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Two new cavernicolous species of *Anillinus* Casey (Carabidae, Trechinae, Anillini) from Texas with a revised key to Texas species

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Abstract

Two new species of blind cavernicolous ground beetles in the genus *Anillinus* Casey are described from Texas. Based on the structure of the male genitalia, *Anillinus reddelli* **sp. nov.** (type locality: SW Bypass Cave, Williamson County, Texas) is closely related to *A. forthoodensis* Sokolov and Reddell from the neighboring Bell County. Based on the structure of the male genitalia, *Anillinus bexarensis* **sp. nov.** (type locality: Up the Creek Cave, Bexar County, Texas) is closely related to *A. weismanensis* Sokolov and Kavanaugh from Hays and Bell Counties. Both new species are illustrated with images of the habitus, body parts, and male and female genitalia. Based on morphological data a new grouping of the Texas species is proposed and discussed.

Keywords

cave fauna, distribution, new species, new lineage

Introduction

The genus *Anillinus* Casey is one of the most diverse genera of carabid beetles in the Southern United States. It currently includes more than 60 species distributed across the eastern and central parts of the United States, from Maryland and Indiana in the north, to Florida and Texas in the south (Bousquet 2012; Sokolov et al. 2014; Sokolov and Schnepp 2021). In the eastern temperate forests (especially in the Appalachian region) the genus is dominated by typical litter-species, however towards the South and to the West, the number of litter-species is drastically decreased while the diversity of subterranean species is increased. In Texas, the westernmost part of the generic range, no litter species are known to occur. At present, the Texas fauna of *Anillinus* comprises seven species, all of which can be treated as subterranean species, and most have been reported from a cave environment (Sokolov et al. 2014).

The last paper focusing on the *Anillinus* of Texas was published almost a decade ago (Sokolov et al. 2014) and was based on material collected during sampling of cavernicolous taxa in the caves of central Texas. These localities have been intensely monitored because of conservation issues involving troglobitic species threatened by urban development (see U.S. Fish and Wildlife Service, Department of Interior 2000; Paquin and Hedin 2004; Ledford et al. 2012). In that paper, the Texas fauna of *Anillinus* was reviewed and illustrated, and a key to the species was provided. As a result, this research doubled the known species diversity of the state. However, several female specimens originating from different caves could not be identified at that time, because of the lack of males and the impossibility of examining the male genitalia to determine the taxonomic position of these beetles. A number of superficial characters of the unidentified females suggested that additional new species remained to be discovered in the state. Some time ago, through the courtesy of James R. Reddell (Curator Emeritus of Cave Invertebrates Collection, Biodiversity Center, The University of Texas at Austin, TX), I received new material of Texas Anillini from the caves where the previously unidentified females had been collected. Examination of the material proved the correctness of earlier anticipations, allowing delineation of two new species in the genus. Descriptions of these new species, together with corresponding modifications of a key to the Texas species of *Anillinus*, serve as the basis for this paper.

Materials and methods

This study is based on the examination of 14 specimens of *Anillinus* collected in the caves of Bexar and Williamson Counties of Texas. Type material of new species is deposited in the collections of the National Museum of Natural History, Washington, DC, USA (**NMNH**), in the Texas Memorial Museum, The University of Texas at Austin, Austin, Texas, USA (**TMM**), and in the collection of the California Academy of Sciences, San Francisco (**CAS**).

Terms used in this paper are of general use, in particular cases for codes of elytral chaetotaxy follow Erwin (1974), for male and female genitalia follow Sokolov and Carlton (2008) and Sokolov et al. (2014).

Extractions and processing of genitalia were made using standard techniques as described by Sokolov and Kavanaugh (2014).

Photographs of the external features of specimens were taken with a Macropod Pro photomacrography system (Macroscopic Solutions, LLC). Digital images of genitalia were taken with a Nikon Eclipse N*i*-U light microscope supplied with DS-Fi2 camera and DS-LR3 camera control unit.

All specimens were measured using tpsDig 2.17 (Rohlf 2013) software on digital photographs. Measurements for various body parts are encoded as follows: **ABL** = apparent body length, from clypeus to apex of elytra; **WH** = width of head at level of first orbital setae; **WPm** = maximum width across pronotum; **WPa** = width across anterior angles of pronotum; **WPp** = width across posterior angles of pronotum; **LP** = length of pronotum from base to apex along the midline; **WE** = width of elytra at level of 2nd discal seta; **LE** = length of the elytra, from the apex of the scutellum to the apex of the left elytron. Apparent body length (ABL) measurements are given in mm, others are presented as nine ratios: body parts –WPa/WPp, WPm/WPp, WPm/LP, WE/LE; body proportions – WH/WPm, WPm/WE, LP/LE, LE/ABL, and WE/ABL. All values are given as the mean ± standard deviation.

Results

Order Coleoptera Linnaeus, 1758
Family Carabidae Latreille, 1802
Subfamily Trechinae Bonelli, 1810
Tribe Anillini Jeannel, 1937

Genus *Anillinus* Casey, 1918

Anillinus Casey, 1918: 167. Type species: *Anillus* (*Anillinus*) *carolinae* Casey, 1918, by original designation.
Micranillodes Jeannel, 1963a: 57. Synonymy established by Bousquet (2012: 699) and confirmed by Sokolov et al. (2014: 83). Type species: *Micranillodes depressus* Jeannel, 1963a, by original designation.
Troglanillus Jeannel, 1963b: 147. Synonymy established by Barr (1995: 240). Type species: *Troglanillus valentinei* Jeannel, 1963b

Anillinus bexarensis sp. nov.

https://zoobank.org/C17CDC72-318B-491F-9A7E-CF32D3925A26
Figs 1, 2, 5C

Type material. ***Holotype*:** male, deposited in NMNH, card-mounted, dissected, labeled: \ USA-TX: Bexar Co., Up the Creek Cave, 29.631433°N, 98.559079°W, 12 Mar 2020, J. Owen, UTIC#246598 \ HOLOTYPE *Anillinus bexarensis* Sokolov, 2022 [red label].

Paratypes (8 specimens, deposited in NMNH and TMM). One female, labeled same as holotype, except UTIC#246599 \; 1 male, labeled same as holotype, except , 25 Feb 2020, J. Owen, A. Jensen, UTIC#246585 \; 1 male, labeled same as holotype, except 5 Mar 2020, J. Owen, UTIC#246593 \, 1 female (pronotum broken, ovipositor sclerites and spermatheca lost), labeled: \ TX: Bexar Co., Up the Creek Cave, 14.XI.1995, J. Cokendolpher, J. Reddell, M. Reyes \ Texas Memorial Museum Invertebrate Zool Coll #27.141 \; 2 females labeled: \ TEXAS: Bexar Co., Constant Sorrow Cave, 29.63554° 98.58514°W, 20 Jan 2020, K. McDermid, L. Pustka, UTIC#246580 \; 1 female labeled: \ TEXAS: Bexar Co., Constant Sorrow Cave, 29.63554°N 98.58514°W, 31 Jan 2020, K. McDermid, L. Pustka, UTIC#246564 \; 1 female labeled: \ TEXAS: Bexar Co., Constant Sorrow Cave, 29.63554°N 98.58514°W, 19 Mar 2020, J. Owen, UTIC#246623 \.

Additional material. One female (in poor condition, only head, pronotum and abdominal ventrites present, ovipositor sclerites and spermatheca lost), deposited in CAS, labeled: \Zara-3873: TX: Bexar Co., Holy Smoke Cave, 10.XII.2008, P. Sprouse, S. Zappitello \.

Etymology. The specific epithet is a Latinized adjective in the masculine form based on the name of Bexar County, from which the new species is described.

Type locality. U.S.A., Texas, Bexar County, San Antonio, Eisenhower Park area, Up the Creek Cave, 29.631433°N, 98.559079°W.

Recognition. Females of *A. bexarensis* are practically indistinguishable from those of other Texas species of subterranean *Anillinus*. Males of *A. bexarensis* are distinguished from those of the other Texas species by the structure of the median lobe.

Description. Medium-sized for genus (SBL range 1.68–1.88 mm, mean 1.78±0.082 mm, n = 7).

Habitus. Body form (Fig. 1A) subdepressed, subparallel, markedly elongate (WE/SBL 0.37±0.009), head (Fig. 1B) large for genus compared to pronotum (WH/WPm 0.76±0.0207), pronotum wide in comparison to elytra (WPm/WE 0.82±0.020).

Integument. Body rufobrunneous, appendages testaceous. Microsculpture distinct over all dorsal surfaces of head, pronotum and elytra, with isodiametric polygonal meshes.

Head. Labium with mental tooth; mentum and submentum separated by suture.

Prothorax. Pronotum (Fig. 1C) relatively long (LP/LE 0.39±0.017) and transverse (WPm/LP 1.31±0.017), with lateral margins shallowly sinuate and moderately constricted posteriorly (WPm/WPp 1.28±0.026). Anterior angles indistinct, posterior angles nearly rectangular (95–105°). Width between anterior and posterior angles of approximately equal length (WPa/WPp 0.99±0.035). Basal margin slightly concave.

Elytra (Fig. 1A). Slightly and widely depressed along suture, of normal length (LE/SBL 0.59±0.013) and narrow for genus (WE/LE 0.62±0.021), with traces of 5–6 striae. Humeri distinct, rounded, in outline forming obtuse angle with longitudinal axis of body. Lateral margins subparallel, slightly divergent at basal fifth, evenly rounded to apex in apical fourth, without subapical sinuation. Vestiture of elytra short (less than one-third length of discal setae). Apex of elytron truncate with distinct sutural angle.

Legs. First male protarsomere markedly dilated apico-laterally with two rows of adhesive setae ventrally. Male hind legs modified: metafemora triangularly dilated along posteroventral margin with a small tooth at tip of dilation.

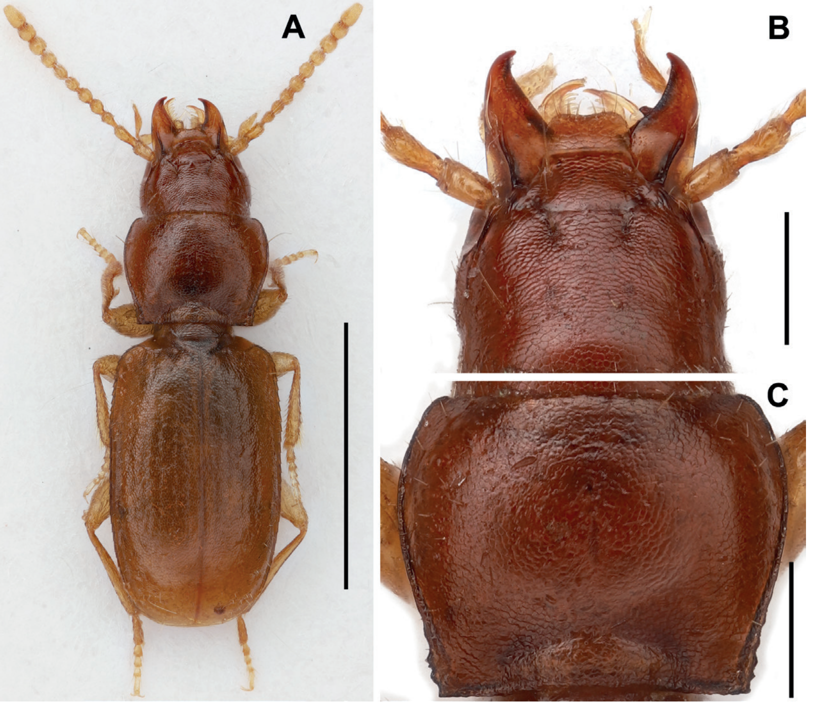

Figure 1. Digital images of external features of *Anillinus bexarensis* sp. nov. **A** habitus, dorsal aspect (female, Up the Creek Cave, Bexar County, Texas) **B** head, dorsal aspect (male, Up the Creek Cave, Bexar County, Texas) **C** pronotum, dorsal aspect (male, Up the Creek Cave, Bexar County,Texas). Scale bars: 1.0 mm (**A**); 0.2 mm (**B–C**).

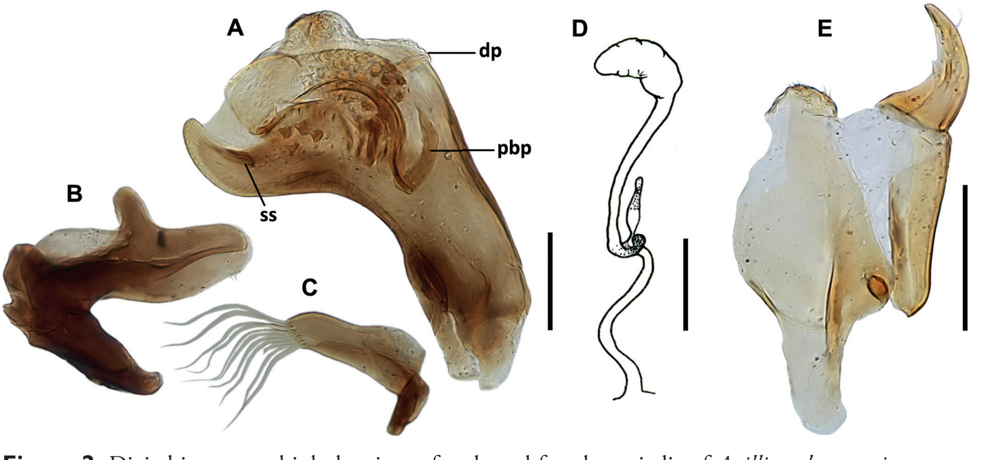

Figure 2. Digital images and ink drawings of male and female genitalia of *Anillinus bexarensis* sp. nov. (Up the Creek Cave, Bexar County, Texas). Male genitalia: **A** median lobe, right lateral aspect; apex to upper left and basal bulb to lower right **B** left paramere, left lateral aspect **C** right paramere, right lateral aspect. Female genitalia: **D** spermatheca **E** ovipositor sclerites. dp–dorsal protuberance, pbp–posterior basal prolongation, ss–spine-like structure. Scale bars: 0.1 mm.

Male genitalia. Median lobe of aedeagus (Fig. 2A) with short basal lobe, long almost rectangularly bent shaft, and with apex enlarged and bent upwards, narrowly rounded at tip. Apical half of shaft with dorsal protuberance only slightly protruded beyond the general contour of the shaft (Fig. 2A, dp). Dorsal margin narrowly sclerotized along almost all its length. Ventral margin enlarged in apical part, with numerous poriferous canals. Dorsal sclerite in the form of a semicircular stylus-like structure, with characteristic posterior basal prolongation (Fig. 2A, pbp). Scaly membranous field occupies almost entire apical third of the shaft, with numerous short spines basally and anteroventrally. Enlarged apical area of median lobe with a dark spine-like structure (Fig. 2a, ss). Left paramere (Fig. 2B) wide, greatly enlarged basally, without long setae. Right paramere (Fig. 2C) long and wide, with numerous (>8) long setae, their length approximately equal to the length of the paramere.

Female genitalia. Ovipositor sclerites (Fig. 2E) typical for *Anillinus*. Gonocoxite 2 unguiform, of moderate length, with slightly curved blade and narrowly rounded apex, with one nematiform and two ensiform setae. Laterotergite with 8–9 setae. Spermatheca with distal part of cornu abruptly dilated. Nodulus short, slightly sclerotized, ramus undifferentiated (Fig. 2D). Spermathecal gland and spermathecal duct shorter than the length of the spermatheca.

Geographical distribution. This species is known only from several caves located in Bexar County, Texas (Fig. 5C).

Way of life. This species has been found only in caves.

Relationships. The presence of a dorsal protuberance on the shaft and the characteristic shape of the dorsal copulative sclerite of the median lobe put *A. bexarensis* together with two other Texan species of *Anillinus*, *A. wisemanensis* Sokolov and Kavanaugh and *A. sinuatus* Jeannel. The general outline of the median lobe and details of the armature of the apical part of the median lobe suggest that *A. bexarensis* is the closest relative of *A. wisemanensis*.

Anillinus reddelli sp. nov.

https://zoobank.org/B4413401-93FB-46C2-AB33-1AB5C0599DA6

Figs 3, 4, 5B

Type material. *Holotype*: male, deposited in NMNH, card-mounted, dissected, labeled: \ USA-TX: Williamson Co., SW Bypass Cave, No 1, TMM # 91,549, Kemble White, 12 Oct 2016 \ HOLOTYPE *Anillinus reddelli* Sokolov des., 2022 [red label].

Paratypes (2 specimens, deposited in NMNH and TMM). One female, dissected, labeled: \ USA-TX: Williamson Co., Beck Horse Cave, TMM # 91,543, Kemble White, 4 Mar 2015 \; 1 male, dissected, labeled: \ TEXAS: Williamson Co., Glenna Mae's Cave, TMM # 91,592, Kemble White, 5 Jun 2015 \.

Additional material. One male (aedeagus lost), deposited in CAS, labeled: \ TX: Williamson Co., Lobo's Lair, 13.IX.1991, J. Reddell & M. Reyes \ Texas Memorial Museum Invertebrate Zool Coll #27.142 \; one female, deposited in CAS, labeled: \ TX: Williamson Co., Lobo's Lair, 1.IX.1991, W. Elliot, J. Reddell, M. Reyes, M. Warton \ Texas Memorial Museum Invertebrate Zool Coll #27.126 \.

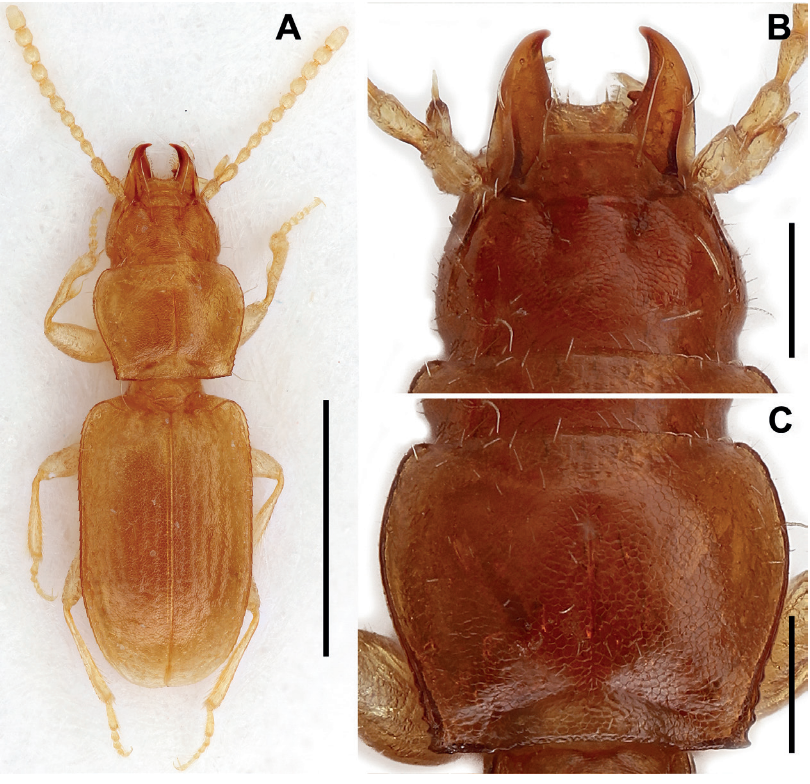

Figure 3. Digital images of external features of *Anillinus reddelli* sp. nov. **A** habitus, dorsal aspect (female, Beck Horse Cave, Williamson County, Texas) **B** head, dorsal aspect (male, SW Bypass Cave, Williamson County, Texas) **C** pronotum, dorsal aspect (male, SW Bypass Cave, Williamson County, Texas). Scale bars: 1.0 mm (**A**); 0.2 mm (**B–C**).

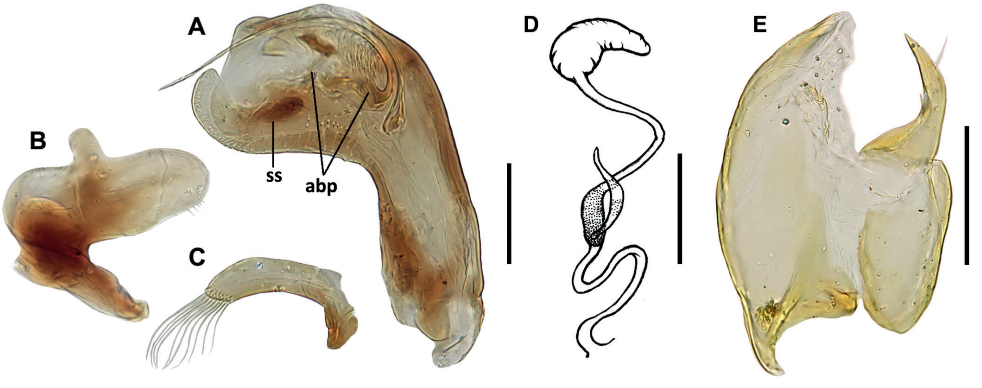

Figure 4. Digital images and ink drawings of male and female genitalia of *Anillinus reddelli* sp. nov. (SW Bypass Cave and Beck Horse Cave, respectively, Williamson County, Texas). Male genitalia: **A** median lobe, right lateral aspect; apex to upper left and basal bulb to lower right **B** left paramere, left lateral aspect **C** right paramere, right lateral aspect. Female genitalia: **D** spermatheca **E** ovipositor sclerites. abp–anterior basal prolongation, ss–spine-like structure. Scale bars: 0.1 mm.

Etymology. The specific epithet is a Latinized eponym in the genitive case and is based on the surname of James R. Reddell, Curator Emeritus of Cave Invertebrates Collection at the University of Texas at Austin, TEXAS, U.S.A., a participant of many speleological expeditions, outstanding explorer of cave fauna, and a collector of a great number of troglobitic invertebrates, including numerous taxa new to science.

Type locality. U.S.A., Texas, Williamson County, SW Bypass Cave.

Recognition. Females of this new species are practically indistinguishable from those of other Texas species of subterranean *Anillinus*. Males of *A. reddelli* are distinguished from those of the other Texas species by the structure of the median lobe.

Description. Medium-sized for genus (SBL range 1.53–1.83 mm, mean 1.67±0.147 mm, n = 3).

Habitus. Body form (Fig. 3A) subdepressed, subparallel, markedly elongate (WE/SBL 0.36±0.004), head (Fig. 3B) large for genus compared to pronotum (WH/WPm 0.77±0.008), pronotum wide in comparison to elytra (WPm/WE 0.87±0.005).

Integument. Body rufotestaceous, appendages testaceous. Microsculpture distinct over all dorsal surfaces of head, pronotum and elytra, with isodiametric polygonal meshes.

Head. Labium with mental tooth; mentum and submentum separated by suture.

Prothorax. Pronotum (Fig. 3A, C) relatively long (LP/LE 0.42±0.014) and transverse (WPm/LP 1.27±0.015), with lateral margins shallowly sinuate and moderately constricted posteriorly (WPm/WPp 1.28±0.027). Anterior angles indistinct, posterior angles nearly rectangular (95–100°). Width between anterior and posterior angles of approximately equal length (WPa/WPp 0.99±0.010). Basal margin slightly concave.

Elytra (Fig. 3A). Slightly and widely depressed along suture, of normal length (LE/SBL 0.58±0.015) and narrow for genus (WE/LE 0.62±0.016), with traces of 5–6 striae. Humeri distinct, rounded, in outline forming obtuse angle with longitudinal axis of body. Lateral margins subparallel, slightly divergent at basal fifth, evenly rounded to apex in apical fourth, without subapical sinuation. Vestiture of elytra short (less than one-third length of discal setae). Apex of elytron of normal shape with distinct sutural angle.

Legs. First male protarsomere markedly dilated apico-laterally, with two rows of adhesive setae ventrally. Male hind legs modified: metafemora triangularly dilated along posteroventral margin with a small tooth at tip of dilation.

Male genitalia. Median lobe of aedeagus (Fig. 4A) with short basal lobe, long rectangularly bent shaft, and with apex enlarged and bent upwards, tapering to angular tip. Dorsal margin strongly sclerotized along almost all its length. Ventral margin enlarged along entire length to basal orifice, with numerous poriferous canals. Dorsal sclerite in form of a semicircular flagellum-like structure, with characteristic anterior basal prolongation (Fig. 4A, abp). Scaly membranous field located between anterior basal prolongation and flagellum of dorsal sclerite. Apical area of shaft with a dark spine-like structure (Fig. 4A, ss). Left paramere (Fig. 4B) wide, greatly enlarged basally, without long setae. Right paramere (Fig. 4C) long and wide with numerous (>8) long setae, their length approximately equal two-thirds of the length of the paramere.

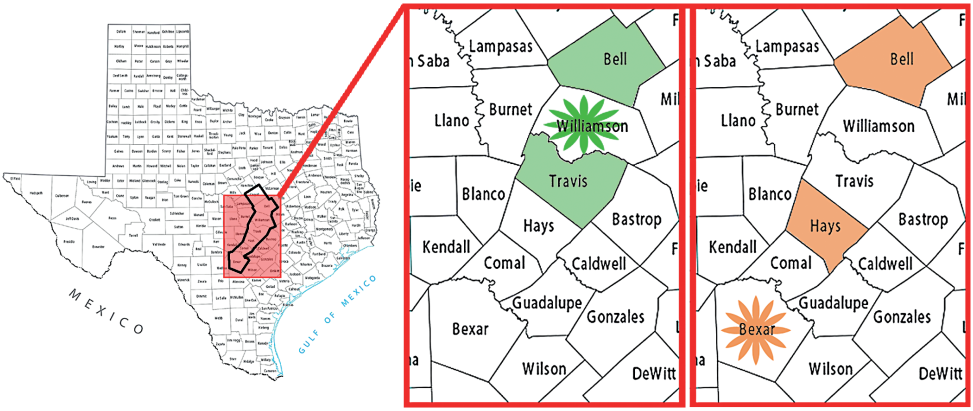

Figure 5. Distribution of the *Anillinus* species by county in central Texas **A** position of the region under question on the map of Texas **B** distribution of *A. reddelli* and its relatives **C** distribution of *A. bexarensis* and its relatives. Non-rectangular heavy black contour on state map shows the genus range in Texas. Stars on insets indicate counties where new species were collected, color-filled counties on insets indicate ranges of the presumed relatives of the appropriate new species.

Female genitalia. Ovipositor sclerites (Fig. 4E) typical for *Anillinus*. Gonocoxite 2 unguiform, of moderate length, with slightly curved blade and acute apex, with one nematiform and two ensiform setae. Laterotergite with 8–9 setae. Spermatheca (Fig. 4D) with distal part of cornu abruptly dilated. Nodulus short, slightly sclerotized, ramus undifferentiated. Spermathecal gland and spermathecal duct shorter than length of the spermatheca.

Geographical distribution. This species is known only from several caves distributed in Williamson County, Texas (Fig. 4B).

Way of life. This species has been found only in caves.

Relationships. The absence of a dorsal protuberance on the shaft, and the characteristic design of the dorsal copulative sclerite of the median lobe place *A. reddelli* in one group with two other Texan species of *Anillinus*, *A. forthoodensis* Sokolov and Reddell and *A. affabilis* (Brues). The general shape of median lobe and details of its apical part suggest that *A. forthoodensis* is the closest relative of *A. reddelli* among the Texan congeners.

Unidentified material

Among 14 specimens examined I was unable to identify one female with the following label data: \ Texas: Bexar County, Fobia Cave, 5 March 2017, P. Sprouse \ TMM #91,750 \ (not dissected). This female differs significantly from the other specimens of *Anillinus* collected in Bexar County by its smaller size and different body shape. With its proportionally shorter elytra and markedly subparallel habitus, the female closely resembles the specimens of *A. forthoodensis*. The species of *Anillinus* cannot be unequivocally determined by female spermathecae and in our case examination of the male genitalia is needed to clarify the taxonomical status of the population of beetles from Fobia Cave.

The following key to the Texas *Anillinus* from Sokolov et al. (2014) is modified to accommodate both new species

1 Larger beetles on average (ABL range 1.60–2.00 mm); pronotum with basal margin more or less straight laterally, posterior angles not shifted forward; elytral umbilicate series of pores with 8^{th} and 9^{th} pores geminate (eo8 and eo9, Sokolov et al. 2014, Fig. 2G–I, p. 82) **2**

– Smaller beetles on average (ABL < 1.50 mm); pronotum with basal margin oblique laterally, posterior angles shifted forward (Sokolov et al. 2014, Fig. 1C, p. 80); elytral umbilicate series of pores with 8^{th} and 9^{th} pores disassociated, 8^{th} pore situated approximately equidistant from 7^{th} and 9^{th} pores (Jeannel 1963a, Fig. 17, p. 57) .... ***A. depressus* (Jeannel)**

2 Species with body markedly elongate, subparallel: with pronotum and elytra of approximately equal width (WPm/ WE>0.85) and with narrower elytra (WE/LE<0.60) **3**

– Species with body less elongate, more ovoid: with narrower pronotum (WPm/ WE<0.85) and wider elytra (WE/LE>0.60) **5**

3 Apex of elytron widely concave with a long curved spine on the outer margin of incision (Sokolov et al. 2014, Fig. 2J, p. 82); female spermatheca with distal part of cornu (dpc) only slightly dilated (Sokolov et al. 2014, Fig. 7G, p. 92) .... ***A. acutipennis* Sokolov & Reddell**

– Apex of elytron without spine laterally, female spermatheca with distal part of cornu markedly dilated (Figs 4D) **4**

4 Pronotum markedly elongate (WPm/LP 1.21±0.024); male median lobe with spiny membranous field (Sokolov et al. 2014, Fig. 6N, p. 90) .... ***A. forthoodensis* Sokolov & Reddell**

– Pronotum more transverse (WPm/LP 1.27±0.015); male median lobe with scaly membranous field without spines (Fig. 4A) .... ***A. reddelli* sp. nov.**

5 Pronotum with microsculpture distinct at any angle, lateral margins and posterior angles varied **6**

– Pronotum with fine microsculpture visible on disc only at certain angles, lateral margins with shallow basilateral sinuation before the nearly rectangular (90–100°) posterior angles (Sokolov et al. 2014, Fig. 1B, p. 80); beetle from Bexar County .... ***A. sinuatus* (Jeannel)**

6 Male with abdominal ventrites modified; median lobe of male aedeagus without protuberance on dorsal margin (Sokolov et al. 2014, Fig. 6A, p. 90); spermatheca of female with distal part of cornu (dpc) markedly dilated (Sokolov et al. 2014, Fig. 7C, p. 92) .... ***A. affabilis* (Brues)**

– Male with abdominal ventrites simple; spermatheca of female varied **7**

7 Metafemora of male modified, triangularly dilated medially (Sokolov et al. 2014, Fig. 4E, p. 86); spermatheca of female with distal part of cornu markedly dilated (Figs 2D) **8**

– Metafemora of male unmodified, fusiform (Sokolov et al. 2014, Fig. 4G, p.86); median lobe of male with dorsal side evenly rounded, without dorsal protuberance extended beyond the general contour, and with large spinose ventral sclerite (vs) in the inner sac (Sokolov et al. 2014, Fig. 6K, p. 90); spermatheca of female with distal part of cornu only slightly dilated (Sokolov et al. 2014, Fig. 7F, p. 92)..................... ***A. comalensis* Sokolov & Kavanaugh**

8 Median lobe of males with following characteristics: dorsal protuberance (dp) of shaft extended far beyond the general contour of median lobe, inner sac with scaly membranous field without spines, dorsal copulatory sclerite without posterior basal prolongation (Sokolov et al. 2014, Fig. 6G–J, p. 90). Beetles from Hays and Bell Counties ...***A. wisemanensis* Sokolov & Kavanaugh**

– Median lobe of males with following characteristics: dorsal protuberance (dp) of shaft less developed, only slightly extended beyond the general contour of median lobe, inner sac with spiny membranous field, dorsal copulatory sclerite with distinctive posterior basal prolongation (pbp) (Fig. 2A). Beetles from Bexar County..***A. bexarensis* sp. nov.**

Discussion

With new findings the number of *Anillinus* species recorded in Texas has reached nine, which surpasses the total number of *Anillinus* species in the Ouachita and Ozark Mountains of Arkansas (Bousquet 2012; Sokolov et al. 2017), thereby making Texas the richest region of anilline fauna west of the Mississippi River. New morphological data indicate that the first lineage of *Anillinus*, namely the *A. affabilis-forthoodensis-sinuatus-wisemanensis* lineage (Sokolov et al. 2014), is represented by two groups of species distinguished by the shape and internal design of the median lobes in males. The first group encompasses three species, namely *A. affabilis*, *A. forthoodensis*, and *A. reddelli*, characterized by the unmodified apical half of the shaft and the presence of a distinctive anterior prolongation at the basal part of the dorsal copulative sclerite in the inner sac of the median lobe (Fig. 4A, abp). The cumulative range of this group includes three neighboring counties (Fig. 5B). The second group encompasses another three species, namely *A. sinuatus*, *A. weismanensis*, and *A. bexarensis*. Their representatives demonstrate a distinctive protuberance at the apical half of the shaft (Fig. 2A, dp) and a lack of anterior prolongations at the basal part of the dorsal copulative sclerite in the inner sac of the median lobe. The range of this group extends from Bexar County to Bell County (Fig. 5C) and includes the major part of the generic range within the Edwards-Trinity aquifer system (except Coryell County). It is noteworthy that both groups include one species that is recorded in a non-cavernicolous habitat, *A. affabilis* in the first group and *A. sinuatus* in the second group, as well as two species collected only in caves. Morphologically, based on the structure of male genitalia, species that are recorded outside the caves are less derived and, possibly can be treated as the closest relatives of the ancestral forms of the corresponding groups. Supporting evidence for this statement may be the previously described morphological similarity in structure of the male median lobes between *A. sinuatus* and *A. relictus* Sokolov from Alabama (Sokolov 2021), linking the representatives of *Anillinus* occurring to the west of the Mississippi River with their eastern counterparts.

In addition, it makes sense to comment on the unidentified material of Texas *Anillinus* reported in the previous review of Texas species (Sokolov et al. 2014). Among the six unidentified specimens of *Anillinus* mentioned in the paper, two specimens from Lobo's Lair, Williamson County presumably belong to *A. reddelli*, and two females from Bexar County presumably belong to *A. bexarensis*. The status of the other two females labeled: \ TX: Coryell Co., Lucky Day Cave, Fort Hood, 27.VI.2009, J. Fant, J. Reddell, M. Reyes \ Texas Memorial Museum Invertebrate Zool Coll #70.013 \ and \ TX: Bell Co., Sponge Bob Pot, Fort Hood, 17.II.2009, J. Fant, M. Warton \ Texas Memorial Museum Invertebrate Zool Coll #69.724 \ remains obscure, and in both cases the examination of males from the corresponding localities is needed. Together with a female from Fobia Cave of Bexar County mentioned above (in the subsection Unidentified material) specimens from Coryell County and from the Sponge Bob Pot, Bell County belong to a cluster of *Anillinus* populations which on further investigation might lead to the recognition of additional new species.

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