



First records of the alien spider *Pandava laminata* (Thorell, 1878) (Araneae: Titanoecidae) in Poland

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Abstract: *Pandava laminata* is an exotic representative of the family Titanoecidae, which has been recently introduced into Europe. Authors discuss the occurrence of *P. laminata* in Poland and Europe, as well as pathways of its spreading. The observations indicate that *P. laminata* is an expansive species and it may be present in many European countries. This species spreads by ornamental plants transporting (mainly orchids), and it established several populations in greenhouses in the Netherlands and Poland.

Key words: greenhouses, occurrence, non-indigenous species, pathways of spreading

INTRODUCTION

The spider species *Pandava laminata* (Thorell, 1878) (Araneae: Titanoecidae) occurs in tropical regions of East Africa, Madagascar, Sri Lanka, Burma, Indonesia, Philippines, southern China, Okinawa, New Guinea and French Polynesia (Chrysanthus 1967, Lehtinen 1967, Song et al. 1999, Jäger 2008, Enriquez & Nuñez 2014, WSC 2015). Jäger (2008) found this species in the Zoological Garden of Cologne. In addition, *P. laminata* was recorded in Debrecen in Hungary (Pfliegler et al. 2012, Pfliegler 2014). Since that time, no information was reported on the occurrence of this species in Europe (Arachnologische Gesellschaft 2016, Nentwig et al. 2016, WSC 2016).

In the meantime, we have observed that the species can be found in Poland.

METHODS AND MATERIAL

Since 2009 to 2015, we searched the synanthropic araneofauna in greenhouses, flower shops and large hypermarket centres in a few cities in Poland. We repeatedly observed specimens or webs of this species, on potted plants, especially with orchids *Phalaenopsis* (Table 1).

RESULTS

Our research showed that *P. laminata* is a widespread spider. The findings indicate that *P. laminata* is frequent in greenhouses in Poland as well in the Netherlands (Table 1, Fig. 1).

Pandava laminata (Thorell, 1878)

(Figs 2–9)

Male. Total length 5.5–5.8 mm (n = 3). Cephalothorax in the cephalic part with numerous long hairs, in the thorax part sparsely hairy. The front part of cephalothorax brownish, rear part of the yellowish-brown, chelicerae black-brown. Abdomen bushy, uniform grey-olive, only base spinnerets and spinners slightly darker (Fig. 2). Legs yellowish, profusely feathered. Hairs

of legs, particularly patella, tibiae and metatarsus of the legs_{I-III} clearly differentiated. On the mediolateral, lateral and medioventral part of legs consisting of long, curved hairs on the side of retrodorsal and retrolateral with hair long and straight (Figs 3–4). Hair differentiation of IV pair of legs and femur_{I-IV} and tarsus_{I-IV} less pronounced. Metatarsus_{IV} without calamistrum. Tibia of male pedipalps with two large apophysis: semicircular retrolateral and fan-shaped, membranous, stretched on 3–4 "ribs" prolateral apophysis (Figs 7–8). Embolium thin capillaries (Figs 6–7).

Female. Total length 5.4–7.0 mm (n = 3), colouration and body hair of the cephalothorax and abdomen close to the colouration a male, legs without differentiated hair. In the Mt_{IV} there is long distinct calamistrum (Fig. 5). Epigyne as in Fig. 9.

Colouration of subadult specimens is similar to adults, differentiation of hair on legs absent. In juvenile and subadult specimens of both sexes calamistrum present, similar to adult females.

Remarks. Description and pictures of *P. laminata* were made shortly after undergoing preservation of specimens; after prolonged storage at significantly fade the colour of alcohol, so that the spiders look almost uniformly yellowish, yellowish-greyish coloration (see Jäger 2008: figs 8–9). Then the well reveals significantly darker, greyish (grey-black) ring at the base of spinnerets (see Jäger 2008: p. 5 and figs 8–9).

Webs of *P. laminata* are easily recognized in terms of construction, shape and type of silk, resemble the web spiders of genus *Titanoeca* or *Amaurobius* (Fig. 10). They are always placed between the protruding roots, ground and on the lower-lying shoots and leaves of plants (Fig. 10). Spiders are staying in hideouts between the roots at the base of shoots or under the leaves and they are difficult to observe and to capture.

Table 1. List of collected specimens and observation of *Pandava laminata* in Poland. Frequently on the labels was only general information about the country of origin (e.g. Product of Nederland (Poland); Produced in Nederland (Poland) for the commercial network market name). Collectors/Observers: P.B-B. – Paweł Bielak-Bielecki; R.R. – Robert Rozwalka; W.S. – Wojciech Starega.

Site	UTM Grid	Date of collection	Country (place) of origin	Number of specimens	Collector/Observer
Wrocław, Długa 29/35 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	XS 46	30 Mar 2010	The Netherlands: Bleiswijk [FT 06]	1 juv. (grown to maturity - ♂)	P.B-B.
		26 Nov 2011	The Netherlands: Bleiswijk	1 ♀ (coll.), 12 exx. (obs.)	P.B-B.
		24 Jan 2012	The Netherlands	3 exx. (obs.)	P.B-B.
		28 Jan 2012	The Netherlands	1 exuvium (♀?) and 15 exx. (obs.)	P.B-B.
		26 Aug 2014	-	1 ex. (obs.)	P.B-B.
Wrocław, Długa 37/47 Str., hypermarket (on <i>Phalaenopsis</i> hybr.)	XS 46	26 Nov 2011	The Netherlands	2 exx. (obs.)	P.B-B.
Stężycza, Zielona 48 Str., in glasshouses of large ornamental plans farm (on <i>Phalaenopsis</i> hybr.)	EC 51	07 Apr 2011	Poland	1 juv. (coll.) and numerous webs obs.	R.R.
Lublin, Zwycięska 1 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	FB 07	24 Nov 2009	The Netherlands: Bleiswijk	10 webs obs.	R.R.
		23 Apr 2010	-	1 ex. (obs.)	P.B-B.
		20 Sep 2013	The Netherlands	1 ♀ (coll.), 2 exx. (obs.)	P.B-B.
		22 Nov 2012	The Netherlands	1 ex. (obs.)	P.B-B.
		10 Jul 2014	-	1 ex. (obs.)	P.B-B.
Lublin, Orkana 6 Str., florist shop (on <i>Phalaenopsis</i> hybr.)	FB 07	08 Nov 2010	The Netherlands	1 ♀ (coll.)	P.B-B.

Table 1 continued on the next page

Continuation of the Table 1

Site	UTM Grid	Date of collection	Country of origin	Number of specimens	Collector/Observer
Lublin, Turystyczna 1 Str., florist shop (on <i>Phalaenopsis</i> hybr.)	FB 17	29 Aug 2009	The Netherlands	1 sub♀ (grown to maturity)	R.R.
		05 Sep 2009	The Netherlands	1 ex. & two webs (obs.)	R. R.
		25 Jul 2015	-	1 ex. (obs.) & some webs obs.	P.B-B.
Lublin, Turystyczna 1 Str., hypermarket (on <i>Phalaenopsis</i> hybr.)	FB 17	22 Nov 2012	-	1 ex. (obs.)	P.B-B.
		13 Jun 2013	The Netherlands	1 sub♀ (coll.), 4 exx. (obs.)	P.B-B.
Lublin, Chemiczna 2 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	FB 17	21 Nov 2009	The Netherlands	1 sub♂, 1 sub♀ (grown to maturity)	R.R.
		27 Nov 2009	The Netherlands: Bleiswijk	1♀ (coll.), and some webs obs.	R.R.
		15 Mar 2010	The Netherlands	1 sub♂, 1 sub♀ (grown to maturity)	R.R.
		07 Apr 2010	-	1 sub♂ (grown to maturity)	R.R.
		02 Sep 2010	Poland: Warszawa, Tomaszewski LLC [DC 98]	1♀ (coll.) & some webs obs.	R.R.
		11 May 2011	The Netherlands	1♀, and some webs obs.	R.R.
		21 Jul 2011	The Netherlands: Bleiswijk	1 ex. (obs.) & 2 webs obs.	P.B-B.
		22 Jul 2011	The Netherlands: Bleiswijk	1 sub♂ (grown to maturity)	R.R.
		24 Jul 2011	-	6 exx. (obs.)	P.B-B.
		04 Mar 2012	The Netherlands	1♂, 1♀ (coll.)	R. R.
		27 Jul 2014	The Netherlands	1♀ (coll.)	P.B-B.
Lublin, Wolska 11 Str., discount store (on <i>Phalaenopsis</i> hybr.)	FB 17	02 Sep 2010	Poland: HRS Dawidy [DC 97]	1♀ (coll.) & some webs obs.	R.R.
		24 Jun 2015	Poland	2 webs obs.	R.R.
Lublin, Melgiewska 16c Str., large garden-building centre (on <i>Phalaenopsis</i> sp. hybr.)	FB 17	14 Jul 2015	The Netherlands	3 webs. obs.	P.B-B.
Świdnik, Krępiecka 3 Str., discount sore (on <i>Phalaenopsis</i> hybr.)	FB 17	08 Nov 2010	-	1♀ (grown grown to maturity)	P.B-B.
		13 Nov 2010	-	3 exx. (obs.)	P.B-B.
Świdnik, Raclawicka 11 Str., in house	FB 17	15 Dec 2010	specimen fugitive from breeding	1 sub♀ (grown to maturity)	P.B-B.
Lublin, Spółdzielczości Pracy 32 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	FB 08	15 Feb 2013	The Netherlands	1 ex. (obs.)	P.B-B.
		06 Aug 2015	The Netherlands	1 juv. (grown to maturity)	P.B-B.
Dębówka 17a, floristic market and warehouse (on <i>Phalaenopsis</i> hybr.)	FB 08	07 Aug 2010	The Netherlands	1 juv. (coll.)	R.R.
		29 Aug 2010	-	2 exuvia (coll.) and some webs obs.	R.R.
Elizówka 65, floristic warehouse (on <i>Phalaenopsis</i> hybr.)	FB 18	23 Jun 2015	-	2 webs (obs.)	R.R.
Warszawa, Jana Pawła II 82 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	DC 98	22 Oct 2011	The Netherlands	1 web (obs.)	R.R. & W.S.
		21 May 2014	-	3 exx. (obs.) & some webs obs.	P.B-B.
		15 May 2015	-	2 webs (obs.)	R.R.
Warszawa, Radzymińska 166 Str., large garden-building centre (on <i>Phalaenopsis</i> hybr.)	EC 09	26 Sep 2010	The Netherlands	2 webs (obs.)	R.R.

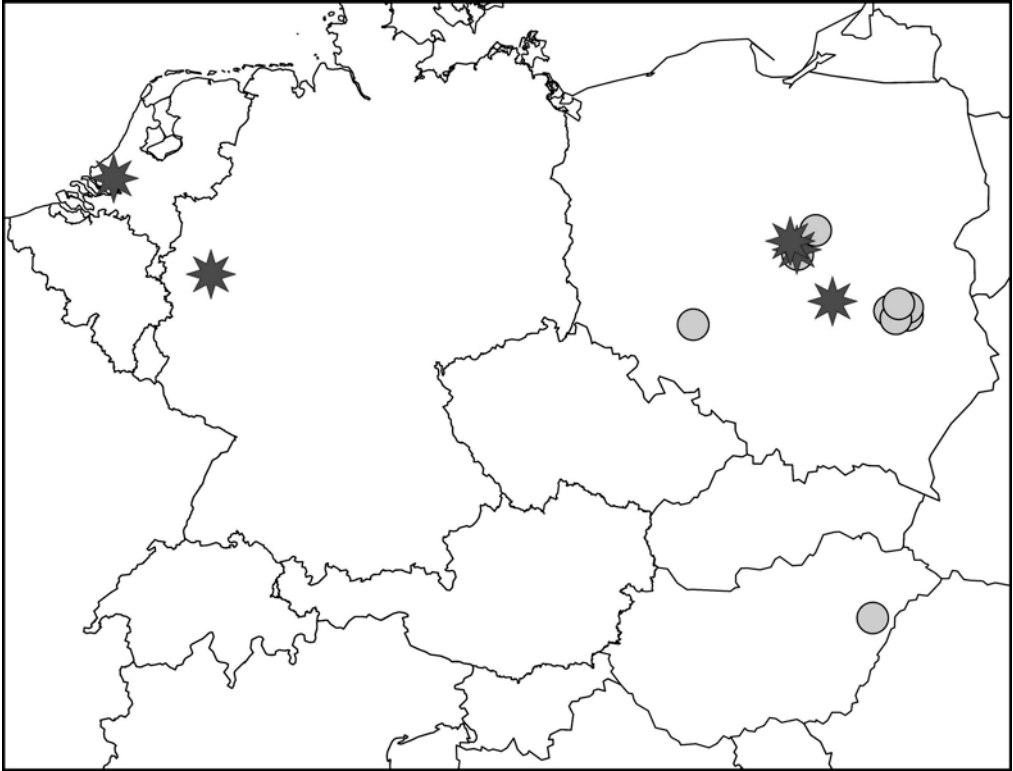


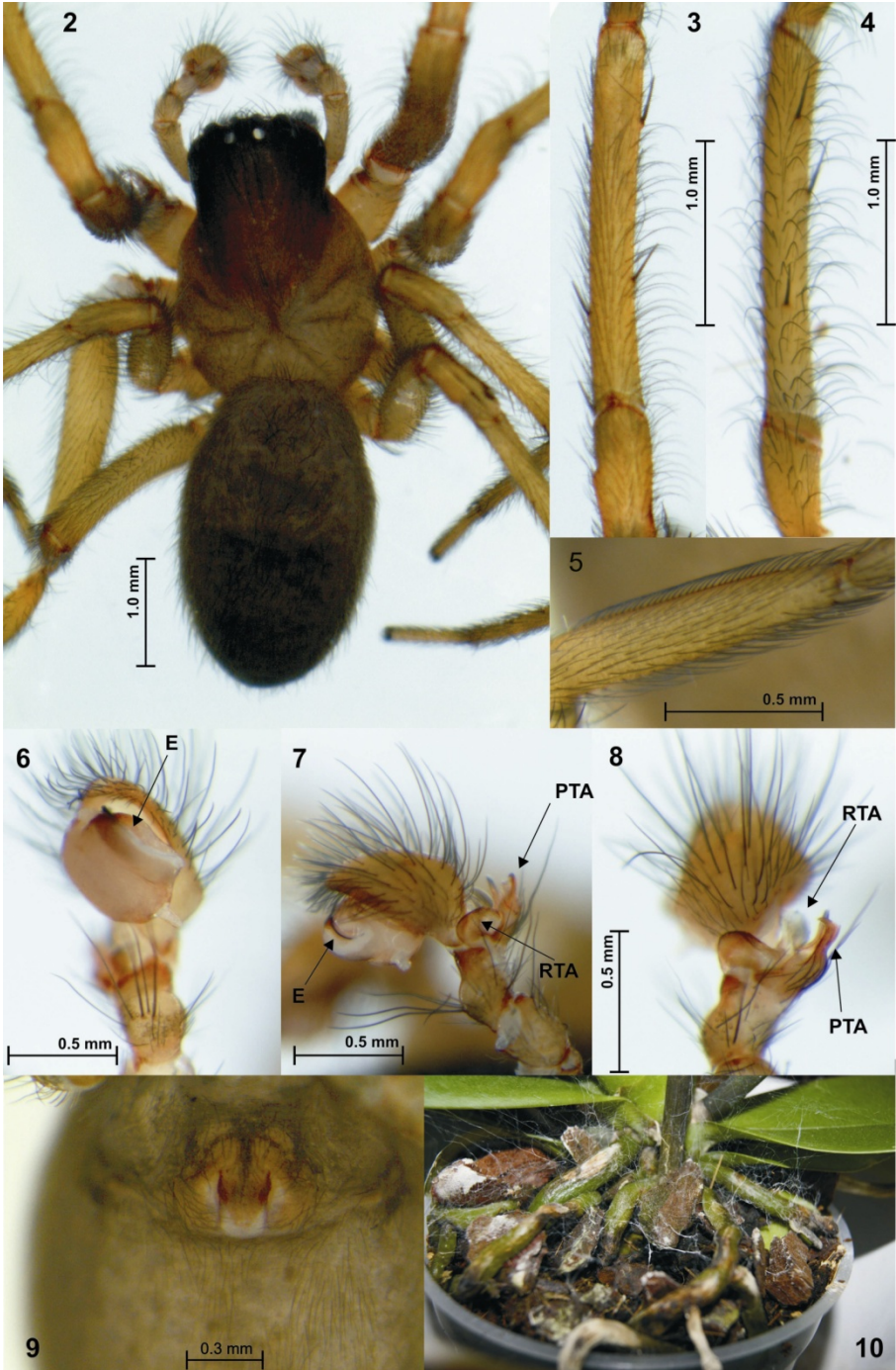
Fig. 1. Records of *Pandava laminata* in Europe: stars – locations of a large (stable?) population, circles – locations where single specimens were collected or observed.

DISCUSSION

Jäger (2008) revealed that the population of *Pandava laminata* was in the Zoological Garden of Cologne, while Pfliegler et al. (2012) found only a single specimen in Debrecen. Since then, there was no other data about *P. laminata* from Europe (Arachnologische Gesellschaft 2016, Nentwig et al. 2016, WSC 2016). Our research of the Polish synanthropic spider fauna indicate that *Pandava laminata* is a relatively common species (Table 1).

Studies were carried out in potential sites of occurrence: in botanical gardens of Warszawa, Kraków, Lublin and in zoological gardens of Warszawa, Wrocław and Zamość – the species was not found (R. Rozwałka, unpub. data). However, we discovered a large population of *Pandava laminata* in ornamental plants farm in Steżyca (Table 1, Fig. 1). In addition, based on manufacturer's data, we found two other locations inhabited by *P. laminata* in Poland (Table 1, Fig. 1). Besides, according to the data on the labels of the pots *P. laminata* occurs also in the Netherlands; in Poland, the most plants with *P. laminata* come from there. Thus the Netherlands is another country in Europe where the spider occurs (Table 1), although it has not been published yet (van Helsdingen 2015).

The number of records of *Pandava laminata*, which was found on plants imported from the Netherlands, suggests that this species is widely spread in Europe. Our observations confirm the fact that the import of ornamental plants is a major source of introduced new spider species to Europe (Kobelt 2008, Nentwig 2015).



Figs 2–10. *Pandava laminata* (Thorell): 2 – male total view, 3 – male tibia I dorsal, 4 – male tibia I mediolateral, 5 – calamistrum of metatarsus IV (female), 6 – male palp ventral, 7 – male palp lateral, 8 – male palp dorsal, 9 – female epigyne, 10 – web of *Pandava laminata* at *Phalaenopsis hybr*; PTA – prolateral tibial apophysis; RTA – retrolateral tibial apophysis; E – embolus.

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STRESZCZENIE

[Pierwsze stwierdzenie *Pandava laminata* (Thorell, 1878) (Araneae: Titanoecidae) w Polsce]

W pracy omówiono występowanie w Polsce egzotycznego gatunku pająka z rodziny Titanoecidae – *Pandava laminata* (Thorell, 1878). Ten niedawno introdukowany gatunek znany był dotychczas w Europie jedynie z dwóch stanowisk. Zaprezentowane wyniki badań wskazują, że *P. laminata* jest pająkiem znacznie częstszym, niż wynikałoby to z dotychczasowych publikacji, trwale zadomowionym w Polsce i Europie. Świadczą o tym populacje tego gatunku na terenie dużych gospodarstw z roślinami ozdobnymi w Polsce. Poza szklarniami, okazy *P. laminata*, często obserwowano w sklepach z roślinami ozdobnymi. To właśnie transport roślin ozdobnych jest źródłem rozprzestrzeniania się tego gatunku. Ustalono także, że *P. laminata* występuje na terenie Holandii.

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