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An annotated checklist of Chironomidae (Diptera) trapped in Brittany (France) since 1975

Y. R. Delettre

Keywords: Diptera, Chironomidae, species distribution, France.

The chironomid fauna ot the Western part of France has been notably understudied; few data are available on species distribution for the region. This paper provides some information derived from several studies conducted in the eastern part of Brittany. Although a small part of this region is considered, the checklist comprises 94 species, four of which are recorded for the first time in France.

Liste annotée des Chironomidae (Diptera) capturés en Bretagne (France) depuis 1975

Mots clés : Diptera, Chironomidae, répartition, France

Les Chironomidae de l'Ouest de la France ont été particulièrement peu étudiés par le passé et la distribution des espèces est donc fort méconnue. Cette publication recense les informations collectées par une série d'études menées dans la partie Est de la Bretagne. Bien que seule une partie de cette région ait été prise en compte, la liste comporte 94 espèces dont quatre sont nouvelles pour la France.

1. Introduction

The biogeographical distribution of Chironomidae (Diptera) in France and Corscica was synthesized by Serra-Tosio & Laville (1991) and some additions and corrections were published by Laville & Serra-Tosio (1996). As a result, 646 species were listed from France, accounting for one half of the total chironomid fauna in the Palaearctic.

However, as underlined by these authors, some regions were more sampled than others and the study of lowland plains, which belong to the 13th biogeographical region (Illies 1978), is rather fragmentary. The subregion A13, as defined by Serra-Tosio & Laville (1991), includes Brittany, Normandy and the northern part of France (Fig. 1). In Brittany, very few limnological studies have been conducted, and thus, the chironomid fauna is still poorly known.

C.N.R.S., U.M.R. 6553 "Ecobio", University of Rennes I. Biological Field Research Station, F-35380 Paimpont (France). e-mail: yannick.delettre@univ-rennes1.fr

The current paper provides a list of species derived from different research works conducted in the eastern part of Brittany since 1975. Most studies were focused on terrestrial Chironomidae, although some of them also considered aquatic habitats. However, the study of flying insects throughout three agricultural landscapes provided catches of species inhabiting various water bodies, which enlarged the field of investigation of the current work. No separate list of species has been previously published for Brittany.

2. Methods

Two main sampling methods were used, namely emergence traps (E) and yellow water traps (Y). The former catch adult insects emerging from water bodies or from the soil, and thus allow an accurate definition of specific larval habitats. The latter catch flying adults searching for propitious swarming, resting or ovipositing sites, yielding a mixture of species originating in several habitats; the resulting list contains a spectrum of species living in a given heterogeneous landscape. Additionally, a skim net (Sk) was used to collect pupal exuviae in some pools. Samples were preserved in ethanol (70°), and then determined under a stereomicroscope using appropriate keys and revisions (see References)

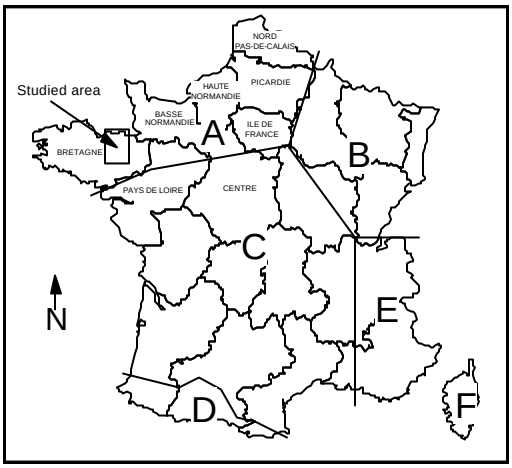

Fig. 1. A schematic map of biogeographical sub-regions of France, adapted from Serra-Tosio & Laville (1991). The study area considered in Brittany is shown.

Fig.1 Carte schématique des sous-régions biogéographiques de la France, adaptée de Serra-Tosio & Laville (1991) montrant la zone d'étude en Bretagne.

3. Study sites

A total of 12 different sites was studied, most of them for more than one year. All are located in the eastern part of Brittany (Ille & Vilaine and Morbihan), at low altitude (below 250m a.s.l.) and at less than 80 km from coasts. They can be clustered in five sets, as follows:

1. Three different heathland types (dry, mesic and tall heathlands) located at Trécesson (Morbihan), near the Forest of Paimpont, either undisturbed or subjected to prescribed fire, sampled with emergence traps for four years (columns [1] to [4] in Table 1). Results for burnt patches are pooled (column [4]). All these heathland patches are located on purple schistose rocks. Soils are acidic brown soils. The mesic heathland is established on a hydromorphic soil. The vegetation is typical of heathlands, including furze, heather and various gramineous plants as well as lichens. The speed of vegetation re-establishment changed according to fire intensity. Detailed results can be found in Delettre (1994, 1995).
2.
3. Five different habitats bordering a pond in the same forest, namely the pond banks, a riparian woodland, a small meadow and, farther, acidic swards and forest plots (columns [5] to [9] in Table 1). These habitats were sampled weekly for two years (Delettre, Tréhen & Grootaert 1992, Delettre 1993). Acidic swards (dry heathlands) located on schistose rocks were more extensively studied during six years in the same area (Delettre 1994). All of them were flooded in winter owing to abundant rainfall and low soil permeability. Solar radiation and reduced soil thickness induced a deep soil drought every summer on those sites. Both emergence traps and yellow water traps were used.
4. Two acidic ponds (Etang du Châtenay & Etang de Comper) in the same area near the Paimpont biological field research Station, where a skim net was occasionally used in spring (Delettre unpubl.). Their physical and chemical characteristics were not determined. Species occurring at these sites are recorded in column [10] (Table 1).
5. A temporary pond, located in an old abandoned quarry, studied for 15 months by Ducrotoy (1976) and for two years by Delettre (1984, 1989). According to Ducrotoy (1976), its main characteristics were : area = 300 m² in winter, maximum depth = 24 cm, average pH = 5.1, conductivity = 0.02 µΩ, calcium = 0.62 mg/l, phosphate = 0, nitrate = 0.017 mg/l, oxygen saturation = 74-100% all through the year, average annual temperature = 10.9°C, organic matter of the bottom sediment = 1-4%, C/N = 11.5. Mud granulometry was dominated by silt (32-43%) and sand (31-49%) while clay accounted for 18-23% (Delettre, 1984). The pond dried up each summer for one week to two months depending on the year (Delettre, 1989). Both emergence traps and yellow water traps were used (column [11] in Table 1).
6. Three agricultural landscapes with dense to sparse hedgerow networks, located south of Mont Saint Michel Bay (Ille & Vilaine, 48°36' N, 1°32 W) in which a total of 128 yellow water traps was used from March to July for two consecutive years. These landscapes (each covering 500-700 ha) include permanent streams running across an agricultural mosaic (corn or wheat fields, permanent and temporary meadows, fallow land, woodlots). A synthesis of some results can be found in Burel *et al.* (1998, 2000) and a detailed analysis of aquatic species is provided in Delettre & Morvan (2000). See column [12] in Table 1.

4. Results

As a whole, 94 species were identified (Table 1). The Orthocladiinae accounted for the greatest part (58 spp.), followed by the Chironominae (24 spp.) and Tanypodinae (11 spp.); only one species belonging to the sub-family Prodiamesinae was recorded. Four species were new for France, 50 were new for sub-region A13, three species identifications were confirmed and one species, omitted in Laville & Serra-Tosio (1996), was added.

Species new for France are four terrestrial Orthocladiinae: *Pseudosmittia angusta* (Edw.), *P. curticosta* (Edw.), *Smittia contingens* (Walk.) and *S. foliacea* (K.). All of them have been recorded previously from England (Pinder 1978). *S. foliacea* is also known from Belgium (Goddeeris & Behen, 1991). *P. curticosta* (Edw.) accounted (as *Smittia curticosta* Edw.) for *ca*. 50% of the total fly fauna in a brown woodland soil (mull humus type) in England (Healey & Russel-Smith, 1971). Species new for A13 sub-region are indicated in Table 1. Most of them were already found in other French sub-regions (e.g. B13 or C13). One species (*Smittia celtica* Rossaro & Delettre) was, till now, only found on acidic swards in Brittany (Rossaro & Delettre 1992). It was tentatively reported as *Parasmittia sp.* nr. *carinata* Str. by Delettre in some previous papers. Its ecology, population dynamics and ecophysiological capabilities were extensively studied by Delettre (1984, 1988a, 1988b).

Several remarks must be added. *Bryophaenocladius brincki* (Freem.) was described from South Africa by Freeman (1955) and redescribed by Saether (1973) from Mt. Kenya (8-9000 ft. a.s.l.). Identification of our specimens was checked by Saether, who concluded the identification accurate (O.A. Saether, pers. comm). The occurrence of this species so far from its supposed biogeographic area was surprising, but most terrestrial chironomid species are highly understudied and many terrestrial ecosystems have not been sampled for this taxon. Therefore, numerous gaps in the biogeographical distribution of edaphic species are likely to occur frequently. This remark is also valid for the four terrestrial species mentioned above.

Although Saether (1983) suggested that *Raphidocladius* (a subgenus of *Gymnometriocnemus)* was probably aquatic or semi-aquatic, *G. (R.) brumalis* (Edw.) was found in huge numbers in fully terrestrial habitats including dry heathlands and woodlands as well.

Limnophyes minimus (Mg.) and *L. natalensis* (K.) were found together at several sites in Brittany. According to Ole Saether (pers. comm.), who examined our specimens, hybrids are likely to occur between these two species in Brittany. The same problem was mentioned recently by Henk Moller-Pillot (pers. comm.) in the Netherlands.

Amongst the aquatic species, most are tyical of ponds and small rivers. Species originating in springs are not well represented, except *Rheocricotopus (s. str.) effusus* and *Chaetocladius dentiforceps* (Edw.), which is typical of limnocrene springs. Numerous adults of the latter species emerged from the small temporary pond located in an old quarry. *Heterotrissocladius marcidus* (Walk.) is an hyporheic species. Other species living in interstitial water are likely to occur but their study needs appropriate sampling methods (Marmonier *et al*., 2000). *Cladotanytarsus nigrovittatus* (G.), already known from U.K. and Belgium, is not listed in Serra-Tosio & Laville (1991). It was found in lakes above 1000m a.s.l. in the Pyrenees by Moubayed *et al*. (1999).

Some other species are not listed in the current paper, as several specimens were too deteriorated or found at the pupal stage, which did not allow an accurate identification. They belong to the following genera: *Conchapelopia*, *Krenosmittia* and *Tanypus*.

5. Conclusion

The current list of Chironomidae from Brittany is, of course, far from complete as many aquatic habitats have not yet been investigated. Many species recorded in other lowland areas in France are likely also to be found in Brittany, when detailed limnological studies of running and standing waters in the rest of Brittany are performed. This work is planned for the near future, including the interstitial fauna, and thus additions to the current list will be provided later. However, this checklist does show the value of studying the most western part of France and the need for future research.

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Table 1 : Checklist of chironomid species. Status (St): # = occurrence confirmed in A13; * = new species in A13 but previously found in other subregions of France; F = new for France; O = omitted in Laville & Serra-Tosio (1996). Trapping devices as follows : E = emergence trap; Y = Yellow pan trap; Sk = skim net.
Tableau 1. Liste annotée des espèces de Chironomidés. Situation (St) : # présence confirmée en A13; * = espèce nouvelle en A13 mais connue antérieurement d'autres sous-régions de France ; F = nouvelle pour la France ; O = oubliée chez Laville & Serra-Tosio (1996). Appareils de récoltes : E : piège à émergence; Y = Piège jaune; Sk = filet à écume.

	St.	1	2	3	4	5	6	7	8	9	10	11	12
SPECIES	Status	Dry heathland	Mesic heathland	Tall heathland	Burnt heathlands	Wet pond banks	Riparian woodl.	Grassland	Acidic swards	Forest	Agric. landscapes	Ponds	Temporary pond
Tanypodinae													
Ablabesmyia longistyla Fitt.						Y						Sk	
Ablabesmyia monilis (L.)								Y			Y		E
Arctopelopia barbitarsis (Zett.)	*										Y		
Macropelopia adaucta (K.)	*										Y	Sk	
Macropelopia nebulosa (Mg.)											Y		
Macropelopia notata (Mg.)											Y		E
Monopelopia tenuicalcar (K.)	*										Y		
Paramerina cingulata (Walk.)											Y		
Procladius (Holotanypus) choreus (Mg.)												Sk	E
Procladius (Holotanypus) crassinervis (Zett.)	*											Sk	E
Psectrotanypus varius (Fabr.)													E
Prodiamesinae													
Prodiamesa olivacea (Mg.)											Y		
Orthocladiinae													
Acricotopus lucens (Zett.)	*					Y							
Brillia modesta (Mg.)	*							Y			Y		
Bryophaenocladius brincki (Freem.)	#			E	E								
Bryophaenocladius muscicola (K.)	*						Y			Y			
Bryophaenocladius subvernalis (Edw.)								Y	E	Y	Y		E
Bryophaenocladius vernalis (G.)		E	E	E	E				Y		Y		
Camptocladius stercorarius (de Geer)						Y			Y		Y		
Chaetocladius dentiforceps (Edw.)								Y	Y				E
Chaetocladius perennis (Mg.)	*										Y		
Chaetocladius piger (G.)	*							Y			Y		
Corynoneura celtica Edw.	*							E					
Corynoneura edwardsi Brundin	*					Y							

	St.	1	2	3	4	5	6	7	8	9	10	11	12
Corynoneura lacustris Edw.	#					Y							
Corynoneura lobata Edw.	*							Y			Y		
Cricotopus (s. str.) pulchripes Verr.	*							Y					
Cricotopus (Isocladius) sylvestris (Fabr.)								Y	Y				
Diplocladius cultiger K.	*							Y					
Epoicocladius flavens (Malloch)	*					Y					Y		
Eukiefferiella brevicalcar (K.)	*							Y			Y		
Gymnometriocnemus (Raphidocladius) brumalis (Edw.)		E	E	E	E		E			E	Y		E
Heterotanytarsus apicalis (K.)	*					Y	Y	Y	Y	Y		Sk	
Heterotrissocladius marcidus (Walk.)	*					Y					Y		
Limnophyes habilis (Walk.)	*						Y	Y		Y	Y		
Limnophyes minimus (Mg.)		E	E	E	E	EY	E		E	E	Y		E
Limnophyes natalensis (K.)			E			E							
Limnophyes pentaplasus (K.)	*										Y		
Metriocnemus albolineatus (Mg.)					E	Y					Y		
Metriocnemus fuscipes (Mg.)	*							Y					
Metriocnemus obscuripes (Holm.)	*						Y			Y	Y		
Metriocnemus tristellus Edw.								Y	Y	Y	Y		
Nanocladius bicolor (Zett.)												Sk	
Orthocladius (Eudactylocl.) thienemanni K.	*										Y		
Paralimnophyes hydrophilus (G.)						Y					Y		E
Parametriocnemus stylatus (K.)						Y			Y		Y		
Paraphaenocladius impensus (Walk.)	*					Y					Y		
Paraphaenocladius irritus (Walk.)	*										Y		
Paratrichocladius skirwithensis (Edw.)	*										Y		
Paratrissocladius excerptus (Walk.)						Y							
Psectrocladius (Allopsectrocl.) obvius (Walk.)	*											Sk	
Psectrocladius (s. str.) psilopterus (K.)	*					Y						Sk	
Psectrocladius (s. str.) sordidellus (Zett.)								Y					
Pseudorthocladius (s. str.) cranstoni Saeth. & Subl.			E		E								
Pseudorthocladius (s. str.) curtistylus (G.)	*					E					Y		
Pseudorthocladius (s. str.) filiformis (K.)	*					E							
Pseudosmittia angusta (Edw.)	F					E							
Pseudosmittia curticosta (Edw.)	F					EY					Y		
Pseudosmittia longicrus (K.)									E				
Rheocricotopus (Psilocricot.) atripes (K.)	*										Y		

	St.	1	2	3	4	5	6	7	8	9	10	11	12
Rheocricotopus (Psilocricot.) glabricollis (Mg.)	*										Y		
Rheocricotopus (s. str.) effusus (Walk.)	*										Y		
Rheocricotopus (s. str.) fuscipes (K.)								Y			Y	Sk	
Smittia aterrima (Mg.)				E	E						Y		
Smittia celtica Rossaro & Delettre	O								E				
Smittia contingens (Walk.)	F							Y		Y	Y		
Smittia foliacea (K.)	F						Y	Y		Y	Y		
Smittia pratorum (G.)		E							E		Y		
Synorthocladius semivirens (K.)								Y					
Tvetenia verralli (Edw.)	*										Y		
Chironominae Chironomini													
Chironomus plumosus (L.)											Y		
Chironomus pseudothummi Str.													E
Chironomus riparius Mg.											Y	Sk	
Cladopelma edwardsi (Krus.)	*										Y		
Cladopelma krusemani (G.)	*						Y	Y		Y	Y		
Endochironomus tendens (Fabr.)	*					Y							
Microtendipes chloris (Mg.)	*											Sk	
Microtendipes pedellus (de Geer)	*										Y		
Parachironomus parilis (Walk.)	*							Y				Sk	
Paratendipes albimanus (Mg.)	*						Y			Y			
Phaenopsectra flavipes (Mg.)						Y	Y		Y	Y			
Polypedilum (Pentapedilum) nubens (Edw.)	*					Y							
Polypedilum (Pentapedilum) uncinatum (G.)											Y		E
Polypedilum (Uresipedilum) convictum (Walk.)	#										Y		
Polypedilum (s. str.) nubeculosum (Mg.)													E
Chironominae Tanytarsini													
Cladotanytarsus nigrovittatus (G.)	*					Y							
Micropsectra atrofasciata (K.)						Y	Y			Y	Y		
Micropsectra bidentata G.	*										Y		
Micropsectra fusca (Mg.)						Y	Y		Y	Y	Y		E
Rheotanytarsus curtistylus (G.)	*										Y		
Rheotanytarsus reissi Lehm.	*										Y		
Tanytarsus pallidicornis (Walk.)						Y						Sk	E
Tanytarsus sylvaticus (van der Wulp)	*					Y	Y			Y			
Zavrelia pentatoma K.	*										Y		

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