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The Trichopteran fauna of the Campania region in Southern Italy

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Abstract. The first list of Trichoptera from the Campania region is reported. It is the result of research carried out from 1951 to 2002 in 44 sampling sites: 27 lotic, 1 lentic, 16 hypogean. 52 species, 5 subspecies and 3 genera from 15 families were collected. The species belong to several chorological categories. 10 species and 5 subspecies are endemic to the Italian fauna, 1 of these is limited to the regions of Campania and Molise. The presence of *Agapetus incertulus* MacLachlan 1884, found in the river Volturno, is noteworthy because it is its sole locality in Italy.

Key words: checklist Trichoptera, Campania, Southern Italy, ecology, chorology.

Introduction

There are a few fragmentary studies on the Trichopteran fauna of the Campania region of Italy and in this paper, all the available information is considered.

The first collections were made in hypogean habitats in southern Campania in 1951 at Grotta S. Arsenio Cp/Sa by S. Patrizi and in 1956 at Grotta Bussento, Sa by P. Parenzan (Moretti, Gianotti, 1967).

From 1961 to 1982, research in the hypogean cavities was continued and also extended to northern Campania by several researchers: V. Sbordoni, M. Olmi, D. Capolongo, A. Antonelli, G. Caoduro, V. Vomero, S. Forestiero, G.S.A.M. (Gruppo Speleologico Alpi Marittime) (Cianficconi, Moretti, 1985).

The research in epigeal lotic and lentic waters was carried out by a student (Florenzano, 1993-94) and undergraduate students (A. Pangia, 1969-70; M. R. Cibelli, 1979-80) of the former Istituto di Zoologia dell'Università di Perugia and by G.P. Moretti and collaborators (Chiappafreddo, Cianficconi, Tucciarelli), 1979-1984. Other samplings, made mainly with light traps, were carried out by R. De Pietro (1996), by Bertuetti and Pantini from the Museo di Scienze Naturali di Bergamo in 1995 and 2000 (Valle, 2001).

From 1995 to 2002 collections were made by C. Gramegna in the rivers Bussento and Mingardo and in the tributaries of the river Volturno in collaboration with Maglio.

Further information was taken from the Checklists of Italian Trichoptera (Moretti, Cianficconi, 1981; Cianficconi, Moretti, 1991; Cianficconi, 2002).

Based on published and unpublished data, this paper proposes a first faunistic, ecological and chorological balance of the hydrographic system of the Campania region.

Study area

Campania is a region (13.594 Km²) in southern Italy. It is bordered in the north by Lazio, in the south by Basilicata and in the east by Molise and Puglia. In the west, Campania is on the Tyrrhenian coast. The internal area is hilly (50.8%) and mountainous (34.6%) whereas the plain (14.7%) is subdivided by numerous passes. The lithology and morphology of Campania are complex due to the co-

existence of calcareous, marly and igneous lithotypes. The rocks of the hydrographic basins of the watercourses under consideration belong mainly to the calcareous masses of the southern Apennines. There are numerous caves, sink holes and resurgences indicating the calcareous nature of the substrate and karstic origins which have regulated the epigeal and hypogean flow.

Sampling sites

The sampling sites investigated from 1951 to 2002 are shown on a map (Fig. 3) in numerical order from west to east and from north to south. They are numbered 1 to 43 (including site 19a) with a specific symbol for three typologies. Of the watercourses investigated, the Sele river flows only through Campania. The other rivers flow through Campania and into the other regions: Molise (F. Volturno), Basilicata (F. Tanagro), Puglia (T. Cervaro) and into the Tyrrhenian Sea. The sampling sites are listed below, subdivided into 6 hydrographic basins, with the name of the biotope, location, province, altitude and, in brackets, the number of samplings made. The symbols identify the different biotopes: ● = lotic waters, □ = lentic waters, ▲ = hypogean cavities.

Basin Torrente Cervaro

1 - ● Torrente Cervaro, Savignano de' Greci Scalo, Savignano Irpino, AV, 476 m (2)

2 - ● Torrente Cervaro, Montaguto Scalo, AV, 406 m (4)

Basin Fiume Volturno

3 - ● Torrente Tornora, tributario del Lago del Matese, San Gregorio Matese, CE, 1073 m (3)

4 - □ Lago del Matese, San Gregorio Matese, CE, 1011 m (14)

5 - ▲ Grotta dei Diavoli, Monti del Matese, Letino, CE, 1000 m (1)

6 - ▲ Grotta di San Pietro, 820 Cp/Ce, Gallo Matese, 1000 m (1)

7 - ▲ Grotta del Lete, 191 Cp/Ce, Monti del Matese, Letino, 870 m (1)

8 - ● Fiume Volturno, Capriati al Volturno, CE, 140 m (2)

9 - ● Fiume Volturno, Raviscanina, CE, 110 m (3)

10 - ● Fiume Volturno, Ponte della Scafa, Piana di Monte Verna, CE, 36 m (3)

11 - ● Fiume Lete, affluente F. Volturno, Masseria la Forca, Letino, CE, 1120 m (1)

12 - ● Torrente Acqua Calda, affluente T. Titerno, Gera Grande, Pietrarroia, BN, 950 m (3)

13 - ● Vallone dell'acqua Paradiso, affluente T. Acqua Calda, Sambuco, Cusano Mutri, 500 m (1)

14 - ● Torrente Torbido, affluente T. Titerno, Batticelle, Cusano Mutri, BN, 330 m (1)

Basin Regi Lagni

15 - ▲ Grotta degli Sportiglioni, 184 Cp/Av, Avella, 760 m (1)

16 - ▲ Tunnel acquedotto Roccarainola, NA, 101 m (1)

Basin Fiume Sele

17 - ● Fiume Sele, Bagni, Contursi Terme, SA, 110 m (2)

18 - ● Fiume Sele, Ponte autostrada, Campagna, SA, 50 m (1)

19 - ● Fiume Sele, Ponte Sele, Serre, SA, 48 m (1)

19a - ● Serra località Serre-Persano, SA, 556 m (1)

20 - ● Torrente San Nicola, affluente Fiume Sele, Molino S. Nicola, Oliveto Citra, SA, 285 m (1)

21 - ● Torrente Vogna, affluente Fiume Sele, Vogna Sottana, Oliveto Citra, SA, 180 m (2)

22 - ● Fiume Tanàgro (Calore), affluente Fiume Sele, Ponte del Re, Casalbuono, SA, 600 m (1)

23 - ● Fiume Tanàgro (Calore), affluente Fiume Sele, Buonabitacolo, SA, 500 m (1)

- 24 - ● Fiume Tanàgro, affluente Fiume Sele, Auletta, SA, 210 m (1)
 25 - ● Fiume Tanàgro, affluente Fiume Sele, Contursi Terme, SA, 60 m (1)
 26 - ▲ Grotta di S. Angelo, 524 Cp/Sa, Montesano sulla Marcellana, 800 m (1)
 27 - ▲ Inghiottoio di Vallicelli, Monte San Giacomo, SA, 1200 m (1)
 28 - ▲ Grava Funnatura, Monte San Giacomo, SA, 1000 m (1)
 29 - ▲ Grotta di S. Arsenio, S. Arsenio, SA, 870 m (1)
 30 - ▲ Grotta di Polla, Polla, SA, 460 m (1)
 31 - ▲ Grotta di Pertosa, 187 Cp/Sa, Pertosa 300 m (3)
 32 - ● Sicignano degli Alburni, SA, 460 m (2)
 33 - ▲ Grotta di Campo d'Amore, Postiglione, SA, 1550 m (1)
 34 - ▲ Grava dei Gentili, 255 Cp/Sa, S. Angelo a Fasanella, 850 m (5)
 35 - ▲ Grava del Serrone, Monti Alburni, Corleto Monforte, SA, 1000 m (1)

Basin Fiume Mingardo

- 36 - ▲ Grava di Vesolo, 187 Cp/Sa Laurino, 970 m (8)
 37 - ● Fiume Mingardo, Fosso di Pruno, Le Fistole, Rofrano, SA, 430 m (8)

Basin Fiume Bussento

- 38 - ● Fiume Bussento, Vallone dell'Inferno, Ponte Inferno, Sanza, SA, 530 m (2)
 39 - ● Fiume Bussento, Ponte l'Abate, Sanza, SA, 425 m (2)
 40 - ● Fiume Bussento, Ponte dei Farnitani, Sanza, SA, 380 m (8)
 41 - ▲ Grotta Bussento, Morigerati, SA, 263 m (1)
 42 - ● Fiume Bussento, Cerreto, Morigerati, SA, 84 m (1)
 43 - ● Fiume Bussento, Foce Pantana, Policastro Bussentino, Santa Marina, SA, 8 m (1)

The sampling sites are at different altitudes from 8 m (F. Bussento, foce Pantana, site 43) to 1550 m a.s.l. (Grotta di Campo d'Amore, site 33). The majority of the sampling sites (27) are located in lotic waters (streams, rivers), 1 in lentic waters (Lago del Matese, site 4), 16 in hypogean cavities. In total 102 samplings were made (53 in lotic waters, 14 in lentic waters and 38 in hypogean cavities).

Materials and Methods

Trichoptera were collected randomly or seasonally for undergraduate theses. Some watercourses were investigated in more than one section and some sites checked more than once in different years.

The aquatic stages (larvae and pupae) were collected with a net with a handle or tweezers according to the habitat and typology of the substrate. They were fixed in loco in formol 7% and partly reared in the laboratory until the emergence of the adults.

The adults were collected mainly during the day with an entomological net and a microaspirator in the surrounding vegetation. Only in recent times, specimens have been collected during the night with light traps (fluorescent or U.V. lamps). Some specimens were fixed in 70° ethanol and others were taken alive to the laboratory for dry conservation.

The qualitative relationships among basins were explored by means of cluster analysis, using the UPGMA method. Distances for constructing the cluster dendrogram were calculated by means of Bray-Curtis index.

Catalogue of Trichoptera in Campania

The species are subdivided into families and listed in a catalogue following the order of the checklist of Italian Trichoptera (Cianficconi 2006) updated on the basis of revisions by Malicky in the Atlas of European Trichoptera (2004). For each species, the sampling sites are recorded with the corresponding number in Fig. 1, the dates of the samplings in chronological order, the number of adults and aquatic stages (l = larva, p = pupa, pp = prepupa, fl = larval case, fp = pupal case), name of the collector. (L) indicates that the specimens were collected with light traps.

For published findings, bibliographic data is given. The zoogeographical distribution is reported.

The specimens classified as species by Moretti, Cianficconi or Corallini are kept in the Biology section of the Dipartimento di Biologia Cellulare e Ambientale dell'Università di Perugia.

RHYACOPHILIDAE

1. *Rhyacophila albardana* McLachlan, 1879

22 - 13.10.2000: 12♂, 5♀ (L) Buffagni.

Several adults have been collected with light traps in the River Tanagro (Valle, 2001). This species is rarely found in Italy. Central-European distribution.

2. *Rhyacophila dorsalis pantinii* Valle, 2001

8 - 13.05.1995: 2♂, 8♀ (L), Pantini, Valle; 1.09.2000: 1♂, Bertuetti et al.

17 - 2.08.2000: 1♂, 8♀ (L), Valle; 2.09.2000: 5♀ (L), Bertuetti et al.

18 - 2.09.2000: 1♂, 3♀ (L) Bertuetti et al.

21 - 20.05.1997: 1♂, Gramegna.

Described by Valle (2001) after examining specimens collected in Molise (river Biferno, CB) and with light traps in Campania in the Rivers Volturno (CS) and Sele (SA). S-Apenninic endemic.

3. *Rhyacophila pubescens* Pictet, 1834

38 - 10.06.2002: 1♂, 4 l, Gramegna.

The species lives in Italy from Liguria to Basilicata, mainly in springs and spring-brooks with a substrate covered with moss at about 900 m a.s.l. European distribution.

4. *Rhyacophila rougemonti* McLachlan, 1880

3 - 12.11.1967: 1 l, Pangia.

7 - 21.09.1969: 2♂, Capolongo.

12 - 28.05.1995: 5 l, Gramegna, Maglio.

13 - 28.05.1995: 4 l, Gramegna, Maglio.

29 - 27.10.1951: 1♂, Patrizi.

31 - 10.04.1969: 2♂, Vomero

41 - 00.08.1956: 1♀, Parenzan

Widespread in running waters of the Apennines (from Umbria to Calabria) and in Sicilia. In Campania, adults have been collected in 4 hypogean cavities located in 3 basins. Central-S-Apenninic, Sicilian endemic.

5. *Rhyacophila vallei* Moretti, 1997

22 - 13.10.2000: 1♂ (L), Buffagni.

Described by Moretti after examining specimens collected by Valle in Calabria (Gole del Raganello Civita, CS). It was later found in Molise (F. Volturno, Colli a Volturno, IS), Basilicata (F. Noce, PZ) and Campania (F. Tanagro, SA) (Valle, 2001), S-Apenninic endemic.

Rhyacophila sp.

- 12 - 28.05.1995: 1, Gramegna, Maglio.
 14 - 28.05.1995: 1, Gramegna, Maglio.
 21 - 20.05.1997: 8 l, Gramegna, Maglio.
 36 - 00.00.00: 1 ♀, G.S.A.M.
 40 - 18.06.2002: 4 l, Gramegna.

GLOSSOSOMATIDAE

6. *Catagapetus nigrans* McLachlan, 1884

- 9 - 1.05.1982: 1 ♀, Chiappafreddo.
 The species inhabits the springs and spring-brooks of the Apennines, Sicilia, Elba (Cianficconi, Moretti, 1992). Recently found by Malicky (2002) in the French Maritime Alps. W-Alpino-Apenninic Sicilian endemic.

7. *Agapetus incertulus* McLachlan, 1884

- 10 - 20.05.1984: 1 ♂, Moretti.
 This is the only record from Italy. Recorded in the Iberian Peninsula and in the Maghreb (Gonzalez M.A. et al., 1992). W-European distribution.

8. *Agapetus laniger* Pictet, 1834

- 9 - 4.05.1982: 2 ♂, 3 ♀, 26p, Moretti, Cianficconi
 This species is found from the central Apennines to Campania and recorded in northern Italy (Piemonte, Lombardia) by Valle (2001). European distribution.

HYDROPTILIDAE

9. *Ithytrichia lamellaris* Eaton, 1873

- 25 - 2.09.2000: 1 ♂ (L), Bertuetti et al. (Valle, 2001).
 Collected in Italy after 1996 in watercourses of Lombardia, Friuli Venezia Giulia, Toscana, Campania (Valle, 2001). The specimens were collected in the lower tracts of the rivers. European distribution.

10. *Oxyethira falcata* Morton, 1893

- 2 - 11.10.1979: 1 ♂, 1 ♀, Cibelli
 This species inhabits slow-running, freshwater resurgences and streams in central southern Italy, Piemonte, Sardegna and Sicilia. Recently recorded in Lombardia (Valle 2001). W-Palearctic distribution

11. *Hydroptila forcipata* (Eaton, 1873)

- 19 a - 16.08.1992: 1 ♂, Letardi.
 The specimen was determined by Valle and is kept in the Museo di Scienze Naturali di Bergamo. The species inhabits the Italian peninsula from Piemonte to Campania. European distribution.

12. *Hydroptila simulans* Mosely, 1920

- 9 - 2.05.1982: 3 ♂, 3 ♀, Moretti, Tucciarelli.
 Found in central Italy and collected in Campania in the rithral zone of the river Volturno. European distribution.

13. *Hydroptila tineoides* Dalman, 1819

- 1 - 1.10.1979: 1 ♂, Cibelli.
 Recorded in the Peninsula, the islands of Sardegna and Capraia in waters with a slow current. W-Palearctic distribution.

14. *Allotrichia pallicornis* Eaton, 1873

- 2 - 10.06.1980: 1 ♂, Cibelli.
 Collected in several sampling sites in the peninsula from Piemonte to Calabria. Recorded in Lombardia and Sicilia by Valle (2001). W-Palearctic distribution.

PHILOPOTAMIDAE

15. *Philopotamus montanus* Donovan, 1813

- 37 - 10.06.2002: 3 ♂, Gramegna.
 38 - 28.07.1993: 1 ♀ (L), Pantini, Valle (Cianficconi et al., 1993).
 Common in springsbrooks and streams of Basilicata, Calabria, Sicilia. Attributed by Moretti to subspecies *P. montanus siculus* Hagen, 1860. Malicky in the most recent Atlas of European Trichoptera (2004) eliminated *siculus* as a subspecies. European distribution.

16. *Wormaldia mediana* McLachlan, 1878

- 7 - 21.09.1969: 5 ♂, 3 ♀, Capolongo.
 Present in Italy in the Alps and in the central northern Apennines, this taxon was found in Campania in a hypogean cavity. European distribution.

17. *Wormaldia mediana nielsenii* Moretti, 1981

- 38 - 28.07.1993: 1 ♂, 1 ♀ (L), Pantini, Valle.
 Found in Campania, Calabria and Sicilia (Cianficconi et al., 1993), it is attracted by light traps. S-Apenninic Sicilian endemic.

HYDROPSYCHIDAE

18. *Hydropsyche incognita* Pitsch, 1993

- 18 - 17.07.1994: 1 l, De Pietro.
 19 - 17.07.1994: 1 ♂, De Pietro.
 This species was found in Italy only in the regions of Campania and Lazio by De Pietro (Malicky, 1999). S-European distribution.

19. *Hydropsyche klefbecki* Tjeder, 1946

- 38 - 28.07.1993: 23 ♂ (L), Pantini, Valle.
 Recorded in the Apennines (from Umbria to Calabria) and in Sicilia (Cianficconi et al., 1993). Central-S-Apenninic Sicilian endemic.

20. *Hydropsyche moretii* De Pietro, 1996

- 23 - 29.09.1994: 2p, 2 ♂, 1 ♀ (L), De Pietro.
 24 - 29.09.1999: 24p, 16 ♂, 10 ♀ (L), De Pietro.
 Collected by De Pietro in the river Tanagro, with light traps. In the watercourses of the peninsula and Sicilia, it is widespread from hypocrenal to potamal zones. Central-S-Apenninic Sicilian endemic.

21. *Hydropsyche pellucidula* Curtis, 1834

- 1 - 1.10.1979: p, Cibelli.
 9 - 4.05.1982: 2 ♂, 1 ♀, l, p, Moretti, Chiappafreddo.
 39 - 10.06.2002: 1pp., Gramegna.
 Euryoecious species widespread in the meta-hyporithral zones of the Italian peninsula. In Campania, it was collected in watercourses of 3 basins. W-Palearctic distribution.

22. *Cheumatopsyche lepida* Pictet, 1834

- 2 - 1.10.1979: 3 ♂, Cibelli.
 This euryoecious species is present in Italy in running waters at low altitudes. Centralasiatic-European-Mediterranean distribution.

POLYCENTROPODIDAE

Plectrocnemia sp.

- 36 - 00.00.00: 1 ♀, G. S. A. M.

23. *Polycentropus flavomaculatus* Pictet, 1834

2 - 9.10.1979: 1♂, Cibelli.

7 - 21.09.1969: 1♂, Capolongo.

Widespread in slowly-running waters of the Alps. It may be substituted by *P. mortoni* in the peninsula. In Campania it was collected in a cave (Grotta del Lete). European distribution.

24. *Polycentropus malickyi* Moretti, 1981

2 - 10.06.1980: 1p♂, Cibelli.

Inhabits the rithral zone of the watercourses of the central southern Apennines (from Toscana to Calabria) and Sicilia. Central-S-Apenninic Sicilian endemic.

25. *Polycentropus mortoni* Mosely, 1930

9 - 4.05.1982: 2♂, Moretti.

Present in watercourses of the Apennines (from Toscana to Calabria), Corsica, Sardegna and Sicilia mainly in the lower sections. Tyrrhenian endemic.

PSYCHOMYIDAE**26. *Psychomyia pusilla* Eaton, 1781**

9 - 4.05.1982: 62♂, 19♀, Moretti, Chiappafreddo, Cianficconi.

Collected in Volturno river with a high number of specimens. Present in the Peninsula and Sardegna in shallow waters on stony substrates. W-Palearctic distribution.

27. *Lype pheopa* Stephens, 1836

36 - 00.00.1985: 3♂, G. S. A. M.

Found in Campania only in a hypogean cavity. Recorded in Italy in the southern Alps and central southern Apennines mainly in rithral and hypocrenal zones. Europeo-Mediterranean distribution.

28. *Tinodes antonioi* Botosaneanu & Viganò, 1974

9 - 20.05.1984: 3♂, 2♀, Moretti, Tucciarelli.

Found in the rithral zone of the Pre-Alps and Apennines (from Lombardia to Calabria), it has been recorded in Slovenia (Kumanski, Urbanic, 2002) and in the French Maritime Alps (Botosaneanu, Giudicelli, 2004). Alpino - Apenninic endemic.

29. *Tinodes dives consiglioi* Botosaneanu, 1980

43 - 18.06.2002: 1♂, 2♀, Gramegna.

Found in the lower section of the river Bussento, it is endemic to the Apennines and French Maritime Alps (Botosaneanu, Giudicelli, 2004). W-Alpino-Apenninic endemic.

PHRYGANEIDAE**30. *Agrypnia varia* Fabricius, 1793**

4 - 6.08.1968: 4fl, Pangia.

The aquatic stage is characterized by a case made of rectangular pieces of leaves arranged in vertical spirals. It can be seen in ponds, peat-bogs, lakes and agricultural lakes in the Apennines. Centralasiatic -European distribution.

LIMNEPHILIDAE**31. *Limnephilus bipunctatus* Curtis, 1834**

4 - 2.06.1969: 10♂, 8♀; 22.06.1969: 1♀; 8.06.1970: 7♂, 7♀; 23.06.1970: 1♂, 1♀, Pangia.

In Italy, it is a typical inhabitant of mountain pools of the central Apennines. In Campania it is also found in the Matese lake. European distribution.

32. *Limnephilus flavicornis* Fabricius, 1787

4 - 19.05.1968: 1♂; 6.08.1968: 5fp; 8.04.1969: 2p♀; 22.06.1969: 1♀, Pangia.

Found in the Matese lake, it is widespread in the stagnant waters of the Peninsula. Palearctic distribution.

33. *Limnephilus helveticus* Schmid, 1965.

10 - 20.05.1984: 2♂, Moretti.

It can be seen in limnocrenous waters rich in submerged vegetation. It is present in the Alps and Apennines (from Umbria to Campania). S-European distribution.

34. *Limnephilus lunatus* Curtis, 1834

4 - 25.05.1968: 1♂, 4♀; 8.04.1969: 1♀; 10.06.1970: 1♂, Pangia.

It is widespread in Italy in lentic waters, in slowly running waters and in limnocrenous springs. W-Palearctic distribution.

35. *Limnephilus vittatus* Fabricius, 1798

4 - 2.06.1969: 1♂; 10.06.1970: 3♂; 23.VI.1970: 14♂, 12♀; 30.06.1970: 4♂, 3♀; 6.07.1970: 1♂, 5♀, Pangia.

Collected in June-July in the Matese lake. It is found in marshes, mountain pools and temporary waters in mountain zones of the Italian peninsula and Sicilia. Palearctic distribution.

36. *Grammotaulius nigropunctatus* Retzius, 1783

4 - 19.05.1969: 1p♀; 12.06.1969: 1p♀, Pangia.

Present in the Matese lake. It can be seen in marshes in the Apennine high plains. Palearctic distribution.

37. *Potamophylax cingulatus gambaricus* Malicky, 1971

3 - 31.08.1967: 3p♂, 3p♀; 6.IX.1967: 3♂, 9♀, 1p♂, 1p♀, Pangia.

4 - 6.08.1968: 2l, Pangia.

36 - 00.00.1985: 2♂, 1♀ G.S.A.M.

Widespread in the rithral zone of the T. Tornora. In Campania, it has been also found in the Grotta di Vesolo. Apenninic Sicilian endemic.

38. *Halesus appenninus* Moretti & Spinelli 1981

11 - 22.09.1967: 1♀, Pangia.

Found in the river Lete, it is present in the Apennines (from Emilia Romagna to Campania) and Sicilia. Apenninic Sicilian endemic.

39. *Stenophylax mitis* McLachlan, 1875

27 - 12.08.1963: 2♂, 3♀, Olmi.

32 - 2.05.1998: 1♂, Osella; 12.08.1963: 2♂, 3♀, Olmi.

34 - 9.08.1971: 1♂, 1♀, Forestiero. 5.08.1972: 1♂; 27.07.1978: 1♀, Sbordonì.

Subtroglophilous species recorded throughout Italy. Mediterranean distribution.

40. *Stenophylax mucronatus* McLachlan, 1880

5 - 7.06.1963: 1♀, Sbordonì.

16 - 19.10.1969: 1♂, Capolongo.

34 - 6.08.1972: 1♀, Sbordonì.

Subtroglophilous species, it is found in hypogean cavities in Italy from Toscana to Calabria. S-European distribution.

41. *Stenophylax permistus* McLachlan, 1895

7 - 21.09.1969: 1♀, Capolongo.

Subtrogliphilous species, found in Italy in caves from Piemonte to Campania. European distribution.

42. *Stenophylax vibex* Curtis, 1834

28 - 6.08.1982: 1♂, Capolongo.

Subtrogliphilous species, rare in Italy. Its presence in a cave (Grava Fonnatura) in Campania is the most southern record in the peninsula. Europeo-Mediterranean distribution.

43. *Micropterna fissa* MacLachlan, 1875

6 - 12.04.1970: 1♂, Antonelli.

26 - 9.04.1970: 1♂, 1♀, Sbordoni.

28 - 6.08.1982: 1♀, Caoduro.

Subtrogliphilous species, in Italy it is recorded in caves in Lombardia, Veneto, the Apennines (from Toscana to Campania) and Sardegna with high numbers of specimens. European distribution.

44. *Micropterna nycterobia* McLachlan, 1875

27 - 12.08.1963: 1♀, Olmi.

30 - 00.00.00: 1♀, Parenzan.

34 - 15.08.1969: 6♂, 2♀, Sbordoni; 27.07.1978: 1♂, 1♀, Sbordoni.

35 - 27.07.1961: 1♂, 1♀, Sbordoni.

Subtrogliphilous species recorded in Italian caves from Piemonte to Campania. European distribution.

45. *Micropterna sequax* MacLachlan, 1875

28 - 6.08.1982: 1♂, Caoduro.

34 - 27.07.1978: 1♂, Sbordoni.

Subtrogliphilous species recorded in Italian caves from Piemonte to Campania. European distribution.

46. *Micropterna testacea* Gmelin, 1789

33 - 15.10.1978: 1♂, 1♀, Sbordoni.

It is a subtrophilous species collected in Italian caves from Piemonte to Campania. Central -S-European distribution.

47. *Mesophylax aspersus* Rambur, 184

15 - 24.02.1973: 1♂, Sbordoni.

It is a trogliphilous species, frequently found in Italian caves. The larvae live in temporary waters. Europeo-Mediterranean distribution.

48. *Allogamus antennatus ausoniae* Moretti, 1991

40 - 18.06.2002: 1♂, 1♀, Gramegna.

The specimens of this taxon were collected in many sampling sites in crenal and epirithral zones of the central Apennines extending to Molise and Campania. Central-S-Appenninic endemic.

49. *Chetopteryx gessneri* McLachlan, 1876

12 - 30.04.1995: 2 l, Gramegna.

This crenobiont characterizes the springs along the course of the streams. Emergence occurs in autumn. Central-European distribution.

GOERIDAE**50. *Silo nigricornis* (Pictet, 1834)**

40 - 19.03.1993: 1♂; 19.04.1993: 3♂; 18.05.1993: 1♂, 1♀, Florenzano.

It is widespread in spring-brooks of the Alps and also of the Apennines. Central-S-European distribution.

LEPIDOSTOMATIDAE**51. *Lepidostoma basale* Kolenati, 1848**

39 - 18.06.2002: 8♂, 1♀, Gramegna.

38 - 18.06.2002: 9♂, 2♀, 2 fp, 1 l, Gramegna; 9.05.93: 1♂; 5.04.1994: 1♂, 1♀, Florenzano.

Synonym of *Lasiocephala basalis* (Kolenati, 1848) (Malicky, 2005). Characterized by massive evening emergence in watercourses in the Marche and Umbria regions (Cianficconi et al., 2007). European distribution.**52. *Lepidostoma hirtum* Fabricius, 1775**

9 - 4.05.1982: 1♂, 2♀, Moretti.

39 - 18.06.2002: 1♂, Gramegna.

42 - 18.06.2002: 1♂, Gramegna.

It inhabits running water with mosses, algae and submerged vegetation in Italy from the Alps to Calabria. Sibero-European distribution.

LEPTOCERIDAE***Athripsodes* sp.**

3 - 30.08.1967: 2l, Pangia.

53. *Ceraclea dissimilis* Stephens, 1836

9 - 4.05.1982: l, Moretti.

Found in the Volturno river, it is present in slowly-running waters in central Italy. W-Mediterranean distribution.

SERICOSTOMATIDAE**54. *Sericostoma siculum* McLachlan, 176**

40 - 19.03.1993: 2♂; 9.05.1993: 2♂, 2♀; 18.05.1993: 5♂, 2♀; 14.06.1993: 1♂, Florenzano.

Recorded in springs-brooks and streams of southern Apennines and Sicilia.

S-Appenninic Sicilian endemic.

BERAEIDAE***Beraea* sp.**

21 - 20.03.1997: 1p♂: Gramegna.

It is important to find adults to define the species which could be new to Italy.

55. *Beraeamyia squamosa* Mosely, 1930

40 - 18.06.2002: 1 l, Gramegna. 9.V.1993: 1pp, 1♀; 18.V.1993: 1♂; 14.VI.1993: 5♂, 6♀, Florenzano.

It inhabits the rithral zone of the Apennines (from Liguria to Calabria) and Sicilia. Recorded in the French Maritime Alps and in the Pyrenees (Gonzalez M.A. et al., 1992). W-Mediterranean distribution.

ODONTOCERIDAE**56. *Odontocerum albicorne* Scopoli, 1769**

20 - 24.06.1997: 3 l, Gramegna, Maglio.

21 - 24.06.1997: 2 l, Gramegna, Maglio.

31 - 2.07.1971: 1 l, Vomero.

40 - 9.06.1993: 1♀, Florenzano.

42 - 18.06.2002: 1♂, 2♀, Gramegna.

It inhabits the hypocranal and epirithral zones of the running waters of the Peninsula and Sicilia. In Campania,

one larva was collected by Vomero in a hypogean cavity. European distribution.

Results and Discussion

During the research on 102 samplings, 380 adults (251 ♂, 129 ♀) and 131 aquatic stages were collected. 56 taxa (51 species, 5 subspecies) were identified. They represent respectively 12,01% of the species and 15,6% of the subspecies of the Italian Trichopteran fauna (416 species, 32 subspecies) and belong to 33 genera and 15 families of the 93 genera and 20 families known in Italy.

The family with the highest number of species is the Limnephilidae with 5 species of *Limnephilus* (equal to 20% of the species of the Peninsula), 4 species of *Stenophylax* (equal to 66% of the species of the Peninsula) and 4 species of *Micropterna* (equal to 50 % of the species of the Peninsula). This family is followed by the Rhyacophilidae with 4 species and 1 subspecies of *Rhyacophila* (equal to 12,9% of the species and 25% of the subspecies present in Italy) (Cianficconi et al., 2008), and the Hydropsychidae with 4 species of *Hydropsyche* (equal to 21% of the species in Italy)

The high number of species of *Limnephilus* is due to collections in lentic waters (Lago del Matese) and the high number of *Stenophylax* and *Micropterna* species in collections in hypogean cavities.

In the genus *Rhyacophila*, *R. albardana* is rare in Italy and *R. dorsalis pantini*, *R. rougemonti* and *R. vallei* are endemic to the Italian fauna.

In the genus *Hydropsyche*, *H. incognita* is found in Italy only in Campania and Lazio, *H. klefbecki* and *H. morettii* are endemic to the Italian fauna.

The finding of *Agapetus incertulus* McLachlan in the river Volturno (Fig. 6) is interesting because, up to now, it is the only record in Italy.

The highest number of specimens collected belong to the species *Hydropsyche pellucidula* (81), *H. morettii* (55) and *Limnephilus vittatus* (43) (Table 2).

Analysis of caddisfly assemblages in the investigated area reveals that they are well characterized and diverse among the basins (Table 1).

By means of cluster analysis, it is possible to highlight an early separation of the basins with low biodiversity, namely Regi Lagni, which has the lowest number of species (2 from hypogean cavities) and T. Cervaro. They are also colonized by some exclusive species: *Mesophylax aspersus* (Regi Lagni) and *Oxyethira falcaara*, *Hydroptila tineoides*, *Allotrichia pallicornis*, *Cheumatopsyche lepida*, *Polycentropus malickyi* (T. Cervaro).

The remaining basins show a high level of separation due to the low similarity of the assemblages (dissimilarity index = 0.85). The Volturno and Sele basins are characterized by the highest species richness and specimens collected and share the greatest number of species. In addition, the Sele basin has the highest number of total samplings and the highest number of sites and samplings in hypogean cavities. T. Bussento and T. Mingardo basins share one species in common and it is exclusive to these two rivers. (*Philopotamus montanus*). (Fig. 1)

The ecological balance shows, as well as euryoecious species in lotic waters, the presence of crenal species (*Catagapetus nigrans*, *Plectrocnemia* sp., *Cheumatopsyche lepida*) and of epirithral and hyporithral biozones, which provide the populations richest in

species (Fig. 7). The lentic species include, as well as *Agrypnia varia*, various species of *Limnephilus* in the Matese lake (*L. bipunctatus*, *L. flavicornis*, *L. lunatus*, *L. vittatus*) and *Grammotaulius nigropunctatus*. 9 species of subtrogliphilous Stenophylacinae were found only in caves.

In hypogean cavities of Campania, it is noteworthy that epigeal species are also present, including: *Rhyacophila rougemonti* in 4 caves (7, 29, 31, 41); *Rhyacophila* sp. (cave 36); *Wormaldia mediana* and *Polycentropus flavomaculatus* (cave 7); *Lype phaeopa* and *Potamophylax cingulatus gambaricus* (cave 36); *Odontocerum albicorne* (cave 31).

The altitudes of the epigeal sampling sites are from 8 m (F. Bussento, foce Pantana site 43) to 1073 m a.s.l. (T. Tornora, S. Gregorio Matese site 3).

Of the 16 caves examined, 6 are at altitudes above 1000 m, 6 at between 60 and 970 m and 4 from 101 to 460 m. The lentic waters of Lake Matese are 1100 m a.s.l.

Analysis of species richness in relationship with altitude shows higher levels of biodiversity at about 100 and 1000 m a.s.l. (Fig. 2). Typical species of the lotic assemblages dominate at lower altitudes, from 0 to 250 m a.s.l., with specimens of 9 families, while species of the family Limnephilidae colonized the high waters of Lake Matese and the spring brooks of the Volturno and Bussento basins. As expected, cave species are present in a wide range of altitudes, spanning from the elevation of about 101 m (Tunnel Roccarainola site 16) up to 1550 m a.s.l. (Grotta di Campo d'Amore site 33) (Fig. 4).

The geographical balance (Fig. 5) shows a predominance of species with European distribution (30%). 37% of the species have wide distribution: WPAL (11%), PAL (5%), CAE (2%), EUM (5%), CEU (5%), SEU (5%) SIE (2%), CEM (2%) and 7% have Mediterranean distribution: MED (2%), WME 5%. 10 species and 5 subspecies can be considered endemic to the Italian fauna and represent 15% of the Italian endemics (119). Among the species, *P. mertonii* (TYRR) and *T. antonioi* (ALAP) have a wide distribution, *R. vallei* (APPS) and *H. appenninus* (APPE) have limited distributions. 6 species (*R. rougemonti*, *C. nigrans*, *H. klefbecki*, *H. morettii*, *P. malickyi* and *S. siculum*) have distributions extending to Sicilia.

Among the subspecies, *Tinodes dives consiglioi* has a wide distribution (ALWA), *R. dorsalis pantini* and *A. antennatus ausoniae* have a Central S-Apenninic distribution. *W. mediana nielsenii* and *P. cingulatus gambaricus* have a distribution extending to Sicilia.

The presence of *Agapetus incertulus* McLachlan 1884 collected in River Volturno (Fig. 6) is noteworthy because it is the only finding in Italy. *Hydropsyche incognita* was found in Italy only in the regions of Campania (River Sele) and Lazio.

In conclusion, on the basis of this data, the Trichopteran fauna of the Campania region is of great systematic, ecological and zoogeographical interest. This paper provides useful information for future studies. It is important to ascertain at a specific level the taxonomy of the *Plectrocnemia* sp. found in the Mingardo basin, of the *Athripsodes* sp. found in the Volturno basin and of the *Beraea* sp. found in the Sele basin, to extend research using light traps in lentic biotopes of the individual basins and in the basins not yet examined.

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BASINS	SPECIES	SPECIMENS	SITES	SAMPLINGS
Cervaro	7	10	2	6
Volturno	29(4)	302(4)	12(3)	34(4)
Regi Lagni	(2)	(2)	(2)	(2)
Sele	18(9)	152(35)	20(9)	152(35)
Mingardo	5(3)	11(7)	2(1)	11(7)
Bussento	15(1)	109(1)	6(1)	109(1)

Table 1 - Species richness, specimens collected, number of sites and sampling numbers in the six basins investigated. In brackets hypogean species are reported.

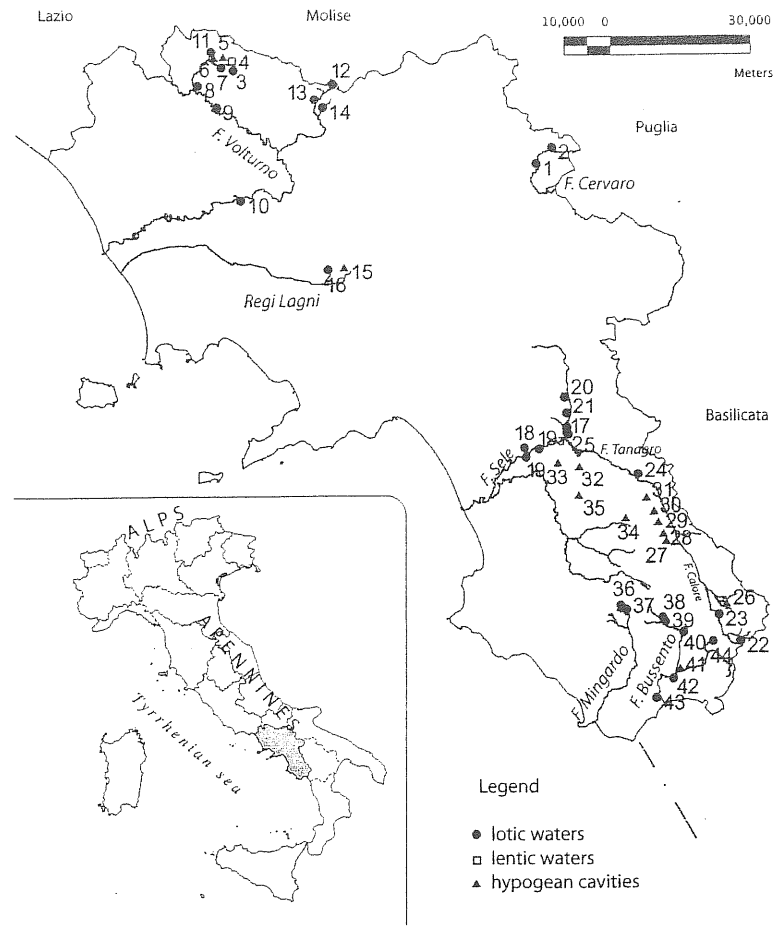


Fig. 3 – Campania region : map of sampling sites with number and symbol for each typology shown in the legend.

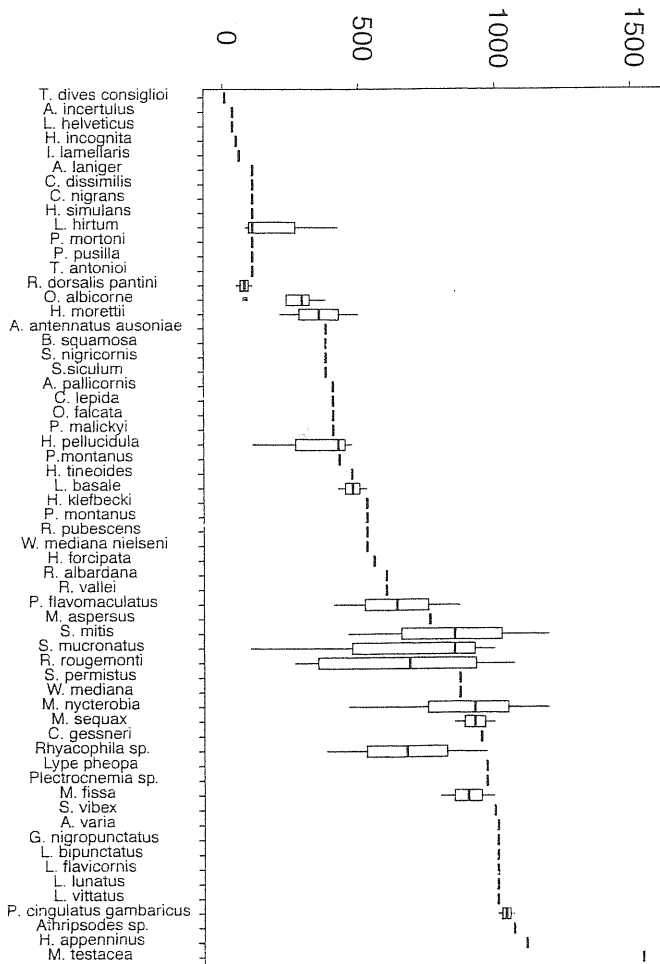


Fig. 4 –Altitudinal distribution pattern of Trichoptera species

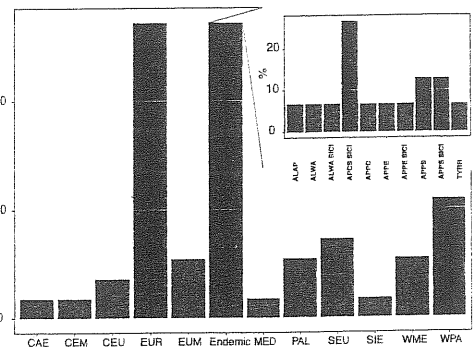


Fig. 5 – Percentage of the geographical distribution of the Campania Trichopteran species and subspecies, according to the main chorotypes (Vigna Taglianti et al. 1999). WPA = W-Palearctic , SIE = Sibero-European, CAE = Centralasiatic- European, EUM = Europeo-Mediterranean, EUR = European, CEU = centraleuropean, SEU = S-European, MED = Mediterranean, WME = W-Mediterranean. Endemic: ALAP =Alpino-Apenninic, ALWA = W-Alpino-Apenninic , ALWA SICI = W-Alpino-Apenninic-Sicilian, APPE = Apenninic, APPE SICI = Apenninic –Sicilian, APCS= Central-S-Apenninic, APCS SICI = Central s-Apenninic Sicilian, APPS= S-Apenninic, APPS SICI = S-Apenninic Sicilian, TYRR = Tyrrhenian,

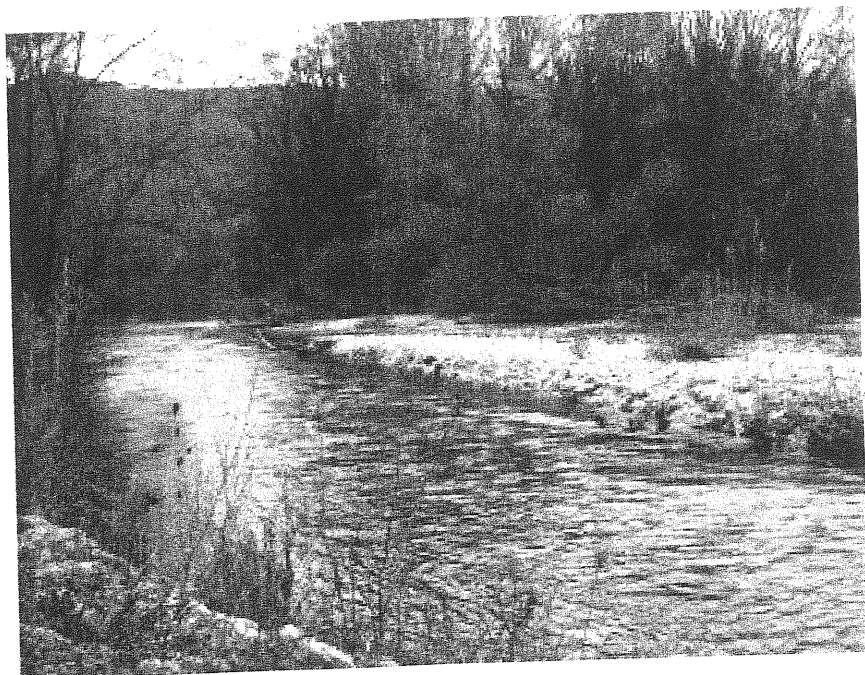


Fig. 6 – River Volturmo (site 10) inhabited by: *Agapetus incertulus*

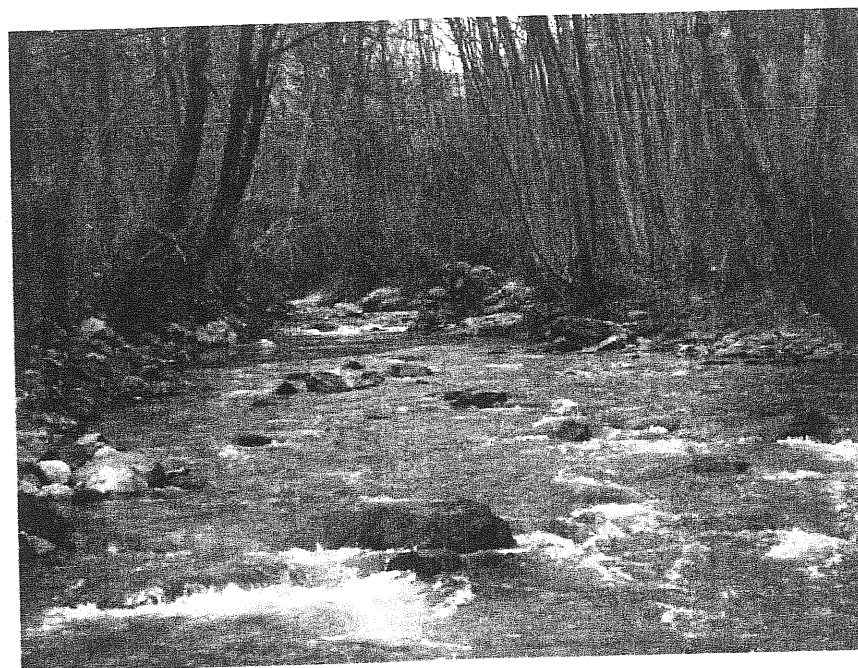


Fig. 7 – River Bussento (site 40) inhabited by a high number of species: *Allogamus antennatus ausoniae*, *Silo nigricornis*, *Sericostoma siculum*, *Beraemyia squamosa*, *Odontocerum albicorne*.