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The westernmost locations of *Lasius jensi* SEIFERT, 1982 (Hymenoptera: Formicidae): first records in the Iberian Peninsula

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Abstract

Three populations of *Lasius jensi* SEIFERT, 1982, a temporary social parasite, from two separate regions in Spain were detected. These locations represent the westernmost populations of the species. *Lasius jensi* is a new record for the Iberian Peninsula, bringing the total number of native ant species to 285. Dealate queens were captured with pitfall traps from mid July to mid August. Taking into account the other species present in the three populations, the host species could be *Lasius alienus* (FÖRSTER, 1850), *Lasius grandis* FOREL, 1909 or *Lasius piliferus* SEIFERT, 1992. The zoogeographical significance of those populations, probably a relict from glacial refuge, is briefly discussed.

Key words: Ants, Formicidae, *Lasius jensi*, *Chthonolasius*, Spain, Iberian Peninsula, new record.

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Introduction

Lasius jensi SEIFERT, 1982 belongs to the subgenus *Chthonolasius* RUZSKY, 1912, whose species are temporary social parasites of other *Lasius* FABRICIUS, 1804 species. *Lasius jensi* was described from German material collected at sandy and limestone xerothermous grasslands (SEIFERT 1982). Soon after, this author described the subspecies *Lasius jensi longiceps* SEIFERT, 1988 from the Ukraine, South Russia and Kazakhstan, while the nominal subspecies *L. jensi jensi* SEIFERT, 1982 was known from Armenia, Austria, Belgium, Bulgaria, the Czech Republic, Germany, Greece, Kazakhstan, Poland, Romania, Slovakia, and Turkey (SEIFERT 1988, 2006); *Lasius alienus* (FÖRSTER, 1850) was confirmed as the main host species (SEIFERT 1988, 2007), while *Lasius psammophilus* SEIFERT, 1992 is supposed to be an accessory host (SEIFERT 2007). In addition to Seifert's site reports, *L. jensi* has been found in Hungary (CSÖSZ & al. 2002), in further localities in Belgium (DEKONINCK & al. 2003) and France (GALKOWSKI 2008). Recently, ZRYANIN & ZRYANINA (2007: 235) have raised *L. jensi longiceps* SEIFERT, 1988 to specific status, distinguish it from *Lasius jensi* and report occurrence of the latter from one site in the south of Nishnegorodkskoy Oblast' in Russia.

It is a trivial truism that biogeographical statements are as good as the data on which they are based, and that specific biogeography may be construed as one of the many dimensions of biological species, which grows directly with the effort invested in getting new, perhaps sufficient, distribution data. A fortiori, a distinctive situation occurs at the description of any new species. Its morphological limits and ecological preferences are, by necessity, partial and this is nothing to be criticised. Here we provide a further example, of those statements. It concerns the discovery of the westernmost populations for an otherwise Central and Eastern European and Western Asian ant: *Lasius jensi*.

Materials and methods

Collected material comes from three sites: I) We collected ants in pitfall traps in summer 2010 during fieldwork for a research project on the effect of traditional farming practices in biodiversity conservation in the uplands of the southern slopes of the Cantabrian mountain ranges (northwestern Spain), in the province of León. The ants captured were sorted and identified at species level. One specimen belonged to *Lasius jensi*; II) this prompted a careful search for this species in other material collected using pitfall traps in a nearby area (40 km away) of the same province a few years before. The search was positive and further material was detected; III) a worker of *L. jensi* was identified from material collected by direct sampling in the province of Burgos in July 2010; the locality is 220 km away from the first place.

The species was identified using keys of SEIFERT (1988, 2007). The highly characteristic petiole scale in the worker and queen castes and the profile of the hind tibia were crucial in the naming. Biometry in Iberian specimens fits with-

in the range for the species given by SEIFERT (1988). Photographs were taken using a Panasonic Lumix DMC-FZ 50 with a Raynox MSN- 202 lens. A map was created and photographs processed using Adobe Photoshop.

Results

***Lasius jensi* SEIFERT, 1982** (Figs. 1 - 3)

1. Spain: León, Abelgas de Luna (42° 53' N, 5º 57' W), 13. VII. - 2.VIII.2010, leg. D. Cuesta-Segura, one dealated queen, from pitfall trap in a mountain meadow grazed by cattle, 1410 m a.s.l. According to GALLEGO VALCARCE & al. (1995), the site is included in the Atlantic biogeographical region with a mean annual precipitation of 1238 mm and a mean annual temperature of + 7.5ºC. The snow covers the site several months. The bedrock is limestone, which is outcroping nearby. Other species present: *Lasius grandis* FOREL, 1909, *Lasius mixtus* (NYLANDER, 1846), *Lasius piliferus* SEIFERT, 1992, *Myrmica aloba* FOREL, 1909, *Myrmica sabuleti* MEINERT, 1861, *Myrmica schencki* VIERECK, 1903, *Tapinoma erraticum* (LATREILLE, 1798), and *Tetramorium impurum* (FÖRSTER, 1850) (with males).

2. Spain: León, Redipuertas (43º 02' N, 5º 24 - 26' W), 19.VII. - 1.VIII.2004 and 1. - 15.VIII.2004, leg. D. Cuesta-Segura, two dealate queens, both from pitfall traps in *Calluna* heathland, at two points 3 km apart, 1560 and 1660 m a.s.l. According to GALLEGO VALCARCE & al. (1995), the site is included in the Atlantic biogeographical region with a mean annual precipitation of 1320 mm and a mean annual temperature of + 5.5ºC. The snow covers the site several months. Soil is podsol on various kinds of bedrock. Other species present: *Formica lemani* BONDROIT, 1917, *Formica sanguinea* LATREILLE, 1798, *Lasius grandis*, *Leptothorax acervorum* (FABRICIUS, 1793), *Teleutomyrmex schneideri* KUTTER, 1950, *Temnothorax tuberum* (FABRICIUS, 1775), and *Tetramorium impurum* (with males). These *Calluna* heathlands should have some measure of protection as they are the only known Iberian location of *Teleutomyrmex schneideri* (see ESPADALER & CUESTA 2006).

3. Spain: Burgos, Briviesca (42º 32' N, 3º 19' W), 18. VI.2010, leg. F. García, one worker. The single specimen matches with *Lasius jensi* following both keys from SEIFERT (1988, 2007). Biometric measures made were: scape length / cephalic size (SL / CS) = 1.014, maximum scape diameter at midpoint / minimum scape diameter at midpoint (SMAX / SMIN) = 1.83, length of longest hair on dorsal face of first gaster tergite (GHL) = 100 (this is the only measurement that is slightly outside the known range for *L. jensi*), number of standing hairs protruding the extensor profile of hind tibia (nHHT) = 27, average pubescence distance on dorsal area of first gaster tergite (PDG) = 11.2, and average pubescence distance in front of mid ocellus (PDF) = 10. The petiole profile matches with the second one shown in the figure 30 of SEIFERT (1988). Precise habitat unknown as the material was collected over a surface of 0.08 km^2 with an old pine plantation, *Genista* sp. scrub and open areas with grasses and bareground on sandstone bedrock, 790 m a.s.l. The site is included in the Mediterranean biogeographical region with a mean annual precipitation of 646 mm and a mean annual temperature of + 11ºC (SIGMAPA 2011 [Station: Briviesca; key: 9030U]). The winters are cold and the summers fresh. Other species present: *Aphaenogaster iberica* EMERY, 1908, *Camponotus piceus* (LEACH, 1825), *Crematogaster auberti* EMERY, 1869, *Formica pratensis* RETZIUS, 1783, *Lasius alienus*, *Lasius grandis*, *Messor capitatus* (LATREILLE, 1798), *Solenopsis* sp., *Tapinoma nigerrimum* (NYLANDER, 1856), and *Tetramorium caespitum* (LINNAEUS, 1758) group.

This locality presents an interesting combination of typically Atlantic and typically Mediterranean ant species. In Central Europe (SEIFERT 1988), *Lasius jensi* inhabits more xeric habitats than other *Chthonolasius* species. In nearby localities, *Lasius umbratus* (NYLANDER, 1846) was also found, Briviesca being the driest habitat where *Chthonolasius* species were located.

Discussion

The presence of *Lasius jensi* in Spain is initially surprising because the species was considered biogeographically to be a Central and Eastern European and Western Asian ant. The previous westernmost locality of distribution was Dieppe in France (GALKOWSKI 2008) (Fig. 3). Thus, the extremes in the known distribution are Abelgas de Luna in León, Spain (42º 53' N, 5º 57' W), Dilijan / Delizhan in Armenia (40º 40' N, 45º E; SEIFERT 1988), Urazovka in Nizhegorodoskaya Oblast, Russia (55º 24' N, 45º 37' E; ZRYANIN & ZRYANINA 2007) and the Saur Mountains in East Kazakhstan at 47° 20' N, 85° 31' E (SEIFERT 2006).

According to the biogeographical provinces defined in FAUNA EUROPAEA (2010), the species is present in the Alpine, Atlantic, Continental, Mediterranean, and Steppic provinces. This is a heterogeneous set, although the ecological characteristics of the sites (at the local scale) where *Lasius jensi* is present are quite similar, independently of the biogeographical province (SEIFERT 2006). It is known that for a given chorological area longitude is generally broader than latitude (CAIN 1944), because climate is more influenced by latitude than by longitude. We are unaware of any biogeographical pattern matching the known distribution of *L. jensi*, although some model projections of climate suitability of rodent species in Europe during the last glacial maximum (cf. Fig. 2 in FLØJGAARD & al. 2009) for *Microtus agrestis* (LINNAEUS, 1761) approach its distribution. Its host *Lasius alienus* is the most abundant and most widely distributed species of the West Palaearctic *L. alienus* complex (SEIFERT 1992), and this would not be a limit to the presence of *L. jensi*. Instead, we suggest this is due to insufficient field work. Similarly, there are wide gaps among the known locations, as the 900 km between Dieppe (France) and Briviesca (Spain). SEIFERT (1988) was right when he wrote, in his *Chthonolasius* revision, on the distribution of *L. jensi*, "The species has a much wider range than earlier believed and is not rare." We cannot but concur.

Why is the Spanish population zoogeographically remarkable? During the harsh climatic glacial episodes of the Quaternary (2.6 million years b.p.) many species with low tolerances for cold climates were pushed to southern temperate regions and became restricted to the Mediterranean peninsulas – Iberia, Italy, the Balkans (HEWITT 1996, 1999). From there, populations expanded during the postglacial warming period. Mountainous areas of southern Europe were also critical for the survival of biota in Europe through glacial periods because their high relief offered scope for altitudinal range shifts in response to major climatic changes (BENNETT & al. 1991). Recently, the simplified vision of those three major southern refugia has been refined to give a more complex picture in which multiple,

Figs. 1 - 2: Queen of *Lasius jensi* from Redipuertas (Spain). (1) Rear view of petiolar scale, with the characteristic parallel sides and dent-like projection in the median part of the dorsal crest. (2) Lateral view of the hind leg, with its distinctive depression at the internal border of the tibia (nHHT = 16).

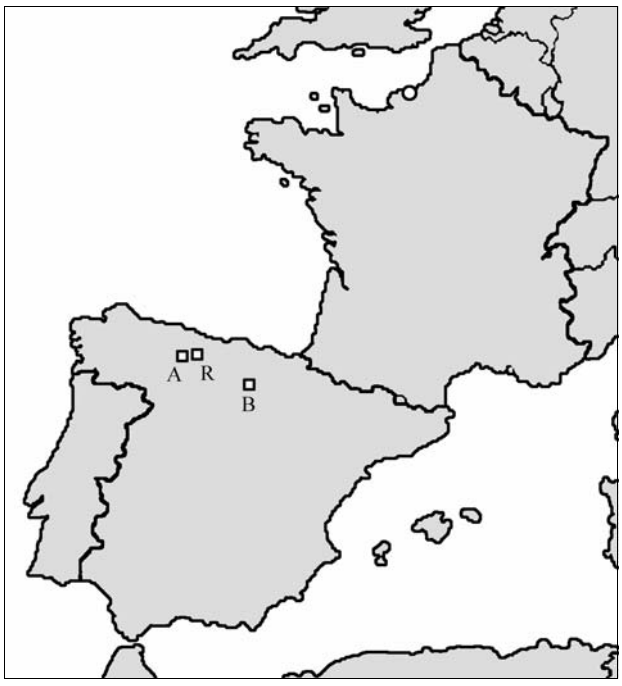

Fig. 3: The westernmost locations of *Lasius jensi*. Dieppe, France (circle); Abelgas de Luna (A), Redipuertas (R) and Briviesca (B), Spain (squares).

but smaller in area, southern refugia (MÉDAIL & DIADEMA 2009) could be the source for recolonization of North and Central Europe. In particular, the Cantabric mountain ranges have been identified as potential location of refugia for Mediterranean species (LÓPEZ DE HEREDIA & al. 2007). The abundance of *Lasius jensi* strongly declines from Central Europe to the west (France and Belgium). This picture makes it very likely that postglacial invasion into Central Europe started mainly from a Balkan refuge and that a Spanish population south of the Pyrenees should have spread from a separate South Iberian refuge. The thin French and Belgian populations could then have invaded from either an Iberian or a Balkan refuge. Expansion out of Iberia towards western France has been suggested for tawny owl (*Strix aluco* LINNAEUS, 1758) (see BRITO 2005). An alternative hypothesis involving cryptic, northern refugia (PROVAN & BENNET 2008) for Central or Northern European species is not to dismiss.

Lasius alienus is the only host of *Lasius jensi* confirmed by direct evidence (SEIFERT 1988, 2007). *Lasius alienus* and *Lasius grandis* were present in Briviesca; *L. grandis* and *Lasius piliferus* were present in Abelgas de Luna; and only *L. grandis* was detected in Redipuertas. The absence of *L. alienus* at both sites must be verified with new prospections. The host(s) of *L. jensi* in Spain is (are) thus unclear: *L. alienus*, *L. grandis* and *L. piliferus* are the candidates.

Flying dates: We captured dealate queens in pitfall traps from mid July to mid August. These dates are fully within main flight period determined for the species: SEIFERT (2006) evaluated 46 flights in Central Europe and found as mean and standard deviation 28 July ± 20 days and a total range from 23 June to 8 October. CZECHOWSKI & al. (2002) gave mid July to early September for Poland, DEKONINCK & al. (2003) June to September for Belgium and GALKOWSKI (2008) September for France. It seems that there are no significant differences between the countries be it lowland habitats at 49 - 52° N or mountain habitats at 40 - 43° N.

Distribution of parasitic species also depends on the distribution of their hosts, and since *Chthonolasius* species may have several hosts (mean ± s.d.: 2 ± 1.55; range: 1 - 6; JANDA & al. 2004) the distribution of the parasite may become very wide ranging. Parasitic species are uncommon in the field, and rare in collections. With this addition, the number of native ants recorded in the Iberian Peninsula is 285 species. However, we strongly expect this number of species to increase in a near future, due to the collective effort within the Myrmecology Iberian Association (AIM) and the enthusiasm of its members. The region still has many gaps with no myrmecological information, and scarce resources are currently available for these purposes. An improved effort at field sampling usually yields important addition to faunal lists, as has been proved by the recent findings of *Myrmica karavajevi* ARNOLDI, 1930 (see ESPADALER & al. 2004), *Teleutomyrmex schneideri* (see ESPADALER & CUESTA 2006) or *Myrmica bibikoffi* KUTTER, 1963 (see GARCÍA & al. 2008) in peninsular Spain.

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