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A New Species of Tasmanian Mountain Shrimp, *Anaspides driesseni* sp. nov. (Malacostraca, Anaspidacea, Anaspidesidae)

Christoph G. Höpel[1], Stefan Richter[1], and Shane T. Ahyong[2]

[1] Allgemeine & Spezielle Zoologie, Institut für Biowissenschaften,
Universität Rostock, Universitätsplatz 2, 18055 Rostock, Germany

[2] Australian Museum Research Institute,
Australian Museum, 1 William Street, Sydney NSW 2010, Australia, and

[2] School of Biological, Earth & Environmental Sciences,
University of New South Wales, Kensington NSW 2052, Australia

Abstract. Species of the genus *Anaspides*, known as mountain shrimps, are endemic to Tasmania and inhabit a variety of freshwater habitats such as mountain tarns, pools, creeks and runnels, as well as caves. Until 2015 only two species of Tasmanian mountain shrimps were recognized, *A. tasmaniae* (Thomson, 1893), which was believed to be widespread all over the island and *A. spinulae* from Lake St. Clair. Revision of the genus by Ahyong in 2016 recognized 7 species, most having narrow geographic distributions. Only two widespread species remained: *A. richardsoni,* occurring mainly on the Central Plateau and its margins, and *A. swaini*, occurring largely in south-western Tasmania. Notably, within *A. swaini*, three geographically correlated morphological forms were observed. We re-evaluated all three forms of *A. swaini* and herein describe one of the forms as a new species, *A. driesseni*, on the basis of morphological and molecular data. *Anaspides driesseni* corresponds to *A. swaini* form 3 and occurs mainly in south-eastern Tasmania from the Hartz Mountains over the Snowy Mountains to the Wellington Range. Telson structure, spination and male secondary sexual characters proved taxonomically instrumental.

Introduction

The investigations of Ahyong (2015, 2016) significantly expanded our taxonomic knowledge of *Anaspides* leading to the morphological description of five new species, *A. clarkei* Ahyong, 2015*, A. jarmani* Ahyong, 2015*, A. swaini* Ahyong, 2015*, A. eberhardi* Ahyong, 2016 and *A. richardsoni* Ahyong, 2016, bringing the known fauna to seven species. Ahyong (2016), however, observed geographically correlated morphological variation in some species (e.g., *A. swaini, A. richardsoni*) suggesting additional unrealized taxonomic diversity. *Anaspides swaini* is notable*,* having the widest putative distribution, ranging from southern Tasmania from the Weld River, Snowy Mountains region, Mt Field and Mt Wellington (North West Bay River catchment) to the Western Arthurs Range, throughout the Franklin-Gordon drainage, north to Lake Rhona and Frenchmans Cap, Mt Rufus and the vicinity of Lake St. Clair on the Central Plateau. Ahyong (2016) observed three morphologically different forms occurring in different areas and drainages. Form 1 corresponds to *A. swaini sensu stricto* and has a south-western range, essentially around the periphery of

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ORCID: Christof G. Höpel 0000-0001-6827-3767, Stefan Richter 0000-0002-2865-2751, and Shane T. Ahyong, 0000-0002-2820-4158
Corresponding author: Christoph G. Höpel christoph.hoepel@uni-rostock.de
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Lake Gordon and Lake Pedder, from Lake Rhona to Mt Field and Mt Mueller to the Snowy Mountains, Federation Peak, the Arthur Ranges and at least as far north as Coronation Peak on the south-western side of Lake Pedder. It is usually more spinose than form 2 and 3. *Anaspides swaini* form 1 was also included in the molecular study of Richter *et al*. (2018) where they found high intraspecific distances (especially within COI) between specimens that were collected alongside the Mueller Road occurring sympatrically in the sampled rivers. Form 2 has a northern range beyond Lakes Gordon and Pedder, from the southern part of the Central Plateau, where it ranges from the western vicinity of Lake St. Clair including the Cuvier Valley and Mt Rufus south to Butlers Gorge and Wentworth Hills and Frenchmans Cap; it continues further south in caves in the Nicholls Range karst (Bill Nielson) and Franklin River karst (Kutikina), where it is apparently isolated from surface forms (Eberhard *et al*., 1991). Form 3 has a south-eastern distribution; it occurs east of Tyler's Line, ranging from the western and northern Wellington Range, including the North West Bay River catchment of Mt Wellington, to at least the Huonville area.

The taxonomic status of *A. swaini* form 2 is currently subject to ongoing study, but herein, we formally recognize *A. swaini* form 3 as new to science.

Material and methods

Collection, identification of specimens and morphological methods

Morphological terminology follows Ahyong (2015, 2016). Measurements of specimens are of total body length, measured from the apex of the rostrum to the tip of the telson. Abbreviations: above sea-level (*asl*); feet (*ft*); indeterminate (*indet*); juvenile (*juv.*).

For the taxonomic descriptions, ethanol preserved specimens were softened in glycerol for 1–2 days before dissection of appendages along the left side of the body. Illustrations were produced using a drawing tube attached to a Nikon Eclipse 80i or Leica M165C stereomicroscope.

Specimens are deposited in the collections of the Australian Museum, Sydney (AM); South Australian Museum, Adelaide (SAMA); Tasmanian Museum and Art Gallery, Hobart (TMAG); National Museum of Natural History, Smithsonian Institution, Washington DC (USNM); Western Australian Museum (WAM); and Zoological Collection, Universität Rostock (ZSRO).

A total of 94 specimens of *A. swaini* and *A. driesseni* sp. nov. were collected and newly sequenced for this study (Table 1). In addition, a total of 47 COI, 57 16S rRNA and 30 28S sequences from the study by Richter *et al*. (2018) were included to calculate genetic distances.

Molecular methods

Tissue was removed from thoracopod 8 or from the pleopods. The DNA extraction was performed with the innuPrep Forensic Kit (Analytik Jena) and the DNeasy Blood and Tissue Kit (Qiagen), following the manufacturer´s instruction. Three different markers were partially sequenced: mitochondrial cytochrome c oxidase subunit I (COI) and 16S rRNA as well as the nuclear 28S rRNA. The polymerase chain reaction (PCR) had a total volume of 30 µl which contained 3 µl of each primer (each 10 µM), 3 µl 10× buffer (Sigma Aldrich), 3 µl dNTP mix (2 mM, Biozym), 2.58 µl $MgCl_2$ (25 mM, Sigma Aldrich), 0.12 µl Taq-polymerase (Sigma Aldrich), 10.71 µl ultrapure water and 4.5 µl of the DNA extract. Primers were LCO2 5'-TCN ACH AAY CAT AAA GAY ATT GGA AC-3' (Richter *et al*., 2018), HCO2198 5'-TAA ACT TCA GGG TGA CCA AAA AAT CA-3' (Folmer *et al*., 1994) for COI, 16Sa 5'-CGC CTG TTT ATC AAA AAC AT-3', 16Sb 5'-CTC CGG TTT GAA CTC AGA TCA-3' (Xiong & Kocher, 1991) for 16S and rd4.8a 5'-ACC TAT TCT CAA ACT TTA AAT GG-3', rd7b1 5'-GAC TTC CCT TAC CTA CAT-3' (Richter *et al*., 2007) for 28S rRNA. PCR amplification programs comprised an initial denaturation step at 94°C for 1 min, followed by 40 amplification cycles (94°C for 30 s, 50°C for 30 s, 72°C for 60 s) for COI, 38 amplification cycles (94°C for 30 s, 48°C for 30 s, 72°C for 60 s) for 16S, 35 amplification cycles (94°C for 30 s, 55°C for 30 s, 72°C for 60 s) for 28S and a final elongation step at 72°C for 5 min.

All PCR reactions were performed with a Mastercycler gradient (Eppendorf). PCR products were visualized by gel electrophoresis, using 5 µl of the PCR product with 1.5 µl loading buffer DNA b II (AppliChem) on a 1.2 % agarose/TAE gel stained with 5 µl Rotisafe (Carl Roth). PCR products were purified using paramagnetic beads (High Prep PCR, Magbio) following the manufacturer's instruction with a final volume of 25 µl. Sequencing of PCR products was performed in Lightrun 96 well plates by the company, Eurofins Genomics, as well as using the dideoxy chain termination method and cycle sequencing using an ABI Prism® Big Dye® Terminator V.1.1 Cycle Sequencing Kit. Cycle sequencing products were analysed by using capillary separation on an ABI Genetic Analyzer 3130 xl (Applied Biosystems/Hitachi). The resulting chromatograms were manually checked and adjusted with Geneious 2021.0.3 (Biomatters Limited). The sequences of all three gene fragments were separately aligned using Consensus Align implemented in Geneious Prime 2021.0.3 (Biomatters Limited) with default parameters. All sequences were deposited at GenBank (Benson *et al*., 2005) (accession numbers: OP684680–684764, OP686521–686535, OP686545–686569, OQ158727–OQ158764, OQ160856–OQ160881, OQ160958–OQ160970). Pairwise distances were calculated using MEGA X (Kumar *et al*., 2018). For pairwise distance analyses the uncorrected p-distance was calculated. Phylogenetic networks were calculated with Network 10.2.0.0. (Fluxus Technologies) separately for COI, 16S, and 28S alignments by using the median-joining method with the parameter epsilon set to 10.

Table 1. List of individuals newly sequenced for this study. For each specimen, ID, species, locality details, deposition and GenBank accession numbers are provided. Abbreviations: *(P)* denotes paratype; collectors: *SA*, S. Ahyong; *MD*, M. Driessen; *MG*, M. Grams; *CH*, C. Höpel; *AP*, A. Palfreyman; *MR*, M. Reinhardt; *SR*, S. Richter; and *MW*, M. Weiler. GenBank registrations listed under *28S, 16S* and *COI*.

ID	species	locality	latitude longitude	date	collectors	deposition	28S	16S	COI
Ana 143	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	—	OP684680
Ana 144	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	OP686521	OP684681
Ana 145	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	OP686522	OP684682
Ana 146	*A. driesseni* (P)	Myrtle Forest Creek MF 2	-42.86028° 147.15222°	28.02.2017	SA, CH, MR, SR	ZSRO CR67	OP686545	—	OP684728
Ana 147	*A. driesseni* (P)	Myrtle Forest Creek MF 2	-42.86028° 147.15222°	28.02.2017	SA, CH, MR, SR	ZSRO CR67	—	—	OP684729
Ana 148	*A. driesseni* (P)	Myrtle Forest Creek MF 2	-42.86028° 147.15222°	28.02.2017	SA, CH, MR, SR	ZSRO CR67	—	OP686534	OP684730
Ana 149	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68883° 146.50125°	17.03.2017	CH, MR, SR	ZSRO CR70	—	—	OP684683
Ana 150	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68883° 146.50125°	17.03.2017	CH, MR, SR	ZSRO CR70	—	—	OP684684
Ana 151	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68883° 146.50125°	17.03.2017	CH, MR, SR	ZSRO CR70	—	—	OP684685
Ana 152	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	—	OP686523	OP684686
Ana 153	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	OP686546	—	OP684687
Ana 154	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	—	OP686524	OP684688
Ana 155	*A. swaini*	Mueller Rd, 3.8 km behind west gate	-42.81069° 146.42728°	18.03.2017	CH, MR, SR	ZSRO CR74	—	—	OP684689
Ana 156	*A. swaini*	Mueller Rd, 3.8 km behind west gate	-42.81069° 146.42728°	18.03.2017	CH, MR, SR	ZSRO CR74	—	—	OP684690
Ana 157	*A. swaini*	Mueller Rd, 3.8 km behind west gate	-42.81069° 146.42728°	18.03.2017	CH, MR, SR	ZSRO CR74	—	—	OP684691
Ana 158	*A. swaini*	Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684692
Ana 159	*A. swaini*	Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684693
Ana 160	*A. swaini*	Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684694
Ana 161	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	—	OP684695
Ana 162	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	OP686525	OP684696
Ana 163	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	—	OP684697
Ana 164	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	—	OP684698
Ana 165	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	—	OP684699
Ana 166	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	OP686526	OP684700
Ana 167	*A. swaini*	Tributary of Weld Rv, Müller Rd, 5.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	OP686547	—	OP684701
Ana 168	*A. swaini*	Styx River, Mueller Rd, 11.5 km behind west gate	-42.80467° 146.49436°	18.03.2017	CH, MR, SR	ZSRO CR78	—	—	OP684702
Ana 169	*A. swaini*	Styx River, Mueller Rd, 11.5 km behind west gate	-42.80467° 146.49436°	18.03.2017	CH, MR, SR	ZSRO CR78	—	—	OP684703
Ana 170	*A. driesseni*	Tributary of South Styx River, (Nevada Peak)	-42.84225° 146.61978°	18.03.2017	CH, MR, SR	ZSRO CR79	OP686548	OP686531	OP684731
Ana 310	*A. driesseni* (P)	Myrtle Forest Creek MF 1	-42.85944° 147.15917°	28.02.2017	SA, CH, MR, SR	ZSRO CR66	—	—	OP684732
Ana 311	*A. driesseni* (P)	Myrtle Forest Creek MF 1	-42.85944° 147.15917°	28.02.2017	SA, CH, MR, SR	ZSRO CR66	—	—	OP684733
Ana 312	*A. driesseni* (P)	Myrtle Forest Creek MF 1	-42.85944° 147.15917°	28.02.2017	SA, CH, MR, SR	ZSRO CR66	—	—	OP684734
Ana 313	*A. driesseni* (P)	Myrtle Forest Creek MF2	-42.86028° 147.15222°	28.02.2017	SA, CH, MR, SR	ZSRO CR67	—	—	OP684735
Ana 314	*A. driesseni* (P)	Myrtle Forest Creek MF2	-42.86028° 147.15222°	28.02.2017	SA, CH, MR, SR	ZSRO CR67	—	—	OP684736
Ana 315	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	—	OP684704
Ana 316	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	—	OP684705
Ana 317	*A. swaini*	Growling Swallet cave, "entrance hall"	-42.68974° 146.49950°	17.03.2017	CH, MR, SR	ZSRO CR69	—	—	OP684706
Ana 318	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68931° 146.49833°	17.03.2017	CH, MR, SR	ZSRO CR71	—	—	OP684707
Ana 319	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68931° 146.49833°	17.03.2017	CH, MR, SR	ZSRO CR71	OP686549	—	OP684708
Ana 320	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68931° 146.49833°	17.03.2017	CH, MR, SR	ZSRO CR71	—	—	OP684709
Ana 321	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68931° 146.49833°	17.03.2017	CH, MR, SR	ZSRO CR71	—	—	OP684710
Ana 322	*A. swaini*	Garths Creek, Growling Swallet Cave	-42.68931° 146.49833°	17.03.2017	CH, MR, SR	ZSRO CR71	—	—	OP684711
Ana 323	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	—	—	OP684712

Table 1 continued.

ID	species	locality	latitude longitude	date	collectors	deposition	28S	16S	COI
Ana 324	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	—	—	OP684713
Ana 325	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 2 km behind west gate	-42.81269° 146.40881°	18.03.2017	CH, MR, SR	ZSRO CR73	—	—	OP684714
Ana 326	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684715
Ana 327	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684716
Ana 328	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 4.4 km behind west gate	-42.81047° 146.43333°	18.03.2017	CH, MR, SR	ZSRO CR75	—	—	OP684717
Ana 329	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	—	OP684718
Ana 330	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	—	OP684719
Ana 331	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 5.1 km behind west gate	-42.81194° 146.44100°	18.03.2017	CH, MR, SR	ZSRO CR76	—	—	OP684720
Ana 332	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 7.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	—	OP684721
Ana 333	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 7.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	—	OP684722
Ana 334	*A. swaini*	Tributary of Weld Rv, Mueller Rd, 7.1 km behind west gate	-42.81011° 146.46025°	18.03.2017	CH, MR, SR	ZSRO CR77	—	—	OP684723
Ana 335	*A. swaini*	Tributary of Styx Rv, Mueller Rd, 11.5 km behind west gate	-42.80467° 146.49436°	18.03.2017	CH, MR, SR	ZSRO CR78	OP686550	—	OP684724
Ana 489	*A. swaini*	Sanctuary Lake, Frankland Range	-42.93235° 146.03179°	13.02.2018	MD	ZSRO CR172	OP686551	—	—
Ana 490	*A. swaini*	Sanctuary Lake, Frankland Range	-42.93235° 146.03179°	13.02.2018	MD	AM P106566	OP686552	OP686527	—
Ana 491	*A. swaini*	Lake Sirona	-43.16481° 146.33769°	13.02.2018	MD	ZSRO CR173	OP686553	OP686528	OP684725
Ana 492	*A. swaini*	Lake Sirona	-43.16481° 146.33769°	13.02.2018	MD	ZSRO CR173	OP686554	OP686529	—
Ana 493	*A. swaini*	Lake Sirona	-43.16481° 146.33769°	13.02.2018	MD	AM P106567	OP686555	—	—
Ana 494	*A. swaini*	Lake Cygnus	-43.12971° 146.23611°	13.02.2018	MD	ZSRO CR174	OP686556	—	—
Ana 495	*A. swaini*	Lake Cygnus	-43.12971° 146.23611°	13.02.2018	MD	AM P106568	OP686557	—	—
Ana 496	*A. driesseni*	unnamed creek on Pipeline track	-42.95144° 147.23047°	19.02.2019	SA, MG, CH, SR	ZSRO CR175	—	—	OP684737
Ana 497	*A. driesseni*	unnamed creek on Pipeline track	-42.95144° 147.23047°	19.02.2019	SA, MG, CH, SR	ZSRO CR175	OP686558	—	OP684738
Ana 498	*A. driesseni*	unnamed creek on Pipeline track	-42.95144° 147.23047°	19.02.2019	SA, MG, CH, SR	ZSRO CR175	—	OP686532	OP684739
Ana 499	*A. driesseni*	unnamed creek on Pipeline track	-42.95144° 147.23047°	19.02.2019	SA, MG, CH, SR	ZSRO CR175	OP686559	—	OP684740
Ana 500	*A. driesseni*	Levert Rivulet	-42.94593° 147.23030°	19.02.2019	SA, MG, CH, SR	ZSRO CR176	—	—	OP684741
Ana 501	*A. driesseni*	Levert Rivulet	-42.94593° 147.23030°	19.02.2019	SA, MG, CH, SR	ZSRO CR176	OP686560	—	OP684742
Ana 502	*A. driesseni*	Levert Rivulet	-42.94593° 147.23030°	19.02.2019	SA, MG, CH, SR	ZSRO CR176	OP686561	—	OP684743
Ana 503	*A. driesseni*	Levert Rivulet	-42.94593° 147.23030°	19.02.2019	SA, MG, CH, SR	ZSRO CR176	—	—	OP684744
Ana 504	*A. driesseni*	St. Crispins Well	-42.94583° 147.23000°	19.02.2019	SA, MG, CH, SR	ZSRO CR177	OP686562	—	OP684745
Ana 505	*A. driesseni*	St. Crispins Well	-42.94583° 147.23000°	19.02.2019	SA, MG, CH, SR	ZSRO CR177	—	—	OP684746
Ana 508	*A. driesseni*	East-West track, roadside ditch	-42.87389° 147.14333°	20.02.2019	SA, MG, CH, SR	ZSRO CR178	OP686563	—	OP684747
Ana 509	*A. driesseni*	East-West track, roadside ditch	-42.87389° 147.14333°	20.02.2019	SA, MG, CH, SR	ZSRO CR178	—	—	OP684748
Ana 510	*A. driesseni*	East-West track, roadside ditch	-42.87389° 147.14333°	20.02.2019	SA, MG, CH, SR	ZSRO CR178	—	—	OP684749
Ana 511	*A. driesseni*	East-West track, roadside ditch	-42.87389° 147.14333°	20.02.2019	SA, MG, CH, SR	ZSRO CR178	—	—	OP684750
Ana 512	*A. driesseni*	Knights Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR179	—	—	OP684751
Ana 513	*A. driesseni*	Knights Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR179	—	—	OP684752
Ana 514	*A. driesseni*	Knights Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR179	—	—	OP684753
Ana 515	*A. driesseni*	Knights Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR179	OP686564	OP686533	OP684754
Ana 517	*A. driesseni*	Glen Dhu Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR180	OP686565	—	OP684755
Ana 518	*A. driesseni*	Glen Dhu Creek	-42.88111° 147.13639°	20.02.2019	SA, MG, CH, SR	ZSRO CR180	—	—	OP684756
Ana 519	*A. driesseni*	silted pool near creek feeding Glen Dhu Creek	-42.88222° 147.13472°	20.02.2019	SA, MG, CH, SR	ZSRO CR181	OP686566	—	OP684757
Ana 523	*A. swaini*	Khazad Dum entrance creek	-42.71428° 146.56731°	22.02.2019	SA, MG, CH, SR	ZSRO CR182	OP686567	—	OP684726
Ana 524	*A. swaini*	Khazad Dum entrance creek	-42.71428° 146.56731°	22.02.2019	SA, MG, CH, SR	ZSRO CR182	—	OP686530	OP684727
Ana 525	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	—	—	OP684758
Ana 526	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	OP686568	—	OP684759

Table 1 continued.

ID	species	locality	latitude longitude	date	collectors	deposition	28S	16S	COI
Ana 527	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	—	—	OP684760
Ana 528	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	—	—	OP684761
Ana 529	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	OP686569	—	OP684762
Ana 530	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	—	OP686535	OP684763
Ana 560	*A. driesseni*	road off Waterfall Creek Rd, unnamed creek	-42.75364° 146.62361°	23.02.2019	SA, MG, CH, SR	ZSRO CR183	—	—	OP684764
Ana 710	*A. driesseni* (P)	Myrtle Forest Creek	-42.86392° 147.15313°	08.11.2021	AP	ZSRO CR202	OQ160970	OQ160856	OQ158727
Ana 711	*A. driesseni* (P)	Myrtle Forest Creek	-42.86392° 147.15313°	08.11.2021	AP	ZSRO CR202	—	OQ160857	OQ158728
Ana 712	*A. driesseni* (P)	Myrtle Forest Creek	-42.86392° 147.15313°	08.11.2021	AP	ZSRO CR202	—	OQ160858	OQ158729
Ana 713	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	12.11.2021	AP	ZSRO CR204	OQ160969	OQ160859	OQ158730
Ana 714	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	OQ160968	OQ160860	OQ158731
Ana 715	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	—	OQ160861	OQ158732
Ana 716	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	OQ160967	OQ160862	OQ158733
Ana 717	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	OQ160966	OQ160863	OQ158734
Ana 718	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	—	OQ160864	OQ158735
Ana 719	*A. driesseni*	Billy Brown River	-42.91558° 146.98708°	21.01.2022	AP	ZSRO CR203	OQ160965	OQ160865	OQ158736
Ana 747	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	OQ160964	OQ160866	OQ158737
Ana 748	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	OQ160867	OQ158738
Ana 749	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	OQ160868	OQ158739
Ana 750	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	OQ160963	OQ160869	OQ158740
Ana 751	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158741
Ana 752	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158742
Ana 753	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158743
Ana 754	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158744
Ana 755	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158745
Ana 756	*A. driesseni*	Trestle Creek	-42.90022° 147.13638°	02.11.2022	SA, MG, CH, AP, SR, MW	ZSRO CR205	—	—	OQ158746
Ana 762	*A. driesseni*	Lake Skinner	-42.94036° 146.67886°	02.12.2022	MG, CH, AP, SR, MW	ZSRO CR206	OQ301631	—	OQ158747
Ana 765	*A. driesseni*	Lake Skinner	-42.94036° 146.67886°	02.12.2022	MG, CH, AP, SR, MW	ZSRO CR206	OQ301632	—	OQ158748
Ana 767	*A. driesseni*	Lake Skinner	-42.94036° 146.67886°	02.12.2022	MG, CH, AP, SR, MW	ZSRO CR206	OQ301633	—	OQ158749
Ana 769	*A. driesseni*	Lake Skinner	-42.94036° 146.67886°	02.12.2022	MG, CH, AP, SR, MW	ZSRO CR206	OQ301634	—	OQ158750
Ana 772	*A. driesseni*	unnamed tarn near summit of Snowy South	-42.94047° 146.66472°	02.12.2022	AP	ZSRO CR207	OQ160962	OQ160870	OQ158751
Ana 773	*A. driesseni*	unnamed tarn near summit of Snowy South	-42.94047° 146.66472°	02.12.2022	AP	ZSRO CR207	—	OQ160871	OQ158752
Ana 774	*A. driesseni*	unnamed tarn near summit of Snowy South	-42.94047° 146.66472°	02.12.2022	AP	ZSRO CR207	—	OQ160872	OQ158753
Ana 775	*A. driesseni*	unnamed tarn near summit of Snowy South	-42.94047° 146.66472°	02.12.2022	AP	ZSRO CR207	OQ160961	OQ160873	OQ158754
Ana 776	*A. driesseni*	unnamed tarn near summit of Snowy South	-42.94047° 146.66472°	02.12.2022	AP	ZSRO CR207	—	—	OQ158755
Ana 777	*A. driesseni* (P)	Myrtle Forest Creek	-42.85944° 146.15917°	08.12.2022	MG, CH, SR	ZSRO CR208	OQ160960	OQ160874	OQ158756
Ana 778	*A. driesseni* (P)	Myrtle Forest Creek	-42.85944° 146.15917°	08.12.2022	MG, CH, SR	ZSRO CR208	—	OQ160875	OQ158757
Ana 779	*A. driesseni* (P)	Myrtle Forest Creek	-42.85944° 146.15917°	08.12.2022	MG, CH, SR	ZSRO CR208	—	OQ160876	OQ158758
Ana 780	*A. driesseni* (P)	Myrtle Forest Creek	-42.85944° 146.15917°	08.12.2022	MG, CH, SR	ZSRO CR208	OQ160959	OQ160877	OQ158759
Ana 781	*A. driesseni*	Sorell Creek	-42.86835° 147.16942°	08.12.2022	MG, CH, SR	ZSRO CR209	OQ160958	OQ160878	OQ158760
Ana 782	*A. driesseni*	Sorell Creek	-42.86835° 147.16942°	08.12.2022	MG, CH, SR	ZSRO CR209	—	OQ160879	OQ158761
Ana 783	*A. driesseni*	Sorell Creek	-42.86835° 147.16942°	08.12.2022	MG, CH, SR	ZSRO CR209	—	OQ160880	OQ158762
Ana 784	*A. driesseni*	Sorell Creek	-42.86835° 147.16942°	08.12.2022	MG, CH, SR	ZSRO CR209	—	OQ160881	OQ158763
Ana 785	*A. driesseni*	Sorell Creek	-42.86835° 147.16942°	08.12.2022	MG, CH, SR	ZSRO CR209	—	—	OQ164764

Systematics

Syncarida Packard, 1885

Anaspidacea Calman, 1904

Anaspidesidae Ahyong & Alonso-Zarazaga, 2017

Anaspides Thomson, 1894

Anaspis Thomson, 1893: 7 (preoccupied, *Anaspis* Geoffroy, 1762 [Coleoptera]; type species: *Anaspis tasmaniae* Thomson, 1893).

Anaspides Thomson, 1894: 285, 286 (replacement name for *Anaspis* Thomson, 1892, preoccupied).

Diagnosis. See Ahyong (2016).

Species composition. *Anaspides tasmaniae* (Thomson, 1894) (type species), *A. clarkei* Ahyong, 2015, *A. driesseni* sp. nov., *A. eberhardi* Ahyong, 2016, *A. jarmani* Ahyong, 2015, *A. richardsoni* Ahyong, 2016, *A. spinulae* Williams, 1965, and *A. swaini* Ahyong, 2015.

Anaspides driesseni sp. nov.

urn:lsid:zoobank.org:act:555CA468-CCA2-42FC-8985-239C251CFCCF

Figs 1–5, 10E–F

Anaspides tasmaniae.—Smith, 1909a: 64, 70 (North West Bay River).—Manton, 1930: pl. 2, 3 (dark form).—Tjønneland *et al*., 1984: 226, figs. 1–10 (heart ultrastructure).

Anaspides swaini.—Ahyong, 2016: 352, 353, 359: fig. 32 G–J, 33A–J.—Höpel *et al*., 2021: 47, 52, fig. 2 [in part, form 3].

Holotype: TMAG G9228, ♂ (32 mm), Myrtle Forest Creek, Wellington Range, 42°51.6'S 147°10.3'E, 440 m asl, coll. R. Swain, Jun 1969. **Paratypes**: TMAG G6403, 4 ♂♂ (28–33 mm), 14 juv. ♂♂ (17–26 mm), 17 ♀♀ (24–38 mm), 3 juv. ♀♀ (18–21 mm), collected with holotype; ZSRO CR208, Ana777–Ana780 (sequenced), 1 juv. ♂ (23 mm), 3 juv. ♀♀ (21–23 mm), Myrtle Forest Creek, 42°51'34"S 147°09'33"E, 553 m asl, coll. M. Grams, C. Höpel & S. Richter, 08 Dec 2022; ZSRO CR202, Ana710-712 (sequenced) 1 ♂ (34 mm), 1 juv. ♂ (21 mm), 1 juv. ♀ (22 mm), Myrtle Forest Creek, 42°51'50.1012"S 147°09'11.2788"E, 676 m asl, coll. A. Palfreyman, 8 Nov 2021; ZSRO CR66, Ana310–Ana312 (sequenced), 3 juv. ♀♀ (8–11 mm), Myrtle Forest Creek, 42°51'34"S 147°09'33"E, 553 m asl, coll. S. Ahyong, C. Höpel, M. Reinhardt & S. Richter, 28 Feb 2017; ZSRO CR67, Ana146–148 (sequenced), Ana313–314 (sequenced), 2 juv. ♂♂ (13–15 mm), 3 juv. ♀♀ (12–15 mm), Myrtle Forest Creek, 42°51'37"S 147°09'08"E, 734 m asl, coll. S. Ahyong, C. Höpel, M. Reinhardt & S. Richter, 28 Feb 2017; AM P106558, 5 juv. ♂♂ (9–29 mm), 2 juv. ♀♀ (14–16 mm), Myrtle Forest Creek, 42°51'37"S 147°09'08"E, 734 m asl, coll. S. Ahyong, C. Höpel, M. Reinhardt & S. Richter, 28 Feb 2017; TMAG G6402, 4 ♂♂ (26–31 mm), 1 juv. ♂ (22 mm), 10 ♀♀ (27–34 mm), Myrtle Forest Creek, 42°51.6'S 147°10.3'E, 440 m asl, coll. R. Swain, Jun 1969; TMAG G983, 19 juv. ♂♂ (18–25 mm), 12 juv. ♀♀ (14–26 mm), Sorell Creek, Myrtle Gully [Myrtle Forest], Collinsvale, 42°53.8'S 147°15.4'E, 400 m asl, coll. museum staff, 9 Dec 1964; TMAG G6315, 4 ♂♂ (24–28 mm), 6 ♀♀ (25–32 mm), Myrtle Forest, Collinsvale, 42°51.6'S 147°10.3'E, 440 m asl, coll. R. Swain, Sep 1969.

Other material examined. *Southwest National Park, Snowy Mountains*: ZSRO CR183, 6 ♂♂ (29–35 mm), 3 juv. ♂♂ (15–16 mm), 3 ♀♀ (32–35 mm), 7 juv. ♀♀ (12–20 mm), Snowy North, road off Waterfall Creek Road, unnamed creek, tributary of Styx River, 42°49'39.03"S 146°39'41.70"E, 521 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 23 Feb 2019; AM P106559, 2 ♂♂ (29–34 mm), 2 juv. ♂♂ (13–17 mm), 6 ♀♀ (31–35 mm), 7 juv. ♀♀ (12–16 mm), Snowy North, logging road off Waterfall Creek Road, unnamed creek, tributary of Styx River, 42°45'13.1"S 146°37'25"E, 521 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 23 Feb 2019; ZSRO CR79, 1 juv. ♀ (9 mm), Snowy North, tributary of South Styx River, 42°50'32.1"S 146°37'11.2"E, 439 m asl, coll. C. Höpel, M. Reinhardt & S. Richter, 18 Mar 2017; TMAG 14369/G113, 2 ♂♂ (29 mm), 2 juv. ♂♂ (24–25 mm), 5 ♀♀ (24–34 mm), 1 juv. ♀ (23 mm) Snowy Mountains, 42°53.4'S 146°39'E, 2000 ft asl [600 m], coll. C.D. King, 20 Feb 1939; TMAG 14373/G117, 3 ♂♂ (29–32 mm), 2 juv. ♂♂ (25–26 mm), 3 ♀♀ (26–33 mm), 2 juv. ♀♀ (19–24 mm), Snowy Mountains, 42°55.5'S 146°40.5'E, 3000 ft asl [900 m], small Lake, coll. C.D. King, Feb 1939; AM P56374, 2 juv. ♂♂ (22–29 mm), Lake Skinner, Snowy Mountains, 42°57'S 146°41'E, C.62T, small stream at end of track to Lake, coll. W. Ponder *et al*., 15 Jan 1982; AM P73044, 2 juv. ♂♂ (17–28 mm), 3 juv. ♀♀ (10–25 mm), Snowy North, stream flowing into Styx River, 42°53.26'S 146°39.30'E, 590 m asl, coll. S. Jarman; TMAG G397, 1 ♀ (40 mm), plateau on summit of Mt Snowy, small pool 3 inches deep, 3500 ft asl [1050 m], coll. J.F. Thompson, 31 Jan 1962; ZSRO CR207, 2 ♂♂ (40 mm), 2 juv. ♂♂ (28–29 mm), 1 ♀ (41 mm), nameless tarn near summit of Snowy South, Snowy Mountains, 42°56'25.7"S 146°39'53.0"E, 1260 m asl, coll. A. Palfreyman, 02 Dec 2022; ZSRO CR206, 3 juv. ♂♂ (21–23 mm), 2 ♀♀ (27–31 mm), 2 juv. ♀♀ (22 mm), Lake Skinner, Snowy Mountains, 42°56'25.3"S 146°40'43.9"E, 980 m asl, coll. M. Grams, C. Höpel, A. Palfreyman, S. Richter, & M. Weiler, 02 Dec 2022; TMAG G3432, 4 ♀♀ (25–33 mm), 1 juv. ♀ (24 mm), Lake Skinner, Snowy Mountains, 42°56.8'S 146°40.5'E, 970 m asl], coll. D. Farnell, 28 Jan 1962; TMAG G130, 2 ♂♂ (32–34 mm), 1 juv. ♂ (25 mm), 3 ♀♀ (32–35 mm), 2 juv. ♀♀ (17–22 mm), Lake Denison, 42°57.4'S 146°41.0'E, 1900 ft asl [570 m], coll. C. King, Feb 1936; TMAG G127, 1 juv. ♂ (25 mm), 5 juv. ♀♀ (13–20 mm), Lake Denison, 42°57.4'S 146°41.0'E, 1900 ft asl [570 m], coll. C. King, Feb 1939; TMAG G112, 1 ♂ (28 mm), 2 juv. ♂♂ (23–25 mm), 7 ♀♀ (26–31 mm), 2 juv. ♀♀ (22–25 mm), Lake Skinner, Snowy Mountains, 42°56.8'S 146°40.1'E, c. 3000 ft asl [970 m], coll. C.D. King, Feb 1939; TMAG G6407, 2 ♂♂ (28–29 mm), 6 juv. ♂♂ (20–22 mm), 10 ♀♀ (23–26 mm), 9 juv. ♀♀ (8–14 mm), Snowy Mountains, 42°54'S 146°42'E, tarn, coll. M. Fenton, 19 Nov 1970; TMAG G6361, 1 juv. ♂ (12 mm), Snowy South, 42°56.7'S 146°39.4'E, small Lake on slope, 1340 m asl, coll. P. Davies, Apr 1986; AM P99308, 1 ♂ (damaged), Lake Picton, 43°09.56'S 146°38.23'E, coll. S. Jarman; TMAG G6317, 10 juv. ♂♂ (15–28 mm), 20 ♀♀ (24–33 mm), 11 juv. ♀♀ (14–21), Lake Picton, 43°09.5'S 146°38.3'E, 900 m asl, 23 Jan 1969; TMAG G6424, 1 ♂ (24 mm), 2 juv. ♂♂ (26–28 mm), 25 ♀♀ (23–36 mm), Lake Picton, 43°09.5'S 146°38.2'E, 900 m asl, coll. P. Tyler, Jan 1969.

Arve Valley, Hartz: TMG G2214, 1 ♀ (25 mm), Arve Loop Road, Arve Valley, 43°07.7'S 146°44.9'E, from creek, 390 m asl, coll. R. Shoobridge, 14 Feb 1980; TMAG G6382, 24 juv. ♂♂ (13–28 mm), 8 ♀♀ (26–32 mm), 39 juv. ♀♀ (8–24 mm), 1 indet juv. (7 mm), Hartz Mountains [almost certainly from northern Hartz], coll. R. Swain & G. Bert, Feb 1970.

Wellington Range: ZSRO CR209, 1 ♂ (35 mm), 7 juv. ♂♂ (16–25 mm), 1 ♀ (37 mm), 5 juv. ♀♀ (13–24 mm), 3 indet juv. (5–7 mm), Sorell Creek, 42°52'6.0492"S 147°10'9.9084"E, 600 m asl, coll. M. Grams, C. Höpel, & S. Richter, 08 Dec 2022; ZSRO CR178, 5 indet juv. (6–11 mm), East-West track, roadside ditch, 42°52'26"S 147°08'36"E, 961 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; AM P106563, 1 juv. ♂ (24 mm), 2 ♀♀ (33–34 mm), 1 indet juv. (7 mm), East-West track, roadside ditch, 42°52'26"S 147°08'36"E, 961 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; ZSRO CR181, 1 ♀ (38 mm), silted pool near creek feeding Glen Dhu Creek, 42°52'56"S 147°08'05"E, 946 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; ZSRO CR180, 3 juv. ♀♀ (16–21 mm), 2 indet (9 mm), Glen Dhu Creek, 42°52'52"S 147°08'11"E, 930 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; AM P106564, 1 ♂ (30 mm), 3 ♀♀ (27–40 mm), Glen Dhu Creek, 42°52'52"S 147°08'11"E, 930 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; ZSRO CR179, 3 juv. ♂♂ (22–29 mm), 1 ♀ (33 mm) Knights Creek, 42°52'08"S 147°12'02"E, 687 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; AM P106565, 1 juv. ♂ (24 mm), 3 ♀♀ (35–39 mm), Knights Creek, 42°52'08"S 147°12'02"E, 687 m asl, coll. S. Ahyong, M. Grams, C. Höpel, S. Richter, 20 Feb 2019; AM P106780, 1 ♂ (34 mm), 1 juv. ♂ (15 mm), 1 juv. ♀ (21 mm), 3 ♀♀ (33–40 mm), Trestle Creek, 42°54'0.7812"S 147°08'10.9788"E, 480 m asl, coll. S. Ahyong, M. Grams, C. Höpel, A. Palfreyman, S. Richter & M. Weiler, 02 Nov 2022; ZSRO CR205, 1 ♂ (30 mm), 2 juv. ♂♂ (18–21 mm), 9 ♀♀ (32–36 mm), 3 juv. ♀♀ (18–21 mm), Trestle Creek, 42°54'0.7812"S 147°08'10.9788"E, 480 m asl, coll. S. Ahyong, M. Grams, C. Höpel, A. Palfreyman, S. Richter & M. Weiler, 02 Nov 2022; ZSRO CR204, 1 juv. ♀ (16 mm), Trestle Creek, 42°54'0.7812"S 147°08'10.9788"E, 480 m asl, coll. A. Palfreyman, 12 Nov 2021; AM P4143, 1 ♂ (32 mm), 1 ♀ (34 mm), Mt Wellington, 42°53.8'S 147°14.5'E, coll. E.A. Briggs, pre 1918; AM P14772, 2 ♂♂ (24–26 mm), 1 juv. ♂ (19 mm), 1 juv. ♀ (21 mm), Mt Wellington, 42°54'S 147°14'E, from University of Sydney Biology Dept,

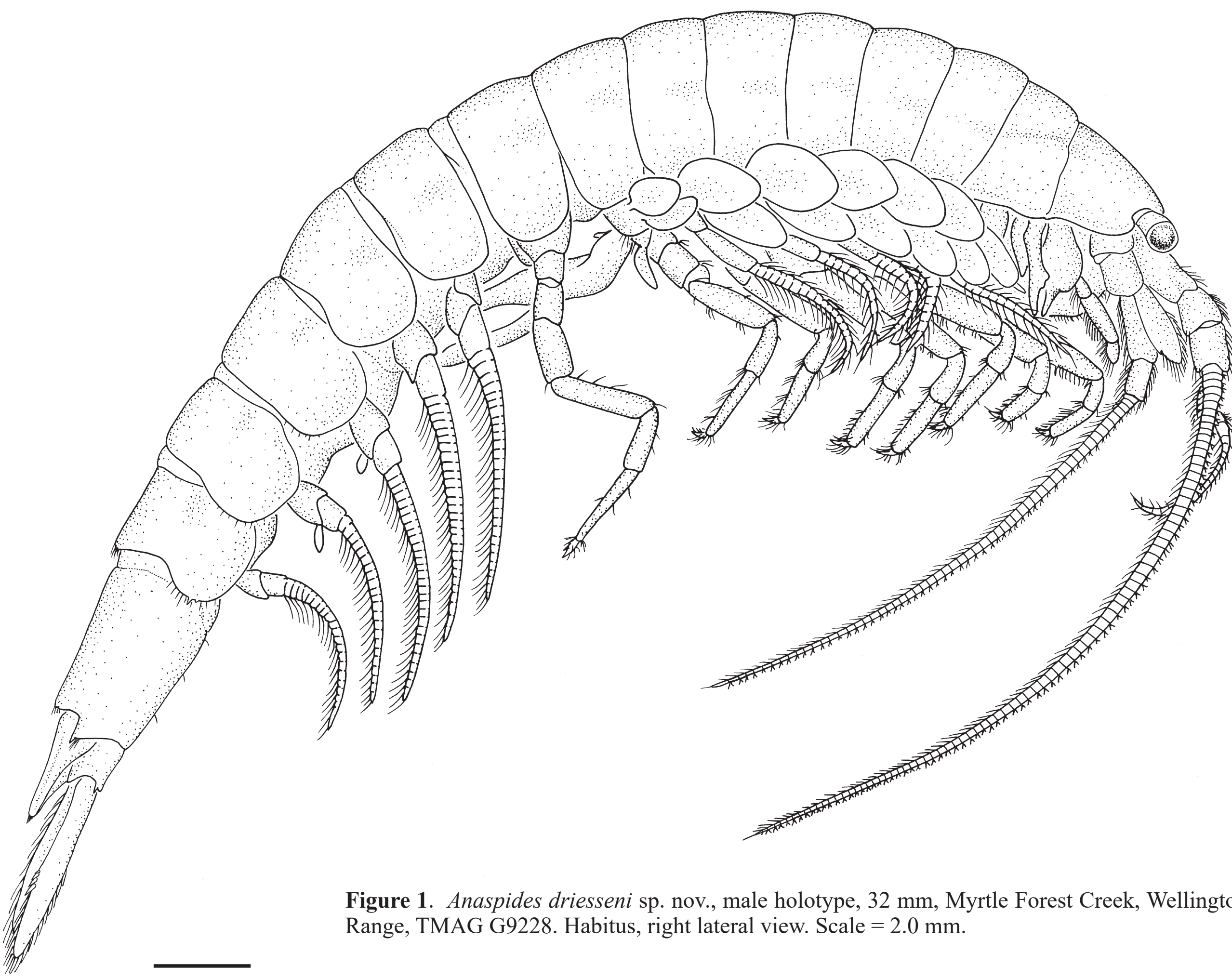

Figure 1. *Anaspides driesseni* sp. nov., male holotype, 32 mm, Myrtle Forest Creek, Wellington Range, TMAG G9228. Habitus, right lateral view. Scale = 2.0 mm.

1964; AM P14773, 1 ♂ (36 mm), Mt Wellington, from University of Sydney Biology Dept in 1964, possible Haswell label; AM G1779, 1 ♂ (24 mm), 3 ♀♀ (24–27 mm), 5 juv. ♀♀ (14–20 mm), summit of Mt Wellington, 42°54'S 147°14'E, pres. C. Hedley, pre 1898; AM P2266, 1 ♂ (34 mm), Mt Wellington, 42°54'S 147°14'E, pres. E.G. Goddard; AM P2551, 1 ♂ (32 mm), 4 juv. ♂♂ (19–22 mm), 3 ♀♀ (23–24 mm), 4 juv. ♀♀ (12–20 mm), Mt Wellington, 42°54'S 147°14'E, coll. T.T. Flynn; USNM 59126 (ex AM P2551), 2 ♂♂ (24–25 mm), Mt Wellington, coll. T.T. Flynn; USNM 78433, 1 ♂ (29 mm), Mt Wellington, snow pools in swamp, coll. Mel Ward; USNM 25030, 1 ♂ (27 mm), 1 ♀ (25 mm), "Lakes (4000 ft) Tasmania", G.M. Thomson; AM P9217, 11 juv. ♂♂ (18–29 mm), 12 juv. ♀♀ (19–27 mm), Wishing Well, Mt Wellington, 42°55.67'S 147°14.76'E, 1450 feet asl [442 m], coll. C. Anderson, A. Musgrave, G.P. Whitley, 23 Jan 1928; AM P10724, 8 juv. ♂♂ (16–22 mm), 3 ♀♀ (26–37 mm), 15 juv. ♀♀ (8–24 mm), Mt Wellington, 42°54'S 147°14'E, coll. F.D. Manning, Jan 1935; AM P56375, 1 ♂ (32 mm), 3 juv. ♂♂ (14–18 mm), 7 juv. ♀♀ (12–20 mm), Mt Wellington, small pools (running water) 2500 ft [750 m], coll. J.W. Evans, Dec 1938; AM P82859, 1 ♂ (24 mm), 2 juv. ♂♂ (9–11 mm), 1 ♀ (23 mm), 15 juv. ♀♀ (8–12 mm), Mt Wellington, 12 Mar 1997; TMAG G794, 1 ♂ (23 mm), back of Mt Wellington, coll. G.E. Nicholls, 16 Dec 1933; WAM C58162, 2 ♀♀ (29–34 mm), Mt Wellington, coll. J. Searle; WAM C367 (ex No. 6613), 3 juv. ♀♀ (16–17 mm), Mt Wellington, coll. J. Searle, 29 Jan 1913; SAMA C473, 2 ♀♀ (shrivelled, previously dried; c. 25–26 mm), 2 juv. ♀♀ (9–13 mm), 2 indet juv. (6 mm), North West Bay River, Mt Wellington, 42°55.3'S 147°11.2'E, 2700 ft [810 m], coll. Prof. Osborn; ZSRO CR203, 3 ♂♂ (29–31 mm), 1 juv. ♂ (22 mm), 2 ♀♀ (30–32 mm), Billy Brown River, 42°54'56.0988"S 146°59'13.4988"E, 580 m asl, coll. A. Palfreyman, 21 Jan 2022; AM P9218, 2 ♂♂ (30–32 mm), 3 juv. ♂♂ (20–22 mm), 5 ♀♀ (28–34 mm), 7 juv. ♀♀ (15–23 mm), Fern Tree Glen, Mt Wellington, 42°55.5'S 147°15.7'E, coll. C. Anderson, A. Musgrave, G.P. Whitley, 23 Jan 1928; TMAG G6450, 3 ♂♂ (30–33 mm), 3 juv. ♂♂ (16–22 mm), 6 ♀♀ (26–40 mm), 4 juv. ♀♀ (18–23 mm), St. Crispins Well, Mt Wellington, 42°55.76'S 147°12.57'E, 640 m asl, coll. R. Swain, 14 Feb 1971; ZSRO CR177, 1 juv. ♂ (25 mm), 1 juv. ♀ (16 mm), 3 indet juv. (7–10 mm), St. Crispins Well, 42°55'39.73"S 147°12'42.48"E, 750 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; AM P106560, 1 juv. ♂ (24 mm), 2 juv. ♀♀ (13–20 mm), 1 indet juv. (7 mm), St. Crispins Well, 42°55'39.73"S 147°12'42.48"E, 750 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; ZSRO CR176, 1 juv. ♀ (12 mm), 3 indet juv. (7–9 mm), Levert Rivulet, 42°56'45.33"S 147°13'49.08"E, 524 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; AM P106561, 1 juv. ♀ (26 mm), Levert Rivulet, 42°56'45.33"S 147°13'49.08"E, 524 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; ZSRO CR175, 2 juv. ♂♂ (10–13 mm), 1 juv. ♀ (13 mm), 2 indet juv. (9 mm), unnamed creek on Pipeline track, 42°57'05.2"S 147°13'49.7"E, 716 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; AM P106562, 1 juv. ♀ (12 mm), 1 indet juv. (7 mm), unnamed creek on Pipeline track, 42°57'05.2"S 147°13'49.7"E, 716 m asl, coll. S. Ahyong, M. Grams, C. Höpel & S. Richter, 19 Feb 2019; SAMA C8445, 1 juv. ♂ (21 mm), 1 ♀ (28 mm), 1 juv. ♀ (22 mm), Huonville, creeks, coll. R.T.T.

Description. Eyes with well-developed cornea, pigmented, wider than and longer than half length of stalk; stalk with subparallel margins. Rostrum narrow in adults, apex blunt.

Pleonites with pleura sparsely setose, rounded; pleura 1–3 unarmed; pleuron 4 usually unarmed (rarely with 1 small spine on one side); pleuron 5 with 0–3 small spines (usually unarmed or with 1 spine). Pleonite 5 posterior tergal margin setose, unarmed or with 1–4 small spines either side of midline. Pleonite 6 tergal posterior margin with 0–11 spines in juveniles and 0–15 in adults, setose; posterolateral margin setose, rounded, with or without minute denticles. Pleonal sternites 3–4 with distinctly bilobed median processes between pleopod bases, widest on sternite 3; sternite 5 with narrow, weakly emarginate lobe.

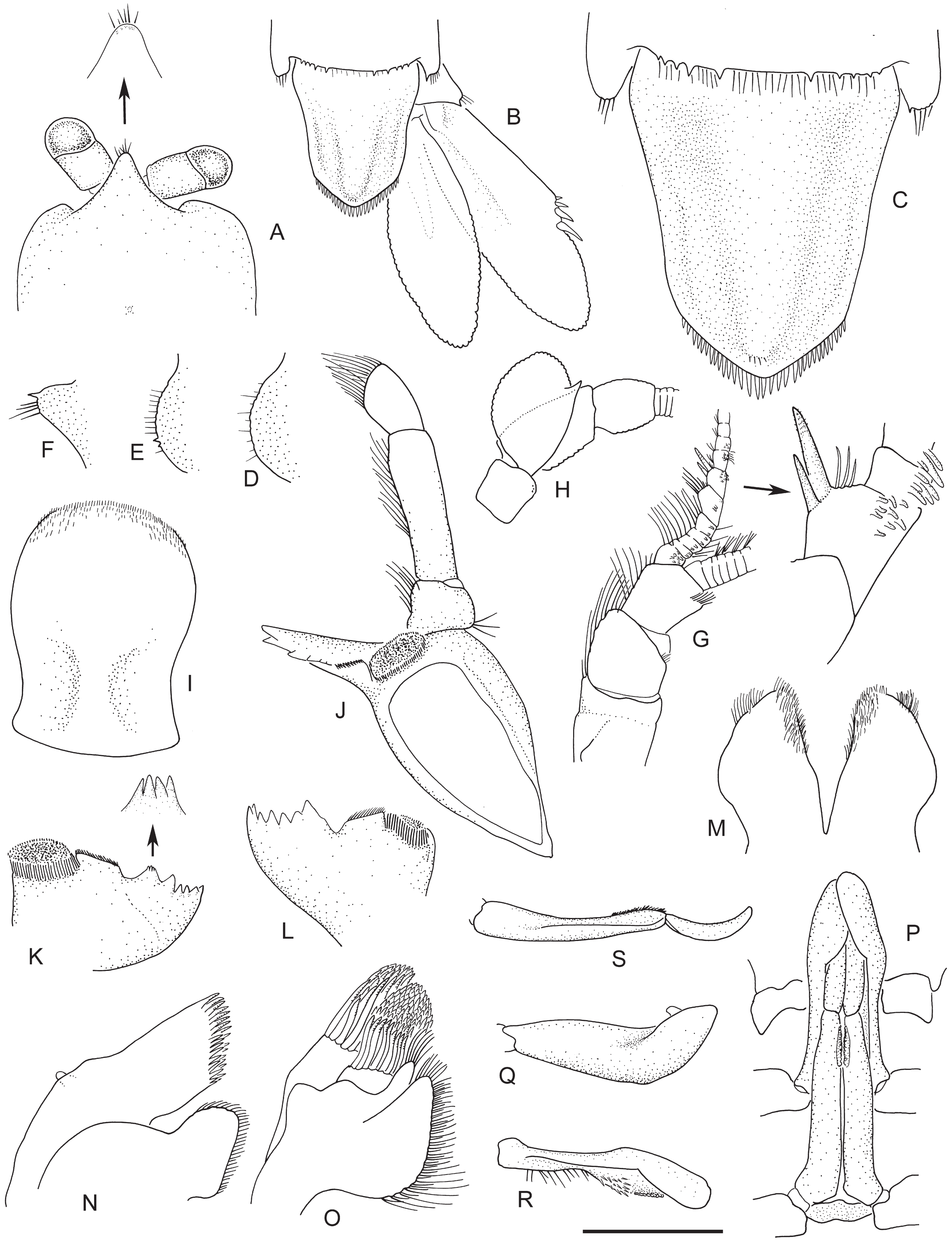

Figure 2. *Anaspides driesseni* sp. nov., male holotype, 32 mm, Myrtle Forest Creek, Wellington Range, TMAG G9228. (*A*) anterior cephalothorax, dorsal view; (*B*) pleonite 6, telson and right uropod; (*C*) pleonite 6 and telson; (*D–F*) pleonites 4–6 pleura, right lateral view; (*G*) right antennule; (*H*) right antenna; (*I*) labrum, anterior view; (*J*) right mandible; (*K*) right mandible incisor process; (*L*) left mandible incisor process; (*M*) paragnaths, anterior view; (*N*) right maxillule; (*O*) right maxilla; (*P*) pleopods 1–2, in-situ, ventral view; (*Q–R*) right pleopod 1 endopod, lateral view and dorsal view, respectively; (*S*) right pleopod 2 endopod, lateral view. Scale: A, B, D–H, P–S = 2.0 mm, C, I–O = 1.0 mm.

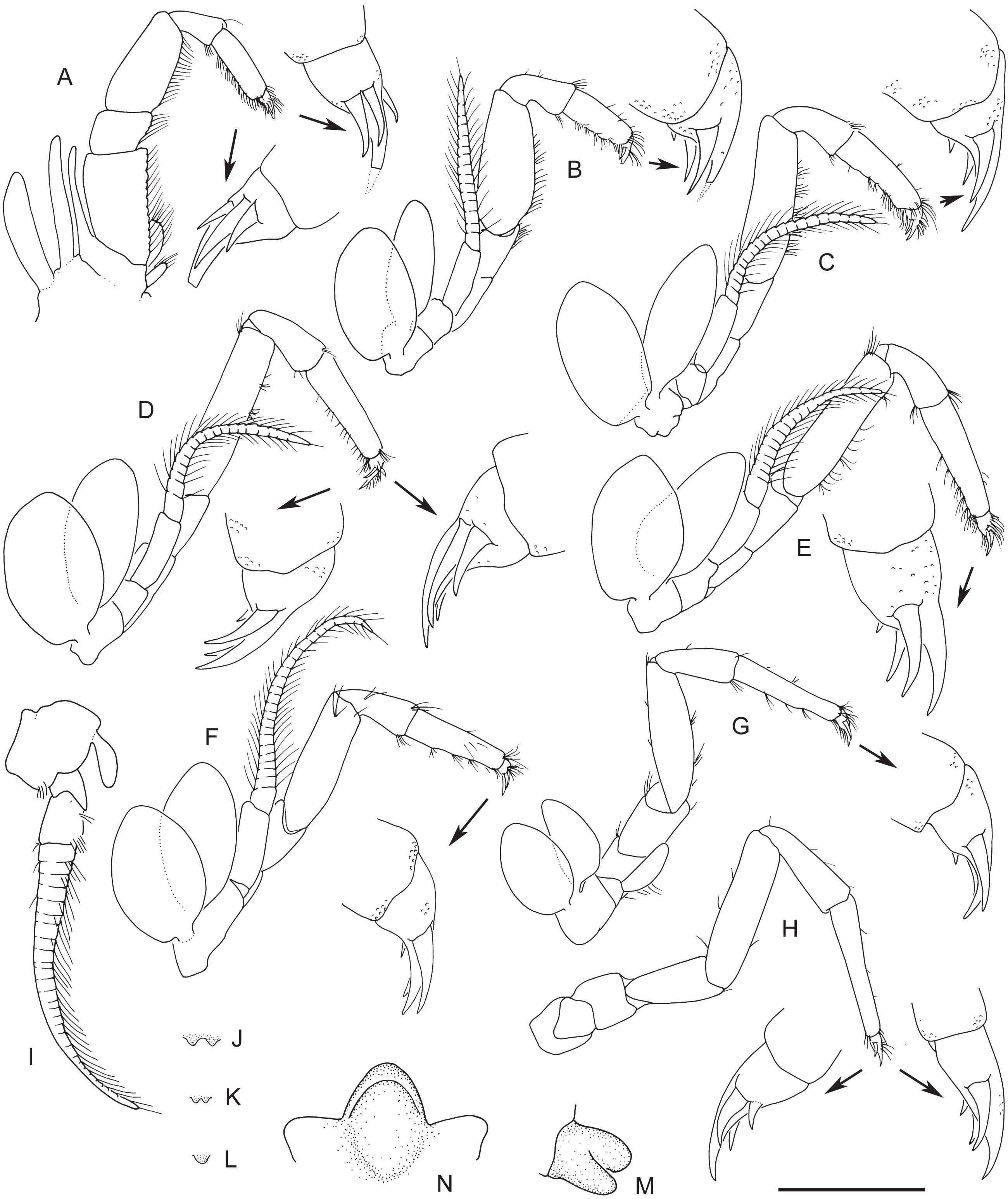

Figure 3. *Anaspides driesseni* sp. nov., (*A–L*) male holotype, 32 mm, Myrtle Forest Creek, Wellington Range, TMAG G6403; (*M–N*), female, 34 mm, Mount Wellington, AM P9218. (*A*) right thoracopod 1 (maxilliped); (*B–H*) right thoracopods 2–8, respectively; (I) right pleopod 4, anterior view; (*J–L*) pleonites 3–5 median sternal processes, respectively; (*M, N*) female gonopore, right lateral and ventral views, respectively. Scale 2.0 mm.

Telson slightly wider than long to longer than wide (usually equal to slightly wider than long), pentagonal, widest proximally; lateral margins slightly sinuous to nearly parallel in dorsal outline, transition from lateral to posterior margin obtusely angular; posterior margin slightly angular, apex bluntly rounded medially; posterior spine row with 14–53 (juveniles) or 24–54 (adults) slender, evenly graded, closely spaced spines, longest medially.

Antennule inner flagellum about 0.2× body length (22–23 annulations in holotype); in adult males articles 1–5 wider

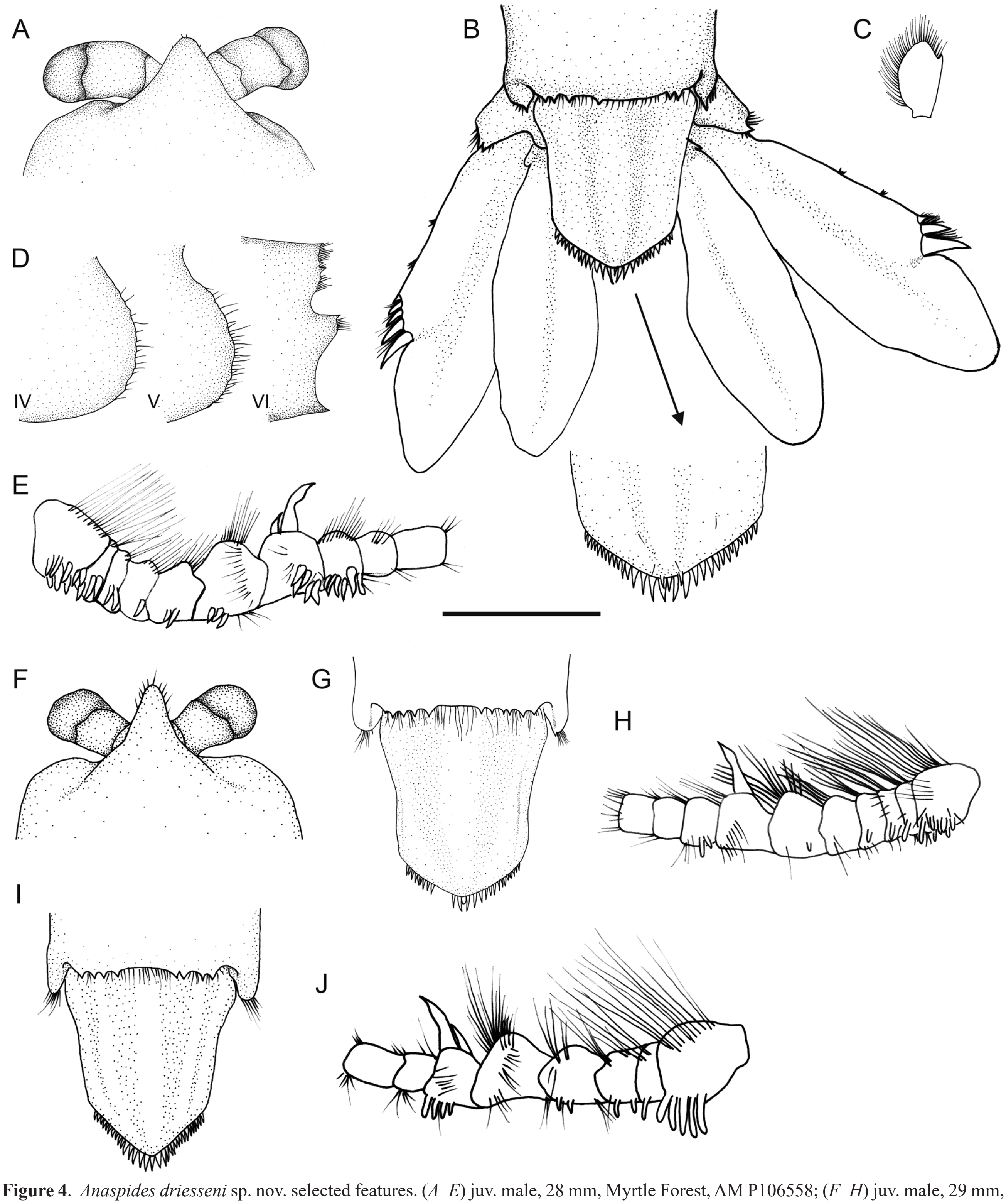

Figure 4. *Anaspides driesseni* sp. nov. selected features. (*A–E*) juv. male, 28 mm, Myrtle Forest, AM P106558; (*F–H*) juv. male, 29 mm, Myrtle Forest, AM P106558 (*I–J*) male, 28 mm, Mt Fenton, TMAG G6407. (*A, F*) anterior cephalothorax. (*B*) telson with uropods. (*C*) scaphocerite. (*G, I*) telson. (*D*) pleonal pleura. (*E*) right antennule with clasping spines. (*H, J*) left antennule with clasping spines. Scale: A–D, F, G, I = 2.0 mm, E, H, J = 1.0 mm.

than long, articles 6–7 as wide as long, article 8 wider than long, articles 1–6 densely setose on lateral inner margin, articles 1–8 with small spines on the outer lateral margin, longest on article 1, article 4–7 obtusely angled inner margin, article 7 usually with 2 small, clasping spines proximally (rarely 3 or 4 clasping spines on one site), directed distally, distal clasping spines equal to slightly longer than width of article 7, proximal clasping spine equal to slightly shorter than width of article 7; outer flagellum 0.5–0.9× body length (usually 0.5–0.7) (77–85 annulations in holotype).

Antennal flagellum 0.3–0.4× body length (55–58 annulations in holotype); scaphocerite elongate, ovate, lateral

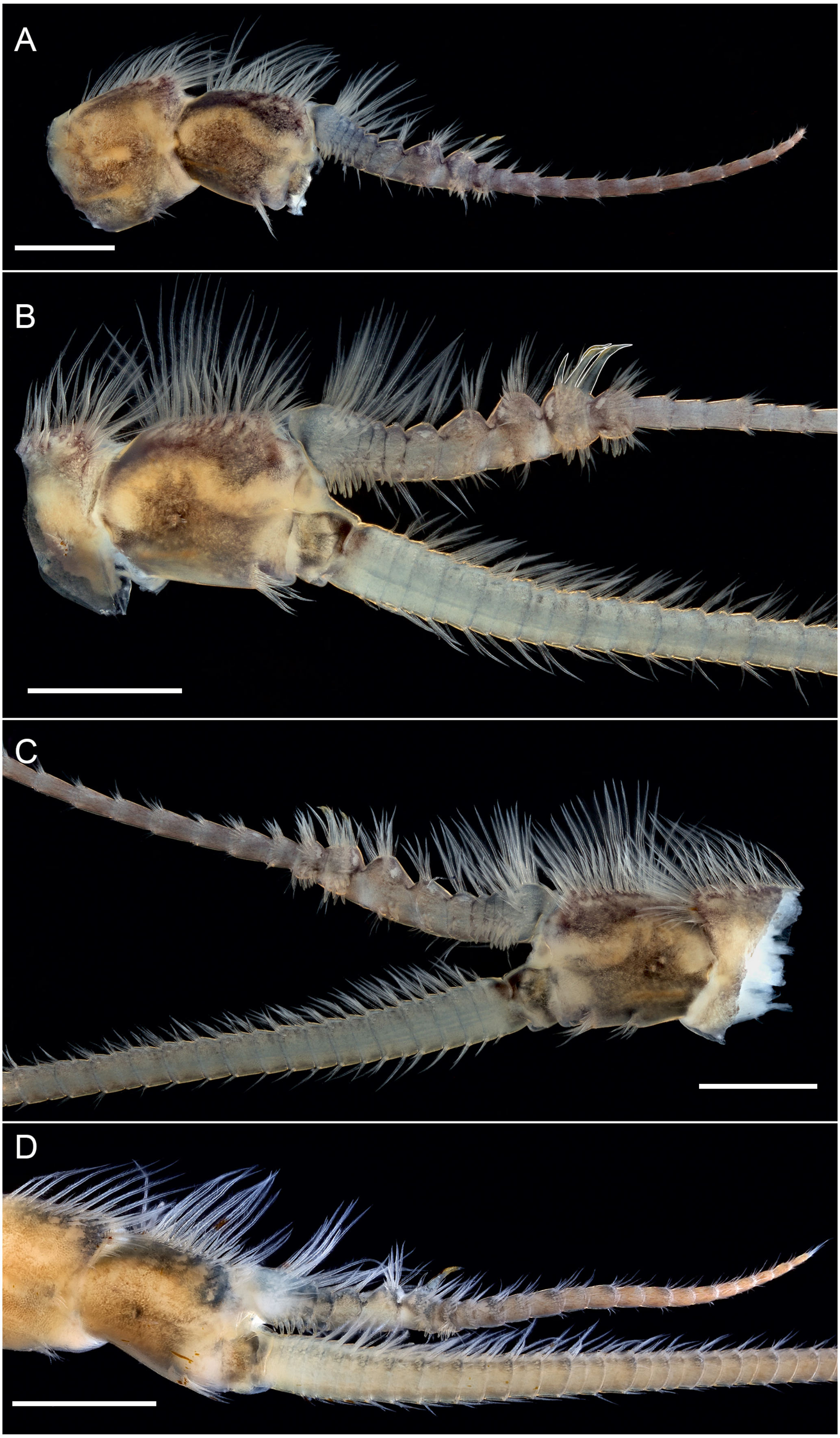

Figure 5. Dorsal view on the antenna of male *A. driesseni* sp. nov. (*A–C*) Snowy North, unnamed tributary of Styx River crossing the road off Waterfall Creek Road, ZSRO CR183; (*A*) 35 mm, right antenna; (*B*) Ana 560, 35 mm, right antenna, with 4 abnormal clasping spines, highlighted with white outlines; (*C*) Ana 560, 35 mm, left antenna; (*D*) right antenna, 29 mm, Knights Creek, Wellington Range, ZSRO CR179. Scale bars: 1 mm.

spine slightly distal to midlength; apex reaching as far as midlength of distal peduncular article.

Right mandibular incisor process with proximal tooth distally bifid to quadrifid, usually trifid.

Pleopods 1–4 (rarely on pleopod 5 on one side) each with endopod in adults. Adult male pleopod 1 distally widened, scoop-like, lateral margins expanded, obscuring retinacular lobe in lateral view.

Uropodal protopod dorsally unarmed or with 1–3 small spines; exopod with 2–5 movable spines on outer margin near position of partial diaeresis; exopod length about 2.5–3.0× width, slightly wider than endopod, apex rounded, narrow to relatively broad.

Measurements. Adult male (n = 62) 24–40 mm, juvenile male (n = 165) 9–29 mm, adult female (n = 187) 23–41 mm, juvenile female (n = 214) 8–27 mm, sex indeterminate (n = 24) 5–11 mm.

Distribution. South-eastern Tasmania from the Arve Valley and Hartz Mountains area over the Mt Picton area and Snowy Mountains to the Wellington Range and western to north-western Mt Wellington (Collinsvale and North West Bay River catchment); Southern-Derwent and Huon drainage system (Figs 7–10); 390–1260 m asl.

Etymology. Named in honour of Michael Driessen PhD, for his many contributions to the conservation of Tasmanian Wildlife, especially of our knowledge of *Allanaspides,* and for his facilitation of our research in Tasmania.

Remarks. Of the three morphological forms of *Anaspides swaini* recognized by Ahyong (2016), *A. driesseni* sp. nov. corresponds to form 3. *Anaspides driesseni* sp. nov. differs from form 1 through the reduced pleonal spination (except for some specimens from the Arthurs Range and Frankland Range), the less narrowed lateral margins of the telson, which are more parallel and narrows just to the end, the shape of the antennule inner flagellum with the highly setose lateral inner margins on article 1–6, the proportions of article 5–6 (in *A. swaini* form 1, article 5 is as wide as long to slightly longer than wide and article 6 is always longer than wide), the obtusely angled inner margin of article 4–7 and the presence of two short clasping spines, with the distal clasping spine being equal to slightly longer than the width of article 7 and the proximal clasping spine being equal to slightly shorter than the width of article 7 (Figs 2G, 4E,H,M, 5). In contrast, both clasping spines of *A. swaini* form 1 are always longer than the width of article 7 (1.3–2.0× longer than the width) (Fig. 11A,B). *Anaspides swaini* form 2 has reduced pleonal spination as in *A. driesseni*, but differs in the shape of the telson, resembling that of form 1, the presence of pleopodal endopod 1–5 and the shape of the antennule inner flagellum. As in *A. swaini* form 1, both clasping spines are longer than the width of article 7 (1.1–1.8× longer than the width of article 7), only article 6 is obtusely angled and articles 5–6 are longer than wide (Fig. 11C). Also *A. swaini* form 2 shows less setation on articles 1–6, similar to that of *A. swaini* form 1.

Anaspides driesseni sp. nov. is distinguished from other congeners by the combination of the angular posterior margin of the telson, the presence of pleopodal endopod 1–4, the greater size at maturity (23–29 mm, usually 26–28 mm), the shape of the antennule inner flagellum in adult males (Figs 2G, 4E,H,J, 5) and the presence of two small clasping spines (Figs 2G, 4E,J, 5).

Sexual maturation at a larger body size (indicated by the full development of secondary sexual features) is noticeable and separates *A. driesseni* from all other species of the genus. In *A. driesseni*, sexual maturity is reached by 23–29 mm, usually at 26–28 mm body length, while other species reach maturity at 18–23 mm (usually 20–21 mm), respectively 14–15 mm in *A. spinulae* (Ahyong, 2016). In *A. driesseni*, the endopod of pleopod 4 is not developed (occasionally on one side) before reaching a size of about 11 mm.

Overall, *A. driesseni* is morphologically rather consistent, with only slight variation evident. The specimens from the Snowy Range region, except those from the unnamed creek crossing the road off Waterfall Creek Road (tributary of Styx River) (ZSRO CR183, AM P106559), some specimens from Lake Skinner and one specimen from Lake Picton (TMAG G6424), lack the denticle on the uropodal protopod and show no pleural spination of the pleon. Furthermore, the antennular outer flagellum is elongated, ranging from 0.7–0.9× of the body length in comparison to specimens from the Wellington Range and the tributary of Styx River (0.4–0.8× of the body length, usually 0.4–0.6). The Arve-Valley-Hartz populations similarly lack the denticle on the uropodal protopod, but in the remaining characters, resemble the populations from the Wellington Range. Only in three aberrant specimens from Snowy North (ZSRO CR183) and one specimen from a nameless tarn near the summit of Snowy South, an abnormal number of clasping spines on one side was observed. Three specimens had 3 clasping spines (2x Snowy North, 1x Snowy South) on one side rather than the usual 2, and one specimen had 4 clasping spines (Fig. 5B). In these specimens the additional spines were not in a row as in "normal" males, but instead they stand disorderly in a second row, forming a kind of cluster. These cases appear to be the result of abnormal development of the clasping spines, which typically develop in a single row along the article axis.

Anaspides driesseni the species with the largest known males, with two males from an unnamed tarn near the summit of Snowy South reaching 40 mm total length. The largest known male so far is one male of *A. richardsoni* from Honeycomb Cave in the Mole Creek karst system reaching 37 mm. The largest epigean males apart *A. driesseni* are recorded with 33 mm in *A. richardsoni* and *A. tasmaniae* (Ahyong, 2016).

Why epigean *A. driesseni* attains such a large maximum body size compared to congeners might be related to the onset of maturity at a larger body size.

To date, there are no known subterranean occurrences of *A. driesseni*.

Molecular data. Maximum intraspecific uncorrected p-distances for *A. driesseni* were 2.2% in COI, 0.6% in 16S and 0.3% in 28S, while interspecific distances to other congeners of the genus *Anaspides* were 8.4–14.2% in COI, 1.2–7.1% in 16S and 0.6–3.5% in 28S (Table 2). In COI we uncovered 11 different haplotypes in 4 distinct haplotype clusters for *Anaspides driesseni* (Fig. 6). The first cluster comprises specimens from an unnamed creek crossing the road off Waterfall Creek Road, the tributary of South Styx River, a nameless tarn near Snowy South, Billy Brown River, Glen Dhu Creek and a roadside ditch near the East-West track. The second cluster comprises specimens from Lake Skinner, while the third cluster comprises specimens from St. Crispins Well and an unnamed creek crossing the Pipeline Track. The fourth cluster comprises specimens from Myrtle

Table 2. Inter- and intraspecific uncorrected p-distances for COI, 16S and 28S of *Anaspides spp.*

		A. swaini (form 1)	*A. driesseni*	*A. richardsoni*	*A. spinulae*	*A. tasmaniae*	*A. clarkei*	*A. jarmani*
A. swaini (form 1)	COI	0.0–10.2						
	16S	0.0–2.8						
	28S	0.0–0.2						
A. driesseni	COI	8.4–11.1	0.0–2.2					
	16S	1.2–3.1	0.0–0.6					
	28S	0.6–1.0	0.0–0.3					
A. richardsoni	COI	11.1–14.4	12.0–14.2	0.0–6.2				
	16S	3.1–4.3	4.0–5.3	0.0–1.2				
	28S	2.6–2.9	3.4–3.5	0.0–0.2				
A. spinulae	COI	12.0–14.2	13.3–14.0	0.5–5.6	0.0–1.6			
	16S	3.4–4.3	4.3–5.0	0.0–1.5	0.0–0.6			
	28S	—	—	—	—			
A. tasmaniae	COI	12.2–14.2	10.7–11.5	9.3–10.6	9.5–9.8	0		
	16S	2.8–4.0	4.0–4.6	2.8–3.4	2.8–3.1	0		
	28S	2.0–2.1	2.4–2.6	1.3–1.5	—	0		
A. clarkei	COI	11.3–14.4	10.7–12.8	11.7–13.3	11.5–12.9	11.7–12.9	0.0–2.6	
	16S	4.0–6.5	5.3–6.8	3.7–5.3	3.7–4.3	2.8–4.3	0.0–2.5	
	28S	2.7–2.8	2.8–3.0	2.9–3.0	—	2.5	0	
A. jarmani	COI	12.0–14.8	11.5–13.1	12.4–13.8	12.9–13.5	12.8–12.9	5.3–6.0	0.0–0.4
	16S	4.7–7.2	5.9–7.1	4.7–6.2	4.3–5.6	4	1.5–2.8	0.0–1.9
	28S	2.5–2.7	2.7–2.8	2.3–2.5	—	2.2	1.2	0

Forest Creek, Sorell Creek, Trestle Creek and Levert Rivulet. In 16S, three haplotypes were found each separated by one mutation. One haplotype comprises specimens from Myrtle Forest Creek and Sorell Creek, one comprises specimens from Trestle Creek and Knights Creek and the last one comprises specimens from Billy Brown River, a tributary of the South Styx River and a nameless tarn near the summit of Snowy South. In 28S, we found 4 haplotypes, each separated by one mutation respectively one indel (compared with 6 nucleotide positions in the other two haplotypes). The first haplotype comprises specimens from Billy Brown River, Levert Rivulet, Glen Dhu Creek and the roadside ditch at the East-West track. The second haplotype comprises specimens from Trestle Creek, Billy Brown River, St. Crispins Well, an unnamed creek crossing the Pipeline Track, the tributary to South Styx River, an unnamed creek crossing the road off Waterfall Creek Road, Lake Skinner and a nameless tarn near the summit of Snowy South. The third haplotype comprises specimens from Lake Skinner, while the fourth haplotypes comprises specimens from Myrtle Forest Creek (Fig. 6).

Discussion

Our results support the findings of Ahyong (2016) that *A. swaini* is a diverse species clade, now comprising two named species (*A. swaini* and *A. driesseni*). This expands the genus *Anaspides* to eight species. As with other species of *Anaspides*, the secondary sexual characters of the male antennules, especially the shape of the antennule inner flagellum (articles, setation and clasping spines) and presence of pleopodal endopods proved instrumental in taxonomic delineations. Furthermore, the onset of sexual maturity (indicated by the development of secondary sexual features) appears to be a valuable character in *A. driesseni*.

Of the three morphological forms of *A. swaini* recognized by Ahyong (2016) *A. driesseni* corresponds to form 3. The geographic distribution of *A. driesseni* as determined by present results, however, is extended slightly from that originally reported for *A. swaini* form 3, which now includes the Arve Valley and Hartz Mountains area, over the Snowy Mountains to the Wellington Range and western to north-western Mt Wellington (Collinsvale and North West Bay River catchment). To date there are no known sympatric occurrences of *A. driesseni* with other species of *Anaspides*, although it is parapatric with *A. tasmaniae* at Wellington Park (*A. swaini* (form 3) in Ahyong, 2016 and Höpel *et al*., 2021).

Ahyong (2016) pointed out that *Anaspides driesseni* was previously recorded from the plateau near the summit of Mt Wellington in tarns and creeks by Manton (1930) under the name *A. tasmaniae*. The current absence of *Anaspides* from the summit of Mt Wellington is probably a result of major bushfires that swept across the top of Mt Wellington in 1930s (Swain pers. com. in O'Brien, 1990). A detailed search in 2019 in tarns and creeks across the plateau "confirmed" the absence of *Anaspides* in this area (Höpel *et al*., 2021).

The low intraspecific and high interspecific genetic distances support the delimitation of *Anaspides driesseni* as a separate species. Moreover, the monophyly of *A. driesseni* and its position as sister species to *A. swaini* form 1 are supported by mitogenomic analysis of the genus (Höpel *et al*., unpublished). On the other hand, in *A. swaini* form 1 as now restricted, the high intraspecific distances (up to 10.3 % in COI) are striking, especially between the lineages found in tributaries of the Weld River (Richter *et al*., 2018). Nevertheless, these lineages are sympatric and no significant morphological differences between these lineages were detectable. Only specimens from the Arthur Range and Frankland Range differ to some degree

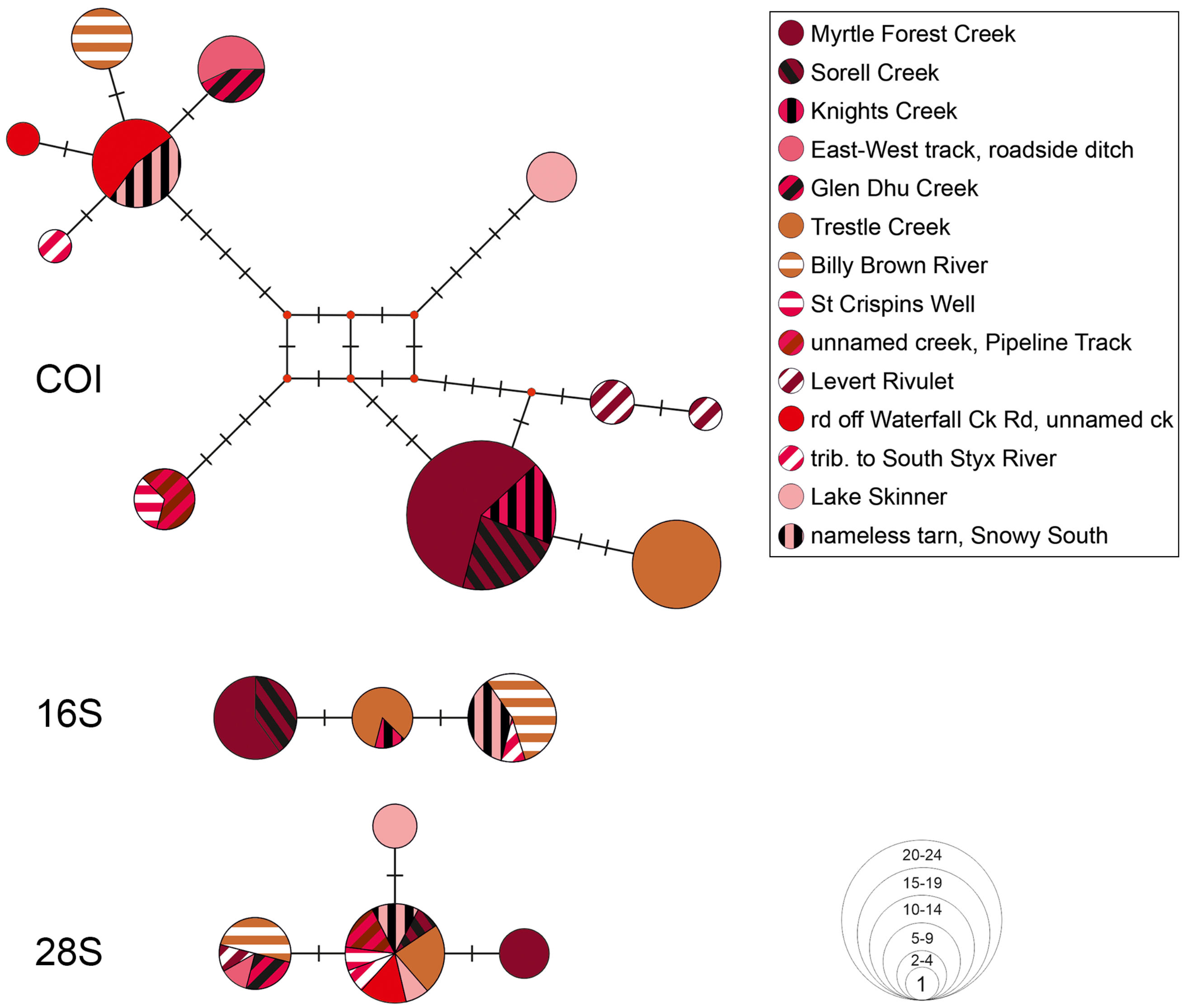

Figure 6. COI, 16S and 28S median joining haplotype networks of *Anaspides driesseni*. Colours correspond to figure legend. The size of each haplotype corresponds to the number of individuals sharing that specific haplotype (see scale). Each dash corresponds to one mutation respectively indel.

morphologically, being less spinose than their more easterly occurring conspecifics. Until more detailed population data are available, they are considered to represent a single species (*A. swaini*).

Comparable to *Anaspides tasmaniae* (Höpel *et al*., 2021), in *A. driesseni* a disjunct distribution between Wellington Park and areas in the south-western wilderness is present (25 km apart, Billy Brown River–Lake Skinner, Figs 7–9), which might be due to a current lack of suitable habitats in the lower areas between the two mountain ranges with the main limiting factors being the water temperature, dissolved solids and turbidity (Williams, 1965; Swain and Reid, 1983; O'Brien, 1990). It should also be noted that we see no signs of artificial translocation as shared haplotypes in COI between Snowy Range and Wellington Range as well as between major drainage systems at Wellington Range (Figs 6, 8–9) do not occur. Therefore, we are likely witnessing the same phenomenon as observed in *A. tasmaniae*, namely that during glacial periods (6–10°C colder than today, Colhoun *et al*., 2010), *A. driesseni* may have occupied a wider geographic range including lower altitudes that includes the Styx and Derwent River as well as the Weld and Huon Rivers; localities at Snowy Range and Wellington Park might have been connected for *Anaspides* during these periods. In contrast to *A. tasmaniae*, however, the genetic difference between these haplotypes is lower (Höpel *et al*., 2021) (see Fig. 6, separation in COI between the haplotype incorporates the unnamed creek crossing the road off Waterfall Creek Road and nameless tarn near the summit of Snowy South and the two haplotypes representing localities at western Wellington Park, Billy Brown River and Glen Dhu Creek catchment), with just one mutation difference and might indicate a more recent connection of these habitats, maybe during the Last Glacial Maximum.

Interestingly, we detected one shared haplotype in COI between two locations at the Snowy Range, which belong to two different major drainage systems (Derwent and Huon River catchment) (Figs 6, 8). We suggest that this shared haplotype is explained by colonization of neighbouring drainages over mountain plateaus via floodplains, swamps or

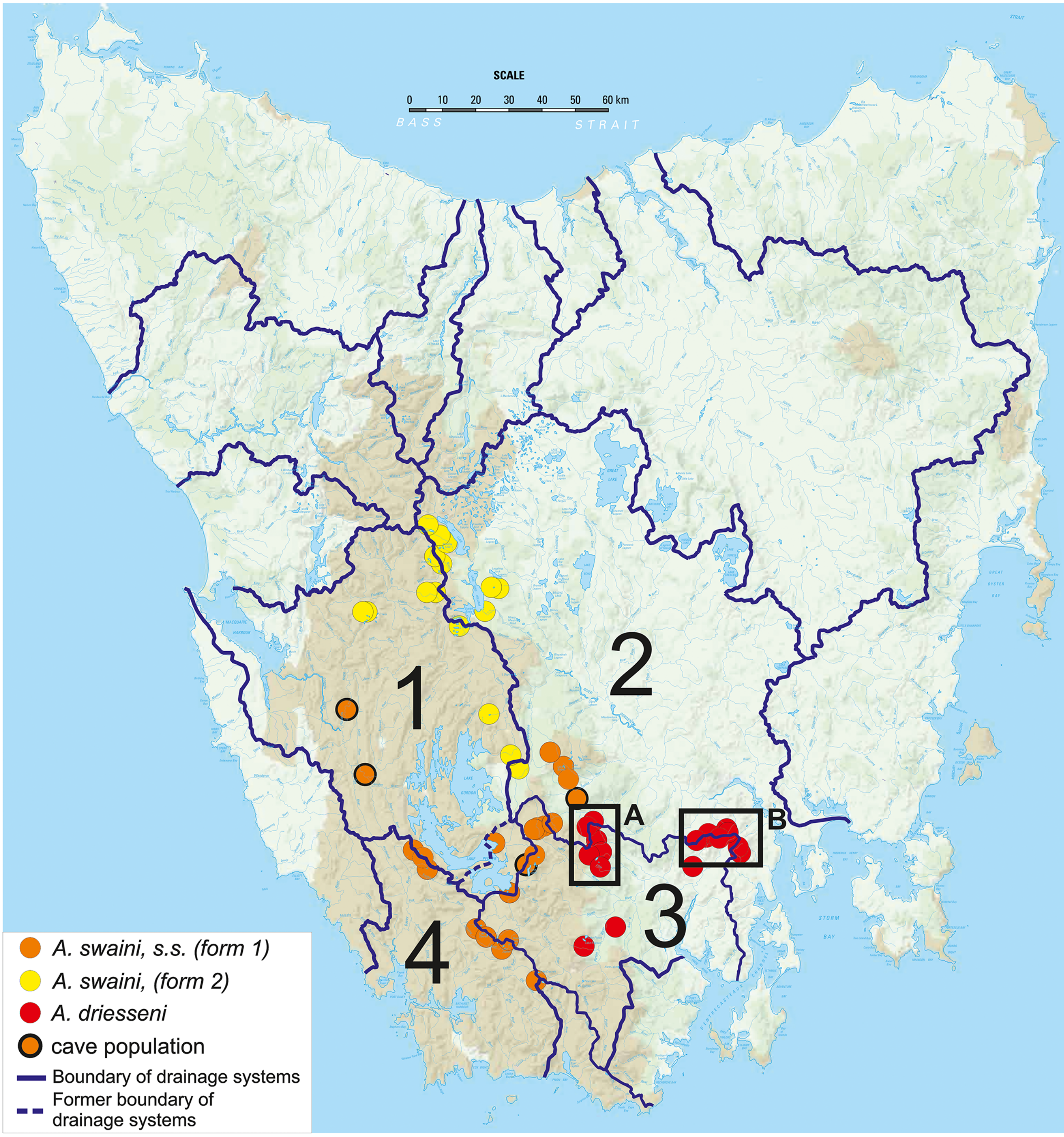

Figure 7. Distribution map of *A. swaini* and *A. driesseni* with important drainage divides (*1*) Franklin-Gordon; (*2*) Derwent; (*3*) Huon; (*4*) Port Davey; and (*5*) North West Bay River. Light brownish background colour indicates National Parks. (*A*) detailed view of Snowy Range, see Fig. 8; (*B*) detailed view of Wellington Park, see Fig. 9. Modified after the Tasmania catchments map. https://dpipwe.tas.gov.au/Documents/Tasmania-Catchment-Map.pdf

snow and snowmelt channels, connecting temporarily different water systems (e.g., at Nevada Peak) (Fig. 8). Interestingly, specimens from a nameless tarn near the summit of Snowy South and Lake Skinner belong to different haplotype clusters in COI (Fig. 6) despite being only 800 m horizontally and 300 m in altitude apart. A similar case of potential crossing of watersheds is found at Wellington Park, where we have two closely related haplotypes in COI and even a shared one in 16S (Fig. 6), between the Myrtle Forest Creek/Sorell Creek (Fig. 9, subdrainage system 3) + Knights Creek systems (Fig. 9, subdrainage system) (all Derwent River catchment) and the Mountain River catchment (Fig. 9, subdrainage system 9, Huon River catchment). A potential crossing area could be the floodplains, swampy area near todays Big Bend Trail. This model of phylogeographic pattering corresponds largely to the Headwater Model (HM) proposed by Finn *et al*. (2007) (waterbug *Abedus herberti*, limited overland dispersal), extended by temporarily connections due to flooded tarn shelfs or swamps or snow and snow melt. *Anaspides* probably also has a limited overland dispersal ability, having been previously observed to sometimes crawl out of the water and being able to survive several days on land (Swain & Reid, 1983).

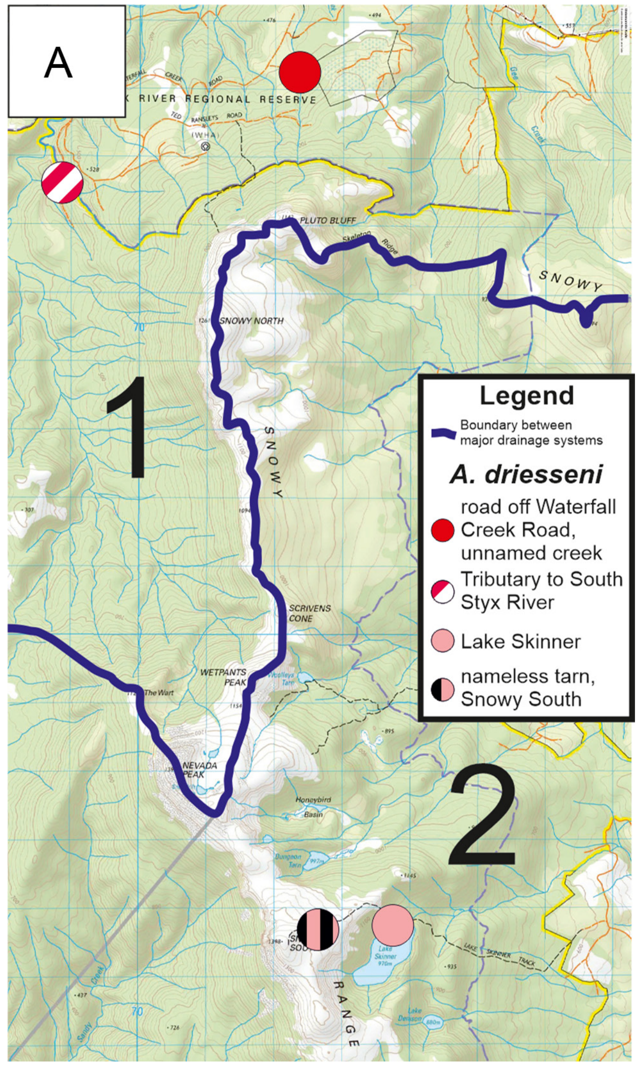

Figure 8. Topographical map of Snowy Range with major drainage systems, as well as collection sites with genetically analysed individuals from this study. 1 corresponds to the Derwent River drainage system, while 2 corresponds to the Huon River drainage systems. Base image by TASMAP© (www.tasmap.tas.gov.au) State of Tasmania.

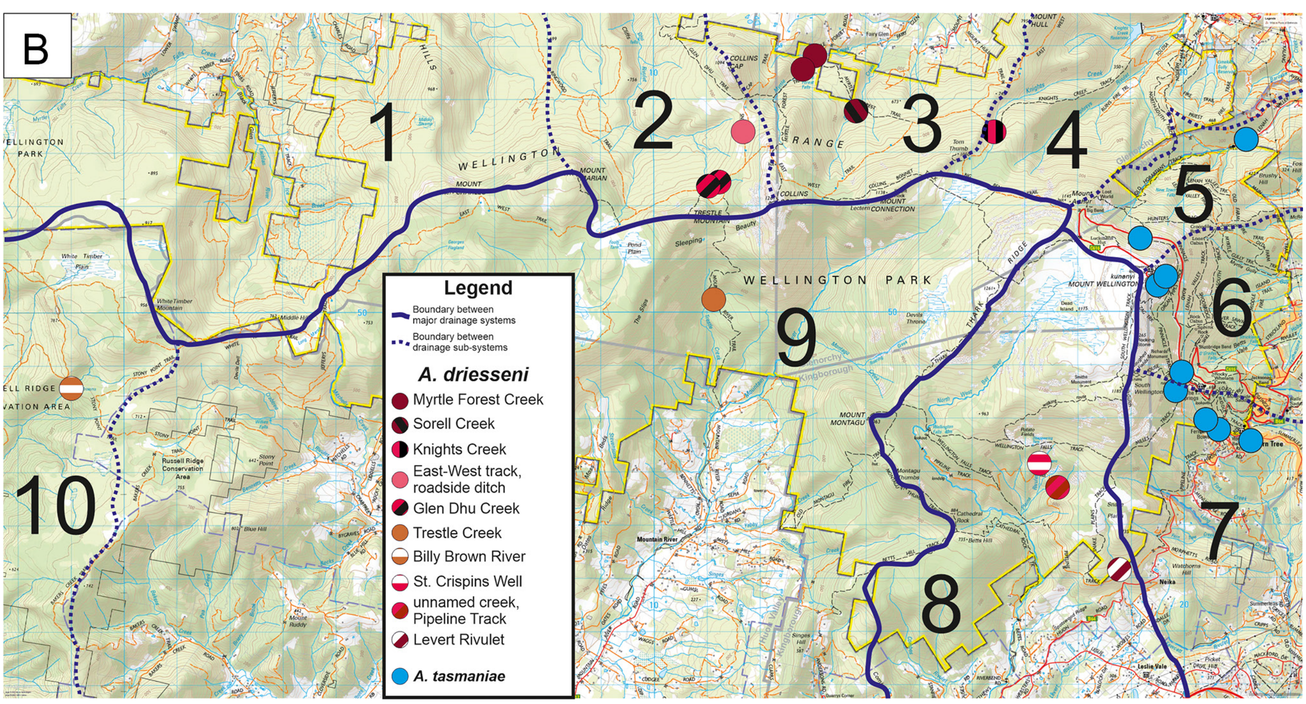

Figure 9. Topographical map of Wellington Park with drainage and sub-drainage systems, as well as collection sites with genetically analysed individuals from this study. Subdrainage systems 1–7 drain into the Derwent River drainage system: (*1*) Lachlan River/Myrtle Falls Creek; (*2*) Glen Dhu Creek; (*3*) Myrtle Forest Creek/Sorell Creek; (*4*) Knights Creek; (*5*) New Town Rivulet; (*6*) Guy Fawkes; (*7*) Browns River; (*8*) corresponds to the Noth West Bay River drainage system; whereas subdrainage system 9–10 drain into the Huon River drainage system; (*9*) Mountain River; (*10*) Judds Creek. Base image by TASMAP© (www.tasmap.tas.gov.au). State of Tasmania.

Figure 10. Typical habitats and colour-in-life of *A. driesseni*: (*A*) Glen Dhu Creek (*B*) Knights Creek at Knights Creek Track (*C*) small trickle fed road side ditch, next to Collins Cap Trail (*D*) unnamed creek, tributary of Styx River, crossing the road off Waterfall Creek Road (*E*) adult male, 35 mm, Ana560, unnamed creek, tributary of Styx River, crossing the road off Waterfall Creek Road. (*F*) adult male, 29 mm, AM P106559, unnamed creek, tributary of Styx River, crossing the road off Waterfall Creek Road.

Figure 11. Dorsal view on the antenna of male *A. swaini* form 1 and 2: (*A*) *A. swaini* form 1, 28 mm, tributary of Weld River, Mueller Road, 5.1 km behind west gate, ZSRO CR76, Ana329, right antenna; (*B*) *A. swaini* form 1, 23 mm, tributary of Weld River, Mueller Road, 4.4 km behind west gate, ZSRO CR75, Ana 655, right antenna; (*C*) *A. swaini* form 2, 29 mm, Lake Oenone, ZSRO CR206, Ana621, left antenna (mirrored view). Scale bars: 1 mm.

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