East meets West: on the true identity of *Cheiracanthium rupestre* and *Xysticus albomaculatus* (Arachnida: Araneae: Eutichuridae, Thomisidae)

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Abstract. *Cheiracanthium rupestre* Herman, 1879, and *Xysticus albomaculatus* Kulczyński, 1891, both originally described from Hungary, are among the most rarely reported species of their genera in Europe. Here we report that both of these species have very close relationships to similarly uncommon species originally described from France at about the same time. The specimens currently considered as *Cheiracanthium rupestre* turn out to be very closely related to, but distinct from, *Cheiracanthium striolatum* Simon, 1878. However, the original description of *C. rupestre* does not match these specimens nor any other known species of *Cheiracanthium*. We therefore consider *C. rupestre* a **nomen dubium** and suggest that all previous records of this species after the original description actually refer to *Cheiracanthium macedonicum* Drensky, 1921. *Xysticus albomaculatus,* on the other hand, turns out to be a junior synonym of *Bassaniana baudueri* (Simon, 1877) **syn. nov.**, expanding the range of this species considerably to the East and at the same time confirming that it is a genuine European species, rather than a recent immigrant from North America as previously suspected.

Keywords: *Bassaniana*, *Coriarachne*, doubtful species, new synonyms, nomen dubium, *Ozyptila*, species inquirendae

Zusammenfassung. Anmerkung zur wahren Identität von *Cheiracanthium rupestre* und *Xysticus albomaculatus* (Arachnida: Araneae: Eutichuridae, Thomisidae). Die beiden aus Ungarn beschriebenen Großspinnen *Cheiracanthium rupestre* und *Xysticus albomaculatus* gehören zu den seltensten Vertretern ihrer Gattungen in Europa. Es zeigt sich, dass beide Arten enge Affinitäten zu Arten haben, die etwa zur gleichen Zeit aus Frankreich erstbeschrieben wurden. Die gemeinhin als *C. rupestre* bezeichneten Exemplare sind eng verwandt mit *C. striolatum* Simon, 1878, gehören aber zu einer eigenen Art. Da die Originalbeschreibung von *C. rupestre* jedoch deutliche Unterschiede zu diesen Exemplaren aufweist, und sich auch sonst keiner bekannten *Cheiracanthium*-Art zuordnen lässt, betrachten wir *C. rupestre* als **nomen dubium**; der gültige Name für die bisher zu dieser Art gestellten Exemplare ist *Cheiracanthium macedonicum* Drensky, 1921. *Xysticus albomaculatus* erwies sich bei näherer Untersuchung als jüngeres Synonym von *Bassaniana baudueri* (Simon, 1877) **syn. nov.**, was eine deutliche Ausdehnung des Nachweisareals nach Osten darstellt und bestätigt, dass es sich bei dieser Form um eine autochthone europäische Art handelt, nicht um einen rezenten Import aus Nordamerika, wie zuvor angenommen.

Numerous spider species described from Europe have never been found again after their initial discovery (Breitling et al. 2015, Breitling et al. in press). Others have been found only very rarely and in widely scattered locations. This is particularly surprising when it concerns rather large and noticeable species and when there is no indication of a restriction to rare and unusual habitats. In such cases, there is always the possibility that the rare records are in fact based on misidentifications of more common species (a number of examples are discussed in Breitling et al. 2015). But sometimes it also turns out that the species are actually more common than initially suspected, in which case the lack of records is probably due to a combination of undersampling and insufficient descriptions in the available literature. Here we discuss two such cases, which are especially noteworthy as they reveal unexpected links between rare spider species described from Hungary and similarly uncommon relatives from Western Europe.

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Abbreviations:

CJVK	=	Collection J. Van Keer
HNHM	=	Hungarian Natural History Museum, Budapest (L. Dányi)
IZ	=	Museum and Institute of Zoology, Polish Academy of Sciences, Warsaw (W. Wawer)
LNU	=	Ivan Franko National University of Lviv (A. Hirna)
MCSN	=	Museo Civico di Scienze Naturali "E. Caffi", Bergamo (P. Pantini)
MMUE	=	Manchester Museum of the University of Manchester (D.V. Logunov)
MNHN	=	Muséum National d'Histoire Naturelle, Paris (C. Rollard)
NHMW	=	Naturhistorisches Museum Wien (C. Hörweg);
NMNHS	=	National Museum of Natural History in Sofia (S. Lazarov)
NMP	=	National Museum, Prague (P. Dolejš)
PMC	=	Pedro M. Cardoso Collection
SMF	=	Senckenberg Museum, Frankfurt (P. Jäger & J. Altmann)

The case of *Cheiracanthium rupestre*

Material examined

sub *C. rupestre*: BULGARIA: 1♀, 2 juv., Kranevo near Varna, forest edge, ca. 150 m a.s.l., 9.–11.VIII.2005, Dolanský leg. et coll. 1♀, Stranbaka mts., Vitanovo nature reserve, 28.–30.VIII.2000, S. Petrov leg., J. Dolanský coll. 1♂, 10.–14. VII.1977, NMP, J. Buchar leg. et coll. P6d-41/2012/C2331. 3 juv., Bosnek, ca. 1100 m a.s.l., 13. VIII. 2009, J. Dolanský leg. et coll. 6 juv. (1♀, 1♂ kept to adult stage under laboratory conditions), Bosnek, 13. X. 2010, J. Dolanský leg. et coll.

HUNGARY: 1♀, Várpalota, HNHM Araneae-2198, Chyzer coll. 1187. 2♀♀ Várpalota IZ Kulczyński coll. (photographs examined). 1♀, Szentendrei-sziget (Szentendre Island), north of Budapest, under bark on dead wood, end of May 2009, K. Pfeiffer leg., A. Grabolle coll. 1♂, Nadap, Meleghegy, oak forest, 15.VI.1951, HNHM, Kakassné leg. SLOVAKIA: 1♀, Čachtice, 19.VI.1978, J. Svatoň leg. et coll.

sub *C. macedonicum*: BULGARIA: 1♀, between Yakoruda between Yakoruda and Mekhomiya and Mekhomiya, NMNHS, holotype.

sub *C. striolatum*: ITALY: 2♂♂, Firenze, Marradi, Badia Valle 430 m a.s.l., 25.VI.2003, A. Usvelli leg., MCSN. Sicily 1♀, Ragusa, Giarratana, fiume Irminio, 500 m a.s.l., 19.V.1995, P. Pantini, M. Valle leg., MCSN.

Comparative material

C. striolatum: FRANCE: 4♀♀, 1♂ "Pyr[énnés] Or[ientales] Prats de Mollo", MNHN Simon coll. 1791. 1♂ Bonne Anse dunes, near La Coubre, Charente-Maritime "mainly under rock rose" MMUE Duffey coll. G7512. 1♀, Balcons de la Mescla near Draguignan, bushy area, ca 800 m a.s.l., 25. IV.2009, J. Dolanský leg. et coll. PORTUGAL: 1♀, Picotino, 21.II.2001, P. Cardoso leg. et coll. PMC0390b, pitfall. 1♂, Tó, 21.II.2001, P. Cardoso leg. et coll. PMC0390c, pitfall. 1♀, Fonte d'Aldeia, 7.III.2001, P. Cardoso leg. et coll. PMC0390d, pitfall. 1♀, Fonte d'Aldeia, 13.VI.2001, P. Cardoso leg. et coll. PMC0390g, pitfall. 1♀, Algozinho, 21.III.2001, P. Cardoso leg. et coll. PMC0390e, pitfall. 1♀, Algozinho, 4. IV. 2001, P. Cardoso leg. et coll. PMC0390f, pitfall. 1♂, Mogadouro, 8.II.2001, P. Cardoso leg. et coll. PMC0248B. 1♀, 1♂, Picote, 21.VI.2001, P. Cardoso leg. et coll. PMC0248c, pitfall. 1♂, Bruçó, 3.X.2001, P. Cardoso leg. et coll. PMC0248d, pitfall. 1♂, Picote, 14.XI.2001, P. Cardoso leg. et coll. PMC0248e, pitfall. 1♂, Mértola, 27.V.2003, P. Cardoso leg. et coll. 5358. 1♂, Limas, 18.VI.2003, P. Cardoso leg. et coll. 5475, pitfall. 4♀♀, 2♂♂, 5 juv., Picote, 31.V.2001, P. Cardoso leg. et coll. PMC0390a, swept. 1♀, 1 juv., Praia da Bordeira near Lagos, 12.IV.2005, M. Řezáč leg., J. Dolanský coll. 1♀, Mértola, Corredoura, valley of Guadiana river, 8.XI.2005, M. Řezáč leg., J. Dolanský coll. 1♀ Barca d'Alva near Mogadouro, 10.X.2007, M. Řezáč leg., J. Dolanský coll. 1 juv., Ribeira Limas, 1.VII.2007, S. Pekár leg., J. Dolanský coll. 1 juv., Golega near Torres Novas, 2.X.2007, M. Řezáč leg., J. Dolanský coll. 1♂, Palao near Mogadouro, 4.X.2007, M. Řezáč leg., J. Dolanský coll. 1♂, Fonte de Aldeia near Mogadouro, 5.X.2007, M. Řezáč leg., J. Dolanský coll. 1♀, Faro, Murração, 17.IV.2013, R. Bosmans leg. et coll. 1♀, 1♂, Lagoa de Obidos, in pine litter, 20. IV. 2013, R. Bosmans leg. et coll. 1♀, Belmeque, bushy area, 300 m a.s.l., 38°2'45"N, 7°22'59"W, 28.III.2013, J. Dolanský leg. et coll. 1♀, Mértola, bushy area, 50 m a.s.l., 37°38'5"N, 7°40'13"W, 30.III.2013, J. Dolanský leg. et coll. 1♀, Barranco do Velho, 30.III.2013, J. Dolanský leg. et coll. 15♀♀, southern Portugal, 3.–7.IV.2008, M. Řezáč et S. Korenko leg., J. Dolanský coll. SPAIN 1♂, Fabero, 1.V.2012, F. Šťáhlavský leg., J. Dolanský coll. 1♀, Málaga, Mijas, stones in pine forest, 19.XII.1997, R. Bosmans leg. et coll. Mallorca 14 juv. (3♀♀, 4♂♂ kept to adult stage under laboratory conditions), Badia Gran, bushy area, VI. 2008, J. Dolanský leg. et coll. ITALY 1♀, Livorno, Isola di Capraia, 20.V.1992 C. Berera leg. MCSN. Sardinia 1♀, SMF Roewer coll. RII/13643. FRANCE: Corsica 1♀, Vivario, Col de Sorba (1320m), 26.V.1995, under stones in *Larix* forest, J. & K. Van Keer leg. et coll. CJVK 1506. 1♀, Solenzara, 28.V.1999, in a *Juncus* field, CJVK. 1♀, Asco, 23.IX.2013, under a stone along rocks, CJVK. 1♂ Zonza, 28.V.1999, under stones in Corsican pine forest, CJVK. 1♂, Mausoleo, rivière Tartagine, 1100 m a.s.l., light trap, 30.V.2000, E. Bertuetti et al. leg., MCSN. 2♀♀, Mausoleo, rivière Tartagine, 1100 m a.s.l., light trap, 1.VIII.2000 Giomi F., Salmini B. leg. MCSN. 3♀♀, Olmi Cappella, affluent rivière Tartagine, 840 m a.s.l., light trap, 30.V.2000, E. Bertuetti et al. leg., MCSN. 5♀♀, 3♂♂, Asco, rivière Stranciacone, 1800 m a.s.l., light trap, 1.VI.2000, E. Bertuetti et al. leg., MCSN. ALGERIA: 1♀, 2♂♂, Wilaya de Tissemsilt, Theniet el Had, clearing in cedar forest, 1750 m a.s.l., 23.III.1988, R. Bosmans leg. et coll. 2♀♀, 1♂, Wilaya de Bouira, Massif du Djurdjura, Tigounatine, 1460 m a.s.l., cedar forest, 6.X.1987–1.IV.1988, R. Bosmans leg. et coll. MOROCCO: 1♀, 1♂, Tiznit, Mirlef, litter and stones, near the sea, 25 m a.s.l., R. Bosmans leg. et coll. Uncertain locality ("gall. m., hisp., alg."= Southern FRANCE, SPAIN, ALGERIA) 28♀♀, 16♂♂, MNHN Simon coll. 1796.1867 (probably including syntypes). No locality. 2♀♀, 1♂ MNHN Simon coll. 1803.13468.

C. sp. near *striolatum:* ALGERIA: 2♀♀ Tlemcen, MNHN Simon coll. 1804.13299. 1♂, Djelfa, Djebel Djellal, 17. VIII. 1990, R. Bosmans leg. et coll. MOROCCO 2♀♀, 1♂ "Mogador, La Escaleza" (= Essaouria, Marrakesh), MNHN Simon coll., 1803.13648. 1♀ "Maroc: entre Mazagan [= El Jadida] et Oualidia (J. Théodoridès leg.)", J. Denis det., MNHN, Simon coll., 1803. TUNISIA: 2♀♀, 1♂ Djerba, MNHN Simon coll. 1804.12462.

Cheiracanthium rupestre was first described by Herman (1879) based on a single female found under a stone in a stony ditch close to Majláth (Diósgyőr, Miskolc, Hungary). It was redescribed by Chyzer & Kulczyński (1897), who not only discussed both sexes in their determination keys, but also provided the first description of the presumptive male of the species, based on a single specimen, the palp of which they illustrated. They considered the species much rarer ("multo rarius") than *C. effossum*, which itself is one of the rarely found species of the genus. Another record, from "Pajsarjeva jama", a cave in central Slovenia, was contributed by Kratochvíl (1934), without further details. The male, but not the female, was later redescribed with detailed illustrations by Cleopatra Oltean (1973), which were later republished (under her married name) in her monograph on the Romanian Clubionidae s. lat. (Sterghiu 1985). The species is said by Sterghiu to be adult in May in Romania, where a single male was found in low vegetation on a roadside in Băneasa, on the northern edge of Bucharest. Since then, the species has been reported very rarely and usually on the basis of single male individuals from a few additional countries: Slovakia (various locations, Gajdoš et al. 1999, 2009), Austria (1 male collected in a xerothermophilic downy oak forest on a south-facing mountainside between 400 and 500 m, Kanzelkogel, Graz, Styria, Horak 1987), Macedonia (4 male specimens collected in July 1998 at elevations between 1300 and 1800 m on Šar Mountain, Komnenov 2002), and Bulgaria (Slavyanka Mountain, Naumova 2009). A female specimen from Bosnek in the Vitosha Mountains, Bulgaria (and now in the Dolanský collection), was illustrated by Kůrka et al. (2015).

Herman's type material could not be found in the collection of the Hungarian Natural History Museum (HNHM)

and is in all probability lost. It was also not found in the Natural History Museum Vienna (NHMW), the Museum & Institute of Zoology, Polish Academy of Sciences, Warsaw (IZ), or the Zoological Museum of the National University of Lviv (LNU), where parts of the Kulczyński collection are held. However, a single female specimen labelled as *C. rupestre* is still available in Chyzer's collection in Budapest and two further females in the Kulczyński collection in Warsaw. Examination of this material showed that *C. rupestre*, as understood by Chyzer, is identical to *C. macedonicum* Drensky, 1921, a species described on the basis of a female specimen collected between Yakoruda and Mekhomiya (= Razlog, Bulgaria), and later also reported as occurring relatively rarely on Babuna Mountain close to Abdi Han and between Resen and Ohrid (Macedonia; Drensky 1929, 1936) (Figs 1-2). However, a specimen from Ohrid labelled as *C. macedonicum* in the Drensky collection in the NMNHS turned out to be a male *C. montanum* (JD vid.). Deltshev & Blagoev (1997) reported *C. macedonicum* from submediterranean to montane coniferous altitudes on Pirin Mountain (Bulgaria) and Deltshev et al. (2013) found it on Galichitsa Mountain in Macedonia. The records of *C. rupestre* from Macedonia (Komnenov 2002) and Bulgaria (Naumova 2009) already imply the synonymy established here. The synonymy between *C. macedonicum* and *C. rupestre* sensu Chyzer & Kulczyński (1897) auct. is further supported by the examination of male and female specimens collected together in Bosnek (100 km north of Razlog, the type locality of *C. macedonicum*). This confirmed that Chyzer's female is indeed correctly matched to the male that was illustrated by Chyzer & Kulczyński (1897), Oltean (1973) and Sterghiu (1985). The genital structures in both sexes are quite distinct and set the species apart from all other *Cheiracanthium* species in Eastern Europe.

One slight complication arises, however, from the fact that Herman's type material of *C. rupestre* could not be traced anywhere, and his original figure of the epigyne shows little similarity to that of *C. rupestre* as it has been understood since the times of Chyzer & Kulczyński (1897), even when we assume that the intraspecific variability is very high (Figs 1-2). The Hungarian text of the original description, but not its German translation in the same work, describes the epigyne as follows: "The epigyne is very characteristic: there is one pinhead-like brown little sphere on each side of a deeply incised leathery arch." This matches the figure very well, so that a printer's or illustrator's error can be excluded. The "pinhead" structures do not seem to be compatible with the epigynal structure of the specimens that are currently assigned to *C. rupestre*, and the remainder of the illustrated details in the figure also show no resemblance to the distinct patterns seen in, e.g., Chyzer's specimen. There is no indication of the "deeply incised arch" illustrated by Herman in the epigyne of any European *Cheiracanthium* species. The "pinheads" could represent mating plugs, which are known in other *Cheiracanthium* species, such as *C. furculatum* Karsch, 1879 (Bayer 2014) and *C. mildei* L. Koch, 1864 (Bryant 1952), but if Herman's specimen belonged to the same species Chyzer's material, the anterio-lateral position of the plugs would be inexplicable. Moreover, while several females of the closely related *C. striolatum* in Simon's collection had broken emboli lodged in their epigyne, none of the specimens examined had a mating plug. We considered the possibility of assigning a neotype for *C. rupestre*, to stabilize the interpretation of this name, but decided that in view of the major discrepancies between Herman's illustration and the current concept of the species, it would be impossible to select a neotype specimen that fulfils the condition of ICZN art. 75.3.5. "that the neotype is consistent with what is known of the former name-bearing type from the original description and from other sources". Instead, we consider *C. rupestre* as a **nomen dubium**, possibly based on a malformed individual. The valid name for the species described and illustrated in Chyzer & Kulczyński (1897), Oltean (1973) and Sterghiu (1985) thus becomes *Cheiracanthium macedonicum* Drensky 1921, and all records of *C. rupestre* (except that in the original description) should be referred to this species.

Considering the descriptions published after Herman's work and the genitalia of Chyzer's specimen, both male and female *C. macedonicum* appear to be very similar to *C. striolatum*, a species described in 1878 by Simon from a wide range of localities in southern and western mainland France and Corsica, where it was found on low plants. The females were reportedly found with their egg sacs under stones in April. Although the first description already indicated that this species is not rare and can be quite common in suitable habitats, it was relatively rarely reported; and following its inclusion in Simon (1932), which added records from Algeria, Spain and Portugal and also provided the first illustration of the male and female genitalia, the species was not redescribed by modern authors for a long time. Numerous records are known from the Iberian Peninsula, where the species is widespread (Cardoso & Morano 2010). The first illustrated record since Simon (1932) was published only in 2014, based on a female collected under dried leaves along a road margin in Malaga,

Fig. 1: Illustration of the epigyne of **a.** *C. rupestre* in Herman's original description; Herman 1879: Tab. VII, fig. 158); **b.** of *C. macedonicum* in Drensky's original description; Drensky 1921: Tab. I, fig. 14), and **c.** of *C. striolatum* in *Arachnides de France*; Simon 1932: fig. 1361). The epigyne of *C. rupestre* is structurally quite different. In contrast, the epigynes of the other two taxa represent the extremes of a continuum in external appearance, and both forms and their intermediates can be found within a single population.

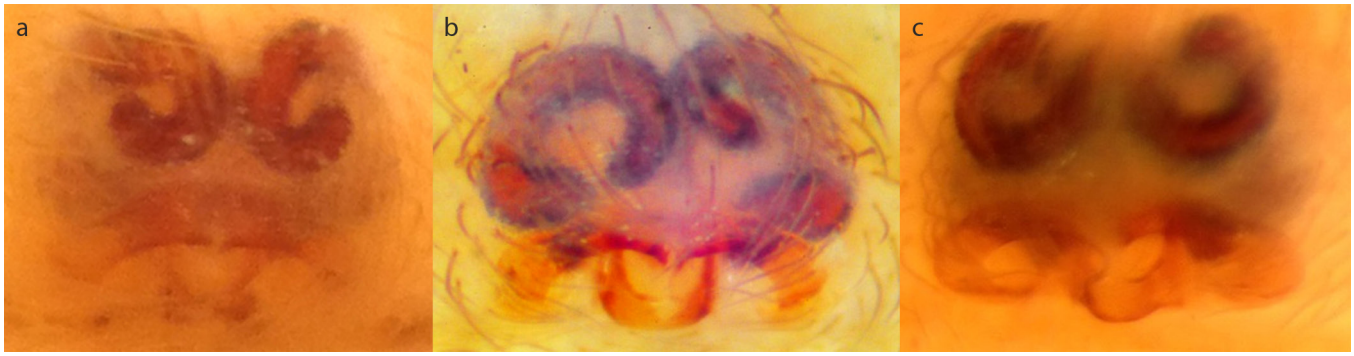

Fig. 2: Epigyne of **a.** *"C. rupestre"* in Chyzer's collection in HMNH, **b.** *C. macedonicum* (holotype, Drensky collection in NMNHS), and **c.** *C. striolatum* (possible syntype, Simon collection in MNHN)

Spain (Lecigne 2014). Lecigne also reported a single female from a dune in Saint-Cyprien, Pyrénées-Orientales, France. Grill et al. (2005) reported the species from Sardinia/Italy and Barrientos et al. (2015) reported and illustrated the species from the Parc Natural del Montseny, Catalonia, Spain, providing the first modern illustrations of both sexes.

The similarity between *C. macedonicum* and *C. striolatum* had already been noted by Deltshev (2003), who had examined the female holotype of *C. macedonicum* in Drensky's collection and concluded that this species is close to *C. striolatum* Simon, 1878, to which it should be thoroughly compared. We have carried out this thorough comparison, based on a large number of specimens from the range of both species (see Material examined, above).

In contrast to the first impression based on published illustrations of the genitalia, *C. macedonicum* and *C. striolatum* cannot be reliably differentiated based on the genitalia in either sex. The female genitalia are extremely variable in morphology, with specimens matching the published illustrations of either *C. striolatum* or *C. macedonicum*, and morphological intermediates between these, even within a single population (Figs 3-4).

In the male, the tegular (median) apophysis is often distinctly bent in specimens of *C. striolatum* (Fig. 5, specimen from mainland France), but this trait is highly variable and specimens with an almost straight apophysis can be found as well, as is typical for *C. macedonicum*.

The hind margin of the cheliceral groove carries 4 teeth in typical *C. striolatum*, compared to 2 teeth in *C. macedonicum*; however, the cheliceral dentition can sometimes vary between the left and right side of the same animal and is difficult to assess reliably. Given that cheliceral dentition has turned out to be unreliable in distinguishing other closely related spiders (e.g., the notorious species pair *Drassodes cupreus/lapidosus*,

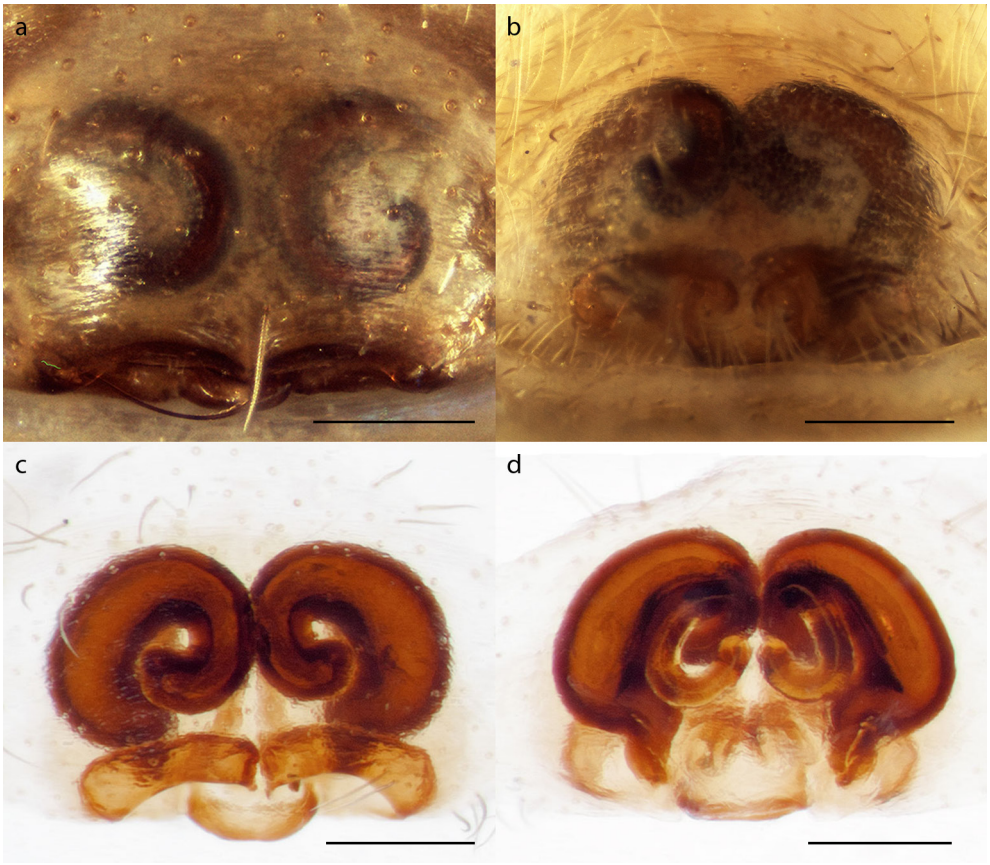

Fig. 3: a., b. External view of the epigyne of two specimens of *C. striolatum* from Corsica representing the *macedonicum* type of external appearance. Cleared epigyne of the latter specimen, in **c.** ventral and **d.** dorsal view. Scale bars = 0.2 mm

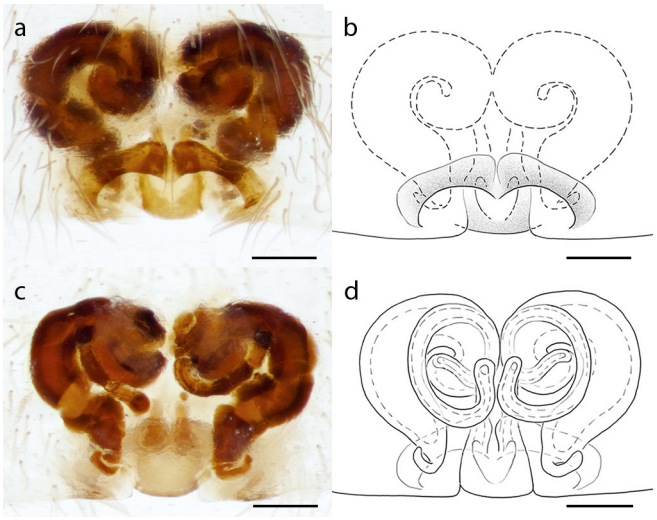

Fig. 4: Cleared epigyne of *C. macedonicum* from Szentendre Island, north of Budapest, Hungary in **a., b.** ventral and **c., d.** dorsal view, photos (a, c.) and schematic drawing (b, d). Scale bars = 0.2 mm

Bolzern & Hänggi 2006), it seems unsuitable to distinguish the two species.

The most reliable feature to distinguish the two species is the opisthosomal pattern: male and female specimens from Western Europe have a distinct reddish heart mark, followed by a series of red chevrons (Figs 6a, 6b). These marks remain distinct and clearly visible even in specimens that have been stored in alcohol for around 100 years in Simon's collection. In specimens from Eastern Europe, any indication of this pattern is usually absent (Figs 6c, 6d). Traces of the chevrons can rarely be seen in male specimens, but the heart mark is always pale and the pattern is never distinct in females. Thus, while some extreme specimens of the two species can be similar in their colouration, there is no overlap in the pattern seen in specimens of the two forms. The difference in opisthosomal pattern is already clearly established in the juveniles, which have distinct markings in *C. striolatum* but not in *C. macedonicum*, as seen in laboratory-reared specimens. Comparable cases of consistent differences in colouration in geographically vicariant populations of widespread spider species seem to be very rare. One example is seen in *Carrhotus xanthogramma* (Latreille, 1819): here, male specimens in the Far East consistently show a black longitudinal line on the opisthosoma, which is missing in European specimens (RB unpubl. observation), while the genitalia are indistinguishable (Prószyński 1973). However, even here, the unusual amphi-Eurasian distribution of the species (Logunov & Marusik 2001) indicates that perhaps the Asian population is a separate species, *Carrhotus crinitus* (Karsch, 1879), which is currently considered a synonym of *C. xanthogramma*. Another relevant case is provided by the sister species *Clubiona vegeta* Simon, 1918, and *C. genevensis* L. Koch, 1866, which are more reliably distinguished based on their abdominal pattern and colouration than based on their genitalia (Helsdingen 1979, Oger unpubl. observation).

Simon (1932) mentioned that the characteristic pattern is sometimes lacking in *C. striolatum*, but this may be due to the inclusion of material from North Africa; examination of the African material in his collection indicates that some populations of *C. striolatum*-like specimens occurring there have a unicolourous opisthosoma. Given the lack of genital diagnostic characters, it is not quite clear if these North African specimens belong to *C. macedonicum* or to a closely related third species, as would be more plausible zoogeographically. Given the apparently highly conservative morphology, it would seem necessary to assess the extent of gene flow between all taxa in this very distinct group using the tools of molecular genetics, with a focus on North Africa and the possible contact areas in the Iberian Peninsula, Italy and Slovenia. For Italy, only *C. striolatum* has been reported in the literature (Caporiacco 1949, Pesarini 2003; another record, from the Laguna Veneta, Caporiacco 1950, is doubtful, according to Hansen 2007, as it is based on a juvenile specimen). However, examination of specimens in the collection of the Museo Civico di Scienze Naturali "E. Caffi", Bergamo, revealed that specimens from the Italian mainland and Sicily lacked the striped opisthosomal pattern and should for now be considered as belonging to *C. macedonicum*. The most recent checklist of Slovenian spiders reports both *C. macedonicum* (sub *C. rupestre*) and *C. striolatum* from that country, based on literature data (Kostanjšek & Kuntner 2015). A molecular genetic analysis would be the most suitable tool to define the precise boundary between *C. macedonicum* and *C. striolatum*, and to determine if sympatric populations or hybrid forms occur in the contact zone.

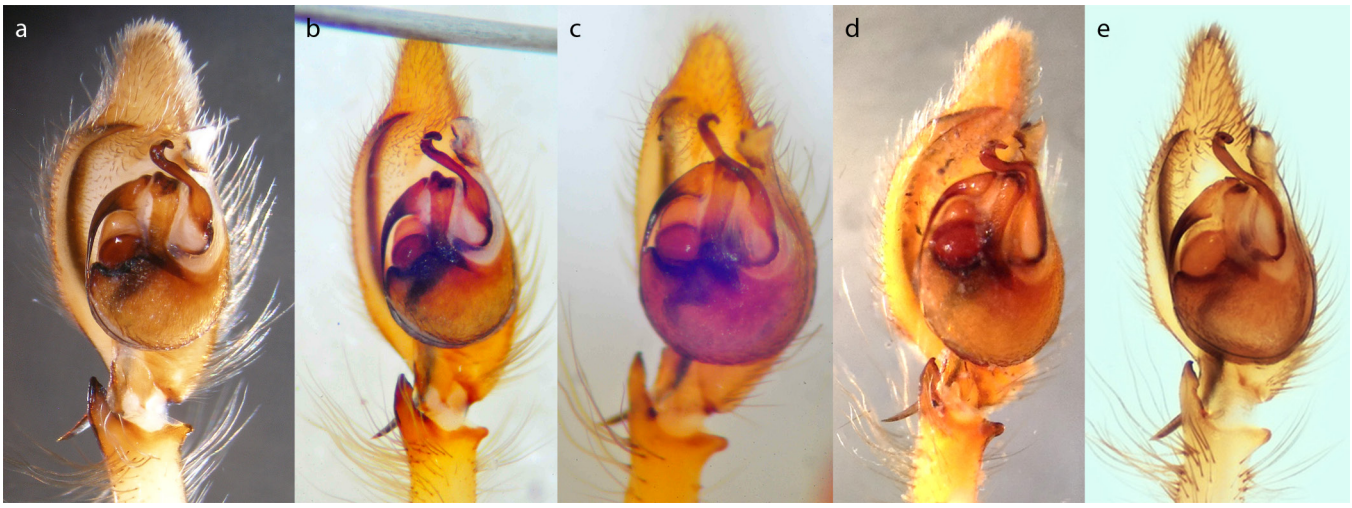

Fig. 5: Ventral view of the pedipalp **a., b.** of two specimens of *C. macedonicum* from Bulgaria and three specimens of *C. striolatum* **c.** from Portugal, **d.** mainland France and **e.** Corsica

Fig. 6: Habitus of **a.** female and **b.** male *C. macedonicum*, and **c.** female and **d.** male *C. striolatum*

For now, we refrain from describing the African specimens as a separate species, but consider *C. striolatum* and *C. macedonicum* as closely related, but distinct species, reliably defined by the differences in opisthosomal pattern only. In view of the stable differences in pattern over a large geographic area (Fig. 7) and long period of time, we consider this hypothesis more likely than the alternative that the two taxa are actually representatives of a single widespread and variable species. Future research may allow a more confident decision in favour of one or the other hypothesis, but for now the treatment as two separate species is not only justified by the available evidence, but is also the more conservative approach, minimizing the number of changes in nomenclature and maximizing the information content of future faunistic records.

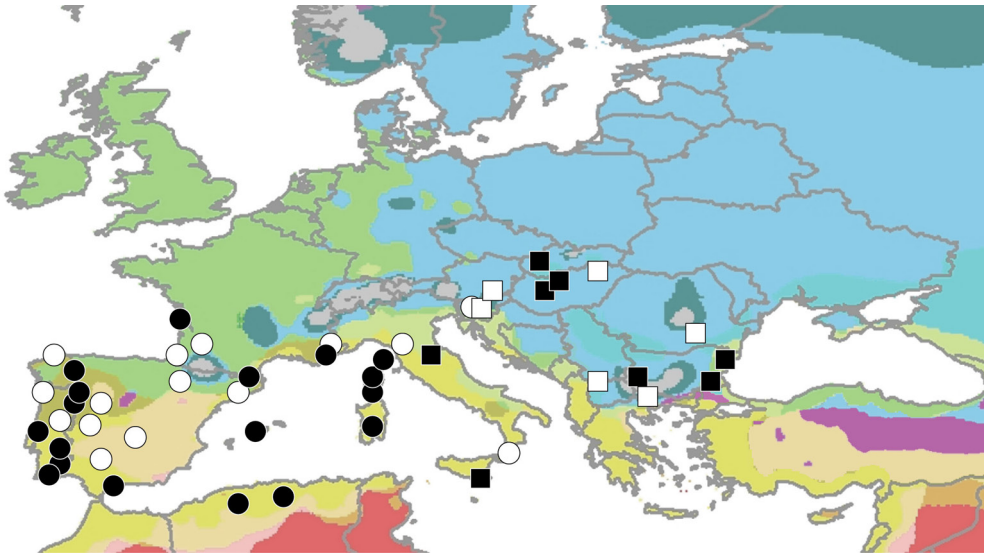

Fig 7: Distribution of *Cheiracanthium striolatum* (circles) and *C. macedonicum* (squares), superimposed on a map of climate types according to Köppen (Peel et al. 2007). Black symbols indicate examined specimens, open symbols are based on literature records. For clarity, records from closely adjacent locations are indicated by a single symbol.

There is no clear indication for an ecological separation of the two species yet, but it is noteworthy that records of *C. macedonicum* come predominantly from montane localities, often in grassy habitats within forests or along forest edges, while there is a reported preference of *C. striolatum* for coastal dune habitats in France. In the Iberian Peninsula, however, records of *C. striolatum* are widespread at altitudes from sea level to 1900 m (Morano et al. 2014).

The case of *Xysticus albomaculatus*

Material examined

sub *X. albomaculatus*: GERMANY: 1♂, Conweiler, Straubenhardt near Pforzheim, "Birnbaumrinde [pear tree bark]", 19 August 1981, coll. J. Wunderlich. AUSTRIA: 2♀♀ (1 epigyne missing), Lower Austria near Purgstall, Ressl, leg., J. Wunderlich coll. SLOVAKIA: 1♂ 3 juv. Szomotor, HNHM Chyzer coll. 1187 (syntypes). Uncertain locality (HUNGARY?) 1♀ B.-Lellc.(?), Szombathy det., HNHM.

sub *B. baudueri*: FRANCE: 1♀, 2subad. ♂♂ "Sos [Lot-et-Garonne]" MNHN 1467.2156 (syntypes) [an adult male in the same tube is *B. versicolor* s. str.; it was probably collected in Contis or Mimizan, Landes, as indicated by a second label]. 1♀ "Saint Saud [Dordogne] (aout 1918!) écorce de châtaignier [chestnut bark]", MNHN Simon coll. 1467.25464 (designated as "lectotype" of *B. baudueri* by Déjean & Ledoux 2013, but not a syntype and therefore invalid). 2♂♂ Forêt de Grésigne (Tarn), pitfall traps, 1999, H. Brustel leg., MNHN Ledoux coll. JV.10.898. 1♀ "Berrias (Ardêche) Montchamp, 7/8/04", MNHN Ledoux coll. NQ 10.898-16.921.

Comparative material

Bassaniana decorata (Karsch, 1879): JAPAN 2♀♀, 3♂, 7 juv. Yokohama (syntypes of *Coriarachne japonica* Simon, 1886), MNHN Simon coll. 1467.7346.

Bassaniana utahensis (Gertsch, 1932): UNITED STATES: 1♀, 1♂ New York, Banks leg., T.A. Bowling det. Nov. 1973, MNHN Simon coll. 1467.4. 9♀♀, 3♂♂, 1subad♂ "Mass. N. Carol. Georg. Colora.", T.A. Bowling det. Nov. 1973, MNHN Simon coll. 1467.688. 2♀♀, 4♂♂ "Am. sept. pacif." (= Pacific North America) T.A. Bowling det. Nov. 1973, MNHN Simon coll. 1467.17106.

Bassaniana versicolor (Keyserling, 1880): UNITED STATES 16♀♀, 9♂♂ "Mass. N. Carol. Georg. Colora.", T.A. Bowling det. Nov. 1973, MNHN Simon coll. 1467.688.

Coriarachne brunneipes Banks, 1893: UNITED STATES: 1♀, 1subad♂ "Mass. N. Carol. Georg. Colora.", T.A. Bowling det. Nov. 1973, MNHN Simon coll. 1467.688. 1♀, 1♂ Washington, Banks leg. "Type!", MNHN Simon coll. 1467.3.

Xysticus albomaculatus was first described in 1891 on the basis of very few ("perpauca") male and female specimens from Sátoraljaújhely (Hungary) and the sands at Szomotor (= Somotor, Slovakia) (Kulczyński in Chyzer & Kulczyński 1891). Other specimens were reported in a later volume of the same work from Pozsony (= Bratislava, Slovakia) and Pápa (Hungary) (Chyzer & Kulczyński 1897), and a single male was found a few years later by Bösenberg (1902) on the Großer Feldberg, Taunus, Hesse, Germany; but afterwards it took more than 60 years before the next reliable records were published, from Aiud, Romania (13.V.1962, Fuhn & Niculescu-Burlacu 1969), Pforzheim, Germany (19.VIII.1981) and Purgstall, Austria (both Wunderlich 1982). Based on this material, Jantscher (2001) re-described the species in detail in her unpublished doctoral thesis.

Even the original description of *X. albomaculatus* was uncertain about its generic placement, noting an affinity with *Ozyptila*, and Jantscher (2001) cites personal communications by Logunov and Marusik, indicating that the species probably belongs to a new genus, with additional representatives in Siberia. A closer examination shows, however, that *X. albomaculatus* with respect to its cryptic mottled habitus, tree bark habitat and the basic structure of the copulatory organs is very similar to species currently placed in the genus *Bassaniana*, which has commonly found representatives in East Asia and North America.

In Europe the genus *Bassaniana* is represented by a single species from France, which has been just as rarely reported as *X. albomaculatus*: *Bassaniana baudueri* (Simon, 1877), was first described (as *Oxyptila baudueri*) on the basis of subadult males and a "young female" from Sos, Lot-et-Garonne, France. Another female was found in 1918 in Saint-Saud, Dordogne, together with its egg sac under the bark of a chestnut tree. Simon (1903) transferred the species from *Coriarachne* (where he apparently had placed it in the meantime) to *Xysticus*, together with several other species currently placed in *Bassaniana*. The new records were published in Simon (1932, publ. posthumously). In this work, the taxonomic situation is considerably confounded by the inclusion of an illustration of a supposed *B. baudueri* female from Spain, which actually belongs to *Xysticus cribratus* (Déjean & Ledoux 2013). Moreover, in addition to the records of *B. baudueri* (again sub *Oxyptila baudueri*), the work also contains a single record of a male *B. versicolor* (sub *Coriarachne versicolor*) from Mimizan or Contis, Landes, which is considered an accidental introduction. At a later stage, someone (Simon himself?) considered this specimen to belong to *B. baudueri*, and it is currently found in the same vial in Simon's collection as the original type material of the latter. However, the structure of the pedipalp, with a long, thin, straight embolus indicates that Simon was actually correct in assuming that this male belongs to *B. versicolor* s. str. Mimizan was a major American army base, housing engineering corps members working in the Landes forest around the town (Fenneman 1930), and together with the neighbouring seaside village Contis was a popular tourist location in the interwar years, both of which could explain the introduction, especially as *B. versicolor* is a common spider often found in synanthropic habitats in North America (Kaston 1948).

Déjean & Ledoux (2013) were the first to report the rediscovery of *B. baudueri* after an interval of almost 80 years, reporting the species to be widespread in forest locations across southern France. They considered *baudueri* a subspecies of the North American *B. versicolor*, and also downgraded *B. utahensis* and (tentatively) *B. decorata* (from Japan) to subspecific status. It is true that all these species are very similar in their (rather variable) habitus, as well as in their genitalia, and difficult to distinguish with confidence. Probable hybrids between *B. versicolor* and *B. utahensis* have been reported as occurring regularly in part of the overlapping range of the two species (Dondale & Redner 1978), and even the material in the Simon collection that was re-identified by T. A. Bowling during his revision of the genus (Bowling & Sauer

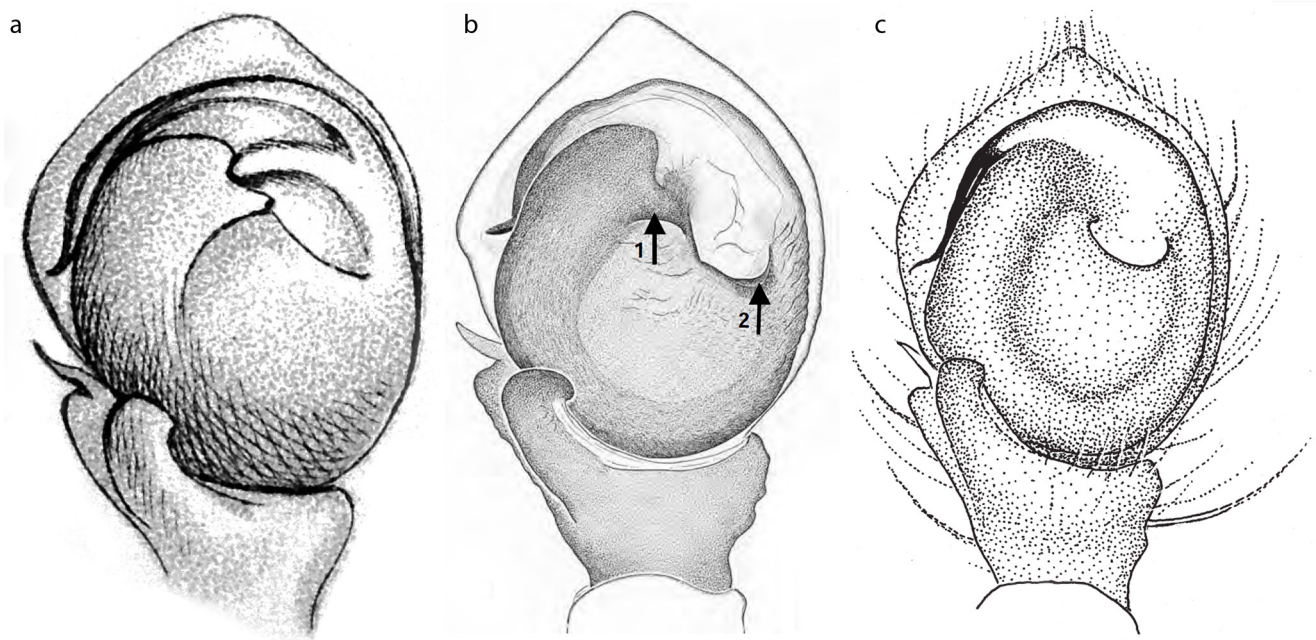

Fig. 8: Pedipalp (ventral view) of *Bassaniana baudueri*: **a.** from the original description of *X. albomaculatus* (Kulczyński in Chyzer & Kulczyński 1891: Tab. III, fig. 33b), **b.** from a German specimen (Jantscher 2001: Tab. 3a), and **c.** a French specimen (figure from Déjean & Ledoux 2013: fig. 10B, by Jean-Claude Ledoux, courtesy of Sylvain Déjean)

1975) seems to contain misidentified specimens. Nevertheless, *B. baudueri* seems to differ consistently in subtle details of the genitalia of both males and females, sufficiently to justify re-elevation to species rank, in addition to the zoogeographical implausibility of spider subspecies occurring on separated continents. In the female, the epigynal septum in *B. baudueri* is broader and less distinct than in the related species, lacking the deeply notched posterior margin, which is particularly prominent in *B. decorata*, but also clearly expressed in the North American species; in the male, the embolus is more robust (not long and thin, as in *B. versicolor*), very gradually tapering towards the tip, which is clearly curved outwards (not straight, as in *B utahensis;* Dondale & Redner 1978: fig. 439). These characters are shared by all European specimens, including the material reported previously as *X. albomaculatus* from Central Europe¸ and we therefore consider *Xysticus albomaculatus* a junior synonym of *Bassaniana baudueri* (**stat. nov., syn. nov.**).

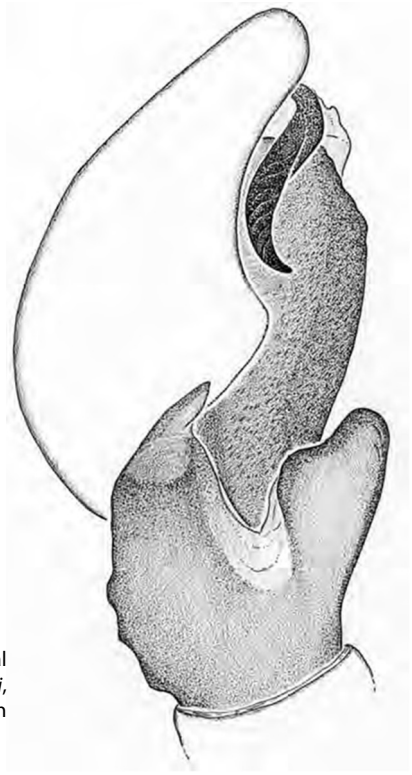

Fig. 9: Pedipalp (retrolateral view) of *Bassaniana baudueri*, based on a German specimen (Jantscher 2001: Tab. 3b). Scale bar = 0.2 mm

Both *X. albomaculatus* and its senior synonym *B. baudueri* have been characterized in detail before, both in the original descriptions and in the more recent work of Jantscher (2001) and Déjean & Ledoux (2013). Here we only provide an abbreviated description and illustration of the diagnostic characters. *Bassaniana baudueri* is a typical member of the genus *Bassaniana*, with a variable cryptic mottled pattern of white, brown and black blotches, on legs and body (habitus photos are provided in Wunderlich 1982 and Déjean & Ledoux 2013). It has rather thick, club-shaped spines on the body (but not on the clypeus), in contrast to the thin, pointed spines of *Xysticus* s. str. Total length: ♂♂ 3.8–4.5 mm, ♀♀ 5.0–5.6 mm. Prosoma length: ♂♂ 1.9–2.2 mm, ♀♀ 2.3–2.6 mm. In the male palpus (Figs 8-9), the retrolateral tibial apophysis carries a short straight tooth that is clearly visible in ventral and dorsal view and readily distinguishes the species from similar European spiders in *Xysticus* or *Ozyptila*. The embolus emerges at the distal end of bulbus, is strong and with its tip distally bent outwards retrolaterally in an almost 90° angle, different from *B. versicolor* and other American species in the genus.

The female epigyne (Figs 10-11) is characterized by a very indistinct light septum, without a distinct posterior margin (different from *B. decorata* and the American species). The poor definition of the epigynal structures might be the reason why Simon (1877) considered his type a "young" (not full sclerotized?) female. The width and shape of the septum are variable, but always broader than in the other species of the genus.

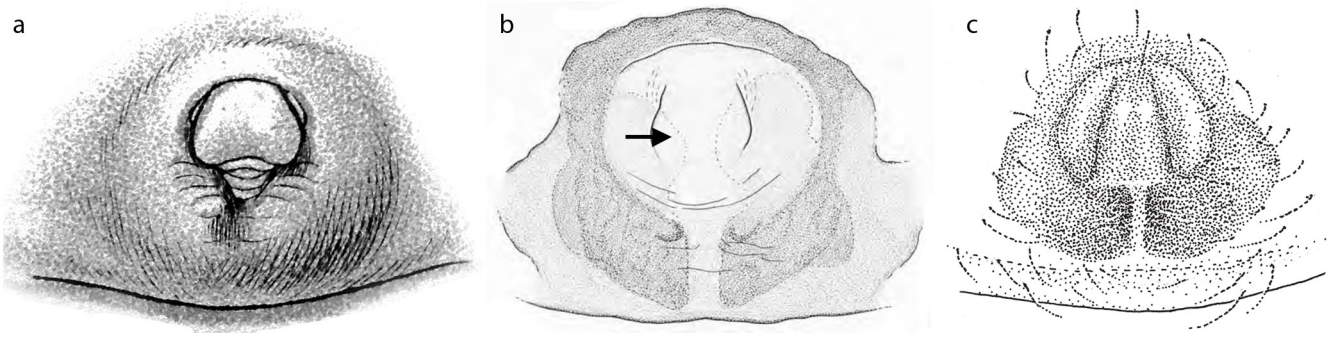

Fig. 10: Epigyne of *Bassaniana baudueri*: **a.** from the original description of *X. albomaculatus* (Kulczyński in Chyzer & Kulczyński 1891: Tab. III, fig. 33a), **b.** from an Austrian specimen (Jantscher 2001: Tab. 3c), and **c.** a French specimen (figure from Déjean & Ledoux 2013: fig. 10A, by Jean-Claude Ledoux, courtesy of Sylvain Déjean)

As discussed above, the generic placement of *B. baudueri* has been unclear since its first description, with suggested affinities to *Ozyptila, Xysticus* and *Coriarachne*. The same holds true for the remaining *Bassaniana* species, which were treated as a distinct (unnamed) species group in *Xysticus* by Simon (1903) and partly united in their own genus (*Platyxysticus*) by Gertsch (1932), who later (1939, 1953) synonymized this genus with *Coriarachne* C.L. Koch, 1837, but maintained two distinct species groups, corresponding to the species currently placed in *Coriarachne* (*brunneipes* group) and *Bassaniana* (*versicolor* group). Finally, the species were placed in *Bassaniana* Strand, 1928 (type species: *Bassania aemula* O. Pickard-Cambridge, 1898 = *B. versicolor*) in its current sense by Ono (1985, 1988). Subsequently, Lehtinen proposed downgrading *Bassaniana* to a subgroup "lower than subgenus" of *Coriarachne*, implying (erroneously) that Ono's separation of the two genera was based only on irrelevant differences in body shape (flattened vs. not quite so flattened), and Dondale (2009) suggested that at least the North American species of *Bassaniana* be placed in *Coriarachne*, arguing that the separation was based solely on "equivocal differences in microhabitat". These arguments do not seem particularly convincing: both *Bassaniana* and *Coriarachne* s. str. are very homogenous and probably monophyletic assemblages. Of the two outliers, *C. nigrostriata* Simon, 1886, from Vietnam (holotype subadult female and additional adult male in MNHN, examined) is probably misplaced in this genus and might possibly belong in or near to *Demogenes* Simon, 1895, an unrevised genus (or group of genera) of coriarachnine-like spiders that includes some of the dominant ground-living thomisids in the Oriental region and Melanesia and resembles *C. nigrostriata* in its habitus and the structure of the pedipalp (Lehtinen 2004, Marusik et al. 2005). And *B. ora* Seo, 1992, from Korea is clearly very close to (and in all probability a junior synonym of) *C. fulvipes* according to the illustrations of the pedipalp provided by Seo and in Namkung (2003) (compare, e.g., figs. 2 and 3 in Seo 1992, to figs. 60 and 61 in Ono 1988). In contrast, the evidence for uniting the two groups in a single *Coriarachne* s. lat. seems to be based entirely on adaptive characters, in particular the flattened body, associated with the shared tree trunk habitat. It is certainly possible that *Xysticus* or *Ozyptila* are paraphyletic with respect to *Bassaniana* and/or *Coriarachne* s. str., but resolving their exact relationships will require a broader study of the entire Coriarachnini (sensu Ono 1988), preferably using a total evidence approach including molecular genetic characters. Until such a study becomes available, we conservatively maintain the generic placement of *baudueri* in *Bassaniana*, following the latest version of the World Spider Catalog (2016).

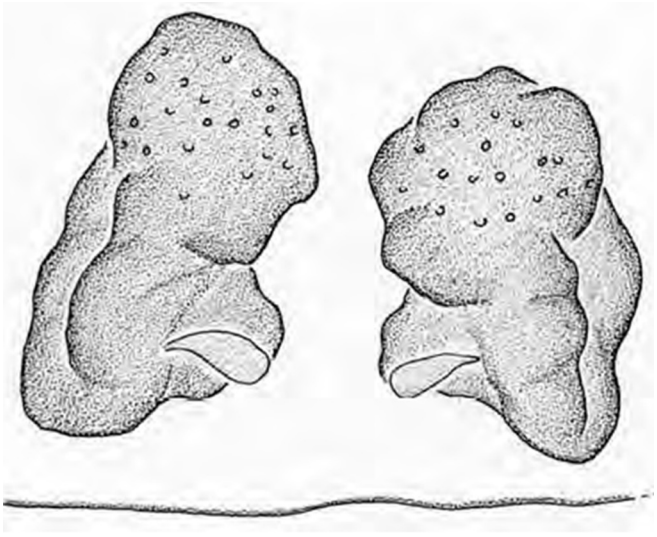

Fig. 11: Internal view of the cleared epigyne of *Bassaniana baudueri* (Austrian specimen, Jantscher 2001: Tab. 3d)

In a curious twist, Déjean & Ledoux (2013) had suggested that Simon's first description of *O. baudueri* was incomplete, as it did not include information on the genitalia, and that the correct publication date should be 1932. This change was not widely accepted, but if it were correct, *O. baudueri* would be a junior synonym of *X. albomaculatus*. However, even if the 1877 description does not include the details that Déjean & Ledoux would have liked to see, it constitutes a perfectly valid description, providing a plethora of supposedly diagnostic details, and even the type material is still available. The change in publication date is therefore not justified, and the associated assignment of a lectotype collected in 1918 is invalid, as this specimen was not a part of the original type series (ICZN art. 74.2).

The known distribution of *Bassaniana baudueri* as defined here extends from northern Portugal (Cardoso et al. 2008, sub *B. versicolor*, two specimens from a Mediterranean oak forest in Mata da Albergaria, Peneda-Gerês National Park (PNPG), at an altitude of 600 to 700 m) and the western coast of France, via Germany, Austria, Hungary, Slovakia to Central Romania. Considering that its relatives in North America are

widespread, common and often found in rather large numbers in synanthropic habitats (see, e.g., Shinkai 2006 and Kaston 1948), it will be interesting to see if the number of records of *B. baudueri* will increase throughout Europe in the coming years. New records might also fill the apparent gap between the eastern and western populations.

Taxonomic summary

***Cheiracanthium rupestre* Herman, 1879 nomen dubium**

Chiracanthium rupestre Herman, 1879: 157, 356, pl. 7, f. 158 (Description and illustration of female). [Holotype ♀ from HUNGARY: Majláth (Diósgyőr, Miskolc), considered lost].

***Cheiracanthium macedonicum* Drensky, 1921**

(Figs 1a+b, 2a+b, 4, 5a+b, 6a+b)

Chiracanthium rupestre – Chyzer & Kulczyński 1897: 235, pl. 9, figs 42, 62, 78 (description of female, description and illustration of male; three ♀♀ examined, two of them by photographs, considered misidentified)

Chiracanthium macedoinica [sic, lapsus] Drensky, 1921: 49, 77, pl. 1, figs 12-14 (description and illustration of female). [Holotype ♀ from BULGARIA: Yakoruda, Drensky leg., examined].

Chiracanthium macedonica – Drensky 1929: 23
(lapsus corrected)

Cheiracanthium mazedonica – Drensky 1936: 173 (lapsus)

Cheiracanthium macedonicum – Roewer 1955: 480 (correction of gender ending required by ICZN Art. 31.2).

Chiracanthium macedonicum – Bonnet 1956: 1060

Cheiracanthium rupestre – Oltean 1973: 46, figs 1-2 (description and illustration of male; considered misidentified)

Cheiracanthium rupestre – Sterghiu 1985: 110, figs 33a-c (description and illustration of male; considered misidentified)

***Cheiracanthium striolatum* Simon, 1878**

(Figs 1c, 2c, 3, 5c–e, 6c+d)

Cheiracanthium striolatum Simon, 1878: 263 (Description of male and female). [Syntype ♂♂ and ♀♀ from FRANCE: "Basses-Alpes: Castellane (Sédillot) Digne – Var. – Alpes-Maritimes. – Gironde: forêt de la Teste. – Lot-et-Garonne: Sos (Bauduer [leg.]) – Corse – Basses-Pyrénées: St-Jean-de-Luz", probably among the material in MNHN Simon coll. 1796.1867, but not individually identifiable]. Simon 1932: 901, 962, fig. 1360-1361 (description and illustration of male and female). Lecigne 2014: 21, fig. 6 (illustration of female). Barrientos et al. 2015: 62, figs 2a-e (illustration of male and female).

***Bassaniana baudueri* (Simon, 1877) stat. nov.** (Figs 8–11)

Oxyptila baudueri Simon, 1877: 41 (Description of female [considered "jeune"]). [Probable syntype ♀ and 2 juvenile ♂♂ from FRANCE: Lot-et-Garonne: Sos, M. P. Bauduer leg., examined]. Simon 1932: 805, 871 (non fig. 1198, misidentified).

Xysticus albomaculatus Kulczyński, in Chyzer & Kulczyński 1891: 94, tab. 3, figs 33a-b (description and illustration of male & female). [Syntype ♂ and ♀ from HUNGARY: I. S.-a.-Ujhely (Sátoraljaújhely) and SLOVAKIA: Somotor (Szomotor), sandy planes, C. Chyzer leg.; one ♂ syntype examined]. Bösenberg 1902: 352, pl. 33, fig. 520 (description and illustration of male & female). Fuhn & Niculescu-Burlacu 1969: 80, pl. 1, fig. 6 (description & illustration of female). **Syn. nov.**

Psammitis baudueri – Wunderlich 1995: 761 (transfer from *Ozyptila*).

Bassaniana versicolor baudueri – Déjean & Ledoux 2013: 88, figs 9, 10A-C (transfer from *Psammitis*; description and illustration of male & female).

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