Bulletin de la Société entomologique de France, **126** (4), 2021 : 421-428. ISSN 0037-928X
https://doi.org/10.32475/bsef_2164 eISSN 2540-2641

The Limoniidae collected during the All-Taxa Biodiversity Inventory in Mercantour National Park, France (Diptera)

Clovis Quindroit

6 avenue Lareveillère, F – 49240 Avrillé <clovis.quindroit@tutanota.com>

(Accepté le 6.IX.2021 ; publié le 7.XII.2021)

Abstract. – During work for the All-Taxa Biodiversity Inventory (ATBI) in Mercantour Park, in French Alps, 23 Limoniidae species were collected. Among them, three are new to French fauna: *Dicranomyia* (*Dicranomyia*) *imbecilla* Lackschewitz, 1941, *Dicranomyia* (*Glochina*) *transsilvanica* Lackschewitz, 1928, and *Molophilus* (*Molophilus*) *priapus* Lackschewitz, 1935. Altitudinal data and other results are commented on.

Résumé. – **Les Limoniidae collectés durant l'inventaire tous taxons dans le Parc national du Mercantour (Diptera)**. Dans le cadre de l'inventaire tous taxons (ATBI) du Parc national du Mercantour, 23 espèces de Limoniidae ont été collectées. Parmi celles-ci, trois sont nouvelles pour la faune de France : *Dicranomyia* (*Dicranomyia*) *imbecilla* Lackschewitz, 1941, *Dicranomyia* (*Glochina*) *transsilvanica* Lackschewitz, 1928, et *Molophilus* (*Molophilus*) *priapus* Lackschewitz, 1935. Les données altitudinales et autres résultats sont commentés.

Keywords. – Faunistics, Palaearctic region, mountain area, new records.

Limoniidae is a family of Diptera with about 274 known species in France and more than 11 000 in the world, divided into four subfamilies (Oosterbroek, 2021). This family forms, along with the Tipulidae, Pediciidae, Cylindrotomidae and Trichoceridae, the suborder of Tipulomorpha, and has recently received some attention in France with a few publications on the subject, such as regional lists, or additions to the national list of French fauna (Kramer & Langlois, 2019 ; Quindroit, 2020 ; Tillier *et al.*, 2020). However, the family remains poorly known in the country, and there is still much to discover, especially in areas of high species diversity.

Limoniidae reach their maximum diversity in humid biotopes, as the larvae of many species —probably more than 50%— are dependent on running or stagnant water. Another large number of Limoniidae live as larvae in decaying wood. The remaining species develop in leaf litter, soil or fungi. Many live in specialized microhabitats at the larval stage, and the species must be sought near their appropriate larval habitats in order to be recorded (Olsen *et al.*, 2018).

Mercantour and Alpi Marittime Parks are situated in the southwestern Alps, at the junction of several climatic and biogeographic domains (continental, alpine and Mediterranean), with a range of altitudes from 350 m to 3297 m, covering a large area of 250 000 ha. Geological terrains range from sedimentary limestone to crystalline igneous rocks, thus providing a very wide variety of soil types (Deharveng *et al.*, 2015) and creating one of the richest biodiversity "hot spots" in Europe.

Because this region was located at the southern limit of the glaciers during the last glaciation, it has retained a large number of endemic plants and invertebrates (Sainte-Claire Deville, 1928 ; Deharveng *et al.*, 2000).

Between 2009 and 2013, a Terrestrial Invertebrates Module of the Mercantour/Alpi Marittime All-Taxa Biodiversity Inventory (ATBI) was conducted, providing some data for Limoniidae in this part of the Alps. These data are presented here.

MATERIAL AND METHODS

The Mercantour/Alpi Marittime inventory project in the southwestern Alps was coordinated by the Museum für Naturkunde of Berlin and the Naturkunde Museum Stuttgart, as a work package of the European project EDIT ("*European* Distributed Institute of Taxonomy" http://www.atbi.eu/mercantour-marittime). It was the first ATBI of this program to be implemented in Europe. The aim of the project was to inventory as completely as possible the biodiversity of the Mercantour and Alpi Marittime parks.

The Terrestrial Invertebrates Module, conducted between 2009 and 2013 by the Muséum national d'Histoire naturelle (MNHN) teams, used: malaise traps, interception traps and pitfall traps. The locations were different from one year to another, but two sites were always chosen in each valley: one at 1440-1500 metres high, another at 2000 m. The sites were located on the communes of Saint-Martin-de-Vésubie and Valdeblore, locality "Boréon", Saint-Dalmas-le-Selvage, locality "Sestrière" (Alpes-Maritimes) in 2009, of Saorge, locality "Caïros" (Alpes-Maritimes) in 2010, and of Val d'Oronaye (Larche and Meyronnes) (Alpes-de-Haute-Provence) in 2011 (map: fig. 1). Traps were collected every two weeks, from May-June to September or October, depending on the climatic conditions.

Interception traps were placed between 1436 m and 2047 m high, as were Malaise traps.

The specimens are stored in the author's collection, and will be returned to the Mercantour Park in the future.

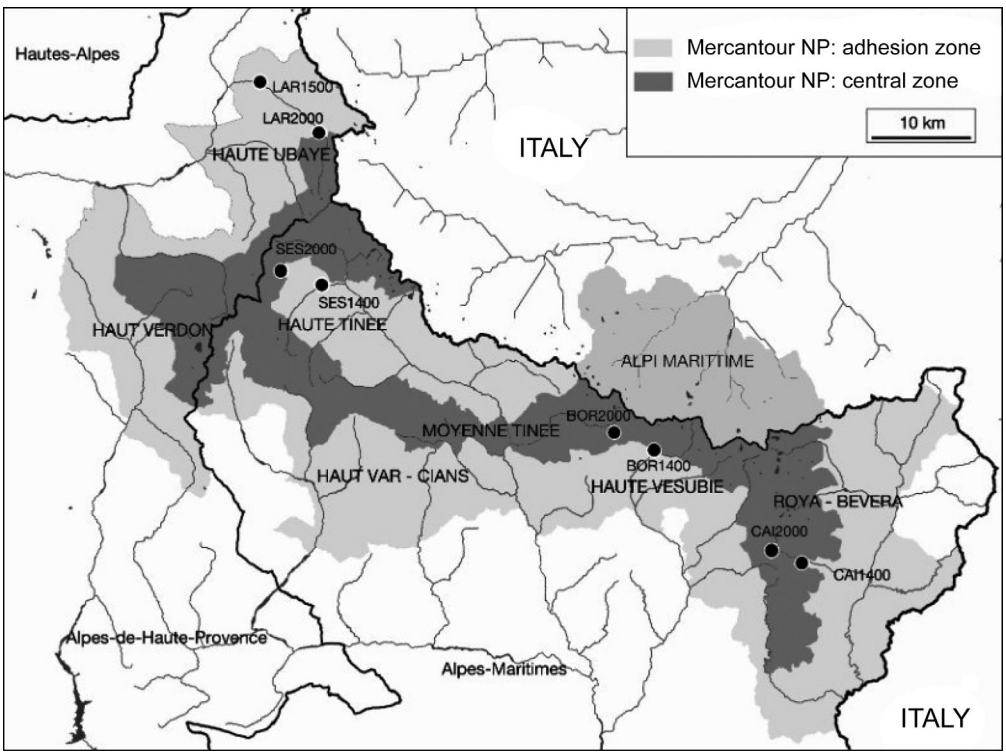

Fig. 1. – Map of the Mercantour National Park. Trap catching area of ATBI Mercantour (BOR1400: Le Boréon, Saint-Martin-de-Vésubie; BOR2000: Salèse pass, Valdebore; CAI1400 and 2000: Caïros forest, Saorge; LAR1500: Meyronnes, Val d'Oronaye; LAR2000: Larche, Val d'Oronaye; SES1400: Valley of Saint-Dalmas, Saint-Dalmas-le-Selvage; SES2000: Valley of Sestrière, Saint-Delmas-le-Selvage.

Results

During the course of this project, 334 specimens belonging to 23 species of Limoniidae were captured. Among them, three species are new to French fauna. The identification of species was not always possible when only females were available (three species) or, in the case of *Limonia cf. trivittata*, because the specimen was a teneral female in poor condition**.** Neither Pediciidae nor Cylindrotomidae were collected.

The commented list of species is given hereafter.

Chioneinae

Gonomyia* (*Gonomyia*) *simplex Tonnoir, 1920. – 1 ♂. This species is considered as scarce in Great Britain (Stubbs & Kramer, 2016a), from seepages. In Finland, where it is considered as a rare species, it is found at ditches. Over there, most of its localities are seepages or spring-fed brooks. It is known from northern France also (forest seepages). According to Cranston & Drake (2010), the larvae of the genus live in marginal situations along flowing and standing waters

Molophilus* (*Molophilus*) *priapus Lackschewitz, 1935. – Fig. 7. 2 ♂. First mention from France. This species is associated with mountainous areas (Wiedenska, 2007), only noted from a few countries in Europe: Austria, Czech Rep., Germany (Sachsen-Anhalt), Italy (Aosta, Trentino-Alto Adige), Poland, Slovakia, Switzerland, Ukraine (Carpathians). Known altitudes are as follows: 650 m in Germany (most northerly records) (Reusch & Hohmann, 2009), 1200 m in Czech republic, 940-1200 m in Italy (south Tyrol), Austria 700-1690 m (Reusch & Heiss, 2012).

Neolimnophila carteri (Tonnoir, 1921). – 4 ♂. Larvae develop in rich organic mud near water reservoirs (Podenas & Podeniene, 2008). In Great Britain, known from wet woodland near streams (Boardman, 2007), mainly northern (Stubbs & Kramer, 2016b). Up to 2100 m in Switzerland, 1700-2350 m in Pirin mountains (Bulgaria).

Ormosia* (*Ormosia*) *fascipennis (Zetterstedt, 1838). – Fig. 4-5. 1 ♂. Shows affinity with mountainous areas. Known in mountains from dry slope along river banks, small mire between mountains (Savchenko & Parkhomenko, 1980), brooks, small rivers, swamps and moist soil (Romania) (Ujvarosi, 2005). Known altitudes in Europe (excluding Scandinavia): in Bulgaria, 1200-2300 m; in Scotland, 1050 m (Stubbs & Kramer, 2016c); in Italy, 1200 and 1630 m (Podenas & Podeniene, 2008). In France, mentioned from Lautaret by Villeneuve (Bergroth, 1907). There is another mention from "around Paris" by Pierre (1924), but this mention appears to be doubtful.

Scleroprocta sororcula (Zetterstedt, 1851). – 1 ♀. Larvae develop in running water (Podenas & Podeniene, 2008), in water and sand of riparian zones (Podeniene, 2009), in small sandy rivers but not bigger ones (Przhiboro, 2017) or damp soil (Kramer & Langlois, 2019). In Ireland, it has been reared from two pupae, one found among debris beneath loose bark, the second found within brackets of a fungus, the Birch Polypore (*Piptoporus betulinus*) (Ashe *et al.*, 2007). In Finland, in wet woodland only (Salmela, 2004), in Great Britain it is scarce, from wooded streams.

Dactylolabinae

Dactylolabis sp. – Only seven females were available. Larvae live under moss from wet rock or soil (Kramer & Langlois, 2019).

Limoniinae

Antocha* (*Antocha*) *vitripennis (Meigen, 1830). – 1 ♀. Larvae live in marginal situations along flowing waters (Drake, 2010). This species is an indicator of exposed riverine sediment habitats (Hewitt *et al.*, 2005). Associated with plains in Switzerland, not extending to mountainous heights according to (Geiger, 1985). Widely distributed in Europe and in France. Up to 1800 m high in Bulgaria (Hubenov, 2017).

Dicranomyia* (*Dicranomyia*) *imbecilla Lackschewitz, 1941. – Fig. 6. 1 ♂. First mention for France. This species has been recently re-described by Starý & Stubbs (2015) from *D.* (*D.*) *mitis*, now split into five species. This is the last species of those five species to be mentioned in France since the

redescription. In Great Britain, this is a rarely recorded species of western and northern districts. Most localities have calcareous seepages depositing tufaceous substrate. There, the species can occur along spring-fed streams associated with seepage complexes, and, in one site, it was abundant beside a large woodland stream well below the source. In the Czech Republic and Slovakia, the species seems to prefer mountainous areas (Up to 2000 m in Czech Republic), but is not strictly confined to mountains (STARÝ & STUBBS, 2015).

Dicranomyia* (*Dicranomyia*) *mitis (Meigen, 1830). – 1 ♂, 1 ♀. Common species in France and Europe, with wide geographical distribution, ubiquitous, considered as common at all altitudes (GEIGER, 1985). This species is known from wet woodland in Northern France, to Mediterranean area (Var) and Corsica.

Dicranomyia* (*Glochina*) *transsilvanica Lackschewitz, 1928. – Fig. 2-3. 1 ♂, 1 ♀. First mention for France. Distribution through Europe: Austria, Bulgaria, Croatia, Czech Republic, Germany, Hungary, Italy, Montenegro, Romania, Serbia, Slovakia, Switzerland, Ukraine; Russia: North Caucasus; Armenia, Azerbaijan, Turkey (Asiatic part: Artvin). (OOSTERBROEK, 2021). This mention is the most western data for this species. Biology is mostly unknown. Czech and Slovakian specimens were collected in habitats where rocks occurred (OOSTERBROEK, 2021, based on Jaroslav Starý, pers. comm.). Altitudinal species, ranging from 385 to 2000 m. In Switzerland, the species is considered to be alpine, but with some data also from plains (GEIGER, 1985).

Limonia cf. trivittata (Schummel, 1829). – 1 ♀. Common species from mid-Spring, from wooded streams' borders. According to GEIGER (1985), ubiquitous to subalpine level.

Limonia flavipes (Fabricius, 1787). – 29 ♂, 40 ♀. Very common species, mostly in forests. According to GEIGER (1985), ubiquitous up to subalpine level.

Limonia nigropunctata nigropunctata (Schummel, 1829). – 53 ♂, 120 ♀. Very common species, mostly in forests. According to GEIGER (1985), ubiquitous up to subalpine level.

Limonia phragmitidis (Schrank, 1781). – 2 ♂, 23 ♀. Very common species, mostly in forests. According to GEIGER (1985), ubiquitous up to subalpine level.

Limonia taurica (Strobl, 1895). – 2 ♂, 2 ♀. In Poland, associated with mountains according to WIEDENSKA (2007); 1050-1950 m in Austria (VOGTENHUBER & KOFLER, 2017), 1300-1800 m in Bulgaria (HUBENOV, 2017), up to 2000 m in Spanish Pyrenees and in Germany (SCHACHT, 1999 ; MEDEROS & EIROA, 2015). Associated with Alpine Chain according to GEIGER (1985)**.**

Lipsothrix errans (Walker, 1848). – 1 ♂. Known in France from Doubs and the Pyrenees. In Great Britain, a local, northern and western, species, associated with wooded streams (STUBBS, 2016a). Red listed in Finland (PENTTINEN *et al.*, 2010), confined to decaying wood, in intermittent headwater streams surrounded by mixed forests. (SALMELA, 2012)

Metalimnobia* (*Metalimnobia*) *quadrimaculata (Linnaeus, 1760). – 3 ♂, 2 ♀. Mycophagous (WIEDENSKA, 2007 ; STUBBS & KRAMER, 2016a ; KRAMER & LANGLOIS, 2019), infrequent, usually from old forests. Wide distribution through France. In Switzerland, considered to be within the group of species with an affinity to northern Alps, and linked to plains, but with a prealpine tendance (GEIGER, 1985).

Neolimonia dumetorum (Meigen, 1804). – 1 ♀. Very common woodland species, larvae feeding in woods. According to GEIGER (1985), ubiquitous to subalpine level.

Rhipidia* (*Rhipidia*) *maculata Meigen, 1818. – 1 ♂, 1 ♀. Common in all of France. Ubiquitous, considered as common at all levels (GEIGER, 1985). Larvae develop in cow dung and rotting vegetation (STUBBS & KRAMER, 2016a).

Limnophilinae

Dicranophragma* (*Brachylimnophila*) *separatum (Walker, 1848). – 8 ♂. Common species from woodland, often humid.

Euphylidorea* (*Euphylidorea*) *lineola (Meigen, 1804). – 1 ♀. Common species from wet meadows and wet forest borders. According to CRANSTON & DRAKE (2010), larvae can be found on river margins.

Ormosia sp. – Only females available (no trustable determination). Might belong to more than one species.

Paradelphomyia sp. – Only females available (no determination). Species usually from forests.

Discussion

Among the collected species, representing all four subfamilies, the genus *Limonia* Meigen, 1803, with terrestrial development, forms the majority (273 specimens, 81% of the caught specimens).

The number of specimens is approximatively similar at different altitudes (161 specimens at 1400 m, 173 at 2000 m). Species richness is similar, with 15 species at both altitudes. Species richness from north to south seems similar, with, from north to south: Larche 15 species, Sestrière 3 species, le Boréon 5 species, Caïros 13 species.

Fig. 2-7. – Limoniidae. – **2**, *Molophilus priapus* Lackschewitz, ♂, genitalia, lateral view. – **3-4**, *Ormosia fascipennis* (Zetterstedt): **3**, ♂, genitalia, dorso-lateral view; **4**, left wing. – **5**, *Dicranomyia imbecilla* Lackschewitz, ♂, genitalia, dorsal view. – **6-7**, *Dicranomyia transsilvanica* Lackschewitz: **6**, ♂, genitalia, dorsal view; **7**, left wing.

Only six species were found on both altitudes (table I): *Dicranomyia transsilvanica, Limonia flavipes, L. nigropunctata, L. phragmitidis, Neolimnophila carteri* and *Rhipidia maculata.*

At both altitudes, *Limonia nigropunctata nigropunctata* and *L. flavipes* are dominant species. Numerous specimens of *L. nigropunctata nigropunctata*, corresponding to the form *masoni* (Edwards, 1921) (formerly a subspecies) were recorded from Val d'Oronaye (Larche, Northernmost sample). This form was dominant in the sampling (about 60-80% of the specimens), at both altitudes, always in company of the classic form.

Species associated with altitudinal habitats are (when this type of information is available, the biology of Limoniidae being still poorly known for most species): *Dicranomyia transsilvanica*, *Molophilus priapus*, *Ormosia fascipennis* and *Limonia taurica* (17% of the species). These species are mostly recorded from high areas in Europe, two of them are new to France.

Three other species show an affinity to high/cold areas: *Neolimnophila carteri*, *Scleroprocta sororcula* and *Dicranomyia imbecilla* (13% of the species).

None of the species are restricted to Mediterranean biotopes, although some can occur in this type of environments.

When methods of capture are considered, Limoniidae have a low retrieval rate from the interception traps, with 12 specimens (4% of the specimens) belonging to 7 species collected this way (*Dicranomyia mitis*, *Dicranophragma nemorale*, *Limonia flavipes*, *L. nigropunctata nigropunctata*, *L. cf. trivittata*, *Metalimnobia quadrimaculata* and *Rhipidia maculata*). All these species were also captured by Malaise traps, except *L. cf. trivittata*. All other specimens were caught by Malaise traps.

Table I. – Comparison of the collected species at each altitude: 1400 m and 2000 m.

1400 m	2000 m
Antocha vitripennis	
Dactylolabis sp.	*Dactylolabis sp.*
	Dicranomyia imbecilla
	Dicranomyia mitis
Dicranomyia transsilvanica	*Dicranomyia transsilvanica*
	Dicranophragma nemorale
Euphylidorea lineola	
	Gonomyia simplex
Limonia cf trivittata	
Limonia flavipes	*Limonia flavipes*
Limonia nigropunctata nigropunctata	*Limonia nigropunctata nigropunctata*
Limonia phragmitidis	*Limonia phragmitidis*
	Limonia taurica
Lipsothrix errans	
Metalimnobia quadrimaculata	
	Molophilus priapus
Neolimnophila carteri	*Neolimnophila carteri*
Neolimonia dumetorum	
	Ormosia fascipennis
Ormosia sp	
Paradelphomyia sp.	
Rhipidia maculata	*Rhipidia maculata*
	Scleroprocta sororcula

Conclusion

Twenty-three species is a low number for this diverse family and can be explained by the constraint of high altitudinal conditions, and more probably because of the restricted dispersion of adult species associated with water. It is certain that many more species will be found in the Mercantour Park, especially in the vicinity of ponds and bogs, by Malaise traps or directed sweep-netting. Still, a large part of the collected species is connected with high altitudinal levels, especially in southern Europe, showing that the Mercantour Park is also an area of special importance for this group. All three species new to France have an affinity to (e.g. *Dicranomyia imbecilla*) or are restricted to mountains, showing how this habitat is still poorly studied in France for this group of flies.

Aknowledgements. – I am greatly indebted to Jaroslav Starý for his frequent and always interesting help on identification problems. I am also really grateful to Pjotr Oosterbroek who has helped me so much to dive deeper into the wide world of the Tipuloidea, and who is always so well advising about them! I thank the Mercantour park and Pierre Tillier for access to the material from ATBI. I also thank Stephane Shao for his friendly help on the English text, as well as the anonymous reviewer of this text for interesting comments on earlier versions of the manuscript. A great thanks to Marine, who supports me so much every day.

References

Ashe P., O'Connor J. P., Chandler P. J., Stubbs A. E., Vane-Wright R. I. & Alexander K. N. A., 2007. – The craneflies (Diptera) of Ireland. Part 5. Tipulidae. *Bulletin of the Irish Biogeographical Society,* **31** : 296-357.

Bergroth E. E., 1907. – Note sur quelques Tipulides de France. *Bulletin de la Société entomologique de France,* **12** : 143-145.

Boardman P., 2007. – *A provisional account and atlas of the craneflies of Shropshire.* Published privatly, 96 p.

Cranston P. & Drake C. M., 2010. – Immature stages of flies and some microhabitats: Water (p. 170-176). *In* : Chandler P. J. (ed.), *A dipterists handbook* (*2nd ed.*). Amateur Entomologists' Society.

Deharveng L., Bedos A., Daugeron C., Villemant C. & Judson M. L. I., 2015. – Organization, usefulness and limitations of an ATBI (All Taxa Biodiversity Inventory): the inventory of terrestrial invertebrates in the Mercantour National Park. *Zoosystema,* **37** (1) : 9-30. https://doi.org/10.5252/z2015n1a1

Deharveng L., Dalens H., Drugmand D., Simon-Benito J. C., Da Gama M. M., Sousa P., Gers C. & Bedos A., 2000. – Endemism mapping and biodiversity conservation in western Europe: an Arthropod perspective. *Belgian Journal of Entomology,* **2** (1) : 59-75.

Drake C. M., 2010. – The habitats of Diptera: Exposed riverine sediment. *The Amateur Entomologist*, **15** : 226-229.

Geiger W., 1985. – Limoniidae (Diptera), sous-famille Limoniinae de Suisse: synonymies nouvelles. *Mitteilungen der Schweizerischen Entomologischen Gesellschaft,* **58** : 69-76.

Hewitt S. M., Atty D., Parker J., Read J. & Sinclair M., 2005. – *Survey of the insects of exposed riverine sediments on the rivers Eden and Derwent in Cumbria in 2004.* Unpublished report to English Nature and the Environment Agency, 55 p.

Hubenov Z., 2017. – Vertical distribution and comparative zoogeographical characteristic of dipteran fauna (Insecta: Diptera) according to the vegetation belts of the Pirin and Rila Mountains. *Historia naturalis bulgarica,* **24** : 61-119.

Kramer J. & Langlois D., 2019. – Craneflies (Diptera, Tipuloidea) of the Ravin de Valbois, France. *Dipterists Digest,* (2) **26** : 83-95.

Mederos J. & Eiroa E., 2015. – Nuevos datos de Limoniidae, Pediciidae y Tipulidae (Diptera: Tipuloidea) de los Pirineos Centrales (Cataluña, España). *Boletin de la Sociedad Entomologica Aragonesa,* **56** : 265-268.

Olsen K. M., Oosterbroek P., Boumans L. & Jong H. D., 2018. – Forty species of limoniid craneflies new to Norway, with an annotated list of Nordic Pediciidae and Limoniidae, including distributional data (Diptera, Tipuloidea). *Norwegian Journal of Entomology,* **65** : 127-174.

Oosterbroek P., 2021. – *Catalogue of the Craneflies of the World (Diptera, Tipuloidea: Pediciidae, Limoniidae, Cylindrotomidae, Tipulidae).* https://ccw.naturalis.nl/ [consulté le 12.V.2021].

Penttinen J., Ilmonen J., Jakovlev J., Salmela J., Kuusela K. & Paasivirta L., 2010. – *Suomen lajien uhanalaisuus: Punainen kirja 2010 = The 2010 red list of Finnish species*. Helsinki : Ympäristöministeriö, Suomen ympäristökeskus, 685 p.

Pierre C., 1924. – Diptères : Tipulidae. *Faune de France,* **8** : 1-159.

Podenas S. & Podeniene V., 2008. – Tipuloidea excl. Tipulidae (p. 345-354). *In* : Ziegler J. (ed.), Diptera Stelviana. Vol. 1. *Studia Dipterologica,* suppl. **16** : 395 p.

Podeniene V., 2009. – Lithuanian Chioneinae (Limoniidae, Diptera): larval habitat preferences and problems of identification, with description of last instar larvae of *Molophilus* (*Molophilus*) *crassipygus* de Meijere, 1918, *M.* (*M.*) *griseus* (Meigen, 1804), *M.* (*M.*) *ochraceus* (Meigen, 1818), *M.* (*M.*) *propinquus* (Egger, 1863). *Lauterbornia,* **68** : 135-145.

Przhiboro A. A., 2017. – New data on psammorheophilous Limoniidae (Diptera) of NE European Russia. *Zoosystematica Rossica,* **26** (2) : 381-391. https://doi.org/10.31610/zsr/2017.26.2.381

Quindroit C., 2020. – Une première liste des Tipuloidea des Pays de la Loire et addition d'une espèce de Limoniidae à la faune de France (Diptera). *L'Entomologiste*, **76** (1) : 5-48.

Reusch H. & Heiss R., 2012. – IV|6.1 Kranich- oder Langbeinmücken (Diptera: Tipuloidea). *Quellen. Schriften des Nationalparks Gesause,* **7** : 165-179, 314-350.

Reusch H. & Hohmann M., 2009. – Stelzmücken (Diptera: Limoniidae et Pediciidae) aus Emergenzfallen im "Nationalpark Harz" (Sachsen-Anhalt). *Lauterbornia*, **68** : 127-134.

Sainte-Claire Deville J., 1928. – *Esquisse du peuplement des Alpes françaises* (*Coléoptères*). Paris : Société de Biogéographie, 86-106.

Salmela J., 2012. – Biogeographic patterns of Finnish crane flies (Diptera, Tipuloidea). *Psyche: A Journal of Entomology*, **2012** : 20 p. https://doi.org/10.1155/2012/913710

Savchenko E. N. & Parkhomenko S. I., 1980. – Preliminary data on fauna of the limoniid-flies (Diptera, Limoniidae) of Chukotka (p. 95-109). *Freshwater Fauna of the Far East.* Vladivostok : Far Eastern Scientific Center of Academy of Science of the USSR, Institute of Biology and Soil Sciences.

Schacht W., 1999. – Zweiflugler aus Bayern XVI. Erganzungen zu Mendl and Reusch (1989) Liste der aus Deutschland bekannten Stelzmucken (Diptera: Pediciidae, Limoniidae). *Entomofauna, Zeitschrift fur Entomologie,* **20** : 129-137.

Starý J. & Stubbs A. E., 2015. – Five species under *Dicranomyia* (*Dicranomyia*) *mitis* (Meigen, 1830) (Diptera, Limoniidae). *Zootaxa,* **3964** (3) : 321-334. https://doi.org/10.11646/zootaxa.3964.3.2

Stubbs A. E. & Kramer J., 2016a. – *Key to Limoniid craneflies with a closed discal cell, by Alan Stubbs, 2001, revised by John Kramer, 2016.* Published as a pdf on the website: https://ccw.naturalis.nl/index.php.

Stubbs A. E. & Kramer J., 2016b. – *Key to species with an open discal cell, by Alan Stubbs, 2001, revised by John Kramer, 2016.* Published as a pdf on the website: https://ccw.naturalis.nl/index.php.

Stubbs A. E. & Kramer J., 2016c. – *Key to subfamily Limoniinae, by Alan Stubbs, 1998, revised by John Kramer, 2016.* Published as a pdf on the website: https://ccw.naturalis.nl/index.php.

Tillier P., Claude J. & Decoin R., 2020. – Première mention pour la France d'une pédicie d'altitude, *Pedicia* (*Amalopis*) *fusca* Ujvarosi & Balint, 2012 (Diptera, Pediciidae). *Bulletin de la Société entomologique de France*, **125** (3) : 240-242. https://doi.org/10.32475/bsef_2134

Ujvarosi L., 2005. – Limoniidae and Pediciidae (Insecta: Diptera) assemblages along mountainous streams: additions to assess the biodiversity in wet habitats in Carpathians, Romania. *Acta Biologica Debrecina Oecologica Hungarica,* **13** : 233-248.

Vogtenhuber P. & Kofler A., 2017. – Zum Vorkommen von Schnaken (Diptera: Tipulidae Cylindrotomidae, Limoniidae, Pediciidae) in Osttirol und Kärnten, Österreich. *Beitrage zur Entomofaunistik,* **18** : 117-143.

Wiedenska J., 2007. – Sygaczowate. Limoniidae (p. 46-48). *In* : Bogdanowicz W., Chudzicka E., Pilipiuk I. & Skibinska E. (eds), *Fauna of Poland. Characteristics and checklist of species, Part II, Vol. II.* Warszawa : Muzeum i Instytut Zoologii PAN.