

## A new species of *Agabus* from south-west Portugal (Coleoptera: Dytiscidae)

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### Abstract

*Agabus picotae*, sp.n., is described as a member of the *Agabus guttatus*-group from Monchique, Algarve, Portugal. It appears to be madicolous, living on wet areas of rocks at the edges of exposed granite. It is illustrated and compared with similar *Agabus* species. A revised key to the western Palearctic species of the *A. guttatus*-group is provided.

**Key words:** Coleoptera, Dytiscidae, Colymbetinae, Agabini, *Dichonectes*, *Agabus guttatus*-group, taxonomy, *Agabus picotae*, new species, Palearctic Region, madicolous

### Introduction

A single female of an unfamiliar species of *Agabus* was found by the senior author in the Riba de Logardo, Monchique on January 1st, 1995. A subsequent visit by both authors established that this was an undescribed species of the *Agabus guttatus*-group associated with wet, exposed rock around Picota Mountain.

### *Agabus picotae* sp.n.

**LOCUS TYPICUS:** Picota Mountain, Monchique, Algarve, Portugal.

**TYPE MATERIAL:** **Holotype** ♂: "PORTUGAL: Monchique SE side of Picota, 225 m 31.3.1996 leg. G.N. Foster & D.T. Bilton" (Naturhistorisches Museum, Vienna - NMW). **Paratypes** (♂♂ + ♀♀): 12 specimens with identical locality data "PORTUGAL: Monchique, Picota, 225-425 m 31.3.1996 leg. Foster & Bilton" dispersed as follows: 1 ♂, Natural History Museum, London, England; 1 ♀, Naturhistorisches Museum, Basel, Switzerland; 1 ♀, Dr. A.N. Nilsson's collection, Umeå, Sweden; 1 ♀, Dr. H. Fery's collection, Berlin, Germany; 1 ♂, 3 ♀♀, G.N. Foster's collection, Ayr, Scotland; 1 ♂, 3 ♀♀, Dr. D.T. Bilton's collection, Plymouth, England - including the gold-spattered specimens used for stereoscanning photomicrographs; 1 ♀: "PORTUGAL: Riba de Logardo, Caldas de Monchique, Algarve 1.1.1995 leg. G.N. Foster" (G.N. Foster's collection, Ayr, Scotland); 2 ♂♂: "PORTUGAL Algarve, Sa. Monchique, between Monchique and Pico de Foia, Ribera da Boina 23.4.1996 leg. C. Hernandes".

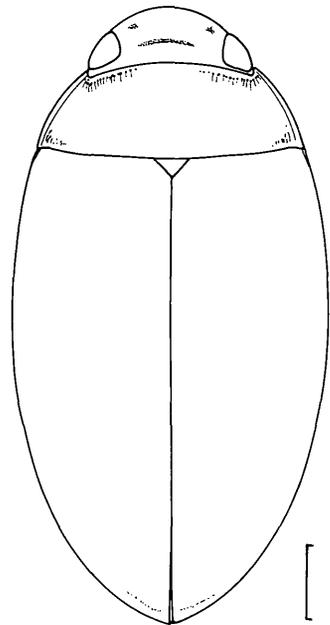
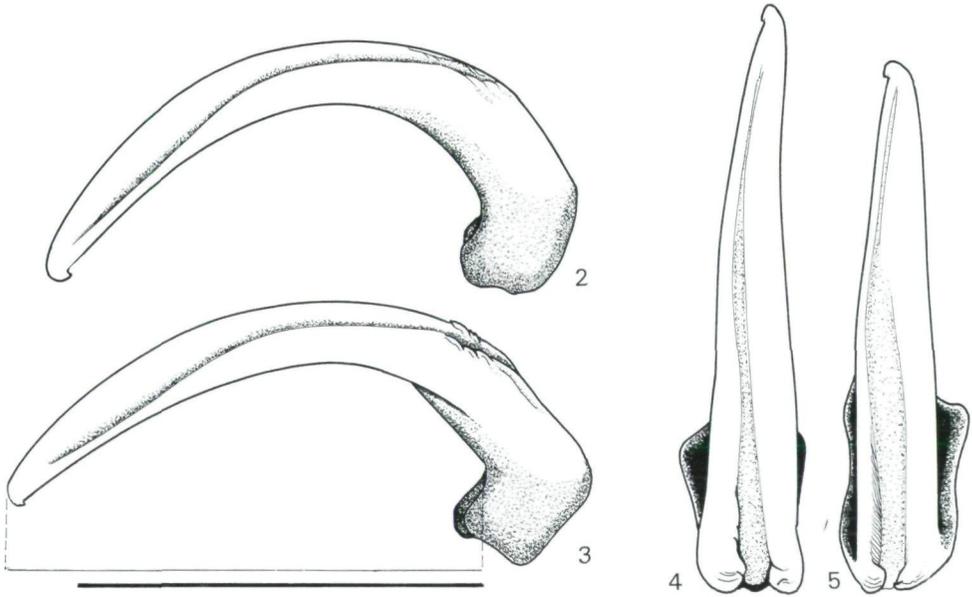


Fig. 1: Habitus of *Agabus picotae* sp.n. Scale is 1 mm.



Figs. 2 - 3: Aedeagi in lateral view: 2) *A. picotae* sp.n., 3) *A. heydeni*. The distance indicated in Fig. 3 is referred to in the text, the thicker line being a scale of 1 mm.

Figs. 4 - 5: Aedeagi in dorsal view: 4) *A. heydeni*, 5) *A. picotae* sp.n.

**Description:** Size 8.2 . 8.6 mm. General shape (Fig. 1) in the field resembling a narrow version of *Agabus didymus* (OLIVIER); body strongly domed, the curvature of the pronotum being distinct from that of the elytra; body outline continuous in that there is no angle between the pronotum and elytra when viewed from above; body widest in the first half of the elytra.

**Head:** black, vertex with two red spots and some specimens with clypeus and centre of frons also reddish; underside usually black but some specimens reddish except for gula; reticulation better developed than on rest of dorsum; palpi and antennae clear testaceous; antennomeres 5 to 8 of the femlae weakly dilated, those of the male noticeably dilated in one plane, i.e. flattened.

**Pronotum and scutellum:** black with reddish brown sides; shining with reticulation weakly impressed; short longitudinal groove medially; anterior transverse line of punctures on the pronotum broadly interrupted, with no more than 5 scattered punctures on either side in between an imaginary line drawn posteriorly from the inner edges of the eyes; scutellum black, smooth and shining, reticulation obsolete in male and weak in female.

**Elytra:** black, smooth and shining with obsolete to weak reticulation, more strongly impressed towards rear in females; each elytron with three sparsely punctured lines; hindmost flecks small and slightly elongate, the middle ones being double with the inner fleck typically larger than the outer, being separated from it by less than the width of the outer one; epipleura black; the specimen taken on 1.I.1995, as is typical of old specimens living in crevices in granite, has deep scratches running in all directions over the dorsum.

Flight capacity: a single non-teneral female (retained as a paratype in G.N. Foster's collection) was dissected - wings fully developed and heavily pigmented and sclerotised along the leading edge; mesosternite well developed and sclerotised but with weak alar sclerites; flight muscles developed.

Thoracic sternites: prosternum black or partly dark red; prosternal process short, with strong marginal beading; prosternal keel not running onto flat process; mesosternum black; metasternum black with broad "wings"; coxal lines sinuate, slightly deflected outwards.

Legs: dark testaceous, with distal parts of femora and tibiae almost black, trochanters contrastingly paler; male fore and mid tarsi narrow, barely wider than those of the female, the first two segments carrying adhesive setae; inner fore claw of male without a tooth, but fore claws of male about 25 % shorter than those of the female and slightly unequal, the outer one being a little more curved than the inner.

Abdominal sternites: black, shining with weak reticulation.

Genitalia: aedeagus (Figs 2, 5) very similar to those of *A. heydeni* (Figs 3, 4) and *A. guttatus*, with a small denticle on the underside of the tip. High power stereoscanning microscopy failed to reveal consistent differences from *A. heydeni* in the shape of aedeagal tip, its setation or the width of the duct. Differences that might be construed from the figures, such as the width of the duct, the strength of curvature, and the structure of the base vary with the individual. It does, however, appear that the extremity of the aedeagus of *A. heydeni* is marginally narrower and longer than in *A. picotae*. The aedeagus of *A. picotae* is therefore smaller than that of the smaller species *A. heydeni*. The full length of the aedeagus is difficult to measure in all specimens, owing to membranous tissues sometimes obscuring the full extent of the base. From its tip to the furthest part of the inner side (Fig. 3), the aedeagus of *A. heydeni* measures 1.1 to 1.2 mm whereas that of *A. picotae* (Fig. 2) measures 1.05 to 1.09 mm. No useful differences could be detected between *A. heydeni* and *A. picotae* in the parameres or female genitalia.

Habitat: under rocks on and in crevices on expanses of exposed granite receiving flowing water; also in a stream pool at the base of such an area. A similar habit is seen in the Tyrrhenian *Agabus aubei* PERRIS, and to some extent *A. maderensis* WOLLASTON of the Madeiran Archipelago. This appears to be the first record of a madicolous colymbetine from mainland Europe.

Etymology: the epithet is formed as the genitive female singular of *Picota*, the mountain around which the beetle was first found.

### Key to *Agabus guttatus*-group in the western Palaearctic Region

The *A. guttatus*-group is Palaearctic and includes 24 species. It was named as the subgenus *Dichonectes* by GUIGNOT (1945), and divided into a series of species-groups (GUIGNOT 1959). It has been treated as a large species-group of *Agabus* by, among others, NILSSON & HOLMEN (1995), and also as a species-group of the genus *Gaurodytes* (ZIMMERMANN 1934). The beetles are characterised by having the clypeus with a more or less continuously beaded edge, and the pronotum without such an anterior beading. The anterior transverse line of punctures on the pronotum is interrupted in the middle. The third mid-tarsal segment lacks adhesive setae. Most species are dark and metallic, with distinct elytral spots, though some have pale brown elytra either as species or as varieties. All species are associated with running water, often in mountains. The group includes two taxa, *A. biguttatus* (OLIVIER) and *A. nitidus* (FABRICIUS), which we regard as extremes of a single species complex, keyed below as one of the eight species of the western Palaearctic fauna.

- 1 Underside of first hind-tarsal segment with a single series of setae. Palpi and antennae without darkened tips. Male fore-claws not dentate. Pronotum dark brown with light testaceous margins. Elytra typically pale brown with paler shoulders and main elytral spot usually comprising three joined marks. Aedeagal tip with shallow tooth on underside. 7 - 8 mm. Corsica, Sardinia, north-west Italy and Sicily. .... *binotatus* AUBÉ

- Underside of first hind-tarsal segment with two series of setae. Palpi and antennae with or without darkened tips. Male fore-claws with or without teeth. Elytra usually dark with main elytral spots.....2
- 2 Inner fore-tarsal claw of male with distinct medial tooth. Apex of aedeagus lacking tooth on underside.....3
- Inner fore-tarsal claw of male simple. Apex of aedeagus with distinct shallow tooth on underside.....4
- 3 Size larger, length 8 - 11 mm. Maxillary palpi dark, each segment almost black in first two-thirds, dark testaceous in apical third. Upper surface entirely black except for two pale elytral spots, or black with light brown elytra (ab. *nigricollis* ZUBKOV). Aedeagus relatively large with bluntly rounded apex. Western and central Europe, Canary Islands (var. *consanguineus* WOLLASTON), Circummediterranean east to Syria and Central Asia, southern European Russia, Transcaucasia, steppe zone of west Siberia..... *biguttatus* (OLIVIER)
- Size smaller, length 6.2 - 8.0 mm. Maxillary palpi, antennae and legs wholly testaceous. Upper surface entirely testaceous brown, elytral spots indistinct or absent. Aedeagus smaller, with bluntly pointed apex. Females varying widely in intensity of reticulation of the dorsum, some being shining and others dull. Endemic to Madeiran archipelago (Madeira and Porto Santo)..... *maderensis* WOLLASTON
- 4 Elytral epipleurs paler, light brown-testaceous. Upper surface usually testaceous or dark brown, uniform in colour. Middle elytral spots yellowish and large, though sometimes absent. Body relatively flattened, 7.8 - 8.6 mm in length. Eastern and central Mediterranean, Italy, former Yugoslavia, Greece, Corfu, Cyprus, Tunisia and Algeria, Asia Minor, Syria (var. *castaneus* SHARP), Transcaucasia and Crimea..... *dilatatus* (BRULLÉ)
- Elytral epipleurs dark. Upper surface of body typically very dark brown to black, with or without pale elytral spots. Body flattened or slightly arched.....5
- 5 Body shape tending towards being "carabiform", pronotum broadest before middle, and with base much narrower than elytra at shoulders (see SHARP 1882, Fig. 166). Habitus flattened, head appearing extremely large and broad. Intensely shining with reticulation of dorsum being distinct but wide meshed; dark, elytral spots obscure or absent. Length 9.2 - 10.3 mm. Endemic to Corsican mountains..... *cephalotes* REICHE
- Body shape not carabiform, less strongly flattened. Pronotum broadest at or behind middle.....6
- 6 Male with aedeagus relatively larger, exceeding 1.4 mm from its tip to the furthest part of the inner side (see Fig. 3 for this measurement). Aedeagus thicker, 125 - 140  $\mu$ m wide (250  $\mu$ m from denticle). Upper surface dark pitchy brown to black, often with slight aeneous reflections. Lateral margins of pronotum lighter. Palpi, legs and antennae uniformly pale. A widespread west Palaearctic species distributed from northern and central Europe to northern and central Iberia, and Italy, the Balkans, Asia Minor, European Russia and west Siberia..... *guttatus* (PAYKULL)
- Male with aedeagus relatively smaller, 11.0 - 1.2 mm from its tip to the furthest part of the inner side (see Fig. 3). Aedeagus thinner, 175 - 200  $\mu$ m wide (250  $\mu$ m from denticle). Upper surface dark pitchy brown to black. Palpi, legs and antennae light or dark testaceous.....7
- 7 Body smaller and narrower, more parallel-sided. Length 7.0 - 7.5 mm, maximum width 3.6 - 3.8 mm. Penis (Figs 3, 4) slightly longer than in next species and narrower in dorsal view towards apex. Male fore claws of similar length to those of female. Iberian endemic known from Galicia to León in north-western Spain, northern Portugal south to Beira Alta and Douro Littoral, central and southern Spain (Avila, Madrid, Salamanca, Cadiz, Granada and Jaén)..... *heydeni* WEHNCKE
- Body larger and broader, more rounded at sides (Fig. 1). Male fore claws about 20% shorter than female fore claws. Length 8.2 - 8.6 mm, maximum width 4.2 - 4.5 mm. Penis (Figs 2, 5) slightly shorter than in *A. heydeni*, broader in dorsal view at apex. Iberian endemic (Serra de Monchique, Algarve, Portugal)..... *picotae* sp.n.

## Discussion

The Serra de Monchique are based on a granite massif dominated to the west by the Madrinha and Foia peaks, at 900 metres, and, south-east of Monchique, by the promontory of Picota at 772 metres. We could not find suitable habitats on the western part of the massif but Carlos Hernandez found 22 specimens in a stream near to Foia in April 1996. POLUNIN & SMYTHIES (1973) described the Serra de Monchique as being formed of foyaite and syenite, surrounded by schists. The western end of the Serra has the highest annual rainfall of the Algarve, and this has led to the construction of irrigated terraces more so there than on the thinner soils surrounding Picota. POLUNIN & SMYTHIES (1973) noted that the original oak forests of the area had disappeared but that some chestnut coppice was maintained, though the hills are now mainly afforested with eucalypts and stone pines (*Pinus pinaster* AITON); POLUNIN & SMYTHIES (1973) remarked that Picota had a more diverse and natural flora than Foia.

The massif is an isolated montane area with acidic water, surrounded by base-rich *terra rossa* lowlands. It is the most south-western mountain system in Europe, and it is interesting to note that *A. maderensis*, found even further south-west on Madeira, is also partly madicolous. We suspect that future investigation of the Monchique area may reveal further endemic, madicolous species.

The first four specimens of *Agabus picotae* were found in a stream pool below a road bridge. However, the majority of specimens were found in thin films of running water under stones or at the edges of steeply sloping exposures of granite, some of which had apparently resulted from quarrying. Species typically associated with it were *Hydroporus obsoletus* AUBÉ, *Agabus brunneus* (FABRICIUS), *Enochrus morenae* (HEYDEN), *Laccobius atrocephalus* REITTER and *Dryops algericus* (LUCAS).

It should also be noted that the beetles occurred above the Caldas de Monchique, hot springs originally used in Roman times. We did not fully investigate the possibility that the species might be associated with these springs, which are enclosed and unsuitable for sampling.

This beetle has almost certainly been detected in the past. Concerning *Agabus*, SHARP (1878) wrote "n. sp.? As I have not yet critically studied all the European species of *Agabus*, I leave without name for the present, what I believe to be an undescribed species, found by M. van Volxem at Monchique. I have found the same species in the Guadarrama and at Reynosa." It is possible that he was not then aware of the description of *A. heydeni* WEHNCKE, 1872. In his world review SHARP (1882) made no comment on his earlier remarks when discussing *A. heydeni*. There is no specimen of *A. picotae* in Sharp's material in the Natural History Museum, London. FRESNEDA & FERY (1992) designated the lectotype of *A. heydeni* from Esploradóra, at Güéjar Sierra, on the west side of the Sierra Nevada.

*Agabus picotae* is clearly closely related to the Iberian endemic *A. heydeni*, sharing with this species a number of features including lack of a tooth on the inner claw of the male fore-tarsi, aedeagal structure and style of elytral microreticulation. It appears that the two taxa represent vicariant sister species, *A. heydeni* being found in the north-west, centre and south-east of the Iberian peninsula and *A. picotae* being apparently restricted to an isolated massif in the extreme south-west. The only other Iberian *Agabus* so far described with a similarly limited range is *Agabus hozgargantae* BURMEISTER, which appears to be restricted to streams in a small region immediately north of Gibraltar. In a similar way to Monchique this region has a rather isolated climatic regime, being one of the wettest areas in Spain.

## Summary

*Agabus picotae* sp.n. is described and figured from the Serra de Monchique, Algarve, Portugal, as a member of the *A. guttatus*-group. The new species appears to be madicolous, occurring in

trickles over bare granite rock faces, and is closely related to the Iberian endemic *Agabus heydeni*. The habitat and ecology of the new species are briefly described, and a key is provided to distinguish it from Mediterranean and Macaronesian species of the *Agabus guttatus*-group.

### Acknowledgments

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