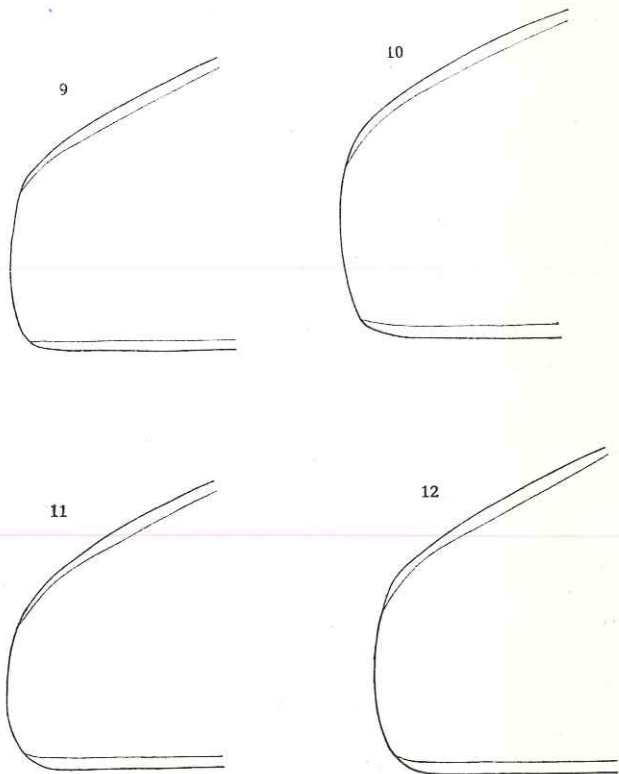
Endemic to Madeira. Wollaston (1857) recorded it from «the streams of intermediate and lofty altitudes».

Gyrinidae

Gyrinus distinctus Aubé, 1836

Synonym *G. atlanticus* Régimbart, 1891.

Azores. Flores: Central plateau. Lagoa Branca (fresh-water pool). 14.4.57. Loc. 110 (1 ♂).



Figs. 9-10. — Apex of elytra of *G. distinctus*. Sweden. Figs. 11-12. — Apex of elytra of *G. distinctus*. Azores.

Régimbart described *Gyrinus atlanticus* on some specimens from the Azores, of which 3 ♂♂ (leg. Dr. Barrois) are still preserved in

Muséum National d'Histoire Naturelle, Paris. Régimbart discussed the relationships of *atlanticus* with *distinctus* and *siculus*, e. g. *G. substriatus* Steph. from Sicily. Régimbart stated about *atlanticus* (transl.): «It is very much like *G. distinctus* but is much smaller somewhat narrower in front and with the punctured striae of the elytrae less marked and with the apical angle of the elytrae more rounded». With regard to the considerable variation within *Gyrinus* species these trivial characters are hardly reliable for a species separation. No information was given about the genitalia of *atlanticus*.

I have studied the genitalia of three males from the Azores, the one collected by Brinck-Dahl, one from Flores (leg. de Guerne 1888, now in collection Brinck) and «*atlanticus*» from Azores (in British Museum, Natural History) as well as a female of the same provenance.

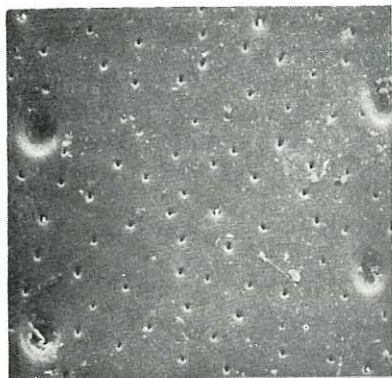
The shape of the middle lobe of the Azorean specimens shows a perfect agreement with *G. distinctus* from Sweden but the tip of the parameres and the middle lobe shows some variation (Figs. 2-5). The male genitalia of *distinctus* differ greatly from other European species. It is especially characterized by its very broad middle lobe. Even the female genitalia of *distinctus* from northern Europe are somewhat variable in shape but agree closely with the Azorean specimen studied (Figs. 6-8).

There is no doubt that *atlanticus* is conspecific with *distinctus*.

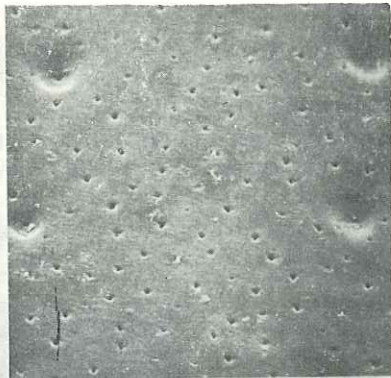
The outer angle of the apex of the elytra of *distinctus* is most often well marked, but specimens with a more or less rounded apex now and then occur in northern Europe. (Figs. 9-10). One of the Azorean males has smoothly rounded apex of elytra, one however, is *distinctus*-shaped (Figs. 11-12) and the third one (leg. de Guerne) is intermediate. The striae of the elytra and the bodyshape are similar in specimens from the Azores and Sweden. The microsculpture of the Azorean males is identical to Swedish specimens and a specimen from Crete chosen by chance (Figs. 13-18). It should be recalled that the microsculpture of *distinctus* clearly separates it from all other European *Gyrinus* species.

In Museums and literature, *distinctus* is now and then confused with *colymbus* Er., a very local species occurring in SE Europe and Russia. The two species are easily separated by the microsculpture. In *colymbus* there are short, somewhat obtuse scratches all over the elytra (Figs. 19-20). The shape of the aedeagus indicates a closer relationship between *colymbus* and *distinctus* than between *distinctus* and any other European species (Fig. 21).

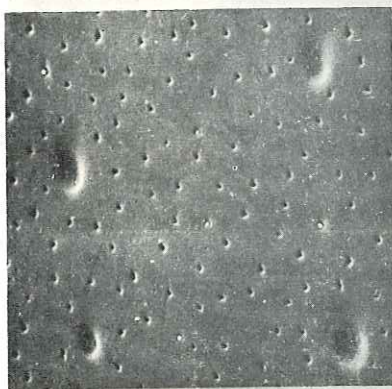
The body length of *atlanticus* given by Régimbart was 5-6 mm. The size of the above four Azorean specimens was: ♂ (leg. Brinck-Dahl) 4.9 mm, breadth 2.6 mm, ♂ (leg. de Guerne) 5.1 mm, ♂ (Brit. Mus.) 4.6 x 2.6 mm; ♀ (Brit. Mus.) 5.8 x 3.0 mm. 31 males from south Sweden varied in length from 5.0 to 6.2 mm, mean 5.71, SD 0.31; breadth



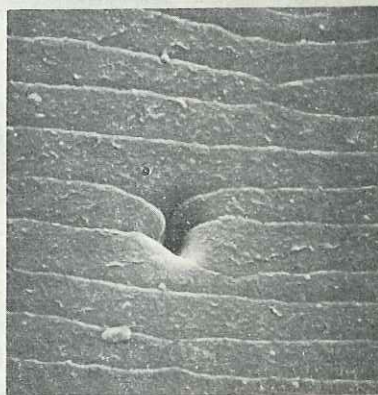
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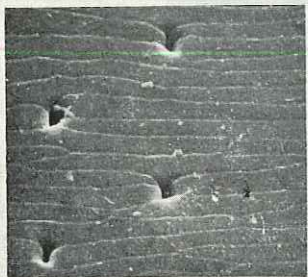
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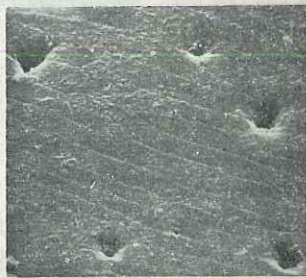
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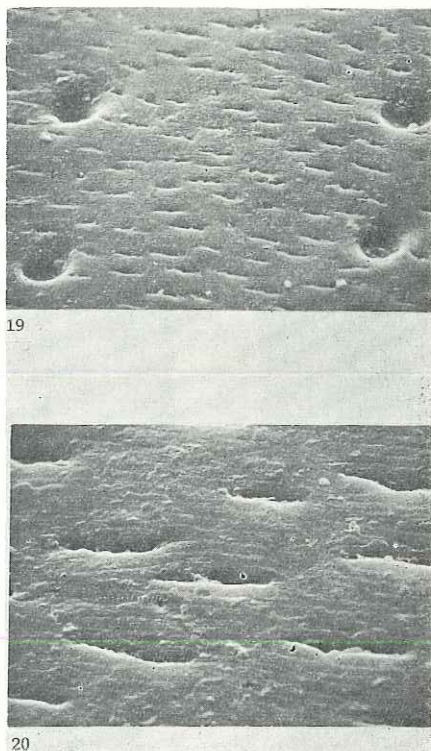


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Figs. 13-18.—Microsculpture of elytra of *G. distinctus* male specimens from: 13: Sweden, 14: Azores, 15: Crete, 16-17: Sweden and 18: Azores. Scanning micrographs: Figs. 13-15: 600 X, Fig. 16: 6000 X and Figs. 17-18: 2400 X on original photographs, here reduced to slightly more than half size.

2.6-3.2, mean = 2.99 SD 0.15. 21 south Swedish females had length: 5.5-7.1 mm, mean = 6.39, SD 0.38 and breadth 2.8-3.6, mean = 3.30 mm, SD 0.18. The smallest Swedish male measured 5.0 x 2.6 mm and the smallest female 5.5 x 2.8 mm. Four males from Crete (collection Brinck) varied in length from 4.9-5.4 mm, mean = 5.25 and the smallest one measured 4.9 x 2.6 mm.

As for other *Gyrinus* species, the body size of *distinctus* varies considerably and probably often reflects the environmental conditions



Figs. 19-20. — Microsculpture of an elytron of a male *G. colymbus*
Er. 19: 600 X, 20: 2400 X on original photograph, here reduced
 to slightly more than half size.

of the breeding localities. It is worth noticing that specimens from very small populations of a species often tend to be smaller than those from waters with dense populations (Svensson unpubl.). The small material present indicates, as does the description of Régimbart, that the mean size of *distinctus* on the Azores is smaller than in northern Europe. A variation between the islands in the body size of «*atlanticus*» on the

Azores was, however, observed by Régimbart who stated that «the specimens from Flores are larger than those from São Miguel». Later on Mequignon (1942) named a certain subspecies, *Gyrinus atlanticus guernei*, because of the greater size of specimens from Flores. Two of the specimens examined originate from Flores, but they do not justify Mequignon's opinion.

G. distinctus is widely spread in Europe, from central Scandinavia southwards to North Africa and also occurs in Russia and western Asia. It inhabits stagnant as well as slowly running water bodies (Svensson 1969). It is the only species of the genus on the Azores, although it was recorded as *G. dejceni* Brullé by Crotch (1867).

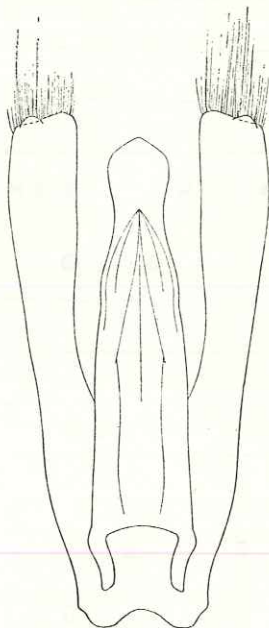


Fig. 21. — Aedeagus in dorsal view of *G. colymbus*.

DISCUSSION

A total of 17 species of Dytiscidae and 1 of Gyrinidae have been recorded from Madeira and the Azores by various collectors (Tab. 1). There is a striking faunal difference between these two island groups: only three species are in common. These species are, *Agabus bipustulatus* and *Coelambus confluens*, which are both common and widely distributed all over Europe and North Africa, and the almost cosmopolitan *Eretes sticticus*. Furthermore, several species are endemic. The higher

Tab. 1. Distribution of Dytiscidae and Gyrinidae on Madeira and the Azores

	MADEIRA				AZORES									
	Madeira	Porto Santo	Desertas	total	total	Flores	Corvo	Faial	Pico	São Jorge	Graciosa	Terceira	São Miguel	Santa Maria
DYTISCIDAE														
<i>Coelambus confluens</i> (F., 1787)	○	○	○	●	●								○	○
<i>C. pallidulus</i> (Aubé, 1850)				●	●								○	○
<i>Hydrotarsus lundbladi</i> Falkenström, 1938	○			X	X	○	○	○		○		○	○	○
<i>Hydroporus guernei</i> Rég., 1891					●								○	○
<i>H. limbatus</i> Aubé, 1836					●								○	○
<i>H. obsoletus</i> Aubé, 1836	○			●	●								○	○
<i>Potamonectes ceresyi</i> (Aubé, 1836)		○		●	●					○				
<i>P. dubius</i> (Aubé, 1838)	○			X	X									
<i>Agabus bipustulatus</i> (L., 1767)	○			●	●					○				
<i>A. conspersus</i> (Marsh., 1802)				●	●									
<i>A. godmani</i> Crotch, 1867					X	○		○		○		○		
<i>A. maderensis</i> Woll., 1854	○	○		X	X	○		○		○		○		
<i>A. nebulosus</i> (Forst., 1771)	○		○	●	●									
<i>A. wollastoni</i> Sharp, 1880-82	○			X	X									
<i>Rhantus pulverosus</i> (Steph., 1828)				●	●	○	○	○		○			○	○
<i>Meladema lanio</i> (F., 1775)	○			X	●								○	○
<i>Eretes sticticus</i> (L., 1767)	○			●	●								○	○
GYRINIDAE														
<i>Gyrinus distinctus</i> Aubé, 1836					●	○		○	○				○	○

○ = occurrence, X = endemic

number on Madeira, 5 endemic species out of a total of 11, compared to the Azores, 2 out of 10, is consistent with what is known for other groups, e. g. Carabidae (Lindroth, 1960).

There is a vast number of fresh water bodies on most of the islands, many of which are well investigated, but the density of aquatic Coleoptera seems to be low. The major part of the waters, however, are springs and streams and many are temporary, especially on Madeira. The summer droughts make them less suitable for many water insects. Furthermore, Dytiscidae generally exhibit a low diversity in springs and streams. Most species are undoubtedly adapted to lenitic habitats. At least two species seem, however, to have established stable populations only in natural springs and streams, viz. *Potamonectes dubius* and *Meladema lamio*, both endemic on Madeira. Also recorded from streams on Madeira are the endemic *Agabus wollastoni* and *A. maderensis*. In the Azores, in the same habitats, the endemic *A. godmani* has often been found. *Hydroporus obsoletus* is known from two streams on Madeira; this is one of the few species of the genus confined to streams and rivers in northern Europe.

On some Azorean islands, e. g. São Miguel and Terceira, there are numerous more or less oligotrophic lakes. Their low content of aquatic plants makes them less suitable for most beetles. In any case, on the Azores the endemic *H. guernei* has often been recorded from lakes, sometimes also *Gyrinus distinctus*, but always in low numbers, and *Rhantus pulverosus*, which is widely distributed in Europe and northern Africa.

Man-made ponds or basins, sometimes eutrophic, make important habitats for several species, e. g. *H. guernei*, *G. distinctus* and *R. pulverosus* on the Azores.

C. pallidulus and *A. conspersus* from the Azores and *P. ceresyi* from Madeira are all confined to brackish waters or salines. Their main distribution area is south Europe, north Africa and west Asia.

There is a great contrast in the species composition between Madeira and the Azores as regards Dytiscidae. The same has been found for Carabidae (Lindroth op. cit.).

The aquatic beetle fauna of the Macaronesian islands shows a clear affinity to the fauna of Southwest Europe and North Africa, as illustrated by the following cases: *Meladema coriacea* Cast., distributed in the Mediterranean region westwards to the Canaries, is the only species of the genus besides the Madeiran *M. lamio*. Outside the Azores, *Hydroporus limbatus* is restricted to the Iberian peninsula, Corsica and Sardinia. The semi-aquatic *Dryops agiricus* (Luc). (Dryopidae) is only known from southernmost Europe, North Africa and the Azores (Svensson 1970).

No doubt many of the endemic elements of the Macaronesian

islands are very old, e. g. the genus *Hydrotarsus*, restricted to Madeira and the Canaries.

The time of arrival for most non-endemic species is of course not known, but an immigration by flight seems reasonable for many species. Most Dytiscidae and Gyrinidae of the continent make extensive flights, usually in spring or autumn. However, it should be borne in mind that a vast number of aquatic plants were introduced to the Azores, mainly São Miguel and Faial, from Europe in the 19th century (Brinck & Scherer 1961). Furthermore, transport of eggs of fish from England, Germany and Portugal, may have lead to opportunities for introduction of many water insects (cf. e. g. Barrois 1896). Aldready Crotch (1857) proposed that *R. pulverosus* had probably been introduced in connection with introduction of goldfish.

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