Achille Casale* - Pier Mauro Giachino** - Dante Vailati*** - Ron Felix****

The genus *Duvalius* in Mount Pílio (Thessalia, Greece) with descriptions of two new species
(Coleoptera Carabidae Trechinae)[#]

Riassunto: *Il genere* Duvalius *nel Monte Pílio* (*Thessalia, Grecia*)*, con descrizione di due nuove specie* (*Coleoptera Carabidae Trechinae*).
Gli autori presentano un contributo su tre specie di *Duvalius* delle foreste e delle grotte del Monte Pílio (Tessaglia, Grecia). *Duvalius* (*Duvalius*) *moczarskii* (G. Müller, 1917) viene ridescritto sulla base del materiale tipico e di altri esemplari raccolti recentemente. Sono inoltre descritte due specie simpatriche dello stesso massiccio: *D.* (*D.*) *marijkeae* n. sp., raccolto sia in grotta sia in Ambiente Sotterraneo Superficiale (M.S.S.), e *D.* (*D.*) *chironis* n. sp., raccolto con trappole nel solo M.S.S. (due esemplari in due anni diversi).
Sono forniti dati sulla distribuzione e considerazioni delle affinità di queste e altre specie di *Duvalius* di Grecia.

Abstract: The authors present a contribution to the knowledge of three *Duvalius* species known from forests and caves in Mount Pílio (Thessalia, Greece). *Duvalius* (*Duvalius*) *moczarskii* (G. Müller, 1917) is redescribed from the type material and further specimens sampled in recent years. Furthermore, the authors describe two sympatric species living in the same massif: *D.* (*D.*) *marijkeae* sp. n., sampled both in a cave and in Superficial Subterranean Habitat (M.S.S.), and *D.* (*D.*) *chironis* sp. n., only sampled by traps in M.S.S. (two individuals in two different years). Notes about relationships and distribution of these and other *Duvalius* species from Greece are also added.

Key words: Coleoptera, Carabidae, Trechinae, *Duvalius marijkeae* new species, *Duvalius chironis* new species.

Introduction

In May 1989 two of the authors (A.C. and P.M.G.), along with the late Lucien Genest from Grenoble (France), visited the Mount Pílio, located behind the town of Volos in Thessalia, with the intention of finding *Duvalius moczarskii* (Müller, 1917), a species never found again after its original description. By digging in a groove in a beech forest near the village of Hánia, at an altitude of about 1000 m a.s.l., a small series of a *Duvalius* species attributed to *D. moczarskii* was found, through examination of genitalia of some male specimens. The rest of the series, in the belief that in Mt. Pílio there was only one species of *Duvalius*, was attributed *ex patria* to *D. moczarskii*.

In the following years, between 1990 and 1993, two of the authors (P.M.G. and D.V.) began to apply also to Mt. Pílio the search technique in the Superficial Subterranean Habitat (MSS), subsequently published in Giachino & Vailati (2010), obtaining a further small series of *Duvalius* all, with the exception of only two specimens clearly belonging to another species, assigned *ex patria* to *D . moczarskii*.

Towards the end of 2015 one of the authors (R.F.) informed P.M.G. of the discovery in a cave of Mt. Pílio by Hans Henderickx and Marijke Peeters of a *Duvalius* species not attributable either to *D. moczarskii* nor to the new species already identified by P.M.G. and D.V. This news, together with the fact that now the complexity and diversity of the genus *Duvalius* in the mountains of Greece was clearly evident (Casale *et al*., 2013), encouraged us to re-examine all the *Duvalius* specimens collected so far in Mt. Pílio, pointing out that the last species was already collected in the Superficial Subterranean Habitat since 1989.

*Achille Casale, c/o Università di Sassari, Dipartimento di Scienze della Natura e del territorio (Sez. Zoologia); private: Corso Raffaello 12, 10126 Torino, Italy. E-mail: a_casale@libero.it
**Pier Mauro Giachino, Settore Fitosanitario Regionale, Environment Park, Palazzina A2, via Livorno 60, 10144 Torino, Italy. E-mail: piermauro.giachino@regione.piemonte.it
***Dante Vailati, Via Interna 8, 25127 Brescia, Italy. E-mail: dante.vailati@libero.it
****Ron Felix Hazelaarlaan 51, 5056 XP, Berkel Enschot, the Netherlands. E-mail: r.felix3@kpnplanet.nl
#Results of the programme "Research Missions in the Mediterranean Basin" sponsored by the World Biodiversity Association onlus. XXXVIII contribution.

Materials and Methods

Acronyms

The materials used for this study are deposited in the following Museums and private collections:

CCa	Collection Achille Casale, Torino (Italy)
CFe	Collection Ron Felix, Berkel Enschot (Netherlands)
CGi	Collection Pier Mauro Giachino, Torino (Italy)
CVa	Collection Dante Vailati, Brescia (Italy)
NHMB	(Coll. Frey) Naturhistorisches Museum Basel (Switzerland)

For the type material, the following acronyms are used:

HT	Holotypus
PT, PTT	Paratypus (i)
LT	Lectotypus
PLT	Paralectotypus

For the measurements, the following acronyms are used:

TL:	Total body length (measured from the anterior margin of clypeus to the apex of the elytra).
L:	Overall length, from apex of mandibles to apex of the elytra measured along the suture.
PW/PL:	ratio maximum Width of Pronotum, as greatest transverse distance/Length of Pronotum, as linear distance from the anterior to the basal margin, measured along the midline.
EL/EW:	ratio Length of Elytra, as linear distance from the basal ridge to the apex, measured along the suture/maximum Width of Elytra.

Materials

The materials gathered by the authors throughout different research campains must be added to those collected by Hans Henderickx in 2015 in addition to the type series of *D. moczarskii* preserved in the NHMB collections.

Methods

Specimens were sampled by digging soil and litter, in a cave, and by traps placed in deep crevices and baited with cheese and salted water.

A detailed examination of the specimens required, also for the drawing, the making of microscopic slides of male genitalia and the copulatory piece by means of the inclusion into Canada Balsam. The drawings of male genitalia were performed by using a camera lucida applied to a Leitz Dialux microscope, while the drawings of the habitus as a whole were made with the use of a micrometer grid applied to a Wild M3 stereomicroscope.

Results

Duvalius (Duvalius) moczarskii (G. Müller, 1917) (Figs. 1-4)

Trechus (*Duvalius*) *moczarskii* G. Müller, 1917: 611.
Loc. typ.: mont Pelion (coll. Breit).

Duvalius moczarskii G. Müller, 1917: Jeannel, 1928: 574.
Duvalius moczarskii G. Müller, 1917: Casale & Laneyrie, 1982: 199.
Duvalius moczarskii G. Müller, 1917: Casale *et al*., 1996: 311.
Duvalius moczarskii (G. Müller, 1917): Löbl & Smetana, 2003: 304.
Duvalius moczarskii (G. Müller, 1917): Lorenz, 2005: 198.
Duvalius moczarskii G. Müller, 1917: Casale, 2011: 142.

Type material. HT ♂, Pelion Thessalien (white, printed); Type (red, printed); Duvalius moczarskii Mull. (white, handwritten); ex Orig. Samlg. J. Breit. Wien (red, printed); Lectotype 1956 det. Kamp (white, handwritten); Lectotypus *Trechus moczarskii* G. Müller, 1917 A. Casale, P.M. Giachino, D. Vailati & R. Felix des, 2017 (red, printed) (NHMB) (examined).
PLT ♀, Pelion Thessalien (white, printed); Type (red, printed); Paratypoid (red, printed); ex Orig. Samlg. J. Breit. Wien (red, printed); Paralectotypus *Trechus moczarskii* G. Müller, 1917 A. Casale, P.M. Giachino, D. Vailati & R. Felix des, 2017 (red, printed) (NHMB) (examined).

Further material examined. 4 ♂♂ 3 ♀♀, Grecia, Volos, M. Pelio, m 1000, 17/18.V.1989, A. Casale leg. (CCa); 1 ♂ 4 ♀♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1000, 18.V.1989, P. M. Giachino leg. (CGi); 3 ♂♂ 1 ♀, Grecia, n. Magnissía, O. Pílio, Hánia m 1100, 25.V.1990, Giachino & Vailati leg. (CGi); 1 ♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, 13.VI.1991, P.M.

Giachino leg. (CGi); 1 ♂ 1 ♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, 13.VI.1991/7.VI.1992, Giachino & Vailati leg. (CGi, CVa).

NOTES. The male specimen originally indicated as "Type" was already dissected by Jeannel, but we were unable to find the microscopic slides of male genitalia illustrated by Jeannel (1928: 574, and see below, in Taxonomic Remarks). Maybe, these genitalia could have been kept by Jeannel and preserved in the Paris National Museum of Natural History.

The two specimens of the type series were arbitrarily designated but never published as "Lectotype" and "Paratypoid" by Kamp in 1956; therefore it was necessary to proceed to the formal designation of a Lectotypus.

The examination of the external characters and aedeagus of male specimens collected by us in Mt. Pílio, compared with the drawings provided by Jeannel (1928) and the male LT (without aedeagus) allowed us to identify *D. moczarskii* from the two other sympatric and syntopic species.

REDESCRIPTION. General features as in Fig. 1. Medium-sized species: TL: 4.38 mm LT ♂; 3.74 - 4.60 mm ♂♂; 4.46 - 4.84 mm ♀♀; L: 4.79 mm LT ♂; 3.94 - 5.03 mm ♂♂; 4.79 - 5.34 mm ♀♀.

Colour testaceous, with paler yellow reddish palpi, antennae and legs.

Dorsal surface shiny; transversal cuticular microlines slightly evident on frons and pronotum, scarcely visible as polygonal meshes on elytral intervals.

Head robust, with swollen genae narrowed to the neck constriction and frontal furrows markedly impressed, smooth, almost straight in the anterior third; frons convex; supraorbital setiferous punctures inserted on ranges slightly convergent backwards; eyes smallest in size, flat, reduced to whitish oblique spots, with traces of slightly distinguishable ommatidia; labrum slightly emarginate at the anterior side, straight in the middle; mentum tooth prominent, bifid at apex; antennae elongate, exceeding backwards the level of the fourth humeral setiferous puncture.

Pronotum cordiform, transverse (ratio PL/PW: 0.83-0.86), wider than head, widest at the anterior third; disc convex, smooth; lateral margins markedly arcuate in front, shortly and slightly sinuate towards the hind angles, which are rectangular or acute; marginal furrows shallow; anterior margin straight, front angles obtusely prominent in front; base straight, basal foveae elongate and deep.

Elytra elongate (ratio EL/EW: 1.50-1.61), slightly widened at the apical third, much wider than prothorax; disc depressed; humeri rounded but evident, with pre-humeral margins oblique; lateral furrows relatively wide and deep; striae all visible: striae 1-4 much deeper, 5-6 reduced to series of punctures, stria 7 almost effaced; apical striola very deep and curved, connected by some points with apex of stria 5; intervals flat; apical carina developed. Chaetotaxy

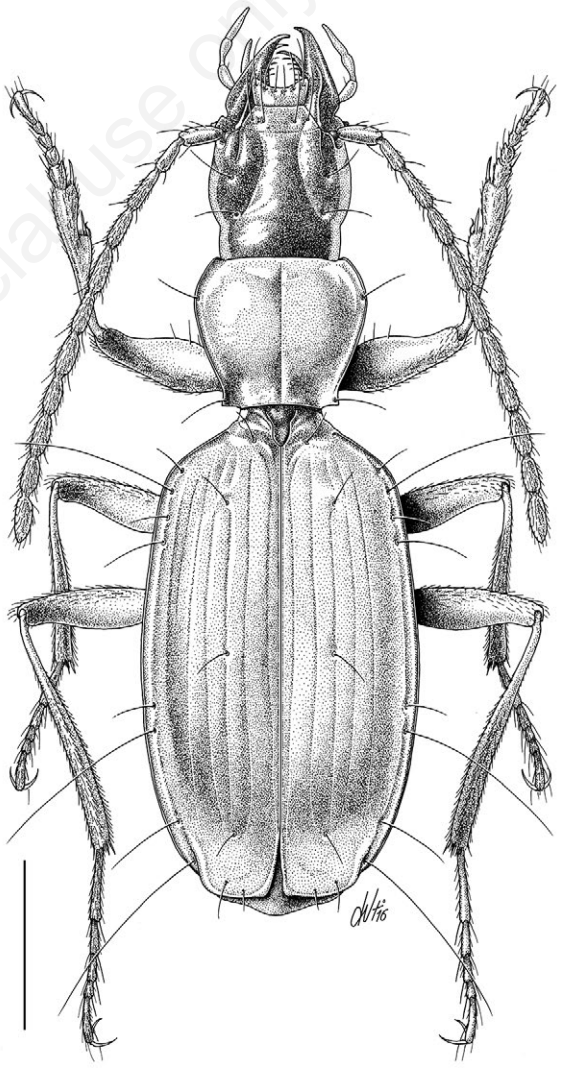


Fig. 1. *Duvalius moczarskii* G. Müller, 1917, habitus of ♂ (scale bar: 1 mm).

as in Fig. 1: three setiferous discal punctures (two discal, one pre-apical) on stria 3, the third one inserted anteriorly to the level of the 8th of the umbilicate series; umbilicate pores 5 and 6 very close to each other; apical and angulo-apical punctures present, forming with the pre-apical puncture an apical triangle.

Abdominal sterna IV - VII with a pair of setae, two pairs on VII in female.

Legs long, slender; protibiae slightly dilated and sparsely pubescent at apex, each with a long groove on the external side; protarsi in the male each with two basal tarsomeres dilated and denticulate inwards.

Male genitalia as in Figs. 2-4. Median lobe of aedeagus relatively stout and thickened, in lateral aspect regularly bent basally and slightly sinuate in the apical third, regularly narrowed at apex; basal bulb very large, inflated, with wide basal orifice; sagittal carina absent. In dorsal aspect it is wide, almost straight and parallel sided, markedly narrowed and obtusely rounded at apex. Endophallus armed with an elongate, "isotopic" copulatory piece, rounded at apex in lateral aspect, slightly bilobed in dorsal aspect, bifid at base, and a series of small, sclerotized spines that fringe the basal tract of lateral sides of the copulatory piece. Parameres robust, each with four apical setae.

Female genitalia: not examined.

TAXONOMIC REMARKS. *Trechus* (*Duvalius*) *moczarskii* was described by Müller (1917: 611), with type locality the mount "Pelion", from two specimens in the Breit collection (now in the Frey collection by the NHMB).

Later Jeannel (1928) treated this taxon as member of the genus *Duvalius* subgenus *Duvalius* Delarouzée, 1859, and provided drawings of both habitus and male genitalia. With this name the species was cited in subsequent catalogues and contributions (Casale & Laneyrie, 1982: 199; Casale *et al*., 1996: 311; Löbl & Smetana, 2003: 304; Lorenz, 2005: 198; Casale, 2011: 142).

The copulatory piece illustrated by Jeannel (1928) for *D. moczarskii* is rather different from that we have examined in several specimens from the type locality. On the contrary, it is almost identical to that of *D. zaimisi* Jeannel, 1929, described from Mt. Ossa, a massif north of Mt. Pílio (Figs. 5-7). These two taxa are very close to each other, so that we suspect that Jeannel in his monograph wrongly illustrated the copulatory piece of the latter in place of that of *D. moczarskii.*

Duvalius (Duvalius) marijkeae sp. nov. (Figs. 8-11)

LOC. TYP.: Greece, Mt. Pílio (= Pelion), Mouresi, Tsouka Cave, 220 m.

TYPE MATERIAL. HT ♂, Gr. Mt. Pelion, Mouresi, Tsouka Cave, 39°23'52.53''N 23°10'11.44''E, 8.9.2015, Marijke Peeters (CGi).
PTT: 1 ♀, Gr. Mt. Pelion, Mouresi, Tsouka Cave, 8 sep. 2015, M. Peeters leg. (CFe); 1 ♂, Grecia, n. Magnissía, O. Pílio, Hánia, m 1000, 18.V.1989, P. M. Giachino leg. (CGi); 2 ♀♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, V.1989/25.V.1990, P. M. Giachino leg. (CGi); 2 ♀♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, 25.V.1990, P. M. Giachino leg. (CGi); 6 ♀♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, 13.VI.1991, P.M Giachino & D. Vailati leg. (CCa, CFe, CGi, CVa); 2 ♂♂ 3 ♀♀, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, 13.VI.1991/7.VI.1992, P.M Giachino & D. Vailati leg. (CCa, CGi, CVa); 1 ♀, Grecia, n. Magnissía, O. Pílio, str. Hánia-Makriráhi, m 950, 6.VI.1993, Giachino & Vailati leg. (CGi).

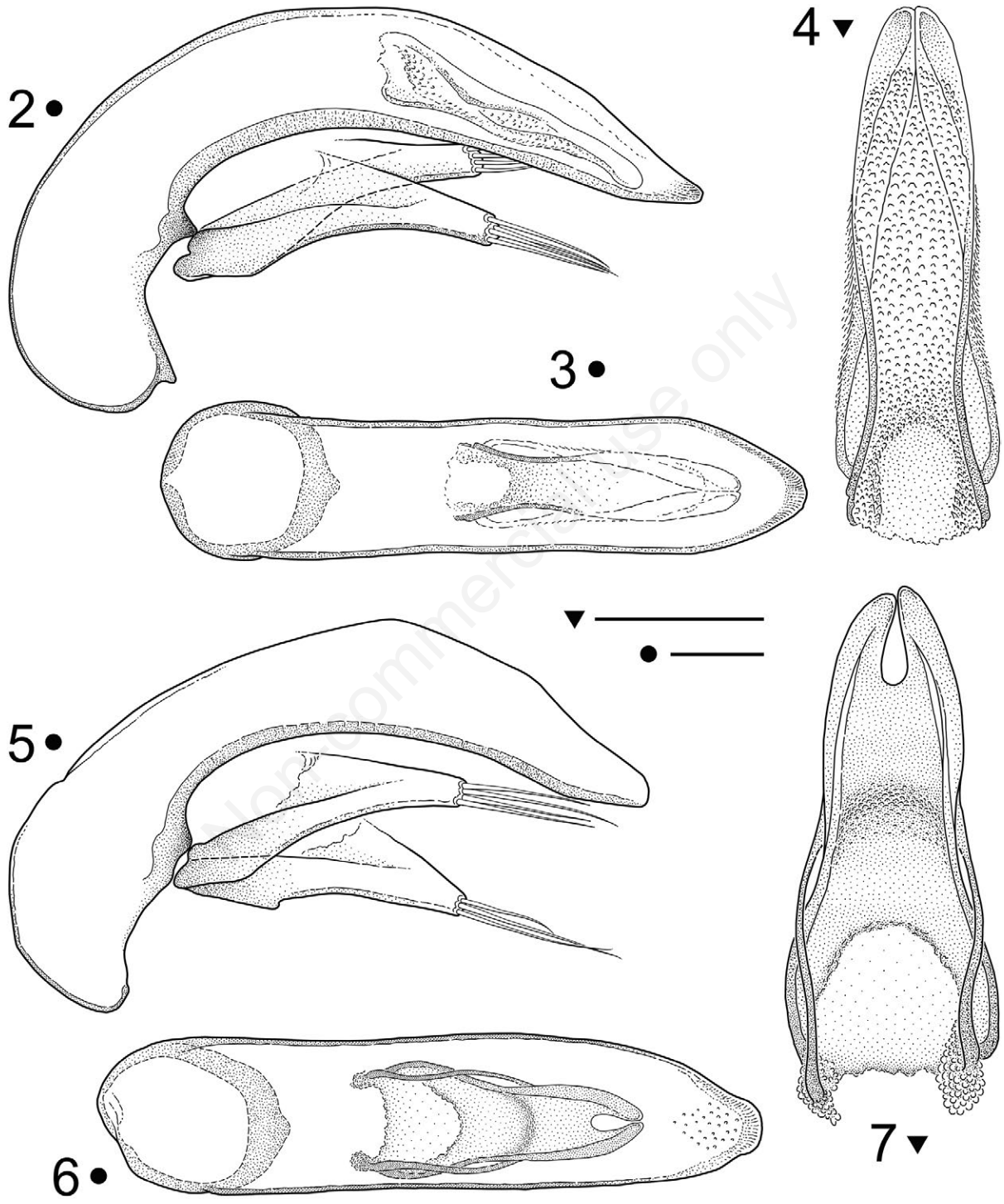
DIAGNOSIS. Very similar in external features and close to *D.* (*D.*) *moczarskii,* from which it is distinct by the more atrophied eyes, reduced to oblique impressions without evident ommatidia, the position of the preapical discal pore of elytra moved backwards to the level of the 8th pore of the umbilicate series, and by the different shape of median lobe of aedeagus and copulatory piece.

DESCRIPTION. General features as in Fig. 8. Medium-sized species: TL: 4.06-4.30 mm ♂♂; 4.08-4.63 mm ♀♀; L: 4.41-4.57 mm ♂♂; 4.19-4.93 ♀♀.

Colour testaceous, with paler yellow reddish palpi, antennae and legs.

Dorsal surface shiny; transversal cuticular microlines slightly evident on frons, almost vanished on pronotum, scarcely visible as polygonal meshes on elytral intervals.

Head robust, with swollen genae narrowed to the neck constriction and frontal furrows markedly impressed, smooth, almost straight in the anterior third; frons convex; supraorbital setiferous punctures inserted on ranges slightly convergent backwards; eyes absent, reduced to oblique impressions without distinguishable ommatidia; labrum slightly emarginate at the anterior side; mentum tooth prominent, bifid at



Figs. 2-7. *Duvalius* spp., aedeagus in lateral view (2, 5), aedeagus in dorsal view (3, 6) and copulatory piece (4, 7). *Duvalius moczarskii* G. Müller, 1917 (2-4); *Duvalius zaimisi* Jeannel, 1929 from Mt. Ossa (5-7) (scale bar: 0.1 mm).

apex; antennae elongate, exceeding backwards the level of the fourth humeral setiferous puncture.

Pronotum cordiform, transverse (ratio PL/PW: 0.84-0.86), wider than head, widest at the anterior third; disc convex, smooth; lateral margins markedly arcuate in front, shortly and slightly sinuate towards the hind angles, which are rectangular or acute; marginal furrows shallow; anterior margin straight or slightly prominent, front angles obtusely prominent in front; base straight, basal foveae elongate and deep.

Elytra elongate-ovate (ratio EL/EW: 1.55-1.56), widened at the apical third, much wider than prothorax; disc depressed; humeri rounded but evident, with prehumeral margins oblique; lateral furrows relatively wide and deep; striae all visible: striae 1-4 much deeper, 5-6 reduced to series of punctures, stria 7 almost effaced; apical striola very deep and curved, connected by some points with apex of stria 5; intervals flat; apical carina developed. Chaetotaxy as in Fig. 8: three setiferous discal punctures (two discal, one pre-apical) on stria 3, the third one inserted anteriorly at the level of the pore 8 of the umbilicate series; umbilicate pores 5 and 6 very close to each other; apical and angulo-apical punctures present, forming with the pre-apical puncture an apical triangle.

Abdominal sterna IV - VII with a pair of setae, two pairs on VII in female.

Legs long, slender; protibiae slightly dilated and sparsely pubescent at apex, each with a long groove on the external side; protarsi in the male each with two basal tarsomeres dilated and denticulate inwards.

Male genitalia as in Figs. 9-11. Median lobe of aedeagus relatively stout and thickened, in lateral aspect regularly bent basally and slightly sinuate in the apical third, regularly narrowed at apex; basal bulb large, inflated, with wide basal orifice; sagittal carina absent. In dorsal aspect it is wide, almost straight and parallel sided, moderately narrowed and rounded at apex. Endophallus armed with a large-sized "isotopic" copulatory piece, very elongate, flattened and sinuate in lateral aspect, slightly bilobed in dorsal aspect, deeply bifid at base, and a series of small, sclerotized spines that fringe the basal and medium tract of lateral sides of the copulatory piece. Parameres robust, each with three-four apical setae.

Female genitalia: not examined.

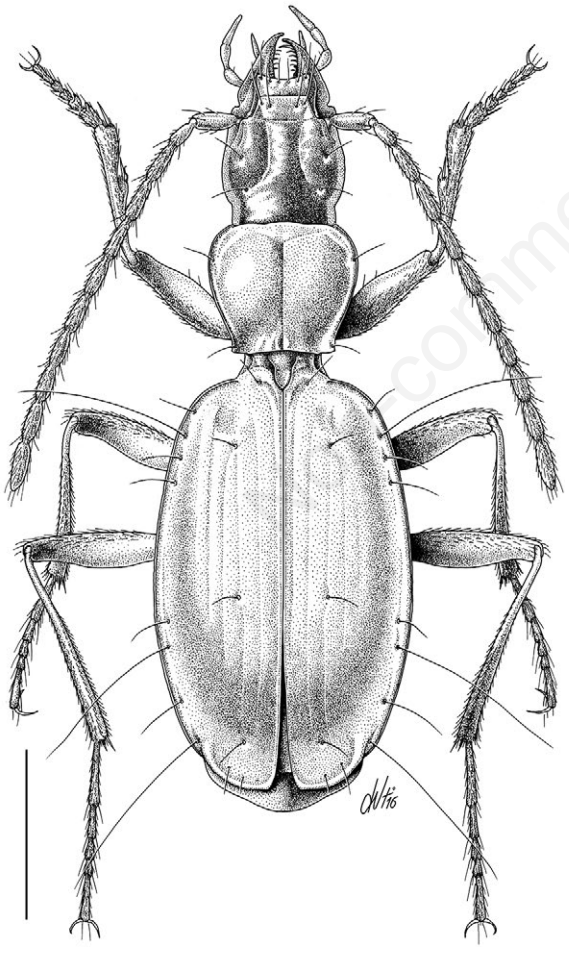


Fig. 8. *Duvalius marijkeae* sp. n., habitus of HT ♂ (scale bar: 1 mm).

ETYMOLOGY. We dedicate with pleasure this new species to one of its collectors, Dr. Marijke Peeters, Belgian therapist, who always accompanied her partner Hans Henderickx, photographer and well known specialist of Pseudoscorpionida and Strepsiptera, in his travels to collect cave Pseudoscorpionida.

Duvalius (Duvalius) chironis sp. nov. (Figs. 12-15)

LOC. TYP.: Greece, n. Magnissía, O. Pílio (= Pelion), Hánia, m 1100.

TYPE SERIES. HT ♂, Grecia, n. Magnissía, O. Pílio, Hánia, m 1100, V.1989/25.V.1990, P. M. Giachino leg. (CGi).

PT: 1 ♀, Grecia n. Magnissía, O. Pílio, str. Hánia-Makriráhi, m 900, 13.VI.1991/7.VI.1992, Giachino & Vailati leg. (CVa).

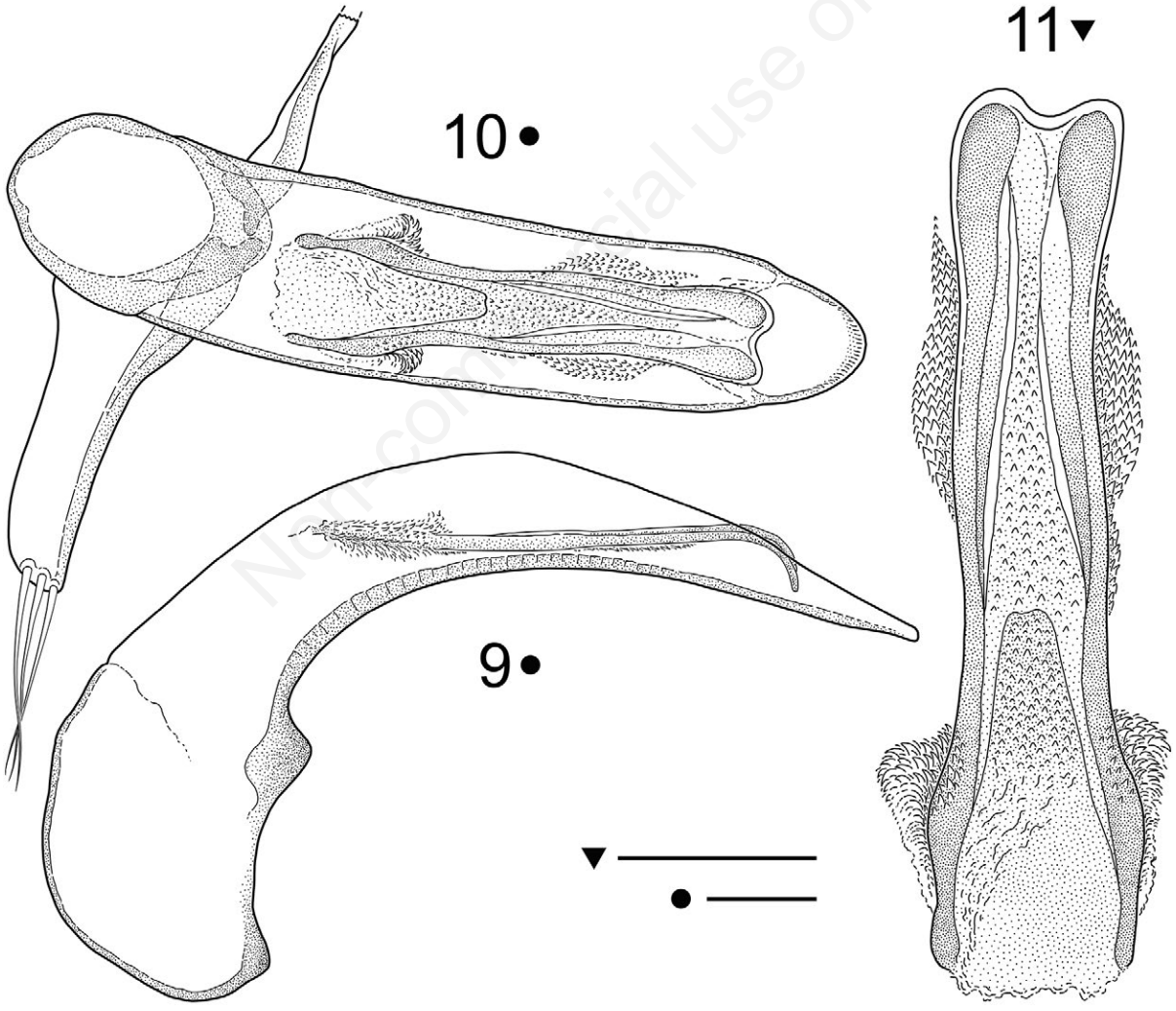
DIAGNOSIS. Rather similar in external features to the two species described above, but markedly distinct by the smaller size, the deeper, deeply punctured elytral striae, and particularly by the very different shape of both median lobe of aedeagus, which is very elongate and slender, with small basal bulbus and developed sagittal carina, and the copulatory piece, which is very narrow and unifid at apex.

DESCRIPTION. General features as in Fig. 12. Small-sized species: TL: 3.74 mm ♂, 3.53 mm ♀; L: 4.12 mm ♂, 3.86 mm ♀.

Colour testaceous, with paler yellow reddish palpi, antennae and legs.

Dorsal surface shiny; transversal cuticular microlines slightly evident on frons, almost vanished on pronotum, more visible as polygonal meshes on elytral intervals.

Head robust, with swollen genae narrowed to the neck constriction and frontal furrows very deep, transversally wrinkled, almost straight in the anterior



Figs. 9-11. *Duvalius marijkeae* sp. n. HT ♂: aedeagus in lateral view (9), aedeagus in dorsal view (10) and copulatory piece (11) (scale bar: 0.1 mm).

third; frons convex; supraorbital setiferous punctures inserted on ranges slightly convergent backwards; eyes absent, reduced to oblique impressions without distinguishable ommatidia; labrum deeply emarginate at the anterior side; mentum tooth prominent, bifid at apex; antennae elongate, exceeding backwards the level of the fourth humeral setiferous puncture.

Pronotum cordiform, transverse (ratio PL/PW: 0.85), wider than head, widest at the anterior third; disc convex, smooth; lateral margins markedly arcuate in front, shortly and slightly sinuate towards the hind angles, which are acute; marginal furrows shallow; anterior margin straight or slightly prominent, front angles obtusely prominent in front; base straight, basal foveae elongate and deep.

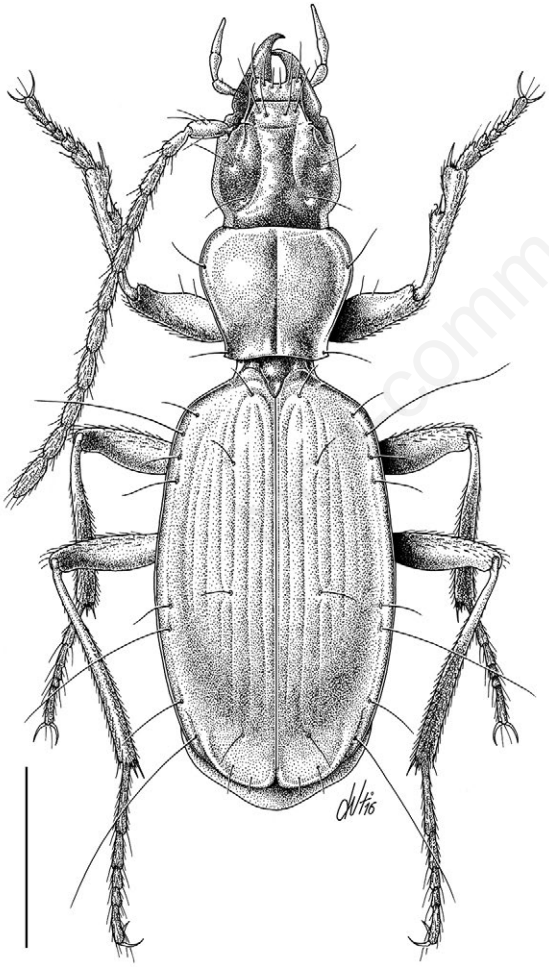


Fig. 12. *Duvalius chironis* sp. n., habitus of HT ♂ (scale bar: 1 mm).

Elytra elongate-ovate (ratio EL/EW: 1.67), widened at the apical third, much wider than prothorax; disc moderately convex; humeri rounded, with pre-humeral margins oblique; lateral furrows relatively wide and deep; striae all visible and deeply punctured: striae 1–4 much deeper, 5–7 shallow; apical striola very deep and curved, connected by some points with apex of stria 5; intervals convex; apical carina developed. Chaetotaxy as in Fig. 12: three setiferous discal punctures (two discal, one pre-apical) on stria 3, the third one inserted at the level of the pore 8 of the umbilicate series; umbilicate pores 5 and 6 very close to each other; apical and angulo-apical punctures present, forming with the pre-apical puncture an apical triangle.

Abdominal sterna IV - VII with a pair of setae, two pairs on VII in female.

Legs elongate, slender; protibiae slightly dilated and sparsely pubescent at apex, each with a long groove on the external side; protarsi in male each with two basal tarsomeres dilated and denticulate inwards.

Male genitalia as in Figs. 13-15. Median lobe of aedeagus very elongate and slender, with small-sized basal bulbus and developed basal sagittal carina, in lateral aspect narrow and straight in the apical third, in dorsal aspect parallel sided, narrow and subtruncate at apex. Endophallus armed with dense scales and spines and a very elongate copulatory piece, narrowed and unifid at apex, slightly bilobed at base. Parameres elongate, each with four apical setae.

Female genitalia: not examined.

Etymology. The specific epithet is the genitive of the Latinized name (Chiron) of the mythical Keyron, the wisest of all Centaurs, teacher of Achilles, Asklepios and many other Greek heroes, who was living in a cave on Mount Pílio and was killed with an arrow by Heracles.

Taxonomy and biogeographical notes about the *Duvalius* species sympatric on Mt. Pílio

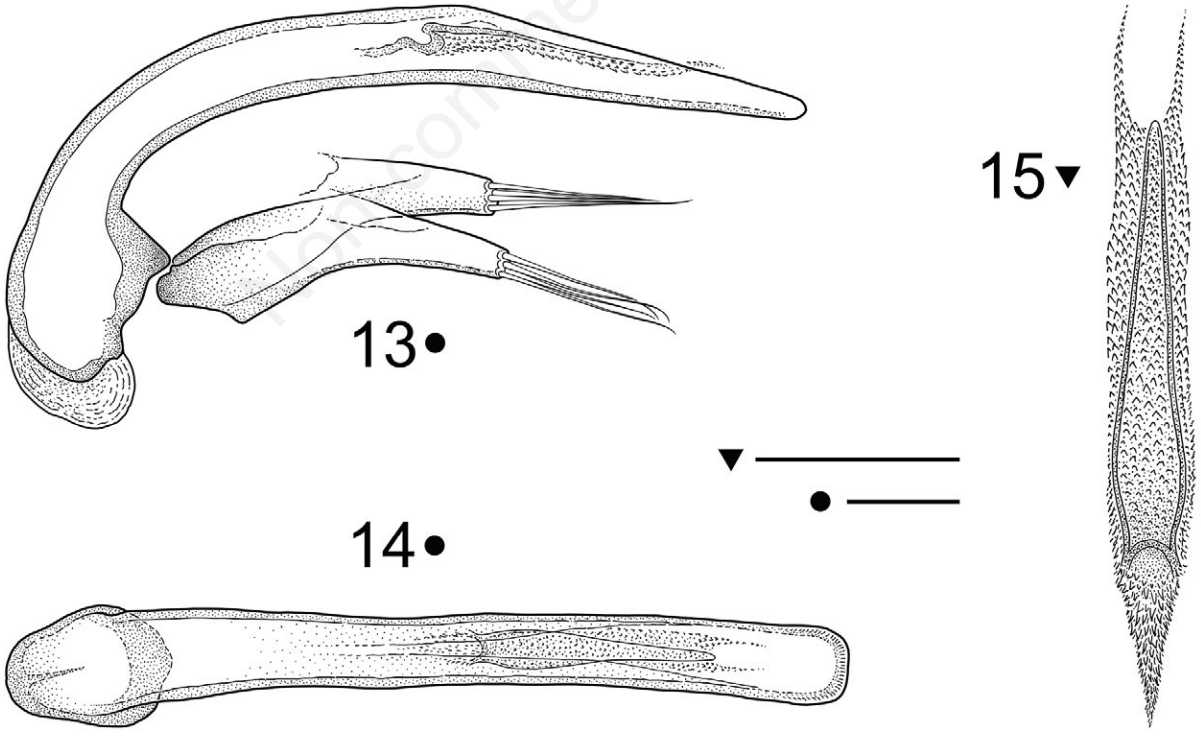
Two of the three *Duvalius* species treated above (*D. moczarskii* and *D. marijkeae*) can be traditionally attributed to the "*krueperi* species group" in the widest sense of Jeannel (1928) (followed by Casale, 2011), in particular owing to the morphological features of copulatory piece of endophallus. They are not easily distinguishable from each other by only

external features. In fact, the differences in some characters (size, and shape of pronotum and humeral angles of elytra) between *D. moczarskii* and *D. marijkeae* seem to be rather variable. The most informative morphological characters are very evident in male genitalia (median lobe of aedeagus and endophallus), the different reduction of eyes in the two species and the position of the third setiferous discal pore of elytra.

On the contrary, *D. chironis* sp. n. shows very different characters both in external features and in male genitalia. The median lobe of aedeagus is very similar to that of *D. krueperi* (Schaum, 1862) illustrated by Jeannel (1928: Fig. 1971), but the copulatory piece of endophallus is elongate and narrow, unifid at apex, similar to those of species attributed by Jeannel (1928) to subgen. *Biharotrechus* Bokor, 1922 (=*Duvaliotes* Jeannel, 1928), in particular to those of *D.* (*B.*) *durmitorensis* (Apfelbeck, 1904) and *D.* (*B.*) *mallaszi* (Csiki, 1901) (see Jeannel, 1928: Figs. 1836 and 1896).

This subgenus should be represented in Greece by two species: *D.* (*B.*) *meshniggi* Meixner, 1928, living at high altitude near the snow on Mt. Olimbos (two examined female specimens, with evident traces of eyes, from " GR – Mt. Olympos 2450 m, 29.VII.1979, A. & G. Casale leg.") and *D.* (*B.*) *roseni* Jeannel, 1929, known from one only female sampled in deep soil on Mt. Ossa (Casale, 2011). These two massifs are close to Mt. Pílio (Fig. 16), but both external features and the copulatory piece of *D.* (*B.*) *meshniggi* are completely different from those of *D. chironis* sp. n. (see Jeannel, 1928).

It is a fact that discoveries and descriptions of new species in Greece are demonstrating that some of these subgenera and species groups are mere "groups of convenience", in some cases probably polyphyletic as shown in other species groups of *Duvalius* by Faille *et al.* (2013). Never before have these beetles been a subject of a phylogenetic analysis (on the validity of the specie group of *Duvalius*, see Faille *et al.,* 2013), and in fact several new taxa are not fitting in any of the groups or subgenera proposed so far (Casale *et al*., 2013).



Figs. 13-15. *Duvalius chironis* sp. n., aedeagus in lateral view (13), aedeagus in dorsal view (14) and copulatory piece (15) (scale bar: 0.1 mm).

For these reasons, in this contribution we treated all the three species as members of *Duvalius* sensu stricto. A complete revision of this genus in the country, and descriptions of many new species recently sampled with methods illustrated by Giachino & Vailati (2010), will allow us to better understand the validity and relationships amongst subgenera and species.

The following key may help in the identification of the *Duvalius* species sympatric in Mt. Pílio:

1. Species smaller in size (TL: 3.53 - 3.74 mm**;** L: 3.86-4.12 mm)**.** Eyes absent. Elytral striae very deep, intervals convex (Fig. 12). Median lobe of aedeagus very elongate and slender, with small-sized basal bulbus and developed sagittal carina, in lateral aspect narrow and straight in the apical third, in dorsal aspect parallel sided, subtruncate at apex (Figs. 13-14). Endophallus armed with dense scales and spines and a very elongate, narrow copulatory piece, unifid at apex, slightly bilobed at base (Fig. 15).....
.....*Duvalius* (*Duvalius*) *chironis* sp. nov.
- Species larger in size (TL: 3.74-4.84 mm; L: 3.94-5.34 mm). Elytral striae moderately deep or shallow, intervals flat or moderately convex. Median lobe of aedeagus short and stout, with large-sized basal bulbus and without basal sagittal carina. Copulatory piece wide, widely bilobed at apex 2
2. Eyes reduced to whitish spots, with some visible ommatidia. Pronotum wider in front, with lateral margins markedly narrowed and sinuate anteriorly to the basal margin. Preapical (third) discal pore of elytra moved forwards, at the level between the 7th and 8th pore of the umbilicate series (Fig. 1). Median lobe of aedeagus short, inflated and stout,

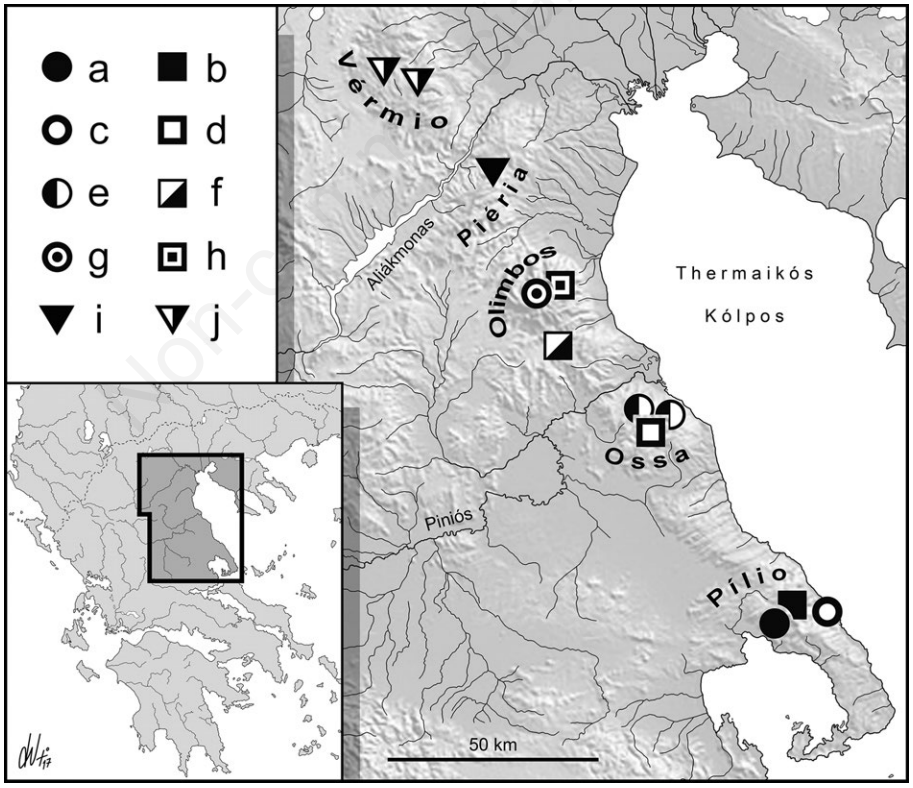


Fig. 16. Distribution map of known species of the genus *Duvalius* along the mountains Vérmio - Piéria - Olimbos - Ossa - Pílio. a) *D. moczarskii* (G. Müller, 1917); b) *D. chironis* sp. n.; c) *D. marijkeae* sp. n.; d) *D. roseni* Jeannel, 1929; e) *D. zaimisi* Jeannel, 1929; f) *D. fulvii* Casale, Giachino, Vailati, Vigna Taglianti, 1996; g) *D. waltnerae* Lebenbauer, 2004; h) *D. meschniggi* Meixner, 1928; i) *D. antonellae* Casale, Giachino, Vailati, Vigna Taglianti, 1996; j) *D. vermionensis* Casale, 1983.

markedly bent in the middle, slightly narrowed at apex, in dorsal aspect parallel-sided, regularly narrowed and obtusely rounded at apex. Copulatory piece smaller in size, in lateral aspect moderately sinuate, in dorsal aspect short, slightly bilobed at apex (Figs. 2-4)....*Duvalius* (*Duvalius*) *moczarskii* (G. Müller, 1917)

- Eyes fully atrophied, reduced to oblique impressions without evident ommatidia. Pronotum moderately widened in front, with lateral margins moderately narrowed and sinuate anteriorly to the basal margin. Preapical (third) discal pore of elytra moved backwards, at the level of the 8th pore of the umbilicate series (Fig. 8). Median lobe of aedeagus in lateral aspect elongate, straight in the apical half, markedly narrowed at apex, in dorsal aspect slightly curved on the right side, widely rounded at apex. Copulatory piece much larger in size, in lateral aspect very narrow, sinuate, bent at apex, in dorsal aspect widely bilobed both at base and apex (Figs. 9-11).....*Duvalius* (*Duvalius*) *marijkeae* sp. nov.

The occurrence of three sympatric and syntopic *Duvalius* species in the same massif is very interesting, but not surprising.

As examples in Greece, this is a well known fact in other massifs, as in Mt. Taigetos (Peloponnese), where four *Duvalius* (*Duvalius*) species are sympatric: *D. diaphanus* (Rottemberger, 1874), *D. mirei* Deuve, 2001, *D. taygetanus* Casale, 1979 and *D. genesti* Casale & Vigna Taglianti, 1984. They belong to three different species groups, and two of them colonize high altitude pastures, fissures and cold caves near the snow at 2000-2200 m (see Casale & Lebenbauer, 2011).

A similar scenario occurs in Mt. Killini (Peloponnese), where three *Duvalius* species of the same species group (*wichmanni* species group) are sympatric and two of them are syntopic in the same cave: *D.* (*Duvalius*) *kyllenicus* Scheibel, 1937 and *D.* (*Duvalius*) *lucarellii* Casale & Vigna Taglianti, 1993 in the Ermou-Spiliá cave, whereas *D.* (*Duvalius*) *casalei* Sciaky, 1992 was only found near the snow at high altitude.

The three species treated above, sympatric on Mt. Pílio, show different degrees of specialisation to the subterranean environment in body size, reduction of eyes, and length of appendages. *D. marijkeae* was sampled both in a cave (-20 m deep, 40 m from the entrance near wet stalagmites with guano and debris. Temperature 18°C, outside 28°C) and in Superficial Subterranean Habitat (M.S.S.), *D. moczarskii* only in MSS and in wet forest soil and litter (Fig. 17), and *D. chironis* only by traps in M.S.S. (two only individuals in two different years).

Fig. 17. Small gully, at 1000 m a.s.l., in a *Fagus* forest near Hánia, Mt. Pílio, collecting site of *D. moczarskii*, *D. marijkeae* sp. n. and *D. chironis* sp. n.. Photo by P.M. Giachino.

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