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A NEW TROGLOPHILIC *AGYNETA* FROM COLORADO, THE FIRST DESCRIPTION OF THE FEMALE OF *AGYNETA LLANOENSIS* FROM TEXAS CAVES, AND A CLASSIFICATION OF NORTH AMERICAN CAVE LINYPHIIDAE (ARANEAE) AS TROGLOBITES OR TROGLOPHILES.

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ABSTRACT

Agyneta llanoensis (Gertsch and Davis, 1936) and *Agyneta hedini,* new species are described from Texas and Colorado caves, respectively. The female of *A. llanoensis* is documented for the first time. Both species are illustrated and their distributions assessed. *Agyneta llanoensis* is a species commonly found in Texas caves and its distribution extends to caves in Alabama and Tennessee, although it includes two surface records from Texas and one from Wisconsin. All known North American Linyphiidae species associated with caves were scored according to their eye reduction and specificity to cave habitat, in order to produce a first classification of these species as troglophiles or troglobites. *Anthrobia mammouthia* is restored as the correct spelling for this troglobitic Linyphiidae.

RESUMEN

Agyneta llanoensis (Gertsch y Davis, 1936) y *Agyneta hedini,* especie nueva, se describen de cuevas de Texas y Colorado, respectivamente. La hembra de *A. llanoensis* se reporta por primera vez. Ambas especies se ilustran y se analizan sus distribuciones. *Agyneta llanoensis* es una especie encontrada comúnmente en las cuevas de Texas y su distribución se extiende a cuevas en Alabama y Tennessee, e incluye dos registros superficiales de Texas y uno de Wisconsin. Todas las especies norteamericanas conocidas de Linyphiidae asociadas a cuevas fueron evaluadas en base a reducción del tamaño de los ojos y a la especificidad al hábitat cavernícola, para producir una primera clasificación de estas especies como troglófilas o troglobias. El nombre *Anthrobia mammouthia* se restaura como el deletreo correcto para este Linyphiidae troglobio.

INTRODUCTION

Linyphiidae associated with caves in North America display different degrees of adaptations to subterranean life with species that are highly troglobitic, to some that show little or no morphological modifications. For instance, the reduction of eyes is variable among these species and ranges from totally absent to no obvious reduction. The exclusivity to karst habitat is also variable; some species have only been collected in caves, while others are also known from surface records. The traditional ecological classification of species as trogloxenes (roost in caves but must emerge for food), troglophiles (reproduce in caves but may also live on the surface) and troglobites (obligate cavernicoles) (Barr and Holsinger, 1985) is a useful and widespread terminology, although the assignment of some species as a troglophile or a troglobite is not always straightforward (Paquin and Anderson, 2009).

In this paper, we re-describe the male of *Agyneta llanoensis* (Gertsch and Davis, 1936) and provide the first description of the female. The species is known from many Texas caves, but the type specimen is a surface record. We also describe *Agyneta hedini* new species, known only from two specimens collected in a Colorado cave. In order to provide a reliable assignment of *A. llanoensis* and *A. hedini,* new species, as troglophiles or troglobites, we are proposing a first ecological classification of 20 North American Linyphiidae species associated with caves based on their degree of eye reduction and exclusivity to cave habitat.

METHODS

Specimens were examined in 70% ethanol under a SMZ-U Nikon dissection microscope. A Nikon Coolpix 950 digital camera was attached to the microscope for photographing the structures to be illustrated. The digital photos obtained were traced to establish proportions and the illustrations detailed and shaded by referring back to the structure under the microscope. Female genitalia were excised using a sharp entomological needle and cleared in lactic acid. For the study of the embolic divisions (Figs. 4-6, 14, 16-17) and female cleared epigynums (Figs. 9–11, 20–22), structures were placed for ~10 minutes in warm KOH, washed in 80% alcohol, mounted on a slide in lactic acid and observed under an AmScope XSG Series T-500 compound microscope, then photographed and illustrated as explained above. All measurements are in millimeters and were made using a micrometric ruler fitted to a microscope eyepiece. When possible, five specimens of each sex and species were measured for description. Calculation for the location of Tm I follows Denis (1949). Palpal and epigynal terminology follows Saaristo (1973), Saaristo and Tanasevitch (1996), Saaristo and Koponen (1998), and Hormiga (2000). Saaristo and Tanasevitch (1996:171) provide detailed description and definition of female epigynum morphology. Color description was done under halogen lighting, using traditional color names. Subsequently, we matched the color of the specimen to a reference Pantone™ chart (Pantone Formula Guide, solid matte) and added the color code to the description.

Material from the following collections was examined: American Museum of Natural History (AMNH, New York, New York, U.S.A.), Texas Memorial Museum (TMMC, Austin, Texas, U.S.A.), Texas A&M University Insect Collection (TAMUIC, College Station, Texas, U.S.A.) and Collection Paquin-Dupérré (CPAD, Shefford, Québec, Canada).

Latitude and longitude data are not given to preserve the confidentiality of cave locations. Coordinates of surface records are given in decimal degrees.

In order to classify *A. llanoensis* and *A. hedini* new species as troglophiles or troglobites, we have compiled a list of North American Linyphiidae associated with caves – including some taxa awaiting taxonomic description – and ranked the species to produce two tables. Most of the data used to compile these tables are from specimens curated in the CPAD collection, but the following references were also consulted: Ivie (1965,

1969), van Helsdingen (1973, 1981), Millidge (1984), Gertsch (1992), Cokendolpher and Buckle (2004), Miller (2005a, b), Paquin, et al. (in press). Table 1 accounts for the eye reduction and ranged from no obvious adaptations to totally eyeless. Comparison with other members of the genus was taken into account when possible (*Oreonetides, Bathyphantes, Centromerus,* etc.), but this was not possible for the monospecific genus *Phanetta*. This ranking eased the scoring of each species. Table 2 accounts for the dependence to cave habitat and allows an independent ranking according to this criteria. For instance, species which are found in caves at the southern edge of their distribution but are known from some surface records at the northern edge receive a lower score than a species only known from caves. The final ranking of the species is obtained from the addition of the scores of both tables (total – 2), and ranged from 0 to 10 (Fig. 24).

TAXONOMY

Family Linyphiidae Blackwall, 1859
Agyneta Hull, 1911

Type species.—*Agyneta decora* (O. Pickard-Cambridge, 1871).

Diagnosis.—See Saaristo, 1973:461–465.

Agyneta llanoensis (Gertsch and Davis 1936)
Figs. 1–11, 25-26

Microneta llanoensis Gertsch and Davis 1936: 11, figs. 14–16 (Dm).

Meioneta llanoensis (Gertsch and Davis 1936): van Helsdingen 1973: 8 (Tm from *Microneta*);

Agyneta llanoensis (Gertsch and Davis 1936): Buckle, et al., 2001: 91, 92, 100; Reddell and Cokendolpher 2004: 87.

Type material.—*Microneta llanoensis* Gertsch and Davis 1936, Llano, Texas, Dec 1934 (L. Irby Davis), male holotype [30.759'N; -98.675'W], AMNH examined**.**

Other material examined (TMMC except as otherwise noted).—**U.S.A.: ALABAMA: *Conecuh County*:** Turk's Cave, 12 Aug. 1965 (S. and J. Peck), 1 male, 1 female, 5 juveniles (AMNH). **TENNESSEE: *Van Buren County*:** McElroy Cave, 2 Jan. 1960 (T. Barr), 1 male, 2 females (AMNH). **TEXAS: *Bell County*:** Afternoon Cave, Fort Hood, 4 March 2005 (M. Reyes), 1 male; 4 May 2005 (M. Reyes), 1 female; 4 April 2007 (M. Reyes), 1 juvenile; Awesome Entrance Cave, Fort Hood; 25 Sept. 2004 (J. Reddell, M. Reyes, M. Warton), 1 female; 8 Feb. 2006 (J. Reddell, M. Reyes), 2 males, 1 juvenile; Big Crevice, Fort Hood, Berlese of leaf litter, 13 May 1999 (J. Reddell, M. Reyes), 1 female; Blue Bottle Sink, Fort Hood, 18 Oct. 2005 (M. Warton), 1 female; Blue Green Hole Cave, Fort Hood, 5 April 2007 (J. Fant), 1 male, 1 female; Boca Verde Cave, Fort Hood, 25-26 Feb. 2006 (J. Fant, M. Reyes, M. Warton), 1 male, 1 juvenile; 16 May 2006 (J. Reddell, M. Reyes), 1 female; Born Again Cave, Fort Hood, 8 March 2004 (J. Fant), 1 male, 1 female, 2 juveniles; Buchanan Cave, Fort Hood, 4 Nov. 1998 (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 3 males, 2 juveniles; 4 Nov. 1998 (matured 22 Nov. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 female; 4 Nov. 1998 (matured 29 Nov. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 female; 4 Nov. 1998 (matured 18 Nov. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 female; 4 Nov. 1998 (molted 18 Nov. 1998; matured 1 Jan. 1999) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 male; 4 Nov. 1998 (matured 22 Jan. 1999) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes, 1 female; 4 Nov. 1998 (matured 5 Dec. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 female; 7 May 1998 (L. J. Graves, J. Reddell, M. Reyes), 2 females, 1 juvenile; 5 May 1999 (J. Reddell, M. Reyes), 1 female; 13 June 2000 (J. Krejca, P. Sprouse), 1 female, 1 juvenile; 13 June 2000 (J. Reddell, M. Reyes), 2 males, 2 females, 1 juvenile; 14 Dec. 2001 (J. Reddell, M. Reyes), 1 male; 31 July 2007 (J. Krejca), 1 male; 19 Oct. 2007 (J. Reddell, M. Reyes), 1 female, 3 juveniles; Bumelia Well Cave, Fort Hood, 4 Nov. 1998 (matured 29 Nov. 1998) (J. Cokendolpher, J. Krejca), 1 male; 4 Nov. 1998 (matured 8 Jan. 1999) (J. Cokendolpher, J. Krejca), 1 male; C. B. Cave, Fort Hood, 21 April 1998 (J. Reddell, M. Reyes), 2 females, 1 juvenile; Camp 6 Cave No 1, Fort Hood, 5 May 1999 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 5 May 1999 (J. Reddell, M. Reyes), 1 male; 5 May 1999 (matured 1 June 1999) (J. Reddell, M. Reyes), 1 female; 5 May 1999 (matured 5 July 1999) (J. Reddell, M. Reyes), 1 male; 5 May 1999 (matured 10 July 1999) (J. Reddell, M. Reyes), 1 female; 5 May 1999 (matured 11 July 1999) (J. Reddell, M. Reyes), 1 female; Cellular Cave, Fort Hood, 9 April 2007 (J. Fant), 1 female; Chupacabra Pit Cave, Fort Hood, 3 May 2006 (J. Fant, M. Reyes), 1 male, 1 female, 1 juvenile; Cicurina Cave, Fort Hood, 10 Jan. 2007 (J. Fant, M. Reyes), 1 female; 6 April 2007 (C. Pekins, J. Reddell, M. Reyes, 1 female, 1 juvenile; Copperdead Cave, Fort Hood, 22 May 2005 (J. Fant, M. Reyes), 1 female, 2 juveniles; Corkscrew Cave, Fort Hood, 3 May 2003 (M. Reyes, M. Warton), 1 female; Craggy Rock Cave, Fort Hood, 19 May 2004 (J. Fant), 1 male, 1 juvenile; Deceiving Sink, Fort Hood, 22 Oct. 2005 (M.

Reyes), 1 female; Deep in Dis Bear Cave, Fort Hood, 18 May 1998 (J. Reddell, M. Reyes), 1 female, 3 juveniles; Dual Sinks Cave, Fort Hood, 22 Nov. 2005 (J. Fant, M. Reyes), 1 female; Dying Oak Cave, Fort Hood, 20 April 2007 (J. Fant); Endless Pit Cave, Fort Hood, 15 Oct. 2004 (J. Fant, C. Pekins, J. Reddell, M. Reyes), 1 male, 3 females, 2 juveniles; 9 March 2005 (J. Fant), 1 male, 1 female; Estes Cave, Fort Hood, 28 June 2000 (M. Reyes, M. Warton), 1 male; 28 June 2000 (matured 6 July 2000) (M. Reyes, M. Warton), 1 male; Falling Hat Cave, Fort Hood, 21 April 2006 (J. Fant, M. Reyes), 1 female; Falling Turtle Cave, Fort Hood, 20 March 2004 (J. Fant, R. Ralph), 1 male, 3 females; Fellers Cave, Fort Hood, 6 May 1998 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 1 female; Figure 8 Cave, Fort Hood, 20 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 2 females, 5 juveniles; 3 Nov. 1998 (J. Cokendolpher, M. Reyes), 1 male, 1 female; 10 April 2002 (J. Reddell, M. Reyes), 1 female, 1 juvenile; Fire Break Cave, Fort Hood, 2 Oct. 2004 (J. Fant, C. Murray, M. Warton), 1 female; Fools Cave, Fort Hood, 1 April 1999 (J. Reddell, M. Reyes), 1 male, 1 female; Forbidden Chasm Cave, Fort Hood, 4 March 2005 (J. Fant), 2 males, 1 female,1 juvenile; Forgotten Cave, Fort Hood, 1 April 1999 (J. Reddell, M. Reyes), 4 females, 1 juvenile; 16 May 2006 (J. Reddell, M. Reyes), 1 female; Geocache Cave, Fort Hood, 27 June 2004 (C. Pekins, J. Reddell, M. Reyes), 1 female; 11 June 2005 (J. Fant), 2 females, 1 juvenile; 27 April 2007 (J. Fant, J. Reddell), 1 juvenile; Gnarla Cave, Fort Hood, 20 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 3 females, 1 juvenile; Berlese of leaf litter from cave, 24 April 1998 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 24 April 1998 (J. Reddell, M. Reyes), 2 males, 2 females; Green Carpet Cave, Fort Hood, 10 Oct. 2004 (J. Fant, C. Murray, M. Reyes, M. Warton), 1 male, 1 female, 3 juveniles; 4 May 2005 (J. Fant), 2 females; Hammer Crack Cave, Fort Hood, 5 April 2007 (J. Reddell), 1 female; Hidey Ho Cave, Fort Hood, 1 April 2006 (J. Fant, M. Reyes, M. Warton), 1 female; 6 April 2007 (J. Fant, C. Pekins), 1 female, 2 juveniles; Hope Well Sink, Fort Hood, 2 April 2006 (J. Fant, M. Reyes), 1 male; Humpty Cave, Fort Hood, 19 March 2005; (J. Fant, M. Reyes), 1 male, 2 females, 1 juvenile; 3 May 2006 (M. Reyes), 1 female; 20 May 2007 (J. Fant, J. Reddell, M. Reyes), 1 female, 4 juveniles; Jagged Walls Cave, Fort Hood, 14 March 1992 (J. Reddell, M. Reyes), 1 male; L. Z. Sid Cave, Fort Hood, 3 May 2000 (J. Reddell, M. Reyes), 1 female; Legless Visitor Cave, Fort Hood, 22 Oct. 2005 (M. Warton, H. Johnson), 1 male, 1 juvenile; 19 May 2007 (J. Fant, J. Reddell, M. Reyes), 2 males, 2 females, 8 juveniles; 17 Oct. 2007 (J. Reddell, M. Reyes), 1 male; 20 July 2008 (J. Reddell, M. Reyes), 1 male, 2 juveniles; Leopard Frog Cave, Fort Hood, 8 Feb. 2006 (J. Reddell, M. Reyes), 1 female; Long Joint Sink, Fort Hood, Oct. 1995 (M. Warton), 1 female, 1 juvenile; Lost Chasm Cave, Fort Hood, 20 Jan. 2005 (M. Reyes), 1 male; 4 May 2005 (J. Fant, J. Reddell, M. Reyes), 1 male; 18 Oct. 2007 (J. Reddell, M. Reyes), 1 female; Lucky Rock Cave, Fort Hood, 22 Feb. 1996 (D. Allen, L. J. Graves, D. Love), 2 males, 1 juvenile; 10 Sept. 1997 (L. J. Graves, J. Reddell, M. Reyes), 2 females, 4 juveniles; 25 March 1999 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 1 female; 25 March 1999 (J. Reddell, M. Reyes), 1 male, 1 female, 3 juveniles; 5 May 1999 (J. Reddell, M. Reyes), 1 female; 5 May 1999 (matured 1 June 1999) (J. Reddell, M. Reyes), 1 female; 30 April 2002 (J. Reddell, M. Reyes), 1 male; 28 Dec. 2007 (J. Fant, J. Reddell, M. Reyes), 1 male; Marcelino's Cave, Fort Hood, 2 May 2000 (M. Reyes), 2 males, 1 female; Molly Hatchet Cave, Fort Hood, 8-9 Oct. 2005 (J. Fant, M. Reyes), 1 male, 3 females, 1 juvenile; 19 May 2007 (J. Fant, J. Reddell, M. Reyes), 2 females, 3 juveniles; Nolan Creek Cave, Fort Hood, 19 May 1998 (J. Reddell, M. Reyes), 1 juvenile; 28 Dec. 2004 (J. Fant, J. Reddell, M. Reyes), 4 males, 3 females, 2 juveniles; 11 March 2005 (J. Fant, M. Reyes), 2 juveniles; 27 April 2007 (J. Fant, J. Reddell), 1 male, 12 females, 7 juveniles; 20 May 2007 (J. Fant, J. Reddell, M. Reyes), 1 female; Owl Mountain Cave, Fort Hood, 24 Oct. 1995 (D. Allen, L. J. Graves), 1 female, 1 juvenile; 28 May 2000 (J. Reddell, M. Reyes), 1 male; 27 June 2000 (J. Reddell, M. Reyes), 1 female; Peep in the Deep Cave, Fort Hood, 3 Nov. 1998 (J. Cokendolpher, J. Reddell), 1 female, 1 juvenile; 21 April 1998 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 8 May 1998 (J. Reddell, M. Reyes), 2 females; 10 April 2002 (J. Reddell, M. Reyes), 1 male; Plethodon Cave, Fort Hood, 25 July 2004 (J. Fant, M. Reyes), 1 female; 8 May 2005 (J. Fant, J. Reddell, M. Reyes), 1 female, 1 juvenile; 4 May 2006 (J. Fant, M. Reyes), 1 female, 1 juvenile; Plethodon Pit Cave, Fort Hood, 24 March 2004 (J. Fant, C. Pekins, J. Reddell, M. Reyes), 1 male, 2 females, 4 juveniles; 2 May 2005 (J. Fant, M. Reyes), 1 male, 2 females, 3 juveniles; Raining Rattler Cave, Fort Hood, 28 Nov. 2007 (M. Reyes), 1 male, 1 female; Road Side Sink, Fort Hood, 1 July 1993 (M. Warton), 1 female; 3 Nov. 1998 (M. Reyes), 2 females; Rugger's Rift Cave, Fort Hood, 5 Nov. 1998 (J. Reddell, M. Reyes), 2 males, 2 females; Rusty Cans Cave, Fort Hood, 4 Sept. 2004 (J. Fant), 1 male; 19 May 2007 (J. Fant, J. Reddell), 1 female; Sanford Pit Cave, 4 Nov. 1998 (J. Cokendolpher), 1 male, 3 females, 4 juveniles; 4 Nov. 1998 (matured 1 Dec. 1998) (J. Cokendolpher, J. Krejca), 1 female; 4 Nov. 1998 (matured 16 Nov. 1998) (J. Cokendolpher, J. Krejca), 1 male; 4 Nov. 1998 (matured 17 Nov. 1998) (J. Cokendolpher, J. Krejca), 1 female; 4 Nov. 1998 (matured 18 Nov. 1998) (J.

Cokendolpher, J. Krejca), 1 female; 4 Nov. 1998 (matured 8 Dec. 1998) (J. Cokendolpher, J. Krejca), 1 male, 1 female; 18 May 1998 (J. Reddell, M. Reyes), 1 female; Seven Mile Mountain Cave, Fort Hood, 29 April 2002 (J. Reddell, M. Reyes), 1 male; 23 April 2004 (C. Pekins, J. Reddell, M. Reyes ; 11 June 2005 (M. Reyes), 1 female; Skeeter Cave, Fort Hood, 18 May 1999 (L. J. Graves, J. Reddell, M. Reyes), 2 males; 25 Aug. 2003 (C. Pekins, J. Reddell), 1 female, 2 juveniles; Sledgehammer Cave, Fort Hood, 25 June 2003 (J. Reddell, M. Reyes), 1 female; Sleepy Hollow Cave, Fort Hood, 20 April 2006 (J. Fant, M. Reyes), 1 female; Sleepy Hollow Pit, Fort Hood, 1 July 2005 (J. Fant, M. Reyes), 1 female, 13 juveniles; Slotsky Pit Cave, Fort Hood, 6 June 2004 (M. Reyes, M. Warton), 1 male, 1 female; 19 Sept. 2004 (J. Fant, M. Reyes), 3 males, 1 female; Soldiers Cave, Fort Hood, 25 March 1999 (J. Reddell, M. Reyes), 2 females, 1 juvenile; Southern Cross Cave, Fort Hood, 21 Aug. 2003 (C. Pekins, J. Reddell, M. Reyes), 1 male, 2 females, 3 juveniles; Stand-Off Sink, Fort Hood, 14 Jan. 2006 (M. Reyes), 1 male; Stone Eyes Sink, Fort Hood, 4 April 2007 (J. Reddell, M. Reyes), 1 male, 1 female; Streak Cave, Fort Hood, 6 Oct. 1995 (M. Warton), 1 male, 2 females; 26 Sept. 1997 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 3 females, 5 juveniles; 14 June 2000 (J. Krejca, J. Reddell, M. Reyes, P. Sprouse), 1 juvenile; 18 Oct. 2007 (J. Reddell, M. Reyes), 1 female; 15 July 2008 (J. Reddell, M. Reyes), 1 female, 1 juvenile; Talking Crows Cave, Fort Hood, 20 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 2 males, 3 females, 2 juveniles; 2 Nov. 1998 (M. Reyes), 1 male, 1 female; 2 Nov. 1998 (matured 20 Jan. 1999) (M. Reyes), 1 male; 6 June 2000 (J. Reddell, M. Reyes), 1 male, 1 female, 3 juveniles; 6 June 2000 (matured 17 Oct. 2000) (J. Reddell, M. Reyes), 1 female; 18 Aug. 2003 (C. Pekins, J. Reddell, M. Reyes), 2 males, 1 female; 2 June 2005 (J. Fant, J. Reddell, M. Reyes), 1 male, 4 females, 3 juveniles; 4 May 2006 (J. Fant, M. Reyes), 7 males, 4 females; 6 April 2007 (J. Fant, J. Reddell, M. Reyes), 4 females, 3 juveniles; 21 July 2008 (J. Reddell, M. Reyes), 1 male; Thumbs Up Cave, Fort Hood, 12 Oct. 2005 (M. Reyes), 1 female; Tinaja Cave, Fort Hood, 13 May 2007 (J. Fant), 1 female; Tony's Can Cave, Fort Hood, 20 April 2007 (J. Fant), 1 juvenile; 20 May 2007 (J. Reddell, M. Reyes), 1 female; Treasure Cave, Fort Hood, 2 Nov. 1998 (matured 22 Nov. 1998) (J. Cokendolpher, J. Reddell, M. Reyes), 1 female; 2 Nov. 1998 (matured 29 Nov. 1998) (J. Cokendolpher, J. Reddell, M. Reyes), 1 female; 2 Nov. 1998 (matured 28 Dec. 1998) (J. Cokendolpher, J. Reddell, M. Reyes), 1 female; 2 Nov. 1998 (J. Cokendolpher, M. Reyes), 1 female; 21 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 1 female, 1 juvenile; Triple J Cave, Fort Hood, 23 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 6 juveniles; Tweedledum Cave, Fort Hood, 14 Oct. 2004 (J. Fant), 1 male; Valentine Cave, Fort Hood, 18 Sept. 1997 (J. Reddell, M. Reyes), 1 male, 3 females; Vine Cave, Fort Hood, 25 Aug. 2004 (J. Fant, M. Reyes), 2 females; Violet Cave, Fort Hood, 5 June 2000 (J. Reddell, M. Reyes), 1 male, 2 juveniles; Viper Den Cave, Fort Hood, 27 Jan. 1990 (J. Reddell, M. Reyes), 1 female; Weep Hole Cave, Fort Hood, 14 Nov. 2002 (M. Reyes, M. Warton), 1 male, 2 juveniles; West Corral Cave No 1, Fort Hood, 3 May 2000 (J. Reddell, M. Reyes, M. Warton), 1 female; 30 Oct. 2002 (M. Reyes, M. Warton), 1 male, 3 females, 5 juveniles; West Corral Cave No 2, Fort Hood, 11 May 2007 (J. Fant), 1 male, 3 females, 5 juveniles; West Corral Cave No 4, Fort Hood, 10 May 2003 (J. Fant, M. Reyes), 1 male, 1 female. ***Bexar County*:** B-52 Cave, Camp Bullis, 6 Dec. 1994 (W. Elliott, J. Ivy), 1 male; 10 Oct. 1998 (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 male, 2 females, 1 juvenile; Bexar (=Bear) Cave, 3 July 1968 (J. Reddell, A.R. Smith), 1 female; Bunny Hole, Camp Bullis, 9 Sept. 1998 (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 male, 3 females; 9 Sept. 1998 (matured 4 Oct. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 female; 9 Sept. 1998 (matured 18 Oct. 1998) (J. Cokendolpher, J. Krejca, J. Reddell, M. Reyes), 1 male; 31 March 1995 (J. Reddell, M. Reyes), 1 female; 24 Oct. 1995, (J. Reddell, M. Reyes), 2 females, 2 juveniles; Cannonball Cave, Camp Bullis, 6 Nov. 2001 (P. Sprouse), 1 female, 1 juvenile; 21 Nov. 2001 (J. Reddell, M. Reyes), 1 female; 15 April 2002 (J. Reddell, M. Reyes, G. Veni), 1 female, 1 juvenile; Hairy Tooth Cave, 21 Jan. 1994 (W. Elliott, J. Ivy, G. Veni), 3 males; Dangerfield Cave, Camp Bullis, 5 Dec. 1997 (G. Veni), 1 female; 21 April 1999 (J. Reddell, M. Reyes), 7 females; 25 Jan. 1999 (P. Sprouse, G. Veni), 1 male, 3 females, 1 juvenile; 31 Oct. 2000 (J. Reddell, M. Reyes), 3 males, 6 females, 2 juveniles; Dogleg Cave, Camp Bullis, 25 March 1998 (M. Reyes); 1 male, 2 females; Droll Cave, 2 June 1993 (J. Reddell, M. Reyes, G. Veni), 1 female; Eagles Nest Cave, Camp Bullis, 9 Nov. 1993 (J. Ivy, J. Treviño, G. Veni), 1 female; Elm Springs Cave, no date (A. G. Grubbs), 1 male, 1 female, 1 juvenile; Elm Water Hole Cave, 10 May 2000 (M. Reyes), 2 females; Flying Buzzworm Cave, Camp Bullis, 31 July 2006 (J. Krejca), 1 male, 1 female; Forked Pit, 13 June 1993 (J. Loftin, S. Woods), 1 female; Game Pasture Cave No 1, 2 June 1993 (J. Loftin, J. Reddell, M. Reyes, G. Veni), 1 female; Government Canyon Bat Cave, 11 Aug. 1965 (J. Reddell, J. Fish), 1 female (AMNH); 24 May 1998 (J. Reddell, M. Reyes), 2 males, 2 females; King Toad Cave, 1 June 1993 (J. Loftin, M. Reyes), 1 female; Linda's First Cave Find, 13 June 1993 (J. Loftin, L. Loftin, S. Woods), 1 female; La Cantera Cave No. 3, 20 Sept. 2000 (K. White), 2 females; Lone

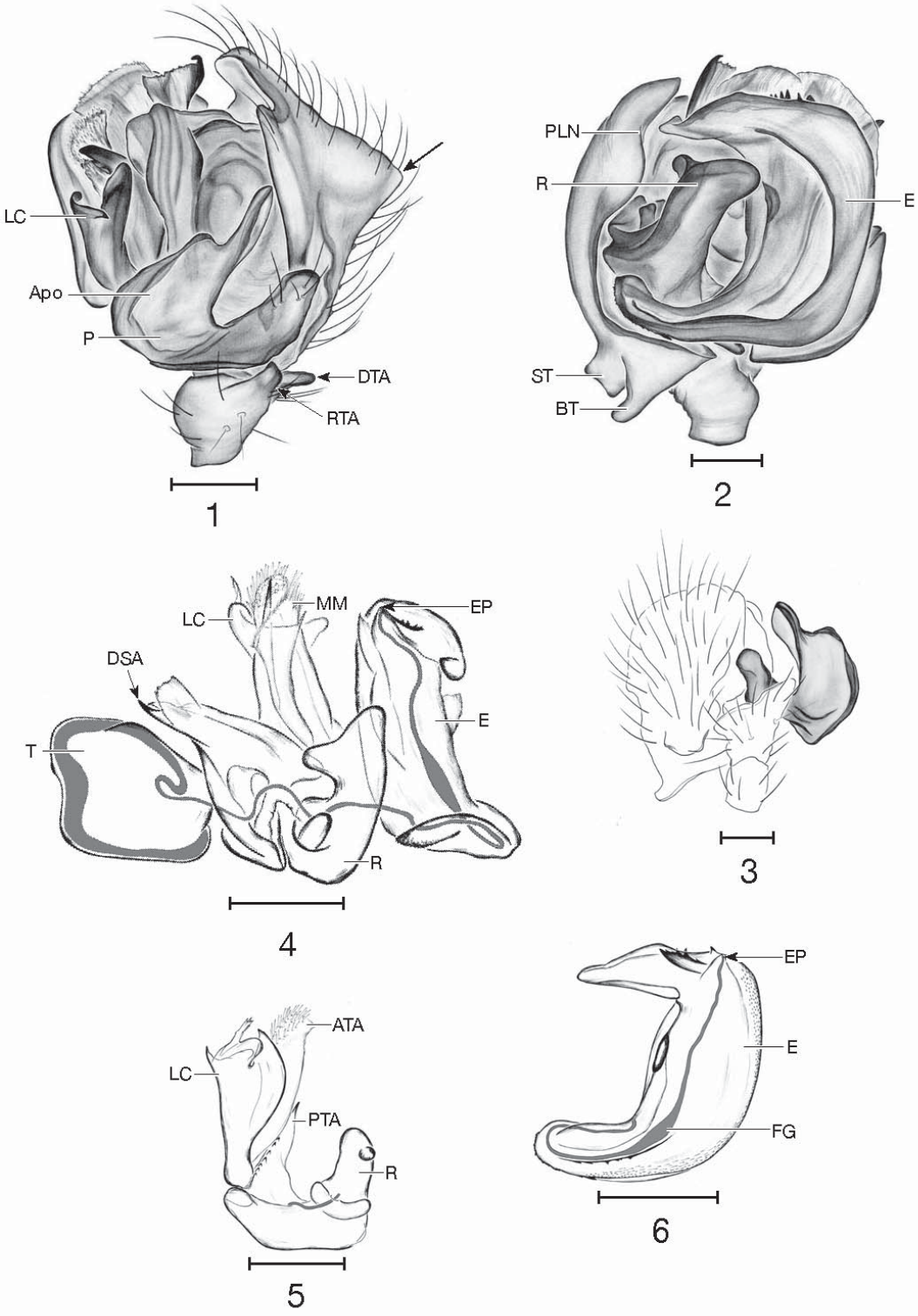
Gunman Pit, Camp Bullis, 8 Sept. 1998 (J. Cokendolpher, M. Reyes), 1 female; 21 April 1999 (matured 15 May 1999) (J. Reddell, M. Reyes), 1 female; Low Priority Cave, Camp Bullis, 29 March 1995 (J. Reddell, M. Reyes), 1 male, 1 female; Max and Roberts Cave, 28 Sept. 2000 (K. White, H. Bechtol), 1 female; Meusebach Flats Cave, 21 Nov. 1997 (G. Veni), 1 male; Obvious Little Cave, 14 June 2001 (J. Cokendolpher), 1 male, 1 female; Peace Pipe Cave, Camp Bullis, 5 Feb. 2001 (P. Sprouse), 1 male; 7 March 2001 (G. Veni), 1 female; 17 April 2001 (J. Reddell, M. Reyes), 1 female; 30 April 2003 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 7 May 2003 (J. Reddell, M. Reyes), 1 female; Plethodon Pit, Stone Oak Karst Region, north of 1604 and 281 intersection, 12 Sept. 1999 (K. White), 3 females, 6 juveniles; Porcupine Parlor Cave, Camp Bullis, 29 March 2001 (G. Veni), 1 female; Raging Cajun Cave, no date (A.G. Grubbs), 1 female; Root Canal Cave, Camp Bullis, 20 April 1999 (J. Reddell, M. Reyes), 1 male; 26 Oct. 2001 (J. Krejca, P. Sprouse), 1 female; Root Toupee Cave, Camp Bullis, 1 Nov. 2000 (J. Reddell, M. Reyes), 1 male, 3 females; Stevens Ranch Trash Hole Cave, 12 June 1993 (J. Loftin), 1 male, 2 females; 19 July 2007 (P. Paquin, B. Weissling, K. White, C. Crawford, C. Collins), 1 female (CPAD); Strange Little Cave, Camp Bullis, 29 Nov. 1993 (J. Reddell, M. Reyes), 1 male, 3 females, 1 juvenile; 5 Oct. 1995, (J. Reddell, M. Reyes), 1 male, 1 juvenile; 22 Oct. 2004 (J. Reddell, M. Reyes), 1 female; 31 July 2006 (R. Myers), 1 male, 1 female; 4 Oct. 2006 (R. Myers), 1 female; Tin Pot Cave, Camp Bullis, 18 April 2001 (J. Reddell, M. Reyes), 2 males, 2 juveniles; 6 March 2001 (G. Veni), 1 male; Wurzbach Bat Cave, 25 June 1993, (D. Bowles, A. Grubbs, J. Reddell, M. Reyes, R. Stanford), 1 female; 22 May 1993 (J. Loftin, J. Reddell, M. Reyes), 1 female, 2 juveniles; Yellow Ball Cave, Camp Bullis, 7 Dec. 1999 (P. Sprouse, G. Veni), 1 female; 17 Feb. 2000 (J. Reddell, M. Reyes), 1 female, 1 juvenile. ***Blanco County*:** Wells Sink, 22 May 1995, (A. G. Grubbs), 1 female, 3 juveniles. ***Burnet County*:** Cricket City Sink, 4 June 1989 (W. Elliott, M. Reyes), 2 males, 1 juvenile; Eckhardt Root Cave, 17 April 1990 (M. Reyes), 1 female; Fenceline Sink, 17 April 1990 (J. Reddell, M. Reyes), 2 females, 1 juvenile; Longhorn Caverns, 24 Sept. 1999 (A. Cobb), 1 male, 1 female, 1 juvenile; Pie Cave, 24 July 1963 (B. Russell), 4 males, 3 females, 2 juveniles (AMNH); Railroad Cave, Marble Falls, 5 Sept. 1996 (A.G. Grubbs, T. Whitfield, G. Hoese), 1 male, 2 females, 2 juveniles; Resurrection Well, 2 July 1989 (M. Grimm), 1 female, 2 juveniles; 10 Feb. 1990 (M. Grimm), 1 juvenile; Simons Pretty Pit, 17 Jan. 1991 (J. Reddell), 1 female; Simons Water Cave, 8 Feb. 1991 (J. Reddell, M. Reyes), 1 male; Washout Cave, 17 April 1990 (M. Reyes, M. Warton), 1 female. ***Comal County*:** Bad Weather Pit, 3 Sept.. 1972 (R. Fieseler), 1 female (AMNH); Camp Bullis Cave No 1, Camp Bullis, 22 Oct. 1996 (G. Veni), 2 males, 1 female, 1 juvenile; Ebert Cave, 30 Jan. 1988 (J. Reddell, M. Reyes), 1 female; Snake Skin Pit, Camp Bullis, 1 Nov. 1996, (G.. Veni, P. Sprouse), 2 females; 19 Nov. 1996 (W. Elliott), 1 female; ***Comanche County*:** Bill Haney Pecan Orchard, FM 1476, 2 mi E. US 377\67 [32.083 N; -98.474 W] pitfall trap, 25 May-1 June 2001 (A. Calixto), 1 male (TAMUIC). ***Coryell County*:** Big Red Cave, Fort Hood, 6 May 1999 (J. Reddell, M. Reyes), 2 females; 14 June 2000 (J. Krejca, P. Sprouse), 1 female; Chigiouxs' Cave, Fort Hood, 22 Nov. 1994 (M. Warton), 3 females; Copperhead Cave, Fort Hood, 30 April 1998 (J. Reddell, M. Reyes), 1 female; Cornelius Cave, Fort Hood, 21 Feb. 1995 (J. Reddell, M. Reyes), 1 female; Dionne Cave, Fort Hood, 7-8 March 2003 (M. Reyes), 1 male, 1 juvenile; Egypt Cave, Fort Hood, 16 Sept. 1997 (L. J. Graves, J. Reddell, M. Reyes), 1 male; 7 April 1999 (J. Reddell, M. Reyes), 1 female; Formation Cave, Fort Hood, 29 July 2005 (J. Fant, C. Pekins, J. Reddell, M. Reyes), 1 male, 3 females, 6 juveniles; 12 May 2007 (J. Fant, J. Reddell, M. Reyes), 1 female, 13 juveniles; Ingram Cave, Fort Hood, 7 April 1999 (J. Reddell , M. Reyes), 1 female, 1 juvenile; Keyhole Cave, Fort Hood, 20 Feb. 1999 (J. Reddell, M. Reyes), 2 females; 6 May 1999 (J. Reddell, M. Reyes), 1 female; Lucky Day Cave, Fort Hood, 4 June 2003 (J. Reddell, M. Reyes), 1 male, 1 female; 2 April 2007 (J. Fant, M. Reyes), 2 males, 3 females; 4 April 2007 (J. Fant, J. Reddell, M. Reyes), 1 juvenile; New Cave, Fort Hood, 12 May 2007 (J. Fant), 2 females, 6 juveniles; Plateau Cave No 2, Fort Hood, 15 Jan. 1992 (J. Reddell, M. Reyes), 1 female, 1 juvenile; Porter Cave, Fort Hood, 8 April 1999 (J. Reddell, M. Reyes), 1 male, 1 female; Sperry Cave, Fort Hood, 5 June 2006 (C. Pekins, J. Reddell, M. Reyes), 2 males, 2 females; 2 April 2007 (J. Fant, J. Reddell, M. Reyes), 2 juveniles; 12 May 2007 (J. Fant, J. Reddell, M. Reyes), 1 male, 1 female; Tippit Cave, Fort Hood, 8 April 1999 (L. J. Graves), 1 female, 3 juveniles; 24 Jan. 1992 (D. McKenzie, J. Reddell, M. Reyes), 1 male; 16 July 1993 (D. McKenzie, J. Reddell, M. Reyes), 1 male; 22 April 1998 (L. J. Graves, J. Reddell, M. Reyes), 1 male, 1 female. ***Edwards County*:** Jenkins Skylight Stream Cave, 3 Aug. 2008 (P. Paquin, M. Warton), 1 male, 6 females (CPAD); Killer Frog Cave, 9 May 2004 (G. Veni). ***Hays County*:** Boyett's Cave, 23 June 1978 (W. Elliott, J. Holsinger, T. Poulson, F. Howarth), 1 female (AMNH); McCarty Cave, 200 feet from darkness in webs, 5 July 1963 (J. Reddell), 1 male, 3 females, 1 juvenile (AMNH); 14 March 2000 (J. Kennedy, J. Jenkins, J. Fant), 2 males, 3 females; 15 Dec. 2000 (J. Kennedy), 4 females, 2 juveniles; 15 Dec. 2000 (G.

Veni), 1 female, 2 juveniles; Taylor Bat Cave, 4 March 2003 (A. Gluesenkamp, J. Kennedy, J. Fant), 4 females. ***Irion County*:** Murphy Wells Cave, 24 Feb. 1974 (no collector), 2 females (AMNH); ***Kendall County*:** Behr's Cave, 30 Aug. 1969 (W. Elliott), 1 female (AMNH); Charley's Downclimb Cave, 4 March 2006 (J. Krejca, V. Loftin), 1 male; Covered Hole, 17 Aug. 1991 (D. Allen, L.G. Graves), 1 female, 2 juveniles (AMNH); Pfeiffer's Water Cave, 18 Oct. 1980 (G. Veni), 1 female (AMNH); Sattler's Deep Pit, 28 April 1990 (D. Pate), 1 female; 10 July 1994 (A.G. Grubbs), 1 male; Schroeder Bat Cave, 31 March 2004 (J. Kennedy, A. Cobb), 2 females, 1 juvenile. ***Kerr County*:** Seiker's Cave, March 1968 (J. Fish, M. Thomas), 1 male, 1 female (AMNH); Wilson Ranch Cave, 30 Dec. 1956 (W. McAlister, Baker), 1 female, 1 juvenile (AMNH); ***Kinney County*:,** Kelley Cave, 1 Feb. 2003 (J. Kennedy, J. Germany), 1 female; ***Mason County*:** Mill Creek Cavern, 30 Jan. 1977 (R. Fieseler, T. Byrd, R. Farr), 1 female (AMNH); 26 July 1978 (R. Fieseler), 1 male, 2 females (AMNH). ***Real County*:** Red Arrow Cave, 28 July 1974 (W. Elliott, M. Mckenzie), 1 male, 1 juvenile (AMNH); ***San Saba County*:** Gorman Cave, beyond breakdown, 12 June 1968 (J. Reddell), 7 females (AMNH); Gorman Cave, 14 Sept. 1985 (J. Reddell), 1 female; 14 Sept. 1985 (J. Reddell, S.J. Harden), 1 male, 2 females; 7 April 2007 (P. Paquin, K. O'Connor, M. Sanders), 1 male, 1 female (CPAD); Harrell's Cave, 50-200 ft. inside cave, 20 Oct. 1962 (J. Reddell, D. Mckenzie), 3 males, 3 females (AMNH); Whiteface Cave, 9 Feb. 1964 (J. Reddell, D. Mckenzie, K. Garrett), 3 females, 2 juveniles (AMNH); ***Schleicher County*:** Cave Y, 12 Dec. 1964 (J. Reddell, T. Raines), 2 females (AMNH). ***Sutton County*:** Harrison Cave, 21 June 2003 (J. Kennedy), 1 female. ***Terrell County*:** Goode Cave, twilight zone, 28 June 1963 (J. Reddell, B. Russell), 2 females (AMNH); ***Travis County*:** Amber Cave, 8 April 1984 (J. Reddell, M. Reyes), 1 male; Armadillo Ranch Sink, 23 Sept. 1990 (J. Reddell, M. Reyes, C. Sexton), 1 male, 1 juvenile; 15 Oct. 1990 (J. Reddell, M. Reyes, M. Warton), 1 female; 15 Oct. 1990 (J. Reddell, M. Reyes, M. Warton), 1 male, 1 female; Broken Arrow Cave, 25 Jan. 1991 (J. Reddell, M. Reyes), 1 female; Cave site #401, near FM620, 1999 (P. Sunby), 1 male, 2 juveniles; Chuck's Joint, 23 Sept. 1990 (J. Reddell, M. Reyes), 1 male; Coon Slide Cave, 21 Jan. 1993 (M. Warton), 1 female (AMNH); Driskill Cave, 6 Sept. 1990 (J. Reddell, M. Reyes), 1 male; GCWA Cave, 20 April 2007 (P. Paquin, K. White, C. Crawford), 3 males, 3 females (CPAD); Jack's Joint Cave, 23 June 1989 (J. Reddell, M. Reyes), 1 male, 5 females, 1 juvenile (AMNH); Jest John Cave, 22 June 1993 (W. Elliott), 1 female; 29 May 1993 (W. Russell, J. Sigmond), 2 males; Jollyville Plateau Cave, 11 April 1995 (A. G. Grubbs, G. Wald), 2 females; Kretschmarr Double Pit, 20 April 1991 (J. Reddell, M. Reyes), 1 female; Lunsford's Cave, April 1963 (B. Russell), 2 males, 2 females, 1 juvenile (AMNH); Midden Sink, 18 Aug. 1990 (J. Reddell, M. Reyes), 1 female; No Rent Cave, 22 June 1990 (J. Reddell, M. Reyes), 1 female; Rolling Rock Cave, 15 Feb. 1991 (J. Reddell, M. Reyes), 1 female, 3 juveniles; Two Trunks Cave, 19 June 1997 (J. Reddell, M. Reyes), 1 male, 3 females; Weldon Cave, April 1996 (M. Warton), 1 female, 1 juvenile; Windmill Cave, 26 Sept. 2000 (J. Reddell, M. Reyes, M. Warton), 1 male, 3 females. ***Uvalde County*:** Tampke Ranch Cave, 25 July 1974 (E. Elliott, S. Sweet), 1 male, 5 females (AMNH); Whitecotton Bat Cave, 24 April 1966 (J. Reddell, E. Alexander), 2 females (AMNH). ***Val Verde County*:** Wren Cave, 9 April 1968 (J. Reddell, T. Mollhagen), 1 female (AMNH). ***Williamson County*:** A. J. & B. L. Wilcox Cave, 4 Dec. 2000 (M. Warton), 1 female; Avant Ranch Cave, 22 Aug. 2008 (P. Paquin, C. Crawford, B. Parker), 1 female (CPAD); Avery Ranch Cave, March 1994 (M. Warton), 1 female, 1 juvenile; Avery Stairstep Cave, March 1994 (M. Warton), 2 females; Ballroom #2 Cave, 4 Aug. 2008 (P. Paquin), 1 female (CPAD); Beck Bat Cave, 24 Oct. 1991 (L. Sherrod), 1 female; 26 Feb. 2007 (P. Paquin, C. Crawford, C. Thibodaux), 1 female (CPAD); Beck Creek Cave, 3 June 1996 (J. Reddell, M. Reyes), 1 female; Beck Crevice Cave, 3 May 1996 (J. Reddell, M. Reyes), 1 male, 3 females, 1 juvenile; Beck Horse Cave, 15 May 1996 (J. Reddell, M. Reyes), 1 male, 2 females; Beck Pride Cave, 21 May 1996 (J. Reddell, M. Reyes), 1 female; Beck Ranch Cave, 24 March 1989 (J. Reddell, M. Reyes), 1 female, 2 juveniles; Beck Rattlesnake Cave, 31 March 1993 (D. Allen, L. J. Graves, D. Love), 1 female; 10 Nov. 2000 (J. Reddell, M. Reyes), 2 males, 4 females, 1 juvenile; 28 Feb. 2007(P. Paquin, C. Crawford, C. Thibodaux), 1 female (CPAD); Behren's Ranch Cave, 9 April 1999 (M. Warton), 1 female, 3 juveniles; Black Cat Cave, April 1995 (A.G. Grubbs), 1 male, 1 female; Blowhole Cave, 2 April 2007 (P. Paquin, C. Crawford, B. Larsen), 1 male, 1 female (CPAD); Boyd's Void Cave, Rasmussen Tract, 14 June 1999 (M. Warton), 1 female; Broken Plate Cave, 20 April1993 (M. Warton), 1 female; Brown's Cave, 23 April 1989 (W. Elliott, J. Reddell, M. Reyes), 1 female, 2 juveniles; Buttercup Blow Hole Cave, 27 Feb. 1995 (D. Allen, D. Love), 1 male, 3 females, 2 juveniles; Cat Cave, 11 April 1994 (J. Reddell, M. Reyes), 2 females; 28 April 1999 (R. Price, M. Warton), 1 female; Cat Hollow Bat Cave, 16 April 1995 (A. G. Grubbs), 2 males, 1 female, 1 juvenile; 13 April 1995 (A. G. Grubbs, G.. Wald), 1 male, 2 females, 5 juveniles; Cat Hollow Cave No. 3, 13 April 1995 (A. G. Grubbs, G.. Wald), 1 male, 1 juvenile; Cave Coral Cave, 14 Jan. 2000 (J. Reddell, M. Reyes), 1 male, 1 female; Chagas

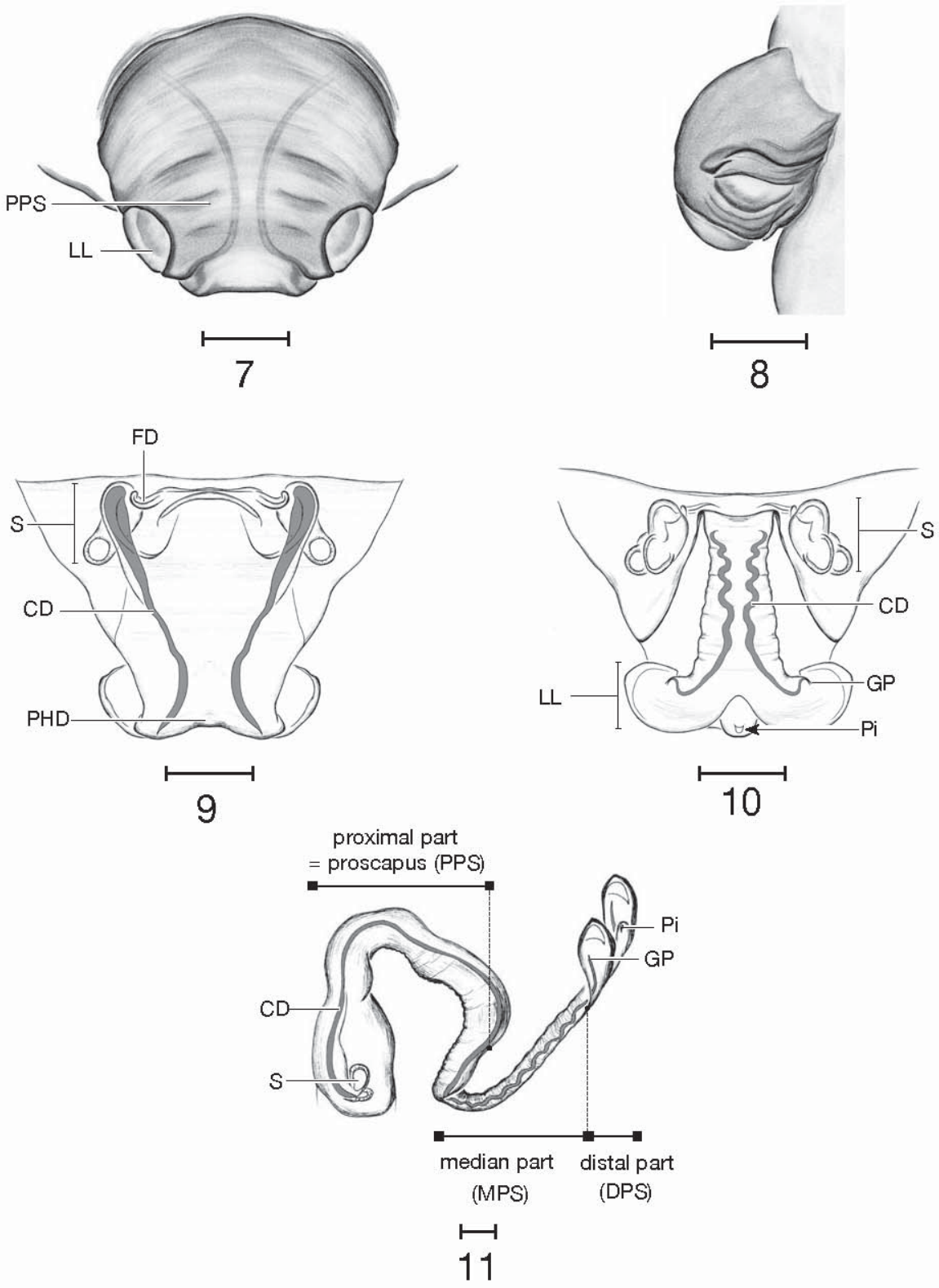
Cave, 24 Aug. 1994 (J. Reddell, M. Reyes), 1 female; Clan Cave, 27 July 2008 (P. Paquin, M. Sanders, K. O'Connor), 1 female (CPAD); Cobb Cavern, 8 April 2004 (M. Warton), 1 male, 1 female; Dion Cave, 6 Feb. 1994 (J. Reddell, M. Reyes), 1 male, 1 female, 3 juveniles; 18 April 1994 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 20 July 1994 (J. Reddell, M. Reyes), 1 male, 1 female, 4 juveniles; Double Nickel Cave, 14 April 1994 (J. Reddell, M. Reyes), 3 females, 6 juveniles; Duckworth Bat Cave, 21 April 1999 (M. Warton), 1 female; Feature No 1, Ronald Regan Blvd., 19 April 2007 (P. Paquin), 1 female, 1 juvenile (CPAD); Fern Cave, March 1994 (M. Warton), 1 female, 3 juveniles; Fortune 500 Cave, 20 April 1998 (M. Warton), 2 females; Godwin's Goat Grave Cave (=Lift Station Cave), 2 Feb. 1991 (W. Elliott, J. Reddell, M. Reyes), 1 male; Grimace Cave, 16 April 1989 (M. Warton), 1 male; Hatchet Cave, 6 March 1994 (J. Reddell, M. Reyes), 1 male, 3 females; Holler Hole Cave, 20 July 1995 (J. Reddell, M. Reyes), 1 female; Hook Cave, 5 March 1994 (J. Reddell, M. Reyes), 1 male, 2 females, 1 juvenile; Ilex Cave, 1 June 1989 (J. Reddell, M. Reyes, M. Warton), 2 females, 1 juvenile; Joker Cave, April 1994 (M. Warton), 1 female; Jug Cave, 18 May 1989 (W. Elliott, J. Reddell, M. Reyes), 1 female; 14 March 2000 (J. Reddell, M. Reyes, P. Sprouse, G. Veni), 1 male; Killian Cavern, Oct. 1998 (M. Warton), 1 female; LakeLine Cave, 30 Oct. 1991 (D. Allen), 1 male; LakeLine Mall Well Trap No. 3, 15 Oct. 1990 (L. Sherrod), 1 female; Leaning Tree Cave, 18 April 1996 (M. Warton), 1 female; Man-With-A-Spear Cave, 2 Sept. 1990 (D. Allen, W. Elliott), 1 female, 1 juvenile; 7 Oct. 1990 (A. Cobb, W. Elliott), 1 male; 27 July 2008 (P. Paquin, M. Sanders, K. O'Connor), 1 female (CPAD); Maverick Cave, 24 Nov. 1998 (M. Warton), 2 males; Mayfield Cave, 27 April 1998 (M. Warton), 1 female; Medicine Man Cave, 25 July 1995 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 13 April 2000 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 28 Dec. 2006 (P. Paquin, C. Crawford), 4 males (CPAD); Millennium Cave, 27 Feb. 2007 (P. Paquin, C. Crawford), 1 female (CPAD); Mongo Cave, April 1999 (M. Warton), 1 male, 1 female; 21 Dec. 2006 (P. Paquin, K. White, C. Crawford), 1 male (CPAD); Mustard Cave, 31 May 1993 (J. Reddell, M. Reyes), 1 male, 1 juvenile; Near Miss Cave, 1 Nov. 2000 (G. Veni), 1 female, 1 juvenile; 2 Nov. 2000 (J. Reddell, M. Reyes), 1 female; O'Connor Cave, 12 April 1993 (M. Warton), 1 male; Off Campus Cave, 8 April 1989 (W. Elliott, J. Reddell, M. Reyes), 2 females; Paleospring Cave, 2 Aug. 1994 (P. Sprouse, B. Larsen), 2 females; Pemmican Cave, 19 April 1994 (J. Reddell, M. Reyes), 2 males, 2 females, 1 juvenile; Prairie Flats Cave, 14 April 1994 (J. Reddell, M. Reyes), 1 female; Price Is Right Cave, 18 Jan. 1999 (M. Warton), 4 females, 2 juveniles; Prospectors Cave, 20 Nov. 2002 (J. Reddell, M. Reyes, M. Warton), 1 male; Raccoon Cave, 16 March 1990 (J. Reddell, M. Reyes), 1 female; Rock Ridge Cave, 21 Dec. 2006 (P. Paquin, K. White, C. Crawford), 2 females (CPAD); Rockfall Cave, 27 April 1993 (J. Reddell, M. Reyes), 1 female; Rootin Tootin Cave, 9 Dec. 1998 (M. Warton), 1 male, 3 females; Salamander Squeeze Cave, 16 Feb. 1995 (D. Allen, J. Wolff), 1 male; Snowmelt Cave, 23-26 March 2003 (A. Gluesenkamp, P. Sprouse), 4 males, 2 females; Squeeze-Down Cave, 11 May 1990 (M. Reyes), 1 female; Stepstone Cave, 14 Jan. 2000 (J. Reddell, M. Reyes), 1 female; Testudo Tube, 11 Nov. 1996 (P. Sprouse), 2 females; Texella Cave, 2 Oct. 1991 (J. Reddell), 1 female; 24 Sept. 1991 (J. Reddell, M. Reyes), 1 female; 8 April 1996 (M. Warton), 1 female, 1 juvenile; The Abyss, March 1994 (M. Warton), 1 female; 6 March 1994 (J. Reddell, M. Reyes), 1 male; Thin Roof Cave, 28 April 1998 (J. Reddell, M. Reyes, J. Wolff), 1 female, 1 juvenile; Two Hole Cave, 20 Feb. 1995 (D. Allen, J. Wolff), 1 male, 1 female; Underline Cave, 30 Oct. 1990 (J. Reddell, M. Reyes), 1 female; Vault Cave, 5 April 1993 (D. Allen, L. J. Graves, D. Love, C. Savvas, M. Warton), 1 male; Velcro Cave, 3 Feb. 2003 (J. Reddell, M. Reyes), 2 males, 2 females; Venom Cave, 17 Nov. 1993 (J. Reddell, M. Reyes), 1 male; 22 Nov. 1993 (J. Reddell, M. Reyes), 1 female; 29 July 1995 (W. Elliott), 1 female; 29 Nov. 1995 (W. Elliott), 1 female; 9 April 2000 (J. Reddell, M. Reyes), 1 male, 1 female, 1 juvenile; Village Idiot Cave, 17 Nov. 1994 (J. Reddell, M. Reyes), 1 female, 1 juvenile; Waterfall Canyon Cave, 30 July 2008 (P. Paquin, C. Crawford, B. Parker), 2 females, 1 juvenile (CPAD); Water Tank Cave, 25 Sept. 1998 (J. Reddell, M. Reyes), 1 female, 1 juvenile; 30 Sept. 1998 (J. Reddell, M. Reyes), 2 females; 28 Oct. 1998 (J. Reddell, M. Reyes), 1 female, 3 juveniles; Water Tower Cave, 15 March 1994 (L. Sherrod), 1 female; White Wall Cave, 9 Dec. 1998 (M. Warton), 1 female; Wild Card Cave, April 1994 (M. Warton), 2 females, 1 juvenile; Zapata Cave, March 1994 (M. Warton), 1 male, 1 female, 1 juvenile. **WISCONSIN: *Dane County*:** University of Wisconsin Arboretum, Grady Tract, [43.046 N; -89.416 W] Sandy Prairie, leaf litter, 27 Aug. 1969 (S. E. Riechert), 1 male.

Diagnosis.—Males of *A. llanoensis* are distinguished by the combination of the following characters: palpal tibia with prominent dorsal and retrolateral tibial apophyses, palpal cymbium bearing small and big tubercles, lamella characteristica with fist-like tip. Females are distinguished by the large, squared shape proximal part of the scape bearing dark horizontal lines.

Description.—*Male (n=5)*: Total length: 1.95–1.99; carapace length: 0.87–0.93; carapace width: 0.71–0.75; carapace finely reticulate, shiny, light yellow-



Figs. 1–6.—*Agyneta llanoensis* 1, palpus of male, retrolateral view, arrow points to conical protuberance; 2, palpus of male, prolateral view; 3, palpus of male, dorsal view; 4, expanded male palpus, schematic illustration; 5, excised embolic division, without embolus; 6, excised embolus. Scale bar: 0.1 mm. Abbreviations used: **Apo** anterior pocket, **BT** big tubercle, **DSA** distal suprategular apophysis, **DTA** dorsal tibial apophysis, **E** embolus, **EP** embolus proper, **LC** lamella characteristica, **MM** median membrane, **P** paracymbium, **PLN** prolateral notch, **R** radix, **RTA** retrolateral tibial apophysis, **S** spermatheca, **ST** small tubercle, **T** tegulum. Some abbreviations and terms used in figures are given to facilitate the comprehension of the structures but are not mentioned any further in the descriptions.



Figs. 7-11.—*Agyneta llanoensis*. 7, epigynum, ventral view; 8, epigynum, lateral view; 9 cleared epigynum, ventral view; 10, cleared epigynum, dorsal view; 11, unfolded epigynum, lateral view. Scale bar: 0.1 mm. Abbreviations used: **CD** copulatory ducts, **DPS** distal part of scape, **FD** fertilization ducts, **GP** genital pore, **LL** lateral lobe, **MPS** median part of scape **P** paracymbium, **Pi** pit, **PHD** pit hook depression, **PPS** proximal part of scape, **S** spermatheca. Some abbreviations and terms used in figures are given to facilitate the comprehension of the structures but are not mentioned any further in the descriptions.

orange (141M) to orange (143M), eye region slightly darker, 3 erected setae along midline. Sternum bulbous, light yellow-orange (141M). Chelicerae orange (143M); promargin with 5 teeth, retromargin with 4–5 denticles. Cheliceral stridulatory organ visible, with 25–30 striae; associated stridulatory pick present at base of palpal femur. Abdomen uniformly colored, off-white to light gray (Warm gray 2M) covered with long erected setae; ventral surface of abdomen often suffused with dark gray (Warm gray 8M); book lung cover light gray with darker margins (Warm gray 2M), finely reticulate; coxae IV with stridulatory pick. Legs light yellow-orange (141M); leg formula 1-4-2-3; total length leg I: 4.67–4.81; femur: 1.21–1.22; patella 0.25–0.26; tibia: 1.28–1.31; metatarsus: 1.12–1.19; tarsus: 0.76–0.83; total length leg IV: 4.16–4.26; femur: 1.12 –1.15; patella 0.19–0.22; tibia: 1.08–1.12; metatarsus: 1.05–1.08; tarsus: 0.67–0.71. Tibia I–IV with two long dorsal macrosetae; metatarsus I with dorsal trichobothrium (Tm I 0.21–0.23); Tm IV absent. Palpal femur length: 0.35–0.42; palpus length: 0.48–0.50. Palpal tibia with two apophyses, one smooth retrolateral (RTA) and a rugged dorsal one (DTA) (Fig. 1), palpal tibia bearing two retrolateral and one dorsal trichobothria (Fig. 1); cymbium with dorsal conical protuberance (arrow, Fig. 1), prolateralo-basal small (ST) and big tubercle (BT) (Fig. 2), prolateral notch (PLN) shallow; paracymbium (P) with long anterior pocket (Apo), proximal part bearing five setae (Fig. 1); median membrane (MM) with filiform projections (Fig. 4), lamella characteristica (LC) complex, multifaceted (Figs. 1, 5), anterior terminal apophysis (ATA) elongated with bulbous, transparent apex bearing filiform projections (Fig. 5), posterior terminal apophysis (PTA) with proximal part membranous, bearing a row of several sharp points, converging to a pointed apex (Fig. 5); apical section of embolus (E) long and curved, with pointed tip (Fig. 6), embolus proper (EP) short and concealed in apical part of embolus (Figs. 4, 6); sperm duct (SD) with well developed, elongated Fickert's gland (FG) located in the proximal region of the embolus (Figs. 4, 6), far from the embolus proper.

Female (n=5): Total length: 1.98–2.22; carapace length: 0.80–0.93; carapace width: 0.64–0.72. Coloration as in male. Carapace with 3 erected setae along midline. Sternum flat. Chelicerae promargin with 5 teeth, retromargin with 4–5 denticles. Cheliceral stridulatory organ visible, with 17–20 striae; associated stridulatory pick at base of palpal femur present. Abdomen covered with long erected setae; book lung cover light gray with darker margins (Warm gray 2M), finely reticulate; coxae IV with stridulatory pick. Leg formula 1-4-2-3; total length leg I: 4.49–4.97; femur: 1.15–1.28; patella 0.26–0.29; tibia: 1.19–1.31; metatarsus: 1.12–1.15; tarsus: 0.71–0.83; total length leg IV: 4.04–4.61; femur: 1.06 –1.28; patella 0.19–0.22; tibia: 1.09–1.25; metatarsus: 1.03–1.15; tarsus: 0.61–0.71. Tibia I–IV with two long dorsal macrosetae; metatarsus I with dorsal trichobothrium (Tm I 0.21–0.25); Tm IV absent. Palpal claw absent. Epigynum width: 0.29–0.35; epigynum length (unfolded): 1.07–1.12. Epigynum consisting of a very long (3x longer then wide) folded scape (Fig. 11); proximal part of scape (proscapus) (PPS) large, side parallel, going over the pit (Pi) (Figs. 7, 9); pit hook depression (PHD) shallow (Fig. 9); median part of scape (MPS) narrow, parallel, enlarging apically into distal part of scape (DPS) bearing the lateral lobes (LL) (Fig. 11); spermathecae (S) consisting of three receptacula: one large, elongated and two small rounded ones (Figs. 9, 10); copulatory duct (CD) long, sinuous, undulate in median part of scape; genital pore (GP) situated in basal part of the lateral lobes (Figs. 10–11).

Distribution.—*Agyneta llanoensis* is a widespread species found in caves from southern Texas to Alabama and Tennessee to the northeast. A surface record from Wisconsin also suggests that *A. llanoensis* is not limited to areas characterized by karstic features (Fig. 23). Not all cave localities from Texas could be included on the distribution maps; two records – from Val Verde and Irion counties – are however included despite the lack of precise locations, as they represent important localities for the distribution range.

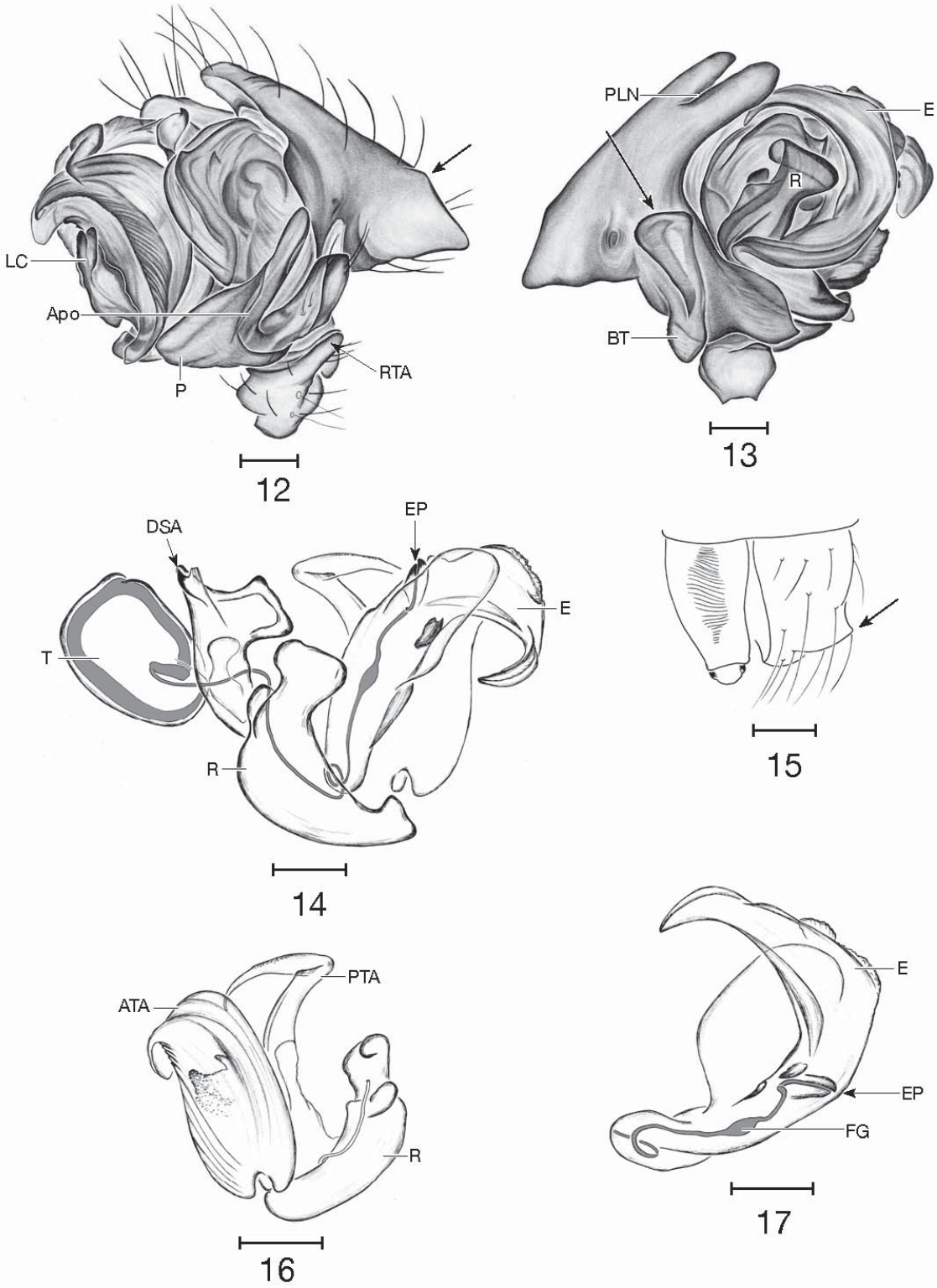
Remarks.—There is no obvious eye reduction or leg elongation in *A. llanoensis* when compared to the surface member of the genus.

Etymology.—The epithet *llanoensis* refers to Llano (Texas), the type locality.

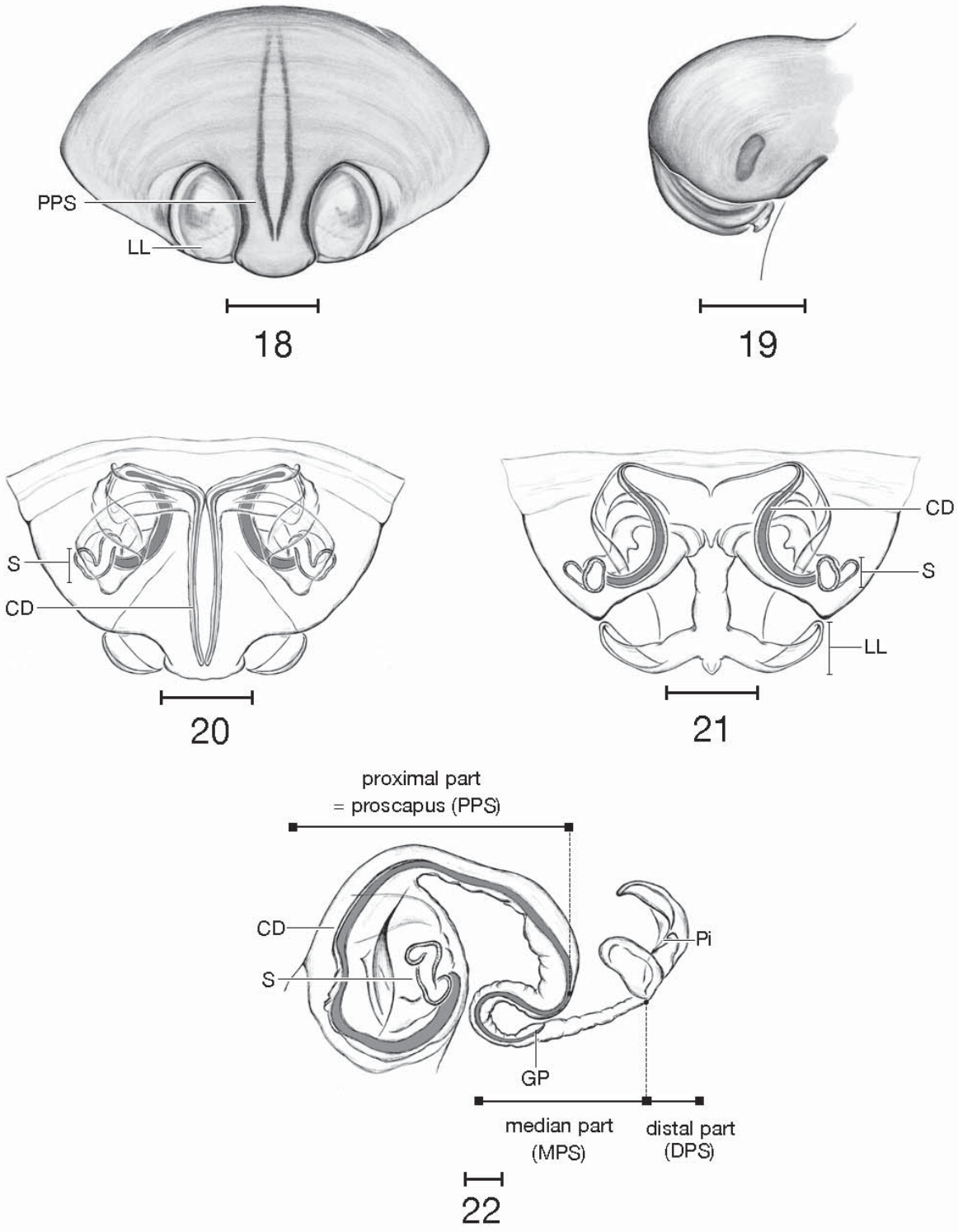
Natural history.—The numerous records from caves clearly demonstrate an affinity for this habitat. Despite three surface records, the species is clearly a troglophile (see discussion). The distribution of the species in caves is variable; it is sometimes found near cave entrances and sometimes in deeper cave conditions. *Agyneta llanoensis* typically spin sizeable sheet webs reaching 15 x 15 cm among rocks on the ground, against cave walls, or in various depressions, in which the spiders hang upside down. This species can sometimes be extremely abundant in a given cave and absent in the neighboring ones.

Agyneta hedini Dupérré and Paquin, new species
Figs. 12–23

Type material.—**HOLOTYPE: U.S.A.:** *Colorado*: Fremont County, Marble Cave, Four Mile Creek, 13 mi. N Cañon City, 6 May1992 (M. Hedin), male, hand collected, in dark zone cave on flood (?)



Figs. 12–17.—*Agyneta hedini,* new species. 12, palpus of male, retrolateral view, arrow points to conical protuberance; 13, palpus of male, prolateral view, arrow points to cymbial outgrowth; 14, expanded male palpus, schematic illustration; 15, male endite, lateral; 16, excised embolic division, without embolus; 17, excised embolus. Scale bar: 0.1 mm. Abbreviations used: **Apo** anterior pocket, **ATA** anterior terminal apophysis, **BT** big tubercle, **DSA** distal suprategular apophysis, **E** embolus, **EP** embolus proper, **FG** Fickert's gland, **LC** lamella characteristica, **P** paracymbium, **PLN** prolateral notch, **PTA** posterior terminal apophysis, **R** radix, **RTA** retrolateral tibial apophysis, **T** tegulum. Some abbreviations and terms used in figures are given to facilitate the comprehension of the structures but are not mentioned any further in the descriptions.



Figs. 18–22.—*Agyneta hedini,* new species. 18, epigynum, ventral view; 19, epigynum, lateral view; 20 cleared epigynum, ventral view; 21, cleared epigynum, dorsal view; 22, unfolded epigynum, lateral view. Scale bar: 0.1 mm. Abbreviations used: **CD** copulatory ducts, **DPS** distal part of scape, **GP** genital pore, **LL** lateral lobe, **Pi** pit, **PPS** proximal part of scape, **S** spermatheca. Some abbreviations and terms used in figs. 1–22 are given to facilitate the comprehension of the structures but are not mentioned any further in the descriptions.

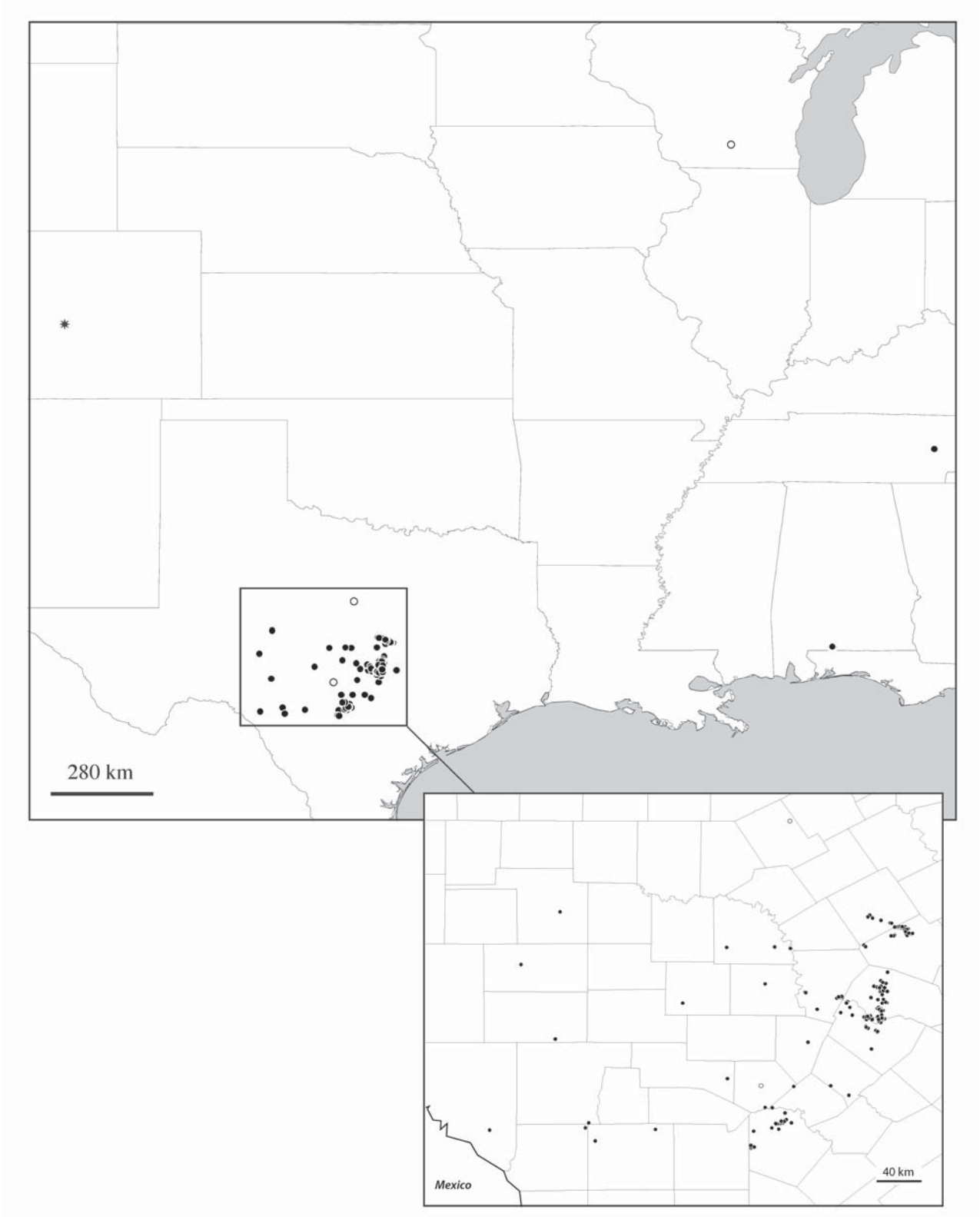


Fig. 23.—Distribution of *A. llanoensis* (circles) and *A. hedini,* new species (star). Dark symbols refer to cave records and open symbols refer to surface records.

debris (AMNH). **ALLOTYPE:** female, same data as holotype (AMNH).

Diagnosis. —Males of *A. hedini,* n.sp. are distinguished from all other *Agyneta* by the following characters; male palpal cymbium with large dorsal conical protuberance, absence of small tubercle, bearing a rugose big tubercle and a large outgrowth. Females are diagnosed by the narrow proximal part of the scape, slightly enlarging apically bearing two dark converging vertical lines.

Description.—*Male (n=1)*: Total length: 2.02; carapace length: 0.83; carapace width: 0.71; carapace finely reticulate, shiny, orange (143M), 2 erected setae along midline. Sternum bulbous, orange (143M), margins suffuse with dark gray (Cool gray 9M). Chelicerae orange (143M); promargin and retromargin carinated, 5 denticles and 3 denticles respectively. Endites with a single tubercle (Fig. 15). Cheliceral stridulatory organ visible, with ~31 striae; associated stridulatory pick present at base of palpal femur. Abdomen off-white, with 4 pairs of dark gray spots (Cool gray 9M), covered with long erected setae; ventral surface of abdomen suffused with dark gray (Warm gray 8M) pattern; book lung cover light gray with darker margins (Warm gray 8M), finely reticulate; coxae IV with stridulatory pick. Legs light yellow-orange (141M); leg formula 1-4-2-3; total length leg I: 5.67; femur: 1.44; patella 0.28; tibia: 1.63; metatarsus: 1.39; tarsus: 0.93; total length leg IV: 4.83; femur: 1.44; patella 0.29; tibia: 1.28; metatarsus: 1.12; tarsus: 0.70. Tibia I–IV with two long dorsal macrosetae; metatarsus I with dorsal trichobothrium (Tm I 0.23); Tm IV absent. Palpal femur length: 0.41; palpus length: 0.58. Palpal tibia with one smooth retrolateral apophysis (RTA), two retrolateral and a dorsal trichobothria (Fig. 12); cymbium with dorsal conical protuberance (Fig. 12, arrow), prolateralo-basal rugose big tubercle (BT) and a large outgrowth (Fig. 13, arrow), prolateral notch (PlN) very deep, making the apex of cymbium bifurcate (Fig. 13); paracymbium (P) with long anterior pocket (Apo), proximal part bearing five setae (Fig. 12); median membrane not observed; lamella characteristica (LC), multifaceted with two rugose tips (Fig. 12); anterior terminal apophysis (ATA) large, bearing several ridges (Fig. 16); posterior terminal apophysis (PTA) elongated, proximal part membranous, distal part sickle-shaped and rugose (Fig. 16); apical section of embolus (E) long and curved, with pointed tip, embolus proper (EP) short and concealed in proximal part of embolus (Figs. 14, 17); sperm duct (SD) with well developed, elongated Fickert's gland (FG) located in the proximal section of embolus (Figs. 14, 16), close to the embolus proper.

Female (n=1): Total length: 2.02; carapace length: 0.74; carapace width: 0.71. Coloration as in male.

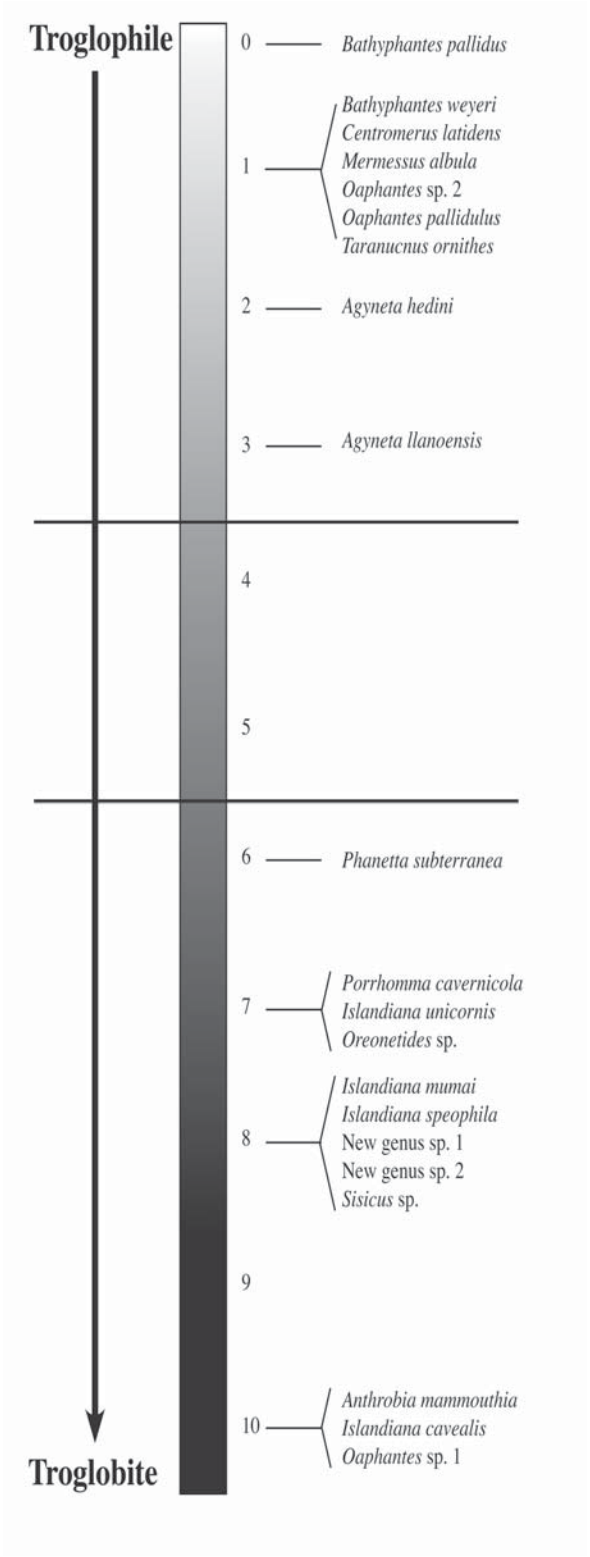


Fig. 24.—Ranking of North American Linyphiidae associated with caves based on the cumulative ranking of their eye reduction and specificity to cave habitat (see Tables 1 and 2). The score 0-3 relates to troglophiles and 6–10 to troglobites.

Table 1.—Ranking of Linyphiidae species associated with caves according to their degree of eye reduction.

Species	Eyes reduction	Rank
Agyneta hedini Dupérré and Paquin, this paper	Not reduced	1
Agyneta llanoensis (Gerstch and Davis, 1936)	Not reduced	1
Bathypantes weyeri (Emerton, 1875)	Not reduced	1
Bathyphantes pallidus (Banks, 1892)	Not reduced	1
Centromerus latidens (Emerton, 1882)	Not reduced	1
Mermessus albula (Zorsch and Crosby, 1934)	Not reduced	1
Oaphantes sp. 2	Not reduced	1
Oaphantes pallidulus (Banks, 1904)	Not reduced	1
Phanetta subterranea (Emerton 1875)	Not reduced	1
Taranucnus ornithes (Barrows 1940)	Not reduced	1
Oreonetides sp. Paquin, et al., in press	Reduced, a few specimens are highly reduced	2
Porrhomma cavernicola (Keyserling, 1886)	Highly reduced, a few specimens are slightly reduced	3
Islandiana mumai Ivie, 1965	Highly reduced	4
Islandiana speophila Ivie, 1965	Highly reduced	4
Islandiana unicornis Ivie, 1965	Highly reduced	4
New genus sp. 1	Highly reduced	4
New genus sp. 2	Highly reduced	4
Sisicus sp.	Highly reduced	4
Anthrobia mammouthia Tellkampf, 1844	Eyeless	5
Islandiana cavealis Ivie, 1965	Eyeless	5
Oaphantes sp. 1	Eyeless	5

Carapace with 2 erected setae along midline. Sternum flat. Chelicerae promargin with 5 teeth, retromargin with 4 denticles. Cheliceral stridulatory organ visible, with ~30 striae; associated stridulatory pick at base of palpal femur present. Abdomen off-white, with 3 pairs of dark gray spots (Cool gray 9M), covered with long erected setae; ventral surface of abdomen suffused with dark gray (Warm gray 8M) pattern; book lung cover light gray with darker margins (Warm gray 8M), finely reticulate; coxae IV with stridulatory pick. Leg formula 1-4-2-3; total length leg I: 5.04; femur: 1.35; patella 0.29; tibia: 1.41; metatarsus: 1.18; tarsus: 0.81; total length leg IV: 4.46; femur: 1.28; patella 0.26; tibia: 1.19; metatarsus: 1.06; tarsus: 0.67. Tibia I-IV with two long dorsal macrosetae; metatarsus I with dorsal trichobothrium (Tm I 0.22); Tm IV absent. Palpal claw present, highly reduced. Epigynum width: 0.47; epigynum length (unfolded): 1.09. Epigynum consisting of a long (2x longer then wide) folded scape (Fig. 22), proximal part of scape (proscapus) (PPS) narrow, slightly enlarging, going over the pit (Pi) (Fig. 18); median part of scape (MPS) slender, parallel, enlarging apically into distal part of scape (DPS) bearing the lateral lobes (LL) (Figs. 21–22); spermathecae (S) consisting of one long, curved receptacula, and a smaller rounded one (Figs. 20–22); copulatory duct (CD) rather short sinuous; genital pore (GP) situated in the median part of scape (Fig. 22).

Distribution.—Known only from the type locality in Colorado (Fig. 23).

Remarks.—No eye reduction or leg elongation was observed.

Etymology.—This species is named in honor of Dr. Marshal Hedin (San Diego State University), arachnol-ogist and collector of the only known specimens.

Natural history.—Nothing is known about the species, except its occurrence in a cave among organic matter.

RESULTS AND DISCUSSION

In the original description of *A. llanoensis*, the only known record was from Llano, the type locality. Gertsch and Davis (1936) gave no indications about the type specimen being collected in a cave, but in the light of the numerous cave records from Texas, this appeared questionable. However, we are including here two new surface records (one from Comanche County, Texas, and one from Dane County, Wisconsin) that support the occurrence of the species on the surface. Paquin, et al. (in press), reports that some Linyphiidae species are only found in caves in the southern portion of their distribution range and that surface records are known at the northern edge. This cryophilic affinities / relict population hypothesis would explain well the surface Wisconsin record, but not the surface records from Texas. Its occurrence in caves in Tennessee and Alabama is also remarkable and extends considerably its range to the northeast. Surprisingly, the species has only been found once in each of these states despite that cave fauna having received attention, particularly the important inventorial work of T. C. Barr and S. B. Peck, among

Table 2.—Ranking of Linyphiidae species associated with caves according to their exclusivety to cave habitat.

Species	Relationship to cave habitat	Rank
Bathyphantes pallidus (Banks, 1892)	Found in caves, but mostly a surface species	1
Bathypantes weyeri (Emerton, 1875)	Found in caves in southern localities, surface records known for northern localities	2
Centromerus latidens (Emerton, 1882)	Found in caves in southern localities, surface records known for northern localities	2
Mermessus albula (Zorsch and Crosby, 1934)	Found in caves in southern localities, surface records known for northern localities	2
Oaphantes sp. 2	Found in caves in southern localities, surface records known for northern localities	2
Taranucnus ornithes (Barrows, 1940)	Found in caves in southern localities, surface records known for northern localities	2
Oaphantes pallidulus (Banks, 1904)	Almost all records are from caves, but a few surface records are known	2
Agyneta hedini Dupérré and Paquin, this paper	Known only from caves, but only 2 specimens known	3
Agyneta llanoensis (Gerstch and Davis, 1936)	Mainly found in caves, surface records are known without obvious geographical structure	4
Islandiana unicornis Ivie, 1965	Mainly known from caves, but the species is also reported from pocket gopher burrows	5
Porrhomma cavernicola (Keyserling, 1886)	Almost all records are from caves, but a few surface records are also known	6
Anthrobia mammouthia Tellkampf, 1844	Cave records only	7
Islandiana cavealis Ivie, 1965	Cave records only	7
Islandiana mumai Ivi,e 1965	Cave records only	7
Islandiana speophila Ivie, 1965	Cave records only	7
New genus sp. 1	Cave records only	7
New genus sp. 2	Cave records only	7
Oaphantes sp. 1	Cave records only	7
Oreonetides sp. Paquin, et al., in press	Cave records only	7
Phanetta subterranea (Emerton, 1875)	Cave records only	7
Sisicus sp.	Cave records only	7

others. The surface record from Wisconsin suggests that the species could be found in many more areas that are not necessarily characterized by important karstic systems. The classification of *A. llanoensis* as a troglophile is, however, fully justified.

Agyneta hedini is only known from two specimens and it is difficult to make any statement about its distribution or affinities. However, the occurrence of mature male and female in the same cave suggests more than a simple accidental occurrence.

Troglophiles or troglobites?

The ranking used here to classify Linyphiidae as troglophiles or troglobites is rather simplistic, but nonetheless allows an objective assignment to one of the two ecological categories (Fig. 24). The results obtained may change with the gathering of additional specimens and data, especially for species that are only known from a few individuals, but represent however a reliable assessment of actual knowledge. The species included in the classification are ranked according to their adaptations and affinities to the cave habitat. The gap found in the middle portion (score 4 and 5) is used here to establish the boundary between troglophiles and troglobites. The assignment of *Phanetta subterranea* (Emerton 1875) to troglobites is important; despite its lack of eye reduction, the species is known from thousands of records from 11 states and presents a distribution range of more than 600 miles without a single surface record. Its assignment as a troglobite is justified and supports the previous view of Gertsch (1992) that eye reduction is not the only criteria to consider for defining troglobitism. In comparison, *Porrhomma cavernicola* (Keyserling 1886) is a widespread troglobite with highly reduced eyes also known from Alabama to New York (U.S.A.) and Ontario (Canada). Specimens of that species have been recently collected on the surface at the northern edge of its distribution and these individuals show important differences in the degree of eye reduction when compared with individuals collected in southern locations (unpublished data). The degree of eye reduction in the southern edge of the distribution leaves no doubt about its assignment as a troglobite, but these recent surface records suggest that the situation could be complex, even within a single species.

The ranking shown in figure 24, suggests that three species are highly troglomorphic and that 10 species display a lesser degree of affinities for this habitat,





Figs. 25-26. *Agyneta llanoensis,* images by James C. Cokendolpher, 1998. 25, ventral aspect of male, Bunny Hole, Camp Bullis. 26, dorsal view of female from Treasure Cave, Fort Hood.

but should nonetheless be considered troglobites. The remaining species are best considered troglophiles, including *A. llanoensis* and *A. hedini* new species. Considering the variability observed for North American Linyphiidae associated with caves, we suggest that species display different degrees of troglobitism that may represent different steps towards complete adaptations to cave life.

Taxonomic and nomenclature notes

Anthrobia coylei Miller 2005a is not retained in this paper because its distinction from *A. mammouthia* (Telkampf 1844) appears doubtful; the species was erected only on the basis of longer legs and in absence of genitalic differences, this may not support a distinct species. As for the degree of eye reduction, that varies within species and is often geographically structured, longer legs may be a geographical variant or a simple population trait. It seems best to consider all troglobitic *Anthrobia* to belong in *A. mammouthia,* until this question is better addressed.

Miller (2005a) restored the use of the original spelling, *A. monmouthia,* as the appropriate spelling for the species. *Anthrobia monmouthia* however appears a case of *incorrect original spelling* (ICZN 1999, article 32.5.1) as the species may have been named after the type locality, Mammoth Cave (Kentucky, U.S.A.). In the original paper however, Tellkampf (1844) did not specify the origin of the name, therefore this interpretation remains debatable. In 1862 however, Keyserling emended the name to *A. mammouthia* without comments. To favor nomenclatural stability, the Code prevails for the use of an unjustified emendation that is widely used. In any case, either following the incorrect original spelling hypothesis or the wide use of Keyserling unjustified emendation (therefore deemed to be treated as a justified emendation, ICZN 1999, article 33.2.3.1), *A. mammouthia* is the spelling to retain. This spelling is consistent with the usage in scientific publications and speleological documents for about a century and a half, which conforms to ICZN (1999) recommendation (point 12: XXVII) about retaining the prevailing usage for a name despite disagreement with the original spelling. We therefore restore *A. mammouthia* as the appropriate spelling for this species.

In the study of the two species described in this paper, we have re-examined other *Agyneta* species in order to correctly assess the complex genitalic morphology of the species. It appears that the structure identified as an embolic membrane for *Agyneta sheffordiana* in Dupérré and Paquin 2007: fig. 3, is best identified as a median membrane.

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