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A NEW SPECIES OF *CATOPS* PAYKULL, 1798 (COLEOPTERA: CHOLEVIDAE) FROM THE AZORES WITH REMARKS ON THE MACARONESIAN FAUNA

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ABSTRACT

A new species of *Catops* Paykull, 1798 (Coleoptera: Cholevidae) from the Azores with remarks on the Macaronesian fauna.

In this work *Catops velhocabrali* sp. n. is described from Santa Maria (Azores), on two males and a single female specimens collected in three different habitats at the highest point of the island. *Catops velhocabrali* sp. n. is the first species of Cholevidae (Coleoptera) recorded for the Azores. The new species is compared with its nearest relatives from Canary Islands, *C. thurepalmi* Szymczakowski, 1975 endemic from Gran Canaria and *C. antoniomachadoi* Palm, 1975 endemic from Tenerife. A key as well as some data on the ecology and distribution of the Macaronesian *Catops* Paykull, 1798 is provided. Finally, all the known Macaronesian Cholevidae are listed and new data on their ecology and distribution is provided. The new species, *C. velhocabrali* sp. n., was sampled at the top biodiversity hotspot from the Azores, the Pico Alto that remnants of «climax pattern of indigenous forest». As in the Canaries, one of the specimens was collected in the Mesocavernous Shallow Stratum (MSS). It is suggested that the older age of S. Maria (one of the smaller Azorean islands) probably explains the presence of this habitat specialized species.

Key words: Coleoptera, Cholevidae, *Catops velhocabrali* sp. n., Azores, Macaronesia.

INTRODUCTION

During one Zoological Expedition of the University of Azores (Department of Biology) and an Entomological Expedition of the University of Azores (Department of Agrarian Sciences) to the Azorean island of Santa Maria, three specimens

belonging to an undescribed species of the genus *Catops* Paykull, 1798 (Coleoptera: Cholevidae) were collected. BORGES (1993) made reference to two of the specimens in a list of species sampled in the mesocavernous shallow stratum (MSS) from the Azores. The third was recently obtained from a comparative study of the arthropod biodiversity of the native and exotic forests from S. Maria (BORGES & VITORINO, in prep.).

Until now no Cholevidae species were known from the Azorean archipelago (cf. BORGES, 1990), in spite of the fact that nine species of this beetle family belonging to the genera *Nargus* Thomson, 1867, *Catops* Paykull 1798 and *Catopidius* Jeannel, 1922 are known from other Macaronesian islands. Five species have been recorded from the Canary Islands: *Nargus* (*Nargus*) *alluaudi* Jeannel, 1936 and *Catops thurepalmi* Szymczakowski, 1975 endemic to Gran Canaria, *N.* (*N.*) *putridus* (Wollaston, 1864) native to La Palma, *Catops antoniomachadoi* Palm, 1975 endemic to Tenerife and *N.* (*N.*) *pinicola* (Wollaston, 1864) recorded from Tenerife and La Gomera. Four species occur in Madeira proper, but some of the records are uncertain: *Nargus* (*Nargus*) *vandeli* Coiffait, 1959, *N.* (*N.*) *bicolor* Coiffait, 1959, *N.* (*N.*) *velox* (Spence, 1815) and *Catopidius murrayi* (Wollaston, 1860) (COIFFAIT, 1959; SZYM CZAKOWSKI, 1975). Only *N. velox* is not endemic.

MATERIAL AND METHODS

The study area is located near the top of S. Maria at Pico Alto (approx. 560 m). S. Maria is the southernmost Azorean island (37° N, 25° W) and it is one of the smallest (97.18 km²) of the nine islands forming the archipelago of the Azores. The island is divided into dry (west) and wet (east) parts by the Pico Alto (587 m). S. Maria is also the oldest Azorean island (8.12 Ma B.P.) and the climate is temperate-oceanic with an averaged annual temperature 17.5° C at the Airport and 14.3° C in Fontinhas (430 m) (max. in August, min. in February). The averaged annual precipitation is approximately 1386 mm per year at Fontinhas (430 m).

Sampling of beetle species was conducted in different habitats at Pico Alto, S. Maria. All specimens were collected by means of pitfall traps using several baits (anti-freeze, turquin, vinegar and formalin). For more details on the pitfall procedure see BORGES (1992a). Three main experiments were conducted: 1) sampling of endogean and cavernicolous species in MSS was initiated in June 1990 in three sites around Pico Alto, S. Maria (see details in BORGES, 1993); 2) sampling of ground forest arthropods was performed between 12 to 18-VI-1990 using a transect with 60 traps in the fragment of native forest and a transect with 30 traps in a *Cryptomeria japonica* (Linnaeus fil.) D. Don plantation; 3) sampling of ground forest arthropods was performed between 26-III to 2-IV-1997 using two transects with 30 traps each (15 traps with turquin and 15 traps with anti-freeze) in the fragment of native forest and two transects with 30 traps each in two different *Cryptomeria japonica* plantations. In all cases pitfall samples were transported to the University of the Azores (Department of Agrarian Sciences at Terceira) and stored in a one-way baby nappy liner in large bottles with 70 % ethanol with some drops of glycerol prior to sorting.

RESULTS

CATOPS Paykull, 1798

Catops velhocabrali sp. n. (Figs.1-7)

Type locality

Pico Alto (Santa Maria, Azores).

Type material

Holotype: male, Pico Alto (560 m), Santa Maria, Azores, 12 to 18-VI-1990, fragment of native forest (P. Borges, F. Pereira & A. Silva leg.), sampled in a pitfall trap with vinegar. Deposited in the University of Azores in Terceira (UAT); Paratypes: one female, Pico Alto, Santa Maria, Azores, 26-III to 2-IV-1997, *Cryptomeria japonica* plantation (A. Vitorino leg.), sampled in a pitfall with Turquin. Deposited in the University of Azores in Terceira (UAT); one male, Poço Grande, S. Maria, Azores, 15-VI to 20-VIII-1990, MSS (P. Borges, F. Pereira & A. Silva leg.), sampled in a pitfall with Turquin placed in the MSS habitat. Deposited in the University of Barcelona, Spain.

Description

Male: Body length 3.8 mm. Fully winged with the body strong, convex and oval (Fig. 1). Tegument uniformly brown, densely punctured with the punctures large and pronounced. Elytral pubescence fine and dense, paler than tegument color.

Head 1.7 times narrower than pronotum. Eyes well developed. Maxillary palpus with the apical segment similar in length than the penultimate one and a bit more slender (Fig. 3). Antenna wide with the club weakly developed (Fig. 4); the 4th antennomer slightly shorter than the 3rd, the 5th is 1.3 times longer than wider, the 6th slightly transverse, the 7th quadrate, 2.3 times as long as the 8th, the 8th is narrower than the 7th, the 9th and 10th slightly transverse, the 11th as wide as 10th, 1.5 times longer than wider.

Pronotum transverse, 1.5 times wider than longer, with the lateral side regularly arched; widest approximately in the middle; hind angles obtuse.

Elytra convex, wide and oval, 1.38 times longer than wide and 1.18 times as wide as pronotum; widest before the middle; the side regularly arched, narrowed in the posterior region; apex of each elytron rounded; elytral striae little marked, except the sutural striae.

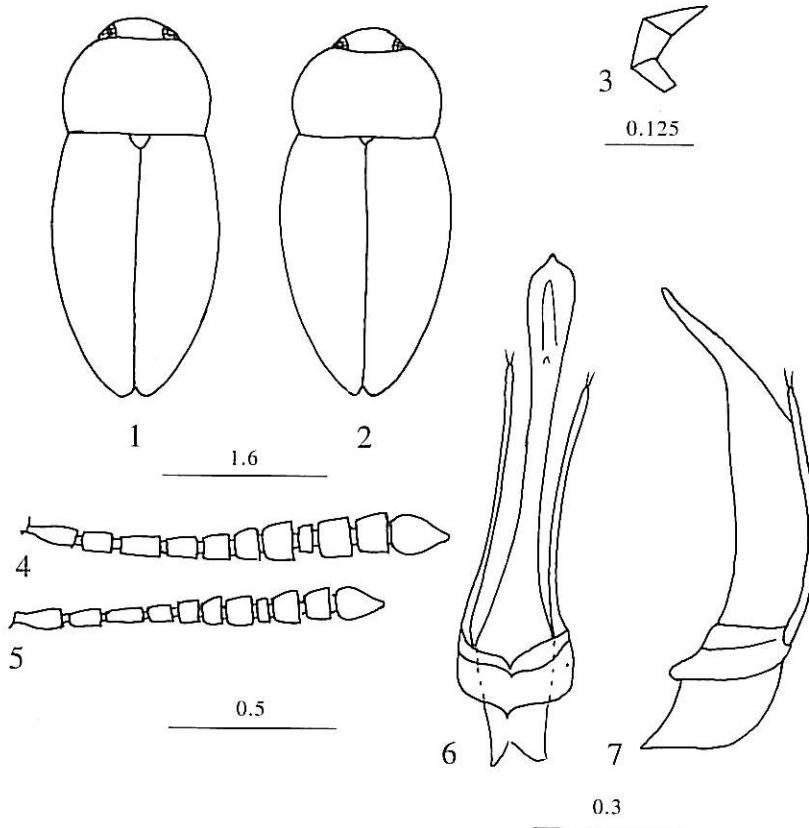
Legs slightly robust; profemur without ventral tubercle; protibia simple, straight, 3.4 times as long as wide; mesotibia slightly arched; metatibia almost straight, 1.3 times longer than the tarsi; protarsi dilated; the 1st mesotarsae segment slightly dilated.

Aedeagus slightly arched, very compressed laterally; the apex of the median lobe not dilated, smoother, with a groove in dorsal position; parameres shorter than the median lobe (Figs. 6-7); internal sac of the aedeagus provided with small spine, visible in cleared preparations.

Female: Body length 3.6 mm. Winged, with similar appearance to male (Fig. 2), although pronotum more transverse, 1.4 times as wide as long; the elytra are 1.3 times as wide as pronotum, antenna as shown in figure 5 and the tarsi are not dilated.

Derivatio nominis

Named in dedication of Velhocabral, the Portuguese Captain who discovered Santa Maria in the XV century.



Figs. 1-7: *Catops velhocabrals* n.sp.: Male habitus (1); female habitus (2); maxillary palpus (3); male antenna (4); female antenna (5); aedeagus in ventral (6) and lateral (7) view. Scale in mm.

Bionomics

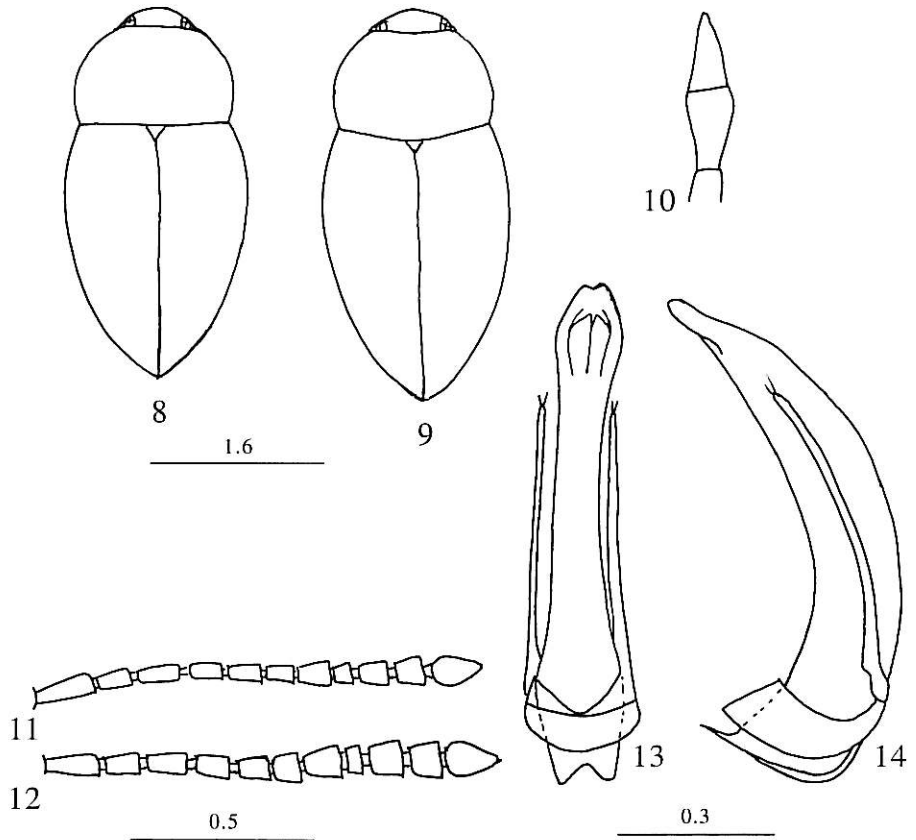
All three specimens were collected with pitfall traps in three different habitats: natural forest consisting mainly of *Laurus azorica* (Seubert), *Myrica faya* Aiton, *Vaccinium cylindraceum* J.E.Smith and *Erica azorica* Hochstetter trees and strubs; *Cryptomeria japonica* (Linnaeus fil.) D. Don plantation; Mesocavernous Shallow Stratum (MSS). We suggest that *Catops velhocabrals* n. sp. occurs in the litter of the native and exotic forests at Pico Alto (S. Maria, Azores), but also inhabits the endogean environment.

Distribution

Endemic to Santa Maria Island.

Affinities

Catops velhocabrals n.sp., differs from its probable nearest relatives *C. thurepalms* and *C. antoniomachadoi* from the Canaries, by having a stronger and more convex general appearance and a less transverse pronotum. It also differs in the antennae, maxillary palpus and aedeagus.



Figs. 8-14: *Catops thurepalmi* Szymczakowski, 1975: Male habitus (8); female habitus (9); maxillary palpus (10) (after Palm, 1975); male antenna (11); female antenna (12); aedeagus in ventral (13) and lateral (14) view. Scale in mm.

Catops thurepalmi Szymczakowski, 1975 (Figs. 8-14)

Catops thurepalmi Szymczakowski, 1975. *Viearea*, 4(1-2): 189-200

Redescription

Male: Body length 3.6-4.0 mm. Winged, with the body oval, weakly convex, narrower than in *C. velhocabrali* (Fig. 8). Tegument brown dark, blackish. The pronotum brown, irregularly blackened on disc. Punctuation large, compact and pronounced. Elytra pubescence fine, less compact than in the preceding species.

Head 1.8 times narrower than the pronotum. Eyes well developed. Maxillary palpus with the apical segment almost as long as the penultimate one and slightly slender (Fig. 10). Antenna wide with the club little distinct (Fig. 11); the 4th antennomer lightly longer than the 5th and shorter than the 3rd; the 5th is approximately 1.5 times as long as wide; the 7th is 1.5 times as long as wide, and 1.8 times as long as the 8th; the 9th and 10th as long as wide; the 11th is 1.5 times longer than wider, lightly narrower than the 9th and 10th antennomers.

Pronotum short and wide, 1.6 times wider than longer, with the lateral side regularly arched; widest after the middle; hind angles obtuse, well distinct.

Elytra oval and little convex, with the side regularly arched, a lot narrowed at the posterior region, 1.7 times as long as wide and 1.2 times as wide than pronotum; elytra apex narrow and conjointly rounded; elytral longitudinal striae little marked, except the sutural striae.

Legs thin; profemur without ventral tubercle in the two sexes; protibia almost straight, little widen, approximately 5.5 times as long as wide; protarsi dilated; 1th mesotarsi segment slightly dilated.

Aedeagus thin, slightly arched and laterally compressed (Figs. 13-14); median lobe with parallel side; apex slightly dilated with a groove in the dorsal medium region; paramera thinner and shorter than the median lobe; internal sac provided with small spine, which are visible by transparency.

Female: The female is a bit stronger than the male (Fig. 9), she has the antenna a bit strong (Fig. 12) and the elytra narrower than the male at the posterior region. Studied material

Caldera de Los Marteles, Gran Canaria, 10-IV-88, 1 male, (Oromí leg); Hoya de Gamonal, 13-II-88, 1 female, (Oromí leg); Valleseco, Gran Canaria, 1 male and 1 female, (Franz, leg).

Other material

Teror (500 m), 2-XII-68, 1 female; 3-IV-73, 1 male (holotype) and 1 female (paratype) (leg. and coll Palm). Ibidem, 1 male (paratype) (coll. Szymczakowski) (PALM, 1975).

Bionomics

The specimen from Caldera de Los Marteles was collected with traps in the MSS (P. Oromí, *pers. comm.*) and the specimens from Teror in the humus of the *Laurus* Linnaeus, *Castanea* Miller and *Cytisus prolifer* Linnaeus forest (PALM, 1975; SZYM CZAKOWSKI, 1975).

Distribution

Endemic to Gran Canaria Island.

Catops antoniomachadoi Palm, 1975 (Figs. 15-19)

Catops antoniomachadoi Palm, 1975. *Ent. scand.*, 6: 240-246.

Description

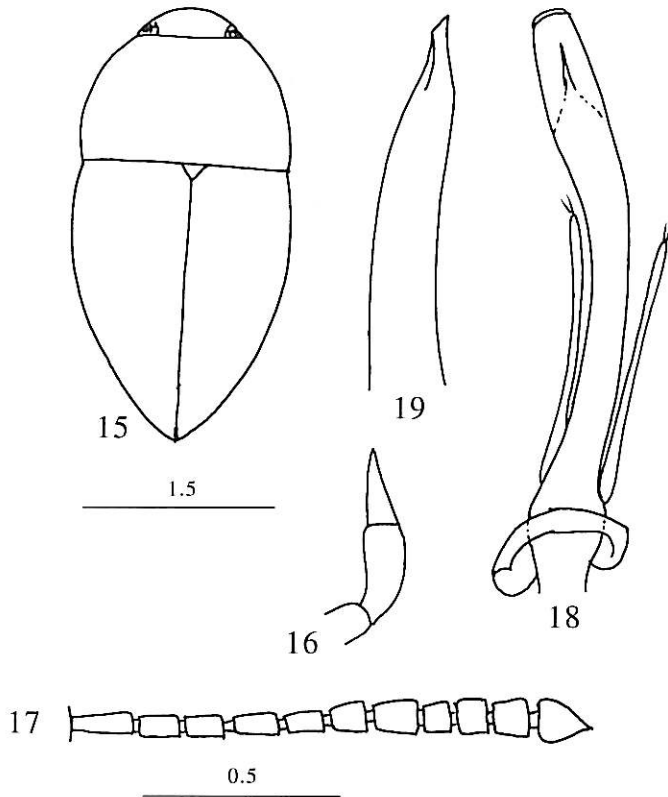
We reproduce the original description of this species (PALM, 1975), because we were unable to study male specimens.

Male: Body length 3.0-3.5 mm; Winged with the body shorter and wider than the others species. Tegument punctuation less pronounced than in the others species. Head and pronotum pubescence more fine, dense and shorter than in *C.thurepalmi*; elytra pubescence similar.

Head: 1.9-2.0 times narrower than the pronotum. Maxillary palpus with the apical segment shorter and narrower than the penultimate one (Fig. 16). Antenna shorter and slender than in *C.thurepalmi*.

Pronotum transverse, 1.75-1.78 times as wide as long, wider than the elytra base, with the side strongly arched; widest after the middle, near to the base.

Elytra 2.35 times longer and 1.05-1.08 wider than the pronotum; protibia strongly arched in the internal side.



Figs. 15-19: *Catops antoniomachadoi* Palm, 1975: Female habitus (15); maxillary palpus (16) (after Palm, 1975); female antenna (17); aedeagus in dorsal (18) and lateral (19) view (after Palm, 1975). Scale in mm.

Aedeagus longer and slender than in *C. thurepalmi* (Figs. 18-19); median lobe not dilated at the apical area, regularly rounded; paramera shorter than the median lobe.

Female: Stronger than the male, with the elytra very narrowed at the apex; the posterior angles very acute (Fig. 15). The antenna according to PALM (1975) are stronger than in the male but, he does not indicate the antennomeres proportions. In the specimen studied we observe that the 2nd and 3rd antennomere have similar size, the 4th is slightly longer than the 5th, the 7th is subsquare, 1.6 times as long as the 8th, this is transverse; the 9th and 10th are lightly transverse; the 11th is 1.1 times as long as wide and it has the same wide than 10th (Fig. 17).

The pronotum and elytra proportions are different than in the male. The pronotum is 1.25 times as wide as long and the elytra are 2.2 times as long as the pronotum. The protibiae are almost straight and the tarsi are not dilated.

Studied material

Tenerife: Barranco de Ijuana, 22-XI-85, 1 female, (Oromí leg).

Other material

Tenerife, Península de Anaga, Anambro (1000 m), 26-I-75, 2 males and 5 female, on fungi (Agaricaceae) in a *Laurus* forest with a humid humud-rich soil (PALM, 1975).

Distribution

Endemic to Tenerife.

KEY TO SPECIES

- 1 General body appearance wider, stronger and more convex; pronotum widest near the middle (Figs. 1-2); antenna strong, with the 8th antennomer very transverse and narrower than the 7th (Figs. 4-5); maxillary palpus with the apical segment similar in length to penultimate one and slightly slender (Fig. 3); aedeagus as shown in figures 6 and 7 *C. velhocabrali* **sp. n.**
- General body appearance different; antenna slender, with the 8th antennomer less transverse, almost with the same width as the 7th 2
- 2 General body appearance slender, with the elytra narrower at the apex; pronotum almost with the same width as the elytra base, widest before the middle (Figs. 8-9); antenna as shown in figures 11 and 12; maxillary palpus with the apical segment almost as long as the penultimate one, and little slender (Fig. 10); aedeagus as shown in figures 13 and 14 *C. thurepalmi* Szymczakowski
- General body appearance less extended, with the elytra very narrow at the end; pronotum narrower than the elytra base, widest near to the elytra base (Fig. 15); antenna as shown in figure 17; maxillary palpus with the last segment shorter and slender than the penultimate one (Fig. 16); aedeagus as shown in figures 18 and 19 *C. antoniomachadoi* Palm

NARGUS Thomson, 1867

SZYMCZAKOWSKI (1975) carried out a complete redescription of the three Canarian species of the genus *Nargus* and he also provided a determination key. For this reason, in this paper, we have focused on enlarging their distribution with new data on localities. We also make some remarks about their bionomics.

In the mentioned paper, Szymczakowski also made some remarks about the species of *Nargus* from Madeira. This species, *N. (N.) vandeli* and *N. (N.) bicolor*, were described by COIFFAIT (1959), just with a unique female specimen for the latter species. However, WOLLASTON (1864) had previously mentioned *N. (N.) velox* from Madeira with a view to collecting one female specimen, without indicating more information about the capture site (JEANNEL, 1936). Due to the difficulty in classifying the female, because externally the species of *Nargus* (*Nargus*) are very similar, Szymczakowski has some doubt about the validity of the *N. (N.) bicolor* and inclusively about the presence of *N. (N.) velox* in Madeira (SZYMCZAKOWSKI, 1975). Moreover, the distribution area of *Nargus (N.) velox* is western and central Europe, representing the only non-endemic species from the Macaronesian.

Nargus (Nargus) alluaudi Jeannel, 1939

Nargus (Nargus) alluaudi Jeannel, 1936. *Mém. Mus. Nat. Hist. Nat., n.s.*, 1: p:233, 142, fig.464.

Type locality

Gran Canaria, San Mateo 1200 m, 3 ex...(Ch. Alluaud 1828), Coll. Mus.Paris.

Studied material

Gran Canaria: Barranco de la Virgen, 2-XI-73, 1 male and 1 female (Oromí leg); Los Marteles, 10-IV-88, 1 female (Oromí leg); Hoya de Gamonal, 19-II-98, 1 female (Oromí leg); Las Lagunetas, 24-II-98, 1 female (Oromí leg).

Other material

Gran Canaria: Teror (500m), 2 to 7-XII-68, 32 ex. (Palm leg); ibidem, 3-IV-73, 20 ex. ; Cruz Tejada, 7-XII-67, 2 ex. (SZYMCZAKOWSKI, 1975)

Bionomics

Most of the specimens were collected among the dead leaves at mountains places. The specimens captured from Los Marteles and La Hoya de Gamonal were collected in the MSS.

Distribution

Endemic to Gran Canaria.

Nargus (Nargus) putridus (Wollaston, 1864)

Catops putridus Wollaston, 1864. *Cat. Canar. Col.*, p.96

Type locality

La Palma. Barranco de La Galga. Coll. British Mus. (Nat.Hist.)

Studied material

La Palma: Llano Negro, 1-II-75, 1 female (Oromí leg); Barranco Fuerte, 8-II-75, 5 ex., (Machado leg.); Garaffa, La Mata, 5-V-90, 2 female (La Roche leg.).

Other material

La Palma: Barranco de La Galga, 28-IV-72, 16 ex. (Palm leg).

Bionomics

The greater part of the specimens were collected among leaf-litter (SZYMCZAKOWSKI, 1975).

Distribution

Endemic to La Palma.

Nargus (Nargus) pinicola (Wollaston, 1865)

Catops pinicola Wollaston, 1865. *Col. Atlant.* p.84 , *Append.* p.12

Type locality

Tenerife: Icod el Alto (Crotch leg.). Coll. British Mus. (Nat.Hist.)

Studied material

Tenerife: Vueltas de Taganana, 15-VIII-72, 1 female (Fernández leg.). La Gomera: El Cedro (1000 m), 5-V-62, 1 female, (Fernández leg.); ibidem, 8 to 10-V-67, 1 male and 1 female (Oromí leg); ibidem, 11-IV-74, 1 male, (Oromí leg.); ibidem, 7-I-83, 1 male, (Oromí leg.); ibidem, 1-IX-84 , 1 male and 1 female (Oromí leg.); Juan Tomé, 28-IV-95, 1 ex., (Oromí leg.); La Meseta, 5-I-75, 1 male (Oromí leg.).

Other material

La Gomera: El Cedro (1,000 m), 8 to 10-V-67, 1 male and 1 female (Palm leg.)

Bionomics

Most of the specimens were collected among leaf-litter in the altitude forest. A part of the specimens captured from El Cedro were collected in the MSS using traps (P. Oromí, com. pers.).

Distribution

Endemic to Tenerife and La Gomera.

***Nargus (Nargus) vandeli* Coiffait, 1959**

Nargus (Nargus) vandeli Coiffait, 1959. *Rev. franç. Ent.*, Paris, 26: 23-25.

Type locality

Madeira: Pico Ruivo

The specimens captured, 6 males and 1 female, were found under stones at 1,750 m altitude in Pico Ruivo

Distribution

Known only from the type locality. Endemic to Madeira.

***Nargus (Nargus) bicolor* Coiffait, 1959**

Nargus (Nargus) bicolor Coiffait, 1959. *Rev. franç. Ent.*, Paris, 26: 23-25.

Type

Madeira: Quemadas

This species was described on the basis of one female specimen which was collected sifting dead leaves. Szymczakowski (1975) doubts the validity of this species. We were unable to study this exemplar and for this reason we considered this species as *incertae sedis*.

Distribution

Known only from the type locality. Endemic to Madeira.

CATOPIDIUS* Jeannel, 1922**Catopidius murrayi* (Wollaston, 1860)**

Catops murrayi Wollaston, 1860. *Ann. Mag. nat. Hist.*, 5: 219.

Type locality

Madeira. Coll. British Mus. (Nat.Hist.)

The description of this species was based on one female specimen captured in the humid forest in Madeira (JEANNEL, 1936). Some years later, COIFFAIT (1959) collected many specimens of this species and described the male's aedeagus. These specimens were captured in the proximity of the forest houses of Rabaçal and Quemadas using traps and sifting dead leaves and soil.

Distribution

Endemic to Madeira.

DISCUSSION

The Azores is faunistically not a diverse archipelago, but much of its apparent poverty is probably a consequence of the poor sampling effort compared with that in Madeira and the Canaries.

S. Maria is the oldest Azorean island with 8.12 Ma B.P. (ABDEL-MONEM *et al.* 1975) with a higher variety of habitats than most of the other Azorean islands. However, the native vegetation is reduced to a small fragment located in the top of Pico Alto, the highest point of the island (587 m).

Arthropod species richness in S. Maria greatly exceeds estimates based on island area, the old geological age and the volcanic stability of the island explaining better its faunistical diversity (BORGES, 1992b, 1997; BORGES & BROWN, 1999). In fact, 39 % (25 species) of the endemic Azorean beetles occur in S. Maria, being 12 species exclusive of the island (see BORGES, 1992b). Particularly interesting is the fact that 50 % of the endemic beetle species exclusive from S. Maria, only occur in the Pico Alto fragment of native forest. Looking for all species of endemic arthropods, 40 out of 91 species occur at Pico Alto native forest (BORGES, unpublished data), which strengthens the importance of this site for conservation purposes.

The three specimens of *C. velhocabrali* sp. n. were collected in three very different habitats: native forest, *Cryptomeria japonica* plantation and Mesocavernous Shallow Stratum (MSS). This follows the same patterns of other endemic species from the island (e. g. the Colydiidae genus *Tarphius*) that, probably as a consequence of the reduction of their native habitat, were able to occupy different alternative habitats (BORGES, 1991). *C. thurepalmi* from the Canaries was also found in MSS, which gives some ecological unity to the genus in the Macaronesia.

Little is known about the zoogeography of the Macaronesian Cholevidae, but SZYMCAKOWSKI (1975) gives some hypothesis for the origin of the Canarian species. The nearest relatives of *Catops velhocabrali* sp. n. are the endemic Canarian species *C. thurepalmi* and *C. antoniomachadoi*. The absence of a *Catops* species endemic from Madeira makes more difficult the construction of the origin of the Azorean species. Recent studies with mitochondrial DNA of Canarian beetles (e.g. JUAN *et al.*, 1995, 1998) strongly indicate that many endemics in the Canaries are most likely to have originated from post-colonization differentiation and divergence. Therefore, we must wait for more consistent molecular data in order to formulate some hypothesis about the origin of *Catops velhocabrali* sp. n.

The fauna from Azorean native forest has received little attention in the past despite its importance as a potential reservoir of endemic taxa. The discovery of *C. velhocabrali* sp. n. is a good example of the results that can be obtained after a systematic sampling of different habitats in a poorly studied region.

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