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On the distribution of *Astrobunus laevipes* CANESTRINI, 1872 (Arachnida: Opiliones) in Central Europe

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Abstract: Published data and unpublished communications show that the range of *Astrobunus laevipes* in Central Europe is much larger than previously believed. The present review extends the list of records to the German states of Baden-Württemberg, Hessia, Rhineland-Palatinate, Bavaria, Northrhine-Westfalia, Saxony, and Lower Saxony and provides a map of the present distribution in Germany. Furthermore, it lists new findings of *A. laevipes* in the Czech Republic and Hungary (Rakaca/Serehat Valley). Records of *A. laevipes* in Austria are not included in this review.

INTRODUCTION

Astrobunus laevipes was first recorded in Germany in Dresden (HERBST 1799, under *Opilio spinosus*). An additional and isolated finding was reported by Höregott (cited in MARTENS 1978) in Mainz (Rhineland-Palatinate). MARTENS (1978) stated that the distribution of the thermophile harvestman *A. laevipes* in Central Europe is limited to the countries of the Carpathians, the Hungarian lowland including the valleys of the rivers Elbe and Danube, and the plains of the river Po, with an isolated population in Mainz, Germany. However, more recent publications as well as our present data show that the range is much larger than previously believed and that the population around Mainz is not isolated. We present here a summary of all records of *A. laevipes* in Germany, the Czech Republic and Hungary, including a characterisation of the biotopes where we have found the species ourselves. These data can serve as a base for further studies in this species.

RESULTS

The new records of *A. laevipes* are summarised in Table 1 and shown in Figure 1. A colour version of the map indicating topographical features can be found at http://www.spiderling.de.vu/. The majority of the new findings

presented here were obtained from pitfall traps. As the records are the result of occasional sampling in studies of numerous investigators no standard methods can be described. The single female obtained at Karlsruhe-Grötzingen was found on April 7th, 1994 under a stone between a hedge and a narrow pass during manual sampling. The locality is situated in a limestone area (Middle Triassic: shell limestone) between vineyards and orchards. Similarly, the findings at the "Drachenfelser Ländchen", near Bonn also were made near vineyards (Trachyt-Rigosol mixed with stony loam), where over 140 individuals were pitfall-trapped in the surrounding undergrowth between March 27th and October 10th, 1996.

DISCUSSION

At present the known distribution of *A. laevipes* suggests an isolated occurrence/population in western Germany. But this might only be an artefact of insufficient knowledge. The map given by MARTENS (1978) as well as our presented data (Tab. 1, Fig.1) suggests that *A. laevipes* mainly used the valleys of the big streams for spreading to the south. The question is where and when the species was able to overcome the distance between the river systems of the Danube and the rivers flowing into the North Sea. The first step was to cross the Bohemian depression, a very warm area containing many southeast European floristic (e. g. *Iris aphylla*) and faunistic elements. Although our knowledge has increased, it remains uncertain how *A. laevipes* was able to overcome the distance between the river systems of the Elbe and the Rhine. There are at least three possibilities:

1. Along the northern border of the highlands
2. Across Thuringia along Saale-Rodach into the Main valley
3. Along the Danube and later either across Altmühl-Regnitz, Altmühl-Tauber or Wörnitz-Jagst.

The first possibility avoids overcoming highlands, but would be an unusual route for southeast European elements. The second route demands transition of the Thuringian Forest, a rather cold area, but this route is mostly supported by the presently known records. The third possibility is a well-known route for several southeast European elements, which occur either in the Jagst- or the Tauber-valley (e. g. the millipede *Mastigona bosniense*, SPELDA 1999). However we have no records of *A. laevipes* from the Bavarian part of the Danube river system, which might support this route.

Table 1: Records of *Astrobunus laevipes* CANESTRINI, 1872 in Germany, the Czech Republic and Hungary.

Country	State	Locality	MTB-grid	Reference
Germany	Baden Württemberg	Hoehberg, near Werbach and Tauber-bischofsheim	6323-4	1987, leg. Raqué, det. Harms* vid. Rausch cited in BAUMANN et al. (1992) vid. Spelda
		„Schwabenheimer Insel" near Heidelberg	6517-4	1987, leg. Raqué, det. Harms, vid. Rausch*
		N of Grötzingen, 7 km E of Karlsruhe	6917-3	1994, Spelda#
	Hessia	Near Offenbach	5818/5918	LANG et al. (1993)
		Botanical Garden, Frankfurt/Main	5817-4	1991, Malten*
		NSG (Nature Reserve) "Lorcher Werth", County of Rheingau-Taunus	5912-2	1993, Malten*
		Riverbanks of the Main, W of Kelsterbach	5917-1	1999, 2000, Malten*
		Cityforest Frankfurt/Main	5918-1	2000, Malten*
		Cityforest Frankfurt/Main, Monte Scherbelino ("alter Müllberg")	5918-1	
		Frankfurt/Main E and Riverbanks of the Nidda, Franfurt/Main–Berkersheim	5818-1	
	Rhineland-Palantinate	„Gonsenheimer Sand", Forest of Gonsenheim, near Mainz	5915-3	HÖREGOTT (1963), cited in MARTENS (1978)
		NSG "Sandlache" near Ingelheim, County of Mainz-Bingen	5914-3	1995, Malten*
		"Bopparder Hamm",	5711-2	2000, Jakobs*
	Bavaria	Riverbanks of the Main near Klingenberg	6221-1	BAUMANN et al. (1992)
		Riverbanks of the Main near Klingenberg	6221-1	LANG et al. (1993); same record as previous one
		Riverbanks of the Main in S-Trennfeld and Trennfeld-Sand near Wertheim,	6223-2	2000, Stumpf*
		Riverbanks of the Main in Erlenbach near Wörth	6120-4	
	Northrhine-Westfalia	"Drachenfelser Ländchen", 20 km S of Bonn	5309-1	1996, Höfer#

* = unpublished

= recorded here for the first time

Country	State	Locality	MTB-grid	Reference
Germany	Saxony-Anhalt	Dübener Heide	4340-1/2	BLISS (1993), BLISS (1990) and BLISS & TIETZE (1984), both cited in BLISS (1993)
		NSG "Porphyrlandschaft bei Gimritz"	4437-1	BLISS (1993), SCHNITTER (1991) cited in BLISS (1991)
		Sennewitz	4437-4	BLISS (1993), LANG (1989) and BLISS (1991b) both cited in BLISS (1993)
	Saxony	Dresden	4949-3	HERBST (1799), cited in MARTENS 1978 and BLISS (1993)
		Schlottwitz, "Hohler Stein	5148-2	Schiemenz, cited in MARTENS (1978) and BLISS (1993)
		Kunzwerda/Torgau (Elbaue)	4444-3	Tietze, cited in MARTENS (1978) and Bliss (1993)
		Freital-Zauckerode	4947-4	BLISS (1993)
		"Götzenbusch", Freital	5047-4	
		NSG "Pillnitzer Elbinsel", Dresden	4949-3	
		Prositz "Ketzerbachtal"	4846-1	
		NSG "Ziegenbusch"	4847-1	
		Falkenberg	4342-4	
		"Wachtelberg"	4642-1	
		Wölpern, NSG "Torfwiesen"	4541-4	
Czech Republic		Povrly, near Ùsti nad Labem	5350-2	KLIMEŠ & ROUŠAR (1998)
		Lipenec, near Louny	5648-3	
		South Moravia: Pálava: Devin, National Nature Reserve of Ranšpurk, Nature Reserve of Krivé jezero, Nature Reserve of Slanisko	6573-2 referred to as Krivé	
		South Moravia	not to classify	KRISTEK (1991) and BEZDĚCKA & ROZKOŠÝ (1995) both cited in KLIMEŠ & ROUŠAR (1998)
Hungary		River valley of river Rakaca–Cserehát	not to classify	BOKOR (1996)

* = unpublished

= recorded here for the first time

Although MARTENS (1978) discusses the possibility of a spreading in recent times when deforestation took place it is as well possible, that the species invaded its western range just after the last glaciation before the forest had covered most parts of Germany. Or it could have invaded its range along the streams, which cause open areas along their borders by flooding. The latter possibility does not restrict the spreading to a special period.

Astrobunus laevipes often has been confused with *A. bernardinus* (SCHENKEL 1926). They are believed to be sibling species (MARTENS 1978), and it is possible that these species hybridise in the Southern Alps. However there are clear differences in the ecology of the two species. *Astrobunus laevipes* is confined to low altitudes, while *A. bernardinus* has an alpine distribution, even occurring above the timberline. It has a wide range of habitats, but avoids dry, open, southern slopes. Another species occurring parapatric to both *A. laevipes* and *A. bernardinus* is *A. helleri*, occurring in the central and eastern parts of the Alps (KOMPOSCH 1997, 1999). It is very likely that the distribution of all three species is influenced by competition. *Astrobunus laevipes* and *A. bernardinus* seldomly occur in sympatry (Drau-valley near Spittal, leg. Ausobsky cited in MARTENS 1978). In areas where *A. helleri* and *A. laevipes* occur sympatric, *A. helleri* inhabits the higher altitudes but, in contrast to *A. bernardinus*, avoids the alpine region. It is very likely, that all three species arose from a single ancestor during the Pleistocene. To test this hypothesis, explain the present distribution of *A. laevipes*, and the relationship between populations we need further investigations and a phylogenetic analysis of this species.

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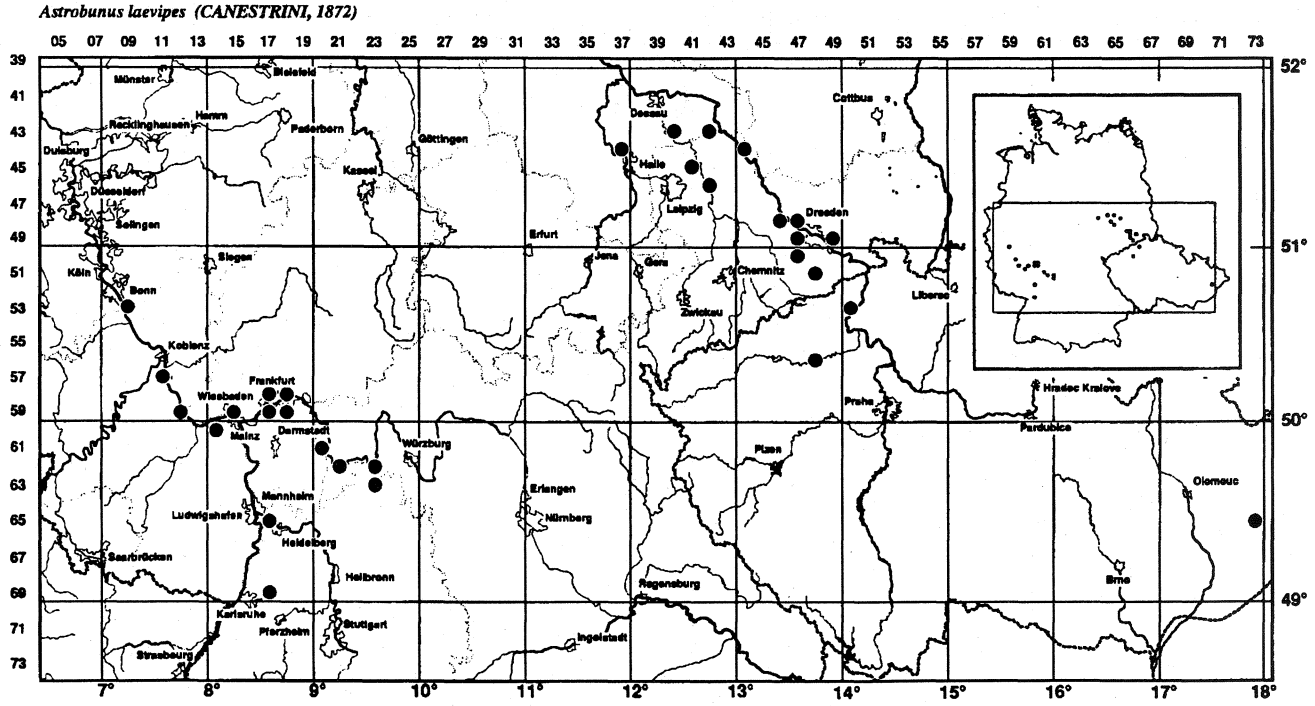

Figure 1: Distribution map of *Astrobunus laevipes* CANESTRINI, 1872 in Germany and in the Czech Republic.

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