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Faunistic inventory of Spheciformes wasps at three protected areas in Portugal

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Abstract

The importance of considering insects in the protection of biodiversity has been recently recognized. However, despite the importance of Spheciformes wasps (Hymenoptera: Ampulicidae, Sphecidae and Crabronidae) in natural ecosystems and their potential as bioindicators, the Spheciformes communities in Portugal (part of the European biodiversity hotspot) have rarely been studied, and data for Portuguese protected areas are scarce. The Spheciformes wasp communities at 3 protected areas in Portugal, Douro International Natural Park, Serras de Aire e Candeeiros Natural Park, and Paúl do Boquilobo Nature Reserve, were studied in 2000 and 2001. During the study, 134 species of Spheciformes belonging to 3 families, Ampulicidae, Sphecidae, and Crabronidae, were identified. The species collected constituted nearly 1/3 of the species known in the Iberian Peninsula, 42 were new records for Portugal. Additionally, several specimens of 6 potentially new species were collected. Douro International Natural Park had the highest species richness, followed by Serras de Aire e Candeeiros Natural Park and Paúl do Boquilobo Nature Reserve. All the protected areas studied had species that were found exclusively at an individual protected area and species that were found to be new records for Portugal. Based on the literature review of the geographic distribution, nidification types, and prey orders, it was found that most species collected had a Euroasiatic or Mediterranean distribution, species with fossorial habits predominated, and the orders/suborders of insects preyed upon by most species were Diptera, Orthoptera, Sternorrhyncha, and Auchenorrhyncha. This study underscores the importance of including the protected areas studied in the conservation of Spheciformes diversity and also suggests that insect diversity should be studied separately, as it does not necessarily follow the same patterns as other, more studied, groups.

Keywords: Douro International Natural Park, faunistic catalogue, Hymenoptera, Paúl do Boquilobo Nature Reserve, Serras de Aire e Candeeiros Natural Park, species richness
Abbreviations: DINP, Douro International Natural Park; **PBNR**, Paúl do Boquilobo Nature Reserve; **SACNP**, Serras de Aire e Candeeiros Natural Park
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Introduction

Biodiversity is one of the most important elements in national and international legislation for the selection of conservation areas. Birds Directive, Habitats Directive, and the IUCN Red List of Threatened Species, for example, specifically include lists of species of special interest for conservation. However, despite its importance, knowledge of the biodiversity of most protected areas is limited, focusing primarily on vertebrates. The most noticeable gap in knowledge is with respect to arthropod diversity. Despite being the most diverse animal group, representation of arthropods in biodiversity inventories and listings has been and remains minimal (New 2012). Knowledge of the entomological fauna in Portugal, for example, is very limited in general, but is especially scarce or absent for Hymenoptera (Kuhlmann 1996), such as Spheciformes (Hymenoptera: Ampulicidae, Sphecidae and Crabronidae). In order to manage and evaluate the effectiveness of protected areas at preserving biodiversity, it is important to have a comprehensive knowledge on the diversity of species under protection.

The variety of roles arthropods play in ecosystems—as herbivores, predators, decomposers, parasites, pollinators, and seed dispersers—require that any evaluation of ecosystem functioning should necessarily include arthropods (Maleque et al. 2006). Spheciformes wasps play an important role in ecosystems as predators. Because previous studies have shown the potential of Spheciformes as bioindicators (Gayubo et al. 2005; Vieira et al. 2011), an inventory of this group with taxonomic, ecological, and biogeographic data collected systematically (Strumia et al. 2002) could be useful for monitoring biodiversity in protected areas. Furthermore, considering the current "biodiversity crisis" (Clausnitzer et al. 2009; Lawrence and Wright 2009; Peh 2011), studies on lesser-known groups, such as Spheciformes, are especially valuable for future and current conservation efforts. Biodiversity inventories in Portugal are not only relevant at a national level but also from an international perspective, as Portugal is part of the European biodiversity hotspot (Myers et al. 2000).

The aim of this study was to contribute to the knowledge of Spheciformes wasps in Portugal. A listing and quantification of the Spheciformes were made for 3protected areas, namely Douro International Natural Park (DINP), Serras de Aire e Candeeiros Natural Park (SACNP), and Paúl do Boquilobo Nature Reserve (PBNR). The abundance, diversity, geographic distribution, and some aspects of the basic biology, such as nidification types and potential prey, were also determined. The knowledge gathered in this study partially fills

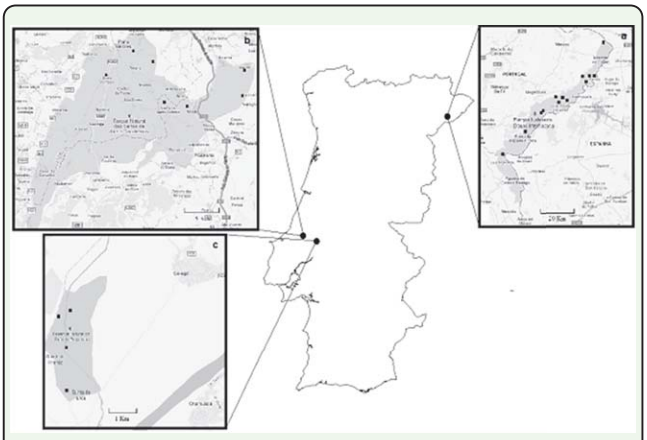

Figure 1. Geographic location and the limits of the Douro International Natural Park (a), Serras de Aire e Candeeiros Natural Park (b), and Paúl do Boquilobo Nature Reserve (c), Portugal. Points on the map of each area show the distribution of sampling sites. High quality figures are available online.

the gap of information on Spheciformes in Portugal (part of the European biodiversity hotspot), complements the biodiversity lists for these areas, provides relevant information for ecosystem functioning recognizing the role of this group as population regulators (predators) for other groups, and provides a baseline for the future monitoring of management in the protected areas.

Materials and Methods

Study areas

The study was conducted at 3 Portuguese protected areas (Figure 1), DINP, SACNP, and PBNR.

The DINP is located on a 122 km border section of the Douro River (41.277806° N, 6.635742 ° W) (Figure 1a). It covers a total area of 85,150 ha (Anonymous 2001b). The border section of Douro River makes the transition between the medium and the lower river basin through a steep longitudinal slope. The northern part of DINP is characterized by an extensive plateau with altitudes ranging from 700 to 800 m a.s.l. The valley is tightly set between granitic steep slopes. Going south, the valley is more open, and the granitic steep slopes remain but there is an open plateau at the bottom (Anonymous 2001b). The climate in the northern part is subcontinental-mediterranean, with a wide thermal range, very cold winters, and very hot and dry summers. The southern part has a microclimate similar to that of the Douro Wine Region, which is characterized by low precipitation and mild winter temperatures (Anonymous 2001b). DINP was established in 1998; its international value has been recognized under the Habitats (1997) and Birds (1999) Directives.

The SACNP is located in the Midwest area of Portugal (39.518344° N, 8.788376° W) (Figure 1b). It has a total area of 39,900 ha (Anonymous 2001a). Most of SACNP is included on the Estremadura's Limestone Massif. Morphologically, the Estremadura's Limestone Massif can be differentiated into 4 elevated sub-units, Candeeiros Mountain (west), Santo António (south central) and São Mamede (north) Plateaus, and Aire Mountain (east), separated by 3 great depressions, Mendiga, Minde-Mira Polje, and Alvados. While there is little surface freshwater, groundwater is abundant and is responsible for the multitude of karst formations in the area (Anonymous 2001a). The climate is atlantic-mediterranean, characterized by high humidity levels, mild temperatures, and dry summers (Anonymous 2001a). SACNP was established in 1979 and its international value has also been recognized under the Habitats Directive (1997) and the Ramsar Convention (2006).

The PBNR is also located in the Midwest area of Portugal in the Almonda River basin (39.347839° N, 8.528481° W) (Figure 1c). It occupies an area of 554 ha (Anonymous 2001c) and covers the transition between fluvial terraces and alluvial flatlands of the Almond River. The alluvial flatlands have

several riparian galleries that follow a complex network of water lines. The various riparian galleries have configurations and characteristics that reflect the history of this area, of which some have been restored in the full protection area (196 ha) and others show the influence of current or previous agricultural exploration in the area (Anonymous 2001c). Because PBNR is located in the same region as SACNP, their climatic characteristics are similar (Anonymous 2001c). The international value of PBNR has also been recognized under The Man and the Biosphere Program-UNESCO (1981) and the Ramsar Convention (1986).

Specimen collection

The sampling sites at each protected area were selected in an effort to cover the majority of the habitats represented. Fourteen sites were selected at DINP, 7 at SACNP and 4 at PBNR (Supplemental Table 1).

Because of the distances between the protected areas and the large number of sites involved, it was not feasible to sample all sites during the same year and with the same frequency. DINP was sampled in 2001, and SACNP and PBNR were sampled in 2002. The sampling effort was classified as high, medium, or low for each site. A high sampling effort consisted of biweekly continuous sampling from April to September, a medium sampling effort consisted of biweekly continuous sampling from June to August, and a low sampling effort consisted of only 1 to 3 sampling periods during May and June. Two sampling methods were used, namely Malaise traps and flight interception traps with blue and yellow trays. At each sampling site, 1 Malaise and 1 flight interception trap were used. Malaise traps were made of a fine mesh, with black sides and central panels and a white top, following the design of Townes (1972). The flight interception traps were a modified version of the Masner and Goulet (1981) model consisting of a 2.5 m × 1 m panel of fine black mesh soaked with insecticide, and yellow and blue collection trays filled with water, detergent, and thymol. The 2 sampling methods were used in combination in order to obtain a more representative sample of the Spheciformes communities in each area (Noyes 1989; Campos et al. 2000).

All Spheciformes specimens collected were preserved in ethanol before being mounted for identification to the species level (Bitsch and Leclercq 1993; Bitsch et al. 1997; Prentice 1998; Brothers 1999; Melo 1999; Bitsch et al. 2001).

The geographic distribution (Pulawski 2011), nidification type, and prey orders consumed (Gayubo 1980; Gayubo et al. 2004; Baños-Picón et al. 2006) were determined for all species. The percentage of species previously found for the Iberian Peninsula was calculated (Gayubo et al. 2008).

Statistical Analyses

Data on the geographic distribution, nidification type, and prey orders consumed were summarized for each of the protected areas. The Renkonen index (Renkonen 1938; Krebs 1998) was also calculated to provide a measure of percent similarity among the 3 study areas with respect to the 3 variables derived for the species collected.

A methodological problem of all faunistic inventories is the impracticability of registering all of the species in a given area, which is necessary for determining total species richness. The nonparametric estimators abundance-based coverage, Chao1, Chao2, first-order Jacknife, second-order Jacknife, and Bootstrap were therefore used to estimate

Spheciformes total species richness at each of the protected areas, taking into consideration the variation in sampling effort, sampling methods, and size of the area (Hortal et al. 2006). Species accumulation-based total richness estimates are more reliable than traditional diversity indexes (which are affected by sampling pattern and size) for comparing faunistic studies in different areas (Jiménez-Valverde and Hortal 2003). As such, this approach was also used for the estimation of total species richness at the 3 protected areas. For the estimation based on the species accumulation curve, the number of samples was used as the sampling effort unit (17 samples maximum), and data input was randomized 1,000 times to obtain an optimized accumulation curve (Jiménez-Valverde and Hortal 2003). The values obtained were then fitted to the Clench equation:

$$S_n = a \times n/[1 + (b \times n)]$$

where S_n is the number of species, a is the rate of increase of new species at the start of sampling, b is a parameter related to the shape of the curve, and n is the sampling effort. The model equation was fitted to the data using the Simplex and Quasi-Newton Method. The total species richness was then determined by calculating the horizontal asymptote of the curve:

$$S_{n \to +\infty} = a/b$$

Two methods were used to evaluate the completeness of the inventories: (1) calculation of the proportion of species richness observed (S_{obs}) in relation to the total richness predicted by the nonparametric estimators (S_{est}), and (2) determination of the slope of the accumulation curve:

$$r_{(n)} = a/[1 + (b \times n)^2]$$

Statistical analyses were performed in EstimateS 8.2.0 (Colwell 2005) and Statistica (StatSoft 2007).

Results

A total of 2,970 specimens were collected during the study. The specimens represented 134 species belonging to 46 genera, 17 tribes, and 3 families (Supplemental Table 2). These constituted 29% of the species and 64% of the genera known from the Iberian Peninsula. Although all species collected have been recorded previously for the Iberian Peninsula, 42 species (31%) are new records for Portugal.

Species composition

At DINP, 118 species and 5 morphospecies (potentially new species to science) belonging

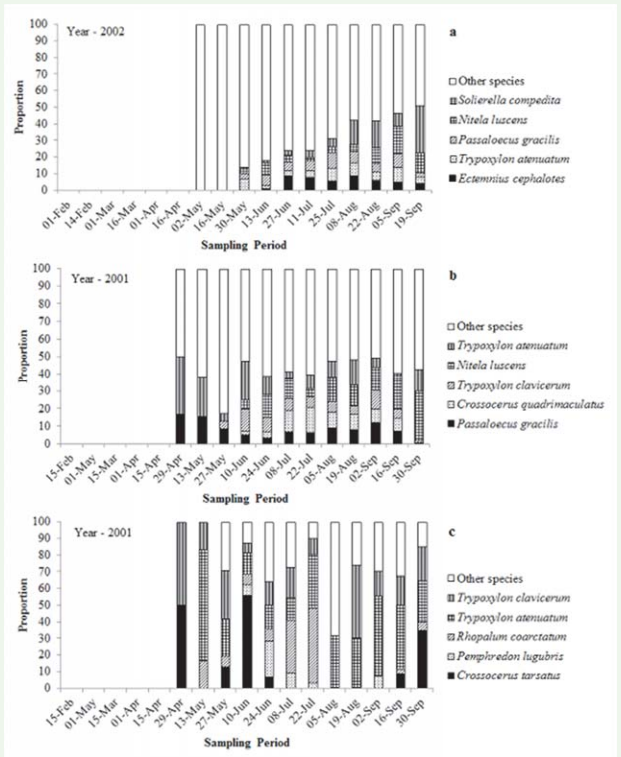

Figure 2. Relative percentage of the 5 most abundant species of Spheciformes wasps collected during each of the sampling periods at Douro International Natural Park (a), Serras de Aire e Candeeiros Natural Park (b), and Paúl do Boquilobo Nature Reserve (c), Portugal. High quality figures are available online.

to 43 genera, 17 tribes, and 3 families, were collected. Thirty-five species were new records for Portugal, and 55 species, 4 morphospecies, and 11 genera were exclusive to DINP (Supplemental Table 2). The occurrence of the 5 most abundant species at DINP increased as the sampling season progressed to a maximum of 51% of the samples, with an average of 27% (Figure 2a).

Seventy species and 1 morphospecies belonging to 34 genera, 14 tribes, and 3 families were collected at SACNP. Twenty-one of the species were new records for Portugal, and 13 species, 1 morphospecies, and 1 genus were exclusive to SACNP (Supplemental Table 2). The occurrence of the 5 most abundant species at SACNP was consistent throughout the sampling season, averaging about 42% of the samples (Figure 2b).

At PBNR, 27 species and 1 morphospecies belonging to 17 genera, 11 tribes, and 3 families were collected. Nine species were new records for Portugal, and 3 species were exclusive to PBNR (Supplemental Table 2). The occurrence of the 5 most abundant species at PBNR was fairly high throughout the sampling season, with an average of 76% of the samples (Figure 2c).

Geographic distribution

Most species collected in all study areas had a Euroasiatic (38%) or Mediterranean (32%) distribution. Other species were distributed in Europe and Asia but also in North America (14%), Africa (10%), and South America (1%). The remaining species were endemic to the Iberian Peninsula (5%). The most dominant zoogeographical element at all natural areas was Euroasiatic. Neither Iberian nor South American species were collected at PBNR (Table 1). For all study areas, the species classified as North American, African, and South American were those that were not only distributed in Euroasia, but also in those continents.

The Renkonen index showed that the geographic distribution of species collected at DINP was more similar to those collected at SACNP (≈95%) than to those at PBNR (≈69%). The similarity between the geographic distribution of the species collected at SACNP and PBNR was ≈73%.

Nidification type

Most species collected in the study were fossorial (64%), making their nests on the ground. Other species were xylicolous (15%), which build their nests in soft core stems, hollow stems, or soft pieces of wood. Others either nested in pre-existing cavities (15%), had mixed behavior showing a combination of the nidification types described previously (2%), or were cleptoparasites (4%) that lay their eggs in other wasps nests (Supplemental Table 3). Species collected at DINP and SACNP were mostly fossorial. Cleptoparasites were not collected at SACNP. Unlike the other study areas, the species collected at PBNR were equally distributed among 3 nidification types, xylicolous, fossorial, or those that nested in pre-existing cavities. There were also less species with mixed behavior or that were cleptoparasites at PBNR (Table 2).

The Renkonen index showed that with respect to nidification type, the species collected at DINP were more similar to those collected at SACNP (≈94%) than to those at PBNR (≈64%). The similarity in species nidification type between SACNP and PBNR was ≈69%.

Prey consumed

Most of the species collected preyed upon 4 main orders/suborders of insects: Diptera (16%), Orthoptera (16%), Sternorrhyncha

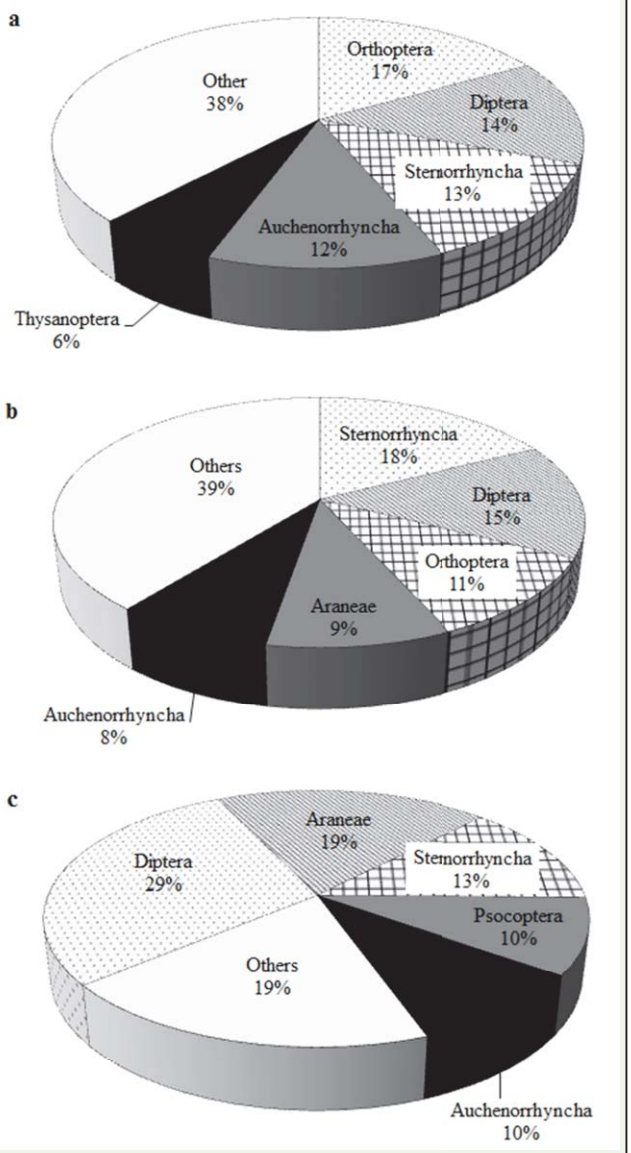

Figure 3. Relative percentage of the species of Spheciformes wasps capturing the 5 main prey orders/suborders of insects at Douro International Natural Park (a), Serras de Aire e Candeeiros Natural Park (b), and Paúl do Boquilobo Nature Reserve (c), Portugal. High quality figures are available online.

(13%), and Auchenorrhyncha (13%). The remaining species preyed upon Heteroptera (8%) and 7 other orders (34%) (Supplemental Table 3). The 5 main orders preyed upon by the species varied according to the natural area (Figure 3a–c).

Based on the Renkonen index, the similarity in the prey species consumption preference by Spheciformes at DINP and SACNP was ≈85%. The similarity between DINP and PBNR was 63%, while the similarity between SACNP and PBNR was ≈68%.

Total species richness estimation

The highest species richness was observed and estimated for DINP, which varied between 139 and 184 species (Table 3). SACNP had lower observed and estimated species richness than DINP, but a higher species richness than PBNR; the estimated total species richness varied between 82 and 111 species (Table 3). The lowest species richness was observed and estimated for PBNR, as the estimated total species richness varied between 28 (similar to the number of species observed) and 42 species (Table 3).

Inventory completeness

A good fit to Clench's model was obtained for the optimized accumulation curves for each study area (R^2 = 0.99, p < 0.01) (Figure 4). The percentage of observed species richness in relation to the estimated species richness collected varied between 67–87%, 69–88%, and 69–86% for DINP, SACNP, and PBNR, respectively (Table 3). The values for the final

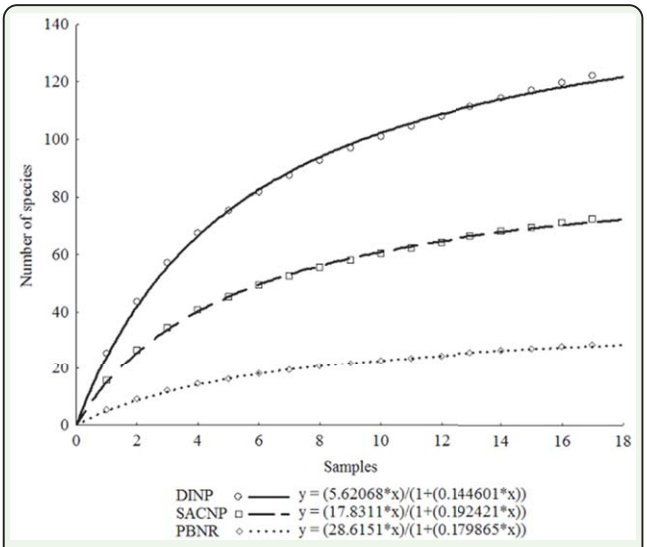

Figure 4. Species richness accumulation curves for the specimens of Spheciformes wasps collected at Douro International Natural Park (circles, solid line), Serras de Aire e Candeeiros Natural Park (squares, dashed line), and Paúl do Boquilobo Nature Reserve (rhombus, dotted line), Portugal. High quality figures are available online.

slope of the species accumulation curves were 2.76, 1.52, and 0.80 for DINP, SACNP, and PBNR, respectively.

Discussion

While knowledge of vertebrate species diversity is extensive for the natural areas that were studied (Monteiro 1998; Brotas 2001; Pimenta and Correia 2001; Coelho 2007; Alexandrino et al. 2008; Alves et al. 2008; Raposo et al. 2008), there appears to be either a significant lack of or limited access to information on the entomological fauna. This was evident in this study by the large number of new records found for Portugal. This work not only generated records for Spheciformes at 3 protected areas in Portugal, but also added 42 species to the Portuguese inventory and potentially 6 new species for science.

The 3 natural areas studied harbor close to 1/3 of the Spheciformes species known in the Iberian Peninsula. DINP had the highest species richness, followed by SACNP and PBNR. This difference in species richness pattern is not consistent with the patterns for vertebrates groups (amphibians, birds, fish, and mammals) in these areas, with the exception of reptiles. However, the species richness patterns for the different vertebrate groups also were not consistent (Monteiro 1998; Coelho 2007; Raposo et al. 2008). The results of our study demonstrated the inadequacy of using vertebrate diversity as an indicator of Spheciformes diversity. This inconsistency between vertebrate and invertebrate diversity has been observed in other studies (Majer 1983; Burbidge et al. 1992; Oliver et al. 1998; Bennett et al. 2009). It should be noted that differences in the pattern of diversity (species richness) at the study areas could have resulted from the different number of sampling points (higher at DINP than at SACNP and PBNR) despite the fact that the number of sampling points was fairly proportional to the size of the protected area.

In addition to species richness, another important factor relevant for conservation is rarity (Rodrigues and Gaston 2002). All the protected areas studied had a number of species that were found exclusively at 1 of the areas and also species that represented new records for Portugal. Additionally, several specimens collected at DINP and SACNP potentially belong to 6 new species. Demographic rarities were also collected. These included the Iberian endemics *Bembecinus carpetanus* Mercet, *Bembecinus pulchellus* Mercet, *Stizus aestivalis* Mercet, *Nysson dusmeti* Mercet, *Nysson konowi* Mercet, and *Ammoplanus torresi* Gayubo collected at DINP, and *Entomognathus fortuitus* Kohl collected at SACNP.

Most species collected had a Euroasiatic or Mediterranean distribution. This pattern was fairly consistent in all areas studied. These results show the biogeographical importance of the protected areas studied as intersection areas, showing a strong representation of both Mediterranean and Euroasiatic biogeographic assemblages (González et al. 2009).

Considering all areas studied and the frequency of each nidification type, most species showed fossorial habits. The remaining species were mainly xylicolous or nested in preexisting cavities, and only a small proportion had mixed behavior or was cleptoparasite. The dominance of fossorial species was consistent with previous studies on other Iberian communities (González et al. 1998; Gayubo et al. 2000; Gayubo et al. 2004). Species at both DINP and SACNP followed this general pattern, while species at PBNR showed a very different pattern, with species that nested in

pre-existing cavities, fossorial species, and xylicolous species being equally present. This discrepancy may be attributed to soil conditions (riparian gallery) that might make the PBNR area less suitable for fossorial species compared with the other 2 protected areas.

The orders most species preyed upon were Diptera, Orthoptera, Sternorrhyncha, and Auchenorrhyncha. Similar to the nidification habits, species at PBNR followed a different general pattern from species at DINP and SACNP. Again, this discrepancy might be related to specific characteristics of the PBNR area, which may be more favorable to the existence of different types of plant resources, as prey orders in all cases are mostly herbivores.

Because the percentage of species observed was generally > 70% of the species predicted, the inventory may be considered to be fairly complete. Jiménez-Valverde and Hortal (2001) referred to a cutoff value of < 0.1 for inventory completeness, but in this study the accumulation curves final slopes were always > 0.1. Despite this, the inventory can still be considered complete because the cutoff value in Jiménez-Valverde and Hortal (2001) was determined using the specimens or records as the sampling unit, while in this study the sampling periods were used.

This study provides new information on Spheciformes wasps in Portugal and specifically at 3 protected areas. The study also reaffirms the importance of including the protected areas in the conservation of Spheciformes diversity and calls attention to the fact that insect diversity does not necessarily follow the same patterns of vertebrates, which are more commonly used for the selection of protected areas (Oliver et al. 1998). Considering the importance of insects both in terms of diversity and ecosystem functions (Wilson 1987), the need for further studies focusing on Spheciformes wasps and other insect groups is clear.

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Table 1. Number of Spheciformes wasps species representing the zoogeographical elements, Iberian, Mediterranean, Euroasiatic, African (also in Africa), North American (also in NA), and South American (also in SA) at Douro International Natural Park (DINP), Serras de Aire e Candeeiros Natural Park (SACNP), and Paúl do Boquilobo Nature Reserve (PBNR), Portugal. Species listed as also in NA, also in Af, and also in SA are present at these locations in addition to having a very wide distribution in Europe and Asia.

Zoogeographical Elements	DINP	SACNP	PBNR
Iberian	6	1	0
Mediterranean	35	21	3
Euroasiatic	50	31	16
Also in Africa	11	5	1
Also in NA	14	10	9
Also in SA	1	1	0

Table 2. Number of Spheciformes wasps species with the nidification types, cleoptoparasite, fossorial, mixed behavior, pre-existing cavities, and xylicolous at Douro International Natural Park (DINP), Serras de Aire e Candeeiros Natural Park (SACNP), and Paúl do Boquilobo Nature Reserve (PBNR), Portugal.

Nidification types	DINP	SACNP	PBNR
Fossorial	75	39	8
Xylicolous	21	13	9
Pre-existing cavities	18	14	10
Cleptoparasite	5	3	1
Mixed behavior	3	0	2

Table 3. Estimated species richness (S_{est}) (± SD where applicable) and the percentage of species observed (122, 72, and 28 at DINP, SACNP, and PBNR, respectively) with respect to the number predicted by each estimator (Percent S_{obs}/S_{est}).

	DINP		SACNP		PBNR	
	S_{est}	Percent S_{obs}/S_{est}	S_{est}	Percent S_{obs}/S_{est}	S_{est}	Percent S_{obs}/S_{est}
ACE	158.47	76.99	92.5	77.84	34.92	80.18
Chao1	162.50 ± 18.03	75.08	96.50 ± 14.33	74.61	36.00 ± 7.48	77.78
Chao2	166.10 ± 18.07	73.45	96.04 ± 13.31	74.97	35.14 ± 5.90	79.68
Jack1	161.52 ± 12.20	75.53	93.64 ± 5.30	76.89	37.41 ± 4.96	74.85
Jack2	182.04	67.02	104.84	68.68	40.44	69.24
Bootstrap	139.86	87.23	81.85	87.97	32.45	86.29
Accumulation curve	159.09	76.69	92.67	77.69	38.87	72.03

Supplemental Table 1. List of sampling sites with site name and code, protected area where the sample was taken, altitude (in meters), UTM coordinates, habitat description with the dominant vegetation indicated, and sampling effort.

Site Name and Code	Protected Area	Altitude	UTM	Habitat description	Sampling Effort
Algozinho (ALR)	DINP	620	29TQF07	Riverside (mainly *Fraxinus angustifolium* and *Salix salvifolius*)	Medium
Barca d'Alva (BAM)	DINP	200	29TPF74	Shrubland (*Cistus ladanifer*)	Low
Bemposta (BEZ)	DINP	450	29TQF17	Mixed wood (mainly *Juniperus oxycedrus*)	Low
Constantim (COC)	DINP	800	29TQG21	Oak wood (*Quercus pyrenaica*)	Low
Fonte d'Aldeia (FAM)	DINP	700	29TQF18	Cork oak wood (*Quercus suber* with *Cistus ladanifer*)	High
Freixiosa (FRA)	DINP	700	29TQF29	Mixed wood (*Quercus ilex* and *Juniperus oxycedrus*)	Low
Lagoaça (LAC)	DINP	350	29TPF96	Mixed wood (*Castanea sativa* and *Pinus pinaster*)	Low
Lamoso (LAR)	DINP	450	29TQF07	Riverside (mainly *Fraxinus angustifolium* and *Salix salvifolius*)	Low
Mazouco (MAG)	DINP	730	29TPF85	Shrubland (*Cytisus* spp.)	High
Palão (PAE)	DINP	630	29TPF85	Eucalyptus plantation (*Eucalyptus globulus* with *Cytisus* spp.)	Medium
Picote (arribas) (PIR)	DINP	610	29TQF28	Thermo-mediterranean Shrubland over river cliff	High
Picotino (PIP)	DINP	740	29TPF86	Pinewood (*Pinus pinaster*)	Medium
Tó (TOC)	DINP	690	29TQF07	Oak wood (*Quercus pyrenaica*)	High
Vila Chã da Braciosa (VCP)	DINP	710	29TQF28	Resting wheat field	Medium
Bairro (BAP)	SACNP	320	29SND37	Pinewood (*Pinus pinaster* with *Erica* spp.)	High
Barrenta (BAE)	SACNP	380	29SND28	Eucalyptus plantation (*Eucalyptus globulus* with *Erica* spp.)	High
Mira d'Aire (MIP)	SACNP	190	29SND27	Riverside (mainly *Crataegus monogyna*), frequently flooded	High
Santo António (SAO)	SACNP	360	29SND27	Olive tree plantation (*Olea europaea*)	High
São Mamede (SMM)	SACNP	420	29SND18	Grassland, almost bare	High
Serro Ventoso (SVC)	SACNP	370	29SND17	Oak wood (*Quercus faginea*)	High
Vale Garcia (VGM)	SACNP	270	29SND37	Shrubland (*Quercus coccifera* with *Cistus ladanifer*)	High
Paúl Boquilobo (choupal) (PBC)	PBNR	20	29SND36	*Populus nigra* plantation	Low
Paúl Boquilobo (montado) (PBM)	PBNR	20	29SND36	Cork oak wood (*Quercus suber*)	High
Paúl Boquilobo (salgueiral) (PBS)	PBNR	20	29SND35	*Salix* spp. area, frequently flooded	High
Paúl Boquilobo (valas) (PBV)	PBNR	20	29SND36	Riverside (mainly *Salix* spp.)	Low

Supplemental Table 2. List of species collected separated into the corresponding families, subfamilies, and tribes; number of female specimens (F); number of male specimens (M); total number of specimens collected (T); location where specimens where collected (DINP: Douro International Natural Park, SACNP: Serras de Aire e Candeeiros Natural Park, PBNR: Paúl do Boquilobo Nature Reserve); and countries with previous records of each species, with indication of the year of the first published record in Portugal and Spain (geographic distribution).

Family	Subfamily	Tribe	Species	F	M	T	Location	Geographic Distribution
AMPULICIDAE	AMPULICINAE	Dolichurini	*Dolichurus bicolor* (Lepeltier, 1845)	7	1	8	DINP, SACNP	Portugal (2002), Spain (1995), Austria, Belgium, Finland, France, Germany, Italy, Switzerland, Ukraine
			Dolichurus corniculus (Spinola, 1808)	3	42	45	DINP, SACNP, PBNR	Portugal (1984), Spain (1904), Andorra, Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Poland, Romania, Russia, Scandinavian, Slovakia, Sweden, Switzerland, Turkey, Yugoslavia
			Dolichurus haemorrhous Costa, 1886	5	19	24	DINP, SACNP, PBNR	Spain (1943), Czechoslovakia, Egypt, France, Italy, Ukraine
SPHECIDAE	SPHECINAE	Ammophilini	*Ammophila campestris* Latreille, 1809	38	4	42	DINP	Portugal (1949), Spain, Austria, Belgium, Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, Finland, France, Germany, Great Britain, Hungary, Italy, Kazakhstan, Latvia, Luxembourg, Mongolia, Netherlands, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Ammophila heydeni Dahlbom, 1845	33	77	110	DINP, SACNP	Portugal (1886), Spain, Afghanistan, Algeria, Austria, Albania, Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, France, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Libya, Macedonia, Malta, Morocco, Romania, Russia, Slovakia, Slovenia, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Ammophila modesta Mocsáry, 1883	1	3	4	SACNP	Portugal (1949), Spain, France (Banyuls-sur-Mer), Iran
			Ammophila sabulosa (Linnaeus, 1758)	6	19	25	DINP, SACNP, PBNR	Portugal (1898), Spain, Algeria, Andorra, Austria, Belgium, Belorussya, Bulgaria, Canary Islands, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, France, Finland, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Korea, Kazakhstan, Latvia, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Yugoslavia
			Podalonia affinis (Kirby, 1798)	0	4	4	DINP	Portugal (1965), Spain (1874), Algeria, Arabian Peninsula, Austria, Belarus', Belgium, Bulgaria, China, Czechoslovakia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Himalayas, Hungary, Iran, Ireland, Israel, Italy, Jordan, Kashmir, Kazakhstan, Korea, Latvia, Libya, Lithuania, Luxembourg, Macedonia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Saudi Arabia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkestan, Turkey, Ukraine, Uzbekistan, Yemen
			Podalonia hirsuta (Scopoli, 1763)	2	0	2	DINP	Portugal (1904), Portugal (Madeira) (1883), Spain (1874), Afghanistan, Albania, Algeria, Andorra, Armenia, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Jordan, Kashmir, Kazakhstan, Kyrghyzstan, Latvia, Lebanon, Libya, Lithuania, Luxembourg, Macedonia, Malta, Mongolia, Morocco, Netherlands, Norway, Pakistan, Poland, Romania, Russia, Scandinavia, Slovakia, Slovenia, South Africa, Sweden, Switzerland, Syria, Tajikistan, Transcaspia, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
		Sphecini	*Prionyx kirbii* (van der Linden, 1827)	1	0	1	DINP	Portugal (1949), Spain (1827), Africa (East, West), Algeria, Angola, Austria, Bulgaria, Central African Republic, China, Congo, Croatia, Czechoslovakia, Czech Republic, Egypt, Ethiopia, France, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Libya, Malta, Morocco, Mozambique, Romania, Russia, Slovakia, South Africa, Switzerland, Syria, Tajikistan, Tanzania, Tunisia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Yugoslavia, Zaire
			Sphex flavipennis Fabricius, 1793	1	3	4	DINP	Portugal (1965), Spain (1835), Afghanistan, Algeria, Bulgaria, China, Croatia, Cyprus, Egypt, France, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Kyrghyzstan, Libya, Macedonia, Malta, Morocco, Palestine, Romania, Russia, Syria, Tajikistan, Transcaspia, Tunisia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Uzbekistan, Yugoslavia
			Sphex funerarius Gussakovskij, 1793	11	3	14	DINP, SACNP	Portugal (1898), Spain (1888), Africa (northwest), Albania, Algeria, Austria, Belarus', Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, France, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Kyrghyzstan, Libya, Macedonia, Malta, Mongolia, Morocco, Palestine, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
	ASTATINAE	Astatini	*Astata apostata* Mercet, 1910	0	2	2	DINP	Portugal (1996), Spain (1910), Bulgaria, Czechoslovakia, Czech Republic, France, Greece, Hungary, Iran, Italy, Morocco, Russia, Slovakia, Turkey, Ukraine
			Astata boops (Shranck, 1871)	6	11	17	SACNP	Portugal (1984), Spain (1897), Afghanistan, Albania, Algeria, Austria, Bangladesh, Belarus', Belgium, Canary Islands, China, Croatia, Cyprus, Egypt, France, Finland, Germany, Great Britain, Greece, Hungary, Iran, Iraq, Ireland, Israel, Italy, Kazakhstan, Korea, Latvia, Luxembourg, Lybia, Malta, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Tajikistan, Tunisia, Turkestan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Astata cobosi Giner Marí, 1946	4	4	8	SACNP	Spain (1962), Italy, Morocco
			Astata costae Costa, 1867	0	3	3	SACNP	Portugal (Algarve) (1984), Spain, Bulgaria, Croatia, Cyprus, Czechoslovakia, Dushanbe, France, Greece, Hungary, Iran, Italy, Kazakhstan, Malta, Morocco, Russia, Slovakia, Switzerland, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Astata kashmirensis Nurse, 1909	1	0	1	SACNP	Portugal (Algarve) (1984), Spain, Austria, Bulgaria, Cyprus, Czech Republic, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Morocco, Poland, Russia, Slovakia, Switzerland, Turkey, Turkmenistan, Ukraine, Uzbekistan
			Astata rufipes massiliensis Mocsáry, 1883	0	3	3	DINP	Spain (1904), Austria, Czechoslovakia, France, Greece, Hungary, Italy, Kazakhstan, Lybia, Russia, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Dryudella tricolor (van der Linden, 1829)	14	7	21	DINP, SACNP	Portugal (1951), Spain (1829), Algeria, Austria, Belarus', Bulgaria, Czech Republic, Czechoslovakia, France, Greece, Hungary, Iran, Italy, Kazakhstan, Kuwait, Libya, Morocco, Romania, Russia, Slovakia, Tajikistan, Turkey, Ukraine
			Bembecinus carpetanus (Mercet, 1906)	2	0	2	DINP	Portugal (Coimbra, Évora, Resende) (1973), Spain (1906)
			Bembecinus pulchellus (Mercet, 1906)	1	0	1	DINP	Portugal (Portalegre, Sobreiral) (1973), Spain (1906)
			Gorytes laticinctus (Lepeletier, 1832)	1	0	1	DINP	Portugal (1973), Spain (1904), Algeria, Austria, Belarus', Belgium, Belorussya, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Gorytes quinquefasciatus (Panzer, 1798)	1	0	1	DINP	Portugal (1973), Spain (1943), Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Italy, Kazakhstan, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Gorytes sulcifrons (Costa, 1869)	3	0	3	DINP, SACNP	Portugal (1949), Spain (1895), Algeria, Armenia, Austria, Belgium, Czechoslovakia, Egypt, France, Germany, Greece, Hungary, Italy, Kazakhstan, Morocco, Romania, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Harpactus alvaroi Gayubo, 1992	11	8	19	DINP	Spain (1992), France
			Harpactus formosus (Jurine, 1807)	2	3	5	DINP, SACNP	Portugal (1973), Spain (1959), Algeria, Austria, Belarus', Bulgaria, Czechoslovakia, France, Germany, Greece, Israel, Italy, Kazakhstan, Kuwait, Libya, Morocco, Poland, Slovakia, Switzerland, Turkey, Ukraine, Uzbekistan
			Harpactus sp. 1	10	7	17	DINP, PBNR	-
			Harpactus sp. 2	4	9	13	DINP	-

Supplemental Table 2. Continued.

	BEMBICINAE	Bembicini	*Harpactus tumidus* (Panzer, 1801)	0	2	2	DINP	Portugal (1949), Spain (1931), Algeria, Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Russia, Slovakia, Sweden, Switzerland, Ukraine, Yugoslavia
			Hoplisoides latifrons (Spinola, 1808)	2	0	2	DINP	Portugal (1931), Spain (1904), Algeria, Austria, Belgium, Croatia, Czechoslovakia, France, Greece, Hungary, Italy, Kazakhstan, Libya, Moravia, Romania, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Lestiphorus bicinctus (Rossi, 1794)	5	1	6	DINP, SACNP	Spain (1906), Austria, Belarus',Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, France, Germany, Great Britain, Hungary, Iran, Italy, Luxembourg, Netherlands, Poland, Romania, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Oryttus concinnus (Rossi, 1790)	2	0	2	DINP, SACNP	Spain (1904), Croatia, France, Germany, Greece, Hungary, Italy, Russia, Switzerland, Ukraine
			Stizus aestivalis Mercet, 1906	1	0	1	DINP	Portugal (1973), Spain (1906)
			Nysson dusmeti Mercet, 1909	0	1	1	DINP	Spain (1909)
			Nysson konowi Mercet, 1909	0	1	1	DINP	Portugal (1973), Spain (1909)
			Nysson maculosus (Gmelin, 1790)	5	0	5	DINP	Spain (1904), Albania, Algeria, Armenia, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Italy, Japan, Kazakhstan, Korea, Latvia, Luxembourg, Moldova, Mongolia, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Nysson pratensis Mercet, 1909	2	9	11	DINP	Portugal (1973), Spain (1909), Greece, Turkey
			Nysson trimaculatus (Rossi, 1790)	3	12	15	DINP, PBNR	Spain (1904), Austria, Belarus', Belgium, Bulgaria, China, Czechoslovakia, Czech Republic, Denmark, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Sweden, Switzerland, Turkey, Ukraine
			Crossocerus acanthophorus (Kohl, 1892)	8	1	9	DINP, PBNR	Spain (1971), Algeria, Austria, Bulgaria, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Israel, Italy, Kazakhstan, Libya, Mongolia, Russia, Slovakia, Switzerland, Tadjikistan, Turkey, Ukraine, Yugoslavia
			Crossocerus annulipes (Lepeletier & Brullé, 1834)	3	4	7	DINP, PBNR	Portugal (1949), Spain (1956), Andorra, Austria, Belarus', Belgium, Bulgaria, Canada: southern Ontario, China, Czechoslovakia, Czech Republic, Cyprus, Estonia, Finland, France, Germany, Great Britain, Italy, Japan, Kazakhstan, Latvia, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, USA (North Carolina, West Virginia, Maryland, Pennsylvania, Massachussetts, Ohio), Uzbekistan, Yugoslavia
			Crossocerus elongatulus (van der Linden, 1829)	26	14	40	DINP, SACNP	Portugal (1949), Portugal (Azores, Madeira) (1936), Spain (1904), Algeria, Andorra, Argentina, Austria, Azerbaijan, Belarus', Belgium, Belorussya, Bulgaria, Canada (Ontario), Croatia, Czechoslovakia, Czech Republic, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Latvia, Japan, Kazakhstan, Kyrghyzstan, Liechtenstein, Luxembourg, Lybia, Morocco, Netherlands, North Africa, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, USA (Connecticut, Massachusetts, Washington), Yugoslavia
			Crossocerus megacephalus (Rossi, 1790)	7	1	8	DINP, SACNP, PBNR	Spain (1982), Andorra, Austria, Belarus', Belgium, Bulgaria, China, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Latvia, Luxembourg, Mongolia, Morocco, Netherlands, Poland, Romania, Russia, Scotland, Slovakia, Sweden, Switzerland, Tajikistan, Tunisia, Turkey, Ukraine
			Crossocerus podagricus (van der Linden, 1829)	1	0	1	DINP	Spain (1904), Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kazakhstan, Korea, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Crossocerus quadrimaculatus (Fabricius, 1793)	44	29	73	DINP, SACNP, PBNR	Portugal (1949), Spain (1904), Altai, Andorra, Austria, Belarus', Belgium, Belorussya, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Irkutsk, Italy, Kazakhstan, Krasnoyarsk, Latvia, Luxembourg, Mongolia, Morocco, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Tuva, Ukraine, Uzbekistan, Yugoslavia
			Crossocerus tarsatus (Shuckard, 1837)	36	11	47	DINP, SACNP, PBNR	Spain (1959), Andorra, Austria, Belarus', Belgium, Bulgaria, Cyprus, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Scandinavia, Scotland, Slovakia, Sweden, Switzerland, Tunisia, Turkey, Ukraine
		Crabronini	*Ectemnius cephalotes* (Olivier, 1792)	73	36	109	DINP, SACNP	Portugal (1949), Portugal (Madeira) (2000), Spain (1904), Andorra, Austria, Belarus', Belgium, Bulgaria, Canada (Quebec, Ontario, Toronto), Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Germany, Great Britain, Greece, Finland, France, Hungary, Ireland, Italy, Kazakhstan, Latvia, Luxembourg, Morocco, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Syria, Turkey, Ukraine, Yugoslavia
			Ectemnius continuus (Fabricius, 1804)	6	1	7	DINP, SACNP, PBNR	Portugal (1949), Spain (1943), Algeria, Altai, Austria, Azerbaijan, Belarus', Belgium, Canada (Alberta, Ontario, Yukon), China, Croatia, Cuba, Cyprus, Czechoslovakia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Guatemala, Hungary, Iran, Iraq, Ireland, Israel, Italy, Japan, Jordan, Kazakhstan, Korea, Kyrghyzstan, Latvia, Liechtenstein, Luxembourg, Malta, Mongolia, Morocco, Netherlands, North Africa, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Syria, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, USA, Yugoslavia
			Ectemnius crassicornis (Spinola, 1808)	1	1	2	DINP	Portugal (1984), Spain (1904), Albania, Azerbaijan, Bulgaria, Croatia, Czechoslovakia, Daghestan, France, Greece, Hungary, Iran, Iraq, Israel, Italy, Jordan, Kazakhstan, Kyrghyzstan, Moravia, Romania, Russia, Slovakia, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Ectemnius lapidarius (Panzer, 1804)	4	0	4	PBNR	Portugal (Azores) (1993), Spain (1971), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Czechoslovakia, Czech Republic, Estonia, Finland, France, Germany, Great Britain, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Korea, Kyrghyzstan, Latvia, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine, USA, Yugoslavia
			Ectemnius rugifer (Dahlbom, 1845)	2	2	4	DINP, SACNP	Spain (2002), Austria, Belarus', Bulgaria, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Italy, Latvia, Poland, Romania, Russia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Entomognathus brevis (van der Linden, 1829)	2	4	6	SACNP	Portugal (1949), Spain (1904), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Israel, Italy, Japan, Kazakhstan, Kyrghyzstan, Latvia, Liechtenstein, Luxembourg, Morocco, Netherlands, Norway, Poland, Romania, Russia, Scandinavian, Serbia, Slovakia, Sweden, Switzerland, Syria, Tajikistan,Turkey, Turkmenistan, Ukraine, Yugoslavia
			Entomognathus fortuitus (Kohl, 1915)	1	0	1	SACNP	Spain (1915)
			Lestica clypeata (Schreber, 1759)	2	0	2	DINP	Portugal (1949), Spain (1904), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Iran, Israel, Italy, Kazakhstan, Kyrghyzstan, Latvia, Liechtenstein, Luxembourg, Morocco, Netherlands, North Africa, Norway, Poland, Romania, Russia, Scandinavia, Serbia, Slovakia, Sweden, Switzerland, Syria, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia

Supplemental Table 2. Continued.

			Lindenius luteiventris (Kohl, 1915)	1	0	1	SACNP	Spain (1915), Morocco, Tunisia
			Lindenius panzeri (van der Linden, 1829)	1	0	1	DINP	Portugal (1949), Spain (1904), Afghanistan, Andorra, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, France, Germany, Great Britain, Hungary, India, Italy, Kazakhstan, Kyrghyzstan, Latvia, Liechtenstein, Luxembourg, Mongolia, Morocco, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Lindenius pygmaeus (Rossi, 1794)	0	2	2	DINP	Portugal (1984), Spain (1959), Austria, Belgium, Cyprus, France, Germany, Greece, Hungary, Italy, Kazakhstan, Kyrghyzstan, Morocco, Netherlands, Poland, Russia, Slovakia, Syria, Tunisia, Turkey
			Lindenius sp. aff. melinopus Kohl, 1915	1	0	1	DINP	Spain (1915), France, Italy, Morocco
			Lindenius sp. 1	0	1	1	DINP	-
			Rhopalum clavipes (Linnaeus, 1758)	8	2	10	SACNP	Spain (1904), Andora, Austria, Belarus', Belgium, Bulgaria, Canada, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Lithuania, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Ukraine, USA, Uzbekistan, Yugoslavia
			Rhopalum coarctatum (Scopoli, 1763)	26	8	34	PBNR	Spain (2006), Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Latvia, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, USA, Yugoslavia
			Tracheliodes quinquenotatus (Jurine, 1807)	9	0	9	DINP, SACNP	Portugal (1949), Spain (1904), Algeria, France, Greece, Italy, Malta, Morocco, North Africa, Tunisia, Turkey
			Larropsis europaea (Mercet, 1910)	1	0	1	SACNP	Portugal (Caparica, Estoril) (1949), Spain, Algeria
			Larropsis punctulata (Kohl, 1884)	5	1	6	DINP	Portugal (Massorra, Rezende, Tabuaço) (1949), Spain, Iraq, Israel, Morocco
			Liris niger Fabricius, 1775	2	2	4	DINP, SACNP	Portugal (1931), Spain (1829), Afghanistan, Algeria, Austria, Bulgaria, Burma, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, France, Germany, Greece, Hungary, India, Iran, Iraq, Italy, Kazakhstan, Libya, Malta, Mongolia, Morocco, Poland, Romania, Russia, Slovakia, Sudan, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Prosopigastra punctatissima Costa, 1867	1	0	1	SACNP	Portugal (1949), Spain (1910), Italy, Kazakhstan, Libya
			Tachysphex adjunctus Kohl, 1885	0	1	1	DINP	Portugal (1964), Spain (1885), Algeria, France, Libya, Morocco
			Tachysphex consocius Kohl, 1892	2	0	2	DINP	Portugal (1949), Spain (1909), Afghanistan, Austria, Azerbaijan, Bulgaria, Cyprus, Czechoslovakia, Czech Republic, Egypt, France, Greece, Hungary, Italy, Kazakhstan, Libya, Morocco, Namibia, Oman, Romania, Russia, Slovakia, Tajikistan, Tanzania, Turkey, Ukraine, Uzbekistan, Zimbabwe
			Tachysphex denisi Beaumont, 1936	3	1	4	DINP	Spain (1956), Spain (Canary Islands) (1993), Algeria, Egypt, France, Libya
			Tachysphex fulvitarsis (Costa, 1867)	12	7	19	DINP, SACNP	Portugal (1964), Spain (1962), Algeria, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Luxembourg, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan
			Tachysphex incertus (Radoszkowski, 1877)	1	0	1	DINP	Portugal (1949), Spain (1904), Afghanistan, Algeria, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Libya, Morocco, Oman, Palestine, Romania, Russia, Slovakia, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yemen, Yugoslavia
			Tachysphex julliani Kohl, 1883	1	0	1	DINP	Portugal (1949), Spain (1910), Algeria, Cyprus, Czechoslovakia, Egypt, France, Greece, Iran, Israel, Italy, Kazakhstan, Libya, Morocco, Oman, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan
			Tachysphex mediterraneus Kohl, 1883	0	5	5	DINP	Portugal (1949), Spain (1910), Algeria, Austria, Bulgaria, Cyprus, Egypt, France, Greece, Hungary, Israel, Italy, Kazakhstan, Kenya, Mauritania, Morocco, Russia, Sri Lanka, Turkey, Yugoslavia, Zambia
			Tachysphex nitidior Beaumont, 1940	6	9	15	DINP, SACNP	Portugal (1964), Spain (1956), Bulgaria, Croatia, Czechoslovakia, Egypt, France, Greece, Israel, Italy, Kazakhstan, Libya, Malta, Mongolia, Morocco, Russia, Turkey, Ukraine, Uzbekistan
			Tachysphex obscuripennis (Schenck, 1857)	34	35	69	DINP, SACNP	Portugal (1931), Spain (1910), Andorra, Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Latvia, Luxembourg, Morocco, Netherlands, Poland, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Ukraine, Yugoslavia
			Tachysphex panzeri (van der Linden, 1829)	1	0	1	DINP	Portugal (1949), Spain (1829), Spain (Canary Islands) (1968), Albania, Algeria, Austria, Belarus', Belgium, Bulgaria, Botswana, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, Ethiopia, France, Germany, Greece, Hungary, India, Iran, Israel, Italy, Jordan, Kazakhstan, Latvia, Libya, Malta, Mongolia, Morocco, Netherlands, Oman, Poland, Romania, Russia, Slovakia, Sri Lanka, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, United Arab Emirates, Ukraine, Uzbekistan, Yemen, Yugoslavia
			Tachysphex pompiliformis (Panzer, 1804)	4	2	6	DINP, SACNP	Portugal (1949), Spain (1897), Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Egypt, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, India, Iran, Ireland, Italy, Kazakhstan, Korea, Latvia, Libya, Liechtenstein, Luxembourg, Mongolia, Morocco, Netherlands, Norway, Pakistan, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, USA, Uzbekistan, Yugoslavia
			Tachysphex psammobius (Kohl, 1880)	3	1	4	DINP	Portugal (1964), Spain (1910), Algeria, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Estonia, France, Germany, Greece, Hungary, Israel, Italy, Kazakhstan, Latvia, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Tunisia, Turkey, Ukraine, USA, Yugoslavia
			Tachysphex sp. 1	0	1	1	DINP	-
			Tachysphex tarsinus (Lepeletier, 1845)	5	6	11	DINP, SACNP	Portugal (1964), Spain (1956), Algeria, Austria, Belarus', Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Kazakhstan, Libya, Luxembourg, Morocco, Oman, Poland, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan
			Tachysphex unicolor (Panzer, 1809)	3	2	5	DINP, SACNP	Portugal (1949), Spain (1934), Spain (Canary Islands) (1993), Afghanistan, Algeria, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Czech Republic, Egypt, France, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Libya, Luxembourg, Malta, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Tachytes obsoletus (Rossi, 1792)	0	1	1	DINP	Spain (1829), Algeria, Austria, Belarus', Bulgaria, China, Croatia, Czechoslovakia, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Kazakhstan, Palestine, Poland, Romania, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Tachytes panzeri (Dufour, 1841)	1	0	1	DINP	Portugal (1931), Spain (1904), Algeria, Austria, Belarus', Bulgaria, China, Croatia, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Iran, Italy, Kazakhstan, Lithuania, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia

Supplemental Table 2. Continued.

		Miscophini	*Miscophus bicolor* Jurine, 1807	38	12	46	DINP, SACNP	Portugal (1952), Spain (1904), Andorra, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, France, Germany, Great Britain, Greece, Hungary, Iran, Italy, Kazakhstan, Korea, Mongolia, Luxembourg, Malta, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Miscophus eatoni Saunders, 1903	15	6	21	DINP, SACNP	Portugal (1952), Spain (1964), Algeria, Austria, Bulgaria, Canary Islands, Germany, Italy, Jordan, Liechtenstein, Switzerland
			Miscophus helveticus Kohl, 1883	1	0	1	DINP	Portugal (1952), Spain (1904), Algeria, Bulgaria, Canary Islands, Cyprus, Czechoslovakia, France, Greece, Hungary, Israel, Italy, Libya, Morocco, Sahara (Western), Switzerland, Turkey, United Arab Emirates
			Nitela borealis Valkeila, 1974	0	1	1	DINP	Portugal (1984), Spain (1983), Andorra, Austria, Belarus', Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Germany, Great Britain, Italy, Kazakhstan, Luxembourg, Moravia, Netherlands, Poland, Russia, Slovakia, Sweden, Switzerland, Ukraine
			Nitela lucens Gayubo & Felton, 2000	202	30	232	DINP, SACNP, PBNR	Portugal (2000), Spain (2000), Austria, Belgium, Germany, Great Britain, Luxembourg
			Nitela sp. 1	1	0	1	SACNP	-
			Nitela spinolae Latreille, 1809	22	23	45	DINP, SACNP, PBNR	Portugal (1964), Spain (1943), Spain (Canary Islands) (1937), Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Italy, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Nitela truncata Gayubo & Felton, 2000	18	13	31	DINP, PBNR	Portugal (2000), Spain (2000), France, Germany, Greece, Italy
			Solierella compedita (Piccioli, 1869)	136	62	198	DINP, SACNP	Portugal (1950), Spain (1904), Spain (Canary Islands) (1968), Albania, Algeria, Austria, Bulgaria, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, France, Germany, Greece, Hungary, Israel, Italy, Jordan, Kazakhstan, Malta, Morocco, Poland, Romania, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Solierella pisonoides (Saunders, 1873)	7	6	13	DINP	Portugal (1984), Spain (1982), Bulgaria, Croatia, Greece, Hungary, Israel, Kazakhstan, Turkey, Turkmenistan
			Solierella seabrai Andrade, 1950	0	1	1	DINP	Portugal (1950), Spain (1956), Bulgaria, Greece, Italy
			Oxybelus mucronatus (Fabricius, 1793)	2	0	2	DINP	Portugal (1949), Spain (1901), Afghanistan, Algeria, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Great Britain, Greece, Hungary, Iran, Iraq, Israel, Italy, Jordan, Kazakhstan, Kyrghyzstan, Lebanon, Luxembourg, Moldova, Morocco, Poland, Russia, Serbia, Slovakia, Sweden, Switzerland, Syria, Tajikistan, Transcaspia, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Oxybelus quatuordecimnotatus Jurine, 1807	28	5	33	DINP, SACNP, PBNR	Portugal (1931), Spain (1904), Afghanistan, Albania, Algeria, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Jordan, Kazakhstan, Kyrghyzstan, Libya, Moldova, Mongolia, Montenegro, Morocco, Netherlands, Pakistan, Poland, Romania, Russia, Saudi Arabia, Serbia, Slovakia, Sweden, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yemen
			Oxybelus uniglumis (Linnaeus, 1758)	2	2	4	DINP	Spain (1904), Austria, Belarus', Belgium, Bulgaria, Canada, China, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Kazakhstan, Kyrghyzstan, Latvia, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Slovenia, Sweden, Switzerland, Turkey, Ukraine, USA
		Trypoxylini	*Pison atrum* (Spinola, 1808)	21	17	38	DINP, SACNP, PBNR	Portugal (1949), Spain (1949), Spain (Canary Islands) (1993), Austria, Bulgaria, Croatia, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Malta, Morocco, Romania, Russia, Slovakia, Switzerland, Ukraine, Yugoslavia
			Trypoxylon attenuatum Smith, 1851	189	71	260	DINP, SACNP, PBNR	Portugal (1949), Portugal (Azores) (2007), Spain (1904), Spain (Canary Islands) (1968), Afghanistan, Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Israel, Italy, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Malta, Morocco, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tunisia, Turkey, Ukraine, USA, Uzbekistan
			Trypoxylon clavicerum Lepeletier & Serville, 1828	146	27	173	DINP, SACNP, PBNR	Portugal (1881), Portugal (Azores) (2007), Spain (1915), Spain (Canary Islands) (1993), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Trypoxylon figulus (Linnaeus, 1758)	1	1	2	DINP, PBNR	Portugal (1931), Spain (1888), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Japan, Kazakhstan, Kyrghyzstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tunisia, Turkey, Ukraine, USA, Uzbekistan, Yugoslavia
			Trypoxylon kolazyi Kohl, 1893	1	0	1	PBNR	Spain (1915), Austria, Bulgaria, Canada, Croatia, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Italy, Kazakhstan, Libya, Malta, Poland, Russia, Slovakia, Switzerland, Turkey, USA, Ukraine, Uzbekstan, Yugoslavia
			Trypoxylon minus Beaumont, 1945	59	34	93	DINP, SACNP	Spain (1986), Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Estonia, Finland, France, Germany, Great Britain, Greece, Italy, Kazakhstan, Korea, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Poland, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine
			Trypoxylon scutatum Chevrier, 1867	40	11	51	DINP, SACNP, PBNR	Portugal (1949), Spain (1894), Albania, Algeria, Austria, Bulgaria, Croatia, Cyprus, Czechoslovakia, Egypt, Ethiopia, France, Germany, Greece, Hungary, Iran, Israel, Italy, Kazakhstan, Libya, Morocco, Poland, Romania, Switzerland, Tajikistan, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
	DINETINAE	Dinetini	*Dinetus pictus* (Fabricius, 1793)	1	0	1	DINP	Portugal (1949), Spain (1904), Albania, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Kazakhstan, Latvia, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
	MELLININAE	Mellinini	*Mellinus arvensis* (Linnaeus, 1758)	22	1	23	DINP, SACNP, PBNR	Portugal (1931), Spain (1904), Andorra, Austria, Belarus', Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Ireland, Italy, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Ammoplanellus rhodesianus Arnold, 1924	1	0	1	SACNP	Portugal (2001), Spain (1981), Namibia, South Africa, United Arab Emirates, Zimbabwe
			Ammoplanus ceballosi Giner Marí, 1943	54	6	60	DINP, SACNP	Spain, Italy
			Ammoplanus kohlii Kohl, 1898	10	3	13	DINP, SACNP	Spain, Algeria
			Ammoplanus perrisi Giraud, 1869	2	0	2	DINP	Spain, Algeria, Austria, Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, France, Greece, Germany, Hungary, Italy, Liechtenstein, Morocco, Romania, Slovakia, Switzerland, Tunisia, Turkey, Ukraine
			Ammoplanus sp. 1	1	0	1	DINP	-
			Ammoplanus torresi Gayubo, 1991	5	0	5	DINP	Portugal (Cabeça - Serra da Estrela) (1991), Spain
			Diodontus insidiosus Spooner, 1938	23	36	59	DINP, SACNP	Portugal (1984), Spain (1982), Austria, Belgium, Bulgaria, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Luxembourg, Netherlands, Russia, Slovakia, Switzerland, Uzbekistan

Supplemental Table 2. Continued.

	PEMPHREDONINAE	Pemphredonini	*Diodontus luperus* Shuckard, 1837	6	2	8	DINP, SACNP	Spain (1904), Andorra, Austria, Belarus', Belgium, Czechoslovakia, Czech Republic, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Liechtenstein, Luxembourg, Mongolia, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Switzerland, Tunisia, Turkey, Ukraine, Yugoslavia
			Diodontus tristis (van der Linden, 1829)	0	1	1	DINP	Spain (1904), Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Italy, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Passaloecus corniger Shuckard, 1837	20	4	24	DINP, SACNP	Spain (1943), Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Japan, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Passaloecus eremita Kohl, 1893	2	0	2	DINP	Spain (1993), Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Grear Britain, Hungary, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Netherlands, Poland, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Passaloecus gracilis (Curtis, 1834)	129	44	173	DINP, SACNP	Portugal (Madeira) (2000), Spain (1981), Spain (Canary Islands) (1977), Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Lithuania, Luxembourg, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Tunisia, Turkey, Ukraine, Uzbekistan
			Passaloecus pictus Ribaut, 1952	11	3	14	DINP, SACNP	Spain (1969), Algeria, Austria, Brazil, Bulgaria, Czech Republic, France, Germany, Greece, Hungary, Italy, Luxembourg, Macedonia, Malta, Morocco, Netherlands, Switzerland, Syria, Turkey, Ukraine
			Passaloecus singularis Dahlbom, 1844	2	5	7	DINP, SACNP	Spain (1981), Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Japan, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, USA, Yugoslavia
			Passaloecus vandeli Ribaut, 1952	99	0	99	DINP, SACNP, PBNR	Portugal (2000), Spain (2000), Austria, Bulgaria, Croatia, Czech Republic, France, Germany, Hungary, Italy, Poland, Switzerland, Turkey
			Pemphredon austriaca (Kohl, 1888)	11	0	11	DINP, SACNP	Spain (1904), Algeria, Austria, Belarus', Belgium, Bulgaria, Cyprus, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Italy, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Turkey, Ukraine, Yugoslavia
			Pemphredon lethifer (Shuckard, 1837)	13	1	14	DINP, SACNP	Portugal (1984), Portugal (Azores) (2007) Spain (1904), Afghanistan, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Iran, Ireland, Israel, Italy, Japan, Kazakhstan, Korea, Kyrghyzstan, Luxembourg, Malta, Mongolia, Morocco, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, Uzbekistan, USA, Yugoslavia
			Pemphredon lugens Dahlbom, 1842	5	0	5	DINP	Spain (1991), Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, Estonia, Finlan, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Slovakia, Sweden, Switzerland, Turkey, Yugoslavia
			Pemphredon lugubris (Fabricius, 1793)	12	0	12	DINP, PBNR	Spain (1904), Albania, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switlzerland, Turkey, Ukraine, Uzbekistan, USA, Yugoslavia
			Pemphredon morio van der Linden, 1829	1	0	1	SACNP	Portugal (2000), Spain (1904), Austria, Belarus', Belgium, Bulgaria, Canada, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Hungary, Italy, Japan, Kazakhstan, Kyrghyzstan, Liechtenstein, Luxembourg, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Ukraine, Uzbekistan, Yugoslavia
			Pemphredon rugifer Dahlbom, 1844	1	0	1	DINP	Portugal (1949), Portugal (Azores) (1936), Spain (1888), Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, Croatia, Czechoslovakia, Czech Republic, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Liechtenstein, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Tunisia, Turkey, Ukraine, USA, Uzbekistan, Yugoslavia
			Spilomena sp1 aff maghrebensis Dollfuss, 1983	16	2	18	SACNP, PBNR	Spain (2006), Jordan, Morocco, Tunisia
			Spilomena beata Bluthgen, 1953	1	0	1	DINP	Spain (1986), Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Italy, Luxembourg, Netherlands, Poland, Scandinavia, Slovakia, Sweden, Switzerland
			Spilomena mocsaryi Kohl, 1898	0	1	1	DINP	Spain (1959), Andorra, Austria, Bulgaria, Czechoslovakia, Czech Republic, France, Germany, Greece, Hungary, Italy, Jordan, Kazakhstan, Kyrghyzstan, Poland, Russia, Slovakia, Switzerland, Syria, Tajikistan, Turkey, Turkmenistan, Ukraine, United Arab Emirates
			Spilomena troglodytes (van der Linden, 1829)	46	8	54	DINP, SACNP, PBNR	Portugal (1949), Spain (1904), Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, Cyprus, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Kazakhstan, Kyrghyzstan, Liechtenstein, Luxembourg, Morocco, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Stigmus solskyi Morawitz, 1864	28	18	46	DINP, SACNP, PBNR	Portugal (1949), Spain (1943), Algeria, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Italy, Kazakhstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
		Psenini	*Mimesa grandii* Maidl, 1933	0	1	1	DINP	Portugal (1949), Spain (1962), Algeria, Austria, Bosnia, Bulgaria, China, Cyprus France, Germany, Greece, Iran, Italy, Kazakhstan, Macedonia, Morocco, Russia, Slovakia, Switzerland, Turkey, Turkmenistan, Ukraine
			Mimumesa unicolor (van der Linden, 1829)	1	0	1	DINP	Spain (1949), Afghanistan, Austria, Belarus', Belgium, China, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Ireland, Italy, Kazakhstan, Kyrghyzstan, Latvia, Liechtenstein, Luxembourg, Netherlands, Pakistan, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan
			Psenulus fuscipennis (Dahlbom, 1843)	68	0	68	DINP, SACNP	Portugal (1949), Spain (1904), Andorra, Austria, Belarus', Belgium, Bulgaria, Croatia, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Great Britain, Greece, Hungary, India, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Psenulus pallipes (Panzer, 1798)	15	0	15	DINP, PBNR	Portugal (1968), Spain (1894), Albania, Algeria, Andorra, Austria, Belarus', Belgium, Bulgaria, Canada, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Ireland, Italy, Japan, Kazakhstan, Korea, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia
			Psenulus sp. aff. schenki (Tournier, 1889)	8	2	2	DINP, SACNP	Spain (1981), Andorra, Austria, Belarus', Belgium, Bulgaria, Czechoslovakia, Czech Republic, Denmark, France, Georgia, Germany, Great Britain, Greece, Hungary, Italy, Luxembourg, Morocco, Netherlands, Poland, Russia, Slovakia, Sweden, Switzerland, Turkey, Ukraine, Yugoslavia

Supplemental Table 2. Continued.

	PHILANTINAE	Cercerini	*Cerceris arenaria* (Linnaeus, 1758)	5	3	8	DINP, SACNP	Portugal (Silves, Mitra) (1881, 1931), Spain (1894), Albania, Algeria, Andorra, Armenia, Austria, Belarus', Belgium, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, France, Finland, Germany, Great Britain, Greece, Hungary, Iran, Israel, Italy, Japan, Kazakhstan, Korea, Latvia, Liechtenstein, Luxembourg, Mongolia, Netherlands, Norway, Poland, Romania, Russia, Scandinavia, Slovakia, Sweden, Switzerland, Transcaspia, Transcaucasia, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
			Cerceris quadricincta (Panzer, 1799)	1	1	2	DINP, SACNP	Portugal (1949), Spain (1894), Albania, Algeria, Andorra, Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechoslovakia, Czech Republic, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Iran, Italy, Kazakhstan, Libya, Luxembourg, Malta, Mediterranean North Africa, Morocco, Netherlands, Poland, Romania, Russia, Slovakia, Switzerland, Tajikistan, Transcaspia, Transcaucasia, Tunisia, Turkey, Ukraine, Uzbekistan, Yugoslavia
			Cerceris sabulosa (Panzer, 1799)	0	1	1	DINP	Portugal (1966), Spain (1959), Afghanistan, Albania, Algeria, Arabian Peninsula, Armenia, Austria, Belgium, Bulgaria, China, Croatia, Cyprus, Czechoslovakia, Czech Republic, Dalmatia, Egypt, France, Germany, Greece, Hungary, Iraq, Iran, Israel, Italy, Kazakhstan, Libya, Malta, Mongolia, Netherlands, Pakistan, Poland, Romania, Russia, Slovakia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yugoslavia
		Philanthini	*Philanthus triangulum* (Fabricius, 1775)	0	1	1	DINP	Portugal (1881), Spain (1874), Afghanistan, Albania, Algeria, Austria, Belarus', Belgium, Bulgaria, China, Congo, Croatia, Cyprus, Czechoslovakia, Czech Republic, Denmark, Egypt, Finland, France, Germany, Great Britain, Greece, Hungary, Iraq, Iran, Italy, Kazakhstan, Kuwait, Latvia, Libya, Luxembourg, Madagascar, Malta, Morocco, Netherlands, Norway, Poland, Romania, Russia, Saudi Arabia, Scandinavia, Slovakia, Somalia, Sudan, Sweden, Switzerland, Tajikistan, Tanzania, Tunisia, Turkey, Turkmenistan, Ukraine, Uzbekistan, Yemen

Supplemental Table 3. List of taxa collected at the three protected study areas in Portugal showing the nidification type and prey order consumed. (●) indicates the classification for the species, (●p) indicates the primary prey order when there is more than one, and (○) indicate an educated guess of the classification of a morphospecies based on knowledge of the genera. Nidification types: Cleptoparasite (C), Fossorial (F), Pre-existing cavities (PC), Xylicolous (X) and Mixed behavior (M). Prey order: Araneae (Ar), Auchenorrhyncha (Hemiptera) (Au), Blattodea (Bl), Coleoptera (Co), Diptera (Di), Heteroptera (Hemiptera) (He), Hymenoptera (Hy), Hymenoptera larvae (Hyl), Lepidoptera (Le), Lepidoptera larvae (Lel), Mantodea (Ma), Orthoptera (Or), Psocoptera (Ps), Sternorrhyncha (Hemiptera) (St), and Thysanoptera (Th).

Species	Nidification type					Prey													
	C	F	PC	X	M	Ar	Au	Bl	Co	Di	He	Hy	Hyl	Le	Lel	Ma	Or	Ps	St	Th
Family Ampulicidae																				
Subfamily Ampulicinae																				
Tribe Dolichurini																				
Dolichurus bicolor (Lepeltier, 1845)					●			●												
Dolichurus corniculus (Spinola, 1808)					●			●												
Dolichurus haemorrhous Costa, 1886					●			●												
Family Crabronidae																				
Subfamily Astatinae																				
Tribe Astatini																				
Astata apostata Mercet, 1910		●									●									
Astata boops (Shranck, 1871)		●									●									
Astata cobosi Giner Marí, 1946		●									●									
Astata costae Costa, 1867		●									●									
Astata kashmirensis Nurse, 1909		●									●									
Astata rufipes massiliensis Mocsáry, 1883		●									●									
Dryudella tricolor (van der Linden, 1829)		●									●									
Subfamily Bembecinae																				
Tribe Bembicini																				
Bembecinus carpetanus (Mercet, 1906)		●					●													
Bembecinus pulchellus (Mercet, 1906)		●					●													
Gorytes laticinctus (Lepeletier, 1832)		●					●													
Gorytes quinquefasciatus (Panzer, 1798)7		●					●													
Gorytes sulcifrons (Costa, 1869)		●					●													
Harpactus alvaroi Gayubo, 1992		●					●													
Harpactus formosus (Jurine, 1807)		●					●													
Harpactus sp1		○					○													
Harpactus sp2		○					○													
Harpactus tumidus (Panzer, 1801)		●					●													
Hoplisoides latifrons (Spinola, 1808)		●					●													
Lestiphorus bicinctus (Rossi, 1794)		●					●													
Oryttus concinnus (Rossi, 1790)		●					●													
Stizus aestivalis Mercet, 1906		●															●			
Subfamily Philanthinae																				
Tribe Cercerini																				
Cerceris arenaria (Linnaeus, 1758)		●							●											
Cerceris quadricincta (Panzer, 1799)		●							●											
Cerceris sabulosa(Panzer, 1799)		●							●											
Tribe Nyssonini																				
eirs Mercet, 1909	●																			
Nysson konowi Mercet, 1909	●																			
Nysson maculosus (Gmelin, 1790)	●																			
Nysson pratensis Mercet, 1909	●																			
Nysson trimaculatus (Rossi, 1790)	●																			
Tribe Philanthini																				
Philanthus triangulum (Fabricius, 1775)		●										●								

Supplemental Table 3. Continued.

Subfamily Crabroninae																			
Tribe Crabronini																			
Crossocerus acanthophorus (Kohl, 1892)		●							●										
Crossocerus annulipes (Lepeletier & Brullé, 1834)				●			●												
Crossocerus elongatulus (van der Linden, 1829)		●							●										
Crossocerus megacephalus (Rossi, 1790)		●							●										
Crossocerus podagricus (van der Linden, 1829)		●							●										
Crossocerus quadrimaculatus (Fabricius, 1793)		●							●										
Crossocerus tarsatus (Shuckard, 1837)		●							●										
Ectemnius cephalotes (Olivier, 1792)		●							●										
Ectemnius continuus (Fabricius, 1804)		●							●										
Ectemnius crassicornis (Spinola, 1808)		●							●										
Ectemnius lapidarius (Panzer, 1804)		●							●										
Ectemnius rugifer (Dahlbom, 1845)		●							●										
Entomognathus brevis (van der Linden, 1829)		●						●											
Entomognathus fortuitus (Kohl, 1915)		●						●											
Lestica clypeata (Schreber, 1759)				●									●						
Lindenius luteiventris (Kohl, 1915)		●							●										
Lindenius panzeri (van der Linden, 1829)		●							●										
Lindenius pygmaeus (Rossi, 1794)		●							●			●p							
Lindenius sp. aff. melinopus Kohl, 1915		●							●										
Lindenius sp1		○							○										
Rhopalum clavipes (Linnaeus, 1758)				●					●										
Rhopalum coarctatum (Scopoli, 1763)				●					●										
Tracheliodes quinquenotatus (Jurine, 1807)		●									●								
Tribe Dinetini																			
Dinetus pictus (Fabricius, 1793)		●								●									
Tribe Larrini																			
Larropsis europaea (Mercet, 1910)			●													●			
Larropsis punctulata (Kohl, 1884)			●													●			
Liris niger Fabricius, 1775			●													●			
Prosopigastra punctatissima Costa, 1867			●			●													
Tachysphex adjunctus Kohl, 1885		●														●			
Tachysphex consocius Kohl, 1892		●														●			
Tachysphex denisi Beaumont, 1936		●														●			
Tachysphex fulvitarsis (Costa, 1867)		●														●			
Tachysphex incertus (Radoszkowski, 1877)		●														●			
Tachysphex julliani Kohl, 1883		●													●				
Tachysphex mediterraneus Kohl, 1883		●														●			
Tachysphex nitidior Beaumont, 1940		●														●			
Tachysphex obscuripennis (Schenck, 1857)		●					●												
Tachysphex panzeri (van der Linden, 1829)		●														●			
Tachysphex pompiliformis (Panzer, 1804)		●														●			
Tachysphex psammobius (Kohl, 1880)		●														●			
Tachysphex tarsinus (Lepeletier, 1845)		●														●			
Tachysphex unicolor (Panzer, 1809)		●														●			
Tachysphex sp1		○														○			
Tachytes obsoletus (Rossi, 1792)		●														●			
Tachytes panzeri (Dufour, 1841)		●														●			
Tribe Mellinini																			
Mellinus arvensis (Linnaeus, 1758)		●							●										

Supplemental Table 3. Continued.

Tribe Miscophini																			
Miscophus bicolor Jurine, 1807		●				●													
Miscophus eatoni Saunders, 1903		●				●													
Miscophus helveticus Kohl, 1883		●				●													
Nitela borealis Valkeila, 1974			●														●		
Nitela lucens Gayubo & Felton, 2000			●														●		
Nitela spinolae Latreille, 1809			●				●										●p		
Nitela truncata Gayubo & Felton, 2000			●														●		
Nitela sp1			○														○		
Solierella compedita (Piccioli, 1869)			●							●									
Solierella pisonoides (Saunders, 1873)			●							●									
Solierella seabrai Andrade, 1950			●							●									
Tribe Oxybelini																			
Oxybelus mucronatus (Fabricius, 1793)		●							●										
Oxybelus quatuordecimnotatus Jurine, 1807		●							●										
Oxybelus uniglumis (Linnaeus, 1758)		●							●										
Tribe Trypoxylini																			
Pison atrum (Spinola, 1808)			●			●													
Trypoxylon attenuatum Smith, 1851			●			●													
Trypoxylon clavicerum Lepeletier & Serville, 1828			●			●													
Trypoxylon figulus (Linnaeus, 1758)			●			●													
Trypoxylon kolazyi Kohl, 1893			●			●													
Trypoxylon minus Beaumont, 1945			●			●													
Trypoxylon scutatum Chevrier, 1867			●			●													
Subfamily Pemphredoninae																			
Tribe Pemphredonini																			
Ammoplanellus rhodesianus Arnold, 1924		●																	●
Ammoplanus ceballosi Giner Marí, 1943		●																	●
Ammoplanus kohlii Kohl, 1898		●																	●
Ammoplanus perrisi Giraud, 1869		●																	●
Ammoplanus torresi Gayubo, 1991		●																	●
Ammoplanus sp 1		○																	○
Diodontus insidiosus Spooner, 1938		●																●	
Diodontus luperus Shuckard, 1837		●																●	
Diodontus tristis (van der Linden, 1829)		●																●	
Passaloecus corniger Shuckard, 1837				●														●	
Passaloecus eremita Kohl, 1893				●														●	
Passaloecus gracilis (Curtis, 1834)				●														●	
Passaloecus pictus Ribaut, 1952		●																●	
Passaloecus singularis Dahlbom, 1844				●														●	
Passaloecus vandeli Ribaut, 1952				●														●	
Pemphredon austriaca (Kohl, 1888)				●														●	
Pemphredon lethifer (Shuckard, 1837)				●														●	
Pemphredon lugens Dahlbom, 1842				●														●	
Pemphredon lugubris (Fabricius, 1793)				●														●	
Pemphredon morio van der Linden, 1829				●														●	
Pemphredon rugifer Dahlbom, 1844				●														●	
Spilomena beata Bluthgen, 1953				●															●
Spilomena mocsaryi Kohl, 1898				●															●
Spilomena sp1 aff maghrebensis Dollfuss, 1983				●															●
Spilomena troglodytes (van der Linden, 1829)				●															●
Stigmus solskyi Morawitz, 1864				●														●	

Supplemental Table 3. Continued.

Tribe Psenini																			
Mimesa grandii Maidl, 1933		●					●												
Mimumesa unicolor (van der Linden, 1829)				●			●												
Psenulus fuscipennis (Dahlbom, 1843)			●															●	
Psenulus pallipes (Panzer, 1798)			●															●	
Psenulus sp. aff. schenki (Tournier, 1889)			●															●	
Family Sphecidae																			
Subfamily Sphecinae																			
Tribe Ammophilini																			
Ammophila campestris Latreille, 1809		●											●		●p				
Ammophila heydeni Dahlbom, 1845		●											●		●p				
Ammophila modesta Mocsáry, 1883		●											●		●p				
Ammophila sabulosa (Linnaeus, 1758)		●											●		●p				
Podalonia affinis (Kirby, 1798)		●													●				
Podalonia hirsuta (Scopoli, 1763)		●													●				
Tribe Sphecini																			
Prionyx kirbii (van der Linden, 1827)		●															●		
Sphex flavipennis Fabricius, 1793		●															●		
Sphex funerarius Gussakovskij, 1793		●															●		
Species total	5	89	22	21	3	10	18	4	5	22	11	2	5	1	6	1	22	5	19	10