

***Aradus (Aradus) brenskei* Reuter, 1884 (Heteroptera: Aradidae), a new barkbug for Belgium**

Berend AUKEMA¹, Brecht VERKEMPINCK² & Robin VAN HEGHE³

¹ Naturalis Biodiversity Centre, P.O. Box 9517, 2300 RA Leiden, the Netherlands
(e-mail: berend.aukema@naturalis.nl). Corresponding author

² Erfken 5, 9340 Lede, Belgium (e-mail: verkempinckbrecht@gmail.com)

³ Regionaal Landschap Schelde-Durme, Markt 1, 9230 Wetteren, Belgium (e-mail: robinvanheghe@gmail.com)

Abstract

Eight species of Aradidae are listed from Belgium. *Aradus (Aradus) brenskei* Reuter, 1884 is added here to the Belgian list. It is locally common on mainly poplar trees infested by the tinder fungus *Fomes fomentarius* (L.) Fr., 1849 in a small part of the province of East Flanders. Diagnostic characters, distribution and biology of the species are summarized. The habitat of the new species, however, is threatened by the removal of poplar plantations in the area.

Keywords: distribution, *Fomes fomentarius*, host tree removal, poplar trees

Samenvatting

In België zijn acht soorten Aradidae waargenomen. *Aradus (Aradus) brenskei* Reuter, 1884 wordt hier toegevoegd aan de Belgische lijst. Ze komt in een klein deel van de provincie Oost-Vlaanderen voor op door tonderzwam *Fomes fomentarius* (L.) Fr., 1849 aangetaste loofbomen, met name populieren. Diagnostische kenmerken, verspreiding en biologie van de soort worden samengevat. Het leefgebied van de nieuwe soort wordt echter bedreigd door het rooien van populierenbossen in de regio.

Résumé

Huit espèces d'Aradidae sont répertoriées en Belgique. *Aradus (Aradus) brenskei* Reuter, 1884 est ajouté ici à la liste belge. Il est localement, à savoir dans une partie limitée de la province de Flandre orientale, commun sur les arbres feuillus, en particulier des peupliers, infestés par l'amadouvier *Fomes fomentarius* (L.) Fr., 1849. Les caractéristiques diagnostiques, la distribution et la biologie de l'espèce sont résumées. L'habitat de cette nouvelle espèce est toutefois menacé par l'élimination des plantations de peupliers dans la région.

Introduction

Aradidae, barkbugs or flatbugs almost exclusively live under or on the bark of decaying trees, feeding from fungal mycelia and carpophores. For the Belgian fauna currently eight species of Aradidae are listed: *Aneurus (Aneurodus) avenius* (Dufour, 1833), *A. (Aneurus) laevis* (Fabricius, 1775), *Aradus (Aradus) betulae* (Linnaeus, 1758), *A. (A.) cinnamomeus* Panzer, 1806, *A. (A.) corticalis* (Linnaeus, 1758), *A. (A.) depressus* (Fabricius, 1794), *A. (A.) signaticornis* R.F. Sahlberg, 1848 and *A. (A.) versicolor* Herrich-Schaeffer, 1835 (BOSMANS & PÉRICART, 1982; SCHMITZ, 1986; BAUGNÉE *et al.*, 2003). Two of those, *A. betulae* and *A. corticalis*, however, have not been recorded for more than a century (LETHIERRY, 1882) and thus can be considered as extinct.



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Fig. 1. *Aradus brenskei*, ♂. © Theodoor Heijerman.

Fig. 2. *Aradus brenskei*, ♀. © Theodoor Heijerman.

Here we present the first records in Belgium of *Aradus* (*Aradus*) *brenskei* Reuter, 1884 (Figs 1–2). The five-year old daughter of the second author discovered the first specimen on May 7, 2020 in their garden at Lede in the central part of the Province East Flanders (50.9627°N 3.9615°E) on a play table made of a stump of a fallen poplar tree on which two fruitbodies of the tinder fungus *Fomes fomentarius* (L.) Fr., 1849 appeared. A small population of the barkbug developed on this table and the second and third author started a survey on *Fomes* infested trees in the vicinity. This resulted in finding more than one thousand individuals at 78 locations (Table 1, see also VERKEMPINCK *et al.*, in press).

Material and methods

Body measurements were taken from ten randomly selected males and females collected on 3–4 August 2020 from populations in and near Lede. Measurements were made with an Olympus SZX10 stereomicroscope equipped with an ocular micrometer eyepiece, using the following magnifications: 8 times for body length and body width, 20 times for head width, vertex width, pronotum length and pronotum width, and 50 times for length of antennal segments.

The following voucher specimens were mounted and deposited in the collections of the Institut royal des Sciences naturelles de Belgique, Brussels, Belgium (RBINS), Naturalis Biodiversity Centre, Leiden, the Netherlands (RMNH) and in the collection of the first author (all remaining ones). Belgium, Oost-Vlaanderen. Lede, 50.96297°N 3.9615°E, 16.V.2020, 1♀ from *Populus*, B. Verkempinck; Ibid., 19.V.2020, 1♂, 1♀; Ibid., 3.VIII.2020, 8♂♂, 1♀ (3♂♂ RBINS, 3♂♂ RMNH). Lede, 50.95056°N 3.93469°E, 3.VIII.2020, 5♂♂, 1♀ from *Fagus*, Lede, 50.9601°N 3.9749°E, 3.VIII.2020, 1♂ from *Prunus*, Lede, Impe, 50.9525°N 3.9528°E, 4.VIII.2020, R. Van Heghe, 1♂, 4♀♀ from *Salix* (2♀♀ RBINS), Erpe-Mere, 50.9494°N 3.9553°E, 4.VIII.2020, R. Van Heghe, 3♂♂, 4♀♀ from *Populus* (2♀♀ RBINS).

Table 1. Locations, sample dates, host trees and number of specimens (N) of *Aradus brenskei*.

No.	Locality	Coordinates	Date	Tree	N
1	Lede	50.96297°N 3.9615°E	7.V.2020	<i>Populus</i>	78
2	Lede	50.96268°N 3.95571°E	22.V.2020	<i>Populus</i>	11
3	Lede	50.96641°N 3.95682°E	27.V.2020	<i>Populus</i>	38
4	Lede	50.96255°N 3.95901°E	27.V.2020	<i>Populus</i>	42
5	Lede	50.95260°N 3.95270°E	30.V.2020	<i>Salix</i>	12
6	Lede (Impe)	50.95223°N 3.95373°E	30.V.2020	<i>Populus</i>	9
7	Aalst	50.95290°N 4.00110°E	6.VI.2020	<i>Populus</i>	1
8	Aalst	50.95210°N 4.00359°E	6.VI.2020	<i>Populus</i>	1
9	Aalst	50.95202°N 4.00381°E	6.VI.2020	<i>Populus</i>	4
10	Aalst	50.95050°N 4.00469°E	6.VI.2020	<i>Populus</i>	1
11	Lede	50.96255°N 3.95877°E	6.VI.2020	<i>Populus</i>	1
12	Lede	50.96200°N 3.95866°E	6.VI.2020	<i>Populus</i>	24
13	Erpe-Mere (Erpe)	50.95200°N 3.97660°E	9.VI.2020	<i>Populus</i>	6
14	Lede	50.94988°N 3.95679°E	9.VI.2020	<i>Salix</i>	8
15	Lede	50.95048°N 3.95777°E	9.VI.2020	<i>Populus</i>	2
16	Lede	50.95240°N 3.95451°E	9.VI.2020	<i>Populus</i>	2

No.	Locality	Coordinates	Date	Tree	N
17	Lede	50.94940°N 3.95510°E	9.VI.2020	<i>Populus</i>	3
18	Lede	50.95420°N 3.95300°E	9.VI.2020	<i>Populus</i>	2
19	Berlare	51.04680°N 3.99523°E	15.VI.2020	<i>Populus</i>	7
20	Berlare	51.04700°N 3.99530°E	15.VI.2020	<i>Populus</i>	8
21	Berlare	51.04660°N 3.99580°E	15.VI.2020	<i>Populus</i>	26
22	Berlare	51.04650°N 3.99580°E	15.VI.2020	<i>Populus</i>	1
23	Berlare	51.02385°N 3.97374°E	15.VI.2020	<i>Populus</i>	10
24	Lede (Oordegem)	50.95056°N 3.93469°E	07.VII.2020	<i>Fagus</i>	103
25	Lede	50.96010°N 3.97490°E	08.VII.2020	<i>Prunus</i>	35
26	Lede	50.96127°N 3.98012°E	08.VII.2020	<i>Prunus</i>	4
27	Erpe-Mere (Erondegem)	50.94580°N 3.95300°E	09.VII.2020	<i>Salix</i>	1
28	Lede (Oordegem)	50.96370°N 3.90990°E	12.VII.2020	<i>Populus</i>	243
29	Wetteren (Westrem)	50.96930°N 3.87800°E	24.VII.2020	<i>Populus</i>	5
30	Erpe-Mere (Erpe)	50.95170°N 3.97700°E	25.VII.2020	<i>Populus</i>	11
31	Erpe-Mere (Erpe)	50.95160°N 3.97710°E	25.VII.2020	<i>Populus</i>	6
32	Erpe-Mere (Erpe)	50.95150°N 3.97720°E	25.VII.2020	<i>Populus</i>	29
33	Lede	50.96550°N 3.95855°E	26.VII.2020	<i>Populus</i>	8
34	Berlare	51.03560°N 3.97970°E	30.VII.2020	<i>Populus</i>	1
35	Berlare	51.03270°N 3.98010°E	30.VII.2020	<i>Populus</i>	28
36	Berlare	51.03780°N 3.97460°E	30.VII.2020	<i>Populus</i>	3
37	Berlare	51.02400°N 4.00050°E	31.VII.2020	<i>Fagus</i>	1
38	Wetteren (Massemen)	50.98140°N 3.88190°E	06.VIII.2020	<i>Populus</i>	10
39	Wetteren	51.00740°N 3.89960°E	07.VIII.2020	<i>Quercus</i>	25
40	Lede	50.96320°N 3.95950°E	07.VIII.2020	<i>Populus</i>	3
41	Lede	50.96276°N 3.95922°E	16.VIII.2020	<i>Populus</i>	11
42	Erpe-Mere	50.95130°N 3.99350°E	17.VIII.2020	<i>Populus</i>	1
43	Lede	50.95190°N 4.00220°E	17.VIII.2020	<i>Populus</i>	1
44	Lede	50.94715°N 3.95549°E	17.VIII.2020	<i>Populus</i>	1
45	Lede	50.94711°N 3.95545°E	17.VIII.2020	<i>Populus</i>	4
46	Lede	50.94950°N 3.95500°E	17.VIII.2020	<i>Populus</i>	6
47	Lede	50.95046°N 3.95488°E	17.VIII.2020	<i>Populus</i>	1
48	Lede	50.95230°N 3.95430°E	17.VIII.2020	<i>Populus</i>	8
49	Lede	50.95285°N 3.95442°E	17.VIII.2020	<i>Populus</i>	1
50	Lede	50.95370°N 3.95680°E	17.VIII.2020	<i>Populus</i>	12
51	Wichelen	51.00618°N 3.95648°E	17.VIII.2020	<i>Populus</i>	60
52	Lede	50.97500°N 4.00850°E	19.VIII.2020	<i>Populus</i>	2
53	Lede	50.96199°N 3.95974°E	20.VIII.2020	<i>Populus</i>	1

No.	Locality	Coordinates	Date	Tree	N
54	Aalst (Hofstade)	50.96030°N 4.01740°E	21.VIII.2020	<i>Populus</i>	7
55	Aalst (Hofstade)	50.96010°N 4.01729°E	21.VIII.2020	<i>Populus</i>	13
56	Aalst (Hofstade)	50.96010°N 4.01740°E	21.VIII.2020	<i>Populus</i>	8
57	Aalst (Hofstade)	50.96010°N 4.01740°E	21.VIII.2020	<i>Populus</i>	2
58	Berlare	51.03960°N 3.97330°E	22.VIII.2020	<i>Populus</i>	17
59	Berlare	51.03890°N 3.97300°E	22.VIII.2020	<i>Alnus</i>	2
60	Berlare	51.02410°N 3.96680°E	23.VIII.2020	<i>Salix</i>	21
61	Wetteren	51.01410°N 3.89740°E	31.VIII.2020	<i>Populus</i>	3
62	Lede	50.96260°N 3.95880°E	31.VIII.2020	<i>Populus</i>	1
63	Lede (Smetlede)	50.96780°N 3.94540°E	02.IX.2020	<i>Populus</i>	2
64	Lede (Smetlede)	50.96810°N 3.94500°E	02.IX.2020	<i>Populus</i>	1
65	Lede (Smetlede)	50.96750°N 3.94510°E	02.IX.2020	<i>Populus</i>	2
66	Wichelen (Serskamp)	50.98060°N 3.92040°E	06.IX.2020	<i>Populus</i>	1
67	Lede (Smetlede)	50.96990°N 3.90230°E	15.IX.2020	<i>Populus</i>	15
68	Lede (Smetlede)	50.96970°N 3.90210°E	15.IX.2020	<i>Populus</i>	6
69	Wetteren (Massemen)	50.96980°N 3.87770°E	15.IX.2020	<i>Populus</i>	14
70	Wetteren (Massemen)	50.97000°N 3.87740°E	15.IX.2020	<i>Populus</i>	17
71	Lede	50.96750°N 3.97060°E	21.IX.2020	<i>Tilia</i>	9
72	Lede	50.96260°N 3.95920°E	29.IX.2020	<i>Populus</i>	3
73	Lede	50.96780°N 3.99360°E	03.X.2020	<i>Aesculus</i>	9
74	Lede	50.95500°N 3.96990°E	12.X.2020	<i>Populus</i>	4
75	Lede	50.95510°N 3.96990°E	14.X.2020	<i>Populus</i>	12
76	Lede	50.95500°N 3.97010°E	14.X.2020	<i>Populus</i>	4
77	Lede	50.95510°N 3.97010°E	14.X.2020	<i>Populus</i>	1
78	Lede	50.95480°N 3.97000°E	14.X.2020	<i>Populus</i>	13

Taxonomy

Aradus brenskei (Figs 1–2) belongs to the so-called *Aradus betulae* group, a group of nine closely related species, which are characterized by their relatively large size (8–11 mm), yellowish brown coloration with dark brown markings, slightly thickened and relatively large antennal segment II, largely white coloured segment III, and the distinct white tubercles on legs and antennal segment II (HEISS & PÉRICART, 2007). From this group four are known from the surrounding countries of Belgium: *A. betulae* (Linnaeus, 1957) from France, Germany and the Netherlands, *A. brenskei* from France, *A. krueperi* Reuter, 1884 from France and Germany, and *A. ribauti* Wagner, 1956 from France and Germany (HEISS, 2001). In France, *A. brenskei* was recorded from nine departments, but only two of which are in Northern France: Oise and Île-de-France. Sky-wide, the nearest locality from the Belgian records is Les beaux Monts in Compiègne at a distance of about 190 km, where *A. brenskei* was collected in 2009 (PARMAIN *et al.*, 2013).



Fig. 3. Paramere of *Aradus brenskei*. © Theodoor Heijerman.

Fig. 4. Terminal abdominal segments of female *Aradus brenskei*. © Theodoor Heijerman.

Identification

The species of the *Aradus betulae* group can be identified by the length of the antennae and the antennal segments, the colouration of the third antennal segment, the parameres of the males (Fig. 3) and the morphology of the terminal segments of the females (Fig. 4) (HEISS & PÉRICART, 2007). *Aradus brenskei* is one of the larger species of the group with longer antennae and an almost entirely yellow third antennal segment. A detailed description of the species is given by HEISS in HEISS & PÉRICART (2007). Measurements of 10 males and 10 females from the Belgian populations were taken (table 2) to establish the amount of variation and to carry out a comparison with the measures that accompany the description and that are used in the identification key in HEISS & PÉRICART (2007). In general, however, carrying out a comparison



Fig. 5. Fifth instar larva, ♀. © Theodoor Heijerman.

of the measurements with the published data is difficult, because in the latter the number of specimens on which they are based is not given and only ranges are included. An important character in the identification key for species of the *Aradus betulae* group is the ratio between the length of the second and third antennal segment, given as 2.65–2.90 mm for males and females by HEISS & PÉRICART (2007). We measured 2.61–2.81 mm for males and 2.59–2.66 mm for females, confirming the published ratios, which are used to characterize the species.

The fifth larval instar (Fig. 5) is described by VÁSÁRHELYI (1986) and HEISS & PÉRICART (2007). Just like the adults they possess the distinct white tubercles on legs and antennal segment II and a remarkably contrasting blackish brown last antennal segment.

Distribution

Aradus brenskei is a rare South European and Ponto-Mediterranean species known in Europe (Fig. 6) from Albania, Austria, Belgium, Bosnia-Herzegovina, Bulgaria, Croatia, the Czech Republic, France, Greece, Hungary, Italy (including Sardinia and Sicily), Montenegro, Romania, Slovakia, Spain and Ukraine, in the Middle East from Iran and Turkey and in the Caucasus from Azerbaijan (HEISS & PÉRICART, 2007). Old specimens of the species from Denmark, collected in 1849 and 1857, were described by GYLLENSVÄRD (1965) as *A. longirostris* and later synonymized with *A. brenskei* by KANYUKOVA (1984). As *A. brenskei* has a southern distribution and no further records from Denmark are known to date, they are assumed to be mislabelled (HEISS, 2001).

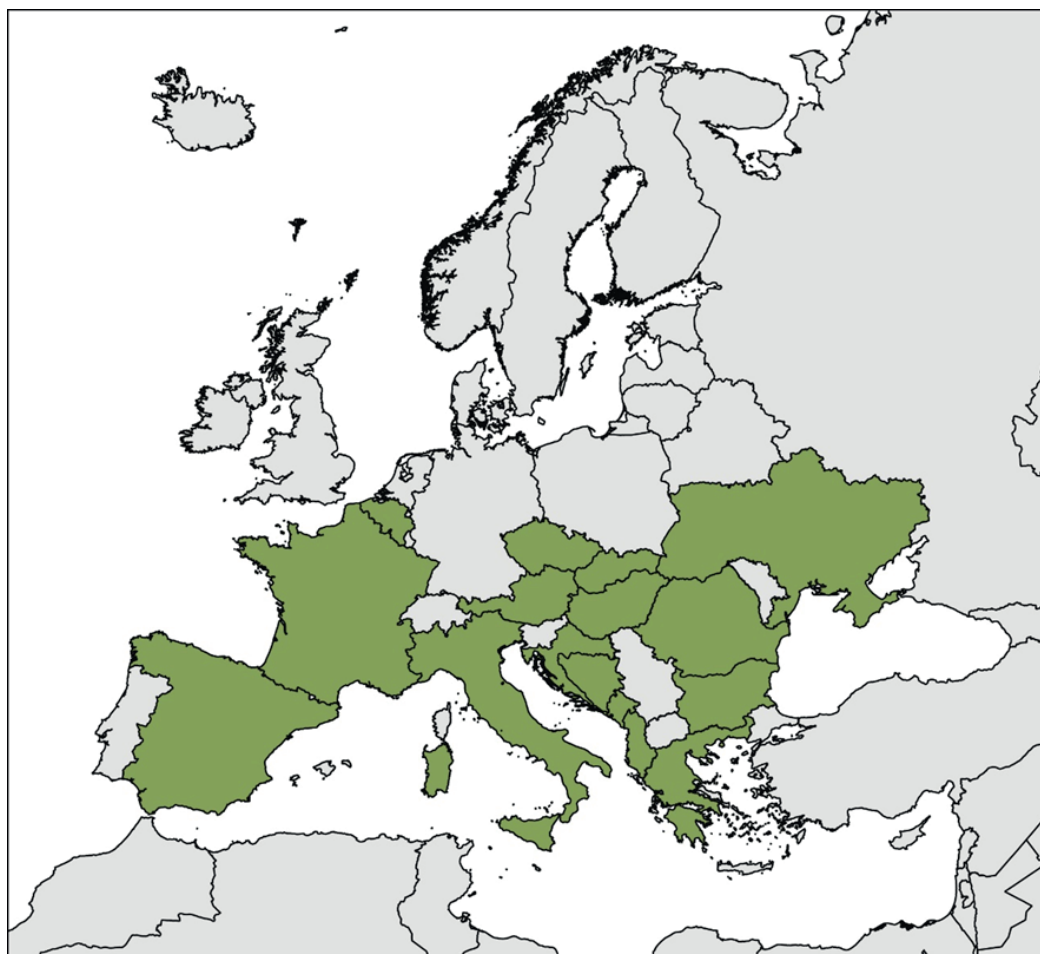


Fig. 6. European distribution of *Aradus brenskei*.

Table 2. Measurements (mm) of Belgian specimens of *Aradus bremskei*, 10 males and 10 females. Reference: HEISS & PÉRICART (2007).

	Males			Females			Reference
	Range (mm)	Average (mm)	Median (mm)	Range (mm)	Average (mm)	Median (mm)	
length of body	8,50–9,13	8,83	8,81	9,65–10,75	10,02	9,94	8,0–9,6/9,3–10,2
width of body	3,44–4,00	3,73	3,70	4,09–4,75	4,37	4,38	–
length of body/width of body	2,28–2,47	2,37	2,35	2,21–2,39	2,29	2,30	–
width of head	1,27–1,40	1,32	1,31	1,16–1,46	1,40	1,39	1,5–1,7
width of vertex	0,78–0,86	0,82	0,81	0,80–0,88	0,86	0,86	–
length of antennal segment I	0,31–0,35	0,33	0,33	0,32–0,35	0,34	0,35	0,30–0,35
length of antennal segment II	1,55–1,80	1,67	1,68	1,47–1,67	1,54	1,54	1,60–1,82
length of antennal segment III	0,59–0,65	0,62	0,61	0,57–0,63	0,59	0,59	0,55–0,65
length of antennal segment IV	0,67–0,75	0,69	0,69	0,65–0,71	0,68	0,69	0,65–0,72
length of antennae	3,12–3,53	3,31	3,34	3,04–3,36	3,15	3,15	–
length of antennal segment II/III	2,61–2,81	2,69	2,67	2,59–2,66	2,62	2,63	2,65–2,9
width of pronotum	2,70–2,98	2,84	2,85	2,90–3,33	3,08	3,06	2,6–3,1
length of pronotum	1,20–1,33	1,27	1,26	1,25–1,50	1,37	1,35	–
width of vertex/width of eye	3,15–3,47	3,31	3,31	2,83–3,60	3,19	3,19	–
pronotum length/pronotum width	2,16–2,37	2,24	2,23	2,13–2,32	2,25	2,27	2,1–2,3
length of antennae/length of body	0,36–0,39	0,37	0,38	0,31–0,33	0,31	0,31	–
length of antennae/head width	2,43–2,55	2,51	2,52	2,19–2,31	2,25	2,24	2,2–2,6

In Belgium, the species was discovered from 78 localities in all together nine neighbouring 5×5 m squares in the province of East Flanders (Fig. 7). We failed to find *A. brenskei* on *F. fomentarius* colonised trees in several other places near Lede, such as other parts of Aalst (Kappellemeersen, Osbroek, Gerstjens and Kravaalbos), Sint-Lievens-Houtem (Vlierzele), Ghent (Vinderhoutse bossen), Lokeren (Molsbroek), Denderleeuw (Wellemeersen), Ninove (Neigembos), Geraardsbergen (De Gavers) and Asse.

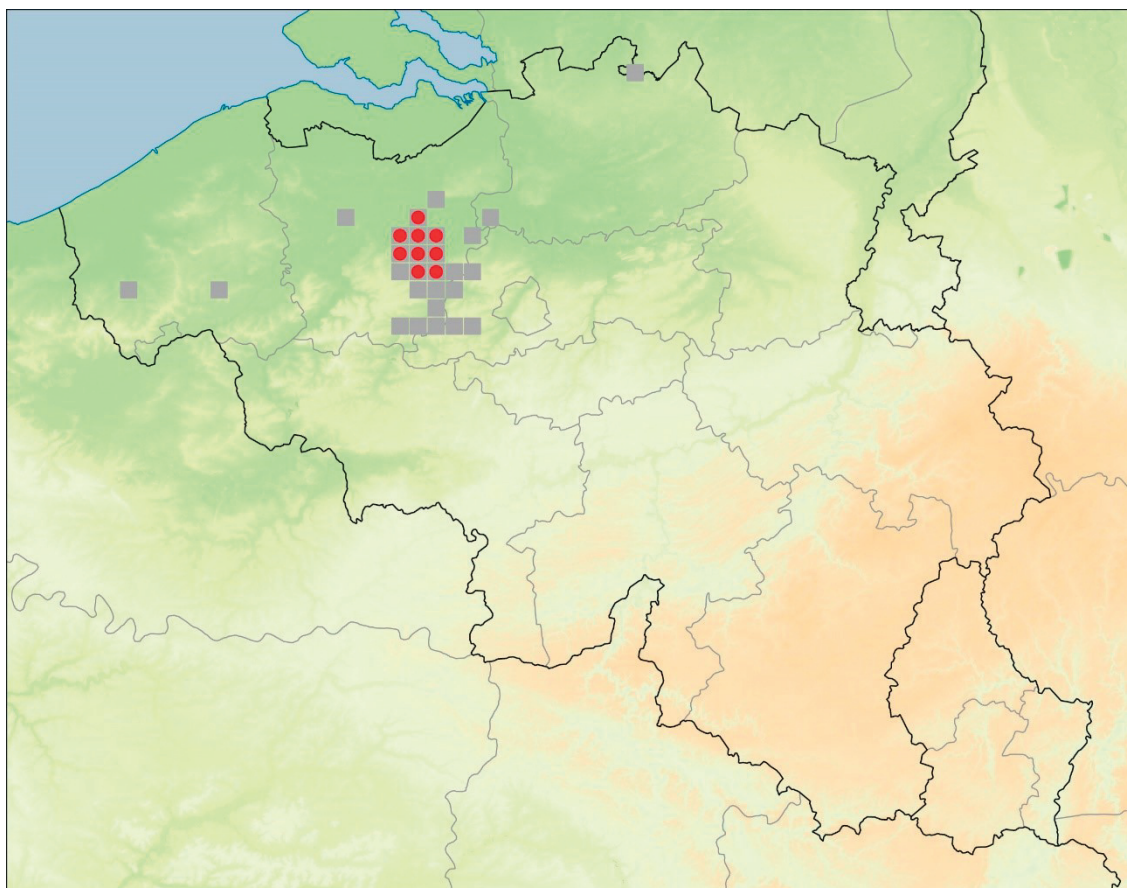


Fig. 7. Belgian distribution of *Aradus brenskei*. Grey squares: investigated area; red dots: one or more locations with *A. brenskei*.

Biology

Macropterous Aradinae like *Aradus brenskei* are associated with fungal mycelia in and on dead wood. They live subcortically feeding on the fungus which grows on dead trees and logs also on the fruiting bodies of fungi outside the bark (SCHUH & WEIRAUCH, 2020).

Aradus brenskei is almost exclusively found on deciduous trees infested by *Fomes fomentarius*. Incidentally, other fungi are listed as a food source, such as *Schizophyllum alneum* (L.) Kuntze, 1898 and *Trametes hispida* Bagl., 1865 (TAMANINI, 1981). They are cited in HEISS & PÉRICART (2007) from *Fagus* and *Populus*, but there are also records from *Quercus* (KANYUKOVA, 1984). In Belgium up till now they were observed on *Fomes* infested *Populus* (Fig. 8, location 12 of 66 locations in total), *Salix* (four locations), *Fagus* and *Prunus* (two locations), and *Aesculus*, *Alnus*, *Quercus* and *Tiliae* at one location (Table 1). The activity on the bark and on the fruiting bodies appeared to be much higher after sunset, when they could be observed easily by the use of a flashlight. Until now no flight observations of *A. brenskei* have been published, but it is clear that colonization of new *Fomes* infested trees takes place



Fig. 8. Poplar tree with tinder fungi hosting *Aradus brenskei* at Lede, location 12. © Brecht Verkempinck.

by flying specimens. A detailed study on the ecology of the species in Belgium is published elsewhere (VERKEMPINCK *et al.*, in press).

The lifecycle of *Aradus brenskei* is acyclic and asynchronous (HEISS & PÉRICART, 2007) and accordingly both adults and larvae were found during the whole observation period from May until November.



Fig. 9. Destruction of the habitat of locations 74–78 (November 18, 2020). © Brecht Verkempinck.

Concluding remarks

The discovery of this southern bark bug in Belgium is remarkable, especially given the large number of locations and individuals involved in a seemingly small part of the country. It is difficult to assess whether this results from a recent extension of its distribution area, or whether it has been overlooked in the past. It is, however, clear that especially coleopterists tend to pay much attention to species living on mushrooms and under bark and were as a consequence likely to have discovered this species in the past, if present.

The future of this rare European species in Belgium is, however, insecure because of the tendency to remove host trees in the area, the poplar cultivars being considered an exotic species (VERKEMPINCK *et al.*, in press). For instance, the poplars of locations 74–78 (Table 1) were removed in October 2020 (Fig. 9). Conservation efforts of this rare and apparently threatened bark bug are therefore recommended (VERKEMPINCK *et al.*, in press).

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