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Analyzing Insect Community Structure through the Application of Taxonomic Distinctness Measures

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Laura Baños-Picón, Josep D. Asís, Severiano F. Gayubo, and José Tormos (2009) Analyzing insect community structure through the application of taxonomic distinctness measures. *Zoological Studies* **48**(3): 298-314. Taxonomic distinctness measures were initially developed as a way to assess aspects related to taxonomic and functional differences among species forming communities which are not usually taken into account in biodiversity analyses. In the present work, a comparative analysis aimed at evaluating the behavior and properties of these indices was performed, using communities of Spheciform wasps from different zones of the Iberian Peninsula. Samples were obtained using 2 different sampling techniques: malaise traps and hand nets. By analyzing the behavior of different classic indices of diversity and the taxonomic distinctness measures (average taxonomic distinctness (Δ+) and variation in taxonomic distinctness (Λ+)), it was found that the 2 methods of capture did not seem to provide the same type of information regarding the community structure, i.e., the use of hand nets revealed greater phylogenetic variability, while specimens captured with malaise traps were more uniform. Communities belonging to different biotopes, which had not experienced perturbation, were compared. Indices proved to be robust in terms of changes. Likewise, when assessing their independence with respect to sample size, both indices reached similar mean values, even though their sampling sizes showed noteworthy differences. Mean values of Δ+ and Λ+ of the communities analyzed in the study did not significantly differ with those obtained by a simulation, regardless of the type of habitat or sample size; this is consistent with the good state of the communities analyzed. Only the sampling method employed seems to influence Δ+. However, the classic estimators of diversity (richness and heterogeneity indices) were affected by the sample size and, to a lesser degree, by the type of sampling method used. Although their ecological interpretation remains unclear, taxonomic distinctness measures can offer a useful tool for studying and comparing insect communities. http://zoolstud.sinica.edu.tw/Journals/48.3/298.pdf

Key words: Taxonomic distinctness, Wasp community, Malaise traps, Sampling methods, Spheciform wasps.

Traditionally, biodiversity has been measured using a long list of proposed indices related to the components of abundance and equitability and mainly based on species richness (Williams et al. 1996, Reid 1998, Gray 2000). However, as a measure of biodiversity, species richness may provide imprecise results in the sense that taxonomy, phylogeny, and functional variability among species are not taken into account when a community is assessed (Heino et al. 2005). Furthermore, it is difficult to relate species richness to the productivity of an ecosystem or to perturbations (Drobner et al. 1998, Grace 1999), and its estimation is strongly influenced by the sampling effort (Clarke and Warwick 2001a).

Some authors have pointed out the necessity of including taxonomic and functional differences among species when assessing biodiversity (Purvis and Hector 2000, Shimatai 2001). With the assumption that taxonomic diversity is translated into ecological diversity, knowledge of the taxonomic range of a community may be crucial for studies of ecosystem structure and stability (Hughes 1994, Tilman 1996).

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Warwick and Clarke (1995) suggested the application of measures of taxonomic diversity based on the idea that even when species diversity might not necessarily differ between 2 communities, in more-mature and/or less-perturbed ecosystems, the species present tend to belong to phylogenetically more-distinct groups. To this end, they proposed 4 indices of taxonomic diversity (Warwick and Clarke 1995 1998, Clarke and Warwick 1998 1999 2001b) based not only on species abundances but also on the taxonomic distances between each pair of individuals in the sample, traced through a phylogenetic tree connecting these species.

The first 2, termed taxonomic diversity (Δ) and taxonomic distinctness (Δ^*), employ quantitative data on species abundances; the other 2, the average taxonomic distinctness (Δ^+) and variation in taxonomic distinctness (Λ^+), use presence/absence data, and their combination provides a statistically robust summary reflecting patterns of taxonomic relatedness present in a community (Clarke and Warwick 2001b). Although other researchers have proposed using measures of phylogenetic relatedness in communities of interacting organisms (Faith 1992 1994, Webb 2000), their dependence on species richness limit their application for making comparisons between communities which differ in sample size (Clarke and Warwick 2001a).

The index of average taxonomic distinctness (Δ^+) is a univariate measure of diversity that shows interesting and advantageous statistical properties compared to other conventional measurements of diversity, which are more related to species richness. First, it is robust to variations in sampling effort and is independent of the number of species in a sample. This independence is extremely useful when making historical comparisons of datasets and in studies for which the sampling efforts are uncontrolled, unknown, or unequal. Additionally, in response to environmental degradation, Δ^+ appears to decline monotonically, generally being lower for degraded habits compared to better-conserved zones. Further, it is relatively insensitive to major habitat differences, thereby palliating the problem found with other indices and allowing data from different habitats to be compared. Its calculation, based on species lists, allows a statistical framework to be obtained for assessing departure of obtained data from ‘expectations’. Finally, it attempts to capture phylogenetic diversity, and it is closer and more related to functional diversity (Clarke and Warwick 1998 2001a).

Since the introduction of these indices, many authors have included taxonomic distinctness measures in their research, in attempts to check their efficiency of studying a large variety of living organisms. In particular, they have been used to analyze the ability to assess the effects of environmental stresses on communities and populations. Their application has allowed study of the distribution, structure, and stability of communities and the discrimination of different types of habitat against stresses, both of natural origin (environmental gradients, degree of maturity, etc.) (Piepenburg et al. 1997, Price et al. 1999, Franco-Gordo et al. 2004, Ellingsen et al. 2005, Heino et al. 2005, Mouillot et al. 2005) and of human origin (pollution, physical stress, eutrophication, commercial practices, etc.) (Warwick and Clarke 1998, Rogers et al. 1999, Brown 2002, Izsak et al. 2002, Bates et al. 2005), in most cases with satisfactory results. There are exceptions; Somerfield et al. (1997) failed to detect a consistent pattern of decreases in taxonomic diversity with an increase in environmental impacts in a study on marine macrofaunal assemblages, while Hall and Greenstreet (1998) observed that for certain fish communities, taxonomic diversity and taxonomic distinctness followed identical time trends, similar to other conventional diversity measures.

Herein, we assessed the behavior and properties of taxonomic distinctness measures, applying them to the study of Spheciform wasp communities (Hymenoptera: Apoidea: Ampulicidae, Sphecidae, and Crabronidae) present on the Iberian Peninsula, using 2 different types of sampling: hand net collecting and malaise traps.

Specifically, our aim was to analyze the robustness of the indices in terms of habitat changes. Sample collection was performed in a series of zones with climatic and vegetation differences, thus conditioning important variations in the wasp communities present and in their richness levels. Nevertheless, these zones are located on reasonably heterogeneous landscapes without noteworthy perturbations (i.e., they are not particularly degraded). In light of the assumed insensitivity of taxonomic distinctness indices to habitat changes (Clarke and Warwick 1998 2001a, Warwick and Clarke 1998), comparison of these areas should not reflect important deviations in these indices.

A further aim was to assess the behavior of taxonomic distinctness indices against variations in sample size, by comparing samples that greatly differ in size. Since taxonomic distinctness measures are robust to variations introduced by sample size (Clarke and Warwick 1998 2001a), the values obtained should be similar, regardless of these differences.

A final aim was to determine whether samplings made with malaise traps and hand nets provide the same type of information about the community structure or whether in contrast, these 2 methods sample a population in characteristic ways. In light of what has emerged from different studies (Sutherland 1996, Thompson et al. 1998, Krebs 1999, Southwood and Henderson 2000), it may be assumed that different sampling techniques are appropriate for different taxa and media, and further, that each method will introduce a different bias to the sample collected (Magurran 2003). To clarify this issue, we analyzed the behavior of several classic indices of diversity, together with taxonomic distinctness measures in different communities sampled with different methods.

MATERIALS AND METHODS

Two datasets were used to perform a comparative study of Spheciform wasp communities from different zones of the Iberian Peninsula and to evaluate possible differences derived from the use of different sampling techniques.

The 1st set are from samples obtained in 9 studies carried out in different zones of the Iberian Peninsula, mainly on the northern subplateau, using light-model malaise traps (Townes 1972). The 2nd group comprised species lists from 14 studies conducted within the same geographic area using hand nets (see Appendix 1). The 468 localities where the sampling took place were grouped into 22 landscape units (LUs) as a function of belonging to them, attending to the criterion followed by Sanz et al. (2003). Lists of the study zones and landscape units are given in appendix 2.

Grouping the localities as a function of LUs, for samples collected by both malaise traps and with hand nets, species richness (*S*) and diversity were calculated, using the Margalef index (a richness index), Shannon diversity index, and Simpson's index (in its *1-D'* form) (2 evenness indices), and 2 measures developed by Clarke and Warwick (Warwick and Clarke 1995, Clarke and Warwick 2001b): average taxonomic distinctness ($\Delta+$), which expresses the average taxonomic distance of all pairs of species in a list, and the variation in the taxonomic distinctness ($\Lambda+$), which complements the previous measure and represents the variance of the taxonomic distances between each pair of species, thus reflecting the unevenness of the taxonomic tree (Clarke and Warwick 2001b).

Construction of the latter 2 taxonomic distinctness indices requires a "master list" or inventory of species, within which taxonomic boundaries are defined. In the present case, we used a list of 312 species with 5 taxonomic groupings (species, genus, tribe, subfamily, and family) to which equal step-lengths were assigned. Samples obtained in those studies were compared to the master list to analyze whether the observed subset of species was representative of the biodiversity expressed in the full species inventory. In the comparison, we plotted values obtained for each of the indices in each sample against the number of species in the sample. Plotting was carried out with PRIMER vers. 5 (PRIMER-E, Ltd) which provides a funnel plot with probability limits at the level selected. The simulated upper and lower probability limits of the funnel were established at the 95% level, based on 999 random selections, from sample sizes of 10-200 species extracted from the master list.

The use of both indices allows a bivariate approach to be obtained, in which their values are jointly considered in terms of both observed outcomes from real datasets and their expected values under subsampling from a master species inventory (Clarke and Warwick 2001a). Elliptical plots were generated by simulation, formed by 95% probability contours for sample size ranges of S of < 30 species, and = 30-60, 61-100, and 100-200 species.

To evaluate differences between values obtained with the different indices for comparing the 2 types of sampling, general linear models were used, which considered values of the indices referred to above as the dependent variable, and as explanatory variables, the sample size (*N*) was taken as a continuous variable, and the sampling method (malaise traps vs. hand nets) was taken as a categorical variable. To achieve normality in the data distribution, variables were logarithmically or power-transformed. Calculations were performed using XLStat vers. 6.01 (Addinsoft,) and Minitab 14.1.

RESULTS

Mean values of the richness and evenness indices (D_{Mg}, *H'* and *1-D'*) were higher in samples collected with malaise traps than when hand nets were used, whereas in the case of the taxonomic distinctness indices (Δ+ and Λ+), the net-caught samples had a higher mean value, although the differences were not significant. Moreover, samples from traps were more homogeneous in terms of the values of the indices calculated than those obtained with hand nets, as shown by SD values (see Appendix 3).

Comparative analysis of the communities sampled (Fig. 1) revealed that in general, all samples had average taxonomic distinctness (Δ+) values within the 95% probability funnel (Fig 1A). Only 2 samples (from traps CABn and COLO) fell outside the funnel, with Δ+ values that were significantly lower than those obtained by the simulation. Observed values of the variation in taxonomic distinctness (Λ+) (Fig. 1B) generally increased for all samples, highlighting the new location of the CABn and COLO traps with respect to the funnel limits and the position of LU 6 (corresponding to Iberian mountain chains), with a Λ+ value far higher than that expected from the simulation.

A striking observation is that for samples with important differences in sample size (such as some of those from hand net samplings), values of Λ+ proved to be similar, or on some occasions even higher, for the less-numerous (in terms of *n*) samples. The analysis also revealed that samples from traps located in the central zone had intermediate values for both indices (close to the 50% probability level), except for the COLO and CABn traps, while samples from hand net captures showed greater variability.

In the elliptical plots generated by the simulation, most of the observed deviations (about 30% of the traps and LUs) in pairs of values of Δ+ and Λ+ (Fig. 2) were due to abnormally high values of Λ+; this was the case of traps CHAV, CABp, PARD, VIL-V, and the 5, 6, 14, 15, 40, and 50 LUs. Only the COLO trap remained outside the probability ellipse because of its low Λ+ value.

Results of the analysis of the effects of sample size and sampling method (trap or hand net) on the different diversity indices are shown in table 1. *S*, D_{Mg}, and *H'* were strongly affected by sample size (*n*), while *1-D'*, Δ+, and Λ+ were not affected by this variable. Also, the sampling method significantly affected values of *H'*, *1-D'*, and Δ+ (although it should be noted that the variance of Δ+ explained by the 2 independent variables was very low); neither of the 2 variables analyzed had a significant effect on Λ+. The interaction between the explanatory variables (*n* and the sampling method) was significant for *H'* and *1-D'*, revealing that for these 2 indices, the effect of *n* on the index varied as a function of the type of sampling employed. A large part of the variation observed in the conventional diversity indices analyzed (*S*, D_{Mg}, and *H'*) was due to changes in *n* and the sampling method used, as reflected by the high value of the

Table 1. *F* values, associated *p* values (in parentheses), and adjusted *R*-squared percentages for general linear models (GLMs) (for each of the 6 indices analyzed). Response variables are shown in the 1st column and predictor variables are in the 1st row. The interaction term between N and the type of collecting method tests the hypothesis that the effect of N on the index value depends on the collecting method. *S*, species richness; D_{Mg}, Margalef's diversity index; *H'*, Shannon's diversity index; *1-D'*, Simpson's index; Δ+, average taxonomic distinctness; Λ+, variation in taxonomic distinctness; sqr, square root; ln, natural logarithm.

	ln N	Collecting method	ln N * collecting method	R^2_{adj}
sqr *S*	163.59 (0.0001) ***	1.60 (0.216)	2.19 (0.149)	95.6%
D_{Mg}	58.04 (0.0001)***	1.39 (0.247)	2.05 (0.162)	89.4%
H'^2	12.82 (0.001)***	5.32 (0.028)*	5.74 (0.023)*	77.9%
$(1-D')^{10}$	1.80 (0.189)	5.66 (0.024)*	5.80 (0.022)*	57.5%
ln Δ+	0.47 (0.498)	4.17 (0.050)*	3.14 (0.089)	18.2%
sqr Λ+	0.10 (0.755)	0.02 (0.889)	0.01 (0.914)	0.0%

*$p \le 0.05$; *** $p \le 0.001$

adjusted *R*-squared percentage. Also of interest is the observation that samples from hand net captures had significantly higher *Δ*+ values than those obtained with traps (Student's *t*-test, t_{33} = -2.038, *p* = 0.025) (x = 74.06 ± 2.58 for traps and x = 76.77 ± 4.35 for hand-net samples).

In the 6 LUs for which samples obtained with traps and hand nets were available (LUs 5, 6, 15, 49, 51, and 84), mean values of the indices analyzed, including *Δ*+ and *Λ*+, were higher in samples collected with hand nets (Table 2), although the differences, tested using a Mann-Whitney test, were not significant. Comparisons of values of the indices for malaise trap samples with those obtained using hand nets of each of these 6 communities revealed increases in the

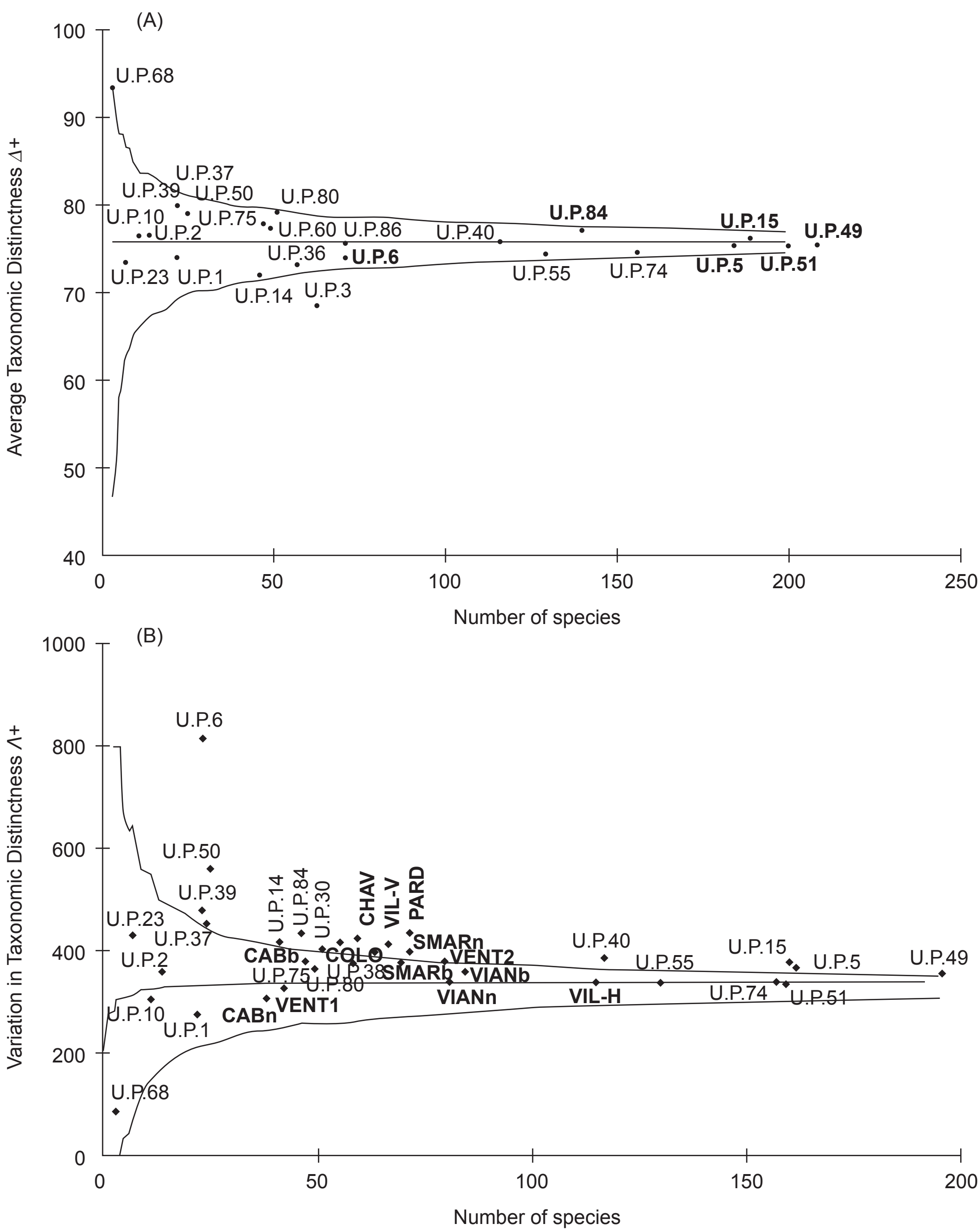

Fig. 1. Funnel plots for simulated values of average taxonomic distinctness (Δ+) (A) and variation in taxonomic distinctness (*Λ*+) (B) against sublist sizes (10-200) obtained from the 312 species master list. Funnel lines represent the limits within which 95% of the simulated values lie. Malaise trap samples are in boldface.

value of Λ+ in the hand-net samples (i.e., sampling of a given community with hand nets afforded a higher Λ+ index than if the captures had been made with malaise traps), although the result of the comparison of pairs of values was only marginally significant (Wilcoxon signed-ranks test, $z = -1.363$, $p = 0.086$, $n = 6$), perhaps owing to the small sampling size. This trend was not significant for the other indices analyzed. Upon grouping the data obtained with malaise traps with those from hand-net captures for each of the 6 LUs described, values of all indices increased (to a greater or lesser extent) in the "hand net + trap" with respect to "hand net only", with the exception of that obtained for Λ+, which was lower (Table 2).

When comparing species richness and abundance values collected with the 2 methods under analysis (see Appendix 4), it should be emphasized that 58% of species were collected with both methods, 25% of the taxa were obtained only with hand-net collecting, and 17% of species were collected exclusively with malaise traps.

DISCUSSION

Different authors have suggested that zones with reduced Λ+ values tend to correspond to impacted or degraded zones, while those with elevated values correspond to better-conserved zones, or zones subjected to less perturbation (Warwick and Clarke 1995 1998, Piepenburg et al. 1997, Rogers et al. 1999, Brown et al. 2002, Izsak et al. 2002, Bates et al. 2005, Mouillot et al. 2005). Similarly, Clarke and Warwick (2001a) reported similar behavior for Λ+, of degraded areas also exhibiting low values, which are located in the lower part of the funnel or even outside it. Values of Λ+ of the communities analyzed here did not significantly differ from those obtained with the simulation, regardless of the method of capture employed. This is consistent with the generally good state of the communities analyzed and with the characteristics of the average taxonomic distinctness index, which is robust to variations in sample size and in comparisons between

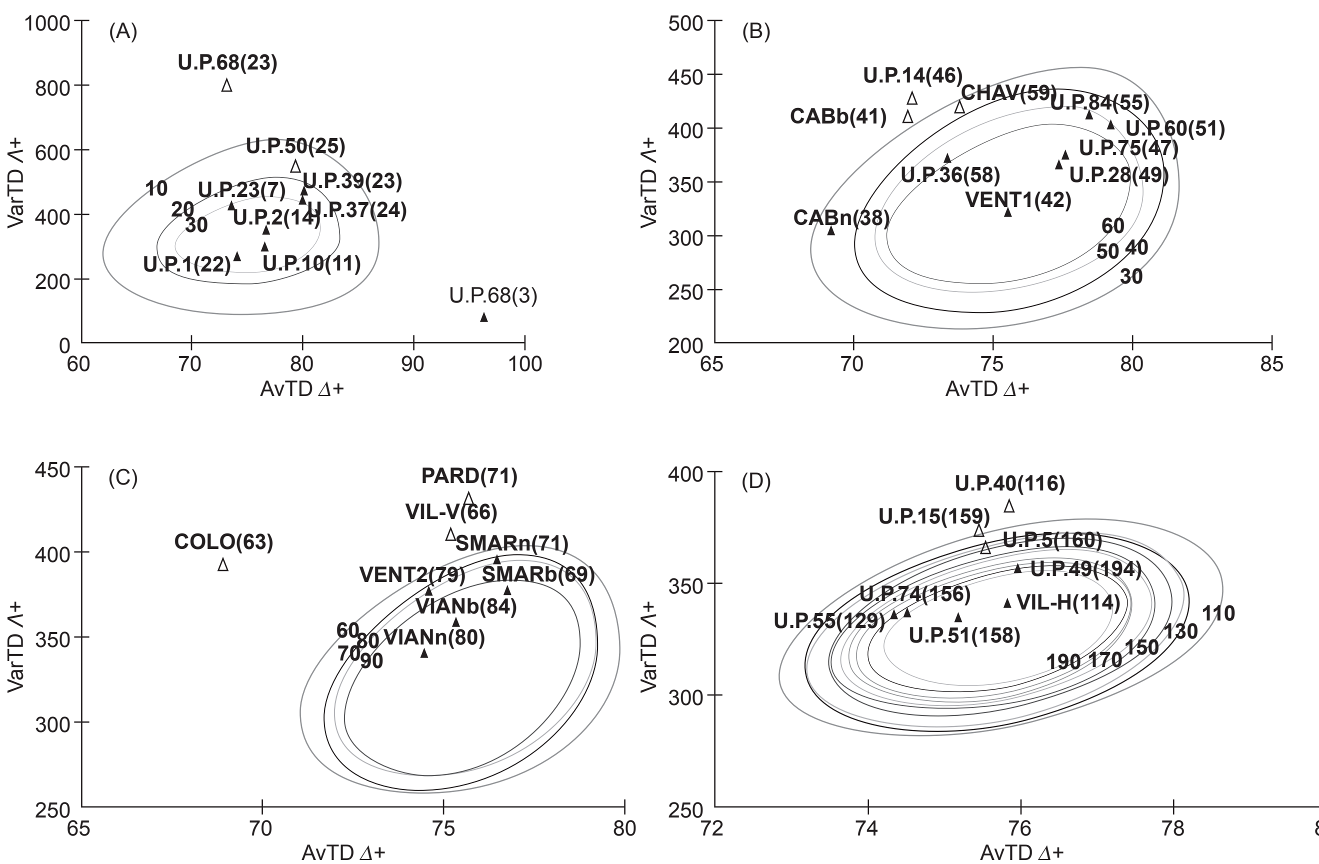

Fig. 2. Elliptical plots of 95% probability areas for average taxonomic distinctness (Δ+) and variation in taxonomic distinctness (Λ+) pairs, separated by sublist sample sizes: (A) S < 30; (B) S = 30-60; (C) S = 61-100; (D) S > 100. Malaise trap samples are in boldface.

different habitats (as long as they are not subject to significant perturbations). The only sample that had an abnormally low $\Lambda+$ value (reflected in both the funnel plot and the probability elliptical plot) was from COLO. Since the simulation was performed beginning with a list of species obtained by grouping all samples (basically reflecting the Spheciform fauna of the northern subplateau of the Iberian peninsula), the value obtained for COLO could indicate the singularity of this community (which is found in the Pyrenees and is under a clear Atlantic influence) with respect to the global patterns of the group studied on the northern subplateau.

About 1/3 of the samples had $\Lambda+$ values higher than that expected from the simulation, and were located outside the 95% probability ellipse (Fig. 2). These deviations appeared in both the trap samples (4 traps of 13) and hand net-captured ones (6 samples of 22), apparently ruling out a possible influence of sampling method: the general linear model (GLM) analysis carried out for $\Lambda+$ also corroborated this, revealing that no effect of the collection method was detected (Table 1). The high $\Lambda+$ values observed for most samples could be an intrinsic characteristic of the communities of Spheciform wasps, some genera of which are well diversified compared to those represented by a single (or only a few) species, giving rise to the observed pattern.

In the 6 units analyzed with both sampling methods, the addition of the trap samples to those collected by hand nets led to an increase in the values of all indices, with the exception of $\Lambda+$, which was reduced (Table 2). This result was due to the fact that using a different type of sampling procedure provides new taxa not collected with the other method, and elicits increases in the value of most of the diversity indices analyzed (including $\Delta+$); however, $\Lambda+$ decreased because the added taxa "filled in" the existing phylogenetic space, reducing variance.

In a comparison of values of $\Lambda+$ for trap samples with those obtained by hand-nets (in the same community), the increase in the value of the index in the hand net-captured sample, although of marginal significance, suggests that the 2 methods, trap and hand net, provided different information in terms of diversity and phylogenetic structure of the communities: the hand-net sample covered greater taxonomic variability, compared to the greater uniformity that seemed to come from the use of malaise traps. Additionally, the fact that the value of $\Delta+$ was marginally significantly lower in samples from malaise traps is congruent with the notion that this type of sampling limits the perception of phylogenetic diversity to a certain extent, either as a result of some bias in the type of specimens captured with the method or of the fact that samples obtained with hand nets included different types of microhabitats and were hence a more-faithful (or complete) representation of the existing community.

These results show once again the well-known importance of using a broad range of sampling techniques to ensure that all potential niches are examined (Longino et al. 2002, Sorensen et al. 2002), especially when the study includes small organisms. The use of only 1 capture technique may give rise to a somewhat inefficient sampling of species, with possible methodological edge effects, as shown by the relatively high percentage of species which were collected exclusively with one or other of the methods analyzed in this article. Thus, with some methods, certain species seem to be rare

Table 2. Values of average taxonomic distinctness (AvTD) and variation in taxonomic distinctness (VarTD) for the 6 landscape units explored with malaise traps and hand nets

	Hand net	Malaise trap	Hand net + Malaise trap
Number of samples	6	13	6
S	124.30 ± 62.62	88.50 ± 25.70	166.00 ± 48.00
D_{Mg}	15.78 ± 2.81	13.22 ± 1.29	20.32 ± 2.00
H'	3.75 ± 0.26	3.60 ± 0.15	3.75 ± 0.27
1-D'	0.95 ± 0.01	0.95 ± 0.01	0.97 ± 0.01
$\Delta+$	75.55 ± 1.78	74.06 ± 2.58	76.56 ± 0.85
$\Lambda+$	443.40 ± 182.97	376.92 ± 39.81	384.75 ± 46.24

or absent, while with other techniques these apparently rare species are seen to actually be quite abundant (Longino et al. 2002). In any case, the higher values of Δ+ and Λ+ in the hand-net samples recommend this method of capture in order to include taxa of the greatest singularity.

The average taxonomic distinctness (Δ+) and the variation in taxonomic distinctness (Λ+) indices are presented here as measures that are relatively independent of sample size and sampling effort (Clarke and Warwick 1998 2001a). This characteristic is also supported by the results found in the present work: both indices had similar mean values, with most samples being included within the probability limits of the funnel plots even though their sizes considerably differed. Moreover, despite the heterogeneity of the habitats compared (which included different biotopes or LUs) the indices proved to be robust to changes, although it would be necessary to analyze the behavior of the indices in communities subjected to perturbation in order to demonstrate a response to this type of action.

The present work is one of the first applications of these indices to the study of insect communities, and although their ecological interpretation remains unclear, their interesting statistical properties mean that these taxonomic distinctness measures can potentially be used to study community biodiversity and organization of terrestrial ecosystems.

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REFERENCES

Bates CR, GW Saunders, T Chopin. 2005. An assessment of two taxonomic distinctness indices for detecting seaweed assemblage responses to environmental stress. Bot. Mar. **48:** 231-243.

Brown BE, KR Clarke, RM Warwick. 2002. Serial patterns of biodiversity change in corals across shallow reef flats in Ko Phuket, Thailand, due to the effects of local (sedimentation) and regional (climatic) perturbations. Mar. Biol. **141:** 21-29.

Clarke KR, RM Warwick. 1998. Quantifying structural redundancy in ecological communities. Oecologia. **113:** 278-289.

Clarke KR, RM Warwick. 1999. The taxonomic distinctness measure of biodiversity: weighting of step lengths between hierarchical levels. Mar. Ecol.-Prog. Ser. **184:** 21-29.

Clarke KR, RM Warwick. 2001a. Change in marine communities: an approach to statistical analysis and interpretation, 2nd ed. Plymouth, UK: Primer-E.

Clarke KR, RM Warwick. 2001b. A further biodiversity index applicable to species lists: variation in taxonomic distinctness. Mar. Ecol.-Prog. Ser. **216:** 265-278.

Drobner U, J Bibby, B Smith, JB Wilson. 1998. The relation between community biomass and evenness, what does community theory predict, and can these predictions be tested? Oikos **82:** 295-302.

Ellingsen KE, KR Clarke, PJ Somerfield, RM Warwick. 2005. Taxonomic distinctness as a measure of diversity applied over a large scale: the benthos of the Norwegian continental shelf. J. Anim. Ecol. **74:** 1069-1079.

Faith DP. 1992. Conservation evaluation and phylogenetic diversity. Biol. Conserv. **61:** 1-10.

Faith DP. 1994. Phylogenetic pattern and the quantification of organismal biodiversity. Phil. Trans. R. Soc. Lond. Ser. B Biol. Sci. **345:** 45-58.

Franco-Gordo C, E Godínez-Domínguez, JM Freire. 2004. Interannual variability of the diversity and structure of ichthyoplankton assemblages in the central Mexican Pacific. Available at http://hdl.handle.net/2183/127

Grace JB. 1999. The factors controlling species density in herbaceous plant communities, an assessment. Perspect. Plant Ecol. Evol. Syst. **2:** 1-28.

Gray JS. 2000. The measurement of marine species diversity, with an application to the benthic fauna of the Norwegian continental shelf. J. Exp. Mar. Biol. Ecol. **250:** 23-49.

Hall SJ, SP Greenstreet. 1998. Taxonomic distinctness and diversity measures, responses in marine fish communities. Mar. Ecol. Prog. Ser. **166:** 227-229.

Heino J, J Soinien, J Lappalainen, R Virtanen. 2005. The relationship between species richness and taxonomic distinctness in freshwater organisms. Limnol. Oceanogr. **50:** 978-986.

Hughes TP. 1994. Catastrophes, phase shifts and large-scale degradation of a Caribbean reef. Science **265:** 1547-1551.

Izsak C, ARG Price, JT Hardy, PW Basson. 2002. Biodiversity of periphyton (diatoms) and echinoderms around a refinery effluent, and possible associations with stability. Aquat. Ecosyst. Health Manage. **5:** 33-42.

Krebs CJ. 1999. Ecological methodology, 2nd ed. New York: Harper and Row.

Longino JT, JRK Coddington. 2002. The ant fauna of a tropical rain forest: estimating species richness three different ways. Ecology **83:** 689-702.

Magurran AE. 2003. Measuring biological diversity. Oxford, UK: Blackwell Science.

Mouillot D, S Gaillard, C Aliaume, M Verlaque, T Belsher, M Troussellier et al. 2005. Ability of taxonomic diversity indices to discriminate coastal lagoon environments based on macrophyte communities. Ecol. Indicat. **5:** 1-17.

Piepenburg D, J Vob, J Gutt. 1997. Assemblages of sea stars (Echinodermata: Asteroidea) and brittle stars (Echinodermata: Ophiuroidea) in the Weddell Sea (Antarctica) and off Northeast Greenland (Artic): a comparison of diversity and abundance. Polar Biol. **17:** 305-322.

Price ARG, MJ keeling, CJO O'Callaghan. 1999. Ocean-scale patterns of 'biodiversity' of Atlantic asteroids determined

from taxonomic distinctness and other measures. Biol. J. Linn. Soc. **66:** 187-203.
Purvis A, A Hector. 2000. Getting the measure of biodiversity. Nature **405:** 212-219.
Reid WV. 1998. Biodiversity hotspots. Trends Ecol. Evol. **13:** 275-280.
Rogers SI, KR Clarke, JD Reynolds. 1999. The taxonomic distinctness of coastal bottom-dwelling fish communities of the North-east Atlantic. J. Anim. Ecol. **68:** 769-782.
Sanz C, R Mata, J Gómez, F Allende, N López, P Molina, L Galiana. 2003. Atlas de los paisajes de España. Madrid: Ministerio de Medio Ambiente.
Shimatani K. 2001. On the measurement of species diversity incorporating species differences. Oikos **93:** 135-147.
Somerfield PJ, F Olsgard, MR Carr. 1997. A further examination of two new taxonomic distinctness measures. Mar. Ecol.-Prog. Ser. **154:** 303-206.
Sorensen LL, JA Coddington, N Scharff. 2002. Inventorying and estimating subcanopy spider diversity using semiquantitative sampling methods in an Afromontane forest. Environ. Entomol. **31:** 319-330.
Southwood R, PA Henderson. 2000. Ecological methods. Oxford, UK: Blackwell Science.
Sutherland WJ. 1996. Ecological census techniques. Cambridge, UK: Cambridge Univ. Press.
Thompson WL, GC White, C Gowan. 1998. Monitoring vertebrate populations. San Diego, CA: Academic Press.
Tilman D. 1996. Biodiversity: population versus ecosystem stability. Ecology **77:** 350-363.
Townes H. 1972. A light-weight malaise trap. Entomol. News **83:** 239-247.
Warwick RM, KR Clarke. 1995. New 'biodiversity' measures reveal a decrease in taxonomic distinctness with increasing stress. Mar. Ecol.-Prog. Ser. **129:** 301-305.
Warwick RM, KR Clarke. 1998. Taxonomic distinctness and environmental assessment. J. Appl. Ecol. **35:** 532-543.
Webb CO. 2000. Exploring the phylogenetic structure of ecological communities: an example for rain forest trees. Am. Nat. **156:** 145-155.
Williams P, D Gibbons, C Margules, A Rebelo, C Humphries, R Pressey. 1996. A comparison of richness hotspots, rarity hotspots, and complementary areas for conserving diversity of British birds. Conserv. Biol. **10:** 155-174.

APPENDIX 1. Articles from which the data on Spheciform wasp communities used in the analysis were obtained

Studies carried out with malaise traps

Baños-Picón L, SF Gayubo, JD Asís, J Tormos, JA González. 2007. Diversidad de la comunidad de avispas Spheciformes de una zona agrícola abandonada del oeste español (Hymenoptera: Apoidea: Ampulicidae, Sphecidae y Crabronidae). Nov. Rev. Entomol. **23:** 249-266.

Cruz-Sánchez MA, SF Gayubo, JA González, F Torres. 2004. La comunidad de avispas Spheciformes de un melojar del oeste español: diversidad y dinámica temporal (Hymenoptera, Apoidea, Ampulicidae, Sphecidae y Crabronidae). Nov. Rev. Entomol. **21:** 213-238.

Gayubo SF, JA González, F Torres. 2000. Estudio de una comunidad de esfécidos en la zona natural de "Las Arribes del Duero" (Salamanca, Oeste español) (Hymenoptera, Sphecidae). Fragm. Entomol. **32:** 181-209.

Gayubo SF, JL Nieves-Aldrey, JA González, JD Asís, C Rey Del Castillo, J Tormos. 2004a. La comunidad de avispas esfeciformes de la estación biogeológica de El Ventorrillo (Sector Medio de la Sierra de Guadarrama, Madrid, España) (Hymenoptera, Apoidea, Ampulicidae, Sphecidae y Crabronidae). Nov. Rev. Entomol. **21:** 125-156.

Gayubo SF, JL Nieves-Aldrey, JA González, J Tormos, C Rey Del Castillo, JD Asís. 2004b. Diversidad de avispas Spheciformes (Hymenoptera, Apoidea, Ampulicidae, Sphecidae y Crabronidae) colectadas mediante trampa Malaise en el Monte de El Prado (Madrid, España). Bol. R. Soc. Esp. Hist. Nat. Secc. Biol. **99:** 105-113.

González JA, SF Gayubo, F Torres. 1998a. Diversidad y abundancia de esfécidos (Hymenoptera, Sphecidae) en un sector arenoso de la Submeseta Norte (España). Bol. R. Soc. Esp. Hist. Nat. Secc. Biol. **94:** 71-85.

González JA, SF Gayubo, F Torres. 1998b. Estudio comparativo de la biodiversidad de esfécidos colectados mediante trampa Malaise en un sector arenoso de la cuenca del Duero (España) (Hymenoptera, Sphecidae). Nov. Rev. Entomol. **15:** 351-370.

González JA, SF Gayubo, F Torres. 2000. Diversidad y abundancia de esfécidos en una zona pirenaica con influencia mediterránea. Nov. Rev. Entomol. **17:** 13-33.

González JA, SF Gayubo, JD Asís, J Tormos, C García. 2003. Estructura y dinámica temporal de la comunidad de avispas esfeciformes (Hymenoptera: Apoidea: Ampulicidae, Sphecidae y Crabronidae) en un pastizal de la Cuenca Alta del Duero (España). Bol. S.E.A. **32:** 59-65.

Studies carried out with hand nets

Gayubo SF. 1979. Himenópteros superiores de la Sierra de Béjar: Sphecidae (Hymenoptera). Salamanca: Univ. de Salamanca.

Gayubo SF. 1981. Himenópteros superiores de la Sierra de Béjar: Sphecidae. II. Ampulicinae, Sphecinae y Pemphredoninae (Hymenoptera). Bol. Asoc. Esp. Entomol. **4:** 131-149.

Gayubo SF. 1982a. Himenópteros superiores de la Sierra de Béjar: Sphecidae. III. Astatinae y Larrinae (Hymenoptera). Bol. Asoc. Esp. Entomol. **5:** 93-115.

Gayubo SF. 1982b. Himenópteros superiores de la Sierra de Béjar: Sphecidae. IV. Crabroninae, Nyssoninae y Philanthinae. Graellsia **37:** 7-63.

Gayubo SF. 1983a. Contribución al conocimiento de los esfécidos de la provincia de Salamanca. I. Ampulicinae y Sphecinae (Hymenoptera: Sphecidae). Bol. Asoc. Esp. Entomol. **6:** 225-235.

Gayubo SF. 1983b. Contribución al conocimiento de los esfécidos de la provincia de Salamanca. IV. Nyssoninae y Philanthinae (Hymenoptera: Sphecidae). Bol. Asoc. Esp. Entomol. **7:** 231-241.

Gayubo SF. 1984a. Contribución al conocimiento de los esfécidos de la provincia de Salamanca. II. Pemphredoninae (Hymenoptera: Sphecidae). Misc. Zool. (Barc.) **8:** 165-169.

Gayubo SF. 1984b. Contribución al conocimiento de los esfécidos de la provincia de Salamanca. III. Astatinae, Larrinae y Crabroninae (Hymenoptera: Sphecidae). Graellsia **40:** 81-97.

Gayubo SF. 1986a. Fauna esfecidológica de la provincia de Zamora. I. Sphecinae, Pemphredoninae, Astatinae y Larrinae (Hymenoptera: Sphecidae). An. Biol. **7:** 27-35.

Gayubo SF. 1986b. Fauna esfecidológica de la provincia de Zamora. II. Crabroninae, Nyssoninae y Philanthinae (Hymenoptera: Sphecidae). Bol. Asoc. Esp. Entomol. **10:** 113-125.

Gayubo SF, C Heras. 1986. Esfecidofauna de las áreas de Cuéllar y Segovia (provincias de Segovia y Valladolid) (Hymenoptera: Sphecidae). Salamanca: Diputación Provincial de Salamanca.

Gayubo SF, AJ Rueda. 1991. Estudio sobre los esfécidos de la provincia de Palencia (Hymenoptera: Sphecidae). Palencia: Diputación Provincial de Palencia.

Gayubo SF, F Sanza. 1986. Esfecidofauna de la margen derecha del la cuenca alta del río Duero (Hymenoptera: Sphecidae). Salamanca: Diputación Provincial de Salamanca.

Gayubo SF, F Torres. 1991. Efecto de la presión urbana sobre abejas y avispas (Hymenoptera,) en Salamanca, IV: Sphecidae. Bol. R. Soc. Esp. Hist. Nat. Secc. Biol. **87:** 73-92.

APPENDIX 2. List of localities and landscape units analyzed in the study

Samples from studies using malaise traps

Samples	Locality
VIANb VIANn	Viana de Cega (Valladolid)
VIL-H VIL-V	Villarino de los Aires (Salamanca)
COLO	Santa Coloma (Andorra)
CHAV	Chavaler (Soria)
VENT1 VENT2	“El Ventorrillo” Biogeological Station (Sierra de Guadarrama, Madrid)
PARD	Monte de El Pardo (Madrid)
SMARb SMARn	San Martín del Castañar (Salamanca)
CABb CABn	Cabañas de Aliste (Zamora)

Samples from studies using hand nets

Landscape unit	Landscape type
U.P.1	Galaic-Asturian-Leonese mountain massifs
U.P.2	Cantabric mountain massifs
U.P.3	Mountain massifs of Pyrenees
U.P.5	Massifs and highlands of the Central System
U.P.6	Iberian mountain massifs
U.P.10	Highlands and Galaic-Zamorano-Leonese mountains
U.P.14	Iberian Range
U.P.15	Mountains of the Central System
U.P.23	Mountains and valleys of the Cantabrian Range
U.P.36	Galaic-Leonese depressions
U.P.37	Basque and Navarre and Cantabrian Range depressions
U.P.39	Iberian depressions of the Soria-Burgos corridor
U.P.40	Graben of the Central System and its borders
U.P.49	Salamancan-Zamoran peniplain and piedmonts of the Leonese Mountains
U.P.50	Piedmonts of the Central System and the Toledo Mountains
U.P.51	Countryside of the Northern Iberian Plateau
U.P.55	Duero Basin meadows
U.P.60	Castilian plains
U.P.68	Leonese-Palentian intramountain valleys
U.P.74	Castilian-Leonese calcareous moors
U.P.75	Castilian-Leonese detritic moors
U.P.80	Iberian moors
U.P.84	Gorges and valleys at the Portuguese border
U.P.86	Large cities and metropolitan areas

APPENDIX 3. Results obtained for each of the samples studied for the values of abundance (*N*), species richness (*S*), Margalef's index (D_{Mg}), Shannon diversity index (*H'*), Simpson's index (*1-D'*), average taxonomic distinctness (*Δ+*), and variation in taxonomic distinctness (*Λ+*). Samples 1-13 were from malaise traps and samples 14-35 were from hand-net captures

	Sample	*N*	*S*	D_{Mg}	*H'*	*1-D'*	*Δ +*	*Λ+*
1	VIL-H	970	114	16.43	3.98	0.97	75.85	339.59
2	VIL-V	367	66	11.01	3.61	0.96	75.09	411.66
3	COLO	352	63	10.57	3.42	0.93	68.83	394.78
4	CHAV	394	59	9.7	3.03	0.91	73.68	423.13
5	VENT1	184	42	7.86	3.28	0.95	75.47	325.59
6	VENT2	960	79	11.36	3.22	0.92	74.52	377.9
7	PARD	878	71	10.33	3.19	0.92	75.57	433.04
8	SMARb	313	69	11.83	3.49	0.94	76.68	375.31
9	SMARn	245	71	12.72	3.87	0.97	76.39	395.85
10	VIANb	648	84	12.82	3.56	0.95	75.27	359.75
11	VIANn	569	80	12.45	3.45	0.93	74.42	341.24
12	CABn	111	38	7.86	3.25	0.95	69.1	307.45
13	CABb	113	41	8.46	3.32	0.95	71.85	414.61
	Malaise traps (mean ± SD)	464 ± 308.46	67.46 ± 20.55	11.03 ± 2.37	3.44 ± 0.27	0.94 ± 0.01	74.06 ± 0.02	376.92 ± 39.81
14	U.P.5	5982	160	18.28	4.02	0.97	75.57	366.55
15	U.P.2	28	14	3.9	2.21	0.83	76.48	356.87
16	U.P.6	104	23	4.74	2.64	0.9	72.81	813.07
17	U.P.15	3534	159	19.34	4.06	0.96	75.42	374.72
18	U.P.40	1334	116	15.98	3.87	0.96	75.81	385.34
19	U.P.49	5396	194	22.46	4.26	0.97	75.95	355.76
20	U.P.74	3216	156	19.19	4.2	0.98	74.47	337.57
21	U.P.14	205	46	8.45	3.12	0.92	71.94	431.69
22	U.P.39	38	23	6.05	3	0.94	79.92	479.05
23	U.P.55	886	129	18.86	4.35	0.98	74.37	339.18
24	U.P.80	116	49	10.1	3.48	0.95	77.01	364.51
25	U.P.75	146	47	9.23	3.26	0.93	77.5	377.48
26	U.P.51	2642	158	19.93	4.21	0.98	75.16	335.69
27	U.P.37	50	24	5.88	2.96	0.94	79.78	453.58
28	U.P.23	12	7	2.41	1.75	0.79	73.33	431.75
29	U.P.68	11	3	0.83	0.6	0.31	93.33	88.89
30	U.P.50	123	25	4.99	2.44	0.87	79	560.33
31	U.P.60	207	51	9.38	3.56	0.96	79.12	405.19
32	U.P.36	228	58	10.5	3.71	0.97	73.3	374.67
33	U.P.10	21	11	3.28	2.24	0.88	76.36	306.78
34	U.P.1	56	22	5.22	2.83	0.93	73.85	275.63
35	U.P.84	230	55	9.93	3.28	0.93	78.37	414.58
	Sweep-net (mean ± SD)	1116.89 ± 1827.15	69.55 ± 61.85	10.41 ± 6.69	3.18 ± 0.94	0.90 ± 0.14	76.77 ± 4.35	392.22 ± 128.59

APPENDIX 4. Abundances of the species collected with malaise traps and hand-net collecting, obtained from the articles listed in Appendix 1

	Malaise trap samples													Hand net samples																					
Species	VIL	VIL	Colo	Chav	Vent	Vent	Pard	Smar	Smar	Vian	Vian	Cab	Cab	Landscape unit number																					
	H	V			1	2		B	N	B	N	N	B	5	2	6	15	40	49	74	14	39	55	80	75	51	37	23	68	50	60	36	10	1	84
Dolichurus bicolor Lepeletier	0	0	0	0	0	0	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolichurus corniculus Spinola	0	0	2	2	0	0	12	0	3	0	0	0	0	3	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolichurus haemorrhous Costa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalybion femoratum Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	8	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Sceliphron destillatorium Illiger	0	0	0	0	0	0	0	0	0	0	0	1	0	15	1	0	3	0	0	28	0	0	7	2	9	20	0	0	0	0	5	0	0	0	8
Sceliphron spirifex Linnaeus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	4	0	0	0	9	0	0	32	0	0	0	0	3	0	0	0	0
Sphex atropilosus Kohl	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Sphex flavipennis Fabricius	1	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0	0	2	15	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Sphex funerarius Gussakovskij	18	18	0	10	0	1	7	67	12	40	23	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphex rufocinctus Brullé	0	0	0	0	0	0	0	0	0	0	0	0	0	105	0	23	68	3	33	19	9	3	9	1	1	146	0	0	0	25	23	1	0	1	0
Isodontia paludosa Rossi	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	2	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmodes melanarius Mocsáry	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palmodes occitanicus Lepeletier & Serville	0	0	0	0	0	0	1	0	1	1	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Chilosphex argyrius Brullé	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	24	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prionyx kirbii Van der Linden	5	1	0	1	1	1	17	2	4	5	2	0	1	22	0	14	40	1	43	21	0	1	17	1	4	42	2	0	0	3	6	3	0	0	2
Prionyx lividocinctus A. Costa	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Prionyx nudatus Kohl	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Prionyx subfuscatus Dahlbom	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Prionyx viduatus Christ	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	6	0	0	0	0	6	0	0	0	0
Podalonia affinis Kirby	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	20	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Podalonia alpina Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	0
Podalonia hirsuta Scopoli	4	0	1	5	6	25	0	1	2	12	14	0	0	363	10	11	52	1	26	17	7	2	26	0	28	49	3	0	9	2	1	6	3	0	1
Podalonia tydei Le Guillou	2	0	0	0	0	2	0	0	1	0	0	0	0	2	0	0	14	9	52	25	0	0	12	0	2	32	2	0	0	0	4	0	0	0	1
Ammophila campestris Latreille	2	7	0	0	0	1	0	0	0	0	0	0	0	68	0	0	48	6	85	0	1	0	2	3	1	0	0	0	0	0	0	0	0	0	2
Ammophila heydeni Dahlbom	54	17	0	0	1	1	25	12	13	12	3	0	2	98	0	1	86	2	13	18	0	0	5	4	0	16	3	0	0	2	2	5	0	0	2
Ammophila hungarica Mocsáry	0	29	0	2	0	1	0	2	1	0	0	0	1	5	0	0	0	3	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7
Ammophila laevicollis André	1	5	0	0	0	0	1	0	0	32	17	0	0	1	0	0	5	1	7	8	0	0	5	0	0	14	0	0	0	0	0	0	0	0	0
Ammophila modesta Mocsáry	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	3	6	0	0	0	0	3	0	0	0	1	0	0	0	0	0	0	1
Ammophila sabulosa Linnaeus	0	2	0	2	10	2	0	2	2	0	0	0	0	27	0	7	5	21	39	18	9	2	0	0	1	9	0	0	0	4	3	0	0	0	0
Ammophila terminata Frivaldsky	1	0	0	0	0	0	0	0	0	1	0	0	0	30	0	0	13	0	14	21	0	2	17	0	0	6	6	0	0	1	3	1	0	0	0
Ammoplanus ceballosi Giner Marí	2	0	4	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammoplanus insularis Giner Marí	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Ammoplanus nanus Boucek & Gayubo	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammoplanus perrisi Giraud	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammoplanus rhodesianus Arnold	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astata apostata Mercet	11	2	0	0	0	0	4	3	1	8	19	0	0	5	0	0	0	6	19	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0
Astata boops Schranck	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	0	0	5	1	5	4	0	4	0	0	1	0	0	0	0
Astata cobosi Giner Marí	1	0	0	0	1	0	2	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astata costae Costa	1	0	0	0	0	0	1	0	0	1	5	1	1	23	0	0	22	0	9	14	2	0	1	0	1	11	0	0	0	0	0	2	0	0	1
Astata gallica Beaumont	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	3	0	0	2	0	0	0	0	2	0	0	0	0
Astata kashmirensis Nurse	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	4	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Astata lusitanica Pulawski	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Astata miegii Dufour	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	3	1	9	6	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Astata minor Kohl	1	0	0	0	0	4	0	0	0	1	7	0	0	14	0	0	13	26	29	0	0	0	7	3	1	0	1	0	0	0	0	0	0	0	0
Dryudella tricolor Van der Linden	11	39	0	0	0	0	7	7	12	27	9	0	0	75	0	0	51	4	48	39	0	0	13	0	2	47	1	0	0	0	0	1	0	1	0
Alysson spinosus Panzer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	4	6	0	1	0	0	0	0	3	0	0	0	0	7	0	0	0	1
Alysson tricolor Lepeletier & Serville	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Didineis crassicornis Handlirsch	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson dimidiatus Jurine	0	0	5	0	0	0	0	0	0	2	0	0	0	3	0	0	2	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson dusmeti Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Nysson fulvipes A. Costa	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	5	8	9	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson interruptus Fabricius	0	1	0	0	2	7	0	5	0	0	0	0	0	51	0	0	24	1	3	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
Nysson konowi Mercet	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson laufferi Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson maculosus Gmelin	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0
Nysson monachus Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson parietalis Mercet	0	1	1	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson pratensis Mercet	3	1	0	0	0	0	5	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson spinosus Förster	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson tridens Gerstaecker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	12	0	0	0	0
Nysson trimaculatus Rossi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nysson varelai Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0

	Malaise trap samples													Hand net samples																					
Species	VIL	VIL	Colo	Chav	Vent	Vent	Pard	Smar	Smar	Vian	Vian	Cab	Cab	Landscape unit number																					
	H	V			1	2		B	N	B	N	N	B	5	2	6	15	40	49	74	14	39	55	80	75	51	37	23	68	50	60	36	10	1	84
Brachystegus scalaris Illiger	1	0	0	1	0	0	0	0	0	0	0	0	0	4	0	0	1	36	97	15	0	0	1	1	0	4	0	0	0	0	0	0	0	0	0
Argogorytes fargeii Shuckard	0	0	0	0	4	33	0	9	0	0	1	0	0	264	1	0	177	2	2	1	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0
Argogorytes hispanicus Mercet	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Argogorytes mystaceus Linnaeus	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harpactus alvaroi Gayubo	4	1	0	1	0	0	3	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harpactus elegans Lepeletier	5	0	0	0	0	0	3	0	1	47	10	0	0	8	0	0	7	10	38	33	0	0	3	0	0	8	0	0	0	0	0	0	0	0	1
Harpactus formosus Jurine	52	12	0	1	0	0	0	0	0	2	1	0	0	31	0	0	38	10	5	3	0	0	1	0	0	5	0	0	0	0	0	1	0	0	0
Harpactus laevis Latreille	0	1	15	3	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Harpactus pruinosus Gayubo	2	0	0	6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harpactus tumidus Panzer	4	0	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0	3	6	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Gorytes africanus Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Gorytes albidulus Lepeletier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gorytes laticinctus Lepeletier	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	8	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gorytes nigrifacies Mocsáry	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	11	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gorytes planifrons Wesmael	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gorytes pleuripunctatus Costa	6	0	0	0	0	0	0	0	0	1	2	0	0	11	0	0	1	5	12	23	0	0	0	0	0	2	0	0	0	0	0	0	0	0	19
Gorytes procrustes Handlirsch	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	0	28	0	12	0	0	0	13	0	1	12	0	0	0	0	0	0	0	0	0
Gorytes quadrifasciatus Fabricius	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	0	8	1	13	1	0	0	12	1	0	4	0	0	0	0	0	0	0	0	0
Gorytes quinquecinctus Fabricius	0	0	0	0	0	0	0	1	0	0	0	0	0	10	0	0	0	15	26	2	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0
Gorytes quinquefasciatus Panzer	0	0	1	0	0	0	0	0	0	0	0	0	0	54	0	0	34	35	100	14	0	0	0	0	0	8	0	0	0	0	0	1	0	0	32
Gorytes sulcifrons Costa	6	9	0	3	1	1	2	1	0	0	0	6	6	229	0	0	102	0	22	93	0	0	3	5	2	24	0	0	0	0	0	7	0	0	38
Lestiphorus bicinctus Rossi	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ammatomus coarctatus Spinola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoplisoides craverii Costa	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	4	0	0	8	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Hoplisoides latifrons Spinola	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hoplisoides punctuosus Eversmann	2	0	0	0	0	0	0	17	1	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Psammaecius punctulatus Van der Linden	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	7	8	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Oryttus concinnus Rossi	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stizus hispanicus Mocsáry	0	2	0	0	0	1	0	0	0	0	0	1	0	1	0	0	2	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Stizus perrisii Dufour	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Stizus ruficornis Förster	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	12	0	0	1	0	0	5	0	0	0	0	0	0	0	0	4
Stizoides tridentatus Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	1	0	2	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Bembecinus carpetanus Mercet	43	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	4	0	9	2	0	0	1	1	0	7	0	0	0	0	0	0	0	0	3
Bembecinus hungaricus Frivaldsky	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bembecinus pulchellus Mercet	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bembecinus tridens Fabricius	0	0	0	0	0	0	3	0	0	42	52	0	0	0	0	0	12	1	7	185	0	0	6	0	0	27	0	0	0	0	0	0	0	0	11
Bembix bidentata Van der Linden	0	0	0	0	0	0	0	7	1	0	0	0	0	14	0	0	7	0	0	15	0	0	2	0	0	4	0	0	0	0	1	0	0	0	2
Bembix flavescens Handlirsch	0	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	0	0	0	7	0	0	0	0	0	3	0	0	0	0	11	0	0	0	0
Bembix merceti Parker	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	55	0	0	5	0	0	2	0	0	0	0	0	0	0	0	0
Bembix oculata Panzer	3	0	0	0	0	0	0	0	0	3	8	0	0	2	0	0	0	12	14	16	0	0	4	0	0	39	0	0	0	0	6	0	0	0	3
Bembix olivacea Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	2	0	0	0	0	9	0	0	0	0
Bembix rostrata Linnaeus	0	2	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	13	5	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Bembix sinuata Latreille	8	0	0	1	0	0	0	6	1	0	0	0	0	30	0	0	14	2	2	134	0	0	16	0	0	112	0	0	0	3	0	0	0	0	1
Bembix tarsata Latreille	0	0	0	38	5	2	0	0	0	0	0	0	0	94	0	9	13	7	23	11	6	2	1	0	0	2	0	0	0	1	0	2	0	1	0
Bembix zonata Klug	15	3	0	9	0	0	0	6	3	5	9	0	0	7	0	0	11	0	0	88	0	0	17	2	0	16	0	0	0	0	12	0	0	0	0
Dinetus pictus Fabricius	8	2	0	0	0	0	2	0	0	5	0	0	0	23	0	0	14	1	92	1	7	0	1	2	0	8	0	0	0	0	2	1	0	0	0
Larra anathema Rossi	2	0	0	2	0	0	0	0	0	0	0	0	0	8	0	0	7	10	34	111	0	1	3	0	0	4	0	0	0	1	0	4	0	0	0
Liris niger Fabricius	3	2	0	0	0	0	0	0	0	2	0	0	0	145	0	0	25	6	5	21	3	1	19	0	0	14	0	0	0	0	1	0	0	0	0
Liris festinans Richards	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	4	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ancistromma punctulatum Kohl	7	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	65	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Tachytes europaeus Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	68	0	1	46	0	10	1	1	0	1	1	0	14	0	0	0	0	0	3	0	0	0
Tachytes freygessneri Kohl	0	0	0	0	0	0	0	11	2	0	0	0	0	0	0	0	5	8	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachytes obsoletus Rossi	0	0	0	0	0	0	0	0	0	0	1	1	0	24	0	0	7	1	31	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Tachytes panzeri Dufour	18	5	0	72	0	1	2	10	2	5	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex adjunctus Kohl	0	4	0	0	0	0	1	0	0	3	2	0	0	35	0	0	19	7	11	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex blattivorus Gussakovskij	0	0	0	0	0	0	0	0	0	1	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex brevipennis Mercet	0	0	0	0	0	0	1	1	0	1	0	0	0	30	0	0	21	1	14	3	1	0	0	0	0	8	0	0	0	0	0	0	0	0	1
Tachysphex consocius Kohl	5	17	0	4	5	2	7	1	2	5	2	0	2	3	0	0	3	0	1	1	0	0	3	0	0	2	0	0	0	0	0	0	0	0	0
Tachysphex costae De Stefani	1	0	0	0	0	0	0	4	2	0	0	0	0	0	0	0	2	8	70	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	1
Tachysphex denisi Beaumont	0	0	0	3	0	0	2	0	0	2	1	0	0	78	0	0	20	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex descendentis Mercet	1	0	0	0	0	0	0	0	0	0	1	0	1	3	0	0	3	0	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex fugax Radoszkowski	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	2	21	85	26	0	0	23	0	0	23	0	0	0	0	2	0	0	0	4
Tachysphex fulvitarsis Costa	11	4	0	13	2	0	16	1	2	13	4	3	2	32	0	0	31	1	27	25	10	0	21	2	12	91	0	3	0	0	1	2	0	0	1
Tachysphex gracilitarsis Morice	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex grandii Beaumont	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	10	11	110	1	0	0	2	0	2	1	0	0	0	0	0	0	0	0	0
Tachysphex incertus Radoszkowski	16	6	0	1	0	0	26	1	0	0	0	0	0	51	0	0	56	2	103	22	0	0	10	0	1	23	0	0	0	10	0	6	0	0	0

	Malaise trap samples													Hand net samples																					
Species	VIL	VIL	Colo	Chav	Vent	Vent	Pard	Smar	Smar	Vian	Vian	Cab	Cab	Landscape unit number																					
	H	V			1	2		B	N	B	N	N	B	5	2	6	15	40	49	74	14	39	55	80	75	51	37	23	68	50	60	36	10	1	84
Tachysphex julliani Kohl	1	2	0	0	0	0	0	0	0	1	1	0	0	3	0	0	16	0	21	24	1	1	6	18	0	9	0	0	0	0	2	0	0	0	2
Tachysphex mediterraneus Kohl	2	0	0	0	0	0	5	0	5	0	9	0	0	0	0	0	0	0	11	6	0	0	7	1	0	1	0	0	0	0	0	0	0	0	0
Tachysphex nitidior Beaumont	1	4	0	0	0	0	1	2	1	0	0	1	2	3	0	0	9	0	12	3	1	0	1	0	0	3	0	0	0	0	0	0	0	0	0
Tachysphex obscuripennis Schenck	11	13	1	4	0	1	11	0	2	7	1	2	1	11	0	0	6	45	18	20	0	0	2	7	0	1	1	0	0	0	0	0	0	0	0
Tachysphex panzeri Van der Linden	9	3	0	0	0	0	15	1	3	8	3	1	3	36	0	1	69	34	77	86	1	1	8	0	0	39	0	0	0	2	6	2	0	0	1
Tachysphex pompiliformis Panzer	4	2	0	16	17	7	0	2	5	3	1	0	0	92	0	0	58	29	498	17	2	0	19	1	1	16	2	0	0	0	1	4	1	2	0
Tachysphex psammobius Kohl	3	5	0	0	0	1	2	0	1	0	0	0	0	157	0	0	31	35	62	0	0	0	0	0	0	1	0	0	0	0	0	1	2	0	1
Tachysphex pseudopanzeri Beaumont	9	5	0	1	0	0	3	0	0	81	26	0	0	14	0	1	37	10	14	47	0	0	12	0	0	32	0	0	0	0	11	0	0	0	4
Tachysphex saundersi Mercet	0	0	0	0	0	0	0	0	0	0	0	0	0	73	0	0	22	17	59	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tachysphex tarsinus Lepeletier	15	3	0	36	1	8	2	2	10	10	10	2	1	21	0	0	23	13	41	35	1	0	12	0	1	39	4	0	0	0	0	6	0	0	0
Tachysphex unicolor Panzer	7	3	0	1	0	1	7	3	11	0	0	0	0	90	2	0	47	2	29	9	1	0	3	1	2	25	6	0	0	0	0	3	0	0	15
Prosopigastra handlirschi Morice	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Prosopigastra kohli Mercet	1	0	0	0	0	0	2	0	0	1	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0
Prosopigastra punctatissima Costa	0	0	0	1	0	0	0	2	0	0	0	0	0	1	0	0	1	1	17	10	0	0	3	2	0	2	0	0	0	0	0	0	0	0	0
Prosopigastra zalinda Beaumont	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	0	1	21	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Plenoculus beaumonti Andrade	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Solierella compedita Piccioli	43	15	0	0	3	10	179	7	3	4	10	2	5	5	1	0	3	0	3	8	3	0	6	1	0	28	0	0	0	0	0	1	0	0	0
Solierella pisonoides Saunders	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Solierella seabrai Andrade	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0	29	0	11	0	0	0	2	0	0	3	0	0	0	0	0	0	0	0	1
Miscophus ater Lepeletier	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	5	2	1	0	3	5	0	4	0	1	4	0	0	0	0	2	0	0	0	0
Miscophus bicolor Jurine	7	5	2	1	1	1	8	3	8	3	1	0	0	0	0	0	0	6	19	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0
Miscophus eatoni Saunders	4	1	2	0	0	2	2	1	3	0	0	1	1	8	0	0	8	0	4	3	2	0	3	0	0	1	0	0	0	0	0	0	0	0	2
Miscophus helveticus Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	10	0	0	0	3	0	1	0	0	0	0	0	0	0	0	0
Miscophus lusitanicus Andrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	5	0	0	0	0	1	0	0	0	0
Miscophus merceti Andrade	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0
Miscophus nicolai Ferton	2	1	0	0	0	0	0	0	0	4	0	0	1	2	0	0	5	1	14	1	0	0	1	1	1	4	0	0	0	0	0	0	0	0	0
Miscophus verhoeffi Andrade	1	0	0	0	0	0	0	0	1	18	11	0	0	0	0	0	0	0	0	4	1	0	1	1	0	2	0	0	0	0	0	0	0	0	1
Nitela borealis Valkeila	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitela lucens Gayubo & Felton	7	18	0	4	12	44	38	0	1	23	119	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitela spinolae Latreille	0	0	1	1	0	1	0	0	1	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nitela truncata Gayubo & Felton	5	2	0	0	7	1	4	1	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palarus variegatus Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pison atrum Spinola	1	0	0	0	1	0	49	1	2	0	15	3	3	0	0	0	4	20	59	4	0	0	1	1	0	4	0	1	0	0	0	1	0	0	0
Trypoxylon attenuatum Smith	44	23	4	3	25	70	3	7	18	0	3	7	4	18	1	0	62	0	28	17	4	0	5	4	0	16	0	0	0	0	0	4	0	2	1
Trypoxylon beaumonti Antropov	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trypoxylon clavicerum Lepeletier & Serville	5	1	9	0	4	10	108	5	6	1	4	12	2	3	0	0	8	0	18	10	0	0	4	0	0	7	0	0	0	0	0	0	0	7	0
Trypoxylon figulus Linnaeus	8	1	1	13	0	30	0	1	0	1	1	0	0	14	1	0	18	0	11	28	0	0	5	2	1	3	1	0	0	0	0	5	0	4	0
Trypoxylon fronticorne Gussakovskij	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trypoxylon kolazyi Kohl	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Trypoxylon latilobatum Antropov	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trypoxylon medium Beaumont	5	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trypoxylon minus Beaumont	0	0	1	1	0	7	0	1	1	0	0	4	1	0	0	2	0	0	0	12	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Trypoxylon scutatum Chevrier	24	6	0	0	0	0	40	14	6	1	0	4	5	0	0	0	6	0	6	14	1	0	1	2	0	7	0	0	0	0	0	0	0	0	0
Belomicrus caesariensis Pate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belomicrus odonthophorus Kohl	0	0	0	0	0	0	0	0	0	9	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belomicrus steckii Kohl	0	0	0	0	0	0	0	0	0	13	1	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus andalusiacus Spinola	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	16	0	0	0	1	0	0	4	0	0	0	0	0	0	0	0	1
Oxybelus argentatus Curtis	0	0	0	0	0	0	0	0	0	0	0	0	1	7	0	0	21	0	1	1	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0
Oxybelus aurantiacus Mocsáry	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	10	0	3	0	1	0	0	1	0	0	0	0	1	0	0	0	0
Oxybelus bipunctatus Olivier	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	4	6	0	1	3	14	1	12	0	1	7	0	0	0	0	5	0	0	0	0
Oxybelus dusmeti Mingo	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus fischeri Spinola	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus haemorrhoidalis Olivier	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus hastatus Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	30	0	0	5	44	144	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Oxybelus latro Olivier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus mandibularis Dahlbom	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus mucronatus Fabricius	3	2	0	3	0	0	1	1	0	0	1	0	1	146	0	5	142	198	599	41	15	0	11	3	2	34	0	0	0	0	0	5	0	4	2
Oxybelus quattuordecimnotatus Jurine	98	7	0	71	12	40	1	7	9	42	16	5	2	677	0	1	505	6	119	166	14	1	39	2	14	128	0	0	0	1	2	18	2	0	4
Oxybelus spectabilis Gerstaecker	0	0	0	2	0	0	0	0	0	0	0	0	1	8	0	1	43	18	48	67	0	2	8	0	0	16	0	0	0	0	1	0	0	0	0
Oxybelus subspinosus Klug	9	0	0	2	0	2	0	0	0	1	1	0	0	43	0	0	29	0	19	18	1	0	13	0	0	32	0	0	0	0	0	0	0	0	2
Oxybelus trispinosus Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Oxybelus uniglumis Linnaeus	4	0	3	0	0	0	3	0	0	3	6	0	19	110	0	2	41	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxybelus variegatus Linnaeus	1	0	0	2	0	4	0	0	0	0	1	0	1	20	0	1	26	0	13	51	1	0	8	0	0	25	0	0	0	0	0	1	0	0	0
Oxybelus victor Lepeletier	0	0	0	0	0	0	0	0	0	0	0	0	0	22	0	2	13	0	39	14	3	0	0	0	1	3	1	0	0	0	2	0	0	0	0
Encopognathus braunsi Mercet	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5	0	10	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Entomognathus brevis Van der Linden	2	0	0	3	0	0	7	2	0	0	0	0	0	61	0	0	44	11	13	19	1	0	3	1	3	26	1	0	0	0	0	7	0	0	0

	Malaise trap samples													Hand net samples																					
Species	VIL H	VIL V	Colo	Chav	Vent 1	Vent 2	Pard	Smar B	Smar N	Vian B	Vian N	Cab N	Cab B	Landscape unit number 5	2	6	15	40	49	74	14	39	55	80	75	51	37	23	68	50	60	36	10	1	84
Entomognathus fortuitus Kohl	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	2	0	0	1	0	0	0	0	0	0	0	0	0
Lindenius albilabris Fabricius	1	0	6	0	0	0	0	0	0	0	0	0	0	31	0	0	9	3	7	0	0	0	5	0	0	27	0	0	0	0	1	7	0	0	0
Lindenius hannibal Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Lindenius ibericus Kohl	20	0	0	5	0	0	0	0	0	0	0	0	0	10	0	0	12	4	14	82	0	0	10	0	3	30	4	0	0	0	2	13	0	0	0
Lindenius luteiventris Morawitz	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lindenius major Beaumont	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lindenius melinopus Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lindenius panzeri Van der Linden	0	0	0	3	0	4	0	0	1	2	1	0	0	3	0	0	0	0	9	2	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0
Lindenius peninsularis Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	13	5	67	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Lindenius pygmaeus Rossi	7	1	0	0	0	2	0	0	0	0	2	0	0	25	4	0	52	0	4	9	2	1	3	2	0	27	0	0	0	0	0	3	0	0	1
Rhopalum clavipes Linnaeus	0	0	6	0	0	3	0	0	0	0	0	0	0	1	0	0	0	27	181	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhopalum coarctatum Lepeletier & Brullé	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus acanthophorus Kohl	2	1	0	0	0	0	6	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus annulipes Lepeletier & Brullé	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3	4	0	0	9	0	0	1	0	0	0	0	0	0	0	0	0
Crossocerus assimilis Smith	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus binotatus Lepeletier & Brullé	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus cetratus Shuckard	0	0	8	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus dimidiatus Fabricius	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus distinguendus Morawitz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus elongatulus Van der Linden	5	0	8	2	2	149	0	0	2	0	3	1	0	232	2	0	122	14	16	102	1	0	22	5	4	89	1	0	0	0	3	8	5	4	0
Crossocerus leucostoma Linnaeus	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus megacephalus Rossi	1	0	1	1	2	14	0	0	1	0	0	0	0	3	0	0	1	0	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Crossocerus nigritus Lepeletier & Brullé	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus podagricus Van der Linden	0	0	3	0	0	1	0	0	4	0	0	0	0	41	0	0	31	5	10	8	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0
Crossocerus quadrimaculatus Fabricius	0	0	3	0	7	195	12	1	0	0	0	1	0	25	0	0	15	16	41	5	1	0	1	0	0	23	0	0	0	0	0	1	0	1	0
Crossocerus tarsatus Shuckard	0	0	2	0	0	10	2	1	0	0	0	0	0	32	0	0	3	0	0	14	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0
Crossocerus toledensis Leclercq	0	0	0	0	0	0	0	0	0	5	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus vagabundus Panzer	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crossocerus varus Lepeletier & Brullé	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tracheliodes quinquenotatus Jurine	5	5	0	0	0	1	19	3	2	8	2	2	6	13	0	0	11	2	0	26	0	0	7	0	4	9	0	0	0	0	9	0	0	0	1
Crabro cribrarius Linnaeus	0	0	0	0	0	2	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	7	0	1	0
Crabro korbi Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0
Ectemnius cavifrons Thomson	0	0	3	0	0	5	0	0	0	0	0	0	0	15	0	0	16	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Ectemnius cephalotes Olivier	0	0	2	2	0	3	24	0	3	0	0	0	0	4	0	0	0	4	18	2	1	0	0	0	1	11	0	0	0	0	0	3	0	0	0
Ectemnius confinis Walker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	0	6	0	0	0	0	0	0	0	0	0
Ectemnius continuus Fabricius	0	0	0	0	1	4	0	0	0	0	0	0	0	35	1	0	38	2	15	25	0	0	5	0	0	35	0	0	0	0	0	2	0	0	0
Ectemnius crassicornis Spinola	1	0	0	0	0	0	0	0	2	0	0	0	0	35	0	0	7	0	6	22	0	0	3	0	0	3	0	0	0	0	0	0	0	0	6
Ectemnius dives Lepeletier & Brullé	0	0	0	2	0	0	0	0	0	0	0	0	0	5	0	0	7	4	26	14	0	0	3	0	0	2	0	0	0	1	0	1	0	0	0
Ectemnius fossorius Linnaeus	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnius guttatus Van der Linden	0	0	0	0	0	8	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnius hypsae De Stefani	1	0	0	0	0	0	0	0	0	0	0	0	0	67	0	0	19	0	23	28	2	0	5	1	0	14	0	0	0	0	0	0	0	0	6
Ectemnius lapidarius Panzer	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ectemnius lituratus Panzer	0	0	2	0	0	0	0	0	0	0	0	0	0	5	0	0	0	6	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnius massiliensis Kohl	0	0	0	0	0	0	0	0	1	0	0	0	0	27	0	0	4	3	1	2	0	0	1	0	3	1	2	0	0	0	0	0	0	0	0
Ectemnius meridionalis Costa	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnius rubicola Dufour	0	0	0	0	1	16	0	0	0	0	0	0	0	12	0	0	1	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
Ectemnius ruficornis Zetterstedt	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0
Ectemnius rugifer Dahlbom	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ectemnius sexcinctus Fabricius	0	0	3	0	0	6	0	0	0	0	0	0	0	4	0	0	0	3	68	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestica clypeata Schreber	3	1	1	0	1	0	11	1	1	1	0	0	0	127	0	0	48	0	24	130	0	1	27	0	2	93	0	1	1	1	5	5	0	0	6
Lestica subterranea Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	16	1	0	8	7	37	10	0	0	0	2	5	1	0	0	0	0	0	0	0	0	0
Mellinus arvensis Linnaeus	0	0	7	0	0	4	0	0	5	1	0	0	1	55	0	0	0	0	43	8	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
Mimesa grandii Maidl	6	0	0	0	0	0	0	0	0	1	0	0	0	2	0	0	2	0	1	0	0	0	1	0	0	1	0	0	0	0	2	0	0	0	1
Mimesa crassipes A.Costa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0
Mimumesa atratina F.Morawitz	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Mimumesa unicolor Van der Linden	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	1	2	0	0	0	0
Psenulus berlandi Beaumont	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psenulus concolor Dahlbom	0	0	10	0	6	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psenulus fulvicornis Schenck	0	0	0	0	5	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psenulus fuscipennis Dahlbom	10	4	78	0	1	8	39	7	8	1	5	4	1	1	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0
Psenulus meridionalis Beaumont	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Psenulus pallipes Panzer	0	0	5	4	0	0	0	1	5	0	0	0	0	2	0	0	1	0	7	4	0	0	1	0	0	23	0	0	0	0	0	0	0	7	0
Psenulus schencki Tournier	2	4	6	0	0	10	0	0	0	0	0	0	0	1	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diodontus friesei Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	46	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diodontus insidiosus Spooner	31	14	0	0	6	8	46	3	1	18	33	1	1	61	0	0	14	25	28	11	0	0	13	0	0	20	0	0	0	0	0	5	1	4	2
Diodontus luperus Shuckard	2	0	2	0	1	15	0	0	0	0	0	0	0	29	1	0	17	0	8	0	0	0	15	0	0	24	1	0	0	0	0	2	0	1	5

	Malaise trap samples													Hand net samples																					
Species	VIL	VIL	Colo	Chav	Vent	Vent	Pard	Smar	Smar	Vian	Vian	Cab	Cab	Landscape unit number																					
	H	V			1	2		B	N	B	N	N	B	5	2	6	15	40	49	74	14	39	55	80	75	51	37	23	68	50	60	36	10	1	84
Diodontus minutus Fabricius	1	0	0	0	0	0	0	0	0	4	12	0	0	0	0	0	0	1	8	12	0	0	38	0	6	91	0	0	1	0	2	0	0	0	0
Diodontus tristis Van der Linden	5	0	0	0	0	3	0	0	0	0	0	0	0	3	0	0	1	18	21	15	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0
Pemphredon austriacus Kohl	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pemphredon inornatus Say	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	9	0	0	1	0	0	0	0	0	0	0	2	0
Pemphredon lethifer Shuckard	14	4	6	1	10	9	1	0	3	8	3	0	2	26	0	0	25	0	10	10	1	0	4	1	1	101	0	0	0	0	0	3	0	0	2
Pemphredon lugens Dahlbom	2	0	3	0	0	0	1	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Pemphredon lugubris Fabricius	0	0	4	2	0	17	0	1	2	0	1	1	0	1	0	0	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pemphredon morio Van der Linden	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pemphredon mortifer Valkeila	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	0	4	1	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0
Pemphredon rugifer Dahlbom	3	1	4	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
Passaloecus brevilabris Wolf	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passaloecus corniger Shuckard	0	0	17	0	1	7	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passaloecus gracilis Curtis	10	4	8	1	4	42	53	4	6	1	3	15	6	5	0	0	2	0	2	5	0	0	1	0	0	17	0	0	0	0	0	2	0	1	0
Passaloecus insignis Van der Linden	0	0	9	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passaloecus pictus Ribaut	4	0	0	0	0	0	3	1	0	2	13	6	6	1	0	0	1	2	4	4	0	0	2	0	0	4	0	0	0	0	0	0	0	0	0
Passaloecus singularis Dahlbom	0	0	23	0	4	15	0	0	0	0	1	0	0	7	0	0	4	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0
Passaloecus turionum Dahlbom	0	0	4	2	0	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Passaloecus vandeli Ribaut	0	0	16	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stigmus pendulus Panzer	0	0	17	0	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stigmus solskyi Morawitz	0	0	4	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	11	0	0	0	0	0	0	1	0	0
Spilomena beata Blüthgen	0	0	2	0	0	21	0	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Spilomena mocsaryi Kohl	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0
Spilomena troglodytes Van der Linden	7	0	5	0	2	13	0	1	7	1	2	4	4	1	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philanthus coronatus Thunberg	2	2	0	0	0	0	0	0	0	0	1	0	0	39	0	0	13	14	15	2	0	0	2	0	0	7	0	0	0	0	0	8	1	0	0
Philanthus dufourii Lucas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	222	0	0	20	0	0	3	0	0	0	0	0	0	0	0	0
Philanthus pulchellus Spinola	18	0	0	0	0	0	0	0	0	37	3	0	0	0	0	0	0	23	97	19	48	0	7	0	0	27	0	0	0	0	5	0	0	0	2
Philanthus triangulum Fabricius	6	1	0	0	0	0	0	0	1	0	0	0	0	3	0	0	2	1	7	64	0	5	20	0	2	146	2	0	0	20	4	1	0	0	1
Philanthus venustus Rossi	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0
Cerceris arenaria Linnaeus	4	3	2	2	2	9	0	16	7	2	10	0	0	252	0	4	154	0	27	9	5	2	14	0	0	24	0	0	0	2	3	13	0	0	1
Cerceris bicincta Klug in Walt	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	2	8	3	0	0	2	1	0	4	0	0	0	0	0	3	0	0	0
Cerceris bupresticida Dufour	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	8	0	7	2	0	0	3	1	0	8	0	0	0	1	1	0	0	0	0
Cerceris circularis Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris dusmeti Giner Marí	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris eryngii Marquet	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cerceris flavicornis Brullé	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cerceris flavilabris Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	4	11	29	10	0	0	2	0	1	7	0	0	0	25	0	1	0	0	0
Cerceris flaviventris Van der Linden	0	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris fimbriata Rossi	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris hortivaga Kohl	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris iberica Schletterer	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	63	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris ibericella Leclercq	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0
Cerceris interrupta Panzer	16	0	0	14	0	2	0	2	0	0	0	1	0	52	0	0	102	0	16	22	0	0	17	1	5	21	0	0	0	0	0	16	0	6	1
Cerceris lunata A. Costa	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris media Klug in Walt	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	2	22	139	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Cerceris quadricincta Panzer	0	0	0	0	0	0	2	9	3	1	0	0	0	290	0	0	127	3	8	35	2	0	4	0	0	16	0	0	0	0	0	0	0	0	0
Cerceris quadrifasciata Panzer	0	0	0	0	0	1	0	0	0	0	0	0	0	29	0	0	0	1	6	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0
Cerceris quinquefasciata Panzer	12	0	1	0	0	0	0	0	0	1	2	0	0	5	0	0	0	0	1	18	0	0	0	0	0	0	0	0	0	0	0	1	2	0	4
Cerceris ruficornis Fabricius	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	14	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris rybyensis Linnaeus	0	0	0	0	0	1	0	0	0	2	1	0	0	88	0	0	1	136	212	6	2	3	3	10	0	10	2	0	0	1	4	5	0	0	0
Cerceris sabulosa Panzer	12	0	0	0	0	2	0	2	0	0	0	0	0	176	0	0	3	29	118	68	3	1	42	0	1	131	1	0	0	12	2	3	0	0	3
Cerceris specularis Costa	0	0	0	0	0	0	0	6	0	1	0	0	0	14	0	0	0	1	10	4	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0
Cerceris tuberculata Villers	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0