

Syrphidae (Diptera) of Central France

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Records are presented for 223 species of Syrphidae, derived from the region of France comprising the Départements of Allier, Cher, Cote d'Or, Indre, Indre-et-Loire, Loir-et-Cher, Loiret, Nièvre, Saône-et-Loire and Yonne. Location of reference specimens is indicated. The ecological balance of this regional fauna is explored, by comparison between the habitat preferences of the species on this list and syrphid lists for North France, Great Britain, Ireland and the Atlantic zone of Europe in general. This shows that, at any location in the Atlantic zone, conversion of deciduous forest to conifer forest can be expected to result in a significant decrease in the diversity of the syrphid fauna.

Zusammenfassung

Aus den französischen Départements Allier, Cher, Cote d'Or, Indre, Indre-et-Loire, Loir-et-Cher, Loiret, Nièvre, Saône-et-Loire and Yonne werden 223 Arten der Syrphidae gemeldet. Der Verbleib der Belegexemplare ist angegeben. Die ökologische Bilanz dieser Regionalfauna wird durch Vergleich zwischen den Habitatpräferenzen der Arten dieser Liste mit Artenlisten für Nord-Frankreich, Großbritannien, Irland und die atlantische Zone Europas erörtert. Die Ergebnisse lassen erwarten, daß bei jeder Umwandlung von Laubwald in Nadelforst in der atlantischen Zone die Diversität der Syrphiden-Fauna erheblich abnimmt.

Introduction

France is a large country which falls naturally into a series of different regions, when matters such as climate, geology and land use are considered. Entomologically, some of these regions have received more attention than others. One of the less well known parts of the country, for which there is no published syrphid list, is the general area often referred to as the Coeur de la France, south of the Paris basin and north of the Massif Central, centred round Berry in Burgundy. This is a relatively low-lying region with large areas of sunflowers and maize, vineyards, grazing cattle and deciduous forest, traversed by one of the last untamed rivers of western Europe, the Loire, which is joined there by major tributaries such as the Allier. Geologically, the

region is relatively homogenous, except for the intrusion of the granitic massif of the Morvan. The region includes major wetland zones, in Sologne and Brenne. Compilation of a syrphid list for this region was prompted by the need for more precise information on its syrphid fauna, as part of baseline studies required in carrying out work on the FAEWE (Functional Analysis of European Wetland Ecosystems) project of the EU, focused on floodplains there. Castella and Speight (1994), Murphy et al (1994) and Speight and Castella (1995) provide further information on the sites and methodology employed on this project.

Central France is defined here as comprising the following 10 Départements: Allier, Cher*, Cote d'Or, Indre*, Indre-et-Loire*, Loir-et-Cher*, Loiret*, Nièvre, Saône-et-Loire, Yonne. Five of these (asterisked above) fall into the Atlantic biogeographical zone of Europe, as recognised by the EU (Stanners & Bourdeau, 1995). The other five fall into the Central Europe zone.

In each record, Département of origin is given first, followed by locality. Next, date of collection is given. In cases where date of collection is unknown the statement "no date" appears. Where sex of the specimen(s) collected is known, this is given following date of collection. Collector's name is then given, in brackets. Finally, location of the specimen is indicated. Where possible, records are given which are based on specimens located in the collections of public institutions. A few records are included based on Séguy (1961). These are indicated accordingly and the specimens concerned have not been seen by the author. In the case of other specimens not examined by the author, this is indicated by inclusion of the abbreviation "det." with the name of the individual who carried out the determination. Except where indicated as above, the specimens upon which the quoted records are based have been examined and determined by the author. Records in which the name of the collector is not given are based on specimens collected by the author, except in cases where the collector is unknown (indicated by "?col.").

In general, only one record is given for each species for each Département, regardless of the number of records available. Where possible, records quoted are based on specimens held in the collections of public institutions, in particular the Muséum National d'Histoire Naturelle (MNHN), in Paris. The exceptions to this general rule are records for species deemed to be of particular interest, for which all available records are quoted, and records derived from the FAEWE project. All of the syrphid records from the Malaise trap surveys carried out on the two French FAEWE sites have been included here (in presence/absence form), so that this account also provides a complete record of the species collected from those Malaise traps. The FAEWE field sites were located at Decize (Nièvre), on the R.Loire, and at Apremont (Cher) on the Allier, and are indicated accordingly. Many of the other records given are based on material collected by H.Marion, now in MNHN. Each of these records is indicated by (M) at the end of the record. More than 100 species are now known from the Département of Indre-et-Loire, but only a few of the records

concerned are quoted here because a separate list is due to published for this Département by Christian Coquempot. The Indre-et-Loire records which are quoted here are for species not otherwise recorded from these 10 Départements.

The nomenclature used here follows Peck (1988), with updates as catalogued by Schmid (1995).

Abbreviations used for FAEWE project field campaigns:

A = Apremont; A1 = Malaise trap, 24 May - 3 June 1991; A2 = Malaise trap, 3-13 October 1991; A3 = Malaise trap, 27 July - 6 August 1992; D = Decize; D1 = Malaise trap, 23 May - 2 June 1991; D2 = Malaise trap, 4-14 October 1991; D3 = Malaise trap, 28 July - 7 August 1992.

Other abbreviations used in records: (C) = collected by C. Coquempot; (L) = collected by D. & T. Levy; (M) = collected by H. Marion and in the collections of the Muséum National d'Histoire Naturelle, Paris; P = in the collections of the Muséum National d'Histoire Naturelle, Paris; PC = in private collection; (?) collector unknown.

Anasimyia contracta Cher: A3; Côte-d'Or: St. Jean de Losne, 4 May 1925, male (Hesse), P. *Anasimyia interpuncta* Indre-et-Loire: Montbazou, 3 May 1981, male (C) P. *Anasimyia lineata* Allier: (Seguy, 1961); Nièvre: Aubigny, 24 July 1966, male (M). *Anasimyia transfuga* Nièvre: Decize, 5 May 1971, male (M). *Arctophila bombiforme* Saône-et-Loire: Haut Folin, Massif de Morvan, 24 August 1964, male (M). *Arctophila superbiens* Nièvre: Verneuil, 7 September 1969, male (M); Saône-et-Loire: Forêt de St. Prix, Haut Folin, Massif de Morvan, 31 July 1992, female, PC. *Baccha elongata* Cher: A1; Nièvre: D1. *Blera fallax* Nièvre: Aubigny, 6 June 1967, female (M); Saône-et-Loire: Forêt de St. Prix, Haut Folin, Massif de Morvan, 20 July 1991, males, PC. *Brachyopa bicolor* Cher: A1. *Brachyopa panzeri* Saône-et-Loire: Les Guerreaux, 20 June 1899, female (?), P. *Brachyopa scutellaris* Cher: A1. *Brachypalpoidea lentus* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, male, PC; Cher: A1; Nièvre: D, 29 May 1991, female, PC; Decize, 24 May 1991, female, PC. *Brachypalpus laphriformis* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, males and females, PC. *Brachypalpus valgus* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, male and female, PC. *Caliprobola speciosa* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, male, PC; Cher: A1; Côte-d'Or: Thenissey, June 1942, male (A. Bayard), P; Nièvre: Brinon, 19 May 1966, female, (M); D1. *Callicera aurata* Côte-d'Or: Thenissey, 2 June 1944, female (A. Bayard), P. *Ceriana conopoides* Cher: (Seguy, 1961); Indre: Rouen, no date, male, (?), in collections INRA, Montpellier. *Chalcosyrphus femoratus* Allier: Brout-Vernet, no date, male, (H. de Buysson), P; Chemilly, 21 July 1894, male (H. de Buysson), P; Forêt de Tronçais, nr. Montluçon, 4 June 1991, male, PC; Saône-et-Loire: Forêt de St. Prix, Haut Folin, Morvan, 22 July 1991, male. *Chalcosyrphus nemorum* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, female, PC; Cher: Apremont, 23 May 1991, female, PC; A1, A2, A3; Nièvre: D1, D2, D3. *Chalcosyrphus piger* Saône-et-Loire: Forêt de St. Prix, Haut Folin, Morvan, 22 July 1991, male, PC. *Chalcosyrphus valgus* Nièvre: Verneuil, 18 May 1970, female, (M); Saône-et-Loire: Forêt de St. Prix, Haut Folin, Morvan, 22 May 1966, male, (M); 18 June 1967, male (M); 20 July 1991, male, PC. *Cheilisia ahenea* Côte-d'Or: Forêt de Chatillon, 13 May 1980, male, (J. Barbier), P (determination confirmed by C. Claussen). *Cheilisia albipila* Côte-d'Or: Curtil sur Seine, 25 March 1974, female, (Barbier), in collections INRA, Montpellier; Nièvre: Teinte, Sougy-sur-Loire, 12 April 1978, male, (M); Decize, 13 April 1966, female, (M); Saône-et-Loire: Haut Folin, 15 May 1966, female, (M). *Cheilisia albatarsis* Cher: A1; Nièvre: D1. *Cheilisia barbata* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, females, PC; Nièvre: Decize, 2 August 1992, female, PC;); Saône-et-Loire: Forêt de St. Prix, Haut Folin, Morvan, 31 July 1992 female, PC. *Cheilisia bergenstammi* Nièvre: Decize, 28 April 1967, female, (M). *Cheilisia chrysocoma* Allier: (Seguy, 1961); Saône-et-Loire: Haut Folin, 19 May 1977, male, (M). *Cheilisia fasciata* Nièvre: Teinte, Sougy-sur-Loire, 7 April 1974, female, (M). *Cheilisia flavipes* Nièvre: Decize, 7 May 1967, female, (M). *Cheilisia fraterna* Côte-d'Or: Forêt de Chatillon, 7 June 1980, female, (J. Barbier), in collections INRA, Montpellier; Nièvre: Decize, 24 April 1966, female, (M); Champvert,

10 May 1978, female, (M); Forêt de Vanzé, Champvert, 8 May 1979, female, (M). *Cheilosia grossa* Allier: (Seguy, 1961); Nièvre: Decize, 24 March 1974, female, (M). *Cheilosia illustrata* Nièvre: Preneley, 21 June 1970, female, (M); St Honoré les Bains, 30 June 1963, male, (M); Villapourçon, 15 May 1967, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male, PC. *Cheilosia impressa* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, male, PC; Cher: A1. *Cheilosia latifrons* Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 15 May 1976, male, (M); 31 July 1992, male, PC. *Cheilosia lenis* Saône-et-Loire: Haut Folin, Morvan, 12 May 1974, males, (M). *Cheilosia longula* Indre-et-Loire: Forêt d'Amboise, 5 June 1992, (D. & T. Levy coll. and det.), PC. *Cheilosia mutabilis* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, male, PC; Indre: Etang de Bellebouche, 8 June 1992, (D. & T. Levy, coll. and det.), PC. *Cheilosia nigripes* Indre-et-Loire: Taligne, 13 May 1989, (C. Coquempot), PC. *Cheilosia pagana* Cher: Apremont, 29 July 1992, female, PC; Côte-d'Or: Forêt de Chatillon, 8 June 1980, male, (J. Barbier), in collections INRA, Montpellier; Nièvre: Teinte, Sougy-sur-Loire, 7 May 1977, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, females, PC. *Cheilosia praecox* Nièvre: Lande de Teinte, Sougy-sur-Loire, 12 April 1978, male and female, (M); Decize, 14 April 1967, female, (M). *Cheilosia proxima* Allier: Broût-Vernet, no date, male, (H. de Buysson), P; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, female, PC. *Cheilosia scutellata* Indre: Etang de Bellebouche, 11 June 1992, (D. & T. Levy coll. and det.); Loiret: Forêt de Montargis, 9-12 July 1980, females, (D. Dowling), PC; Nièvre: Decize, 25 September 1966, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male, PC. *Cheilosia soror* Cher: A2; Apremont, 29 July 1992, male, PC; Indre: Azay-le-Ferron, 8 June 1992, (D. & T. Levy col. & det.), PC. *Cheilosia variabilis* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, females, PC; Cher: A1; Côte-d'Or: Forêt de Chatillon, 8 June 1980, male, (J. Barbier), in collections INRA, Montpellier; Nièvre: Decize, 2 June 1991, male, PC; Saône-et-Loire: Haut Folin, Morvan, 28 May 1968, female, (M). *Cheilosia velutina* Nièvre: Lande de Teinte, Sougy-sur-Loire, 27 July 1979, female, (M). *Cheilosia vernalis* Allier: Broût-Vernet, 1 July 1911, male, (H. de Buysson), P; Indre: St. Michel en Brenne, 25 June 1982, female, (M. Martinez), P; Nièvre: Imphy, 19 March 1972, male, (M); Decize, 11 April 1966, male, (M). *Cheilosia vulpina* Nièvre: Decize, 29 May 1991, females, PC. *Cheilosia zetterstedti* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, female, PC.; Cher: Apremont, 29 July 1992, female, PC; Nièvre: D1; Decize, 30 April 1966, male, (M). *Chrysogaster solstitialis* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, females, PC; Cher: Apremont, 27 July 1992, male, PC; Loiret: Forêt de Montargis, 12 July 1980, male, (D. Dowling), PC; Nièvre: Decize, 12 July 1969, male, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male, PC. *Chrysogaster virescens* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, female, PC; Nièvre: Decize, 30 July 1974, female, (M). *Chrysotoxum arcuatum* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, female, PC; Cher: A1; Indre: Azay-le-Ferron, 8 June 1992, (D. & T. Levy coll. and det.), PC; Nièvre: Decize, 7 August 1992, female, PC; Saône-et-Loire: Haut Folin, Morvan, 14 July 1969, female, (M). *Chrysotoxum bicinctum* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, males and females, PC; Indre: Etang de Couvent, 3 June 1992, (D. & T. Levy coll. and det.), PC; Nièvre: Decize, 8 August 1992, male, PC. *Chrysotoxum cautum* Allier: Forêt de Tronçais, nr. Montluçon, 4 June 1991, male, PC. Cher: A1; Nièvre: D1; Saône-et-Loire: Essarois, 3 June 1979, female, (J. Barbier), in collections INRA, Montpellier. *Chrysotoxum elegans* Nièvre: Decize, 25 May 1991, female, PC. *Chrysotoxum lineare* Indre: Etang de Bellebouche, La Brenne, 12 June 1992, male, (D. & T. Levy), PC; Saône-et-Loire: St. Usage, 7 July 1923, female, (Brolemann/ Hesse), P. *Chrysotoxum octomaculatum* Indre-et-Loire: La Roche Clermault, 10 September 1991, (C. Coquempot), PC. *Chrysotoxum vernale* Nièvre: D1; Saône-et-Loire: Haut Folin, Morvan, 26 May 1967, female, (M). *Chrysotoxum verralli* Loiret: Forêt de Montargis, 12 July 1980, male and female, (D. Dowling), PC; Nièvre: D2; Saône-et-Loire: Haut Folin, Morvan, 10 July 1966, male, (M); *Criorhina asilica* Cher: A1; Nièvre: Verneuil, 17 May 1969, male, (M); Saône-et-Loire: Haut Folin, Morvan, 15 May 1969, female, (M). *Criorhina berberina* Cher: A1; Côte-d'Or: Bords de Gevrey, 19 May 1927, female (?), P; Nièvre: Champvert, 14 July 1978, female, (M); D1. *Criorhina floccosa* Nièvre: Decize, 2 June 1991, male, PC. *Criorhina pachymera* Allier: Broût-Vernet, no date, female, (H. de Buysson), P. *Criorhina ranunculi* Allier: Broût-Vernet, 18 March 1893, male, (H. de Buysson), P; Nièvre: Forêt de Vanzé, Champvert, 17 April 1978, male, (M); Decize, 1958, male, (M); Saône-et-Loire: Clessy, 1889, male, (?), P. *Dasysyrphus albostrigatus* Nièvre: Decize, 11 September 1966, female, (M). *Dasysyrphus lunulatus* Nièvre: Prénéley, 21 June 1970, female, (M); Saône-et-Loire: Haut Folin, Morvan, 1 June 1978, male, (M). *Dasysyrphus tricinctus*

Nièvre: Lande de Teinte, Sougy-sur-Loire, 7 May 1970, male, (M). *Dasysyrphus venustus* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, female, PC; Cher: Apremont, 29 May 1991, female, PC; Nièvre: Verneuil, 17 May 1969, female, (M). *Didea alneti* Saône-et-Loire: Haut Folin, Morvan, 30 August 1970, male, (M). *Didea fasciata* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, male, PC; Nièvre: Verneuil, 18 May 1970, male, (M); Saône-et-Loire: Haut Folin, Morvan, 30 August 1970, male, (M); Yonne: Mauny, female, 1921, P. *Doros profuges* Allier: Broût-Vernet, no date, female, (H. du Buysson), P; Côte-d'Or: Env. de Semur, 21 June 1956, female, (A. Bayard). P. *Epistrophe diaphana* Nièvre: Mt. Prénéley, 21 June 1970, male, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1972, male, PC. *Epistrophe eligans* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, male, PC; Cher: Apremont, 29 May 1991, female, PC; Nièvre: Decize, 28 April 1967, male, (M); D1. *Epistrophe flava* Allier: Forêt de Tronçais, nr. Montluçon, 19 May 1991, female, PC; Nièvre: Verneuil, 18 May 1970, male, (M); Decize, 29 May 1991, female, PC; D1. *Epistrophe grossulariae* Nièvre: Villapourçon, 15 May 1967, male, (M). *Epistrophe melanostoma* Nièvre: Decize, 24 April 1965, males, (M); Lande de Teinte, Sougy-sur-Loire, 7 May 1970, male, (M). *Epistrophe nitidicollis* Cher: A1; Nièvre: D1; Saône-et-Loire: Haut Folin, Morvan, 19 July 1971, female, (M). *Epistrophella euchroma* Nièvre: Verneuil, 18 May 1970, male and females, (M). *Epsyrphus balieatus* Allier: Forêt de Tronçais, 4 August 1992, PC; Cher: A1, A2, A3; Indre: Etang de Gabrière, 6 June 1992, (T. & D. Levy col. & det.), PC; Azay-le-Ferron, 8 June 1992, (T. & D. Levy), PC; Loiret: Forêt de Montargis, 9 July 1980, female, (D. Dowling), PC; Nièvre: D2, D3. *Eriozona erratica* Nièvre: Mt. Prénéley, 21 June 1970, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, female, PC. *Eristalinus aeneus* Nièvre: Decize, 5 March 1966, female, 21 June 1971, male, (M); Nevers, 21 April 1993, male, PC. *Eristalinus sepulchralis* Cher: Maumagne, 4 July 1966, male, (M); A3; Indre: Etang de Couvent, 3 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: D3. *Eristalis abusiva* Nièvre: Decize, 23 July 1978, male, (M); Yonne: Gurgy, no date, female, (Fleutiaux), P. *Eristalis arbustorum* Allier: Forêt de Tronçais, 4 August 1992, PC; Cher: A1; Indre: Etang de Gabrière, 12 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: Decize, 3 April 1966, male, (M); D3. *Eristalis horticola* Allier: Forêt de Tronçais, 4 August 1992, female, PC; Cher: Apremont, 29 July 1992, male, PC; Indre: Etang de Bellebouche, 10 June 1992, (T. & D. Levy col. & det.), PC; Loir-et-Cher: Cheverny, 29 May 1964, male and female, (Pointel), PC; Nièvre: Decize, 29 May 1991, female, PC; Saône-et-Loire: Haut Folin, Morvan, 15 August 1966, female, (M). *Eristalis interrupta* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Loiret: Forêt de Montargis, 12 July 1980, male, (D. Dowling), PC; Nièvre: Mt. Prénéley, 17 July 1978, male, (M); D3; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male and female, PC. *Eristalis intricatoria* Indre: Azay-le-Ferron, 8 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: Decize, 13 April 1978, female, (M); 20-31 May 1991, males and females, PC. *Eristalis jugorum* Nièvre: Mt. Prénéley, 21 June 1970, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male and females, PC. *Eristalis pertinax* Allier: Forêt de Tronçais, 4 August 1992, male, PC; Cher: A1, A2; Indre: Etang de Bellebouche, 10 June 1992, (D. & T. Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, male, (D. Dowling), PC; Nièvre: D1; Saône-et-Loire: Haut Folin, Morvan, 6 September 1969, female, (M). *Eristalis picea* Nièvre: Decize, 27 May 1991, female, PC. *Eristalis pratorum* Allier: Forêt de Tronçais, 4 August 1992, male, PC. *Eristalis rupium* Nièvre: Mt. Prénéley, 21 June 1970, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 30 June 1967, female, (M); 31 July 1992, females, PC. *Eristalis tenax* Allier: Forêt de Tronçais, 4 August 1992, PC; Cher: Apremont, 5 August 1992, PC; Indre: Etang de Couvert, 3 June 1992, (D. & T. Levy col. & det.), PC; Nièvre: Corcelles, env. Nevers, 3 August 1992, PC; D3; Saône-et-Loire: Haut Folin, Morvan, 7 September 1966, female, (M). *Eumerus amoenus* Cher: Bourges, 13 July 1913, male, (J. de Gaulle), P. *Eumerus ornatus* Indre-et-Loire: Veigné, 3 July 1985, male, PC. *Eumerus sabulorum* Cher: Bec d'Allier, 3 June 1991, males, PC; Nièvre: Lande de Teinte, Sougy-sur-Loire, 15 June 1970, male, (M). *Eumerus sinuatus* Indre-et-Loire: La Roche Clermault, 8 July 1991, male, 23 May 1991, female, (C. Cocquempot), P. *Eumerus sogdianus* Cher: Apremont, 29 July 1992, male, PC; A3. *Eumerus strigatus* Cher: A3; Loir-et-Cher: Soing, 1960, males and females, in coll. INRA, Montpellier; Nièvre: D3. *Eumerus tarsalis* Allier: ?locality, no date given, (du Buysson), (Seguy, 1961). *Eumerus tricolor* Cher: Bec d'Allier, 3 June 1991, male, PC. *Eumerus tuberculatus* Cher: A1. *Eupeodes corollae* Allier: Forêt de Tronçais, 4 August 1992, male, PC; Cher: A1, A3; Indre: Etang de Bellebouche, 10 June 1992, (T. & D. Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, male, (D. Dowling), PC; Nièvre: Forêt de Vanzé, 7 April 1979, male, (M); D2, D3; Saône-et-Loire: Haut Folin, Morvan, 6 July 1970, male, (M). *Eupeodes*

latifasciatus Cher: A1; Nièvre: Decize, 11 April 1970, female, (M); D1, D3. *Eupeodes latilunulatus* Cher: A1. *Eupeodes luniger* Cher: A1, A3; Nièvre: Decize, 5 June 1971, female, (M); Saône-et-Loire: Haut Folin, Morvan, 25 June 1967, female, (M). *Eupeodes nitens* Nièvre: Bois d'Avril, Verneuil, 18 May 1970, female, (M). *Ferdinandea cuprea* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, male, PC; Cher: A1, A3; Nièvre: Champvert, 5 April 1977, male, (M); D3. *Helophilus pendulus* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Cher: A1, A2; Indre: Etang de Bellebouche, 10 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: Decize, 16 April 1966, female, (M); D1, D2, D3; Saône-et-Loire: Forêt de St. Priz, Haut Folin, Morvan, 31 July 1992, female, PC. *Helophilus trivittatus* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Cher: Apremont, 6 August 1992, female, PC; Indre: Etang de Gabrière, 2 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: Decize, 11 May 1966, male, (M); D3; Saône-et-Loire: Haut Folin, Morvan, 15 August 1966, female, (M). *Heringia brevidens* Indre-et-Loire: La Roche Clermault, 10 September 1991, male, (C. Cocquempot), PC. *Heringia heringi* Nièvre: Decize, 21 August 1972, male, (M). *Heringia vitripennis* Cher: Apremont, 29 July 1992, male, PC. *Lejogaster metallina* Côte-d'Or: St. Boil, 30 May 1982, female, (M. Martinez), P; Nièvre: Lande de Teinte, Sougy-sur-Loire, 20 August 1978, female, (M); D3. *Lejogaster tarsata* Cher: Bec d'Allier, 30 May 1991, female, PC; Côte-d'Or: Arnay-le-Duc, 5 August 1966, female, (M); Indre: Etang de Gabrière, 12 June 1992, (T. & D. Levy col. & det.), PC; Nièvre: D3. *Leucozonia glaucius* Côte-d'Or: Romanat, 2 July 1942, male, (A. Bayard), P; Nièvre: St. Honoré-les-Bains, 30 September 1968, female, (M); Saône-et-Loire: Haut Folin, Morvan, 30 August 1970, female, (M). *Leucozonia lucorum* Allier: Brout-Vernet, 5 July 1912, males, (H. du Buysson), P; Nièvre: Mt. Préneuf, 21 June 1970, female, (M); Saône-et-Loire: Haut Folin, Morvan, 15 May 1979, male, (M). *Mallota cimbiciformis* Indre-et-Loire: Forêt de Loches, 8 July 1985, male, PC. *Mallota fuciformis* Allier: (H. du Buysson) (Seguy, 1961); Nièvre: Lande de Teinte, Sougy-sur-Loire, 5 April 1978, male, (M). *Melangyna umbellatarum* Indre-et-Loire: La Roche Clermault, 10 September 1991, (C. Cocquempot), PC. *Melanogaster hirtella* Indre: Parc de Fierbois, 31 May 1992, (D. & T. Levy col. & det.), PC. *Melanogaster nuda* Cher: A1. *Melanostoma mellinum* Allier: Forêt de Tronçais, nr. Montluçon, 4 August 1992, male and female, PC; Cher: A3; Loiret: Forêt de Montargis, 12 July 1980, females, (D. Dowling), PC; Nièvre: D1, D2, D3.); Saône-et-Loire: Forêt de St. Priz, Haut Folin, Morvan, 31 July 1992, male, PC. *Melanostoma scalare* Cher: A1; Nièvre: D1, D3. *Meligramma cincta* Cher: A1; Loiret: Loiret: Forêt de Montargis, 12 July 1980, males, (D. Dowling), PC. *Meligramma guttata* Cher: Apremont, 28 May 1991, female, PC. *Meligramma triangulifera* Nièvre: D1. *Meliscaeva auricollis* Cher: Lapan, by R. Cher, 26 May 1991, male, PC; Loiret: Forêt de Montargis, 12 July 1980, males, (D. Dowling), PC. Nièvre: D3. *Meliscaeva cinctella* Indre: Azay-le-Ferron, 8 June 1992, (D. & T. Levy col. & det.); Loiret: Forêt de Montargis, 12 July 1980, male, (D. Dowling), PC; Nièvre: Decize, 11 September 1966, female, (M); Saône-et-Loire: Haut Folin, Morvan, 30 August 1970, females, (M). *Merodon albifrons* Indre-et-Loire: La Roche Clermault, 26 May 1989, male, (C. Cocquempot), PC. *Merodon avidus* Nièvre: Decize, 25 May 1966, female, (M). *Merodon constans* Allier: Brout-Vernet, no date, (H. du Buysson), P; Nièvre: Cosne-sur-Loire, 2 August 1981, male, (Barkemeyer), PC. *Merodon crymensis* Saône-et-Loire: Curley, 21 June 1925, male, (Broleman/Hesse), P. *Merodon equestris* Indre: Etang de Couvent, 1 June 1992, (D. & T. Levy col. & det.). *Mesembrius peregrinus* Indre: Etang de Bellebouche, 12 June 1992, female, (D. & T. Levy.), PC. *Microdon analis* Cher: Apremont, 23 May 1991, male, PC; Saône-et-Loire: Haut Folin, Morvan, 19 May 1971, female, (M). *Microdon devius* Allier: (Seguy, 1961); Nièvre: Bois de Faye, Verneuil, 5 June 1971, female, (M). *Microdon mutabilis* Côte-d'Or: Corgolino, 3 June 1923, males, (Broleman/Hesse), P; Nièvre: Forêt de Vanzé, Champvert, 28 May 1977, male, (M). *Milesia crabroniformis* Cher: Argent sur Sauldre, no date given (Matile & Leclercq, 1992). *Myathropa florea* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Cher: A1, A2, A3; Indre: Azay-le-Ferron, 8 June 1992, (D. & T. Levy col. & det.); Nièvre: D1; Loiret: Forêt de Montargis, 12 July 1980, female, (D. Dowling), PC. *Myolepta luteola* Allier: Brout-Vernet, no date, (H. du Buysson), P; Nièvre: Bois de Chevres, St. Honoré-les-Bains, 21 June 1985, female, PC. *Myolepta vara* Nièvre: Bois de Faye, Verneuil, 16 May 1969, female, (M). *Neoascia interrupta* Indre-et-Loire: Montbazon, 1 June 1984, female, (C. Cocquempot), in coll. INRA, Montpellier. *Neoascia meticulosa* Cher: A1. *Neoascia podagrica* Cher: A1; Côte-d'Or: Dijon, 13 April 1980, female, (J. Barbier), in coll. INRA, Montpellier. *Neoascia tenor* Cher: A1; Indre: St. Michel-en-Brenne, 25 June 1982, females, (M. Martinez), PC. *Olbiosyrphus laetus* Nièvre: Aubigny, 3 June 1966, male, (M). *Orthonevra frontalis* Côte-d'Or: Pont près Semur, 13 June 1941, males, (A. Bayard), P; Nièvre: Lande de Teinte, Sougy-sur-Loire, female, (M).

Orthonevra geniculata Indre-et-Loire: Forêt de Preuilley, 7 May 1986, males, (C.Cocquempot), P. *Orthonevra nobilis* Nièvre: Decize, 2 August 1992, female, PC; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, males, PC. *Paragus albifrons* Côte-d'Or: Forêt de Chatillon, 16 May 1980, female, (? col.), P; Nièvre: D3. *Paragus bicolor* Nièvre: Lande de Teinte, Sougy-sur-Loire, 2 May 1974, female, (M); D1, D3. *Paragus haemorrhous* Cher: A3; Loiret: Forêt de Montargis, 12 July 1980, males, (D.Dowling), PC; Nièvre: Corcelles, env.Nevers, 3 August 1992, male, PC; D1, D3. *Paragus majoranae* Cher: Forêt de Meneton, 24 May 1970, female, (M); A1; Nièvre: D3; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, male, PC. *Paragus quadrifasciatus* Indre-et-Loire: La Roche Clermault, 23 August 1991, (C.Cocquempot), PC. *Paragus tibialis* Indre-et-Loire: La Roche Clermault, 1 May 1990, (C.Cocquempot), PC. *Parasyrphus annulatus* Côte-d'Or: Bords du Lac de Pont, 16 June 1941, female, (A.Bayard), P. *Parasyrphus lineolus* Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 20 July 1991, male, PC. *Parasyrphus macularis* Saône-et-Loire: Haut Folin, Morvan, 15 May 1967, male, (M). *Parhelophilus versicolor* Cher: A3; Indre: Etang de Bellebouche, 11 June 1992, (T. & D.Levy col. & det.); Nièvre: D3. *Pelecocera tricincta* Indre-et-Loire: La Roche Clermault, 28 May 1989, (C.Cocquempot), PC. *Pipiza quadrimaculata* Saône-et-Loire: Haut Folin, Morvan, 7 June 1970, female, (M). *Pipizella annulata* Cher: Apremont, 1 August 1992, male, PC. *Pipizella divicoi* Nièvre: Lande de Teinte, Sougy-sur-Loire, male, (M). *Pipizella viduata* Allier: Forêt de Tronçais, 4 August 1992, males, PC; Cher: A1; Côte-d'Or: Thenissey, 5 July 1942, male, (A.Bayard), P; Indre: Etang de Bellebouche, 8 June 1992, (T. & D.Levy col. & det.), PC; Nièvre: D1, D3; Saône-et-Loire: St.Boil, 31 May 1982, male, (M.Martinez), P; Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, males, PC. *Pipizella virens* Cher: Apremont, 29 July 1992, male, PC; Indre: Etang de Bellebouche, 8 June 1992, (D. & T.Levy col. & det.), PC. *Pipizella zeneggenensis* Cher: Broût-Vernet, P, (Lucas, 1976); Indre-et-Loire: La Roche Clermault, 28 May 1988, (C.Cocquempot), PC. *Platycheirus albimanus* Côte-d'Or: Dijon, 7 April 1980, female, (J.Barbier), P; Loiret: Forêt de Montargis, 12 July 1980, males, (D.Dowling), PC; Nièvre: Decize, 11 April 1966, males and females, (M); Saône-et-Loire: Haut Folin, Morvan, 6 July 1970, males, (M). *Platycheirus ambiguus* Indre-et-Loire: Taligne, 16 April 1991, (C.Cocquempot), PC. *Platycheirus angustatus* Cher: A1, A3; Nièvre: D3. *Platycheirus clypeatus* Cher: A3; Nièvre: D3. *Platycheirus europaeus* Cher: A1; Côte-d'Or: env.Semur, 14 June 1941, female, (A.Bayard), P. *Platycheirus fulviventris* Cher A3; Nièvre: D1, D3. *Platycheirus granditarsus* Nièvre: Decize, 30 June 1970, female, (M). *Platycheirus occultus* Côte-d'Or: bords du Lac de Pont, Semur, July 1942, males and females, (A.Bayard), P. *Platycheirus parmatidus* Saône-et-Loire: Haut Folin, Morvan, 15 May 1966, female, (M). *Platycheirus pelatus* Nièvre: Lande de Teinte, Sougy-sur-Loire, 13 June 1970, male, (M); D3. *Platycheirus rosarum* Cher: A3; Nièvre: D3. *Platycheirus scambus* Indre-et-Loire: Cravant-les-Ctx, 26 June 1983, female, (C.Cocquempot), in coll. INRA, Montpellier. *Platycheirus scutatus* Cher: Bourges, 10 April 1966, male, (M); A1; Indre: Etang Gabrière, 6 June 1992, (D. & T.Levy col. & det.), PC; Nièvre: Decize, 26 April 1966, male, (M); D1, D2. *Pocota personata* Allier: Les Ramillons, Moulins, no date, male, (Villeneuve), in coll. MRNB, Brussels. *Psarus abdominalis* Allier: Broût-Vernet, no date, (du Buysson), P (Seguy, 1961). *Psilota anthracina* Allier: Forêt de Tronçais, 19 May 1991, female, PC. *Rhingia campestris* Cher: A1; Nièvre: Decize, 11 April 1966, male, (M); D1. *Riponnensia splendens* Cher: A1; Nièvre: Decize, 29 May 1991, males, PC. *Scaeva pyrastris* Cher: Apremont, 29 July 1992, male, PC; Nièvre: Decize, 5 August 1972, male, (M); D3; Saône-et-Loire: Haut Folin, Morvan, 10 July 1966, female, (M). *Scaeva selenitica* Allier: Broût-Vernet, 5 December 1911, female, (H.du Buysson), P; Côte-d'Or: Dijon, 15 June 1980, female, (J.Barbier), in coll. INRA, Montpellier; Loiret: Forêt de Montargis, 12 July 1980, male, (D.Dowling), PC; Nièvre: Decize, 21 August 1972, male, (M); D3; Saône-et-Loire: Haut Folin, Morvan, 25 June 1967, female, (M). *Sericomyia lappona* Saône-et-Loire: Haut Folin, Morvan, 1 June 1978, female, (M). *Sericomyia silentis* Nièvre: Mt.Préneley, 27 August 1967, male, (M); Onlay, 15 May 1966, female, (M); Saône-et-Loire: Haut Folin, Morvan 29 June 1969, female, (M). *Sphaerophoria batava* Indre: Etang de Bellebouche, 12 June 1992, (T. & D.Levy col. & det.), PC; Nièvre: St Honoré-les-Bains, 17 July 1991, males, PC. *Sphaerophoria rupepelli* Cher: A3; Nièvre: D3. *Sphaerophoria scripta* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Cher: A3; Côte-d'Or: Armay-le-Duc, 3 August 1966, male, (M); Indre: Etang de Bellebouche, 12 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, males, (D.Dowling), PC; Nièvre: D1, D3;); Saône-et-Loire: Haut Folin, Morvan 11 July 1956, male, (M). *Sphaerophoria taeniata* Indre: St Michel-en-Brenne, 25 June 1982, male, (M.Martinez), in coll. INRA, Montpellier; Loiret: Forêt de Montargis, 12 July 1980, males, (D.Dowling), PC; Nièvre: D3. *Sphagina*

clunipes Saône-et-Loire: Le Creusot, no date, (Marchal) (Seguy, 1961). *Sphiximorpha subsessilis* Nièvre: Decize, 31 May 1991, female, PC. *Spilomyia manicata* Nièvre: Decize, 11 September 1966, female, (M). *Spilomyia saltuum* Nièvre: Toury-sur-Jour, no date, female, (A.Boucamont), P. *Syrirta pipiens* Allier: Forêt de Tronçais, 4 August 1992, males and females, PC; Cher: A3; Côte-d'Or: Dijon, 15 June 1980, male, (J.Barbier), P; Indre: Etang de Bellebouche, 12 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, female, (D.Dowling), PC; Nièvre: D3; Saône-et-Loire: Haut Folin, Morvan 10 July 1968, male, (M). *Syrphus nitidifrons* Saône-et-Loire: Haut Folin, Morvan 12 May 1979, female, (M). *Syrphus ribesii* Cher: A1; Loiret: Forêt de Montargis, 12 July 1980, female, (D.Dowling), PC; Nièvre: D1, D2; Saône-et-Loire: Haut Folin, Morvan, 25 June 1968, female, (M). *Syrphus torvus* Loiret: Forêt de Montargis, 12 July 1980, male and female, (D.Dowling), PC; Nièvre: Decize, 11 September 1966, male, (M); Mt.Préneley, 21 June 1970, female, (M). *Syrphus vitripennis* Cher: A1, A3; Nièvre: D1, D2, D3; Saône-et-Loire: Haut Folin, Morvan, 30 August 1970, female, (M). *Temnostoma bombylans* Cher: A1; Nièvre: Champvert, 2 June 1972, male, (M). *Temnostoma vespiforme* Cher: A1; Nièvre: Decize, 3 June 1972, male, (M). *Trichopsomyia lucida* Indre-et-Loire: La Roche Clermault, 23 May 1991, male, (C.Cocquempot), P. *Triglyphus primus* Loiret: Forêt de Montargis, 12 July 1980, male, (D.Dowling), PC. *Tropidia fasciata* Indre: Etang de Bellebouche, 12 June 1992, (T. & D.Levy col. & det.), PC; Nièvre: Mt.Préneley, 15 May 1969, male and female, (M). *Tropidia scita* Indre: Etang de Couvent, 3 June 1992, (T. & D.Levy col. & det.), PC. *Volucella bombylans* Allier: Forêt de Tronçais, nr. Montlucon, 4 June 1991, PC; Cher: Apremont, 28 May 1991, female, PC; Côte-d'Or: Forêt de Chatillon, 3 June 1979, female, (J.Barbier), P; Nièvre: D1; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 31 July 1992, female, PC. *Volucella inanis* Nièvre: Champvert, 7 September 1969, female, (M); D3. *Volucella inflata* Nièvre: Verneuil, 17 May 1967, males, (M). *Volucella pellucens* Allier: Forêt de Tronçais, 4 August 1992, PC; Cher: Apremont, 29 July 1992, PC; Indre: Etang de Couvent, 3 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, females, (D.Dowling), PC; Nièvre: Mt.Préneley, 29 June 1969, male, (M). *Volucella zonaria* Cher: Apremont, 7 July 1992, male, PC; Côte-d'Or: Dijon, 22 June 1979, female, (J.Barbier), P; Indre: Etang de Couvent, 3 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, female, (D.Dowling), PC; Nièvre: Decize, 2 August 1992, female, PC. *Xanthandrus comtus* Côte-d'Or: Forêt de Nonceuil, 26 July 1979, male, (J.Barbier), P; Nièvre: Decize, 25 September 1966, male, (M); Saône-et-Loire: Haut Folin, Morvan, 10 July 1966, male, (M). *Xanthogramma festiva* Côte-d'Or: Arnay-le-Duc, 3 August 1966, female, (M); Nièvre: Decize, 7 August 1992, PC; Saône-et-Loire: Haut Folin, Morvan, 28 May 1967, female, (M). *Xanthogramma pedissequum* Allier: Forêt de Tronçais, nr. Montlucon, 4 August 1991, female, PC; Cher: A1; Indre: Etang de Couvent, 3 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, male and female, (D.Dowling), PC; Nièvre: D3. *Xylota abiens* Allier: Forêt de Tronçais, nr. Montlucon, 4 June 1991, female, PC; Cher: A1; Côte-d'Or: Corgoloin, 3 June 1929, male, (Brolemman/Hesse), P. *Xylota florum* Allier: Les Colettes, Brout-Vernet, no date, female, (H. du Buysson), P; Nièvre: env.Bazolles, 29 May 1994, female, (T. & D.Levy), PC; Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 22 July 1991, male and female, PC. *Xylota ignava* Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 22 July 1991, males, PC. *Xylota segnis* Allier: Forêt de Tronçais, 4 August 1992, female, PC; Cher: A2, A3; Côte-d'Or: Vitteaux, 26 June 1979, male, (J.Barbier), P; Indre: Etang de Bellebouche, 12 June 1992, (T. & D.Levy col. & det.), PC; Loiret: Forêt de Montargis, 12 July 1980, males and female, (D.Dowling), PC; Nièvre: D1, D2, D3; Saône-et-Loire: Haut Folin, Morvan, 18 July 1968, male, (M). *Xylota sylvarum* Allier: Forêt de Tronçais, 4 August 1992, female, PC; Loiret: Forêt de Montargis, 10 July 1980, male and female, (D.Dowling), PC; Loir-et-Cher: Bracieux, 17 July 1987, male, (D.Cotton), PC; Nièvre: Verneuil, 10 June 1971, female, (M); Saône-et-Loire: Forêt de St Prix, Haut Folin, Morvan, 20 July 1991, male, PC. *Xylota tarda* Nièvre: Forêt de Vanzé, Champvert, 9 June 1978, male and females, (M). *Xylota xanthocnema* Allier: (H. du Buysson) (Seguy, 1961); Nièvre: Lande de Teinte, Sougy-sur-Loire, 12 June 1971, female, (M).

Remarks

As mentioned earlier, of the 10 Départements covered by this syrphid list for central France, five fall into the Atlantic zone of Europe (the ACF Départements) and five into the Central Europe zone (the CECF Départements). It might be expected that the increasing continentality of the climate of the CECF Départements would be reflected in their syrphid fauna, but at the level of presence/absence of species this is hardly noticeable. There are only three species recorded from the CECF Départements, *Merodon constans*, *M. crymensis* and *Orthonevra frontalis*, for which there do not seem to be records from anywhere within the Atlantic zone of Europe (*M. constans* may have become established in the Netherlands recently). Further, there are as many species recorded from the ACF Départements which are apparently unrecorded elsewhere in the Atlantic zone, namely *Eumerus sinuatus*, *Mesembrius peregrinus* and *Pipizella zenegenensis*. The fact that the syrphid fauna of the five CECF Départements includes so few species not recorded from the Atlantic zone means that, for the purposes of the present account, the combined list for all 10 Départements (ACF + CECF) can be taken as a single unit, referred to as the list for Central France, and this list can then be compared with lists from other parts of the Atlantic zone. Such comparisons have been carried out in the following paragraphs. Similar comparisons could be made with lists for parts of the Central Europe zone, but that has not been attempted in this text.

It is possible to use the species list for Central France to identify major features of the syrphid fauna of the area and to carry out various comparisons between that syrphid fauna and the syrphid faunas of adjacent parts of Europe. Recent, published, syrphid species lists are available for various parts of the Atlantic zone. For purposes of comparison, here I have used lists for Great Britain and Ireland, put together from various published sources, and a list for North France. The concept of North France used here is the same as in Speight (1988), which, together with Cadou (1993) and a few additions provided in Speight (1993, 1994) has also provided the species list for North France used here. In carrying out this examination of these various lists I have employed the data-base of syrphid biological features set up during course of the FAEWE project. The anatomy of this data-base is described by Castella and Speight (1996). In order to conduct certain of the comparisons mentioned in the following paragraphs, I have also found it necessary to compile a syrphid list for the Atlantic zone in general. This I have put together from a great variety of sources, both published and unpublished. Regretably, it is not really feasible to publish this list at this juncture, though I consider it could be a useful tool. Perhaps it will prove possible to publish such a list in a future issue of this journal.

The syrphid list for North France comprises 228 species, while the list for Great Britain includes 251 and the list for Ireland 171. The list compiled for the Atlantic zone in general comprises 345 species. All of these species may be categorised according to which general habitats they utilise. The distribution of the species between

general habitat categories is indicated in the histograms presented in Fig. 1, with the species complement for each of the five lists being considered separately. It should be noted that the habitat associations of species are not necessarily exclusive, so that some species occur in more than one of the habitat categories employed here. In consequence, summing the percentages shown by a set of histograms for a particular species list does not give a total of 100%.

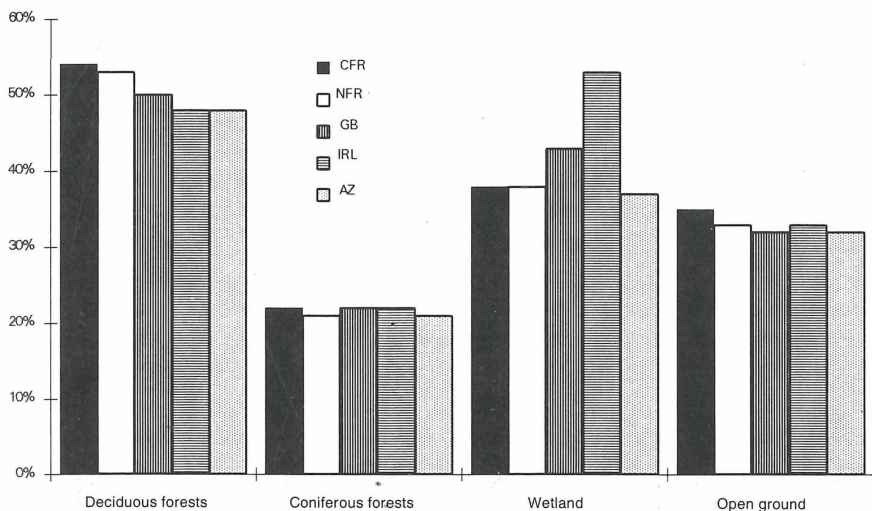


Fig. 1: Representation of syrphids associated with major habitat categories in various parts of the Atlantic zone of Europe, expressed as the percentage of each list associated with each category. Example: column 1 shows that approximately 54% of the syrphid fauna of Central France is associated with deciduous forest habitats. AZ = Atlantic zone, general; CFR = Central France; GB = Great Britain; IRL = Ireland; NFR = North France.

Fig. 1 shows that the major component of the Central France fauna is deciduous forest species, and the similar preponderance of deciduous forest species in the lists for North France and Great Britain suggests this is not atypical for parts of Atlantic Europe. In the past, the natural vegetation types predominating in these parts of Europe were all deciduous forest of one sort or another (Ozenda, et al, 1979), so the dominance of woodland syrphids in these faunas is not surprising. But, given the considerable influence of man's activities in Europe over the past 5000 years, particularly in removing forest from most of the continent, the dominance of woodland

syrrhids in these lists might quite reasonably be regarded as a "fossil" feature, reflecting the past rather than the present. The case of Ireland, where forest removal by man has been most extreme and wetland syrphids predominate, might simply be interpreted as being as much a consequence of the land-use history of the island as of climatic influences. The increasing diversity of indigenous, deciduous forest types represented locally, as you travel from Ireland through to Central France, will also increase the capacity of Central France to support deciduous forest syrphids, in comparison with Ireland. For instance, beech (*Fagus*) forest is not indigenous to Ireland, whereas it is indigenous to the parts of Europe covered by the other lists, and 5% of the deciduous forest syrphids listed for Great Britain, North France and Central France are species which occur almost exclusively in beech forest. Fig.1 shows there is a progressive increase in the *proportion* of deciduous forest syrphids in each list as you pass towards Central France, but does not address the question of the *number* of deciduous forest species in these lists. Contrasting the Irish and Central France lists, Fig.1 indicates that there is either a lesser diversity of wetland species represented in the Central France list, or a considerable increase in the deciduous forest species in that list, as compared with Ireland. Examination of the lists themselves shows that both processes are occurring.

The major habitat grouping with the smallest component of species in the Central France list is conifer forests, in stark contrast to the situation for deciduous forests. Once again, comparison with the other species lists shows this is not an exceptional condition. Indeed, comparing the situation with the species lists for the entire Atlantic zone shows that syrphids which utilise conifer forest habitats are but a minor constituent of the entire regional fauna. Presented as in Fig.1, the conifer forest contingent of syrphid species includes species shared with deciduous forest, i.e. species which utilise either conifer or deciduous forests as habitat. If syrphids which use *only* conifer forest habitats are considered separately, an even more extreme situation is revealed. More than half of the conifer forest syrphid fauna consists of species shared with deciduous forest - the species occurring only in conifer forest comprise only 8% of the lists for Central France and North France, 9% of the list for Great Britain and 6% of the Irish list. The most extreme case is again that of Ireland. Indigenous conifer forests (of *Pinus sylvestris*) are believed to have been almost entirely eradicated from Ireland for 500 years or more, so the 6% of the fauna made up of strictly conifer forest syrphids is believed to be of very recent origin, namely syrphids which colonised the island subsequent to introduction of commercial plantations of introduced conifers, which began on a large scale only during the present century.

The small size of the conifer forest syrphid fauna in these various parts of the Atlantic zone of Europe shows that the current practise of replacing native deciduous forests with conifers, whether the conifers are of European or other origin, must result in a net decrease in the diversity of the syrphid fauna. Furthermore, Fig. 1

shows that these parts of the Atlantic zone are also typical of the Atlantic zone in general, in the relative significance of the conifer forest fauna. At a time when European nations are attempting to grapple with the problems of maintaining biological diversity, following on from the provisions of the Biodiversity Convention, the overwhelming potential influence of coniferisation on the diversity of forest faunas requires to be given greater prominence. If other taxonomic groups are similar to the syrphids, forest faunas will change from being the largest group of species in a local fauna to its smallest group of species, each time a forest is converted from deciduous trees to conifers, to judge from the information provided by the comparison of species lists presented here. Admittedly, with enormous hectares of conifers now established outside their natural range, from the Atlantic to the Urals, some influx of conifer forest fauna from outside Europe, from Siberia, might be expected. To-date, this invasion has largely resulted in the appearance of a number of conifer pest species and their associated predators - some of them syrphids - which has in no way counteracted the impoverishment of forest faunas caused by coniferisation itself.

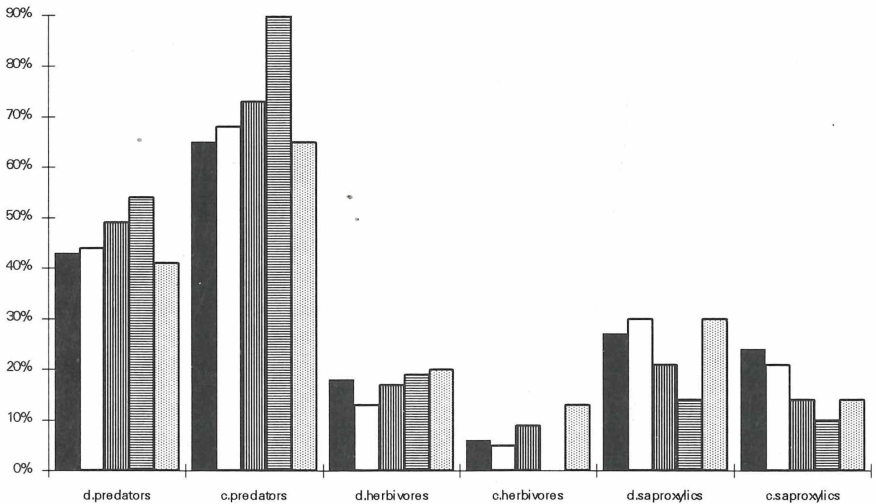


Fig. 2: Representation of syrphids with predatory, plant-feeding or saproxylic larvae in the deciduous forest and coniferous forest faunas of various parts of the Atlantic zone of Europe, expressed as a percentage of the relevant forest fauna of each species list. - Coding of columns as in Fig. 1; prefix c = coniferous forest; prefix d = deciduous forest e.g. d.predators = deciduous forest syrphids with predatory larvae. Example: column 9 shows that 90% of the Irish conifer forest syrphids are species with predatory larvae.

Fig. 2 demonstrates that syrphids with predatory (aphid-feeding) larvae are predominant in the conifer forest fauna of the Atlantic zone of Europe, and that this dominance is expressed in its most extreme form in the Irish list. Managed, commercial conifer plantations lack both the associated ground flora and the overmature trees of indigenous, natural forest. In consequence, the syrphids associated with both ground flora and old trees are almost entirely absent in Irish conifer plantations and hence absent from the Irish syrphid list. In contrast, the presence of more extensive areas of less intensively managed indigenous forest, both conifer and deciduous, in both North and Central France, is reflected in the reduced dominance of forest syrphids with predatory larvae there, the species with saproxylic (dependent upon old/senescent trees) or plant-feeding (leaf, stem or root-mining) larvae becoming increasingly evident components of the fauna. The fauna for Central France again represents the opposite extreme to the Irish fauna, in this regard. The percentage of predatory species in the Central France list most closely resembles that for the Atlantic zone in general, in respect of both deciduous and conifer forests. It is noticeable that in both conifer and deciduous forest, syrphids with predatory larvae are the dominant component in all lists. However, even in the list for the Atlantic zone in general, the predatory species comprise a greater proportion of the conifer forest fauna than the deciduous forest fauna - in deciduous forest, the saproxylics and plant-feeding species combined represent as great a proportion of the fauna as the predators, while in conifer forest there are twice as many predatory species as the combined total for plant-feeders and saproxylics.

Turning to the wetland and open ground groups of habitats, the most evident difference between the species lists lies in the high proportion of wetland species in the list for Ireland. But this is more because of an absence from Ireland of forest species represented on the other lists, than because more wetland species are present in Ireland than in the other lists. This can be recognised from considering the proportion of Atlantic zone wetland species on each list. Subdividing wetland habitats into two groups, peatland (fen and bog) and non-peatland habitats, produces the results shown in Fig.3, which indicates that for both sub-groups of wetland habitats a smaller proportion of the associated Atlantic zone fauna occurs in Ireland than in Great Britain, despite the fact that deciduous forest species are the dominant component of the British fauna and wetland species predominate in the Irish fauna. Another characteristic of these wetland faunas, indicated in Fig.3, is that peatland species are somewhat better represented in both Ireland and Great Britain than are the species associated with other wetland habitats, whereas the converse is true in both Northern and Central France. A similar relationship exists between the species complement of humid and dry unimproved pasture, which, between them, comprise the vast majority of the open ground species. Thus, species associated with humid, unimproved pasture, are better represented on the Irish and British lists, while species associated with dry, unimproved pasture are better represented on the two French

lists. The list for Central France represents the extreme of this condition, with the lowest representation of peatland-associated syrphids and the best representation of syrphids associated with dry, unimproved pasture. It would be difficult not to believe that the character of the climate is to a significant extent responsible for these features of the syrphid fauna.

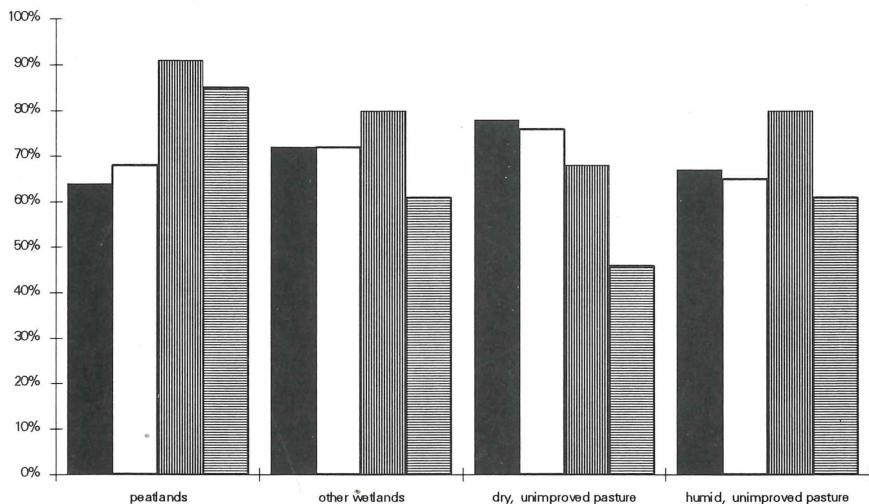


Fig. 3: Proportion of the Atlantic zone syrphid fauna of particular habitat types represented in various species lists, expressed as the percentage of the Atlantic zone fauna of each habitat type represented on each list. Example: column 3 shows that 90% of the Atlantic zone syrphid species associated with peatlands are represented in Great Britain. - Coding of columns as in Fig. 1.

Indubitably, a myriad influences have combined to shape the syrphid fauna of Atlantic parts of Europe as we find it today. But this overview shows that some features of the syrphid fauna of Central France are probably in large part a consequence of the history of man's activities in the area, just as others are most easily understood by considering parameters of the local climate. Whatever the precise reasons may be for some particular feature of a fauna, the ecological balance of species lists like those presented here is demonstrably a tool of potential value in environmental interpretation.

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