PARNASSIANA ARCHIVES 2: 71-81 2014

# BIOSPELEOLOGICAL NOTES ON THE CAVES OF THE PARNASSOS, GIONA AND VARDOUSIA MOUNTAINS (CENTRAL GREECE)

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Published online: December 12, 2014

## Introduction

Although the first Greek cavernicolous animal was discovered by T. Kruper in the middle of 19th century from the cave Korikion Andron on Mount Parnassos (*Duvalius krueperi* (Schaum, 1862)), biospeleological research in this area of central Greece is still yielding very poor and scattered results (Casale and Giachino, 1994).

In the last decade two of us (i.e. Di Russo and Rampini) investigated the cave fauna of several areas of Hellenic regions including cave habitats of some Ionian and Aegean islands (Rampini *et al*. 2008, Taylan *et al*. 2012). Our research was focused mainly on the cave crickets of the family Rhaphidophoridae that comprise in Greece two genera, *Dolichopoda* and *Troglophilus* with about 33 species (Alexiou *et al.* 2013, Di Russo *et al*. 2014). Among the different areas studied, the reliefs of Fokida and Biotia such as mountains Parnassos, Giona and Vardousia have raised particular interest because although they host many important karstic complexes they are almost completely unknown as regards their biospeleological component.

## Studied area

The area studied belongs to the Pindos mountain chain that extends geographically in a North-South direction from the mountains of Northern Albania and Former Yugoslav Republic of Macedonia to Central Greece: Parnassos (2457 m); Giona (2510 m), Smolikas (2637 m), and Olimpos (2917 m). In the Peloponnisos the chain continues with the southernmost Taigetos mountain whose highest peak is 2404 m.

Climatically, the ecoregion is characterized by an average annual rainfall of 1,200 mm, but in certain high altitudes this can be higher than 2,000 mm. Snow frequently falls during winter and minimum average temperatures are below freezing (-5 to 0º C). From the geological point of view, the Pindos mountain range belong to the Alpine orogenic system, distinguished by a very complex lithological


ISSN (print-edition) : 2241-7834
ISSN (on-line edition) : 2241-7842

composition. Mesozoic dolomite and limestone predominate; other important substrates are sandstone and marl, the oldest crystalline metamorphic (i.e. quartzite and schist), and ultrabasic serpentines (Mt Smolikas). The landform is characterized by high steep elevations, mainly related to the calcareous massifs, and the abundance of deep canyons and other karstic landscapes. The wide altitudinal range of this ecoregion results in two major forest zones: a conifer zone, found at the highest elevations (average altitudinal range of 1200-2500 m), and a mixed broadleaf zone, that occurs at medium elevations and lowlands (McNeill 1992).

In this preliminary report, 8 caves have been investigated (Fig.1)**.**


**Fig. 1.** Map showing the caves investigated.

## Investigated caves

Here we report the list of the caves investigated including the geographical data, a brief description of the caves and the fauna studied.

### 1. Korikion Andron

Sterea Ellas, Nomos Fokidos, Delfi

38° 30′ 56″ N - 22° 31′ 16″ E

Altitude: 1.360 m a.s.l.

Air temperature 18°C (first chamber near the entrance)

Investigation date: 20.XI.2008

This cave situated in the south-west slope of Mt. Parnassos, near Delfi, is the most famous in the area investigated. Described by Pausanias, it was sacred to Pan and the Nymphs. In 1969, French

archaeologists discovered bone flutes, Mycenaean shards, a Neolithic male figurine, bronze and iron rings, miniature bronze statuettes and knucklebones used for foretelling (*astragalomancy*). The cave became a shelter in the 5th century from the Persians, and during WWII from the Germans. The cave is composed of a first big chamber about 60 meters long, 26 meters wide and 12 meters high. After two big columnar stalagmites, the cave continues with a second chamber decorated with several big stalagmites and terminates with a narrow passage that leads to the third small chamber called "Adyton" (Petrocheilou 1984).

**Fauna**: Orthoptera*, Dolichopoda* sp.; Lepidoptera, *Triphosa* sp.

**2. Zoodochos Pigi cave**

Sterea Ellas, Nomos Fokidos, Lidoriki, Sikia

38° 38′ 05″ N - 22° 12′ 53″ E

Altitude: 925 m a.s.l.

Air temperature 11.8°C

Investigation date: 07.XII.2013

The cave is located near Sikia village on the western slope of Mt. Giona. It develops for about 80-100 m. A small church (Zoodochos Pigi) has been built inside and the cave contains stalactites, stalagmites and a natural lake.

**Fauna**: Gastropoda, Zonitidae, *Oxychilus* sp.; Diplopoda, Julida; Crustacea: Amphipoda, *Niphargus* sp., Isopoda, Trichoniscidae, *Trichoniscus* sp.; Chilopoda, Scutigeromorpha, *Scutigera coleoptrata*; Acari, Ixodidae; Aracnida, Araneae, *Sulcia cretica*, *Agelena* sp.; Collembola indet.; Orthoptera, Gryllidae, *Gryllomorpha dalmatina*; Diptera, Culicidae; Lepidoptera, *Apopestes* sp.; Mammalia, Chiroptera, *Rhinolophus hipposideros*.

**3. Mayer's cave**

Sterea Ellas, Nomos Fokidos, Panourgias, Stromi

38° 40′ 55″ N - 22° 14′ 43″ E

Altitude: 1352 m a.s.l.

Air temperature 3.8°C (7.XII.2013), 11°C (23.V.2014)

Investigation dates: 07.XII.2013; 23.V.2014

It is a small cave near Stromi village, on the north slope of Mt. Giona. It is no more than 20 m long and was used as a shelter by Greek partisans during the second world war.

**Fauna**: Gastropoda: Zonitidae, *Oxychilus* sp., Limacidae; Aracnida, Scorpiones; Aracnida, Araneae: *Meta menardi, Tegenaria* sp.; Orthoptera, Rhaphidophoridae, *Troglophilus* sp.; Diptera, Culicidae; Lepidoptera, *Apopestes* sp.

**4. Kontilospilia**

Sterea Ellas, Nomos Fokidos, Polidrosos, Ano Polidrosos

38° 36′ 48″ N - 22° 33′ 00″ E

Altitude 700 m a.s.l.

Air temperature 12.7°C (9.XII.2013), 10.5°C (23.V.2014)

Investigation dates: 09.XII.2013; 23.V.2014, 10.XI.2014

This cave is located near the village Ano Polidrosos on the northern slope of Mt. Parnassos. It opens in a little canyon west of the village. The cave has a narrow entrance and consists of a large chamber about 20 m long and 8 m wide, which is characterized by a breakdown cone of large blocks on which stalagmites of a height greater than 2 m have formed in some places.

**Fauna**: Crustacea, Isopoda, Trichoniscidae, *Triconiscus* sp., Diplopoda, Iulidae, *Callipus* sp.; Aracnida, Araneae: *Meta menardi*, *Sulcia* sp., *Dasumia* sp., *Pholcus* sp.; Opilionidae; Collembola; Orthoptera, Rhaphidophoridae, *Dolichopoda vandeli*; Orthoptera, Gryllidae: *Gryllomorpha dalmatina*, *Ovaliptila* sp.; Coleoptera: Carabidae, *Trechus* sp., Staphilynidae, *Medon* sp., Cholevidae, *Choleva* sp.; Lepidoptera: *Triphosa* sp., *Amphipyra effusa*; Mammalia, Chiroptera: *Rhinolophus hipposideros.*

**5. Drakospilia**

Sterea Ellas, Nomos Biotias, Arachova

38° 32′ 47″ N - 22° 34′ 18″ E

Altitude: 1813 m a.s.l.

Air temperature 4.5°C

Investigation date: 22.V.2014

The cave is located near the little chapel at the end of the track departing from the Athens Ski Club refuge on the western slope of Mt. Parnassos. The cave consists of a wide gallery descending for 30-40 m. At the base of the descent opens into a deep pit.

**Fauna**: Oligochaeta; Mollusca, Gastropoda, Limacidae; Diplopoda, Polydesmidae; Orthoptera, Rhaphidophoridae, *Troglophilus zoiai*; Tricoptera; Diptera.

**6. Agios Athanasios Cave**

Sterea Ellas, Nomos Fokidos, Amfissa**,** Prosilio

38° 35′ 25″ N - 22° 19′ 32″ E

Altitude: 1160 m asl

Air temperature 10.5 °C

Investigation date: 21.V.2014, 8.XI.2014

The cave is located near Prosilio village, locality Monastiri, on the eastern slope of Mt. Giona. The cave opens at the base of the rocks facing the valley and consists of a single chamber separated into three rooms by two walls of stalactites. The total length of the cave is about 45 m.

**Fauna**: Pseudoscorpiones, *Neobisium* sp.; Aracnidae, Ixodidae; Orthoptera Rhaphidophoridae: *Dolichopoda* sp., *Troglophilus zoiai*; Orthoptera, Gryllidae: *Grylomorpha dalmatina, Ovaliptila sp.*; Tricoptera; Diptera, Limonidae; Hymenoptera, Formicidae, *Lasius sp*. Lepidoptera: *Apopestes* sp.**,** *Amphipyra effusa*; Mammalia, Chiroptera: *Rhinolophus hipposideros, Rh. ferrumequinum.*

**7. Dafni cave**

Sterea Ellas, Nomos Fokidos, Vardousia, Athanasios Diakos

38° 42′ 40″ N - 22° 10′ 20″ E

Altitude: 1096 m asl,

Air temperature 12°C
Investigation date: 20.X.2008

This small cave opens on the eastern slope of Mt. Vardousia on the border of the dirt road that links Athanasios Diakos to Dafni. The cave is about 20-30 m long and consists of a single room.

**Fauna**: Orthoptera, Rhaphidophoridae*, Dolichopoda lustriae.*

**8. Neraidospilia**
Sterea Ellas, Nomos Fokidos, Vargiani
38° 37′ 20″ N - 22° 25′ 25″ E
Altitude: 1380 m asl
Air temperature 8°C
Investigation date: 09.XI.2014

This big cave is located on the abrupt slope of the mountain that faces the Vargiani village, in the western part of Mt. Parnassos. The cave has a length of about 60 m and consists of a single large chamber completely occupied by a series of large concretion pools (gours) of which only the two furthest from the entrance contained water in November. There is plenty of guano on the floor of the chamber.

**Fauna**: Orthoptera, Rhaphidophoridae, *Troglophilus zoiai*; Gryllidae: *Gryllomorpha dalmatina*, *Ovaliptila* sp.; Lepidoptera: *Triphosa sabaudiata, Amphipyra effusa***;** Chiroptera: *Rhinolophus ferrumequinum, Myotis* sp.

## Concluding remarks

On the whole, 40 taxa have been confirmed in the caves of Mount Parnassos, Giona and Vardousia. Among these, 27 were identified at least at genus level. Most of the species collected belong to the troglophilic elements of cave communities commonly found in the Mediterranean subterranean habitats (Latella *et al.* 1998, Di Russo *et al*. 1999). Only two taxa show characters specialized to cave life (troglomorphosis), the Pseudoscorpiones *Neobisium* from Agios Athanasios cave and the Amphipod *Niphargus* collected in the subterranean water of Zoodochos Pigi. As reported in the introduction, one species of the genus *Duvalius* (*D. krueperi*, Coleoptera Carabidae, Trechinae) is cited for the Korikion Andron. However we were not able to sample this taxon in this cave. Furthermore in the same area (Mt. Parnassos), Sciaky (1992) reports the presence in some unnamed caves at high altitude of another species of *Duvalius (D. oertzeni)*. Regarding Orthoptera, we can confirm the occurrence of the Gryllidae *Ovaliptila* (sensu Gorochov 2006). This genus previously included in the genus *Discoptila* was reported for Mt. Parnassos with the species *D. krueperi* Pantel, 1890. Finally, the Orthoptera Rhaphidophoridae occur in the area with the two genera *Dolichopoda* and *Troglophilus*: the first one is present with the species *D. lustriae*, typical of the caves of Aetolia and Acarnania, in the Dafni cave (Mt. Vardousia) and with *D. vandeli* from Kontilospilia. Two other records come from Korokion Andron and Agios Athanasios caves. In these latter cases, the collection of immature specimens did not allow us to determine their taxonomic status. Only in the case of the specimens from Agios Athanasios cave could we establish a certain similarity, with the species *D. lustriae*, due to the presence of a series of short spines on the hind femurs. On the other hand, the genus *Troglophilus*

is present in this area with the new species, *T. zoiai*, recently described from the Drakospilia on Mt. Parnassos and from epigean habitats of Mt. Vardousia (Di Russo *et al*. 2014). Finally we report the record, in the Agios Athanasios cave, of the Formicidae of the genus *Lasius*. The collection of specimens of this ant inside the cave in full darkness suggests, as already reported from other authors (Decu *et al*. 1998), that members of this genus can regularly establish stable colonies in cave habitats.

**Acknowledgements**

For help in the investigation of the caves and the collection of cave fauna samples we thank Diamantis Kalentzis, Marios Kallimanis, Panos Kouladouros, Andreas and Panagiota Koufali, Giorgio Pintus and Stefano Zoia. For the taxonomic identification we thank Giulio Gardini (Pseudoscorpiones), Chris Georgiadis (Hymenoptera), Roberto Argano (Isopoda), Fabio Mosconi (Lepidoptera), Adriano Zanetti (Col. Staphilynidae), Paolo Pantini (Araneae), Augusto Vigna Taglianti (Col. Carabidae). Thanks are due to Linda Young for her linguistic corrections to this manuscript.

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**Appendix.** Tables I-V.


**Table I.** 1, *Dolichopoda vandeli*; 2, *Gryllomorpha dalmatina*; 3, *Troglophilus zoiai* (immature); 4, *Ovaliptila* sp.


**Table II.** 1, *Lasius* sp.; 2, *Oxychilus* sp.; 3, *Trichoniscus* sp. 4, *Niphargus* sp.




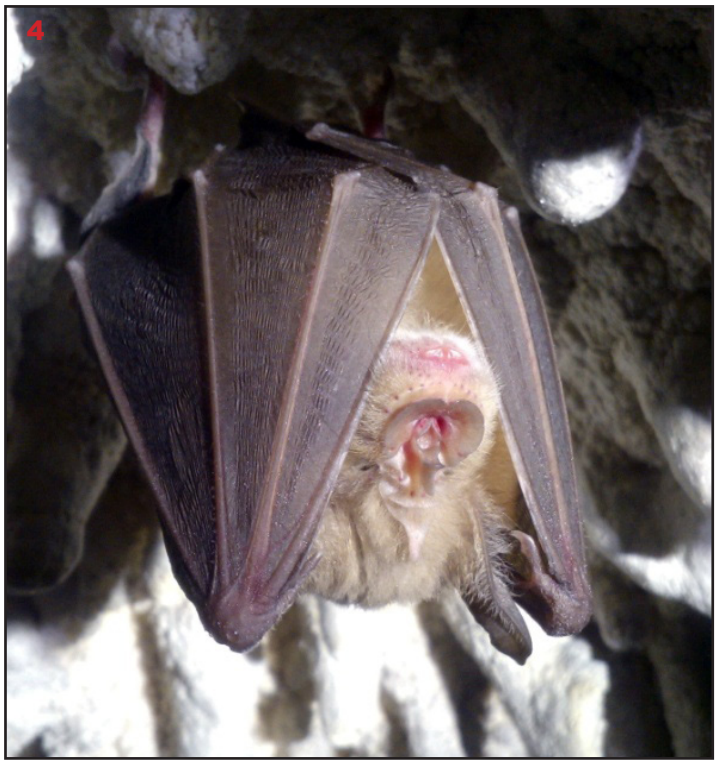


**Table III.** 1, *Meta menardi*; 2, *Neobisium* sp.; 3, *Amphipyra effusa*; 4, *Rhinolophus ferrumequinum.*


**Table IV.** 1, 2 Korikion Andron; 3, 4 Zoodochos Pigi cave; 5, 6 Kontilospilia; 7, 8, 9 Agios Athanasios cave.


**Table V.** 1, 2 Mayer's cave; 3, 4 Dafni cave; 5, 6 Neraidospilia; 7, 8 Drakospilia.