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## A new contribution to the knowledge of centipedes of eastern France (Chilopoda)

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### Abstract

The author gives the results of an extensive study of the centipedes of Alsace and Lorraine (France). It complements the studies of previous workers on the centipedes of eastern France. A list of the species recorded from that region and their presence in each administrative area (Alsace, Lorraine, Champagne-Ardennes, Franche-Comté, Bourgogne) is given.

**Keywords:** faunistics, distribution, ecology, Chilopoda, France

### Zusammenfassung

**Ein neuer Beitrag zur Kenntnis der Hundertfüßer von Ostfrankreich (Chilopoda).** Der Autor stellt die Ergebnisse einer umfangreichen Studie der Hundertfüßer des Elsasses und von Lothringen (Frankreich) dar. Sie vervollständigen die Studien früherer Autoren über die Hundertfüßer von Ostfrankreich. Eine Liste jener Arten, die bereits für diese Region bekannt sind, und ihre Vorkommen für die einzelnen Verwaltungseinheiten (Elsass, Lothringen, Champagne-Ardennes, Franche-Comté, Bourgogne) wird vorgestellt.

### Résumé

**Une nouvelle contribution à la connaissance des chilopodes de l’Est de la France (Chilopoda).** Dans cet article, l’auteur relate les résultats d’une étude approfondie des chilopodes d’Alsace et de Lorraine (France). Celle-ci complète les travaux des précédents chercheurs sur les chilopodes de l’Est de la France. Une liste des espèces actuellement connues dans cette aire géographique et leur présence dans chacune des régions administratives de celle-ci (Alsace, Lorraine, Champagne-Ardennes, Franche-Comté, Bourgogne) sont établies.

## 1. Introduction

Recently SPELDA (2005b) reviewed the work on the centipedes of eastern France, mainly based upon the early papers of German speaking authors (before 1940), and gave new records. Additionally other authors have published papers on the region (Alsace, Lorraine, Champagne-Ardennes, Franche-Comté and Bourgogne), namely: DEMANGE (1959), IORIO (2003a, 2003b, 2004a, 2005a, 2005d, 2005e), IORIO & GEOFFROY (2004a, 2004b, in press), KIME (2003), RAVOUX (1948), SPELDA (1999) (see maps), and VACHON & DEMANGE (1943). REMY & HOFFMANN (1959) and SPELDA (2001) provide data on centipedes of Luxembourg which are also relevant.

However, in spite of the quoted papers above, the fauna of centipedes of eastern France remains very insufficiently known. For this reason, I have continued to collect and determine specimens in Lorraine and Alsace during several years, with the aim to treat a part of the remaining gaps and to draw up a preliminary list of species of eastern France and its regions.

## 2. Situation and description of the examined area, time of examination, capture methods, references for determination

Between 2001 and 2005, I collected centipedes from a large number of localities in the departments of Moselle, Meurthe-et-Moselle and Meuse (Region: Lorraine), in addition some entomologists (Mr Henri Callot and Christophe Brua) sent me specimens for identification from the department Bas-Rhin (Region: Alsace). All specimens have been collected by hand sampling. The results are given here, together with those of J. Spelda and other authors provide a detailed picture of the distribution of the fauna.

The specimens were identified using the publications of ATTEMS (1929), BROLEMANN (1930), DEMANGE (1981), EASON (1964, 1982), IORIO (2005d, 2006) and KOREN (1986, 1992). Taxonomy and classification are based on the works of EASON (1972, 1974, 1982, 1992), GEOFFROY (2000), IORIO (2006), JEEKEL (1999) and SPELDA (2005a). All specimens are kept in my personal collection.

## 3. List of localities

### *Annotation:*

- CSL = Conservatoire des Sites Lorrains.
- If not specifically mentioned all collections are from E. Iorio.

### *3.1. Lorraine*

#### Meuse

- 1 **Chauvencourt** («pelouse calcaire de la côte Champagne»: site of the CSL): thermophilous grassland, under stones, 270-300 m, 29.VI.2003.
- 2 **Lachaussée** («forêt de Lachaussée»: site of the CSL): forest of *Quercus* sp. and *Carpinus betulus*, under stones, moss, decayed trunks on soil, 210 m, 13.X.2004.

#### Meurthe-et-Moselle

- 3 **Waville** («pelouse calcaire de la Croix-Joyeuse»: site of the CSL): edge of thermophilous grassland, under stones, 300 m, 21.IV.2003.
- 4 **Jaulny**: forest of *Fagus sylvatica*, *Quercus* sp. and *Carpinus betulus*, under stones, decayed trunks and leaves on soil, 240-280 m, 19.III.2005.
- 5 **Villecey-sur-Mad** («Forêt communale de Villecey-sur-Mad»): forest of *Fagus sylvatica* and *Quercus* sp. (and some *Pinus sylvestris* and *Abies alba*), under stones, moss, barks, decayed trunks and leaves on soil, and also in the soil, 240-350 m, 15.III.2005, 21.III.2005, 24.III.2005, 1.IV.2005, 18.IV.2005, 5.V.2005.
- 6 **Pagny-sur-Moselle** («forêt de Pagny-sur-Moselle»): forest of *Fagus sylvatica* and *Quercus* sp., under stones and decayed trunks on soil, 300-320 m, 3.IV.2005.
- 7 **Jézainville** («pelouse des Pontances»: site of the CSL):
  - a) thermophilous grassland, under stones, 220-260 m, 27.IV.2003(a);
  - b) thickets of *Pinus sylvestris*, under stones and decayed trunks on soil, 27.IV.2003(b).
- 8 **Champigneulles** («vallon de Bellefontaine»): 220-240 m, leg. Anne Vallet, 10.IX.2004, 17.IX.2004.

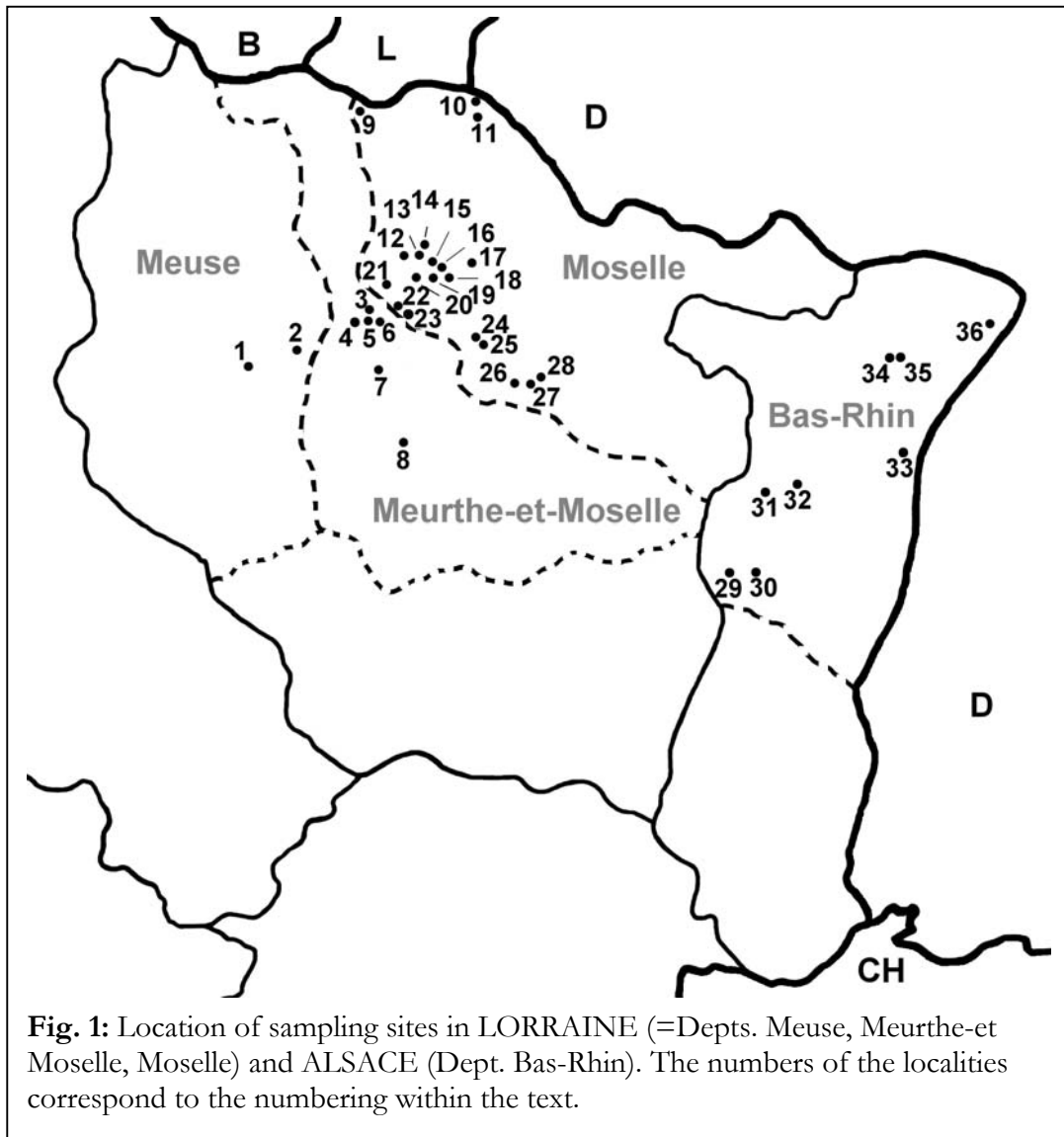
## Moselle

- 9 Audun-le-Tiche:**  
forest of *Fagus sylvatica*, under stones, moss, barks, decayed trunks and leaves on soil, and also in the soil, 390-420 m, 20.IV.2003, 17.X.2003.
- 10 Apach:**  
forest of *Pinus sylvestris* and *Abies alba*, under stones and decayed trunks on soil, 300-340 m, 11.IV.2003.
- 11 Montenach** (near «thermophilous grassland of Montenach», site of the CSL):  
forest of *Fagus sylvatica* and *Quercus* sp., 300 m, under decayed trunks and leaves on soil, 10.V.2003.
- 12 Châtel-Saint-Germain:**  
forest of *Quercus* sp., under stones and decayed trunks on soil, 320 m, 26.X.2002.
- 13 Plappeville:**  
forest of *Fagus sylvatica*, *Abies alba* and *Pinus sylvestris*, under stones, moss, decayed trunks and leaves on soil, 340 m, 1.V.2003, 18.III.2004.
- 14 Woippy:**  
mesophilous grassland near a forest, under stones, 200 m, 10.III.2001, 12.XI.2001.
- 15 Metz** («Fort de Queuleu»):  
forest of *Quercus* sp. and *Acer campestre* with old fortifications, under stones, barks, and decayed trunks on soil, 220 m, 27.X.2002, 28.IV.2003.
- 16 Mercy-les-Metz:**  
forest of *Quercus* sp. and *Acer platanoides*, under stones and decayed trunks on soil, 240 m, 2.IV.2003.
- 17 Laquenexy:**  
forest of *Quercus* sp., under barks and decayed trunks on soil, 230 m, 23.X.2002.
- 18 Mécleuves:**  
mesophilous grassland, 260 m, under barks and decayed trunks on soil, 4.III.2003.
- 19 Chesny** («Bois de l'Hôpital»):  
forest of *Quercus* sp. and *Carpinus betulus*, under stones, barks, decayed trunks and leaves on soil, 210-230 m, 5.III.2003, 2.V.2003.
- 20 Ars-sur-Moselle:**  
near cultivations, under stones, 310 m, 25.X.2002.
- 21 Gorze:**  
forest of *Fagus sylvatica*, under decayed trunks on soil, 300 m, 8.III.2004.
- 22 Novéant:**  
forest of *Pinus sylvestris*, *Quercus* sp. and *Fagus sylvatica*, under barks and decayed trunks on soil, 320 m, 11.XI.2003.
- 23 Lorry-Mardigny** («pelouses calcaires de Lorry-Mardigny»: site of the CSL):  
thermophilous grassland, under stones, 330-390 m, 20.IX.2003.
- 24 Juville** («Côte de Delme»: site of the CSL):  
mesophilous grassland, under stones, 320-360 m, 17.IV.2003.
- 25 Liocourt** («Côte de Delme»: site of the CSL):
  - a) mesophilous grassland, under stones, 320-390 m, 17.IV.2003(a),
  - b) thickets of *Pinus sylvestris*, under decayed trunks on soil, 17.IV.2003(b).
- 26 Vic-sur-Seille:**
  - a) edges of a continental brackish pond, in the soil, 200 m, 21.XI.2003;
  - b) hygrophilous grassland, under stones, 14.III.2004.
- 27 Marsal:**  
near a continental brackish pond, under stones, 200 m, 9.XI.2002.
- 28 Blanche-Eglise:**  
forest of *Quercus* sp., 200 m, under barks and decayed trunks on soil, 14.III.2004.

### 3.2. Alsace

#### Bas-Rhin

- 29 **«Champ du Feu»:**  
forest of *Betula* sp., leg. Henry Callot, 13.X.2004.
- 30 **Barr** («Moenkalb»):  
forest of *Pinus sylvestris*, leg. Henry Callot, 22.X.2004.
- 31 **Niederhaslach** («Rocher du Corbeau»):  
leg. Henry Callot, 5.II.2004, 22.X.2004.
- 32 **Still:**  
leg. Henry Callot, 13.X.2004.
- 33 **Strasbourg:**  
in town, leg. Christophe Brua, 19.IV.1985.
- 34 **Uhlwiller** («Bois d'Uhlwiller»):  
forest of *Pinus sylvestris*, leg. Henry Callot, 16.X.2004.
- 35 **Schweighouse-sur-Moder:**  
forest of *Pinus sylvestris*, leg. Henry Callot, 13.X.2004.
- 36 **Seltz** («Niederwald»):  
122 m, leg. Christophe Brua, 5.V.2005.



**Fig. 1:** Location of sampling sites in LORRAINE (=Depts. Meuse, Meurthe-et Moselle, Moselle) and ALSACE (Dept. Bas-Rhin). The numbers of the localities correspond to the numbering within the text.

## 4. Results

In this study almost 600 specimens, comprising 24 species, have been identified.

### 4.1. *Lithobiomorpha*

#### Lithobiidae

- *Lithobius (Monotarsobius) aeruginosus* L. Koch, 1862  
LORRAINE: Plappeville, 18.III.2004: 1 ♂; Villecey-sur-Mad, 24.III.2005: 2 ♀♀.
- *Lithobius (Lithobius) agilis* C. L. Koch, 1847  
LORRAINE: Villecey-sur-Mad, 15.III.2005: 1 ♂, 1 ♀; *id.*, 21.III.2005: 1 ♀.
- *Lithobius (Lithobius) calcaratus* C. L. Koch, 1844  
LORRAINE: Juville, 17.IV.2003: 1 ♂, 2 ♀♀; Liocourt, 17.IV.2003(a): 2 ♂♂, 2 ♀♀; *id.* 17.IV.2003(b): 1 ♀; Waville, 21.IV.2003: 2 ♀♀; Jézainville, 27.IV.2003(a): 1 ♂, 3 ♀♀; *id.*, 27.IV.2003(b): 2 ♀♀; Plappeville, 1.V.2003: 1 ♀; Chauvoncourt, 29.VI.2003: 1 ♂, 1 ♀; Lorry-Mardigny, 20.IX.2003: 2 ♂♂, 4 ♀♀.  
ALSACE: Schweighouse-sur-Moder, 13.X.2004: 2 ♂♂.
- *Lithobius (Monotarsobius) crassipes* L. Koch, 1862  
LORRAINE: Audun-le-Tiche, 20.IV.2003: 3 ♂♂; Plappeville, 1.V.2003: 1 ♂, 1 ♀; *id.*, 18.III.2004: 1 ♀; Lachaussée, 13.X.2004: 2 ♂♂; Villecey-sur-Mad, 21.III.2005: 3 ♀♀; *id.*, 1.IV.2005: 1 ♂.  
ALSACE: Still, 13.X.2004: 4 ♂♂, 1 ♀.
- *Lithobius (Lithobius) dentatus* C. L. Koch, 1844  
LORRAINE: Plappeville, 1.V.2003: 1 ♀; Audun-le-Tiche, 17.X.2003: 2 ♂♂; Villecey-sur-Mad, 21.III.2005: 1 ♂; *id.*, 5.V.2005: 1 ♂.
- *Lithobius (Lithobius) forficatus* (Linné, 1758)  
LORRAINE: Woippy, 10.III.2001: 3 ♂♂, 5 ♀♀; *id.*, 12.XI.2001: 2 ♂♂, 3 ♀♀; Laquenexy, 23.X.2002: 4 ♂♂, 2 ♀♀; Ars-sur-Moselle, 25.X.2002: 1 ♂, 2 ♀♀; Châtel-Saint-Germain, 26.X.2002: 2 ♂♂, 1 ♀; Metz, 27.X.2002: 2 ♂♂, 2 ♀♀; *id.*, 28.IV.2003: 1 ♂, 2 ♀♀; Marsal, 9.XI.2002: 8 ♂♂, 6 ♀♀; Mécleuves, 4.III.2003: 1 ♂, 2 ♀♀; Mercy-les-Metz, 2.IV.2003: 4 ♂♂, 7 ♀♀; Liocourt, 17.IV.2003(a): 5 ♂♂, 9 ♀♀; Waville, 21.IV.2003: 1 ♂; Jézainville, 27.IV.2003(a): 3 ♂♂, 5 ♀♀; Plappeville, 1.V.2003: 2 ♀♀; *id.*, 18.III.2004: 1 ♂, 2 ♀♀; Lorry-Mardigny, 20.IX.2003: 7 ♂♂, 6 ♀♀; Novéant, 11.XI.2003: 1 ♂; Gorze, 8.III.2004: 1 ♂, 1 ♀; Blanche-Eglise, 14.III.2004: 3 ♂♂, 2 ♀♀; Vic-sur-Seille, 14.III.2004: 8 ♂♂, 10 ♀♀; Lachaussée, 13.X.2004: 5 ♂♂, 4 ♀♀; Villecey-sur-Mad, 21.III.2005: 2 ♂♂, 1 ♀; *id.*, 1.IV.2005: 2 ♀♀.  
ALSACE: Strasbourg, 19.IV.1985: 1 ♂, 2 ♀♀; Schweighouse-sur-Moder, 13.X.2004: 2 ♂♂, 1 ♀; Seltz, 5.V.2005: 1 ♂, 2 ♀♀.
- *Lithobius (Lithobius) sp. cf. lucifugus* L. Koch, 1862  
LORRAINE: Villecey-sur-Mad, 24.III.2005: 1 ♂.
- *Lithobius (Lithobius) macilentus* L. Koch, 1862  
LORRAINE: Chesny, 5.III.2003: 1 ♂; *id.*, 2.V.2003: 1 ♀; Audun-le-Tiche, 20.IV.2003: 1 ♀; *id.*, 17.X.2003: 1 ♂, 2 ♀♀; Plappeville, 1.V.2003: 1 ♂, 1 ♀; Lachaussée, 13.X.2004: 1 ♀; Villecey-sur-Mad, 15.III.2005: 1 ♀; *id.*, 18.IV.2005: 1 ♀; *id.*, 5.V.2005: 1 ♂.
- *Lithobius (Lithobius) melanops* Newport, 1845  
LORRAINE: Villecey-sur-Mad, 24.III.2005: 3 ♂♂, 3 ♀♀; Pagny-sur-Moselle, 3.IV.2005: 1 ♂.
- *Lithobius (Sigibius) microps* Meinert, 1868

LORRAINE: Mercy-les-Metz, 2.IV.2003: 3 ♂♂, 3 ♀♀; Plappeville, 1.V.2003: 2 ♀♀; Vic-sur-Seille, 14.III.2004: 1 ♂, 1 ♀.

ALSACE: Schweighouse-sur-Moder, 13.X.2004: 1 ♀.

- *Lithobius (Lithobius) muticus* C. L. Koch, 1847

LORRAINE: Lachaussée, 13.X.2004: 1 ♂.

- *Lithobius (Lithobius) piceus* L. Koch, 1862

LORRAINE: Audun-le-Tiche, 20.IV.2003: 1 ♂, 2 ♀♀; *id.*, 17.X.2003: 1 ♂; Plappeville, 1.V.2003: 1 ♀.

- *Lithobius (Lithobius) tricuspis* Meinert, 1872

LORRAINE: Laquenexy, 23.X.2002: 1 ♂, 3 ♀♀; Chesny, 5.III.2003: 5 ♂♂, 2 ♀♀; *id.*, 2.V.2003: 1 ♂, 2 ♀♀; Plappeville, 1.V.2003: 2 ♂♂, 3 ♀♀; *id.*, 18.III.2004: 2 ♀♀; Audun-le-Tiche, 20.IV.2003: 3 ♂♂, 2 ♀♀; *id.*, 17.X.2003: 3 ♂♂, 2 ♀♀; Novéant, 11.XI.2003: 1 ♂, 1 ♀; Gorze, 8.III.2004: 2 ♂♂; Blanche-Eglise, 14.III.2004: 1 ♀; Lachaussée, 13.X.2004: 2 ♂♂; Villecey-sur-Mad, 15.III.2005: 3 ♂♂; *id.* 21.III.2005: 2 ♂♂, 1 ♀; *id.*, 24.III.2005: 1 ♂, 4 ♀♀; *id.*, 1.IV.2005: 7 ♀♀; *id.*, 18.IV.2005: 1 ♂; *id.*, 5.V.2005: 2 ♂♂, 2 ♀♀; Pagny-sur-Moselle, 3.IV.2005: 1 ♂.

## 4.2. Scolopendromorpha

### Cryptopidae

- *Cryptops anomalans* Newport, 1844

LORRAINE: Metz, 27.X.2002: 1 ex.; *id.*, 28.IV.2003: 1 ex.

- *Cryptops hortensis* (Donovan, 1810)

ALSACE: Schweighouse-sur-Moder, 13.X.2004: 3 ex.; Seltz, 5.V.2005: 12 ex.

- *Cryptops parisi* Brolemann, 1920

LORRAINE: Laquenexy, 23.X.2002: 2 ex.; Chesny, 5.III.2003: 4 ex.; *id.*, 2.V.2003: 2 ex.; Mercy-les-Metz, 2.IV.2003: 1 ex.; Plappeville, 1.V.2003: 7 ex.; *id.*, 18.III.2004: 3 ex.; Montenach, 10.V.2003: 2 ex.; Audun-le-Tiche, 17.X.2003: 2 ex.; Novéant, 11.XI.2003: 1 ex.; Gorze, 8.III.2004: 1 ex.; Bellefontaine, 10.IX.2004: 1 ex.; *id.*, 17.IX.2004: 1 ex.; Lachaussée, 13.X.2004: 6 ex.; Jaulny, 19.III.2005: 1 ex.; Villecey-sur-Mad, 21.III.2005: 3 ex.; *id.*, 24.III.2005: 2 ex.; *id.*, 18.IV.2005: 5 ex.; *id.*, 5.V.2005: 8 ex.; Pagny-sur-Moselle, 3.IV.2005: 2 ex.

## 4.3. Geophilomorpha

### Dignathodontidae

- *Henia (Chaetechelyne) vesuviana* (Newport, 1844)

LORRAINE: Mercy-les-Metz, 2.IV.2003: 1 ♂; Liocourt, 17.IV.2003(b): 2 ♀♀; Metz, 28.IV.2003: 1 ♂, 1 ♀; Pagny-sur-Moselle, 3.IV.2005: 1 ♀.

### Schendylidae

- *Schendyla nemorensis* (C. L. Koch, 1837)

LORRAINE: Laquenexy, 23.X.2002: 1 ♂, 3 ♀♀; Chesny, 5.III.2003: 1 ♂; Mercy-les-Metz, 2.IV.2003: 1 ♀; Apach, 11.IV.2003: 2 ♂♂, 5 ♀♀; Liocourt, 17.IV.2003(b): 1 ♂, 4 ♀♀; Waville, 21.IV.2003: 1 ♂, 6 ♀♀; Jézainville, 27.IV.2003(a): 3 ♀♀; Montenach, 10.V.2003: 2 ♀♀; Audun-le-Tiche, 17.X.2003: 1 ♂; Gorze, 8.III.2004: 2 ♀♀; Vic-sur-Seille, 14.III.2004: 1 ♀; Villecey-sur-Mad, 15.III.2005: 4 ♂♂, 15 ♀♀; *id.*, 21.III.2005: 1 ♂, 5 ♀♀; *id.*, 24.III.2005: 1 ♂, 5 ♀♀; *id.*, 18.IV.2005: 2 ♀♀; Jaulny, 19.III.2005: 8 ♀♀; Pagny-sur-Moselle, 3.IV.2005: 4 ♀♀.

ALSACE: Schweighouse-sur-Moder, 13.X.2004: 4 ♀♀; Bois d'Uhlwiller, 16.X.2004: 2 ♂♂; Barr Moenkalb, 22.X.2004: 16 ♂♂, 28 ♀♀; Niederhaslach, 22.X.2004: 8 ♂♂, 34 ♀♀.

## Geophilidae

-*Pachymerium ferrugineum* (C. Koch, 1835)

LORRAINE: Vic-sur-Seille, 21.XI.2003: 2 ♀♀.

-*Geophilus carpophagus* Leach, 1814 *sensu stricto*

ALSACE: Niederhaslach, 5.II.2004: 1 ♂, 1 ♀.

-*Geophilus flavus* (De Geer, 1778)

LORRAINE: Laquenexy, 23.X.2002: 1 ♀; Ars-sur-Moselle, 25.X.2002: 2 ♀♀; Metz, 27.X.2002: 1 ♂, 1 ♀; *id.*, 28.IV.2003: 2 ♀♀; Chesny, 5.III.2003: 2 ♀♀; *id.*, 2.V.2003: 2 ♀♀; Mercy-les-Metz, 2.IV.2003: 2 ♂♂; Liocourt, 17.IV.2003(a): 1 ♂, 2 ♀♀; Plappeville, 1.V.2003: 2 ♀♀; *id.*, 18.III.2004: 3 ♂♂, 3 ♀♀; Montenach, 10.V.2003: 1 ♀; Jaulny, 19.III.2005: 1 ♀; Villecey-sur-Mad, 24.III.2005: 1 ♂, 3 ♀♀; *id.*, 5.V.2005: 2 ♂♂, 2 ♀♀; Pagny-sur-Moselle, 3.IV.2005: 1 ♂.

-*Geophilus studeri* Rothenbühler, 1899

LORRAINE: Villecey-sur-Mad, 21.III.2005: 1 ♂.

## Linotaeniidae

-*Strigamia acuminata* (Leach, 1814)

LORRAINE: Apach, 11.IV.2003: 1 ♀; Montenach, 10.V.2003: 1 ♂.

ALSACE: «Champ du Feu», 13.X.2004: 1 ♂.

-*Strigamia crassipes* (C. L. Koch, 1835)

LORRAINE: Apach, 11.IV.2003: 2 ♂♂, 2 ♀♀; Montenach, 10.V.2003: 1 ♂, 2 ♀♀; Novéant, 11.XI.2003: 1 ♂.

## **5. Discussion**

### **5.1. Species spectrum and comments**

*Lithobius aeruginosus* is a species which was already recorded from several localities in Lorraine and elsewhere in eastern France (IORIO 2003a, 2004a; KIME 2003; RAVOUX 1948; SPELDA 2005b). It seems to prefer beech forests.

*Lithobius agilis* is a silvicolous species which was infrequently captured in Lorraine; only two females were previously collected in one locality from this region by SPELDA (2005b). This latter has collected one specimen of *L. agilis* in Alsace, and some other specimens were also identified by DEMANGE (1959) and RAVOUX (1948) in Bourgogne.

*Lithobius calcaratus* was often collected in the calcicolous and marnicolous<sup>1</sup> grasslands of Lorraine, and less frequently in other ecosystems (IORIO 2003a, and present study). This species seems to be the centipede of eastern France which best tolerates xeric ecosystems. It often occurs in these grasslands with *Lithobius forficatus*, which also seems to tolerate moderately dry environments (VOIGTLÄNDER 2005).

*Lithobius crassipes* is mainly found in forests, sometimes in other ecosystems. This species is common in eastern France; I have previously identified fairly numerous specimens in several localities in Lorraine and Alsace (IORIO 2003a, 2005b, 2005e), and it is the most frequent species in the burrows of various mammals in Buré (Meurthe-et-Moselle) according to VACHON & DEMANGE (1943).

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<sup>1</sup> The sense of this word is “which lives in substratum composed of Marne [= engl.: marl / german: Mergel]”, This word is sometime used by french authors (in French: “marnicole”).

*Lithobius dentatus* as a silvicolous species does not seem to be very common in eastern France, and when found, was often at low density (IORIO 2003b, 2005e). It is more common as well in southwestern Germany (SPELDA 1999) as in Germany at all (VOIGTLÄNDER, pers. comm.).

The euryecious species *Lithobius forficatus* is very common everywhere. In the forests of Lorraine, however, the density of its populations seems sometimes lower than in other ecosystems of this area.

Remarkable is the record of a single specimen of *Lithobius* sp. cf. *lucifugus*. I have already identified some *L. lucifugus* in the french southern Alps (unpublished data), and the specimen presented here seems to belong to this species. However, the presence in Lorraine of this alpine lithobiomorph is very surprising, and it would be useful to confirm this identification by the collect of other specimens in the studied area. It is interesting to note that the forests of the hills surrounding the valley of the "Rupt de Mad" (in particular those of the hills in the south of this valley, where Villecey-sur-Mad is situated) are old and contain some small cold and shaded valleys. I have also collected *Geophilus studeri* Rothenbühler, 1899 here (see below), which also prefers mountainous environments (it was found previously in Vosges mountains by J. Spelda and myself). Perhaps a centipede fauna showing affinities with that usually found at higher altitudes can be found there. Further research is required in order to check these assumptions. For information, I have previously collected *Strigamia transsilvanica* (Verhoeff, 1928) in this locality too (IORIO 2005d).

*Lithobius macilentus* is probably one of the most common species in the forests of Lorraine after *Lithobius tricuspis*, because I have collected fairly numerous specimens in this environment only (IORIO 2003a, 2005b, 2005e).

I did not often collect *Lithobius melanops* in Lorraine and Alsace (IORIO 2003a, 2005b), but it is probable that it is rather common there.

An euryecious species, fairly common in these areas, is *Lithobius microps*.

As is the case with *Lithobius dentatus*, *Lithobius muticus* has been recorded from several localities in eastern France, but apparently without being common there (IORIO 2003a, 2005e; RAVOUX 1948; SPELDA 2005b). It is, on the other hand, much more common in western France (BARBER 1986; GADEAU DE KERVILLE 1886; IORIO 2005c; LEWIS & KIME 1988).

Concerning *Lithobius piceus*, a few specimens were present in the material collected. It had previously been recorded from other localities in Lorraine and elsewhere in eastern France (DEMANGE 1959; IORIO 2003a; RAVOUX 1948; SPELDA 2005b; VACHON & DEMANGE 1943). It seems to live mainly in the forests.

The probably most common lithobiomorph in the forests of eastern France is *Lithobius tricuspis*. It is already quoted in this region by the majority of the authors.

I have previously identified specimens of *Cryptops anomalans* from Metz («Fort de Queuleu») and two other localities in Lorraine (Jézainville and Villers-les-Nancy) (IORIO 2003a; IORIO & GEOFFROY in press). It seems to be synanthropic here. The discovery of several specimens in «Fort de Queuleu» at different seasons seems to indicate that the population is permanently established there. The specimens were always found near the fortifications, which probably constitute good shelter for the winter season (in winter, the temperature is higher inside the forests than outside).

*Cryptops hortensis* is undoubtedly less common in eastern France than *C. parisi*. Thus, I never found this species in Lorraine while I collected many specimens of the genus *Cryptops* in this sector (IORIO 2003a, 2005b, 2005e). *C. hortensis* is a species which is more common in the central and western areas of France (IORIO & GEOFFROY in press).



The most common *Cryptops* in eastern France, and in particular in Lorraine is *C. parisi*. It is euryecious, although it is more frequent in forests than in the other ecosystems (IORIO & GEOFFROY 2004a).

*Henia vesuviana* was previously collected in eastern France by several authors [in Moselle, Haut-Rhin, Doubs and Côte-d'Or] (IORIO 2003a; RAVOUX 1948; SPELDA 2005b). It seems to be silvicolous (perhaps not exclusively).

The most common geophilomorph in the forests of the area studied is *Schendyla nemorensis*. GEOFFROY (1979) carried out the same observations in forests of Seine-et-Marne. It can be found in various other ecosystems (meadows, grasslands), as there are deadwood heaps there.

Remarkable is the high number of males. In south-western Germany SPELDA (1999, 2005a) has hardly seen any. To be sure of the sex of the animals, I have checked the gonopods for specimens with 39 legpairs; although it seems to be less males than females (my preceding papers and this study totalize 196 specimens of this species in Alsace/Lorraine, and only 42 males) of this species in eastern France, males exist in this area (and also in central and western France (IORIO 2004b, 2005a, 2005c, 2006): Ile-de-France, Centre, Basse-Normandie, Bretagne, Pays de la Loire). In central and western France the male seems to be more common than in Lorraine and Alsace. An hypothesis is that the male become less common and then almost absent (?) as we advance toward eastern France and south-western Germany.

*Pachymerium ferrugineum* appears not to be very frequent in eastern France; however, I have previously identified several specimens from Puttelange-les-Thionville and Wolfisheim (IORIO 2005b, 2005e). This species is much more common in the Atlantic littoral where it is found with halophilous species.

*Geophilus carpophagus* is currently known only from rare localities in the region. The male and female collected have 53 and 55 legpairs respectively; the specimens thus correspond to *Geophilus carpophagus* Leach, 1814 sensu stricto (see IORIO (2006)).

*Geophilus flavus* is an euryecious species; it is common everywhere in eastern France.

A species more typical of mountainous ecosystems is *Geophilus studeri*. It was found previously in Vosges mountains by SPELDA (2005b) and IORIO (2005b) (I have quoted *Geophilus pyrenaicus* Chalande, 1909 in my paper, a junior synonym of *G. studeri*). Its discovery in Villedieu-sur-Mad is of real interest (cf. remarks in connection with *Lithobius* sp. cf. *lucifugus*). It appears to be rare in Lorraine and Alsace, apart from the Vosges mountains.

Lastly, *Strigamia acuminata* and *Strigamia crassipes* have been collected in grasslands and forests in eastern France, and seems to be common in this area because there are quoted by the majority of the authors.

## **5.2. The centipede fauna of eastern France**

My preceding identifications and those of this article totalize approximately 1050 specimens of Alsace/Lorraine. These data, added to those of other authors, make it possible to supplement our knowledge of the centipede fauna of «eastern France», a geographical area including the regions Alsace, Lorraine, Champagne, Franche-Comté and Bourgogne.

40 species are currently known from this area. Lorraine is the region whose species richness of centipedes is the highest (29 species), followed by Bourgogne (28 species), Alsace (26 species) and Franche-Comté (15 species) (see table 1 below). Champagne has hardly been explored and currently, we know only 5 species from this region. Champagne and Franche-Comté are however not the only regions in which gaps remain. Thus, in Bourgogne, only the department of Côte-d'Or has been the subject of research, the other departments remaining unexplored. It would also

be interesting to investigate further Nièvre, which includes the major part of Morvan (901 meters of altitude at «le Bois du Roi»).

**Tab. 1:** List of species recorded from eastern France and their presence in each administrative area.

Species	Alsace	Lorraine	Champagne-Ardennes	Franche-Comté	Bourgogne
<i>Scutigera coleoptrata</i>		X			X
<i>Lithobius aeruginosus</i>		X		X	X
<i>Lithobius agilis</i>	X	X			X
<i>Lithobius calcaratus</i>	X	X			X
<i>Lithobius crassipes</i>	X	X			X
<i>Lithobius curtipes</i>			X		
<i>Lithobius dentatus</i>		X	X		X
<i>Lithobius forficatus</i>	X	X		X	X
<i>Lithobius lapidicola</i>	X				
<i>Lithobius latro</i> (1)					X
<i>Lithobius</i> sp. cf. <i>lucifugus</i>		X			
<i>Lithobius macilentus</i>	X	X	X		X
<i>Lithobius melanops</i>	X	X			X
<i>Lithobius microps</i>	X	X	X		X
<i>Lithobius mutabilis</i>	X				
<i>Lithobius muticus</i>	X	X			X
<i>Lithobius pelidnus</i>	X	X		X	
<i>Lithobius piceus</i>		X		X	X
<i>Lithobius pygmaeus</i>	X				
<i>Lithobius subtilis</i>	X				
<i>Lithobius tenebrosus</i>					X
<i>Lithobius tricuspis</i>	X	X	X	X	X
<i>Cryptops anomalans</i>		X			X
<i>Cryptops hortensis</i>	X			X	X
<i>Cryptops parisi</i>	X	X		X	X
<i>Stigmatogaster subterraneus</i>		X			X
<i>Henia vesuviana</i>	X	X		X	X
<i>Schendyla nemorensis</i>	X	X		X	X
<i>Stenotaenia linearis</i>	X			X	
<i>Pachymerium ferrugineum</i>	X	X			
<i>Geophilus carpophagus</i> s. str.	X	X			X
<i>Geophilus electricus</i>		X		X	X
<i>Geophilus flavus</i>	X	X		X	X
<i>Geophilus insculptus</i>	X				X
<i>Geophilus proximus</i> (2)		X			
<i>Geophilus studeri</i>	X	X		X	
<i>Geophilus truncorum</i> s. l. (3)					X
<i>Strigamia acuminata</i>	X	X		X	X
<i>Strigamia crassipes</i>	X	X		X	X
<i>Strigamia transsilvanica</i> (4)		X			

(1) This species is quoted in Bourgogne by RAVOUX (1948), but its presence in this area needs to be confirmed.

(2) This species is quoted in Lorraine by VACHON & DEMANGE (1943), but I don't know if it is really *G. proximus* or a confusion with another species of *Geophilus* (e.g. *G. studeri*).

(3) The specimens of *Geophilus truncorum* Bergsö & Meinert, 1866 recorded from Bourgogne belong to the subspecies *G. truncorum ribanti* Brölemann, 1908. I do not consider the subspecies *ribanti* to be synonymous with typical *truncorum* (IORIO 2005a); however, this needs to be confirmed by further research. For this reason it is listed here as "*Geophilus truncorum sensu lato*".

(4) *S. transsilvanica* is very close to *S. crassipes* but seems to be a valid species according to FODDAI *et al.* (1995), KOREN (1986), MATIC (1972) and ZAPPAROLI (2002). However, an extensive study and comparison of both species would be useful to confirm the status of the first.

## Conclusions

Many gaps in the distributions are filled here, but others still remain. Further studies are required to perfect our biogeographic and taxonomic knowledge of centipedes of eastern France. When this area is better known, it will provide interesting information on the transition between the fauna of southern Germany with its central-european affinities, and that of the central and western areas of France, with atlantic affinities.

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