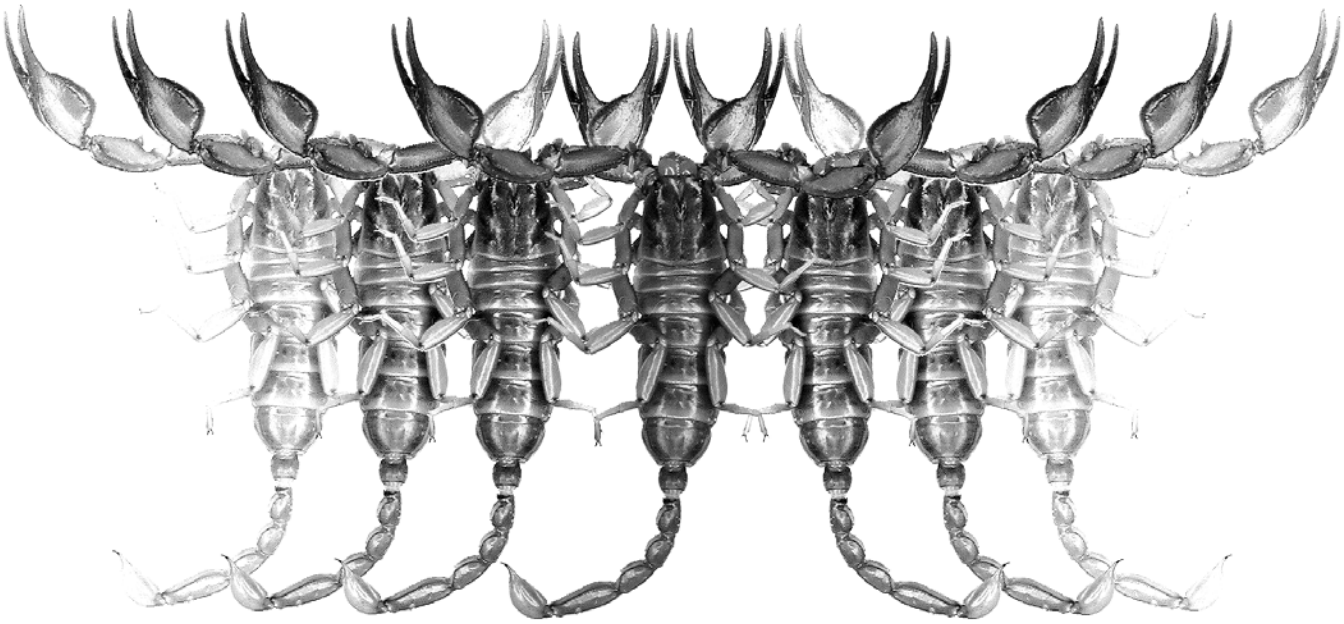
# *Euscorpius*

## Occasional Publications in Scorpiology

# New Data on Distribution and Ecology of Seven Species of *Euscorpius* Thorell, 1876 (Scorpiones: Euscorpiidae)


**Marco Colombo**



**March 2006 – No. 36**

# *Euscorpius*

## Occasional Publications in Scorpiology

*EDITOR*: **Victor Fet**, Marshall University, **'fet@marshall.edu'**

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The name *Euscorpius* Thorell, 1876 refers to the most common genus of scorpions in the Mediterranean region and southern Europe (family Euscorpiidae).

*Euscorpius* is located on Website **'http://www.science.marshall.edu/fet/euscorpius/'** at Marshall University, Huntington, WV 25755-2510, USA.

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# New data on distribution and ecology of seven species of *Euscorpius* Thorell, 1876 (Scorpiones: Euscorpiidae)

**Marco Colombo**

Liceo Scientifico Statale A.Tosi, Busto Arsizio, Varese, Italy
e-mail: oryctes@libero.it; capocaccia@libero.it

## Summary

The author observed seven species of *Euscorpius* in 1999–2005 (*E. alpha*, *E. sicanus*, *E. tergestinus*, *E. concinnus*, *E. naupliensis*, *E. italicus*, and *E. flavicaudis*) in their natural environment, mainly in Italy but also in France, Switzerland, and Greece. Ecology of these species is discussed as well as predatory behavior occasionally observed in nature. This work provides new data on the distribution and ecology of European Euscorpiidae.

## Introduction

A few years ago, only four European scorpion species belonging to the genus *Euscorpius* Thorell, 1876 (family Euscorpiidae Laurie, 1896) were recognized: *Euscorpius carpathicus* (Linnaeus, 1767), *E. flavicaudis* (DeGeer, 1778), *E. germanus* (C.L. Koch, 1837), and *E. italicus* (Herbst, 1800). During the recent years, the intensive research on this genus took place (e.g. Gantenbein et al. 2000, 2002; Fet & Soleglad, 2002; Fet et al. 2001, 2003, 2004). At this moment, there are 16 recognized European species of *Euscorpius* (Fet et al., 2004; Vignoli et al., 2005); among them, eight are found in Italy (*E. alpha*, *E. concinnus*, *E. flavicaudis*, *E. gamma*, *E. germanus*, *E. italicus*, *E. sicanus*, and *E. tergestinus*). The updated list of all valid *Euscorpius* species recorded for Europe (Fet et al., 2004; Vignoli et al., 2005) is given below; species discussed in this paper are marked with an asterisk*:

**Subgenus *Alpiscorpius* Gantenbein et al., 1999**
**Euscorpius alpha* Caporiacco, 1950
*Euscorpius germanus* (C. L. Koch, 1837)
*Euscorpius beroni* Fet, 2000
*Euscorpius gamma* Caporiacco, 1950
*Euscorpius mingrelicus* (Kessler, 1874)

**Subgenus *Euscorpius* Thorell, 1876**
*Euscorpius balearicus* Caporiacco, 1950
*Euscorpius carpathicus* (Linnaeus, 1767)
*Euscorpius hadzii* Caporiacco, 1950
*Euscorpius koschewnikowi* Birula, 1900
**Euscorpius sicanus* (C. L. Koch, 1837)
*Euscorpius tauricus* (C. L. Koch, 1837)
**Euscorpius tergestinus* (C. L. Koch, 1837)
**Euscorpius concinnus* (C. L. Koch, 1837)

**Subgenus *Polytrichobothrius* Birula, 1917**
**Euscorpius italicus* (Herbst, 1800)
**Euscorpius naupliensis* (C. L. Koch, 1837)

**Subgenus *Tetratrichobothrius* Birula, 1917**
**Euscorpius flavicaudis* (DeGeer, 1778)

## Methods and Material

Scorpions were found by picking up stones, flower pots, or household furniture during the day, as well as by searching with UV light at night; in this way they were not disturbed and followed in their activities. In total, 430 specimens were studied. Scorpions were either collected or left where found. Additional recorded information included the data on humidity (based on qualitative observations), temperature, presence of other scorpions of the same or different species, presence of other invertebrates (potential prey), reaction of scorpions to other arthropods (predatory behavior, prey, predators), tree species, type of soil, etc.

Map distribution was plotted using geographical coordinates estimated from atlases, web sources, and, in particular, Google Earth program (©2005 Google). Schematic maps were built using OMC (Online Map Creation) software (Geomar, Germany) (http://www.aquarius.geomar.de) and modified with Windows Paint accessory. Altitudes (Tables 3–9) were estimated from geographical atlases.

Photographs of scorpions were taken both in nature and in captivity to illustrate morphological differences among analyzed species; additional pictures were taken to give a general idea of scorpions' environment and behavior.

| *Species* | *Number of specimens* | *% of specimens found in different habitats* | | | | |
|---|---|---|---|---|---|---|
| | | *Forests* | *Rocky cliffs or nearby* | *Ruins, abandoned castles, houses, and churches* | *Inhabited houses* | *Maquis, or border between maquis and forests* |
| ***E. alpha*** | 44 | 93.2 | 4.5 | - | 2.3 | - |
| ***E. concinnus*** | 92 | 63.0 | 15.2 | 13.0 | 5.4 | 3.4 |
| ***E. flavicaudis*** | 118 | 0.8 | 3.4 | 62.7 | 28.0 | 5.1 |
| ***E. italicus*** | 80 | 1.3 | 50.6 | 39.2 | 8.9 | - |
| ***E. naupliensis*** | 11 | 36.4 | 27.3 | 27.3 | 9.0 | - |
| ***E. sicanus*** | 66 | 20.3 | - | - | 79.7 | - |
| ***E. tergestinus*** | 19 | - | - | 94.4 | 5.6 | - |
| **Total** | 430 | | | | | |

**Table 1:** Habitat distribution of studied *Euscorpius* species. *Note:* Specimens No. 9, 42, and 50 included only in the first column due to the lack of habitat data.

| *Species* | *Altitude, m a.s.l.* | | | | | | |
|---|---|---|---|---|---|---|---|
| | **0–200** | **200–400** | **400–600** | **600–800** | **800–1000** | **1000–1200** | **1200–1400** |
| ***E. alpha*** | - | 32 | 2 | 7 | 2 | - | 1 |
| ***E. concinnus*** | 16 | 65 | 8 | 3 | - | - | - |
| ***E. flavicaudis*** | 41 | 74 | 2 | 1 | - | - | - |
| ***E. italicus*** | 55 | 20 | - | 4 | - | - | - |
| ***E. naupliensis*** | 4 | 1 | 6 | - | - | - | - |
| ***E. sicanus*** | - | 62 | 3 | - | - | 1 | - |
| ***E. tergestinus*** | 1 | 10 | 7 | - | - | - | - |

**Table 2:** Vertical distribution of studied *Euscorpius* species (number of specimens). *Note:* Specimens No. 9 and 50 omitted due to the lack of data.

Below is a list of the localities where specimens were collected or observed. Tables 1–2 depict the general habitats and elevations where these specimens were encountered. More detailed information is given in Tables 3–9, where specimens are listed according to the date of their observation. All specimens were found by the author unless noted otherwise.

*Euscorpius alpha*: ITALY. **Lombardy**: Sombreno (Bergamo), Eupilio (Como), Brunate (Como), Cislano (Brescia), Cure, Monte Isola (Brescia), Colico (Lecco), Piani Resinelli mine (Lecco), Campione d'Italia (Como; a small Italian enclave within Switzerland); **Piedmont**: Romagnano Sesia (Novara). SWITZERLAND. **Ticino**: Mt. Caslano, Mt. San Giorgio.

*Euscorpius sicanus*: ITALY. **Sardinia**: near Baunei (Nuoro), Genna Silana pass (Nuoro); **Tuscany**: Castel San Gimignano (Siena), Mt. Argentario (Grosseto), Giglio Castello, Giglio Island (Tuscan Archipelago; V.Vignoli leg.).

*Euscorpius tergestinus*: ITALY. **Emilia Romagna**: Torrechiara (Parma); **Lombardy**: Cislano (Brescia); **Veneto**: Venice (Venezia), Ceraino (Verona), Lubiara (Verona).

*Euscorpius concinnus*: FRANCE. **Haute-Provence**: Entrevaux; **Var**: Le Muy. ITALY. **Emilia Romagna**: Gropparello (Piacenza); **Liguria**: Pignone (La Spezia), Vernazza (La Spezia), Gambatesa mine (La Spezia), Breccanecca, near Cogorno (Genova), Rapallo (Genova), Pigna (Imperia), coast between Levanto and Monterosso (La Spezia), near Colla Micheri, Capo Mele (Savona); **Piedmont**: Mondovì (Cuneo), La Morra (Cuneo); **Tuscany**: Castel San Gimignano (Siena), Codiponte (Massa), Vagli (Lucca), Castelnuovo di Garfagnana (Lucca), San Vivaldo (Firenze).

*Euscorpius italicus*: ITALY. **Emilia Romagna**: Felino (Parma), Montechiarugolo (Parma), Torrechiara (Parma), Ferrara (Ferrara), Castell'Arquato (Piacenza), San Pietro in Cerro (Piacenza); **Lombardy**: Onno (Lecco), Busto Arsizio (Varese), Cittiglio (Varese), Cernobbio (Como), Peschiera Maraglio, Monte Isola (Brescia), Cislano (Brescia), Montichiari (Brescia), Isola Comacina (Como); **Marche**: Fermo (Ascoli Piceno; A. Colombo leg.);

**Figure 1:** *Euscorpius (Alpiscorpius) alpha*, adult female, Cislano (Lombardy, Italy) (photo by Giorgio Colombo).

**Veneto**: Campo (Verona), Ceraino (Verona); **Piedmont**: Varallo Pombia (Novara).

*Euscorpius naupliensis*: GREECE. **Zakynthos Island**: Skoulikado (Alykes), Volimes (Elation), near Volimes (Elation), Anafonitria (Elation), Louha (Artemision).

*Euscorpius flavicaudis*: FRANCE. **Var**: Fayence, Mont Faron (near Toulon). ITALY. **Liguria**: Finale Ligure (Savona), Toirano (Savona), Andora Castello (Savona); **Sardinia**: Sedini (Sassari), Cala della Barca (Sassari), Maristella (Sassari), Olmedo (Sassari), near Ittiri (Sassari), Martis (Sassari), Chiaramonti (Sassari), Monteleone Roccadoria (Sassari); **Tuscany**: Castelfalfi (Firenze), Levigliani (Massa).

## Results and Discussion

### Subgenus *Alpiscorpius* Gantenbein et al., 1999

### *Euscorpius alpha* Caporiacco, 1950

(Figs. 1–3, Table 3)

Described as a subspecies *E. germanus alpha* by Caporiacco (1950), this taxon was elevated to species status by Gantenbein et al. (2000); their molecular analysis showed a 7% DNA divergence between *E. germanus* and *E. alpha*.

This species is found only in Italy and Switzerland. In Italy, it is recorded from the north (Alpine and Prealpine mountain ranges), as far eastward as Adige River (Trentino-Alto Adige region); beyond this river it is substituted by *E. germanus* (Marcuzzi, 1961). It is also abundant in southern Switzerland (Braunwalder, 2001, 2005). Caporiacco (1950) reported it from the Lombardian Prealps, as far as Brembo River; also, he mentions some localities from Piedmont for *E. germanus beta* that now is a synonym of *E. alpha*. The maps of Crucitti (1993) show numerous records from eastern Lombardy, and less from western Lombardy, Piedmont, and Valle d'Aosta. Gantenbein et al. (2000) report several Italian localities, especially from Bergamascan Prealps, and also some Swiss localities.

In this study, localities from both Italy and Switzerland (Fig. 3) where surveyed in order to obtain a detailed picture of ecological conditions across the range of *E. alpha*. In Italy, this species was found by the author eastward from Piedmont (Romagnano Sesia) in many localities within Lombardy (as far as Lake Iseo). In Switzerland, *E. alpha* was studied in two localities (Monte San Giorgio and Monte Caslano), and in a small (1.7 $km^2$) Italian enclave (Campione d'Italia).

**Figure 2:** *E. alpha* forest habitat in Cislano (Lombardy, Italy) (photo by Marco Colombo).

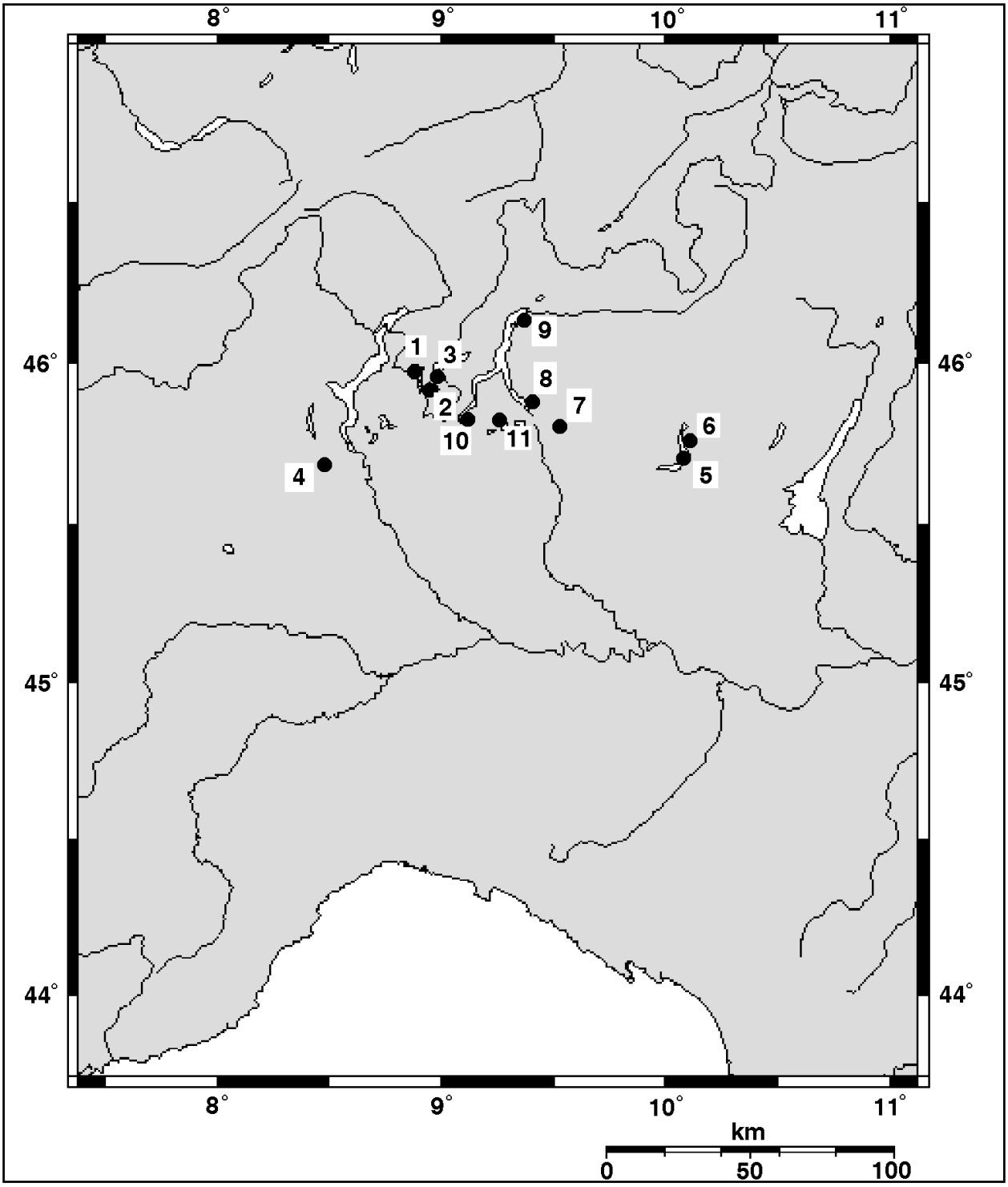


**Figure 3:** *E. alpha* collecting sites. Lombardy, Piedmont (Italy) and Ticino (Switzerland): **1.** Monte Caslano; **2.** Monte San Giorgio; **3.** Campione d'Italia; **4.** Romagnano Sesia; **5.** Monte Isola; **6.** Cislano; **7.** Sombreno; **8.** Piani Resinelli; **9.** Colico; **10.** Brunate; **11.** Eupilio.

*E. alpha* is usually found in mountainous areas (up to 2000 m a.s.l.; Crucitti, 1993) or even in hilly areas, so it could be defined as orophilous (Crucitti, 1993). Ecology of *E. alpha* seems to be similar to that of other related European species, such as *E. germanus* and *E. gamma*; the last species was found down to the sea level

| *No.* | *Date* | *Number of specimens, age and sex* | *Geographic locality* | *Altitude a.s.l.* | *Comments* |
|---|---|---|---|---|---|
| **80** | 7 April 2004 | *E. alpha* (1 adult male and 4 adult females) | Campione d'Italia (Como), a small Italian enclave within Switzerland | 280 m | Under stones in a quite humid *Castanea* forest; some trees were cut down, and seemed that it changed humidity conditions, so scorpions are now available only in more humid parts of the woodland. A female was found near the remains (elytrae and legs) of a beetle (*Chrysolina fastuosa*) |
| **41** | 23 April 2003 | *E. alpha* (2 adult females) | Campione d'Italia (Como), a small Italian enclave within Switzerland | 280 m | Under stones in a humid *Castanea* forest |
| **86** | 25 April 2004 | *E. alpha* (1 adult female and 1 juvenile) | Ceriola Sanctuary, near Cure, Monte Isola (Brescia), Lombardy, Italy | 600 m | Under a large stone, together, in a humid *Fagus* forest |
| **47** | 3 May 2003 | *E. alpha* (1 adult male and 1 adult female) | near Cislano (Brescia), Lombardy, Italy | 650 m | Female under a stone; male in crack on a small rocky cliff in a humid mixed forest |
| **48** | 3 May 2003 | *E. alpha* (1 adult male) | near Cislano (Brescia), Lombardy, Italy | 650 m | Different site from the previous, on a wall near the road (observed with UV light) |
| **16** | June 2002 | *E. alpha* (4 adult females) | Campione d'Italia (Como), a small Italian enclave within Switzerland | 280 m | Under stones in a quite humid and shady *Castanea* forest, also in groups of two specimens. Scorpions were not found here on 23 December 2002; they could spend winter deeper in the cracks in the ground |
| **7** | 1 June 2002 | *E. alpha* (1 male and 2 females) | Romagnano Sesia (Novara), Piedmont, Italy | 268 m | Under stones on sandy substrate in a cool and humid area near the Sesia River; protected from direct sun heat by tree cover |
| **10** | 2 June 2002 | *E. alpha* (3 adult females) | Sombreno (Bergamo), Lombardy, Italy | 329 m | All together under the same stone, in a very humid and shady *Castanea* forest |
| **56** | 12 June 2003 | *E. alpha* (5 adult females) | Campione d'Italia (Como), a small Italian enclave within Switzerland | 280 m | Under stones in a humid *Castanea* forest |
| **58** | 17 June 2003 | *E. alpha* (1 adult male and 1 adult female) | Campione d'Italia (Como), a small Italian enclave within Switzerland | 280 m | Under stones in a humid *Castanea* forest |
| **19** | 28 June 2002 | *E. alpha* (1 adult male and 1 adult female) | Monte Caslano, Canton Ticino, Switzerland | 272 m | Female found under a stone in a humid forest (mainly *Castanea*) with thick undergrowth; male found in a quite unusual hot and not very humid environment, under a marble slab near inhabited houses. This population is endangered, mainly due to its isolation from the others (J.O. Rein, pers. comm.) |
| **66** | 1 July 2003 | *E. alpha* (2 adult females and 1 adult male) | Fuentes Fortress, Colico (Lecco), Lombardy, Italy | 209 m | Under stones in a quite humid mixed forest (*Pinus*, *Corylus*, and *Robinia*) near the fortress |
| **92** | 9 July 2004 | *E. alpha* (1 adult female) | Piani Resinelli (Lecco), Lombardy, Italy | 1276 m | Under a stone on a wall at the exit of the mine, in a quite humid *Fagus* forest; according to the guide, scorpions are also found inside the mine |
| **20** | 15 July 2002 | *E. alpha* (2 adult males) | Monte San Giorgio, Canton Ticino, Switzerland | 800 m | Under stones near big tree stumps, in a humid and shady forest of *Castanea* and *Ostrya*; one specimen in association with an ant colony |
| **21** | 19 July 2002 | *E. alpha* (2 adult males and 1 adult female) | Eupilio (Como), Lombardy, Italy | 383 m | Under stones in a humid mixed forest on the rivers of Segrino lake; one specimen in association with an ant colony |
| **25** | 6 October 2002 | *E. alpha* (2 adult males and 2 adult females) | woodland between Brunate and Torno (Como), Lombardy, Italy | 225 m to 716 m | Under stones (and probably also under wood stumps, abundant in the area) in a quite humid forest of *Castanea* and *Fagus* with thick undergrowth |

**Table 3**: *Euscorpius alpha*: specimen and locality data.

in Slovenia (mouth of Rizana River; Fet et al., 2001). During this study, *E. alpha* was mainly found between 200 and 800 m a.s.l., but one specimen was collected at 1276 m a.s.l. in Piani Resinelli, Lecco, Lombardy (the highest scorpion locality found in this study).

Most of the specimens (93.2%) were found in forests dominated by high trees such as chestnut (*Castanea*), birch (*Betula*), beech (*Fagus*), and oak (*Quercus*), which cover the ground and create a humid and dark environment (Fig. 2). Temperature in such forests usually is not very high, and humidity is always medium, as sunlight is filtered by the leaves and never reaches the litter. In these conditions scorpions are usually found under stones (sometimes more than one specimen [up to three] together) in the leaf litter, or under bark of stumps and dead trees, but always near the ground. Some specimens (4.5%), however, were found on medium-sized rocky cliffs located in the woods, or also in the cracks on those cliffs located high above ground.

This preference of *E. alpha* for natural habitats could also be considered, in cases of its sympatry with larger species such as *E. italicus* (e.g. Cislano, Lombardy, Italy), as a result of this species being relegated to more harsh environmental conditions (larger scorpion species usually occupy more favorable microhabitats; Polis & McCormick, 1987, quoted after Vignoli et al., 2005).

Braunwalder (2005) also reports that 95% of *E. alpha* in Switzerland were found in *Castanea*, *Fagus*, and *Quercus* forests in hilly area, in *Larix* forests at higher altitudes.

In Campione d'Italia (Como, a small Italian enclave within Switzerland), where *E. alpha* was found in forest habitats with leaf litter covered by ferns, small bushes and higher trees such as chestnut (*Castanea*), these scorpions were not usually found under stones located directly on the ground, but only under stones (including smaller ones) located on the top of other stones. There, scorpions were sometimes found in couples. The author also observed during winter, from November to March, *E. alpha* could not be found in natural habitats in Campione d'Italia. Scorpions probably spend colder periods underground.

Usually, *E. alpha* specimens are found far away from houses and human activities, but in some cases (2.3%) they were found near inhabited houses; Braunwalder (2005) reports that in Switzerland *E. alpha* prefers, among anthropogenic habitats, old stony walls and abandoned houses.

From the composition of invertebrate species found under stones along with *E. alpha*, we assume that this species could eat small beetles, wasps, crickets, harvestmen, centipedes**,** grasshoppers, and moths (both adults and larvae). In one case an adult female was found near the remains of the beetle *Chrysolina fastuosa* (Scopoli, 1763) (Coleoptera: Chrysomelidae); the scorpion had left only harder parts of the victim, such as elytrae and legs. Braunwalder (2005) shows a photo of *E. germanus*, a closely related species, killing a centipede. *E. alpha* was found twice in association with an ant colony, under stones. Both cases were recorded in July, the first in Switzerland (Monte San Giorgio, Ticino) and the second, a few days after, in Italy (Eupilio, Como, Lombardy).

Adult males and females were found together from April to October, so we can assume that the mating period includes spring, summer, and maybe the beginning of fall. An adult female collected in Sombreno (Lombardy, Italy), as well as another one collected in Campione d'Italia, gave birth in captivity in the end of June.

### Subgenus *Euscorpius* Thorell, 1876

### *Euscorpius sicanus* (C.L. Koch, 1837)

(Figs. 4–8, Table 4)

In the revision by Fet & Soleglad (2002), the old *E. carpathicus* was split into several species. Later, Fet et al. (2003) also elevated *E. sicanus* to the species status. This species has a southern Mediterranean distribution: northern Africa (Egypt, Libya, Tunisia) and Madeira, central and southern Italy (including Sicily, Sardinia, and some minor islands), Malta, and Greece (center and south, with some islands). In Sicily it was already studied (as *E. carpathicus*) by Valle (1975), who recorded presence of two different forms not recognized at the moment. However, *E. sicanus* was also recorded from a few northern localities, possibly due to introductions (e.g. Trieste, Friuli-Venezia Giulia, northern Italy, collected by F. Werner in 1891, and C. Attems in 1901, both cited in Fet et al., 2003). In Italy, this species is found from Tuscany in the center (author's most northern record: Castel San Gimignano) south to Calabria, Sicily, and Sardinia; on the Adriatic coast it is distributed from southern Marche down to Apulia (Fet et al., 2003). The author studied this species in Tuscany (Fig. 7) and Sardinia (Fig. 8).

No detailed data about preferred altitudinal range was found in literature, mainly because the species was not distinguished by the earlier authors; in older works, such as Crucitti & Bubbico (2001) for Peloponnese, it is treated as *E. carpathicus*, reaching 2000 m a.s.l. In this study, most specimens were found between 200 and 600 m a.s.l., with the highest record in Sardinia (1017 m a.s.l., Genna Silana Pass).

Ecological demands of *E. sicanus* are similar to those of *E. tergestinus*. A high percentage of specimens (79.7%) was found in old inhabited houses, while others were found in forests (20.3%). Both of these habitat types were quite humid and cool. In central Italy (Tuscany), *E. sicanus* was found only in anthropogenic habi-

**Figure 4:** *Euscorpius (Euscorpius) sicanus*, adult male, Monte Argentario (Tuscany, Italy) (photo by Marco Colombo).

**Figure 5:** *Euscorpius (Euscorpius) sicanus*, subadult male, Baunei (Sardinia, Italy) (photo by Marco Colombo).

**Figure 6:** *E. sicanus* habitat: wall of a cellar under inhabited houses in Castel San Gimignano (Tuscany, Italy) (photo by Marco Colombo).

tats, while sympatric *E. concinnus* (see below) inhabited predominantly forests. In southern Italy (south of Mount Argentario, Tuscany) *E. sicanus* tends to occupy all habitats, and can be also found in forests (under stones in the litter; personal observations; see also Rein, 2006). In Sardinia (northern areas), *E. sicanus* tends to occupy natural habitats, probably due to ecological competition with the sympatric species *E. flavicaudis* (which could be introduced there; Crucitti, 1993).

*E. sicanus* was found several times inside inhabited houses in Tuscany; there, it seems to prefer cooler places, such as cellars (Fig. 6). These scorpions usually occupy cracks in the walls, catching passing invertebrates with their pedipalps. In March, night temperatures are still low (about 6°C), and scorpions are inactive; they can be seen at night stretching their pedipalps out of the cracks and waiting for prey. Despite low temperatures, some specimens were seen at night outside of their shelters, maybe hunting (these were mostly males, but also some females). One specimen was also found dead, maybe due to lower temperatures that occurred the night before.

*E. sicanus* feeds mainly on small invertebrates. In Tuscany (Castel San Gimignano), a subadult was observed under a brick on the top of a wall near some remains of an earwig (*Euborellia moesta* (Genè, 1837)) (Dermaptera: Carcinophoriidae), probably eaten by this scorpion. In a small cellar, where eight specimens were observed, there was a variety of arthropods representing potential prey (perhaps except the last, which usually secrete toxic substances): crickets (*Gryllomorpha dalmatina* (Ocskay, 1832) (Gryllidae: Gryllinae), isopods (*Porcellio* sp.) (Isopoda: Porcellionidae), earwigs (*Euborellia moesta*), wolf spiders (Araneae: Lycosidae), and beetles (Coleoptera: Carabidae). Two specimens, an adult female and an adult male, were observed in the same place, with UV light, each eating an unidentified (due to advanced digestion by scorpions) invertebrate; this prey could be a cricket, an isopod, or a spider, all of which were commonly found on the stone wall near the cellar. On the floor of the same cellar, remains of scorpions were also found: chelae, legs, carapaces, and metasomas. These remains could easily be a results of predations by mice or, possibly, conspecifics (cannibalism is not unusual among scorpions; Polis, 1990).

Adult males and females were found together in March and April; a subadult male was found in August, so it seems that this species has its mating period earlier than the other *Euscorpius* species, in the end of winter and in early spring. A female collected in Castel San

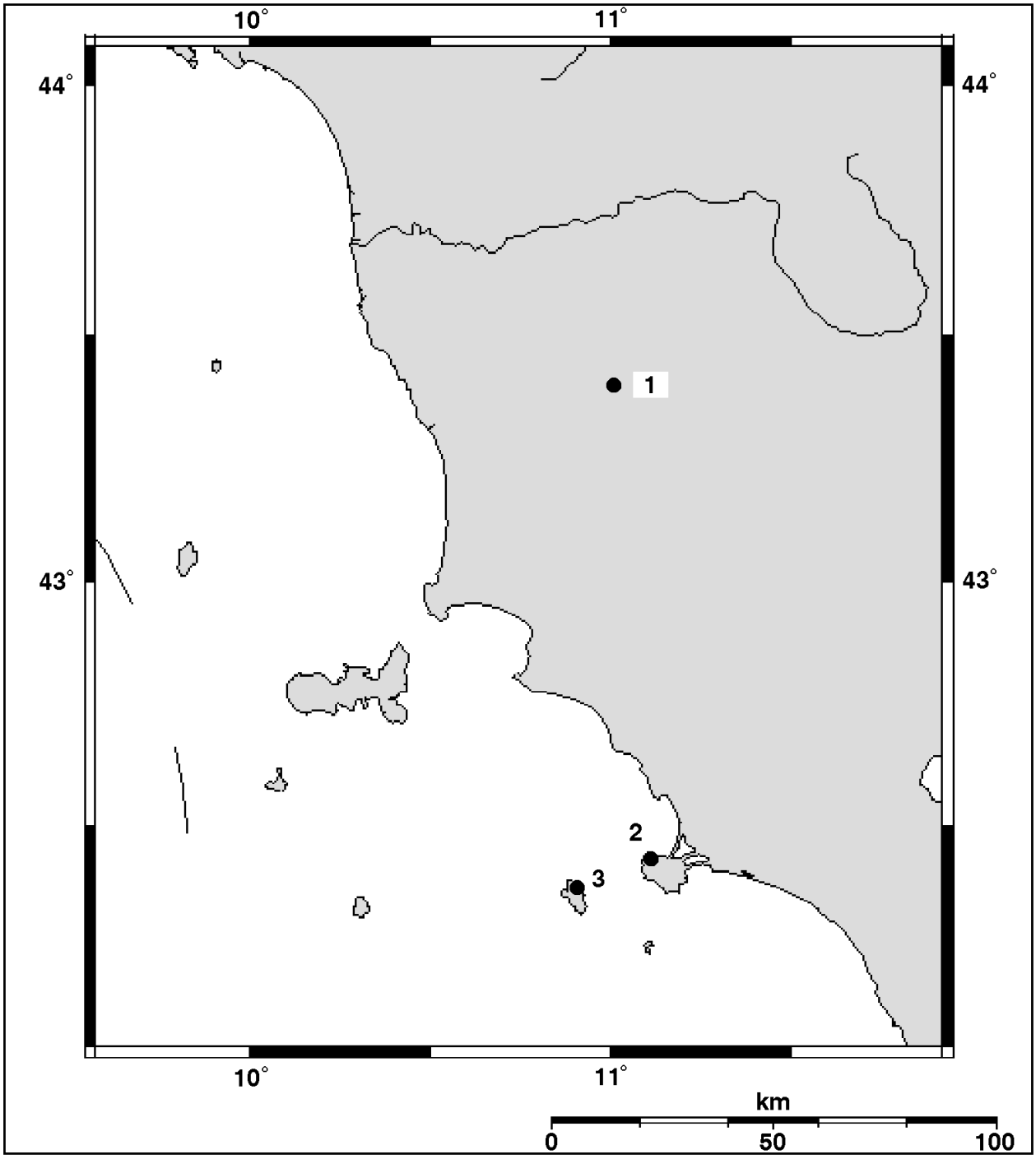


**Figure 7:** *E. sicanus* collecting sites. Tuscany (Italy): **1.** Castel San Gimignano; **2.** Monte Argentario; **3.** Giglio Island.

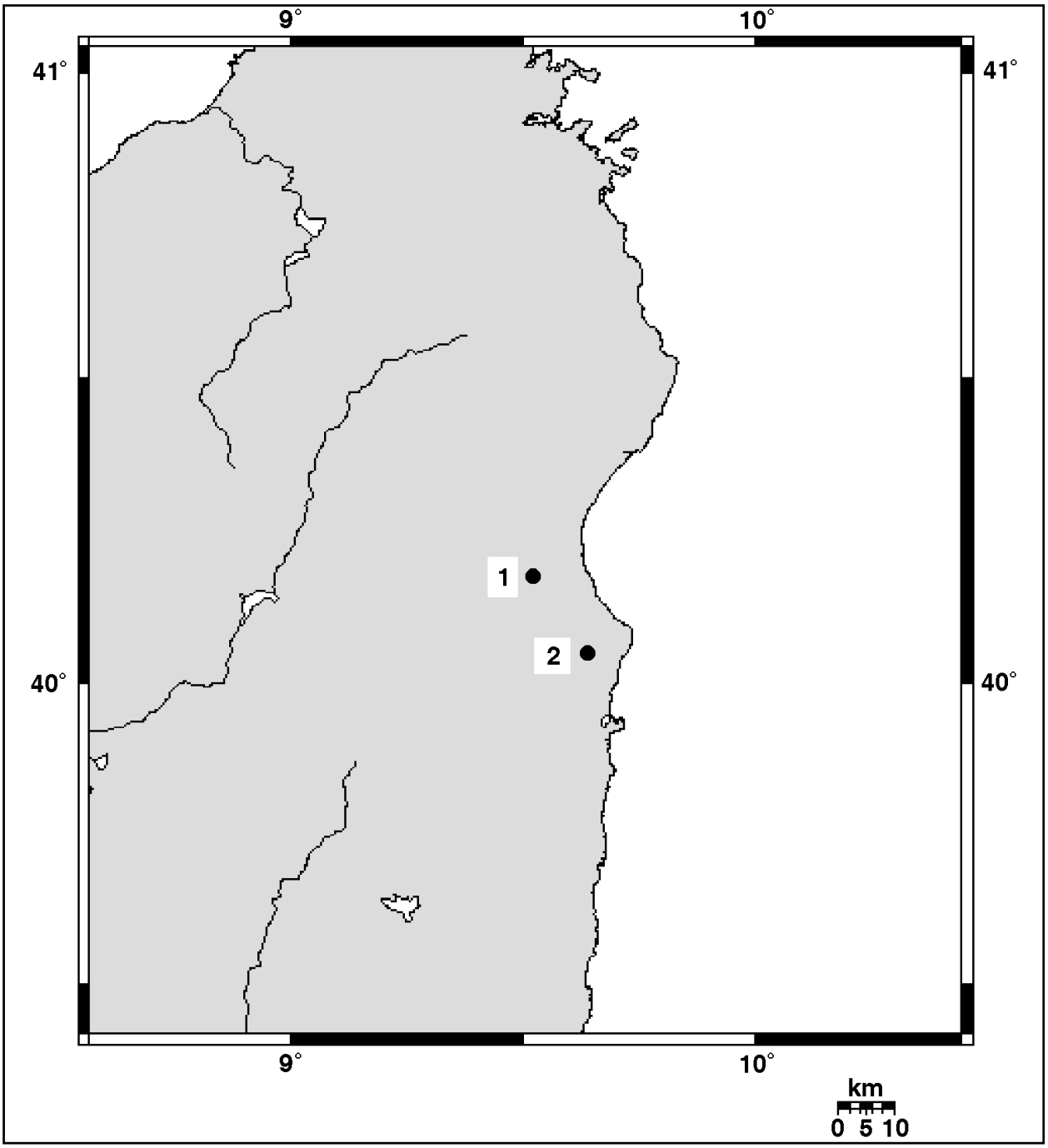


**Figure 8:** *E. sicanus* collecting sites. Eastern Sardinia (Italy): **1.** Genna Silana Pass; **2.** Baunei.

| *No.* | *Date* | *Number of specimens, age and sex* | *Geographic locality* | *Altitude a.s.l.* | *Comments* |
|---|---|---|---|---|---|
| **42** | 24 April 2003 (collected on 3 March 2003) | *E. sicanus* (1 adult male and 1 adult female) V. Vignoli leg. | Giglio Castello (Giglio Island), Tuscany, Italy | 405 m | No data |
| **30** | 7 March 2003 | *E. sicanus* (4 adult males, 4 adult females) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | In cracks under plaster on the walls of a small abandoned cellar, near (or under) inhabited houses; due to low temperatures scorpions were not very active; a male was found freshly dead (observed with UV light) |
| **103** | 25 March 2005 | *E. sicanus* (1 adult male) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | Under a small stone, perhaps fallen from a stone wall, near inhabited houses; medium humid environment |
| **106** | 25 March 2005 | *E. sicanus* (4 adult females and 2 adult males) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | In the cracks of a quite humid stone wall, near an abandoned cellar, under inhabited houses; two specimens, a male and a female, were found eating an invertebrate each, but unfortunately the prey species was not recognised due to partial digestion; however, on the wall, small crickets, spiders, and isopods were commonly found (observed with UV light) |
| **107** | 27 March 2005 | *E. sicanus* (1 adult female, 1 adult male, 2 juv.) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | In the cracks of a quite humid stone wall, near an abandoned cellar, under inhabited houses; a weak rain falls at the moment of observation (observed with UV light) |
| **81** | 9 April 2004 | *E. sicanus* (1 subadult) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | Under a tile on the top of a wall, kept humid by a field of grass, near some inhabited houses; the remains of an earwig (*Euborellia moesta*) were found near the specimen. The same specimen was observed again on the night of 9 April 2004 (with UV light) and on 10 April 2004, under a tile near the first one |
| **82** | 9 April 2004 | *E. sicanus* (5 adult males and adult females, and 3 subadults) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | One female was found squashed on a door near the wall where the previous specimen was found; the others inside (or just outside) a humid abandoned cellar, in wall cracks and under the plaster; due to low temperatures (6°C), specimens do not leave their shelters but only protrude their pedipalps outside to catch prey (observed with UV light) |
| **83** | 10 April 2004 | *E. sicanus* (7 adult males and adult females, and 2 subadults) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | In cracks of the walls inside a humid abandoned cellar; although temperatures were still low, a female was found outside her shelter. Scorpions could feed on crickets (*Gryllomorpha dalmatina*), isopods (*Porcellio* sp.), earwigs (*Euborellia moesta*), spiders (Lycosidae), and ground beetles (Carabidae), observed inside the cellar. Remains of *E. sicanus* were found on the ground, probably a result of predation by mice or cannibalism (observed with UV light) |
| **84** | 11 April 2004 | *E. sicanus* (10 adult males and adult females, and 1 juvenile) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | In cracks of the walls inside a humid abandoned cellar; a male was found wandering, maybe due to higher temperature (12°C) (observed with UV light) |
| **40** | 20 April 2003 | *E. sicanus* (10 adult females and 1 adult male) | near Porto San Stefano, Monte Argentario (Grosseto), Tuscany, Italy | 270 m | Under stones (also two specimens together) in shady and humid *Quercus* forests; a molted female was found with the typical whitish coloration near its old exuvium |
| **2** | 21 April 2000 | *E. sicanus* (1 subadult female) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | On a wall in inhabited house in the countryside |
| **3** | 23 April 2000 | *E. sicanus* (2 adult males) | Castel San Gimignano (Siena), Tuscany, Italy | 350 m | On humid stone walls near old inhabited houses; scorpions occupied cracks in the wall but came out at night |
| **97** | 13 August 2004 | *E. sicanus* (1 subadult) | Fonte Isilai, Genna Silana Pass, Dorgali-Baunei Street (Nuoro), Sardinia, Italy | 1017 m | Under a stone on the top of a stone wall, in a partly humid *Quercus* forest; humid places were easily recognizable due to the presence of ferns |
| **98** | 13 August 2004 | *E. sicanus* (1 subadult male) | near Baunei (Nuoro), Sardinia, Italy | 480 m | Under a stone near a dry river; environment very shady, humid, and quite cool due to tree cover (*Quercus*, *Pinus* and *Ficus*). The specimen (still with the typical whitish coloration) was found near its exuvium |

**Table 4:** *Euscorpius sicanus*: specimen and locality data.

**Figure 9:** *Euscorpius (Euscorpius) tergestinus*, adult female, Venezia (Veneto, Italy) (photo by Giorgio Colombo).

Gimignano (Tuscany, Italy) gave birth in captivity on 9 July 2003; another one collected in March by Valerio Vignoli on Giglio Island (Tuscany, Italy) gave birth on 30 June 2003.

### ***Euscorpius tergestinus* (C.L. Koch, 1837)**
(Figs. 9–11, Table 5)

In the detailed work of Fet & Soleglad (2002), *E. carpathicus* (L., 1767) *sensu stricto* was restricted to Romania, while some subspecies of the "*carpathicus*" complex were elevated to species status. One of these is *E. tergestinus*, which was further reduced by Vignoli et al. (2005) who separated the sibling species *E. concinnus* (see below). As accepted now, *E. tergestinus* is found in Albania, Austria (introduced), Croatia, southern France (Corsica), Greece, Italy (mainly north, but also central part, where it is sympatric with *E. sicanus* and *E. concinnus*), Monaco, San Marino, Slovenia, and maybe Spain (at French boundary). It also was introduced in Austria, and was introduced, but now extinct, in Czech Republic (Fet et al., 2004).

In Italy, *E. tergestinus* is widely distributed through Lombardy, Trentino-Alto Adige, Friuli-Venezia Giulia, and Veneto, while the southeastern boundary of its range is less exactly known (Umbria and Marche). According to Vignoli et al. (2005), this species is also common in Tuscany and Latium. The author studied *E. tergestinus* in northern Italy (Emilia Romagna, Lombardy, Veneto; see Fig. 11).

Few altitudinal data can be determined from the literature, mainly because *E. tergestinus* was not distinguished by the earlier authors. Fet et al. (2001) report (as *E. carpathicus*) a maximal altitude of 400 m a.s.l. in its northeastern part of its range (Slovenia). During this study, most of the specimens was found between sea level (2 m a.s.l., Venice) and 600 m a.s.l., with the maximal altitude near Cislano, Lombardy (about 650 m a.s.l.).

The ecological demands of *E. tergestinus* are similar to those of *E. sicanus*; *E. tergestinus* also shows ecological competition with *E. concinnus*. Author's observations confirm the data of Vignoli et al. (2005), with a very high percentage (94.4%) of specimens found in abandoned houses or ruins (Fig. 10); there they seemed to colonize both humid and dry rooms. A small fraction (5.6%) of *E. tergestinus* was found in and around inhabited houses. However, the walls colonized by this species are usually humid and often covered by moss. An adult male from Ceraino (Veneto, Italy) was observed nearly dead because of low temperatures, on a wall inside a fortress.