

Sawflies (Hymenoptera: Symphyta) of the Parc Natural de s'Albufera de Mallorca

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Eleven sawfly species are recorded from the largest wetland area in the Balearic Islands. Seven of these species are recorded for the first time in the archipelago, with one of them, *Janus luteipes*, being an addition to the recorded fauna of the Iberian Region.

Keywords: sawflies, Symphyta, Mediterranean islands, wetland, biodiversity, faunal records, host plants.

ELS SÍMFITS (HYMENOPTERA: SYMPHYTA) DEL PARC NATURAL DE S'ALBUFERA DE MALLORCA. S'han registrat onze símfits a la zona humida més gran de les Illes Balears. Set d'aquestes espècies han estat primera cita per a l'arxipèlag, essent una d'elles, *Janus luteipes*, també una addició per a la fauna de la regió Ibèrica.

Paraules clau: símfits, Symphyta, Illes mediterrànies, zona humida, biodiversitat, registre de fauna, plantes hoste.

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Introduction

Sawflies (Hymenoptera Symphyta) are an under-recorded group in Mallorca. Information for the Balearic Islands largely stems from the work of Wolfgang Schedl, who collated known records from a series of sources, including specimens collected by his colleagues and himself (Schedl, 1987). These are mainly snapshots in time, and spatially fragmented. None of his records are from the wetland of s'Albufera de Mallorca. This paper reports the first Symphyta records for s'Albufera de Mallorca and places them in the context of current knowledge for the Balearics and

other Mediterranean islands. Very little information on the sawfly assemblages of Mediterranean wetlands has hitherto been made available.

Methods

Study area

S'Albufera de Mallorca is an internationally important wetland. It is the largest wetland in the Balearic Islands and is separated from the sea by a belt of coastal dunes (Fig. 1). Its level of protection is high. In 1988, a total of 1,688 ha, incorporating approximately 1,450 ha of

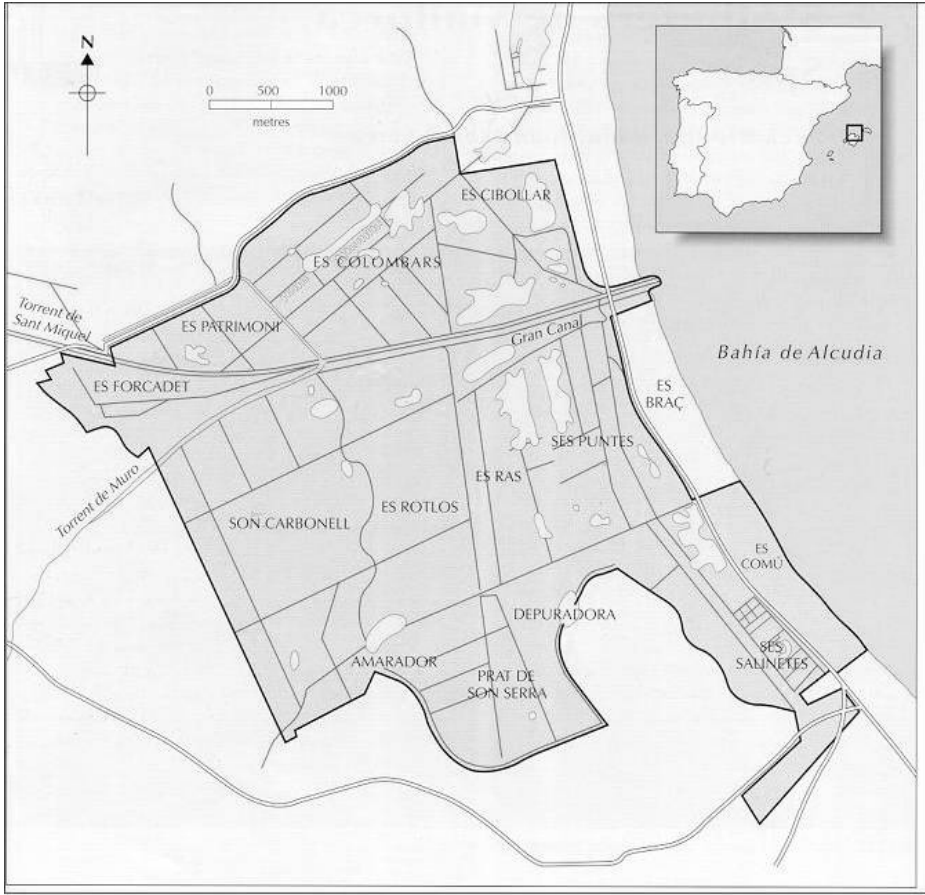


Fig. 1. Map of the Parc Natural de s'Albufera de Mallorca and its location in the Iberian Region.
Fig. 1. Mapa del Parc Natural de s'Albufera de Mallorca i la seva localització dins la regió Ibèrica.

wetland and over 200 ha of dune, received designation as a *Parc Natural* by the Balearic Government. It also became a Ramsar Convention wetland site. Coordinates of the approximate centre of the park are 39.797°N 3.106°E.

The wetland zone comprises a complex network of canals – products of a failed attempt to drain the site in the 1860s (Picornell & Ginard, 1995) – extensive reed beds and shallow, open water bodies. Apart from extensive saltmarsh and saline

lagoons in the north-east and a small set of abandoned salt pans in the south-east, the wetland is largely freshwater. An incomplete set of fossil dunes, remnants of an ancient coastline formed during the Riss glaciation some 100,000 years before present, runs through the wetland parallel to the coast (Barceló & Mayol, 1980; Servera, 2004). An uninterrupted one kilometre wide band of coastal dunes separates the wetland from the sea. A small portion, Es Comú (Fig. 1), has escaped urban development

and been incorporated into the Parc. The entire wetland is flat, and at or just above sea level.

S'Albufera records

All records refer to specimens collected during biodiversity monitoring activities as part of The Albufera International Biodiversity group (TAIB) research and training activities at the Parc Natural de s'Albufera de Mallorca and its periphery at Son Bosc (see Riddiford *et al.*, 2014). The majority of specimens were intercepted by Malaise trap or during light trap studies focused on moths. Five were netted or "tubed" in the field. With the exception of *Tenthredo meridiana* netted in fossil dune grassland, all were taken at sites within or adjacent to wetland habitats, including *Populus alba* riparian woodland. No attempt was made to target the group in the field. Captures, especially in the light trap, were incidental rather than the main focus of activity. However, all individuals from 2006 onwards were taken, prepared as set specimens and sent to ADL for determination or verification. Voucher specimens are deposited in the collection of the Senckenberg Deutsches Entomologisches Institut, Muencheberg, Germany. The results are presented below in an annotated list.

Mallorca

In order to place s'Albufera de Mallorca observations in context, reference is made to records from elsewhere in Mallorca (Table 1). These are taken from Schedl (1987).

Mediterranean

Faunal studies have provided information on the status and distribution of Symphyta for all of the larger Mediterranean islands, and some of the

smaller ones. Published data were reviewed by Turrisi (2011), and additional studies have subsequently appeared for Crete (Liston *et al.* 2015), Sicily (Liston *et al.* 2013), and Malta (Liston & Zerafa 2012, Liston & Mifsud 2016).

Results

The specimens collected at s'Albufera de Mallorca, including the adjacent area of Son Bosc, are listed below. All the records are *leg.* N J Riddiford, *det.* A D Liston unless otherwise stated. Table 1 summarises these records along with those reported by Schedl (1987).

Species list

Cephididae

Janus luteipes (Lepelletier, 1823)

PN s'Albufera de Mallorca, Sa Roca, beaten from *Populus alba*: 1♀, 15.5.2003.

Tenthredinidae

Athalia ancilla Serville, 1823

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: mercury vapour (MV) trap, 1♀, 27.8.2006, *leg.* I Ferriz; 1♀, 18.9.2008; 1♀, 19.9.2008; 1♀, 20.9.2008; 2♀♀, 02.10.2008; 1♀, 24.9.2010; 1♀, 30.9.2010; 2♀♀, 04.10.2010.

Athalia circularis (Klug, 1815)

PN s'Albufera de Mallorca, Camí d'en Pujol, alongside *Cladium mariscus/Phragmites australis* reedbed: Malaise trap, 1♀, 03–05.6.2010.

Athalia cordata Serville, 1823

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: MV trap, 1♀, 09.11.2001; 1♀, 21.9.2008; 2♀♀,

24.9.2010; 2♂♂, 30.9.2010; 1♂, 3♀♀, 03.10.2010; 4♂♂, 4♀♀, 04.10.2010; 1♀, 16.10.2010; 1♀, 17.9.2012; 3♀♀, 18.9.2012; 2♂♂, 2♀♀, 25.9.2012; 3♂♂, 3♀♀, 26.9.2012.

PN s'Albufera, Es Comu, coastal dune woodland, *leg.* T. Tomas: yellow pan trap, 1♀, 07.4.2012.

Cladius brullei (Dahlbom, 1835)

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: Malaise trap, 1♀, 06–10.6.2008; MV trap: 1♀, 03.10.2010; 1♀, 08.10.2010; 1♀, 29.9.2012.

Cladius pectinicornis (Geoffroy, 1785)

PN s'Albufera de Mallorca, Es Rotlos, open habitat after February 2005 fire of *Cladium mariscus/Phragmites australis* reedbed: Malaise trap, 1♀, 06–08.6.2005; 1♂, 21–22.4.2006.

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: Malaise trap, 2♂♂, 1♀, 01–05.6.2008; by hand, on building, 1♀, 13.5.2008; MV trap, 1♂, 23.5.2009; Malais trap, 1♀, 24–26.5.2009; 1♂, 20–21.5.2010; MV trap, 1♀, 21.9.2010.

PN s'Albufera de Mallorca, Camí d'en Pujol, Malaise trap, alongside *Cladium mariscus/Phragmites australis* reedbed: 10♂♂, 01–02.6.2010; 2♂♂, 1♀, 03–05.6.2010; yellow pan trap, 1♂, 09.4.2012.

Empria excisa (Thomson, 1871)

PN s'Albufera de Mallorca, Es Rotlos, *Cladium mariscus/Phragmites australis* reedbed: Malaise trap, 1♂, 21–22.4.2006; 1♂, 23–24.4.2006.

PN s'Albufera de Mallorca, Camí d'en Pujol, alongside *Cladium mariscus/Phragmites australis* reedbed: Malaise trap, 1♂, 01–02.6.2010; yellow pan trap, 1♂, 09.4.2012.

Fenella nigrita Westwood, 1839

PN s'Albufera de Mallorca, Camí d'en Pujol, *Cladium mariscus/Phragmites australis* reedbed: yellow pan trap, 1♀, 09.4.2012.

Halidamia affinis (Fallén, 1807)

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: MV trap, 1♀, 23.5.2009.

Monostegia abdominalis (Fabricius, 1798)

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: Malaise trap, 1♀, 27–31.5.2008; 1♀, 01–05.6.2008; 1♀, 20–21.5.2010.

PN s'Albufera de Mallorca, Es Colombar, *Phragmites australis* reedbed: Malaise trap, 1♀, 29–31.5.2010.

PN s'Albufera de Mallorca, Camí d'en Pujol, alongside *Cladium mariscus/Phragmites australis* reedbed: Malaise trap, 10♀♀, 01–02.6.2010.

Pristiphora denudata Konow, 1902

PN s'Albufera de Mallorca, Sa Roca, riparian woodland and scrub: MV trap, 1♀, 04.5.2003; Malaise trap, 1♀, 27–31.5.2008; by hand, on wall, 1♀, 23.5.2009; MV trap, 1♀, 07.10.2010.

Tenthredo meridiana (Lepelletier, 1823)

PN s'Albufera de Mallorca, Ses Punes, fossil dune grassland: netted, 1♀, 16.4.1999.

S'Albufera de Mallorca, Son Bosc, fossil dune grassland, on *Euphorbia serrata*: 1♀, 08.4.2008, *leg.* Anna Traveset; 1♀, 05.4.2009, *leg.* Rocio Castro.

PN s'Albufera de Mallorca, Es Comu, coastal dune woodland; yellow pan trap, 1♀, 07.4.2012, *leg.* T. Tomas.

Table 1. Summary of Balearic sawfly records. *Taula 1. Resum dels símfits de Balears.*

Species	Family	Listed by Schedl (1987)	Current study	Comments
<i>Megalodontes bucephalus</i> (Klug, 1824)	Megalodontesidae	×		
<i>Janus compressus</i> (Fabricius, 1793)	Cephidae	×		
<i>Janus luteipes</i> (Lepelletier, 1823)	Cephidae		×	new to Iberia (Taeger <i>et al.</i> , 2006)
<i>Calameuta pygmaea</i> (Poda, 1761)	Cephidae	×		
<i>Phylloecus faunus</i> Newman, 1838	Cephidae	×		as <i>Hartigia albomaculata</i> in Schedl (1987)
<i>Trachelus tabidus</i> (Fabricius, 1775)	Cephidae	×		
<i>Arge ochropus</i> (Gmelin, 1790)	Argidae	×		
<i>Gilpinia virens</i> (Klug, 1812)	Diprionidae	×		
<i>Allantus didymus</i> (Klug, 1818)	Tenthredinidae	×		
<i>Aneugmenus padi</i> (Linnaeus, 1760)	Tenthredinidae	×		
<i>Athalia ancilla</i> Serville, 1823	Tenthredinidae	×	×	as <i>Athalia glabricollis</i> in Schedl (1987)
<i>Athalia circularis</i> (Klug, 1815)	Tenthredinidae	×		
<i>Athalia cordata</i> Serville, 1823	Tenthredinidae	×	×	
<i>Athalia cornubiae</i> Benson, 1931	Tenthredinidae	×		
<i>Athalia rosae</i> (Linnaeus, 1758)	Tenthredinidae	×		
<i>Cladius brullei</i> (Dahlbom, 1835)	Tenthredinidae		×	new to Balearics (this study)
<i>Cladius pectinicornis</i> (Geoffroy, 1785)	Tenthredinidae	×	×	
<i>Empria excisa</i> (Thomson, 1871)	Tenthredinidae		×	new to Balearics (this study)
<i>Fenella nigrita</i> Westwood, 1839	Tenthredinidae		×	new to Balearics (this study)
<i>Fenusella hortulana</i> (Klug, 1818)	Tenthredinidae	×		
<i>Halidamia affinis</i> (Fallén, 1807)	Tenthredinidae		×	new to Balearics (this study)
<i>Monostegia abdominalis</i> (Fabricius, 1798)	Tenthredinidae		×	new to Balearics (this study)
<i>Pristiphora abbreviata</i> (Hartig, 1837)	Tenthredinidae	×		
<i>Pristiphora denudata</i> Konow, 1902	Tenthredinidae		×	new to Balearics (this study)
<i>Silliana lhommei</i> (Hering, 1934)	Tenthredinidae	×		
<i>Strongylogaster multifasciata</i> (Geoffroy, 1785)	Tenthredinidae	×		
<i>Tenthredo meridiana</i> Serville, 1823	Tenthredinidae	×	×	

Table 2. Known host plants of larvae and likely hosts at s'Albufera de Mallorca.**Taula 2.** *Plantes conegudes hoste de les larves i potencials hostes a s'Albufera de Mallorca.*

Species	Known hosts	Likely hosts at s'Albufera de Mallorca
<i>Athalia ancilla</i> ¹	Brassicaceae such as <i>Alliaria</i> , <i>Erysimum</i> , <i>Raphanus</i> and <i>Sisymbrium</i> (Benson 1952)	<i>Raphanus raphanistrum</i> , <i>Sisymbrium officinale</i>
<i>Athalia cordata</i> ¹	<i>Ajuga</i> , <i>Antirrhinum</i> , <i>Plantago</i> (Benson 1952)	<i>Antirrhinum orontium</i> , <i>Plantago</i> spp
<i>Athalia circularis</i> ¹	<i>Veronica</i> species ²	?
<i>Cladius brullei</i>	<i>Rubus</i> , <i>Sorbus aucuparia</i> (Benson 1958)	<i>Rubus ulmifolius</i>
<i>Cladius pectinicornis</i>	Rosaceae (Benson 1958)	<i>Potentilla reptans</i> ³
<i>Empria excisa</i>	<i>Filipendula vulgaris</i> (Macek 2009)	? <i>Rubus ulmifolius</i> , ? <i>Potentilla reptans</i>
<i>Fenella nigrita</i>	<i>Potentilla reptans</i> , <i>Agrimonia eupatoria</i> (Benson 1952)	<i>Potentilla reptans</i>
<i>Halidamia affinis</i>	<i>Galium aparine</i> , <i>Galium mollugo</i> (Benson 1952)	<i>Galium elongatum</i> ; other <i>Galium</i> spp
<i>Janus luteipes</i>	<i>Salix</i> , <i>Populus</i> , <i>Viburnum</i> (Benson 1951)	<i>Populus alba</i>
<i>Monostegia abdominalis</i>	<i>Lysimachia</i> , <i>Anagallis arvensis</i> (Benson 1952)	<i>Anagallis arvensis</i>
<i>Pristiphora denudata</i>	<i>Rubus</i> (Chambers 1961)	<i>Rubus ulmifolius</i>
<i>Tenthredo meridiana</i>	? <i>Euphorbia segetalis</i> ⁴ (Schedl 1987)	? <i>Euphorbia terracina</i> ; other <i>Euphorbia</i> spp.

Notes. 1: All three recorded *Athalia* species are affected by unclarified taxonomic problems, possibly involving additional species. The published host plant data may therefore be misleading. 2: *Veronica* species are the only confirmed larval hosts of *A. circularis* (Kontuniemi 1951, Chevin 1975), although Benson (1952) listed other plant genera named as hosts in earlier literature. 3: In Valencia Province, Spain, 2014, ADL found numerous *C. pectinicornis* adults on *Potentilla reptans*, but not on other plant species, strongly suggesting that *P. reptans* is a host. 4: Schedl (1987) speculated that *Euphorbia* species could be the larval hosts of *T. meridiana*, because adults habitually feed at *Euphorbia* inflorescences. However, the known larval hosts of other species belonging to this group of *Tenthredo* are all Asteraceae.

Biodiversity

Eleven species were encountered at s'Albufera de Mallorca. Seven of these were not listed by Schedl (1987) and appear to be additions to the known Balearic fauna. Schedl listed 20 species for the archipelago. Our observations bring the total Balearic species count to 27 (Table 1). Nomenclature follows Taeger *et al.* (2010) and Liston & Prous (2014).

Ecology

No specific information was obtained on larval host plants used at s'Albufera de Mallorca. However, some inferences can be drawn from the hosts as recorded elsewhere, as summarised in Table 2.

Discussion

This is the first sawfly list to be published for s'Albufera de Mallorca.

Because of its spatial limits and the incidental nature of recording, the study has less scope than the more detailed and wide-ranging studies of Schedl (1987) covering all four major Balearic islands. Nevertheless, despite a low count of eleven species, seven were additions to the Schedl Balearic list.

The Balearic context

Schedl's map of his sampling sites and the location of records published in the literature (Schedl, 1987) did not include s'Albufera de Mallorca. The nearest location was the Victoria Peninsula, 10 km away, which is a typical Mediterranean pine woodland replaced at higher altitudes by garrigue and rocky outcrops. Extensive sampling was also done in the Tramuntana mountains and other generally dry habitats.

Sampling periods for the two studies covered much the same times of year, so seasonal differences can be dismissed as the reason for substantial disparity in the taxa recorded. Habitat is probably the main contributor to the differences. The plant communities in wetlands are very different to those of drier habitats, which will influence food plant availability for all but generalist species.

Schedl's observations of plant associations extended only to flowers frequented by the adults. He did, however, note potential larval host plants, drawing largely from Benson (1951, 1952) as his source. Our study gathered no direct data on host plants, but some associations can be made based on known hosts and potentially suitable plant species readily available near the locations of capture (Table 2).

Pristiphora denudata and *Tenthredo meridiana* have respectively an Atlantic and a West Mediterranean distribution pattern. The other species recorded at s'Albufera de Mallorca are more

widespread in Europe. Although they are not associated with particularly narrow habitat niches in the more northern parts of their range, several of them may well prove to be largely restricted in the Mediterranean to wetland areas. One such species is *Janus luteipes*, recorded for the first time in the Iberian region (Table 1).

The Mediterranean context

Distance from the continental mainland will affect species diversity for all Mediterranean islands. For instance, the species list for the department of l'Ariège (France), at 4,890 sq km only marginally smaller than the Balearic Islands (5,015 sq km) stands at 316 (Savina, 2016), while the total for Cyprus is 37 (Liston & Späth, 2008), for Crete 42 (Liston *et al.*, 2015), for Sicily 139 (Liston *et al.*, 2013), for Corsica 75 (Turrisi, 2011) and for Sardinia 73 (Turrisi, 2011). Greater recording effort will certainly explain a considerable part of the disparity between the French mainland total and those from the Mediterranean islands. Nevertheless, better ambient conditions for a group requiring certain levels of humidity or moistness in their early stages may also contribute to the much higher total. Indeed, Liston & Späth (2008) postulated that the considerably higher rainfall regime of the western Mediterranean islands could be an important factor in explaining the higher totals for Sicily westwards, compared with Cyprus and Crete.

The sawfly list for the Balearic Islands now stands at 27. This is lower than the Sicily, Corsica and Sardinia totals by a factor of 2.7 or more. A greater distance from the European mainland, a much smaller land area (see Table 3) and the immense period of isolation from continental blocks (for Mallorca and Menorca) all place limitations on the diver-

Table 3. Land area of the Balearics and four other Mediterranean islands**Taula 3.** Àrea terrestre de les Balears i de quatre illes mediterrànies més.

Island/Archipelago	Size (sq km)
Balearic Islands	5,015
Corsica	8,680
Sardinia	24,100
Sicily	43,090
Cyprus	9,250

sity of Symphyta in the Balearic Islands. However, as a western Mediterranean island experiencing high seasonal rainfall and with habitats ranging through garrigue to wetland, and from lowland plain to high mountain, there is ample scope for more intensive studies to raise this total considerably.

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