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Unexpected occurrence of the genus *Eratigena* in Laos with description of a new species (Araneae: Agelenidae)

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Abstract

During fieldtrips to Laos in 2009 and 2012, two male agelenid specimens were collected from two different caves in the Bolikhamsay Province. Examination of morphological and molecular (CO1) characters revealed, that these specimens belong to a new species, *Eratigena laksao* sp. n. The cheliceral retromargin of the examined specimens have more than six teeth and the most proximal tooth is distinctly smaller, two character states that are regarded as synapomorphic for *Eratigena*. Nevertheless, due to the presence of ventral spines at tarsus IV, the completely reduced distal sclerite at the median apophysis, and the lack of females, the genus affiliation of this species remains tentative. *E. laksao* sp. n. can easily be identified by the unique presence of distinct bristles at the distal palpal tibia.

Key words: relict species, cave, spider, taxonomy, morphology, molecular analysis, CO1

Introduction

In recent years, our knowledge of the systematics and taxonomy of araneomorph funnel weavers (Agelenidae) has been improved significantly (Bolzern *et al.* 2010, 2013; Miller *et al.* 2010). However, indicated by the large number of newly described species within the last couple of years, it appears that our knowledge about species diversity is strongly limited, even for those quite large spiders. This is especially true for regions, where no intensive biodiversity research has been taken place so far.

Therefore, the finding of an undescribed agelenid spider from Laos was not a surprise at all. More interesting and challenging was its genus affiliation. In South and East Asia as well as north-western Southeast Asia, the family Agelenidae is primarily represented by members of the subfamily Coelotinae (Wang, 2014; more than 450 spp.). Coelotine spiders differ from members of the other subfamily, Ageleninae, in having the eye region of the prosoma not distinctly narrowed, relatively stout legs, and a lateral furrow at the cymbium (Nentwig *et al.* 2014). The males here described as a new species have a distinctly narrowed eye region, long and slender legs and lack a furrow at the cymbium, therefore belonging to the Ageleninae. From the 423 agelenine species described within 33 genera (Bolzern 2014), only eight genera and 37 species are known from the area in focus.

The two males discovered in two different caves in Laos do not belong to any of those genera known from that region. Based on morphological characters, the newly described species is tentatively placed in the genus *Eratigena*. As stated in the analysis of Bolzern *et al.* (2013), four synapomorphies supporting the *Eratigena* clade, two for both sexes (characters 26, 27) and two for females only (characters 95, 97). The males described here do show the synapomorphic character states of *Eratigena*: there are more than six teeth at the cheliceral retromargin (Fig. 10, see Bolzern *et al.* 2013: character 26, state 2), and at least the most proximal tooth is distinctly smaller than the others (Fig. 10, see Bolzern *et al.* 2013: character 27, state 2). In addition, by applying the key to European agelenid genera (Bolzern *et al.* 2013: 739), the examination of the present specimens would undoubtedly lead to *Eratigena* (e.g. RTA with two branches and lateroventral ridge absent, conductor with membranous transversal ridge present). However, some uncertainty remains, since there are at least two characters not observable in other

Other important characters (Figs 1–13): Cheliceral promargin with four teeth, retromargin with seven subequally sized teeth (most proximal tooth smaller). Colulus trapezoidal plate with distal margin moderately W-shaped. PLS with distal segment longer than basal segment. Tarsal trichobothria on cymbium absent. Series of tarsal trichobothria increasing in length towards tip. Leg spination: male palp (2–0–0–0, 2–0–0, 1–1–0–0 or 2–2–0–0), leg femora (2⁺–3–3–0, 2–1–2–0 or 3–3–4–0, 4–4–4–0, 2–1–2–0 or 3–3–3–0), patellae (all 2–0–0), tibiae (2–2–2–3 or 2–2–2–1+1p+1, 1–2–1–2 or 2–2–2–1p+1, 2–2–2–1+1p+1, 2–2–2–2 or 2–2–2–3), metatarsi (0–1–0–3p+1 or 0–2–0–3p+1, 0–2–0–3p+1 or 0–3–2–3p+1, 0–3–2–3p+1 or 0–3–3–3p+1, 0–3–2–1+1p+1+1p+1 or 0–4–4–1+1p+1+1p+1), tarsi (0, 0 or 0–2–2–0, 0–1–2–0, 0–1–2–1 or 0–1–3–1).

Colouration (Figs 1–9): Carapace with two longitudinal symmetrical dark bands, margins broadly darkened, between margin and bands irregularly bright spots, median from eyes to posterior end of carapace distinct white band (white hairs), head region laterally with two distinct, longitudinally curved dark bands. Chelicerae frontally with distinct dark patches. Sternum with distinct pale median band, bordered by darkened bands. Opisthosoma dark, brownish, with reddish pale median band, anteriorly bordered by white bands, posteriorly with white dots (indistinct chevrons). Legs annulated. Colulus darkened. ALS moderately, PLS distinctly darkened (lateral segment of PLS moderately less darkened than basal one).

Female. Unknown.

Distribution. Reported from two caves in Bolikhamsay Province, Laos.

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TABLE S1. Genbank accession numbers of included CO1 sequences.

Taxon name	Accession #	Taxon name	Accession #
Agelenidae		<i>Lycosoides coarctata</i> (Dufour, 1831)	FR714885
<i>Agelena canariensis</i> Lucas, 1838	FN554798	<i>Maimuna cretica</i> (Kulczyński, 1903)	FN554795
<i>Agelena koreana</i> Paik, 1965	JN817201	<i>Malthonica oceanica</i> Barrientos & Cardoso, 2007	FN554792
<i>Agelena labyrinthica</i> (Clerck, 1757)	FN554797	<i>Novalena intermedia</i> (Chamberlin & Gertsch, 1930)	EU979472
<i>Agelena limbata</i> Thorell, 1897	JN817198	<i>Rualena cruzana</i> Chamberlin & Ivie, 1942	DQ628543
<i>Agelenopsis aleenae</i> Chamberlin & Ivie, 1935	AY770786	<i>Rualena goleta</i> Chamberlin & Ivie, 1942	DQ628550
<i>Agelenopsis potteri</i> (Blackwall, 1846)	AY770793	<i>Tamgrinia alveolifera</i> (Schenkel, 1936)	FJ949019
<i>Allagelena gracilens</i> (C. L. Koch, 1841)	DQ628606	<i>Tegecoelotes secundus</i> (Paik, 1971)	JN817212
<i>Aterigena aculeata</i> (Wang, 1992)	FN554790	<i>Tegenaria campestris</i> (C. L. Koch, 1834)	FN554770
<i>Aterigena aliquoi</i> (Brignoli, 1971)	FN554791	<i>Tegenaria dalmatica</i> (Kulczyński, 1906)	FN554781
<i>Aterigena ligurica</i> (Simon, 1916)	FN554789	<i>Tegenaria domestica</i> (Clerck, 1757)	FN554808
<i>Barronopsis barrowsi</i> (Gertsch, 1934)	DQ628559	<i>Tegenaria ferruginea</i> (Panzer, 1804)	FR714888
<i>Barronopsis texana</i> (Gertsch, 1934)	AY770816	<i>Tegenaria parietina</i> (Fourcroy, 1785)	AY138836
<i>Calilena restricta</i> Chamberlin & Ivie, 1941	DQ628547	<i>Textrix caudata</i> L. Koch, 1872	FN554803
<i>Coelotes terrestris</i> (Wider, 1834)	DQ628626	<i>Textrix denticulata</i> (Olivier, 1789)	FN554794
<i>Coras lamellosus</i> (Keyserling, 1887)	HM376097	<i>Wadotes calcaratus</i> (Keyserling, 1887)	GU682855
<i>Coras montanus</i> (Emerton, 1890)	GU682929	<i>Wadotes dixiensis</i> Chamberlin, 1925	DQ628623
<i>Draconarius coreanus</i> (Paik & Yaginuma, 1969)	JN817209	Amaurobiidae	
<i>Eratigena agrestis</i> (Walckenaer, 1802)	FN554804	<i>Amaurobius borealis</i> Emerton, 1909	HQ924431
<i>Eratigena atrica</i> (C. L. Koch, 1843)	FN554801	<i>Amaurobius fenestralis</i> (Ström, 1768)	FN554820
<i>Eratigena herculea</i> (Fage, 1931)	FN554788	<i>Amaurobius ferox</i> (Walckenaer, 1830)	FN554819
<i>Eratigena incognita</i> (Bolzern, Crespo & Cardoso, 2009)	FN554784	<i>Callobius bennetti</i> (Blackwall, 1846)	GU682866
<i>Eratigena laksao</i> sp. n.	LK996041	<i>Cybaeopsis euopla</i> (Bishop & Crosby, 1935)	GU684504
<i>Eratigena picta</i> (Simon, 1870)	FN554785	<i>Zanomys californica</i> (Banks, 1904)	FJ949023
<i>Eratigena sardoa</i> (Brignoli, 1977)	FN554786	Cybaeidae	
<i>Eratigena sicana</i> (Brignoli, 1976)	FN554787	<i>Argyroneta aquatic</i> (Clerck, 1757)	DQ628625
<i>Eratigena vomeroi</i> (Brignoli, 1977)	FN554814	<i>Cybaeota nana</i> Chamberlin & Ivie, 1937	FJ263787
<i>Inermocoelotes inermis</i> (L. Koch, 1855)	DQ628628	<i>Cybaeus angustiarum</i> L. Koch, 1868	FJ263790
<i>Histopona torpida</i> (C. L. Koch, 1837)	FN554793	<i>Cybaeus reticulatus</i> Simon, 1886	FJ263793
<i>Hololena adnexa</i> (Chamberlin & Gertsch, 1929)	DQ628554	<i>Cybaeus signifier</i> Simon, 1886	FJ263794
<i>Hololena curta</i> (McCook, 1894)	DQ628556	<i>Cybaeus whanseunensis</i> Paik & Namkung, 1967	JN817204
<i>Iwogumoa songminjae</i> (Paik & Yaginuma, 1969)	JN817211		