2018. Journal of Arachnology 46:507–537

Molecular and morphological characterization of new species of hypogean *Paradraculoides* (Schizomida: Hubbardiidae) from the arid Pilbara bioregion of Western Australia

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Abstract. The Australian schizomid fauna consists of eight genera distributed across the northern half of the country, and are mostly restricted to rainforest or subterranean ecosystems. Several schizomid species have been previously described from the arid Pilbara bioregion of Western Australia, occurring in subterranean cavities that are accessible only by troglofauna sampling. We document the schizomids from subterranean habitats on the western edge of the Hamersley Range using morphological characters and sequence data from the genes *COI*, ITS2 rRNA, 12S rRNA and 28S rRNA. Several genetic clades were found to cluster geographically, consistent with the geomorphology of the region. Adult males were available for four clades (*Paradraculoides affinis* sp. nov., *P. cochranus* sp. nov., *P. confusus* sp. nov. and *P. trinity* sp. nov.), females only were present for two clades (*P. catho* sp. nov. and *P. obrutus* sp. nov.), and only a single juvenile was available for another clade (*P. celatus* sp. nov.). We hypothesize that each of these clades represent distinct species which are here named and described.

Keywords: Taxonomy, systematics, molecular taxonomy, *Draculoides*

ZooBank LSID: http://zoobank.org:8080/References/11121056-B8A3-486A-9CFA-0C248701D4F4

The hypogean fauna of the arid Pilbara bioregion of north-western Australia contains numerous radiations of different animal taxa including arachnids (e.g., Harvey & Edward 2007a, b; Harvey & Volschenk 2007; Edward & Harvey 2008; Harvey et al. 2008; Platnick 2008; Burger et al. 2010; Baehr et al. 2012; Alexander et al. 2014), crustaceans (e.g., Poore & Humphreys 1998; Knott & Halse 1999; Karanovic & Marmonier 2003; Wilson 2003; Finston et al. 2004; Finston & Johnson 2004; Karanovic 2006; Guzik et al. 2008), insects and other hexapods (e.g., Smith et al. 2012; Smith & McRae 2014, 2016; Baehr & Main 2016; Trotter et al. 2017), and worms (Brown et al. 2015). Many species have extremely small distributions and most are clearly short-range endemics with challenging conservation issues related to the extraction of iron ore and other minerals (Harvey 2002; Eberhard et al. 2005; Guzik et al. 2011; Harvey et al. 2011).

The small arachnids of the order Schizomida are relatively well-studied in Australia with 53 named species in eight genera occurring in rainforest and subterranean habitats in the northern half of Australia (Harvey 1992, 2000a, b, 2001; Harvey & Humphreys 1995; Harvey et al. 2008; Abrams & Harvey 2015). A recent global phylogeny of Schizomida recovered several exemplar species of the Australian genera *Draculoides* Harvey, 1992, *Julatennius* Harvey, 1992, *Notozomus* Harvey, 1992 and *Paradraculoides* Harvey et al., 2008 among a radiation of the Asian fauna (Clouse et al. 2017), which formed a separate lineage from the American and African fauna.

The Pilbara bioregion of Western Australia currently contains seven described schizomid species in two genera (Harvey et al. 2008; Abrams & Harvey 2015), all of which occur in subterranean voids that are accessible only via specialized troglofauna sampling methods (Halse & Pearson 2014). The identification of schizomid species usually relies on morphological modifications on adult males, especially characters on the flagellum located at the terminal end of the abdomen. Adult females and juveniles are rarely identifiable, especially between closely related species where there are generally no noticeable changes in somatic morphology or in the genital region. Molecular methods have proven extremely useful in species description, delimitation and identification among Pilbara schizomids, with previous descriptions of *Paradraculoides* species providing diagnostic molecular characters for each species based on the mitochondrial barcoding gene *COI* (Harvey et al. 2008). These diagnostic characters were provided to distinguish among seven species of *Draculoides* and *Paradraculoides*.

Recent collecting in an area of the Pilbara from which schizomids have been previously unrecorded (Fig. 1) has revealed several new species of *Paradraculoides* that could be distinguished from each other and from previously described species by differences in the male flagellum. Furthermore, we use a multigene approach to help unravel the relationships and status of the various populations and to describe these species using morphological and molecular approaches.

METHODS

Specimen sampling and morphological examination.—The specimens included in this study were field-sampled using the techniques described by Harvey et al. (2008). The maps were produced with the computer program ArcView version 3.2

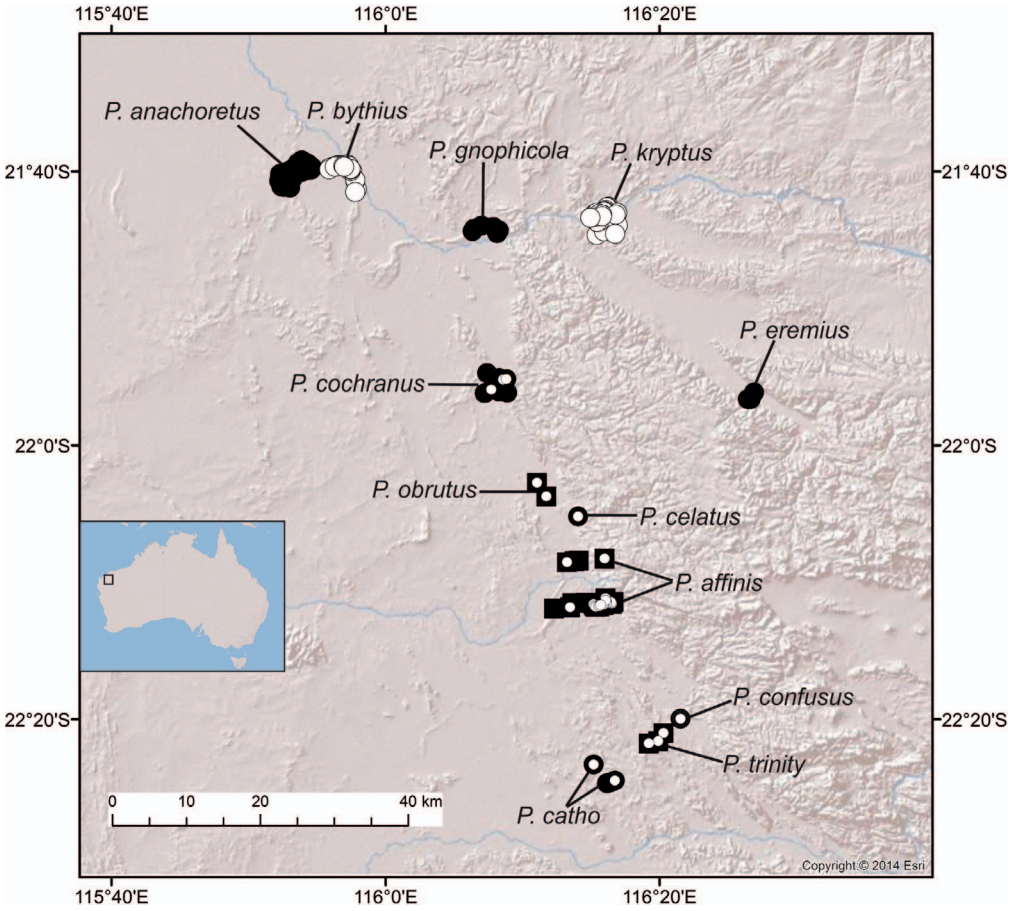

Figure 1.—Map of the western Hamersley Range, Western Australia, showing the distribution of the named species of *Paradraculoides*. The localities of the specimens of the seven new species utilized in the molecular study are depicted with small open circles.

after the relevant locality data were stored in a Microsoft Access database. The descriptions of the new species are presented in alphabetical order, and 'sp. nov.' epithets are removed from the text after the Methods.

All specimens examined in this study are lodged in the Western Australian Museum, Perth (WAM). They were examined with Leica MZ10 and MZ16A dissecting microscopes and a Leica DM2500 compound microscope. The whole-body images were prepared using the Leica Application Suite version 4.6 utilizing multiple images taken with a Leica DFC 500 digital camera, attached to the Leica MZ16A microscope. The female genitalia were examined by dissecting the genital plate from the abdomen and mounting it on a microscope slide in lactic acid.

Terminology of the morphological structures generally follows Harvey (1992) and Reddell & Cokendolpher (1995). The notation of the cheliceral setae follows Manzanilla et al. (2016). The following abbreviations were used for the setae of the flagellum, following Monjaraz-Ruedas et al. (2016): dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Molecular techniques.—*DNA extraction:* DNA was extracted from legs taken from specimens (Table 1) using a Qiagen DNeasy Blood and Tissue kit, following the manufacturer's protocol, with the exception of the final elution of extracted DNA in 60 µl volume. All specimens except WAM T92518 were sequenced for *COI*, and representative specimens from each *COI* clade were sequenced for the remaining genes.

Amplification: Polymerase Chain Reaction (PCR) was used to amplify two mitochondrial DNA genes (cytochrome *c* oxidase subunit I [*COI*] and 12S rRNA [12S]) and two nuclear rRNA markers (internal transcribed spacer subunit 2 [ITS2] and 28S rRNA [28S]). Amplification of all genes was carried out in 25 µl reactions, which included 1 µl of template DNA, 0.2 µM of each primer, 1 mM dNTPs, 3 mM $MgCl_2$, 1x buffer and 1 unit of taq DNA polymerase (MyTaq) except for *COI* which utilized 2.5 µl DNA template, 0.4 µM of each primer, 0.8 mM dNTPs, 2.5mM $MgCl_2$, 1x buffer and 1.5 units of Taq.

Primers for *COI* differed for different specimens. Some used LCOI490 (5′ – GGTCAACAAATCATAAAGATATTGG – 3′) and HCO2198 (5′ – CTAAACTTCAGGGTGACCAAAAAATCA – 3′) (Folmer et al. 1994), whereas others used schiz–COI-115F (5′ – CAGCCCACGCTTTTGTAATAA – 3′) and schizCOI-863R (5′ – GGCTGCTGTAAAATAAGCTCGT – 3′) (Harvey et al. 2008). Primers for 12S were 12Sai (5′ – AAACTAGGATTAGATACCCTATTAT – 3′) (Kocher et al. 1989) and 12SrOpi (5′ – AAGAGCGACGGGCGATGTGTACAT – 3′) (Sharma & Giribet 2011). Primers for ITS2 were 5.8S2 (5′ – GGGTCGATGAAGAACGCAGC – 3′) and 28SAR (5′ – TCCTCCGCTTATTATATGC – 3′) (Rix et al. 2010). Primers for 28S were

Table 1.—Specimens used in the molecular analysis, with GenBank accession numbers. All locations are situated in Western Australia.

Species	WAM registration number	Biota code	Specimens	Locality	Coordinates	*COI*	ITS2	28S	12S
Draculoides bramstokeri Harvey & Humphreys, 1995	T122887	–	1 juvenile	Barrow Island	20°49′12″S, 115°26′04″E	KY573150	MG913092	KY573737	MG912998
Paradraculoides anachoretus Harvey, et al. 2008	T127081	–	1 juvenile	Mesa A, 43.23 km W. of Pannawonica	21°39′33″S, 115°54′27″E	MG913036	MG913102	MG913023	MG913010
Paradraculoides bythius Harvey, et al. 2008	T127091	–	1 juvenile	Mesa B, 38.26 km W. of Pannawonica	21°39′36″S, 115°57′20″E	MG913037	MG913104	MG913022	MG913009
Paradraculoides eremius Abrams & Harvey, 2015	T114968	–	Holotype ♂	Bungaroo, 35.4 km SE. of Pannawonica	21°56′37″S, 116°26′26″E	KU291135	MG913100	MG913024	MG913011
Paradraculoides gnophicola Harvey, et al. 2008	T116008	–	1 ♀	Mesa G, 22.4 km SW. of Pannawonica	21°44′03″S, 116°07′52″E	MG913035	MG913103	MG913021	MG913007
Paradraculoides kryptus Harvey, et al. 2008	T120146	–	1 juvenile	Mesa K, 10 km SW. of Pannawonica	21°42′49″S, 116°16′03″E	ASN79104	MG913101	MG913020	MG913008
Paradraculoides affinis sp. nov.	T54122	UCRC076T1-1	1 ♀	Upper Cane	22°11′35.58″S, 116°15′54.89″E	MG913067	MG913109	-	-
	T54125	UCRC064T2-2	1 juvenile	Upper Cane	22°11′46.38″S, 116°15′21.23″E	MG913048	-	-	-
	T54130	UCRC029T3-1	2 ♀	Upper Cane	22°11′38.66″S, 116°15′52.71″E	MG913044	MG913110	-	-
	T54131	UCRC021T3-1	1 juvenile	Upper Cane	22°11′35.31″S, 116°15′10.72″E	MG913043	MG913111	-	-
	T54132	UCRC069P2T3-1	2 juveniles	Upper Cane	22°11′44.04″S, 116°15′35.26″E	MG913045	MG913112	-	-
	T54133	UCRC029P2T1-1	1 juvenile	Upper Cane	22°11′38.66″S, 116°15′52.71″E	MG913041	-	-	-
	T54135	UCRC040P2T1-1	1 juvenile	Upper Cane	22°11′32.16″S, 116°16′31.27″E	MG913046	-	-	-
	T54137	UCRC053P2T2-1	1 juvenile	Upper Cane	22°11′31.99″S, 116°16′06.82″E	MG913056	-	-	-
	T54138	UCRC076T2-1	1 ♀	Upper Cane	22°11′35.58″S, 116°15′54.89″E	MG913057	MG913113	-	-
	T54140	UCRC076P2T2-2	1 juvenile	Upper Cane	22°11′35.58″S, 116°15′54.89″E	MG913058	-	-	-
	T54143	UCRC051P2T3-1	1 juvenile	Upper Cane	22°11′24.48″S, 116°16′06.75″E	MG913059	MG913114	-	-
	T54144	CBRC208P2T-1	1 juvenile	Cardo	22°11′48.36″S, 116°13′28.01″E	MG913049	MG913115	-	-
	T54146	UCRC051P2T2-1	1 juvenile	Upper Cane	22°11′24.48″S, 116°16′06.75″E	MG913060	MG913116	-	-
	T54147	UCRC062P2T3-1	1 juvenile	Upper Cane	22°11′42.91″S, 116°15′16.30″E	MG913072	-	-	-
	T92518	UCRC040P3T1-1	1 ♀	Upper Cane	22°11′33″S, 116°16′31″E	-	MG913117	-	-
	T92519	UCRC078P3T3-1	1 ♀	Upper Cane	22°11′33″S, 116°15′49″E	MG913061	-	-	-
	T92520	UCRC051P3T2-2	1 ♀	Upper Cane	22°11′25″S, 116°16′07″E	MG913068	-	-	-
	T92523	UCRC051P3T1-3	1 ♂	Upper Cane	22°11′25″S, 116°16′07″E	MG913040	-	-	-
	T92524	UCRC069P3T1-1	1 ♀	Upper Cane	22°11′44″S, 116°15′35″E	MG913047	MG913118	-	-
	T92525	UCRC042P3T2-1	1 ♀	Upper Cane	22°11′27″S, 116°16′28″E	MG913062	-	-	-
	T92529	UCRC062P3T3-1	1 ♀, 3 juveniles	Upper Cane	22°11′43″S, 116°15′16″E	MG913042	MG913108	-	-
	T92533	CBRC08P3T3-1	1 ♀, 1 juvenile	Cardo	22°08′15″S, 116°15′59″E	MG913076	-	-	-
	T93143	UCRC069P3T2-1	1 ♀	Upper Cane	22°11′44″S, 116°15′35″E	MG913050	-	-	-
	T93202	UCRC021P4T2-1	3 ♀	Upper Cane	22°11′35″S, 116°15′11″E	MG913063	-	-	-

Table 1.—Continued.

Species	WAM registration number	Biota code	Specimens	Locality	Coordinates	*COI*	ITS2	28S	12S
	T93211	UCRC040P5T2-3	Holotype ♂	Upper Cane	22°11′32″S, 116°16′31″E	MG913053	MG913119	MG913026	-
	T93212	UCRC040P5T3-3	1 ♂, 1 ♀, 1 juvenile	Upper Cane	22°11′32″S, 116°16′31″E	MG913071	MG913120	-	-
	T93215	UCRC076P5T3-3	1 ♀	Upper Cane	22°11′36″S, 116°15′55″E	MG913069	-	-	-
	T93216	UCRC029P5T3-2	1 ♀, 1 juvenile	Upper Cane	22°11′39″S, 116°15′33″E	MG913070	-	-	-
	T93221	UCRC053P5T3-2	1 ♀	Upper Cane	22°11′32″S, 116°16′07″E	MG913064	MG913121	-	-
	T98313	UCRC040p7T2-1	1 ♂, 2 juveniles	Upper Cane	22°11′32″S, 116°16′31″E	MG913051	-	MG913031	MG913006
	T98316	UCRC040P7T3-1	1 ♀	Upper Cane	22°11′32″S, 116°16′31″E	MG913054	-	MG913028	-
	T98317	UCRC040P7t1-3	1 ♀	Upper Cane	22°11′32″S, 116°16′31″E	MG913055	-	MG913027	MG913003
	T98318	UCRC076P7T1-1	1 ♀	Upper Cane	22°11′36″S, 116°13′55″E	MG913065	-	-	-
	T98319	UCRC093P7T2-1	2 juveniles	Upper Cane	22°11′19″S, 116°16′03″E	MG913066	-	-	-
	T98321	CBRC192P7T1-1	2 ♀	Cardo	22°08′31″S, 116°13′15″E	MG913077	-	-	MG913000
	T98701	PH16P8T1-1	1 juvenile	Upper Cane	22°11′09″S, 116°16′03″E	MG913074	-	MG913025	MG913001
	T98702	UCRC040P8T3-5	1 ♀	Upper Cane	22°11′32″S, 116°16′31″E	MG913052	-	-	MG913002
	T98705	PH16P8T2-1	1 juvenile	Upper Cane	22°11′09″S, 116°16′03″E	MG913075	-	MG913034	-
Paradraculoides catho sp. nov.	T93192	CWRC281P4T2-1	Holotype ♀	Catho	22°23′18″S, 116°15′11″E	MG913078	MG913125	MG913019	-
	T98700	CWRC166P8T2-1	1 juvenile	Catho	22°24′28″S, 116°16′44″E	MG913079	-	MG913018	MG912999
Paradraculoides celatus sp. nov.	T98698	KBRC039P8T2-5	Holotype juvenile	Kens Bore	22°05′11″S, 116°14′03″E	MG913085	MG913105	MG913033	MG913012
Paradraculoides cochranus sp. nov.	T92538	RNRC083P3T2-4	1 juvenile	Jewell & Cochrane	21°55′55″S, 116°07′43″E	MG913089	MG913097	-	-
	T93191	RNRC184P4T2-3	1 juvenile	Jewell & Cochrane	21°55′09″S, 116°08′49″E	MG913086	MG913094	-	-
	T93197	RNRC083P4T1-3	Paratype ♀, 1 juvenile	Jewell & Cochrane	21°55′55″S, 116°07′43″E	MG913090	MG913098	-	-
	T93229	RNRC083P5T1-3	Holotype ♂	Jewell & Cochrane	21°55′55″S, 116°07′43″E	MG913091	MG913099	-	-
	T93231	RNRC189P5T1-1	1 ♀	Jewell & Cochrane	21°55′11″S, 116°08′35″E	MG913088	MG913093	-	-
	T93232	RNRC184P5T3-1	1 ♂	Jewell & Cochrane	21°55′09″S, 116°08′49″E	MG913087	MG913096	-	-
Paradraculoides confusus sp. nov.	T93142	TBRC014T1	Holotype ♂	Trinity	22°19′57″S, 116°21′32″E	MG913080	MG913122	MG913017	-
Paradraculoides obrutus sp. nov.	T54175	KBRC023P2T2-1	Holotype ♀	Kens Bore	22°03′42.7″S, 116°11′44.29″E	MG913038	MG913106	MG913015	-
	T98320	KBRC096P7T2-1	Paratype ♀	Kens Bore	22°02′43″S, 116°11′03″E	MG913039	MG913107	MG913014	-
Paradraculoides trinity sp. nov.	T92510	TBRC036P3T3-4	Holotype ♂	Trinity	22°21′45″S, 116°19′13″E	MG913083	MG913123	MG913016	-
	T92511	TBRC023P3T3-1	Paratype ♂	Trinity	22°21′35″S, 116°19′54″E	MG913082	MG913124	-	-
	T92515	TBRC023P3T1-1	Paratype ♀	Trinity	22°21′35″S, 116°19′54″E	MG913084	-	-	-
	T98704	CWRC166P8T2-1	1 juvenile	Trinity	22°20′59″S, 116°20′17″E	MG913081	-	-	-

28S_D1F (5′ – GGGACTACCCCCTGAATTTAAGCAT – 3′) and 28Sb (5′ – TCGGAAGGAACCAGCTACTA– 3′) (Nunn et al. 1996; Park & O'Foighil 2000).

Reactions for *COI* based on LCOI490 and HCO2198 were run on a 'touch-up' program: 95°C for 5 min; then seven cycles of 95°C for 30 s, 40°C for 30 s, and 72°C for 45 s; then 35 cycles of 95°C for 30 s, 50°C for 30 s, and 72°C for 45 s; with a final extension at 72°C for 10 min. *COI* reactions based on schiz-COI-115F and schiz-COI-863R were run on 94°C for 2 min; then 35 cycles of 94°C for 30 s, 48°C for 20 s, and 72°C for 15 s; with a final extension at 72°C for 2 min. Reactions for 12S, ITS2 and 28S were run at 95°C for 5 min; then 35 cycles of 95°C for 30 s, the annealing temperature for 30 s, and 72°C for 60 s; with a final extension at 72°C for 10 min. The annealing temperatures for 12S, ITS2 and 28S were 44°C, 50°C and 55°C, respectively. PCR products were visualized on E-Gel® pre-cast agarose gels (Life Technologies, Melbourne, Australia). Bi-directional sequencing was carried out at the Australian Genome Research Facility (AGRF), and for newly prepared specimens, sequences and workflows were managed in the Geneious software package (version 7.1.5) (Kearse et al., 2012), using the LIMS Biocode plug-in (online at http://www.mooreabiocode.org).

Sequence editing and phylogenetic analysis: For phylogenetic analyses, the other five described *Paradraculoides* species were included, and the tree was rooted on *Draculoides bramstokeri* Harvey & Humphreys, 1995. This species was selected as the outgroup based on a multi-gene dataset showing that it is sister to most of the other species of *Draculoides* and *Paradraculoides* (KMA, JAH, MSH, unpublished data). Sequences were checked for contamination by comparing to GenBank blast libraries using the sequence search tool in Geneious, and by translating sequences into amino acids where appropriate and searching for internal stop codons. All contaminated sequences were discarded. Sequence editing and alignment also occurred in Geneious, using the MAAFT plugin (Katoh et al. 2002) for all genes, with default settings. Due to the phylogenetic breadth of the dataset, the 12S gene alignment had many regions that were difficult to align. Therefore, the program Gblocks (Castresana 2000; Talavera & Castresana 2007) was used to remove ambiguously aligned sites for the 12S alignment. The web tool was chosen for this task (online at http://molevol.cmima.csic.es/castresana/Gblocks_server.html), and the settings allowed for gaps and larger blocks. The alignment files for each gene region are included as Supplementary Files 1–4 (online at http://dx.doi.org/10.1636/JoA-S-17-101.S1 through dx.doi.org/10.1636/JoA-S-17-101.S4). Phylogenetic trees were built for each alignment separately, using the RAxML plug-in (version 7.2.8) (Stamatakis 2006) in Geneious using the default settings with 100 bootstrap replicates and the GTR+G nucleotide substitution model. A concatenated alignment was also built and analyzed using RAxML, with partitions relating to the different gene regions.

Molecular taxonomy: All bases that were fixed within a species, and unique to that species (single pure characters, following Jörger & Schrödl 2013), were identified for each gene using the R package 'Spider' (Brown et al. 2012). Species were compared to other described species in the genus *Paradraculoides*, including existing sequences on GenBank, and newly produced sequences in this study. To align these datasets, the MAAFT plugin in Geneious was used, with the default settings. The 12S alignment was not treated for non-informative sites for this analysis.

To report the molecular diagnoses, we detail the single pure characters derived from each gene using 'Spider' (Table 2). The characters are reported as the base pair number, and the unique base for the species at that site. The base pair number is relative to the start of sequences derived from one specimen, WAMT98698 (GenBank accession numbers: *COI*, MG913085; ITS2, MG913105; 28S, MG913033; 12S, MG913012), and for the rRNA genes, also include indels. Therefore, interpretation of these diagnostic bases should ensure the recreation of the original alignments (Supplementary Files 1–4, online at http://dx.doi.org/10.1636/JoA-S-17-101.S1 through dx.doi.org/10.1636/JoA-S-17-101.S4).

RESULTS

Molecular phylogenetic analysis.—Individual gene trees and the concatenated gene tree (Figs. 2A–2D) supported the existence of seven new lineages, each of which is distinct from the described *Paradraculoides* species. However, the topologies of these different trees were incongruent and had low bootstrap support for deeper nodes. In each gene tree, the Robe River Valley species found to the north of the study area (i.e., *P. anachoretus*, *P. bythius*, *P. gnophicola* and *P. kryptus*) all formed clades with high support (Figs. 2A–2D). The new species formed three groups in the phylogenies. The most southern group included *P. confusus*, *P. trinity* and *P. catho*, which was recovered in all trees (Figs. 2A–B, 2D). The most northern group comprised *P. affinis*, *P. obrutus* and *P. celatus*, which was recovered in the concatenated, 12S and ITS2 trees (Figs. 2C–D). The final group contained a single species, *P. cochranus*, the farthest north of the study species, and was most closely related to those species in the adjacent Robe River Valley (*P. anachoretus*, *P. bythius*, *P. gnophicola* and *P. kryptus*) in the concatenated, 12S and ITS2 trees (Figs. 2A, 2C–D). *Paradraculoides eremius*, which is found farthest east in the study area, had an uncertain relationship to these main clades.

The seven molecular groups are distinct from each other, as well as from the previously described species of *Paradraculoides*, which are located north of the present study area (Harvey et al. 2008). Four of these clades are represented by adult male specimens, and the morphological details of the flagellum (shape and setal positions) were sufficiently distinct from each other to warrant their recognition as different species. Two of the other three clades were represented only by adult females and juveniles, and the seventh clade was represented by a single juvenile, and none were morphologically distinct from females or juveniles of the other three clades. As advocated by Cook et al. (2010), we believe that sufficient evidence is available to justify treating each clade as a distinct species, and here formally name them and diagnose them (Table 2). Our hypothesis can be tested by continued sampling at these sites to attempt to recover an adult male.

Despite producing molecular data for all proposed species, we have not applied species delimitation methods to these data. With only two independent markers with sufficient genetic variation to resolve species and populations (the linked mtDNA loci, and ITS2), the more rigorous delimitation

Table 2.—Unique ("pure") nucleotide substitutions for each of the seven new species of *Paradraculoides*. Details for notation are described in Methods.

Taxon	Gene region	*n*	Unique substitutions
Paradraculoides affinis sp. nov.	*COI*	39	403 (C), 557 (T)
	ITS2	24	199 (A)
	28S	9	Nil
	12S	7	4 (G), 36 (A), 58 (T), 72 (G), 95 (A), 135 (G), 136 (T), 184 (A), 185 (A), 199 (G), 239, T), 298 (G), 358 (C)
Paradraculoides catho sp. nov.	*COI*	2	184 (G), 583 (C), 735 (T), 754 (T)
	ITS2	2	159 (T), 166 (A)
	28S	2	636 (T), 937 (T)
	12S	1	14 (A), 40 (C), 51 (G), 52 (G), 109 (G), 131 (T), 132 (T), 188 (A), 189 (A), 190 (T), 201 (A), 250 (A), 251 (A), 254 (G), 259 (A), 262 (G), 281 (G)
Paradraculoides celatus sp. nov.	*COI*	1	86 (G), 205 (T), 241 (C), 301 (T), 370 (T), 388 (C), 625 (C), 799 (C)
	ITS2	1	Nil
	28S	1	Nil
	12S	1	4 (T), 22 (A), 197 (A), 202 (G), 239 (G), 326 (A), 333 (A)
Paradraculoides cochranus sp. nov.	*COI*	7	Nil
	ITS2	6	133 (A), 235 (T), 263 (G), 279 (G)
	28S	0	
	12S	0	
Paradraculoides confusus sp. nov.	*COI*	1	325 (C), 518 (G), 535 (C), 565 (C), 574 (C)
	ITS2	1	251 (T), 271 (T)
	28S	1	940 (A)
	12S	0	
Paradraculoides obrutus sp. nov.	*COI*	2	85 (T), 154 (T), 187 (C), 274 (C), 310 (T), 485 (T), 562 (C), 631 (T), 722 (G), 724 (A), 764 (T), 853 (C)
	ITS2	2	199 (G), 281 (C)
	28S	2	755 (A)
	12S	0	
Paradraculoides trinity sp. nov.	*COI*	4	292 (T), 389 (A), 474 (T), 785 (T)
	ITS2	2	192 (A), 277 (G)
	28S	1	469 (T), 647 (T), 661 (G)
	12S	0	

methods that require accurate guide-trees are not appropriate (Carstens et al. 2013). In addition, significant evidence has accumulated to suggest that single locus methods are inadequate (Dupuis et al. 2012). The proposed species may be further split by more molecular or morphological data, especially within species where we have detected genetic divergence (e.g., as in *P. cochranus*).

Problematic specimens.—Most specimens showed high location fidelity, such that those collected from each landform exhibited a distinct genetic signature. Three specimens, however, confounded this pattern with the molecular analysis placing them in different clades than would be expected on the basis of the locality data provided with the specimen:

T93208, juvenile from Trinity Bore, bore TBRC008; sequenced as *P. cochranus*.
T93217, female from Cane and Upper Cane, bore UCRC072; sequenced as *P. cochranus*.
T54123, female from Jewel and Cochrane Bore RNRC189; sequenced as *P. affinis*.

This pattern was detected using *COI* data for all three specimens, and for T93217 also with ITS2. We can only offer four explanations for this result. The first is that the specimens are indeed isolated genetic relicts found in different geographically disjunct subterranean environments to all other specimens of the same genetic clades. The second is that the samples were inadvertently mislabeled in the field or the laboratory. The third is that field samples were not completely sealed during transport from the study area to the laboratory, and the live specimens moved from one Tullgren funnel trap to another during the extraction process. The fourth is that contamination occurred in the molecular laboratory. Scenarios two, three and four seem considerably more likely than the first and we therefore exclude these three specimens from the maps and the list of material examined.

SYSTEMATICS

Family Hubbardiidae Cook, 1899
Subfamily Hubbardiinae Cook, 1899
Paradraculoides Harvey, Berry, Edward & Humphreys, 2008

Paradraculoides Harvey, Berry, Edward & Humphreys 2008: 185.

Type species.—*Paradraculoides kryptus* Harvey, Berry, Edward & Humphreys, 2008, by original designation.

Remarks.—The genus *Paradraculoides* was hypothesized as the sister-group to *Draculoides* by Harvey et al. (2008), a result confirmed by Clouse et al. (2017) in a multi-gene analysis of schizomids. Harvey et al. (2008) described four species of

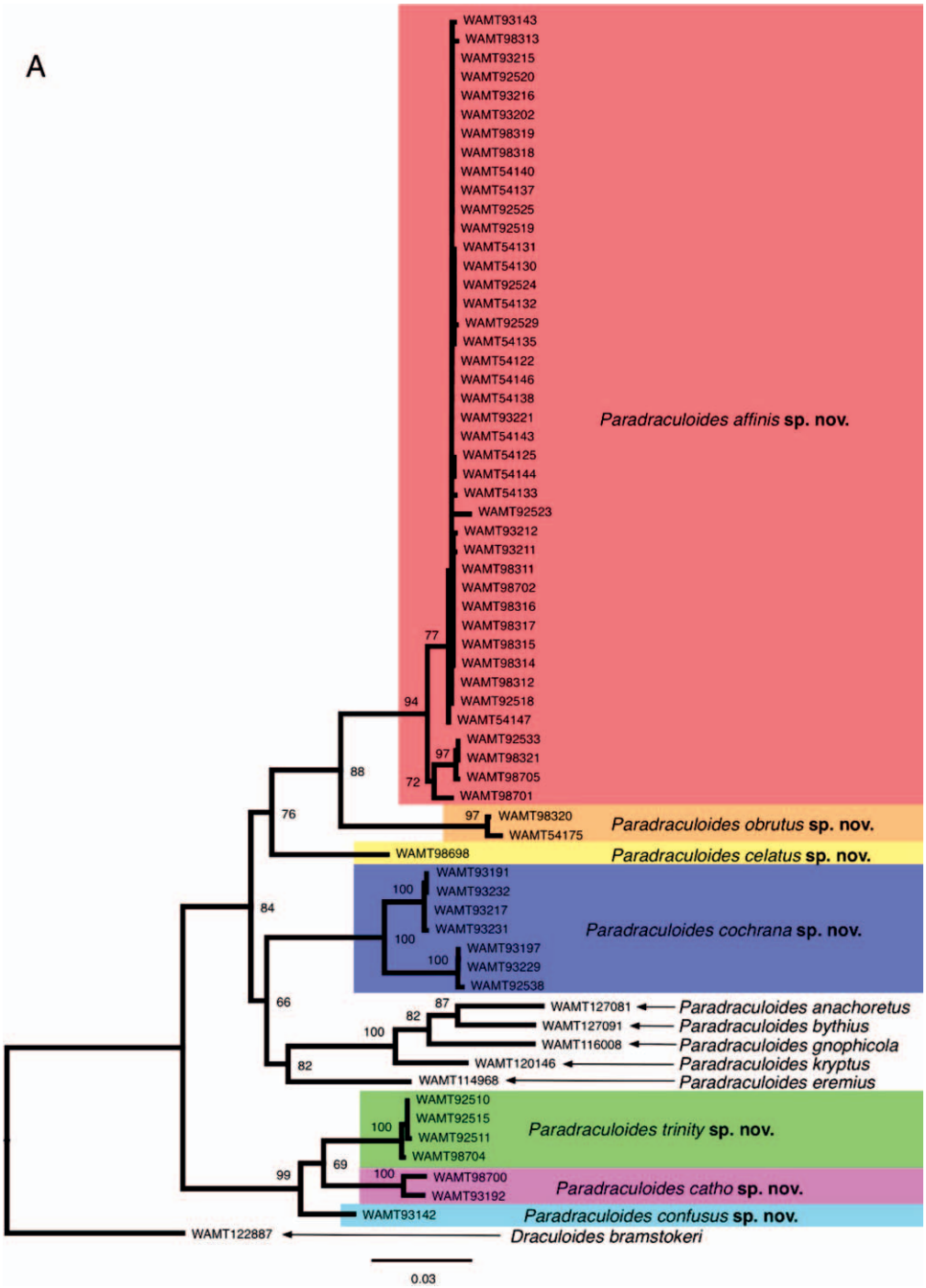

Figure 2A.—Maximum likelihood phylogeny of *Paradraculoides*, using the concatenated dataset (12S, *COI*, ITS2 and 28S). Bootstrap values are presented for all nodes. See 'Methods' for more details.

Paradraculoides, and recognized a fifth unnamed species which was not named due to the lack of adult specimens. These species were located along the Robe River valley, an ancient paleo-drainage system containing a number of Channel Iron Deposit mesas (Ramanaidou et al. 2003), each with an endemic suite of troglobites. *Paradraculoides* was defined by the presence of three macrosetae on tergite II and the lack of a laterally compressed male flagellum (Harvey et al. 2008). The geographically farthest species, *P. eremius* Abrams & Harvey, 2015, was recently described from Bungaroo, located 30 km south-east of the Robe River valley (Abrams & Harvey 2015).

While the new species described below generally fit the generic diagnosis, one species, *P. confusus*, has three pairs of macrosetae on tergite II like other species of *Paradraculoides*, but has a laterally compressed male flagellum, like species of *Draculoides* (Harvey 1992, 2001; Harvey et al. 2008). This

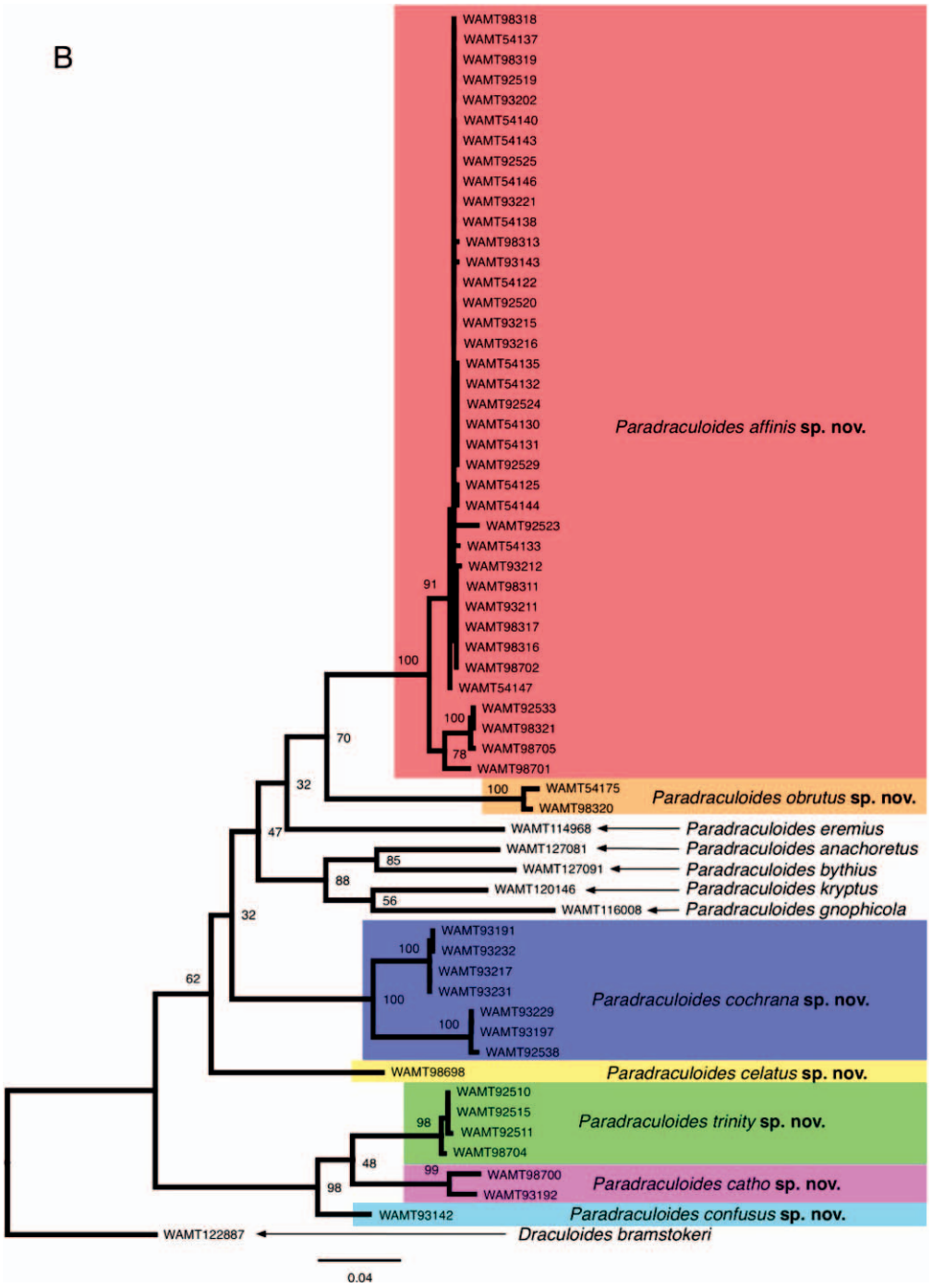

Figure 2B.—Maximum likelihood phylogeny of *Paradraculoides*, using the *COI* data set. Bootstrap values are presented for all nodes. See 'Methods' for more details.

species casts considerable doubt on whether *Paradraculoides* should be retained as a distinct genus. In addition, Clouse et al. (2017) reported a similar result in a multi-gene analysis of schizomids, but we defer any formal synonymy as we are currently undertaking a thorough large-scale review of both genera, which are particularly diverse across the Pilbara bioregion of Western Australia.

Paradraculoides affinis sp. nov.
http://zoobank.org:8080/NomenclaturalActs/A9243824-BE1B-4906-88DB-DA80434FF7EF
(Figs. 3–5)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Cane and Upper Cane [River], 60.6 km S. of

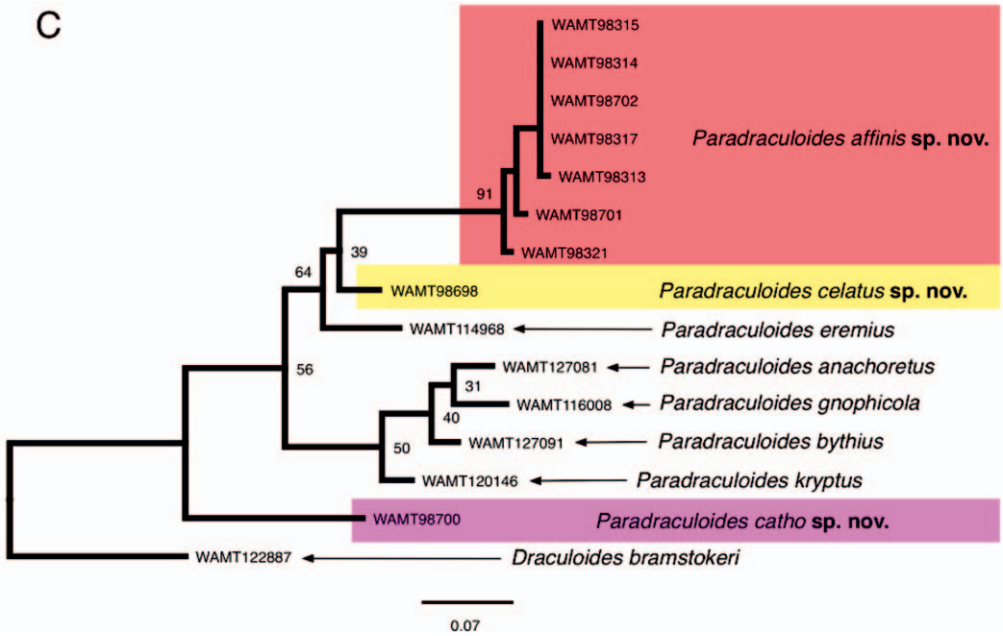

Figure 2C.—Maximum likelihood phylogeny of *Paradraculoides*, using the 12S data set. Bootstrap values are presented for all nodes. See 'Methods' for more details.

Pannawonica, 22°11′32″S, 116°16′31″E, 25–28 November 2008, troglofauna trap, 20 m, J. Cairnes, M. Menz (Biota Environmental Sciences, UCRC040P5T2–3) (WAM T93211) (DNA: *COI*, ITS2).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♀, Cardo Bore North, 55.7 km S. of Pannawonica, 22°08′24″S, 116°14′06″E, 15–21 August 2008, troglofauna trap, 15 m, J. Alexander, T. Sachse (Biota Environmental Sciences, CBRC091P3T1–2) (WAM T93141); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 7–10 July 2009, troglofauna trap, 30 m, J. Cairnes, D. Keirle (Biota Environmental Sciences, UCRC040P8T3–5) (WAM T98702) (DNA: *COI*).

Other material examined.—AUSTRALIA: *Western Australia*: 1 ♀, Cardo Bore North, 54.9 km S. of Pannawonica, 22°08′15″S, 116°13′59″E (WAM T92533) (DNA: *COI*); 1 ♀, Cardo Bore North, 61.2 km S. of Pannawonica, 22°11′29″S, 116°13′38″E (WAM T93224); 1 ♀, Cardo Bore North, 62.3 km S. of Pannawonica, 22°11′53″S, 116°12′18″E (WAM T93225); 1 ♀, Cardo Bore East, 61 km S. of Pannawonica, 22°11′28″S, 116°14′38″E (WAM T93199); 1 ♂, Cane and Upper Cane [River], 60.3 km S. of Pannawonica, 22°11′25″S, 116°16′07″E, 15–21 August 2008, troglofauna trap, 10 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC051P3T1–3) (WAM T92523) (DNA: *COI*); 1 ♂, Cane and Upper Cane Bores, site UCRC003, 22°11′24.81″S, 116°16′38.78″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sasche (Biota Environmental Sciences, UCRC003P2T1–1) (WAM T54142); 1 ♂ (body lost), Cardo Bore North, 55.7 km S. of Pannawonica, 22°08′26″S, 116°13′48″E, 25–28 November 2008, troglofauna trap, 15 m, J. Cairnes, M. Menz (Biota Environmental Sciences, CBRC099P5T1–3) (WAM T93223); 1 juvenile, Cane and Upper Cane Bores, site UCRC069, 22°11′44.04″S, 116°15′35.26″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC069P2T3–1) (WAM T54132) (DNA: *COI*, ITS2); 1 juvenile, Cane and Upper Cane Bores, site UCRC062, 22°11′42.91″S, 116°15′16.30″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC062P2T3–1) (WAM T54147) (DNA: *COI*); 1 juvenile, Cane and Upper Cane Bores, site UCRC040, 22°11′32.16″S, 116°16′31.27″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC040P2T1–1) (WAM T54135) (DNA: *COI*); 1 ♂, Cane and Upper Cane Bores, site UCRC003, 22°11′24.81″S, 116°16′38.78″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC003P2T2–1) (WAM T54141); 1 juvenile, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 7–10 July 2009, troglofauna trap, 20 m, J. Cairnes, D. Keirle (Biota Environmental Sciences, UCRC040P8T2–4) (WAM T98703); 1 ♀, Cane and Upper Cane [River], 60.9 km S. of Pannawonica, 22°11′32″S, 116°16′07″E, 25–28 November 2008, troglofauna trap, 45 m, J. Cairnes, M. Menz (Biota Environmental Sciences, UCRC053P5T3–2) (WAM T93221) (DNA: *COI*, ITS2); 1 ♀, Cane and Upper Cane [River], 60.6 km S. of Pannawonica, 22°11′36″S, 116°15′55″E, 25–28 November 2008, troglofauna trap, 40 m, J. Cairnes, M. Menz (Biota Environmental Sciences, UCRC076P5T3–3) (WAM T93215) (DNA: *COI*); 1 ♂, 1 ♀, 1 juvenile, Cane and Upper Cane [River], 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 25–28 November 2008, troglofauna trap, 30 m, J. Cairnes, M. Menz (Biota Environmental Sciences, UCRC040P5T3–3) (WAM T93212) (DNA: *COI*, ITS2); 1 ♂, 1 juvenile, Cane and Upper Cane [River], 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 25–28 November 2008, troglofauna trap, 10 m, J. Cairnes, M. Menz (Biota

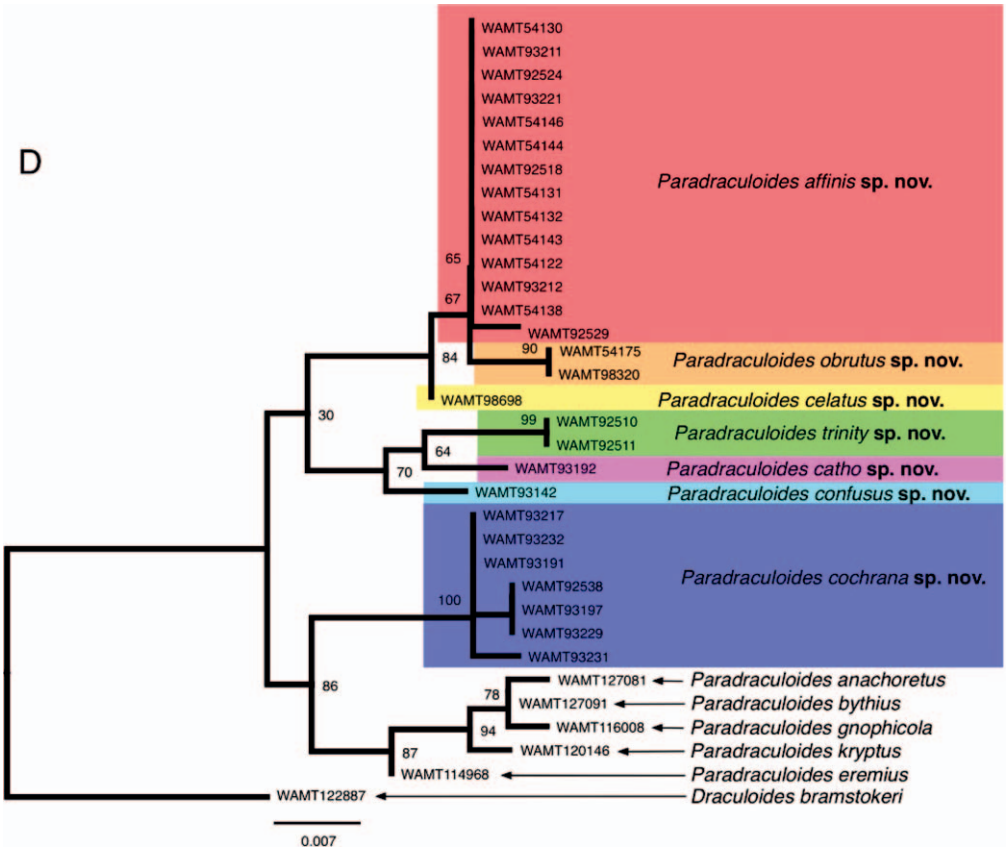

Figure 2D.—Maximum likelihood phylogeny of *Paradraculoides*, using the ITS2 data set. Bootstrap values are presented for all nodes. See 'Methods' for more details.

Environmental Sciences, UCRC040P5T1–4) (WAM T93214); 1 ♀, 1 juvenile, Cane and Upper Cane [River], 60.9 km S. of Pannawonica, 22°11′39″S, 116°15′33″E, 25–28 November 2008, troglofauna trap, 45 m, J. Cairnes, M. Menz (Biota Environmental Sciences, UCRC029P5T3–2) (WAM T93216) (DNA: *COI*); 2 ♀, Cane and Upper Cane, 61 km S. of Pannawonica, 22°11′35″S, 116°15′11″E, 13–16 October 2008, troglofauna trap, 25 m, G. Humphreys, M. Menz (Biota Environmental Sciences, UCRC021P4T2–1) (WAM T93202) (DNA: *COI*); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 12–15 September 2009, troglofauna trap, 10 m, D. Kamien (Biota Environmental Sciences, UCRC040P7T1–1) (WAM T98315); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′36″S, 116°15′55″E, 12–15 September 2009, troglofauna trap, 10 m, D. Kamien (Biota Environmental Sciences, UCRC076P7T1–1) (WAM T98318) (DNA: *COI*); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 12–15 September 2009, troglofauna trap, 30 m, D. Kamien (Biota Environmental Sciences, UCRC040P7T3–1) (WAM T98316) (DNA: *COI*); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 12–15 September 2009, troglofauna trap, 10 m, D. Kamien (Biota Environmental Sciences, UCRC040P7T1–3) (WAM T98317) (DNA: *COI*); 1 juvenile, Upper Cane, 60 km S. of Pannawonica, 22°11′19″S, 116°16′03″E, 12–15 September 2009, troglofauna trap, 10 m, D. Kamien (Biota Environmental Sciences, UCRC093P7T2–1) (WAM T98319) (DNA: *COI*); 1 ♀, Upper Cane, 61.6 km S. of Pannawonica, 22°11′30″S, 116°15′04″E, 12–15 September 2009, troglofauna trap, 35 m, D. Kamien (Biota Environmental Sciences, UCRC055P7T3–1) (WAM T98314); 1 ♀, Upper Cane, 60.6 km S. of Pannawonica, 22°11′36″S, 116°15′55″E, 12–15 September 2009, troglofauna trap, 40 m, D. Kamien (Biota Environmental Sciences, UCRC076P7T3–5) (WAM T98311); 1 ♂, Upper Cane, 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 12–15 September 2009, troglofauna trap, 20 m, D. Kamien (Biota Environmental Sciences, UCRC040P7T2–1) (WAM T98313) (DNA: *COI*); 2 ♀, Cardo Bore, 56.2 km S. of Pannawonica, 22°08′31″S, 116°13′15″E, 12–15 September 2009, troglofauna trap, 15 m, D. Kamien (Biota Environmental Sciences, CBRC192P7T1–1) (WAM T98321) (DNA: *COI*); 1 ♀, Upper Cane, 60.9 km S. of Pannawonica, 22°11′39″S, 116°15′53″E, 12–15 September 2009, troglofauna trap, 10 m, D. Kamien (Biota Environmental Sciences, UCRC029P7T1–2) (WAM T98312); 1 juvenile, Cane and Upper Cane Bores, site UCRC064, 22°11′46.38″S, 116°15′21.23″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC064T2–2) (WAM T54125) (DNA: *COI*); 1 ♂, Cane and Upper Cane Bores, site UCRC042, 22°11′27.46″S, 116°16′27.76″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC042P2T3–1) (WAM T54145); 1 ♀, Cane and Upper Cane Bores, site UCRC076, 22°11′35.58″S, 116°15′54.89″E, 24 October 2007, troglofauna trap, D.

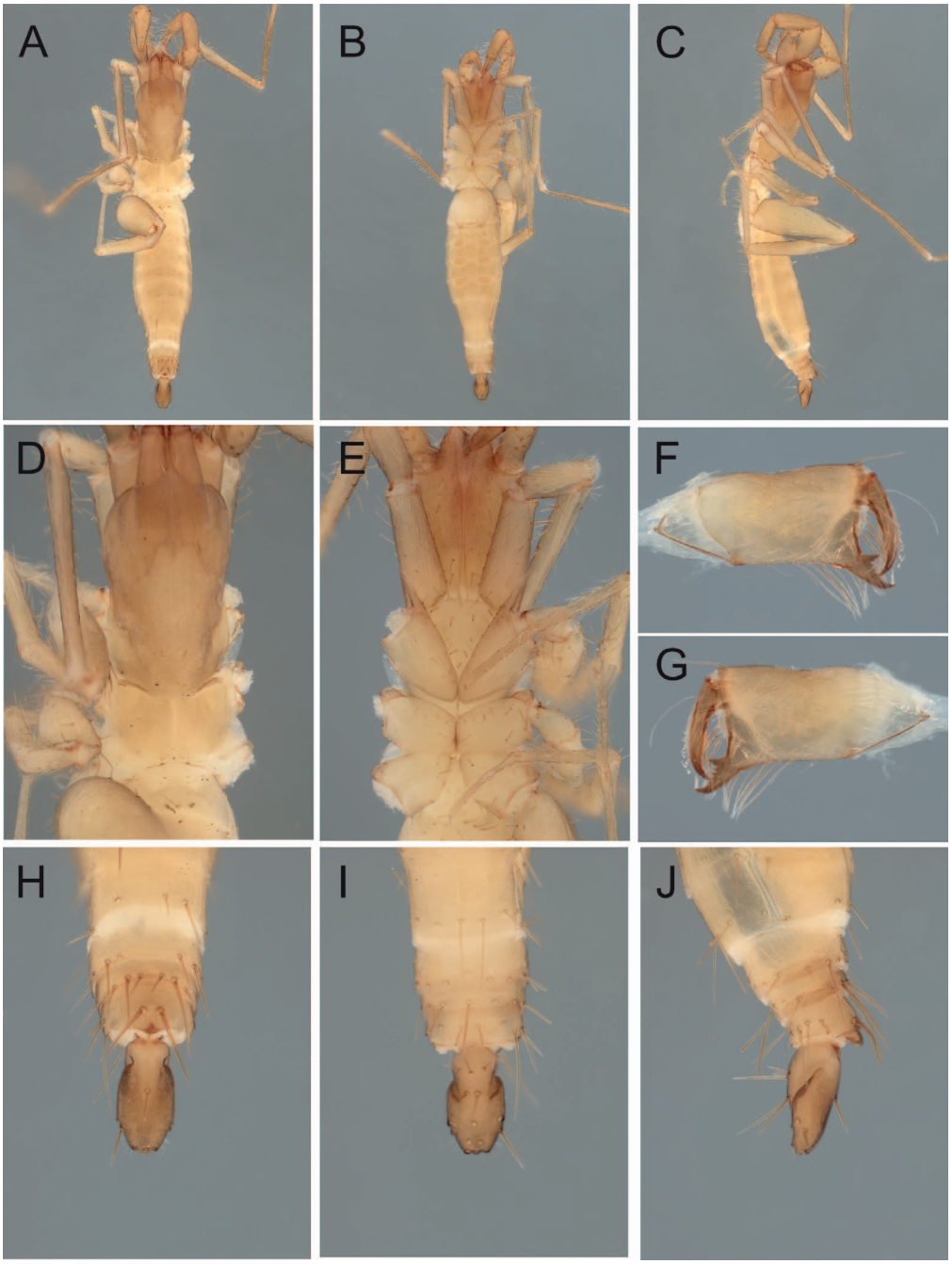

Figure 3.—*Paradraculoides affinis* sp. nov., holotype male (WAM T93211): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Kamien, J. Alexander (Biota Environmental Sciences, UCRC076T1–1) (WAM T54122) (DNA: *COI*, ITS2); 2 ♀, Cane and Upper Cane Bores, site UCRC029, 22°11′38.66″S, 116°15′52.71″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC029T3–1) (WAM T54130) (DNA: *COI*, ITS2); 1 juvenile, Cane and Upper Cane Bores, site UCRC021, 22°11′35.31″S, 116°15′10.72″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC021T3–1) (WAM T54131) (DNA: *COI*, ITS2); 1 ♀, 3 juveniles, Cane and Upper Cane Bores, site UCRC072, 22°11′38.06″S, 116°15′41.99″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC072T3–1) (WAM T54124); 1 juvenile, Cane and Upper Cane Bores, site UCRC069, 22°11′44.04″S, 116°15′35.26″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC069T2–1) (WAM T54127); 1 ♂, 2 juveniles, Cane and Upper Cane Bores, site

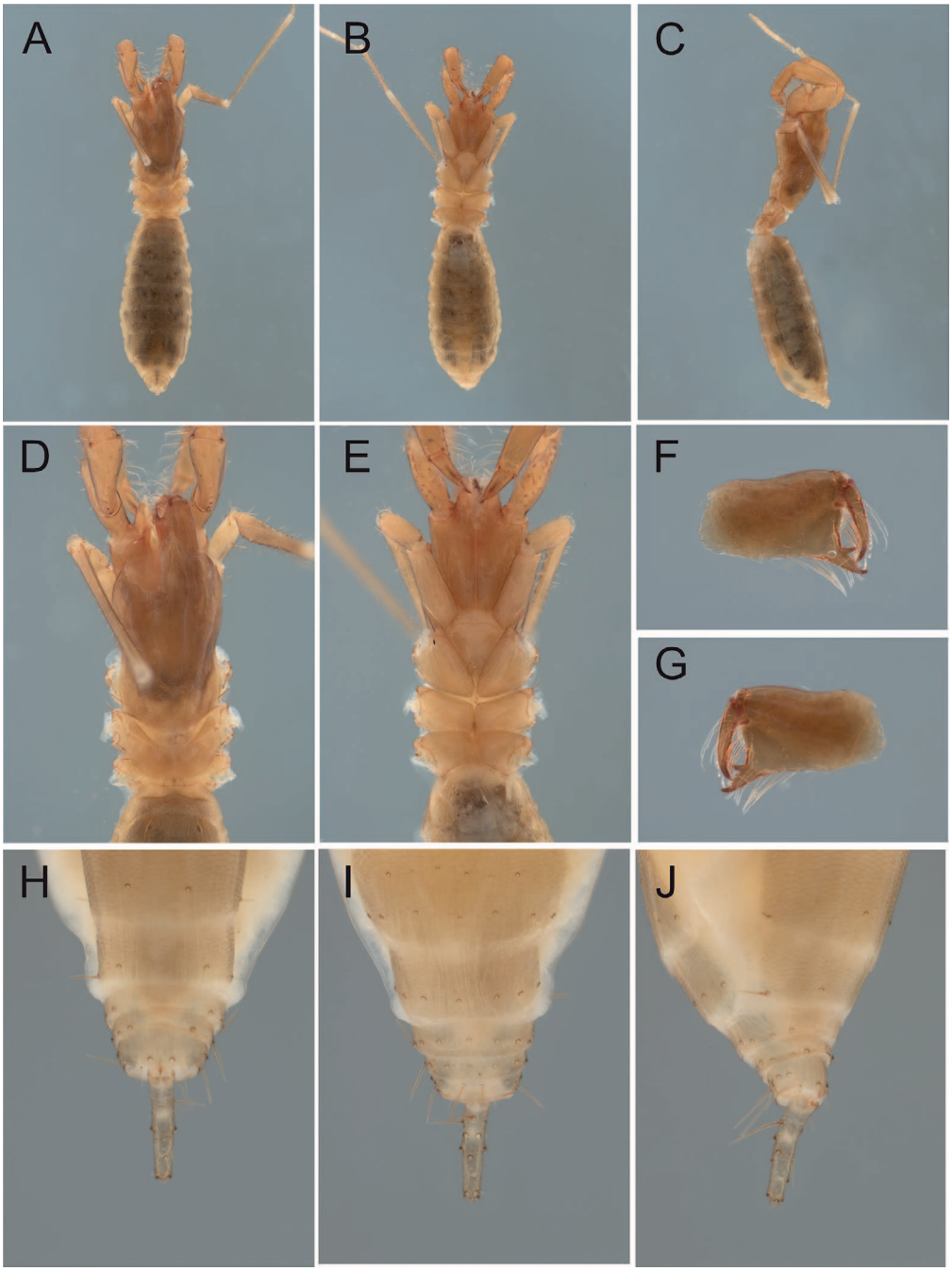

Figure 4.—*Paradraculoides affinis* sp. nov.: A–G, paratype female (WAM T93141): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral. H–J, paratype female (WAM T98702): H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

UCRC069, 22°11′44.04″S, 116°15′35.26″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC069T3–1) (WAM T54139); 1 ♀, Cane and Upper Cane Bores, site UCRC076, 22°11′35.58″S, 116°15′54.89″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, UCRC076T2–1) (WAM T54138) (DNA: *COI*, ITS2); 1 juvenile, Upper Cane, 60.1 km S. of Pannawonica, 22°11′09″S, 116°16′03″E, 8 September 2009, troglofauna trap, 30 m, P. Runham, J. Alexander (Biota Environmental Sciences, PH16P8T3–3) (WAM T98699); 1 juvenile, Upper Cane, 60.1 km S. of Pannawonica, 22°11′09″S, 116°16′03″E, 8 September 2009, troglofauna trap, 10 m, P. Runham, J. Alexander (Biota Environmental Sciences, PH16P8T1–1) (WAM T98701) (DNA: *COI*); 1 juvenile, Upper Cane, 60.1 km S. of Pannawonica, 22°11′09″S, 116°16′03″E, 8 September

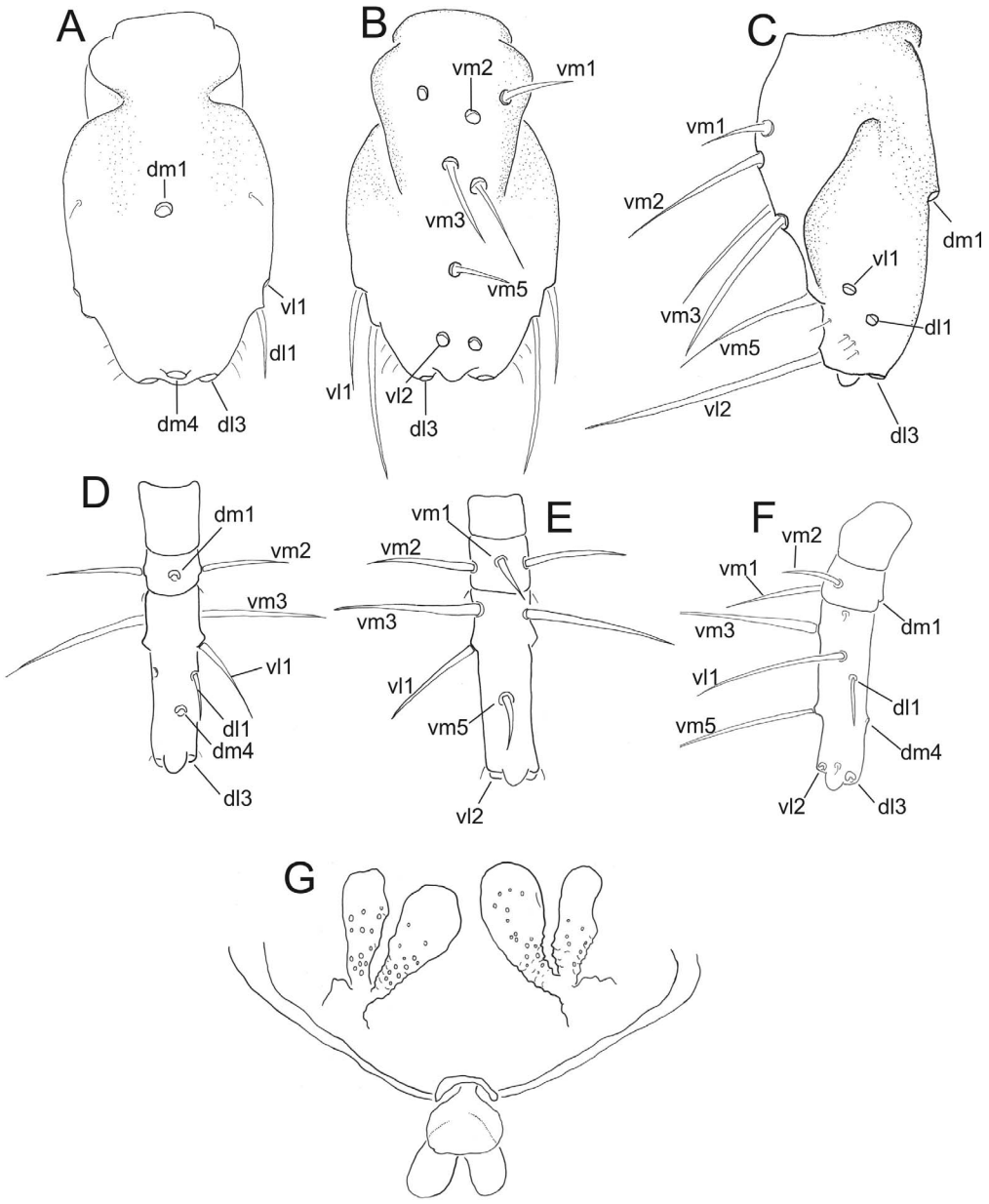

Figure 5.—*Paradraculoides affinis* sp. nov.: A–C, holotype male (WAM T93211): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral. D–G, paratype female (WAM T93141): D. Flagellum, dorsal; E. Flagellum, ventral; F. Flagellum, lateral; G. Spermathecae, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

2009, troglofauna trap, 20 m, P. Runham, J. Alexander (Biota Environmental Sciences, PH16P8T2–1) (WAM T98705) (DNA: *COI*); 1 ♀, Cane and Upper Cane [River], 60.2 km S. of Pannawonica, 22°11′27″S, 116°16′28″E, 15–21 August 2008, troglofauna trap, 20 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC042P3T2–1) (WAM T92525) (DNA: *COI*); 1 ♀, Cane and Upper Cane [River], 60.5 km S. of Pannawonica, 22°11′43″S, 116°15′16″E, 15–21 August 2008, troglofauna trap, 35 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC062P3T3–1) (WAM T92529) (DNA: *COI*, ITS2); 1 ♀, 2 juveniles, Cane and Upper Cane [River], 60.2 km S. of Pannawonica, 22°11′27″S, 116°16′28″E, 15–21 August 2008, troglofauna trap, 10 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC042P3T1–1) (WAM T92528); 1 ♀, Cane and Upper Cane [River], 61.0 km S. of Pannawonica, 22°11′35″S, 116°15′11″E, 15–21 August 2008, troglofauna trap, 10 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC021P3T1–3) (WAM T92521); 2 ♂, 2 ♀, 1 juvenile, Cane and Upper Cane [River], 60.6 km S. of Pannawonica, 22°11′32″S, 116°16′31″E, 15–21 August 2008, troglofauna trap, 30 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC040P3T3–1) (WAM T92522); 1 ♀, Cane and Upper Cane [River], 60.8 km S. of Pannawonica, 22°11′33″S, 116°15′49″E, 15–21 August 2008, troglofauna trap, 45 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC078P3T3–1) (WAM T92519)

(DNA: *COI*); 1 ♀, Cane and Upper Cane [River], 60.6 km S. of Pannawonica, 22°11′33″S, 116°16′31″E, 15–21 August 2008, troglofauna trap, 10 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC040P3T1–1) (WAM T92518) (DNA: ITS2); 1 ♀, Cane and Upper Cane [River], 61.5 km S. of Pannawonica, 22°11′44″S, 116°15′35″E, 15–21 August 2008, troglofauna trap, 15 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC069P3T1–1) (WAM T92524) (DNA: *COI*, ITS2); 1 ♀, Cane and Upper Cane [River], 60.3 km S. of Pannawonica, 22°11′25″S, 116°16′07″E, 15–21 August 2008, troglofauna trap, 20 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC051P3T2–2) (WAM T92520) (DNA: *COI*); 1 ♀, Cane and Upper Cane [River], 61.5 km S. of Pannawonica, 22°11′44″S, 116°15′35″E, 15–21 August 2008, troglofauna trap, 30 m, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC069P3T2–1) (WAM T93143) (DNA: *COI*); 1 juvenile, Cane and Upper Cane Bores, site UCRC029, 22°11′38.66″S, 116°15′52.71″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC029P2T1–1) (WAM T54133) (DNA: *COI*); 1 juvenile, Cane and Upper Cane Bores, site UCRC051, 22°11′24.48″S, 116°16′06.75″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC051P2T3–1) (WAM T54143) (DNA: *COI*, ITS2); 1 juvenile, Cane and Upper Cane Bores, site UCRC076, 22°11′35.58″S, 116°15′54.89″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC076P2T2–2) (WAM T54140) (DNA: *COI*); 1 juvenile, Cane and Upper Cane Bores, site UCRC053, 22°11′31.99″S, 116°16′06.82″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sasche (Biota Environmental Sciences, UCRC053P2T2–1) (WAM T54137) (DNA: *COI*); 1 juvenile, Cane and Upper Cane Bores, site UCRC051, 22°11′24.48″S, 116°16′06.75″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, UCRC051P2T2–1) (WAM T54146) (DNA: *COI*, ITS2); 1 juvenile, NE. of Red Hill, Cardo Bore, 22°11′48.36″S, 116°13′28.01″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, CBRC208P2T1–1) (WAM T54144) (DNA: *COI*, ITS2).

Etymology.—The specific name is an adjective referring to the similarity between this species and other species of the genus (*affinis*, Latin, related to, neighboring).

Diagnosis.—The shape of the male flagellum of *P. affinis* most closely resembles *P. bythius*, *P. cochranus*, *P. eremius* and *P. kryptus*, especially in the presence of a broad base. It differs from *P. cochranus* by the posterior position of dm4 (sub-distal in *P. cochranus*) and the close proximity of vl1 and dl1 such that vl1 is on the same level as vm5 (vl1 is anterior to vm5 in *P. bythius* and *P. kryptus*), from *P. bythius* and *P. kryptus* in the slightly broader flagellum, and from *P. eremius* by the raised antero-dorsal region of the flagellum, which is flat in *P. eremius*. Females differ from all other species of *Paradraculoides* by the comparatively wide separation of both setae vm3. Specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 39$): 403 (C), 557 (T); ITS2 ($n = 24$): 199 (A); 12S ($n = 7$): 4 (G), 36 (A), 58 (T), 72 (G), 95 (A), 135 (G), 136 (T), 184 (A), 185 (A), 199 (G), 239, T), 298 (G), 358 (C) (Table 2).

Description (adults).—*Color:* Yellow-brown; propeltidium somewhat darker; female darker with olive-grey tinge (Figs. 3A–C, 4A–C).

Cephalothorax: Propeltidium with 2 apical setae on anterior process and 2 + 2 + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 14 (♂), 12 (♀) setae (including 2 sternapophysial setae); posterior sternum triangular with 6 setae.

Chelicera: Fixed finger with 2 large teeth plus 6 (♂), 5 (♀) smaller teeth between these; brush at base of fixed finger composed of 7 setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 4 (♂), 3 (♀) short whip-like setae (G4); movable finger serrula composed of 17 (♂), 18 (♀) long lamellae, blunt guard tooth present subdistally; 1 accessory tooth present at two-thirds from base of serrula.

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 8 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.52 (♂), 0.39 (♀) x length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 3.18 (♂), 2.62 (♀) x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 4 microsetae: 3 macrosetae + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 6.

Female genitalia: Two pairs of elongate spermathecae, each pair connected basally before connection with bursa (Fig. 5G), distally round and smooth; sparsely covered with small pores; gonopod short, distally bifurcate. *Flagellum*. Male: Dorsoventrally compressed (Figs. 3H–J, 4A–C); 2.06 x longer than broad; seta dm1 situated dorso-medially, slightly closer to anterior margin; seta dm4 situated at posterior margin; dl1 between dl3 and vl1; dl3 on posterior margin at similar level as dl1; vm2 situated on approximately same level as vm1; vm5 situated slightly closer to vl2 than to vm3; 1 pair of microsetae near anterior end, and three pairs between vl1 and dl3. Female: 5.50 x longer than broad; seta dm1 situated towards posterior end of second slightly more posterior than vm2; setae dl1 situated anterior to dm4, dm4 situated at four fifth length of flagellomere III; dl3 situated almost at posterior margin marginally more posterior than vl2, vm1 situated slightly more posterior than vm2, vm3 situated closer to vm1 than to vm5, vm5 halfway between vm3 and vl2, vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae baso-laterally on flagellomere III, 1 pair of microsetae laterally between dl3 and vl2.

Dimensions (mm): Holotype male (WAM T93211): Body length 3.15. Propeltidium 1.00/0.52. Chelicera 0.91. Flagellum 0.35/0.17. Pedipalp: trochanter 0.45, femur 0.47, patella 0.49, tibia 0.45, tarsus 0.25, claw 0.13, total excluding claw 2.11. Leg I: trochanter 0.37, femur 1.26, patella 1.59, tibia 1.26, metatarsus 0.38, tarsus 0.55, total 5.41. Leg IV: trochanter 0.32, femur 1.21/0.38, patella 0.42, tibia 0.88, metatarsus 0.79, tarsus 0.52, total 4.14.

Paratype female (WAM T93141): Body length 3.49. Propeltidium 1.15/0.61. Chelicera 0.72. Flagellum 0.33/0.06.

Pedipalp: trochanter 0.48, femur 0.54, patella 0.56, tibia 0.50, tarsus 0.35, claw 0.10, total excluding claw 2.43. Leg I: trochanter 0.35, femur 1.13, patella 1.36, tibia 1.08, metatarsus 0.33, tarsus 0.56, total 4.81. Leg IV: trochanter 0.31, femur 1.10/0.42, patella 0.44, tibia 0.79, metatarsus 0.71, tarsus 0.48, total 3.81.

Variation: Body length 2.31–3.64 (males, $n = 10$), 2.41–4.01 (females, $n = 10$); propeltidium 0.93–1.10/0.46-0.59 (males), 0.89–1.26/0.49–0.69 (females).

Remarks.—*Paradraculoides affinis* is known from several locations within two areas known as Cardo Bore and Cane and Upper Cane, situated at the western edge of the Hamersley Range, Western Australia (Fig. 1). The juvenile specimens listed above are associated with this species by locality and, in many cases, by sequence data (Figs. 2A–D).

Paradraculoides catho sp. nov.
http://zoobank.org:8080/NomenclaturalActs/04A7E113-EA1C-4BE3-B3CC-AF18FCA22571
(Figs. 6, 7)

Type material.—*Holotype female*. AUSTRALIA: *Western Australia*: Mt Stuart Station, Catho Well, 82.6 km S. of Pannawonica, 22°23′18″S, 116°15′11″E, 13–16 October 2008, troglofauna trap, 20 m, G. Humphreys, M. Menz (Biota Environmental Sciences, CWRC281P4T2–1) (WAM T93192) (DNA: *COI*, ITS2).

Other material examined.—AUSTRALIA: *Western Australia*: 1 juvenile, Mt Stuart Station, Catho Well, 22°24′36.35″S, 116°16′23.68″E (WAM T54126); 1 juvenile, collected with holotype (WAM T143826); 2 juveniles, Mt Stuart Station, Catho Well, 84.5 km S. of Pannawonica, 22°24′40″S, 116°16′10″E (WAM T92509); 1 juvenile, Catho Well, 84.7 km S. of Pannawonica, 22°24′28″S, 116°16′44″E (WAM T98700) (DNA: *COI*).

Etymology.—The specific epithet refers to the type locality, Catho Well, and is to be treated as a noun in apposition.

Diagnosis.—Males of *P. catho* are unknown, and although the setal arrangement on the female flagellum place this species closest to *P. trinity*, it is currently not possible to differentiate both species on morphology alone. Specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 2$): 184 (G), 583 (C), 735 (T), 754 (T); ITS2 ($n = 2$): 159 (T), 166 (A); 28S ($n = 2$): 636 (T), 937 (T); 12S ($n = 1$): 14 (A), 40 (C), 51 (G), 52 (G), 109 (G), 131 (T), 132 (T), 188 (A), 189 (A), 190 (T), 201 (A), 250 (A), 251 (A), 254 (G), 259 (A), 262 (G), 281 (G) (Table 2).

Description (adult female).—*Color:* Yellow-brown; propeltidium and pedipalps somewhat darker (Figs. 6A–C).

Cephalothorax: Propeltidium with 2 + 1 apical setae on anterior process and 2 + 1 (right) 2 + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 11 setae (including 2 sternapophysial setae); posterior sternum triangular with 7 setae.

Chelicera: Fixed finger with two large teeth plus five smaller teeth between these; basal tooth with two short and very blunt teeth; brush at base of fixed finger composed of 9 setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 5 short whip-like setae (G4); movable finger serrula composed of 21 long lamellae, blunt guard tooth present subdistally; one large accessory tooth present at two-thirds from base of serrula accompanied by two smaller teeth, one basally one distally.

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 10 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.43 length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 5.45 x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae: 3 macrosetae (central somewhat smaller than laterals) + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 4.

Female genitalia: Two pairs of highly elongated spermathecae, sparsely covered with pores over their whole length; gonopod subrectangular with rounded corners (Fig. 7D).

Flagellum: 4.67 x longer than broad (Figs. 6H–J, 7A–C); seta dm1 situated towards posterior end of flagellomere II, at same level as vm2; setae dl1 situated anterior to dm4, dm4 situated at three quarters length of flagellomere III; dl3 situated at posterior margin more posterior than vl2, vm1 situated slightly more anterior than vm2, vm3 situated closer to vm1 than to vm5, vm5 slightly closer to vl2 than to vm3, vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae baso-laterally on flagellomere III, 1 pair of microsetae laterally between dl3 and vm5.

Dimensions (mm): Holotype female (WAM T93192): Body length 5.24. Propeltidium 1.52/0.83. Chelicera 1.14. Flagellum 0.42/0.09. Pedipalp: trochanter 0.71, femur 0.81, patella 0.88, tibia 0.90, tarsus 0.38, claw 0.16, total excluding claw 3.68. Leg I: trochanter 0.47, femur 1.81, patella 2.17, tibia 1.73 [metatarsus and tarsus both missing]. Leg IV: trochanter 0.50, femur 1.69/0.31, patella 0.77, tibia 1.29, metatarsus 1.13, tarsus 0.61, total 5.99.

Remarks.—*Paradraculoides catho* is known from three localities known as Catho Well, Western Australia (Fig. 1). All specimens were collected from bore holes using troglofauna traps, and were collected from sites less than 3.5 km apart.

Paradraculoides celatus sp. nov.
http://zoobank.org:8080/NomenclaturalActs/2332FBCD-A6F6-4583-AB61-D25F0D6B784C
(Figs. 8, 9)

Type material.—*Holotype juvenile*. AUSTRALIA: *Western Australia*: juvenile, Kens Bore, 49.7 km S. of Pannawonica, 22°05′11″S, 116°14′03″E, 7–10 July 2009, troglofauna trap, J. Cairnes, D. Keirle (Biota Environmental Sciences, KBRC039P8T2–5) (WAM T98698) (DNA: *COI*, ITS2).

Etymology.—The specific epithet refers to the discovery of this species only by molecular methods (*celatus*, Latin, hidden).

Diagnosis.—Adults of *P. celatus* are unknown, but specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 1$): 86 (G), 205 (T), 241 (C), 301 (T),

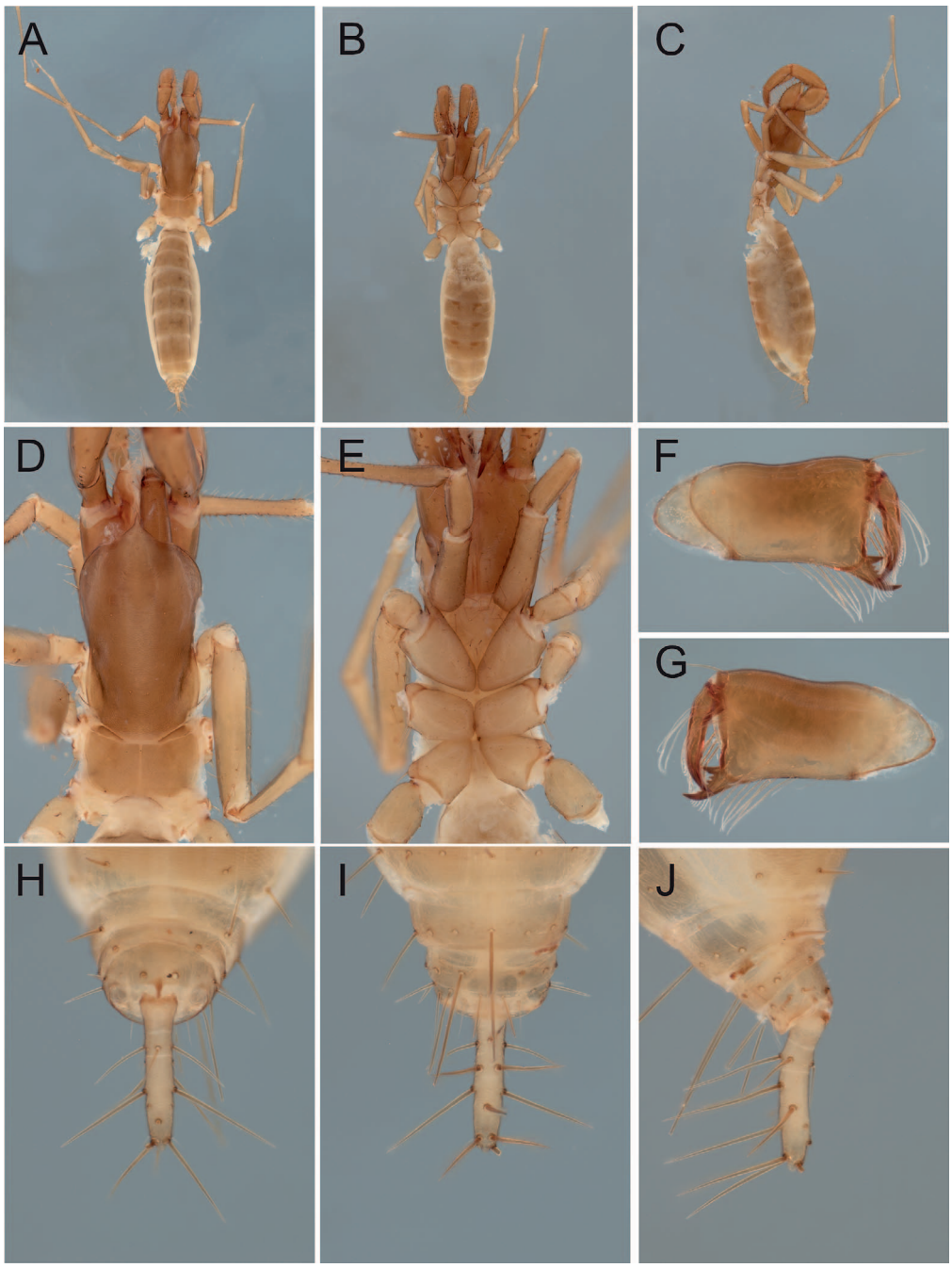

Figure 6.—*Paradraculoides catho* sp. nov., holotype female (WAM T93192): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral. H. Flagellum, dorsal; I. Flagellum, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

370 (T), 388 (C), 625 (C), 799 (C); 12S ($n = 1$): 4 (T), 22 (A), 197 (A), 202 (G), 239 (G), 326 (A), 333 (A) (Table 2).

Description (juvenile).—*Color:* Pale yellow-brown (Figs. 8A–C).

Cephalothorax: Propeltidium with 2 apical setae followed by single seta on anterior process and 2 + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 12 setae (including 2 sternapophysial setae); posterior sternum triangular with 6 setae.

Chelicera: Fixed finger with 2 large teeth plus 4 smaller teeth between these, plus 1 very small tooth on margin of large teeth; brush at base of fixed finger composed of 7 setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 5 short whip-like setae (G4); movable finger serrula composed of 14 long lamellae, blunt guard tooth present subdistally; 1 accessory tooth present at two-thirds from base of serrula.

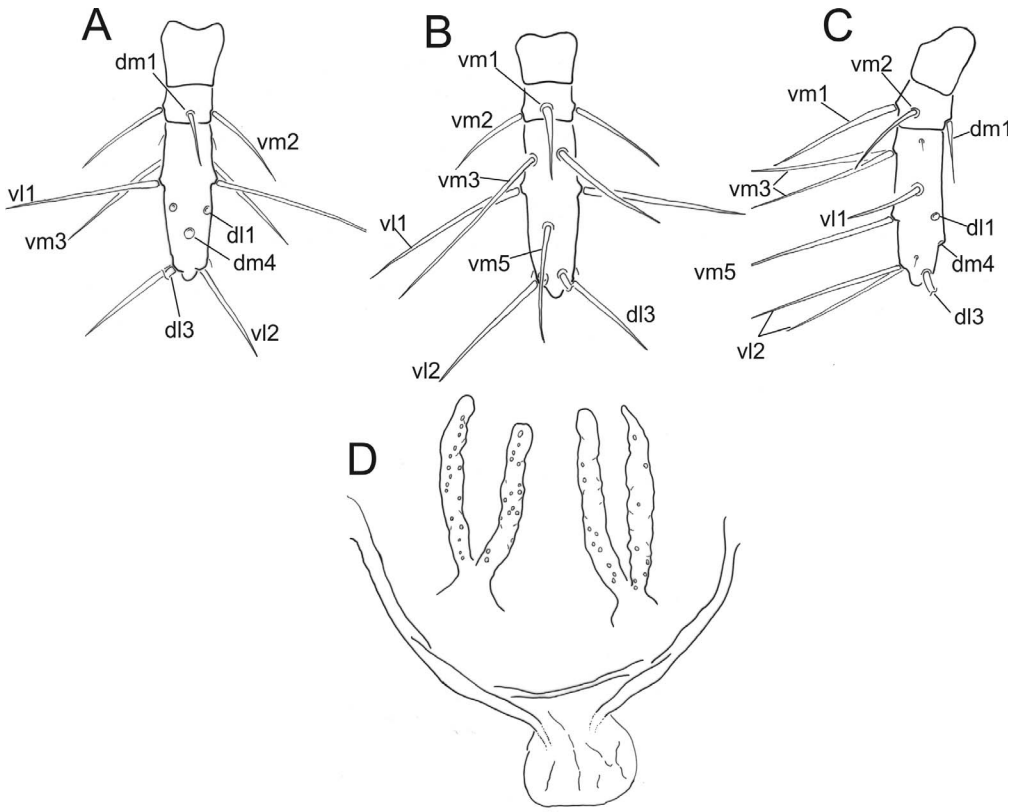

Figure 7.—*Paradraculoides catho* sp. nov., holotype female (WAM T93192): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral; D. Spermathecae, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 8 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.50 x length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 2.60 x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 4 microsetae: 3 macrosetae + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 4.

Flagellum: 5.00 x longer than broad; seta dm1 situated towards posterior end of flagellomere II slightly more posterior than vm2; setae dl1 situated anterior to dm4, dm4 situated at about three-quarters the length on flagellomere III; dl3 situated near posterior margin, very slightly posterior to vl2; vm1 situated between vm2, slightly anterior to vm2; vm3 situated slightly closer to vm1 than to vm5; vm5 halfway between vm3 and vl2; vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae baso-laterally on flagellomere III, 1 pair of microsetae postero-laterally anterior to dl3.

Dimensions (mm): Holotype juvenile (WAM T98698): Body length 2.50. Propeltidium 0.82/0.44. Chelicera 0.51. Flagellum 0.25/0.05. Pedipalp: trochanter 0.31, femur 0.34, patella 0.38, tibia 0.33, tarsus 0.18, claw 0.09, total excluding claw 1.54. Leg I: trochanter 0.34, femur 0.78, patella 0.92, tibia 0.72, metatarsus 0.26, tarsus 0.46, total 3.48. Leg IV: trochanter 0.25, femur 0.78/0.30, patella 0.37, tibia 0.51, metatarsus 0.58, tarsus 0.39, total 2.88.

Remarks.—*Paradraculoides celatus* has only been collected from Kens Bore, Western Australia (Fig. 1) at a site that is only 4.7 km south-east of one of the two known localities of *P. obrutus* and 5.9 km north of *P. affinis*. The specimen was collected from a bore hole using troglofauna traps.

Paradraculoides cochranus sp. nov.
http://zoobank.org:8080/NomenclaturalActs/84eeea24-aad9-402e-b153-6836fbbcf59a
(Figs. 10–12)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Cochrane and Jewell, 37.7 km S. of Pannawonica, 21°55′55″S, 116°07′43″E, 25–28 November 2008, troglofauna trap, 15 m, J. Cairnes, M. Menz (Biota Environmental Sciences, RNRC083P5T1–3) (WAM T93229) (DNA: *COI*, ITS2).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♀, Cochrane and Jewell, 37.7 km S. of Pannawonica, 21°55′55″S, 116°07′43″E, 13–16 October 2008, troglofauna trap, 15 m, G. Humphreys, M. Menz (Biota Environmental Sciences, RNRC083P4T1–3) (WAM T93197) (DNA: *COI*, ITS2); 1 ♀, Jewell and Cochrane Bore, site RNRC162, 21°56′02.88″S, 116°08′15.54″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, RNRC162P2T2–1) (WAM T54136).

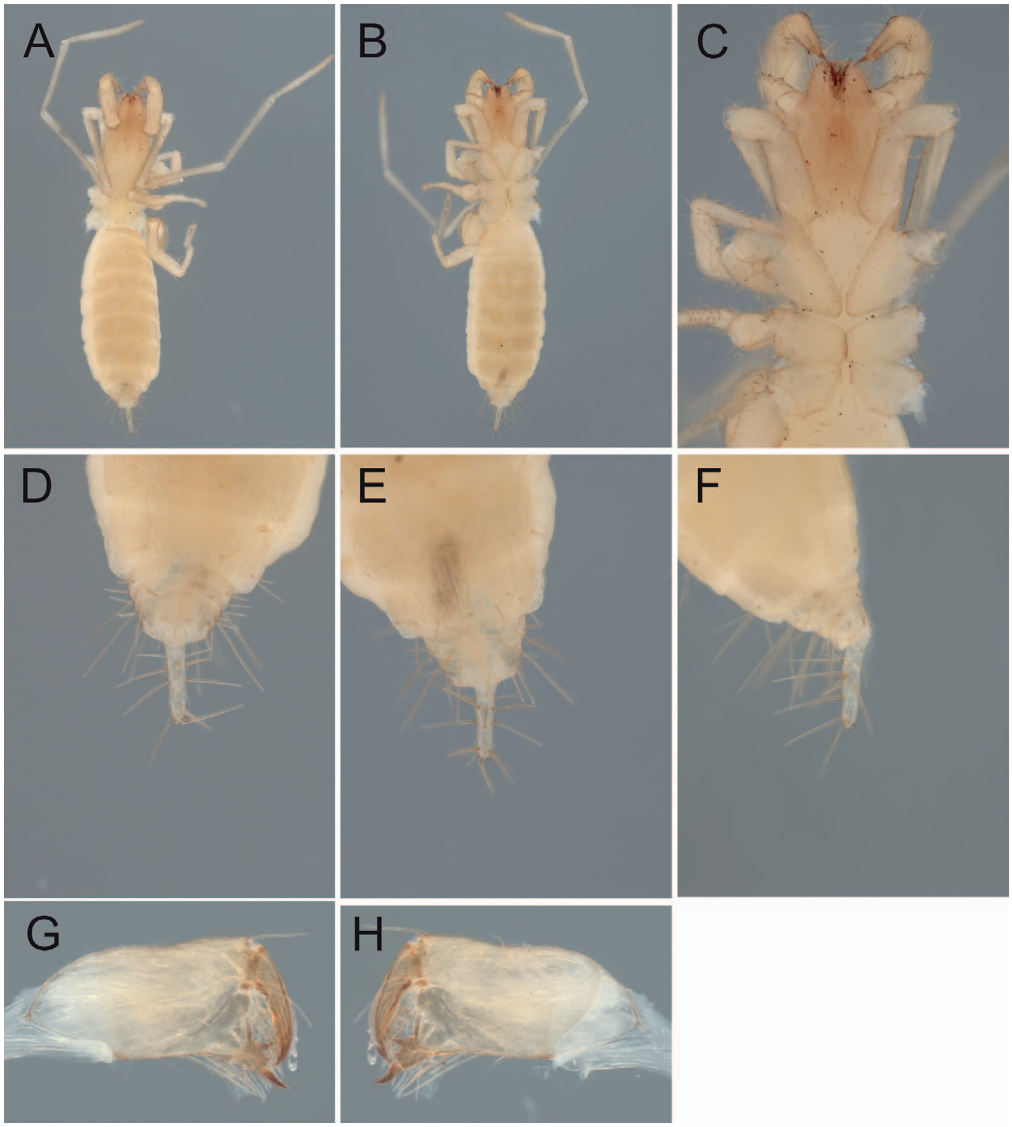

Figure 8.—*Paradraculoides celatus* sp. nov., holotype juvenile (WAM T98698): A. Body, dorsal; B. Body, ventral; C. Cephalothorax, ventral; D. Flagellum, dorsal; E. Flagellum, ventral; F. Flagellum, lateral; G. Left chelicera, prolateral; H. Left chelicera, retrolateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

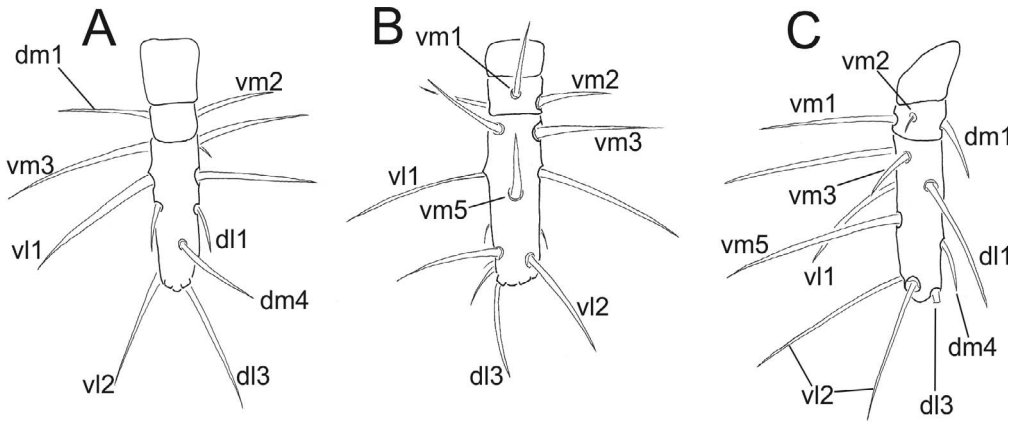

Figure 9.—*Paradraculoides celatus* sp. nov., holotype juvenile (WAM T98698): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

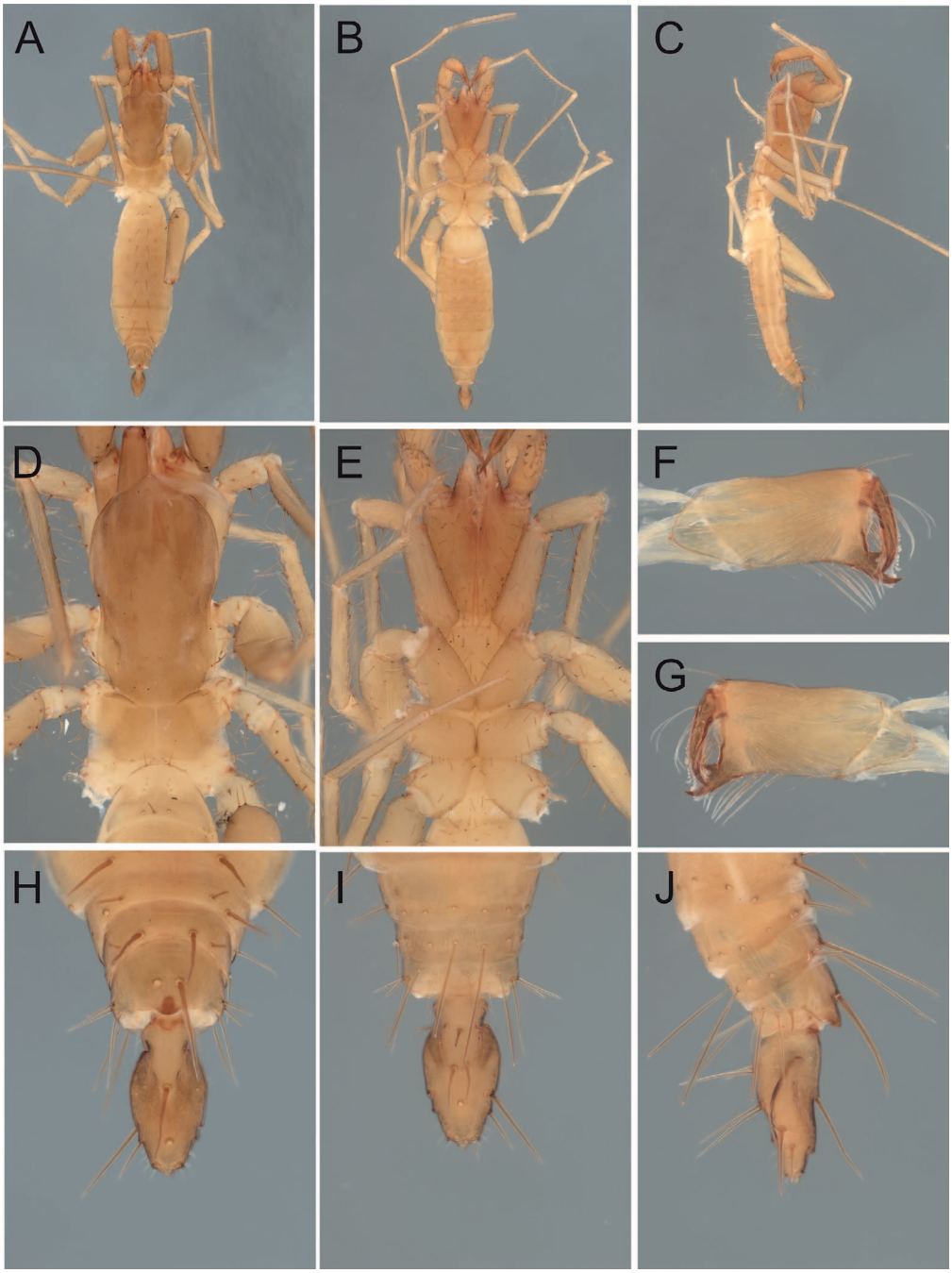

Figure 10.—*Paradraculoides cochranus* sp. nov., holotype male (WAM T93229): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Other material examined.—AUSTRALIA: *Western Australia*: 1 juvenile, Cochrane and Jewell, 37.7 km S. of Pannawonica, 21°55′55″S, 116°07′43″E (WAM T92538) (DNA: *COI*, ITS2); 1 ♂, Cochrane and Jewell, Yaraloola Station, NE. of Red Hill, 38.5 km S. of Pannawonica, 21°56′11″S, 116°07′14″E, 15–21 August 2008, troglofauna trap, 15 m, J. Alexander, T. Sachse (Biota Environmental Sciences, RNRC140P3T1–4) (WAM T92536); 1 ♀, Yaraloola Station, NE. of Red Hill, Cochrane and Jewell, 35.9 km S. of Pannawonica, 21°55′11″S, 116°08′35″E, 15–21 August 2008, troglofauna trap, 10 m, J. Alexander, T. Sachse (Biota Environmental Sciences, RNRC189P3T1–1) (WAM T92541); 1 ♂, Cochrane and Jewell, 35.5 km S. of Pannawonica, 21°55′09″S, 116°08′49″E, 25–28 November 2008, troglofauna trap, 30 m, J. Cairnes, M. Menz (Biota Environmental Sciences, RNRC184P5T3–1) (WAM T93232) (DNA: *COI*, ITS2); 1 ♀, Cochrane and Jewell, 35.5 km S. of Pannawonica, 21°55′09″S, 116°08′49″E, 25–28 November

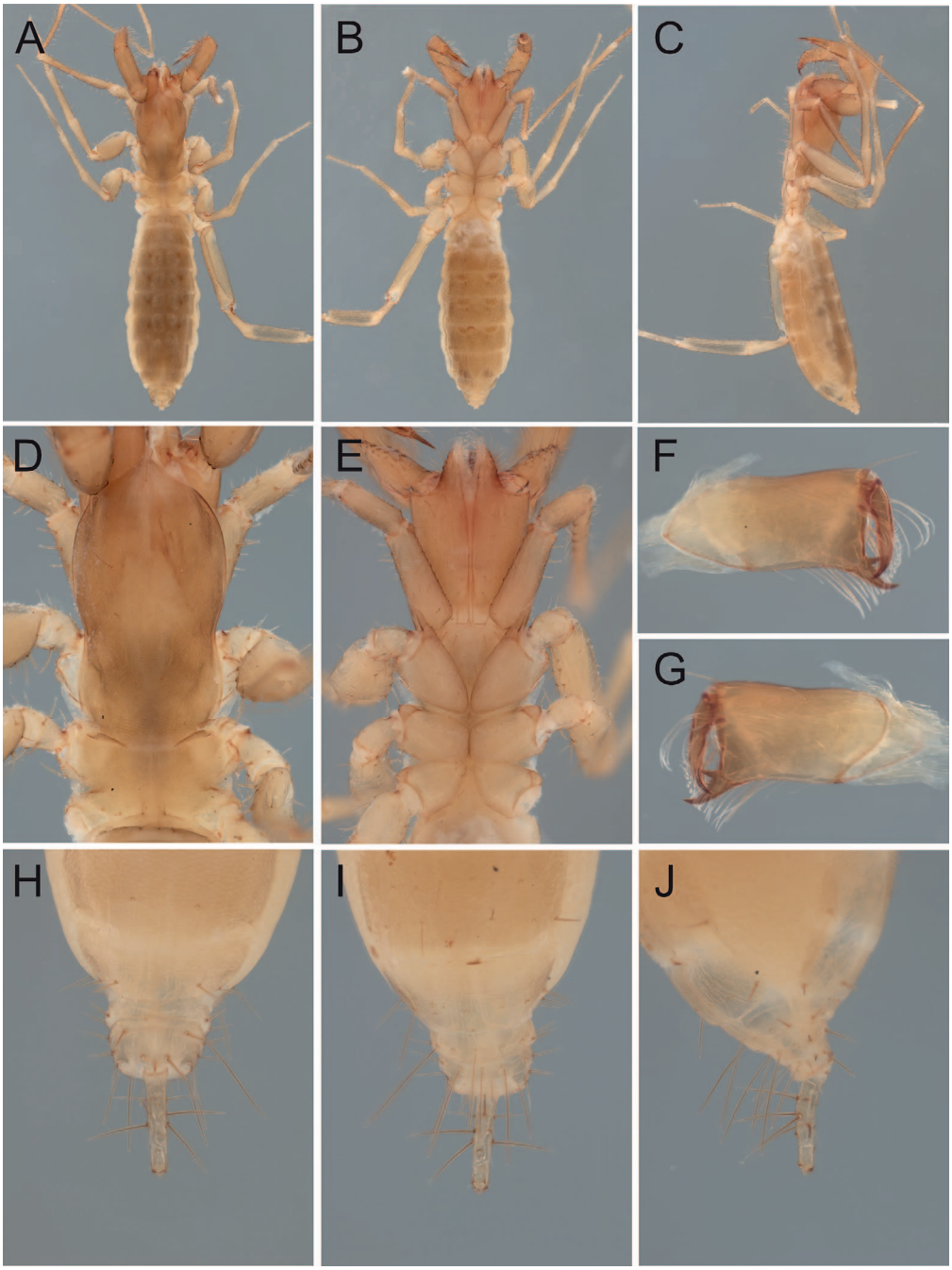

Figure 11.—*Paradraculoides cochranus* sp. nov., paratype female (WAM T93197): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; paratype female (WAM T54136): H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

2008, troglofauna trap, 10 m, J. Cairnes, M. Menz (Biota Environmental Sciences, RNRC184P5T1–1) (WAM T93230); 1 ♀, Cochrane and Jewell, 35.9 km S. of Pannawonica, 21°55′11″S, 116°08′35″E, 25–28 November 2008, troglofauna trap, 10 m, J. Cairnes, M. Menz (Biota Environmental Sciences, RNRC189P5T1–1) (WAM T93231) (DNA: *COI*, ITS2); 1 juvenile, Cochrane and Jewell, 35.5 km S. of Pannawonica, 21°55′09″S, 116°08′49″E, 13–16 October 2008, troglofauna trap, 20 m, G. Humphreys, M. Menz (Biota Environmental Sciences, RNRC184P4T2–3) (WAM T93191) (DNA: *COI*, ITS2); 1 juvenile, Jewell and Cochrane Bore, site RNRC048, 21°56′08.69″S, 116°08′52.71″E, 24 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, RNRC048T3–2) (WAM T54129); 1 juvenile, Jewell and Cochrane Bore, site RNRC213, 21°54′42.64″S, 116°07′24.48″E, 24 October 2007, troglofauna trap, D.

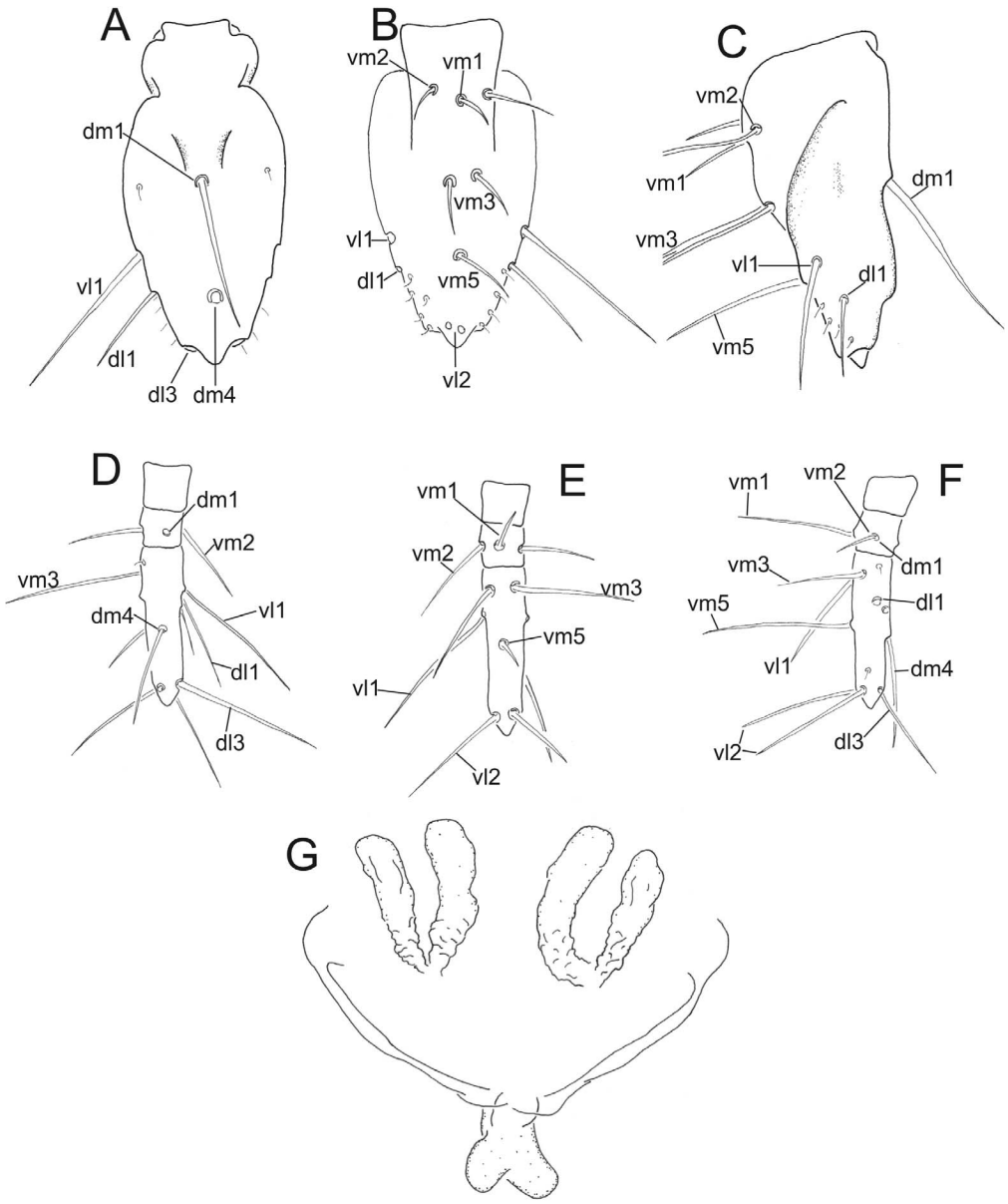

Figure 12.—*Paradraculoides cochranus* sp. nov.: A–C, holotype male (WAM T93229): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral. D–G, paratype female (WAM T93197): D. Flagellum, dorsal; E. Flagellum, ventral; F. Flagellum, lateral; G. Spermathecae, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Kamien, J. Alexander (Biota Environmental Sciences, RNRC213T2–1) (WAM T54128); 1 juvenile, Jewell and Cochrane Bore, site RNRC094, 21°55′04.45″S, 116°08′17.95″E, 23 October 2007, troglofauna trap, D. Kamien, J. Alexander (Biota Environmental Sciences, RNRC094T3–3) (WAM T54134).

Etymology.—The specific epithet is an adjective that refers to the type locality, Cochrane and Jewell Bores.

Diagnosis.—The overall shape of the male flagellum of *P. cochranus* (Figs. 10H–J, 12A–C) most closely resembles *P. bythius*, *P. affinis*, *P. eremius* and *P. kryptus*, especially in the presence of a broad base, from which it differs by the position of dm4 which is located sub-distally (Fig. 12A) rather than on the posterior edge of the flagellum in the other species. The female flagellum of *P. cochranus* differs from all other *Paradraculoides* in the short gap between dm4 to dl1 (by the relatively anterior position of dm4) (Fig. 12D). Specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 6$): 133 (A), 235 (T), 263 (G), 279 (G) (Table 2).

Description (adults).—*Color:* Yellow-brown; propeltidium somewhat darker; female abdomen darker than male with olive-grey tinge (Figs. 10A–C, 11A–C).

Cephalothorax: Propeltidium with 2 apical setae followed by single seta on anterior process and 2 + 2 + 2 (male only) + 2 setae; eye spots absent. Mesopeltidia separated. Anterior

sternum with 12 (♂), 13 (♀) setae (including 2 sternapophysial setae); posterior sternum triangular with 6 setae.

Chelicera: Fixed finger with 2 large teeth plus 4 smaller teeth between these; distal surface of basal tooth with short blunt tooth (♂) or low protrusion (♀); brush at base of fixed finger composed of 10 (♂) or 7 (♀) setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 4 (♂, ♀) short whip-like setae (G4); movable finger serrula composed of 18 (♂), 17 (♀) long lamellae, blunt guard tooth present subdistally; 1 large accessory tooth present (♂, ♀) at two-thirds from base of serrula accompanied by smaller tooth basally (♀ only).

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 10 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.47 (♂), 0.44 (♀) x length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 3.16 (♂), 2.85 (♀) x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 4 microsetae: 3 macrosetae + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 4.

Female genitalia: Two pairs of spermathecae, each pair connected basally before connection with bursa (Fig. 12G), distally round and smooth; sparsely covered with small pores; gonopod short, distally bifurcate.

Flagellum: Male: dorsoventrally compressed (Figs. 10H–J, 12A–C); 2.00 x longer than broad; seta dm1 situated dorso-medially, slightly closer to anterior margin; seta dm4 situated at same level as dl1; dl3 on posterior margin; vm2 situated slightly anterior to vm1, vm1 much closer to vm2 than to vm3; vm5 situated halfway between vl2 and vm3; 1 pair of microsetae at similar level as dm1 and four pairs between vl1 and dl3. Female: 4.11 x longer than broad; seta dm1 situated towards posterior end of flagellomere II slightly more posterior than vm2; setae dl1 situated anterior to dm4, dm4 situated about halfway on flagellomere III; dl3 situated near at posterior margin at same level as vl2; vm1 situated between vm2; vm3 situated closer to vm1 than to vm5, vm5 halfway between vm3 and vl2; vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae baso-laterally on flagellomere III, 1 pair of microsetae postero-laterally but well anterior of dl3 and vl2.

Dimensions (mm): Holotype male (WAM T93229): Body length 4.33. Propeltidium 1.34/0.75. Chelicera 0.72. Flagellum 0.46/0.23. Pedipalp: trochanter 0.58, femur 0.67, patella 0.71, tibia 0.65, tarsus 0.33, claw 0.15, total excluding claw 2.94. Leg I: trochanter 0.44, femur 1.81, patella 2.32, tibia 1.84, metatarsus 0.52, tarsus 0.79, total 7.72. Leg IV: trochanter 0.46, femur 1.61/0.27, patella 0.61, tibia 1.23, metatarsus 1.09, tarsus 0.61, total 5.63.

Paratype female (WAM T93197): Body length 4.34. Propeltidium 1.34/0.67. Chelicera 0.72. Flagellum 0.37/0.09. Pedipalp: trochanter 0.58, femur 0.61, patella 0.67, tibia 0.60, tarsus 0.31, claw 0.13, total excluding claw 2.77. Leg I: trochanter 0.40, femur 1.40, patella 1.77, tibia 1.40, metatarsus 0.40, tarsus 0.69, total 6.06. Leg IV: trochanter 0.38, femur 1.33/0.19, patella 0.54, tibia 0.96, metatarsus 0.83, tarsus 0.54, total 4.58.

Variation: Body length (males, $n = 3$) 4.08–4.33, (females, $n = 5$) 3.15–4.34; propeltidium (males) 1.11–1.34/0.56–0.75, (females) 1.11–1.34/0.52–0.71.

Remarks.—*Paradraculoides cochranus* is known from the Cochrane and Jewell Bores complex, located in the western Hamersley Range, Western Australia, midway between the distributions of *P. celatus* and *P. gnophicola* (Fig. 1). The juvenile specimens listed above are associated with this species by locality and, in some cases, by sequence data (Figs. 2A–D).

Paradraculoides confusus sp. nov.
http://zoobank.org:8080/NomenclaturalActs/03B68E37-083A-4A41-9C76-BDDC2715D1A1
(Figs. 13, 14)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Trinity Bore, 76.4 km S. of Pannawonica, 22°19′57″S, 116°21′32″E, 15–21 August 2008, troglofauna trap, 25 m, J. Alexander, T. Sachse (Biota Environmental Sciences, TBRC014T1) (WAM T93142) (DNA: *COI*, ITS2).

Etymology.—The specific epithet is the Latin adjective for confused (*confusus*), as this species shares both the diagnostic characters of *Draculoides* (laterally compressed male flagellum) and the former diagnostic character of *Paradraculoides* (three setae on tergite II).

Diagnosis.—The male of *P. confusus* differ from all other species of the genus by the laterally compressed flagellum (Figs. 13H–J, 14A–C). Females are unknown. Specimens of this species can also be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 1$): 325 (C), 518 (G), 535 (C), 565 (C), 574 (C); ITS2 ($n = 1$): 251 (T), 271 (T); 28S ($n = 1$): 940 (A) (Table 2).

Description (adult male).—*Color:* Yellow-brown; propeltidium and 3–4 posterior abdominal sclerites somewhat darker (Figs. 13A–C).

Cephalothorax: Propeltidium with 2 + 1 apical setae on anterior process and 2 + 1 (left) + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 13 setae (including 2 sternapophysial setae); posterior sternum triangular with 6 setae.

Chelicera: Fixed finger with two large teeth plus four smaller teeth between these; brush at base of fixed finger composed of 7 setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 5 short whip-like setae (G4); movable finger serrula composed of 16 long lamellae, blunt guard tooth present subdistally; one accessory tooth present at two-thirds from base of serrula.

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 10 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.50 length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 4.63 x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

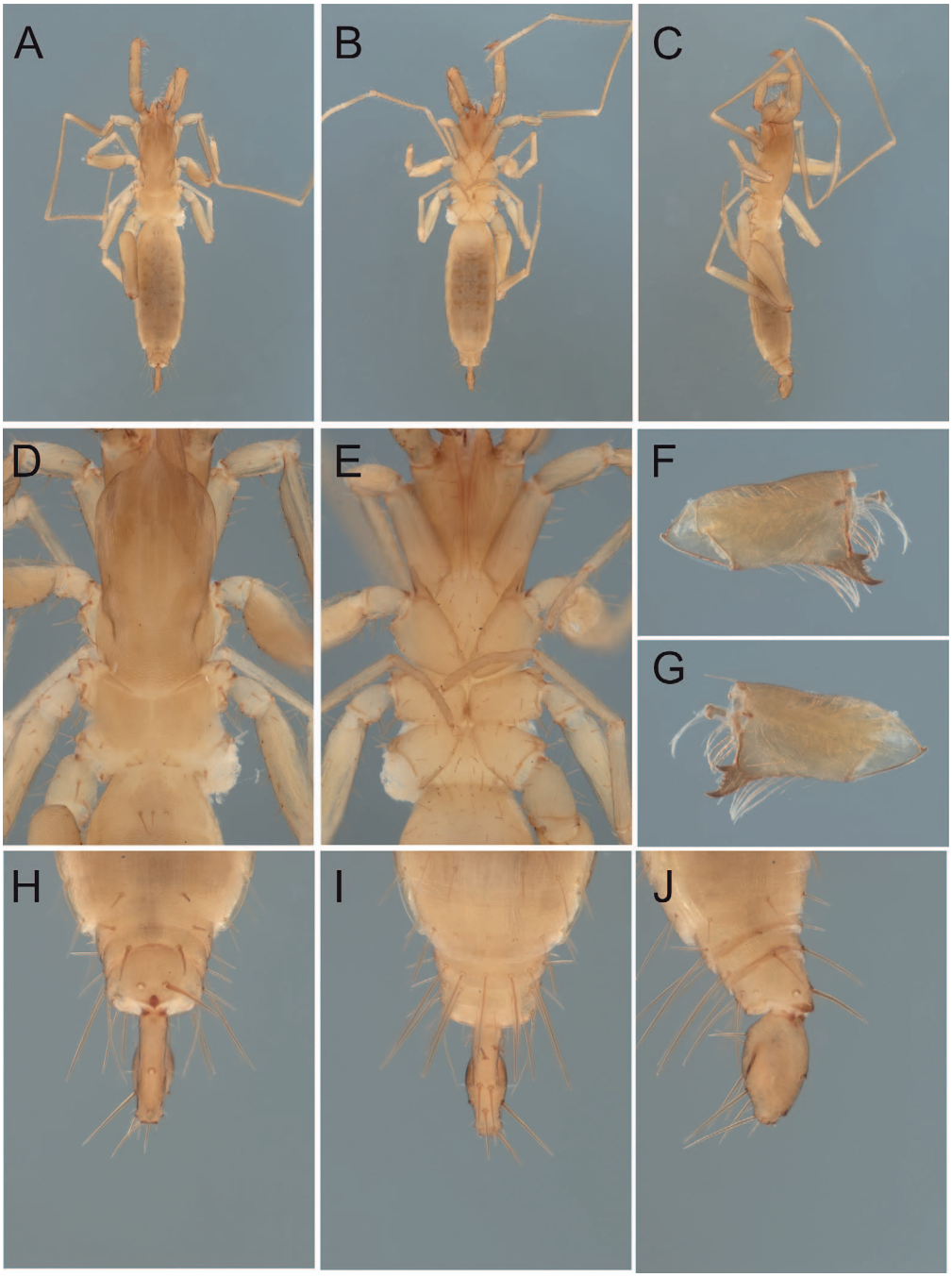

Figure 13.—*Paradraculoides confusus* sp. nov., holotype male (WAM T93142): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 1 microseta: 3 macrosetae (central setae half the size of laterals) + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 4.

Flagellum: Laterally compressed (Figs. 13A–C, 14A–C); 2.75 x longer than broad; seta dm1 situated dorso-medially, somewhat closer to anterior than to posterior margin; seta dm4 closer to posterior margin than to dm1; dl1 between dm4 and vl2; dl3 on posterior margin at similar level as dl1; vm2 situated anterior to vm1, vm1 closer to vm2 than to vm3; vm5 situated midway between vm3 and vl2; 1 pair of microsetae near anterior end, one pair centrally slightly above midline and three further pairs between dl1, vl1 and vl2.

Dimensions (mm): Holotype male (WAM T93142): Body length 3.74. Propeltidium 1.02/0.40. Chelicera 0.62. Flagellum 0.33/0.12. Pedipalp: trochanter 0.37, femur 0.44, patella 0.46, tibia 0.42, tarsus 0.23, claw 0.12, total excluding claw 1.92. Leg

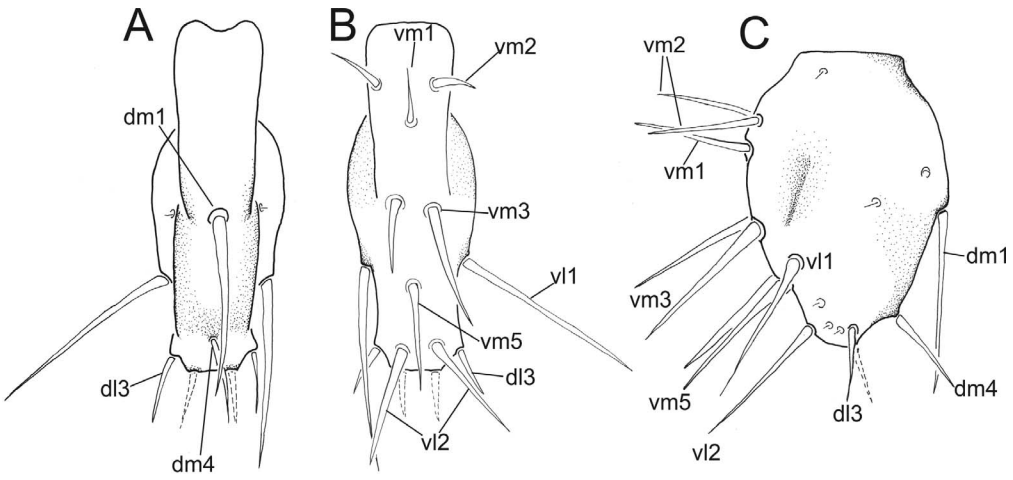

Figure 14.—*Paradraculoides confusus* sp. nov., holotype male (WAM T93142): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

I: trochanter 0.31, femur 1.15, patella 1.38, tibia 1.13, metatarsus 0.37, tarsus 0.60, total 4.94. Leg IV: trochanter 0.29, femur 1.11/0.24, patella 0.46, tibia 0.81, metatarsus 0.71, tarsus 0.50, total 3.88.

Remarks.—*Paradraculoides confusus* has the primary diagnostic feature of *Paradraculoides*, three setae on tergite II, and the diagnostic feature of *Draculoides*, the laterally compressed male flagellum (Figs. 13A–C, 14A–C), suggesting an intermediate taxonomic position that questions the current hypothesis of two separate genera. A similar result was found by Clouse et al. (2017) who found that two species of *Paradraculoides* rendered *Draculoides* as paraphyletic. This taxonomic issue will be addressed in a forthcoming review of the phylogeny and taxonomy of the Pilbara schizomids (K. Abrams, J. Huey, M. Harvey, unpublished data).

Paradraculoides confusus is known from Trinity Bore, Western Australia, in the western Hamersley Range, where it occurs in a single mesa formation (Fig. 1). The mesa is adjacent to an extensive linear mesa, in which *P. trinity* occurs, but the mesas are separated by a low valley containing an incised drainage feature, suggesting that gene flow has been historically disrupted by erosion and separation of the Channel Iron Deposit habitat.

Paradraculoides obrutus sp. nov.
http://zoobank.org:8080/NomenclaturalActs/388D323E-E217-4DDC-81C6-6D4B0DCA6B08
(Figs. 15, 16)

Type material.—*Holotype female*. AUSTRALIA: *Western Australia*: Kens Bore, site KBRC023, 22°03′42.7″S, 116°11′44.29″E, 17 January 2008, troglofauna trap, J. Alexander, T. Sachse (Biota Environmental Sciences, KBRC023P2T2–1) (WAM T54175) (DNA: *COI*, ITS2).

Paratype. AUSTRALIA: *Western Australia*: 1 ♀, Kens Bore, 47.2 km S. of Pannawonica, 22°02′43″S, 116°11′03″E, 12–15 September 2009, troglofauna trap, 20 m, D. Kamien (Biota Environmental Sciences, KBRC096P7T2–1) (WAM T98320) (DNA: *COI*, ITS2).

Etymology.—The specific epithet refers to the discovery of this species only by molecular methods (*obrutus*, Latin, buried, hidden).

Diagnosis.—Males are unknown, and females cannot be differentiated from other species of *Paradraculoides* using morphological criteria. Specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 2$): 85 (T), 154 (T), 187 (C), 274 (C), 310 (T), 485 (T), 562 (C), 631 (T), 722 (G), 724 (A), 764 (T), 853 (C); ITS2 ($n = 2$): 199 (G), 281 (C); 28S ($n = 2$): 755 (A) (Table 2).

Description (adult female).—*Color:* Yellow-brown, chelicerae, pedipalps and anterior portion of propeltidium slightly darker (Figs. 15A–C).

Cephalothorax: Propeltidium with 2 apical setae followed by single seta on anterior process and 2 + 2 + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 14 setae (including 2 sternapophysial setae); posterior sternum triangular with 7 setae.

Chelicera: Fixed finger with 2 large teeth plus 5 smaller teeth between these; distal surface of basal tooth with short blunt tooth; brush at base of fixed finger composed of 7 setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera with 4 short whip-like setae (G4); movable finger serrula composed of 16 long lamellae, blunt guard tooth present subdistally; 1 large accessory tooth present at two-thirds from base of serrula.

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 8 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.48 x length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 2.60 x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 4 microsetae: 3 macrosetae + 6 microsetae (microsetae in column): 2: 2: 2: 2: 2: 4: 6.

Female genitalia: Two pairs of spermathecae, each pair connected basally before connection with bursa (Fig. 16D),

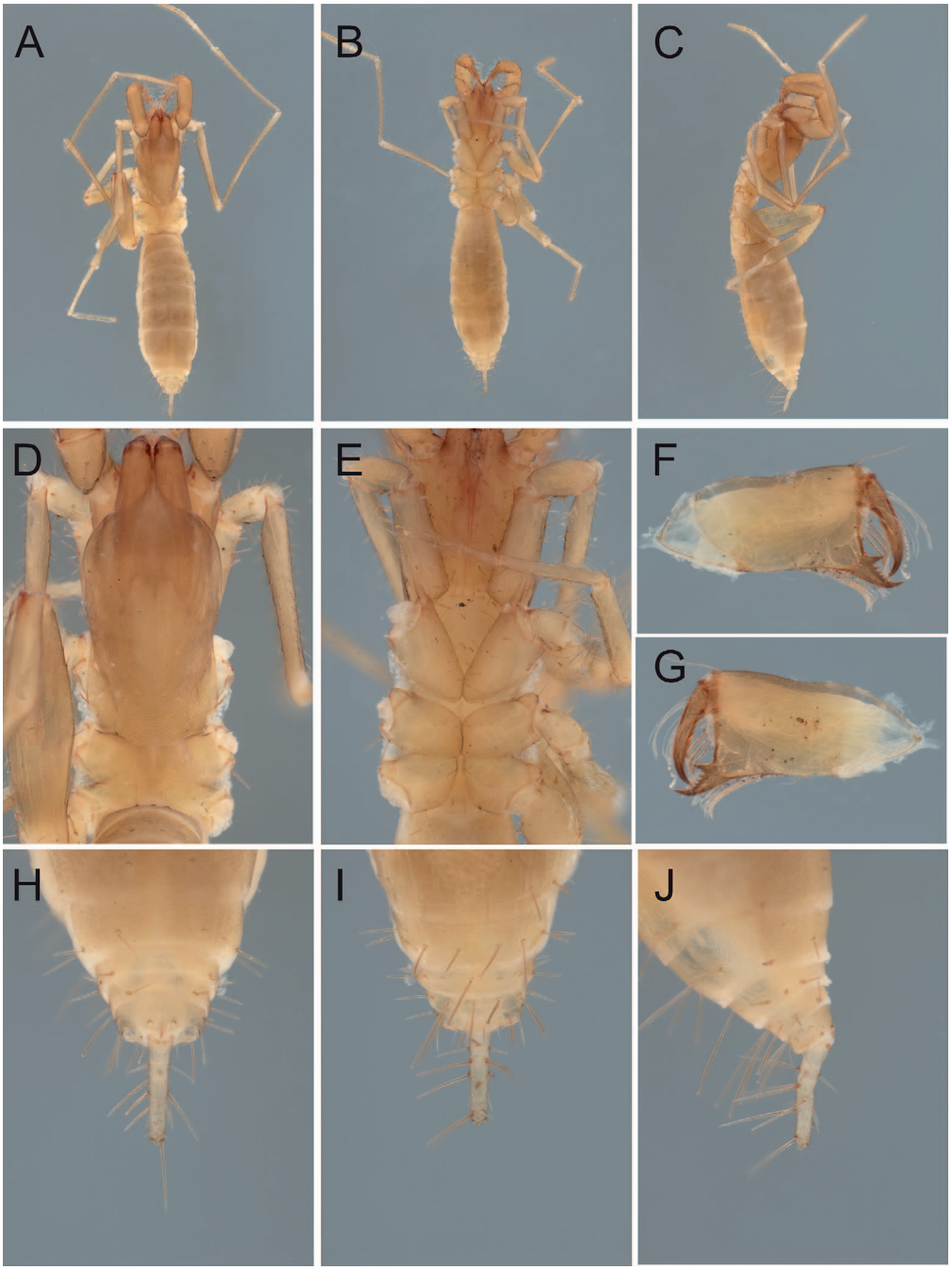

Figure 15.—*Paradraculoides obrutus* sp. nov., holotype female (WAM T54175): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

distally round and smooth; sparsely covered with small pores; gonopod short, distally slightly bifurcate.

Flagellum: 4.25 x longer than broad (Fig. 16D); seta dm1 situated in middle of flagellomere II slightly more posterior than vm2; setae dl1 situated anterior to dm4, dm4 situated at about three-quarters the length on flagellomere III; dl3 situated near posterior margin; vl2 situated away from posterior margin; vm1 situated between vm2; vm3 situated about halfway between vm1 and vm5; vm5 about halfway between vm3 and vl2; vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae postero-laterally anterior of dl3 and vl2.

Dimensions (mm): Holotype female (WAM T54175): Body length 3.35. Propeltidium 1.04/0.55. Chelicera 0.76. Flagellum 0.34/0.08. Pedipalp: trochanter 0.47, femur 0.46, patella 0.50, tibia 0.45, tarsus 0.27, claw 0.13, total excluding claw 2.15. Leg I: trochanter 0.34, femur 1.13, patella 1.36, tibia 1.04, metatarsus 0.35, tarsus 0.53, total 4.07. Leg IV: trochanter

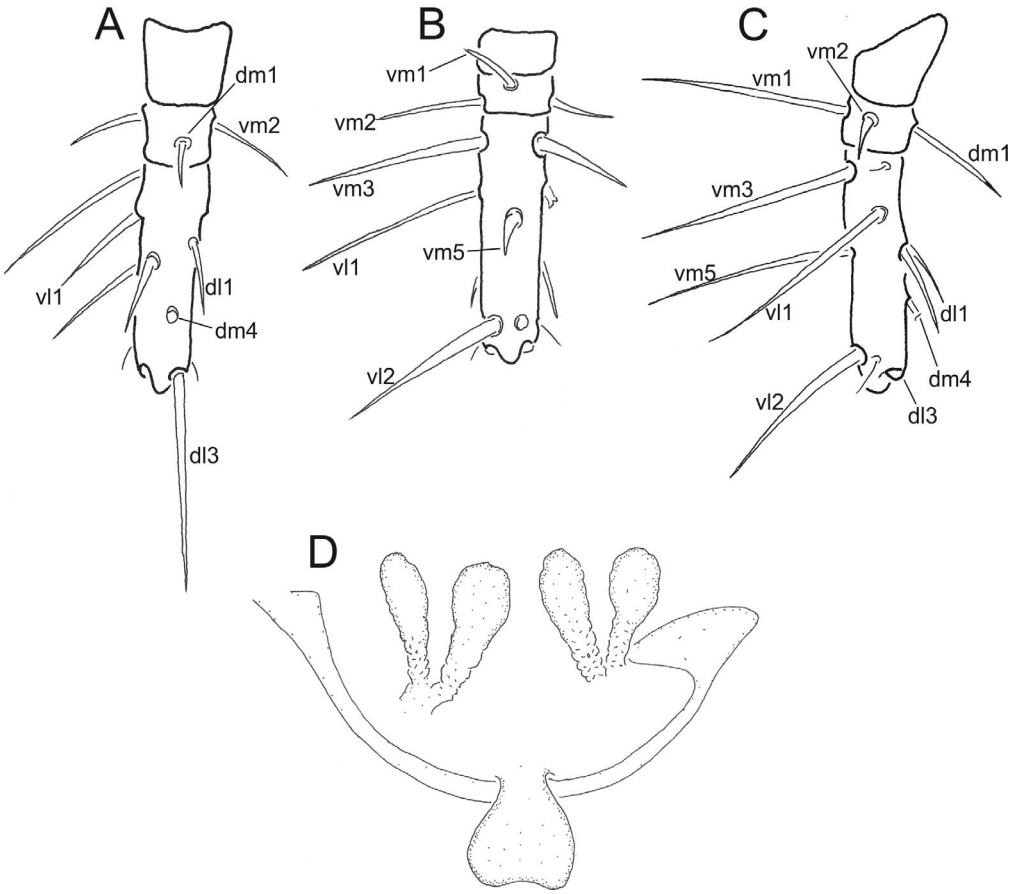

Figure 16.—*Paradraculoides obrutus* sp. nov., holotype female (WAM T54175): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral; D. Spermathecae, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

0.33, femur 1.04/0.40, patella 0.48, tibia 0.79, metatarsus 0.72, tarsus 0.51, total 3.93.

Variation: Body length (female, $n = 1$) 3.60; propeltidium 1.11/0.59.

Remarks.—This species is only known from two localities at Kens Bore, Western Australia (Fig. 1). The specimens were associated by the sequence data (Figs. 2A–D).

Paradraculoides trinity sp. nov.
http://zoobank.org:8080/NomenclaturalActs/D4DE9D6E-BC9C-44EA-850C-7E07DB3EC381
(Figs. 17–19)

Type material.—*Holotype male*. AUSTRALIA: *Western Australia*: Trinity Bore, 79.6 km S. of Pannawonica, 22°21′45″S, 116°19′13″E, 15–21 August 2008, troglofauna trap, 30 m, J. Alexander, T. Sachse (Biota Environmental Sciences, TBRC036P3T3–4) (WAM T92510) (DNA: *COI*, ITS2).

Paratypes. AUSTRALIA: *Western Australia*: 1 ♂, Trinity Bore, 79 km S. of Pannawonica, 22°21′35″S, 116°19′54″E, 15–21 August 2008, troglofauna trap, 45 m, J. Alexander, T. Sachse (Biota Environmental Sciences, TBRC023P3T3–1) (WAM T92511) (DNA: *COI*, ITS2); 1 ♀, Trinity Bore, 79 km S. of Pannawonica, 22°21′35″S, 116°19′54″E, 15–21 August 2008, troglofauna trap, 15 m, J. Alexander, T. Sachse (Biota Environmental Sciences, TBRC023P3T1–1) (WAM T92515) (DNA: *COI*); 1 ♀, Trinity Bore, 77.8 km S. of Pannawonica, 22°20′59″S, 116°20′17″E, 7–10 July 2009, troglofauna trap, 20 m, J. Cairnes, D. Keirle (Biota Environmental Sciences, TBRC161P8T2–4) (WAM T98704) (DNA: *COI*).

Other material examined.—AUSTRALIA: *Western Australia*: 1 juvenile, Trinity Bore, 79 km S. of Pannawonica, 22°21′35″S, 116°19′54″E, 15–21 August 2008, troglofauna trap, 45 m, J. Alexander, T. Sachse (Biota Environmental Sciences, TBRC023P3T3–1) (WAM T143827).

Etymology.—The specific epithet refers to the type locality, Trinity Bore, and is to be treated as a noun in apposition.

Diagnosis.—*Paradraculoides trinity* differs from all other species of *Paradraculoides* by the distinct shape of the male flagellum (Figs. 17H–J, 19A–C); in dorsal view the base is widest rendering the shape like the blunt tip of an arrow. The female flagellum and internal genitalia can currently not be distinguished with certainty from that of *P. catho* (but see respective diagnoses for all other species). Specimens of this species can be distinguished from all other species of *Paradraculoides* by the following combination of nucleotide substitutions: *COI* ($n = 4$): 292 (T), 389 (A), 474 (T), 785 (T);

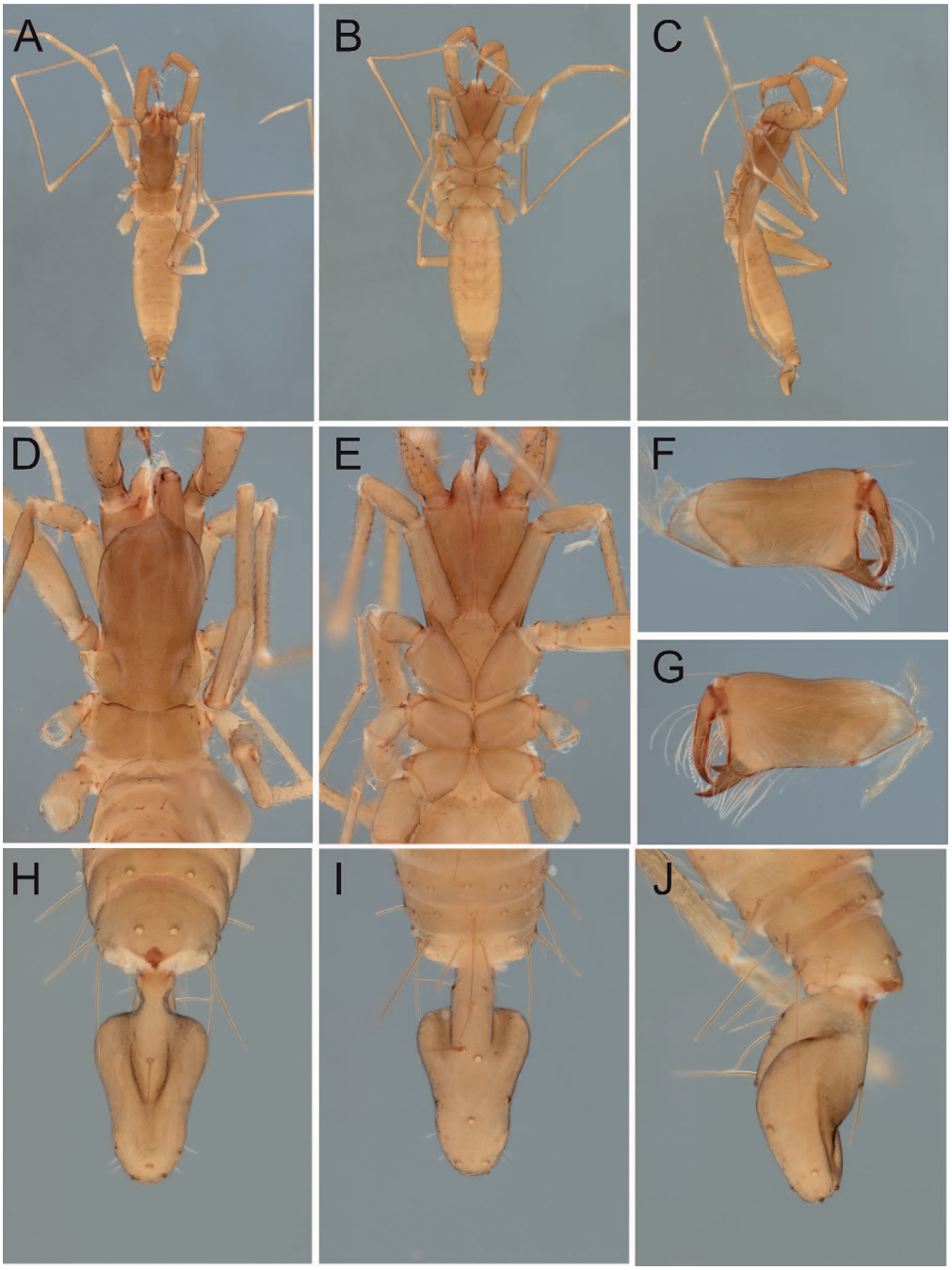

Figure 17.—*Paradraculoides trinity* sp. nov., holotype male (WAM T92510): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

ITS2 ($n = 2$): 192 (A), 277 (G); 28S ($n = 1$): 469 (T), 647 (T), 661 (G) (Table 2).

Description (adults).—*Color:* Yellow-brown; propeltidium and pedipalps somewhat darker (Figs. 17A–C, 18A–C).

Cephalothorax: Propeltidium with 2 + 1 apical setae on anterior process and 2 + 2 + 2 setae; eye spots absent. Mesopeltidia separated. Anterior sternum with 12–13 (♂), 15 (♀) setae (including 2 sternapophysial setae); posterior sternum triangular with 6 or 8 (♂), 7 (♀) setae.

Chelicera: Fixed finger with 2 large teeth plus 5 smaller teeth between these, basal tooth with 1 lateral tooth; brush at base of fixed finger composed of 8 (♂), 10 (♀) setae (G5A), each densely pilose in distal half; lateral surface with 3 large, lanceolate, terminally pilose setae (G1); internal face of chelicera 5 short whip-like setae (G4); movable finger serrula

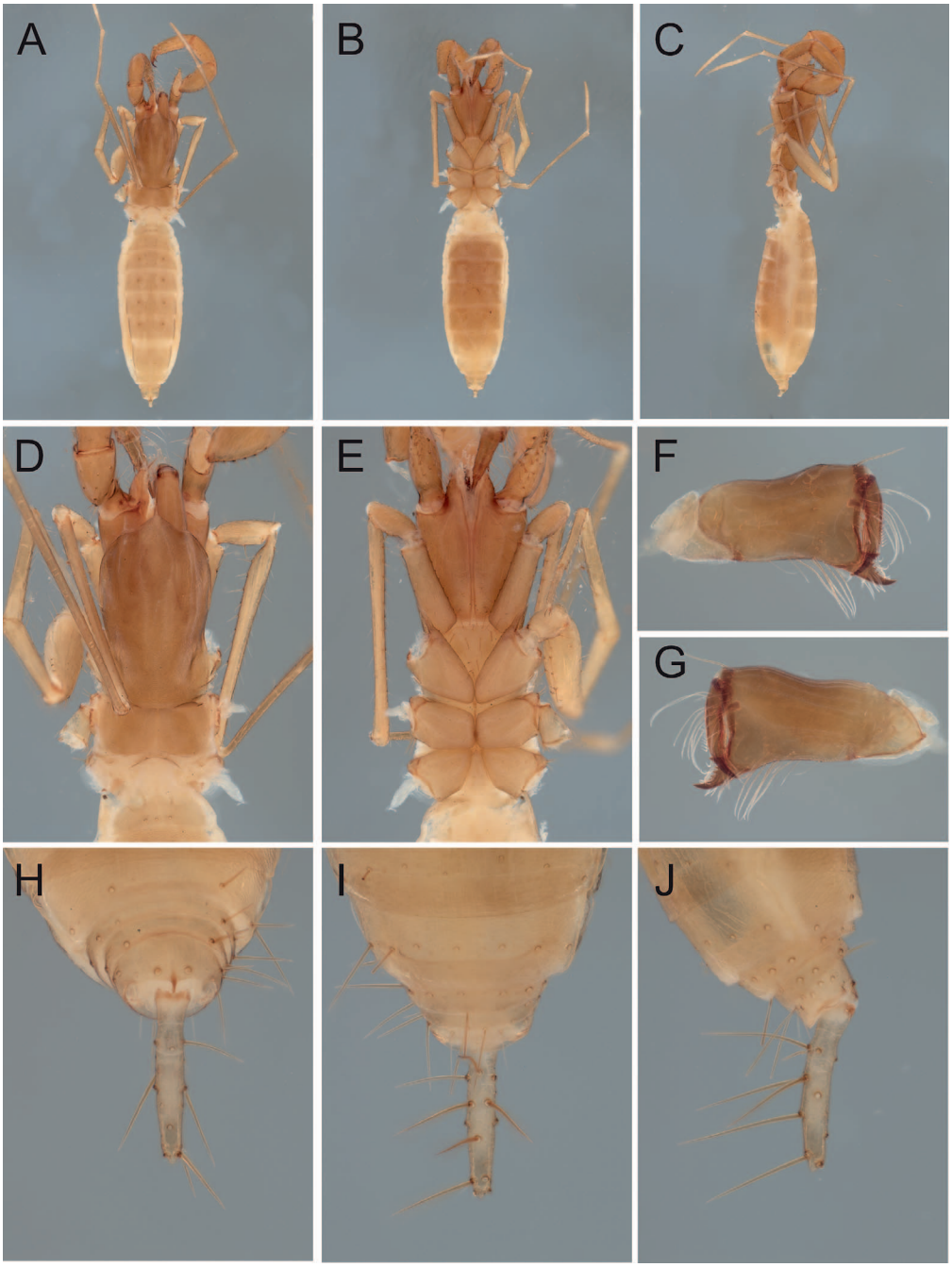

Figure 18.—*Paradraculoides trinity* sp. nov.: A–G, paratype female (WAM T92515): A. Body, dorsal; B. Body, ventral; C. Body, lateral; D. Cephalothorax, dorsal; E. Cephalothorax, ventral; F. Left chelicera, prolateral; G. Left chelicera, retrolateral; H–J, paratype female (WAM T98704): H. Flagellum, dorsal; I. Flagellum, ventral; J. Flagellum, lateral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

composed of 17 (♂), 20 (♀) long lamellae, blunt guard tooth present subdistally; 2 accessory teeth present at two-thirds from base of serrula; the apical larger (in ♂ with two blunt tips).

Pedipalp: Without apophyses; trochanter with sharply produced ventro-distal extension, ventral margin with ca. 15 stout setae, without mesal spur; tarsus and tibia without spines; tarsal spur present; claw 0.53 (♂), 0.43 (♀) x length of tarsus.

Legs: Tarsus I with 6 tarsomeres; femur IV 6.34 (♂), 5.97 (♀) x longer than wide; baso-dorsal margin of femur IV produced at about a 90° angle.

Abdomen: Chaetotaxy of tergites I–IX: 2 macrosetae + 2 microsetae: 3 macrosetae + 4 microsetae (microsetae in column): 2: 2: 2: 2: 2: 2: 4.

Flagellum: Male: Dorsoventrally compressed (Figs. 17H–J, 19A–C); 1.76 x longer than broad; seta dm1 situated at about 1 third of length of flagellum in anterior half; seta dm4 very

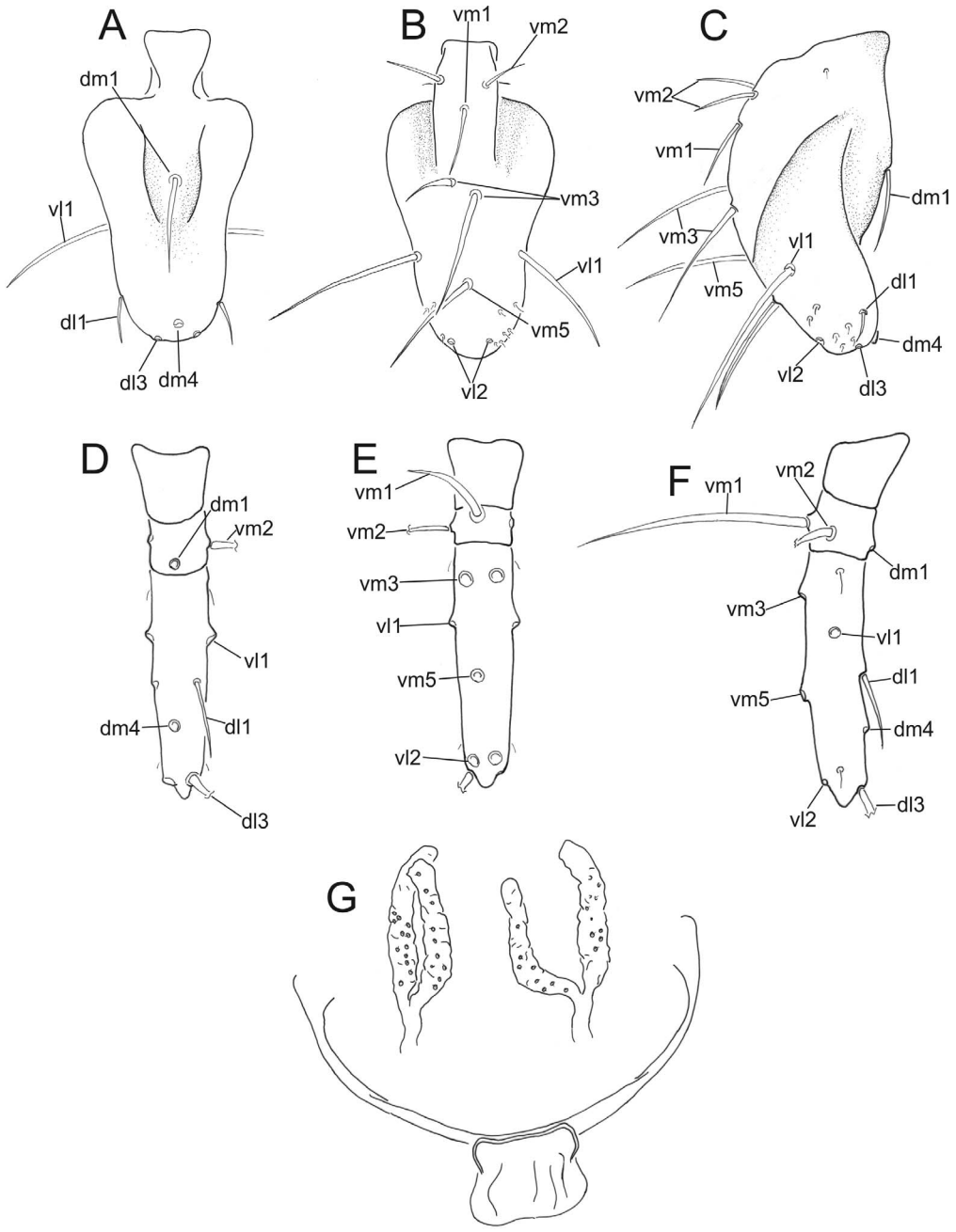

Figure 19.—*Paradraculoides trinity* sp. nov.: A–C, holotype male (WAM T92510): A. Flagellum, dorsal; B. Flagellum, ventral; C. Flagellum, lateral. D–G, paratype female (WAM T92515): D. Flagellum, dorsal; E. Flagellum, ventral; F. Flagellum, lateral; G. Spermathecae, ventral. Abbreviations: dm1, 4 (dorso-median 1, 4), dl1, 3 (dorso-lateral 1, 3), vm1, 2, 3, 5 (ventro-median 1, 2, 3, 5), vl1, 2 (ventro-lateral 1, 2).

close to posterior margin; dl1 between dm4 and vl1, but much closer to dm4; dl3 closer to posterior margin than vl2; vm2 situated anterior to vm1, vm1 closer to vm2 than to vm3; vm5 situated closer to vl2 than to vm3; 1 pair of microsetae near anterior end, six pairs posteriorly between dl1, dl3, vl1 and vl2. Female: 5.75 x longer than broad (Figs. 18H–J, 19D–F); seta dm1 situated towards posterior end of flagellomere II, more posterior than vm2; setae dl1 situated anterior to dm4, dm4 situated at three quarters length of flagellomere III; dl3 situated at posterior margin directly above vl2, vm1 situated slightly more anterior than vm2, vm3 situated closer to vm1 than to vm5, vm5 halfway between vm3 and vl2, vl1 situated posterior to vm3 and anterior to dl1; 1 pair of microsetae baso-laterally on flagellomere III, 1 pair of microsetae laterally between vl2 and dm4.

Female genitalia: Two pairs of elongate spermathecae, each pair connected basally before connection with bursa (Fig. 19G), distally round and smooth; sparsely covered with small pores; gonopod short, distally broad.

Dimensions (mm): Holotype male (WAM T92510): Body length 4.76. Propeltidium 1.38/0.75. Chelicera 0.99. Flagellum 0.58/0.33. Pedipalp: trochanter 0.65, femur 0.75, patella 0.79,

tibia 0.77, tarsus 0.37, claw 0.19, total excluding claw 3.33. Leg I: trochanter 0.46, femur 2.00, patella 2.54, tibia 2.02, metatarsus 0.60, tarsus 0.81, total 8.43. Leg IV: trochanter 0.50, femur 1.84/0.29, patella 0.77, tibia 1.34, metatarsus 0.96, tarsus 0.58, total 5.99.

Paratype female (WAM T92515): Body length 5.76. Propeltidium 1.54/0.86. Chelicera 1.12. Flagellum 0.46/0.08. Pedipalp: trochanter 0.69, femur 0.85, patella 0.87, tibia 0.79, tarsus 0.40, claw 0.17, total excluding claw 3.60. Leg I: trochanter 0.52, femur 1.82, patella 2.21, tibia 1.82, metatarsus 0.52, tarsus 0.75, total 7.64. Leg IV: trochanter 0.44, femur 1.73/0.29, patella 0.73, tibia 1.35, metatarsus 1.19, tarsus 0.67, total 6.11.

Variation: Body length (males, $n = 1$) 5.22, (females, $n = 1$) 4.35; propeltidium (males) 1.57/0.83, (females) 1.48/0.79.

Remarks.—*Paradraculoides trinity* is known from Trinity Bore, Western Australia (Fig. 1).

ACKNOWLEDGMENTS

We gratefully acknowledge the Australian Premium Iron Joint Venture for their generous financial support for this project, and to the many zoologists of Biota Environmental Sciences (Tim Sachse, Jason Alexander, Jess Cairnes, Myles Menz, David Keirle and Dan Kamien), who collected the specimens used in the study. Yvette Hitchen assisted with some of the sequencing. We are grateful to Dr Ron Clouse for supplying primer information. Part of this study was funded by the Gorgon Barrow Island Net Conservation Benefits Fund, and Australian Biological Resources Study research grant no. RF216-06.

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Manuscript received 12 December 2017, revised 13 April 2018.