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Five New Species of New Zealand *Hemiandrus* Ander 1938 Ground wētā (Orthoptera: Anostostomatidae)

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ABSTRACT

Five new species of ground wētā endemic to Aotearoa New Zealand are described based on morphological traits and informed by phylogenetic analysis of mitochondrial DNA sequences. *Hemiandrus briarae* sp. nov. is a robust species living on mountains in northeast South Island, and *H. dryadis* sp. nov. is a gracile denizen of forests in northwest South Island. *Hemiandrus fabella* sp. nov. and *H. johnsi* sp. nov. are phylogenetic sisters, of which the former has females with very short ovipositors and is restricted to central Canterbury, while females of the latter have long ovipositors and a wider range through Canterbury and north Otago. *Hemiandrus mataitai* sp. nov. is an extremely localised, short-ovipositor species known from one site in Otago. *Hemiandrus* species can be readily distinguished using the combinations of spines on their tibiae and hind femora, and if specimens are adult, the distinct genital structures of males and females. The genus *Hemiandrus* now has 16 species.

1 | Introduction

In Aotearoa New Zealand, the Orthoptera commonly called ground wētā comprise two genera, each of which is sister to different lineages outside New Zealand (Trewick et al. 2024). The ground wētā share the feature of concealing themselves during the day in burrows that are typically capped with a soil cover. This behaviour is not uncommon in Anostostomatidae worldwide, but open or tree roosting (some *Deinacrida*) and tree-hole roosting (*Hemideina*, *Anisoura*) are more prominent in the New Zealand fauna.

Adults and juveniles of the two ground wētā genera, *Hemiandrus* Ander, 1938 and *Anderus* Trewick et al., 2024, are readily distinguished by the extent of pilosity on the maxillary palps (Ander, 1938). In *Anderus*, the three distal segments (5th, 4th, and 3rd) of these palps are clothed in small hairs, whereas *Hemiandrus* have hairs restricted to the 5th and distal part of 4th segment of their palps. Adult female *Anderus* all have rather long, thin and curved ovipositors, but this structure is highly variable among species of *Hemiandrus*. The paraprocts of adult male *Anderus* are short, stout, blunt, triangular or tapered, separate, pigmented and typically project rearwards, whereas in *Hemiandrus*, the paraprocts are long, thin, pale with darker tips that typically meet and project upwards, close to the posterior of the abdomen.

Hemiandrus Ander, 1938 comprises 11 valid species: *H. pallitarsis* (Walker, 1869) (see Trewick et al. 2020; Walker 1869; Hutton 1896; Jewell 2007; Trewick 2021), *H. focalis* (Hutton, 1896), *H. bilobatus* Ander, 1938, *H. superba* Jewell, 2007, *H. electra* Taylor Smith et al., 2013, *H. maia* Taylor Smith et al., 2013, *H. celaeno* Trewick et al., 2020, *H. merope* Trewick et al., 2020, *H. sterope* Trewick et al., 2020, *H. taygete* Trewick et al., 2020 and *H. jacinda* Trewick, 2021. Here, we add five species: *H. briarae* sp. nov., *H. dryadis* sp. nov., *H. fabella* sp. nov., *H. johnsi* sp. nov. and *H. mataitai* sp. nov. (Figure 1).

2 | Methods

Specimens collected by hand were stored in 70% or 95% ethanol for morphological examination and DNA extraction and held in the Phoenix collection Massey University (MPN). Additional

zoobank.org:pub:DE9C84C6-0C46-4E24-AC42-23E4F8807E34

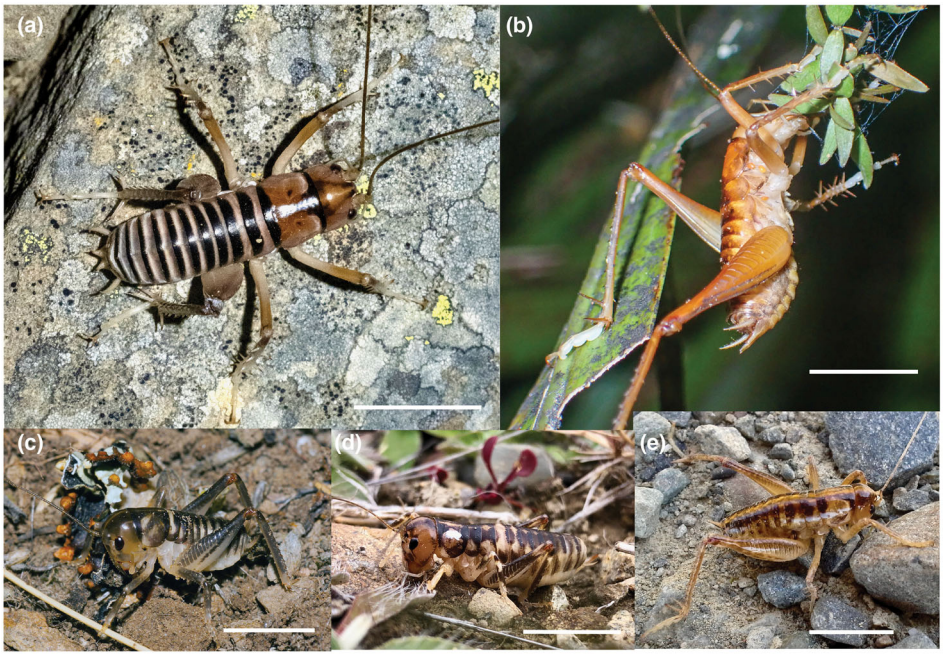

FIGURE 1 | New *Hemiandrus* species from South Island, New Zealand in natura. (a) *Hemiandrus briarae* sp. nov. (credit: Carey Knox), (b) *H. dryadis* sp. nov. (credit: Richard Littauer), (c) *H. mataitai* sp. nov. (credit: Tony Jewell), (d) *H. fabella* sp. nov. (credit: Madeline Pye), (e) *H. johnsi* sp. nov. (credit: Acacia Voorkamp). Scale bar 1 cm.

records from the Canterbury Museum (CMNZ) were consulted. The following measurements were made in millimetres using Mitotoyo callipers (accurate to 0.05 mm): dorsal surface of head to tip of mandibles (HD), body length (BL) (excluding ovipositor in females), hind femur length (HFL), hind femur width at widest point (HFW), hind tibia length (HTL), pronotum length along midline (PL), pronotum width (PW), linear ovipositor length from base to tip (OL). Spines on leg elements were counted following the treatment used previously for New Zealand anostostomatids (e.g., Johns 2001; Taylor Smith et al. 2013, 2016; Trewick and Morgan-Richards 2005) (Figure 2).

Mitochondrial DNA cytochrome oxidase subunit I (COI) sequences were generated using standard methods (Trewick and Morgan-Richards 2005) with PCR primers C1-J-2195 and L2-N-3014 (Simon et al. 1994) from DNA extracted from muscle tissue. Suitable homologous mitochondrial DNA sequences were obtained from GenBank (NCBI) for comparison. Nucleotide sequences were aligned using the Geneious alignment tool in Geneious Prime 2020.2.2 (https://www.geneious.com; Kearse et al. 2012). Phylogenetic analysis used Maximum Likelihood implemented in IQtree2 through IQ-Tree tools (Trifinopoulos et al. 2016; Minh et al. 2020) using model selection (Kalyaanamoorthy et al. 2017) and ultrafast bootstrapping of 1000 (Hoang et al. 2018). Pairwise genetic divergence was estimated using the species delimitation tool in Geneious (Masters et al. 2011). Novel DNA sequences were deposited in GenBank (Table 1).

Sample locations were mapped in R using the Maps (Becker et al. 2022) and Mapdata (Becker et al. 2022) packages calling the "nzHires" map with projection='sp_mercator' to align with the NZ entomological areas map outline https://lris.scinfo.org.nz/layer/48165-nz-area-codes-for-recording-specimen-localities/ (Crosby et al.1998).

Species distribution information includes reference to New Zealand entomological area codes (Crosby et al. 1998): Buller (BR), Central Otago (CO), Dunedin (DN), Kaikoura (KA), Marlborough (MB), Mid Canterbury (MC), Mackenzie (MK), Nelson (NN), South Canterbury (SC). Type material is in the Museum of New Zealand Te Papa Tongarewa (NMNZ).

3 | Results

Morphological examination and comparison of short DNA sequences representing partial mtDNA COI revealed clusters of variation consistent with five new species within the ground wētā genus *Hemiandrus* (Figure 3). Genetic divergence among clusters was larger than observed within genetic clusters (Table 2) and concordant with morphological traits such as the distinctive arrangement of spines on fore and mid tibia and male genitalia. A notable feature of variation among these new species is the relative and absolute variation in size of the ovipositor of adult females, which adds to our understanding of the phylogenetic variation of this trait. Many sister species differ noticeably in the length of the ovipositor (Figure 3).

Some leg spines are exactly the same in all *Hemiandrus* species and so these receive little attention here. In all new *Hemiandrus* species, four articulated apical spines are distributed around each fore and mid tibia, where this element meets the respective tarsus; one each prolateral superior, prolateral inferior, retrolateral inferior and retrolateral superior spine. Distal spines on the hind tibiae are more complex but consistent among species, comprising, in addition to four apical spines, a pair of short inferior sub-apical spines and a pair of long superior sub-apical spines (Figure 2). The two superior apical spines are also usually long.

Femora sometimes have fixed apical spines at the distal end, which are orientated either in line with the femur or perpendicular to the line of the femur; on a living wētā, they might be described as 'pointing backwards' or 'pointing downwards' respectively.

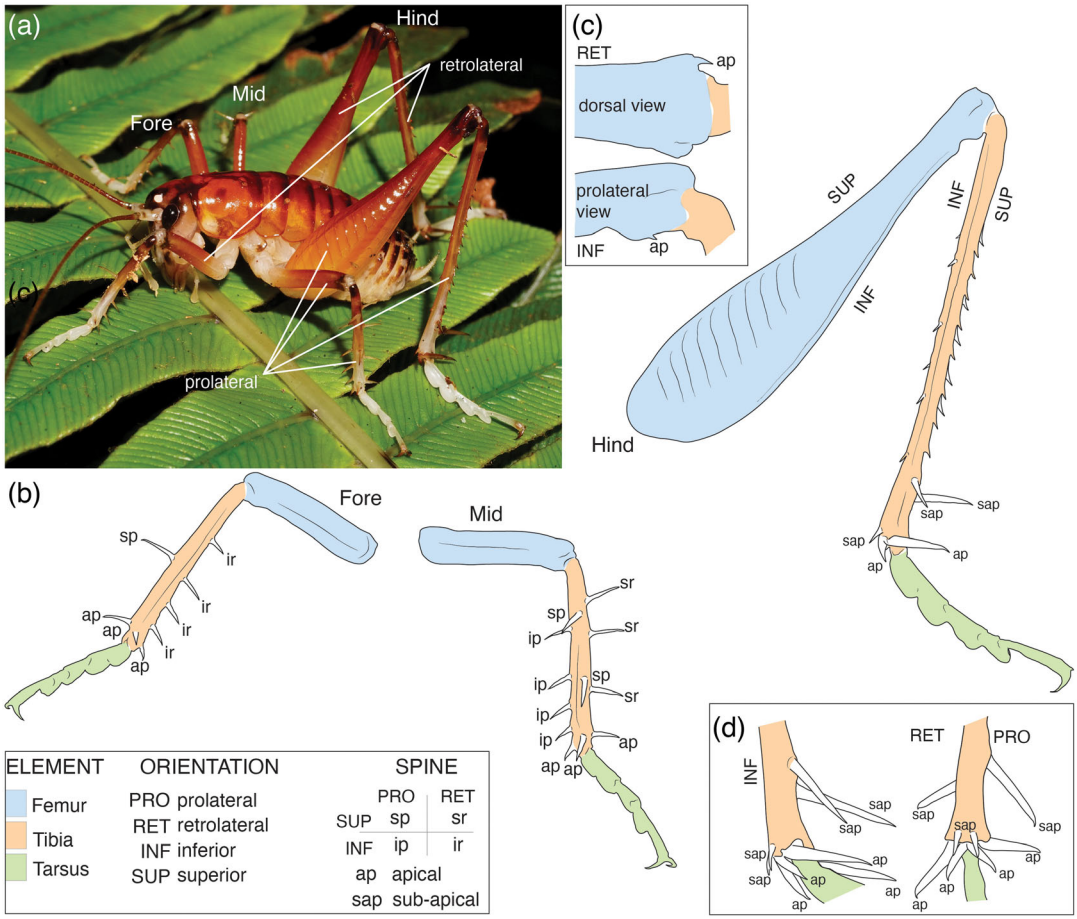

FIGURE 2 | *Hemiandrus* leg spine nomenclature using adult male *H. jacinda* as a model (a). Outlines of legs on left side of wētā depicting visible spination on fore, mid and hind legs in same orientation as image (b). Additional views of distal joint of hind femur showing fixed apical spines (c). Additional views of distal end of hind tibia showing articulated sub-apical and apical spines (d).

4 | Taxonomy

Class: Insecta:

Order: Orthoptera:

Suborder: Ensifera:

Superfamily: Stenopelmatoidea Burmeister, 1838

Family: Anostostomatidae Saussure 1859

Genus: *Hemiandrus* Ander, 1938

4.1 | *Hemiandrus briarae* sp. nov.

Diagnosis: Fore tibiae with two prolateral superior linear spines. Mid tibiae with two prolateral and three retrolateral superior linear spines. Mid and hind femora each with one prolateral and one retrolateral apical spine. Adult males have stout, dark hooked falci on tergite 10, and paraprocts are recurved with sclerotised tips, not meeting at midline and each outside respective falcus. Adult females have a stout ovipositor about half the length of the hind femur.

Type material: Holotype. Male, Inland Kaikoura Range, South Island, New Zealand, latitude −41.9701, longitude 173.6392, 1400 m asl, 18.II.2014, B. L. Taylor-Smith & N. Smith. MPN_GW1054, MNZ_AI.083199. Paratype, Female, Inland Kaikoura Range, South Island, New Zealand, latitude −41.9701, longitude 173.6392, 1400 m asl, 18.II.2014, B. L. Taylor-Smith & N. Smith. MPN_GW1059, MNZ_AI.083200.

Etymology: Named for wētā taxonomist who verified the existence of this species, Dr Briar L. Taylor-Smith (Smith 2014).

Description: A large, robust, boldly marked ground wētā found at higher elevation in north-eastern South Island, New Zealand (Figures 1 and 4). Similar in overall proportions and habitat to *H. focalis* but adult females have a shorter, stouter ovipositor (Figure 3). Predominantly dark brown above but mesonotum, metanotum and each tergite dark on anterior and posterior margins, either side of pale cream band (Figure 4b). Pronotum with dark periphery and medial stripe, around paler orange–brown fill. Dorsal surface of head are dark brown (Figure 4d). Ventral parts of body and legs are pale cream. Legs sturdy and short relative to body size (Figure 4a–c). Fore femora each with one small, fixed, prolateral apical spine in line with femur (Figure 4j). Mid femora, each with one prolateral and one retrolateral fixed apical spine in line with femur (Figure 4j). Hind femora pale at base and darkening towards distal end (Figure 4k), each with one prolateral and one retrolateral fixed, apical spine oriented in line with the femur (Figure 4l). Fore and mid tibiae, each have four articulated apical spines in addition to linear spines (Figure 4i), and hind tibiae with four articulated apical and four articulated sub-apical spines (Figure 4k). Fore tibiae

TABLE 1 | Specimens of *Hemiandrus* ground wētā sampled for genetic data with details of sampling location and GenBank accession number.

Specimen	GenBank	Species	Location	Latitude	Longitude	iNaturalist	Date	Collector
MPN_GW122	EU676777	*bilobatus*	Marfells Beach, Marlborough	−41.726888	174.204701	—	15/03/2000	P. Johns
MPN_GW193	JF895564	*bilobatus*	Seaview Reserve, Marlborough	−41.631195	174.157842	—	19/11/2006	I. Buunk
MPN_GW240	JF895562	*bilobatus*	Botanical Gardens, Wellington	−41.281264	174.766811	—	29/09/2007	M. Morgan-Richards
MPN_ GW1480	PV719998	*briarae* sp. nov.	Kahutara Saddle, Seaward Kaikoura Ra.	−42.3265569	173.42671	108142193	06/03/2022	D. Hegg
MPN_GW191	PV719999	*briarae* sp. nov.	Goat Valley, Lake McRae, Molesworth	−42.17287	173.3281	—	1/02/2006	P. McGahan
MPN_GW668	PV720000	*briarae* sp. nov.	Kowhai River, Seaward Kaikoura Ra.	−42.25445	173.608	—	16/11/10	I. Millar
MPN_GW1482	PV720001	*briarae* sp. nov.	Kahutara Saddle, Seaward Kaikoura Ra.	−42.3233644	173.4274191	108142192	06/03/2022	D. Hegg
MPN_GW669	PV720002	*briarae* sp. nov.	Kowhai River, Seaward Kaikoura Ra.	−42.25445	173.608	—	16/11/10	I. Millar
MPN_GW1050	PV720003	*briarae* sp. nov.	Mt Tapuae-O-Uenuku, Inland Kaikoura Ra.	−41.9701	173.6392	—	18/02/2014	B. Taylor-Smith, N. Smith
MPN_GW527	PV720004	*briarae* sp. nov.	Clarence River terrace	−41.9972285	173.8580616	—	11/08/2008	J. Clayton
MPN_GW1051	PV720005	*briarae* sp. nov.	Mt Tapuae-O-Uenuku, Inland Kaikoura Ra.	−41.9701	173.6392	—	18/02/2014	B. Taylor-Smith, N. Smith
MPN_GW1054	PV720006	*briarae* sp. nov.	Mt Tapuae-O-Uenuku, Inland Kaikoura Ra.	−41.9701	173.6392	—	18/02/2014	B. Taylor-Smith, N. Smith
MPN_GW1056	PV720007	*briarae* sp. nov.	Mt Tapuae-O-Uenuku, Inland Kaikoura Ra.	−41.9701	173.6392	—	18/02/2014	B. Taylor-Smith, N. Smith
MPN_GW129	MT623117	*celaeno*	Porters Pass, Canterbury	−43.295532	171.7423	—	19/03/2006	P. Johns
MPN_GW884	MT623119	*celaeno*	Wainui, Banks Peninsula	−43.830415	172.874359	—	30/11/2012	B. Taylor-Smith
MPN_GW880	MT623118	*celaeno*	Wainui, Banks Peninsula	−43.830415	172.874359	—	30/11/2012	B. Taylor-Smith
MPN_GW251	MT623116	*celaeno*	Kowhai Bush, Kowhai River, Kaikoura	−42.347902	173.565792	—	19/12/2007	L. Cook
MPN_GW33a	PV720008	*dryadis* sp. nov.	Mt Robert, St. Arnaud	−41.835694	172.807297	—	1/03/1999	M. Morgan-Richards
MPN_GW1573	PV720009	*dryadis* sp. nov.	Lake Rotoiti, St Arnaud	−41.87453	172.824632	—	13/04/2005	M. Griffin
MPN_GW1027	PV720010	*dryadis* sp. nov.	Red Hills hut, Mt Richmond	−41.730823	172.991208	—	30/12/2013	B. Taylor-Smith, K. O'keeffe
MPN_StA	PV720011	*dryadis* sp. nov.	Lake Rotoiti, St Arnaud	−41.87453	172.824632	—	13/04/2005	M. Griffin
MPN_GW213	PV720012	*dryadis* sp. nov.	Mt Haidinger, Kahurangi	−40.6924	172.57303	—	4/04/2007	I. Millar
MPN_GW1338	PV720013	*dryadis* sp. nov.	Gouland Downs	−40.891525	172.3544917	9747251	04/02/2018	D. Hegg
MPN_GW1339	PV720014	*dryadis* sp. nov.	Gouland Downs	−40.891525	172.3544917	9747251	04/02/2018	D. Hegg

(Continues)

TABLE 1 | (Continued)

Specimen	GenBank	Species	Location	Latitude	Longitude	iNaturalist	Date	Collector
MPN_GW216	EU676747	*dryadis* sp. nov.	Mt Haidinger, Kahurangi	−40.6924	172.57303	—	4/04/2007	K. Walker
MPN_GW137	EU676781	*dryadis* sp. nov.	Gouland Downs	−40.884718	172.31059	—	2/3/2006	S. Brown
MPN_GW139	EU676782	*dryadis* sp. nov.	Lake Rotoiti, St Arnaud	−41.808255	172.851237	—	16/12/2006	J. Goldberg
MPN_GW138	EU676783	*electra*	Lake Rotoiti, St Arnaud	−41.87453	172.824632	—	16/12/2005	J. Goldberg
MPN_GW101	EU676741	*electra*	Sky Farm, Rameka Creek, Pikikirunga Ra.	−40.926385	172.857072	—	29/01/2006	S. Trewick
MPN_GW1123	PV719987	*fabella* sp. nov.	Lake Benmore, Mackenzie	−44.3387	170.2183	—	17/02/2015	D. Gwynne
MPN_GW1446	PV719988	*fabella* sp. nov.	Maryburn Station South, Mackenzie	−44.137344	170.387794	—	22/12/2021?	T. Murray
MPN_GW1454	PV719989	*fabella* sp. nov.	Maryburn Station north, Mackenzie	−44.104378	170.419937	—	26/01/2022	T. Murray
MPN_GW1441	PV719990	*fabella* sp. nov.	Tekapo River south, Mackenzie	−44.190161	170.369295	—	26/01/2022	T. Murray
MPN_GW1430	PV719991	*fabella* sp. nov.	Pukaki Flats, Ben Ohau Conservation Area	−44.215984	170.118709	—	10/02/2022	T. Murray
MPN_GW1435	PV719992	*fabella* sp. *nov.*	Bendu Scientific Reserve, Mackenzie	−44.413176	169.88342	—	09/02/2022	T. Murray
MPN_GW1465	PV719993	*fabella* sp. *nov.*	Mt Mary, Mackenzie	−44.084495	170.263295	—	22/12/2021	T. Murray
MPN_GW1469	PV719994	*fabella* sp. *nov.*	Patterson's Terrace, Mackenzie	−44.05623	170.4258133	107067478	17/02/2022	D. Hegg
MPN_GW1437	PV719995	*fabella* sp. *nov.*	Tekapo River north, Mackenzie	−44.139577	170.425799	—	26/01/2022	T. Murray
MPN_GW206	EU676774	*focalis*	Obelisk, Old Man Range	−45.32306	169.20714	—	28/11/2006	L. Cook
MPN_GW262	PQ442196	*focalis*	Lake Alta, Remarkables Ra.	−45.060926	168.814276	—	21/12/07	M. Morgan-Richards
MPN_GW62	EU676790	*jacinda*	Moehau, Coromandel Peninsula	−36.540267	175.409772	—	—	P. Johns
MPN_GW1328	MW463352	*jacinda*	Kaimai Ra.	−37.05074	175.600691	63866403	30/10/2020	D. Hegg
MPN_GW1128	PV719983	*johnsi* sp. *nov.*	Fox Peak, Sherwood Ra.	−43.857501	170.815766	—	23/02/2015	S. Trewick
MPN_GW1343	PV719984	*johnsi* sp. *nov.*	Mt Somers, Canterbury,	−43.599655	171.3298167	66564773	14/12/2020	D. Hegg
MPN_GW516	PV719985	*johnsi* sp. *nov.*	Mt Studholme, Hunter hills	−44.643029	170.914799	—	27/12/07	S. Trewick
MPN_GW620	PV719986	*johnsi* sp. *nov.*	Kurinui, Horse Ra.	−45.412051	170.919577	—	22/11/2010	M. Morgan-Richards
MPN_GW114	EU676769	*johnsi* sp. *nov.*	Kurinui, Horse Ra.	−45.36726	170.72366	—	7/01/2006	S. Trewick
MPN_GW211	EU676792	*johnsi* sp. *nov.*	Burkes Pass	−44.09068	170.59961	—	22/11/2006	P. Johns
MPN_GW136	EU676780	*maia*	Blue Mountains, Southland	−45.894243	169.360413	—	4/3/2006	Sally
MPN_GW118	EU676795	*maia*	Kurinui, Horse Ra.	−45.36726	170.72366	—	7/01/2006	M. Morgan-Richards
MPN_GW519	EU676744	*maia*	Kurinui, Horse Ra.	−45.368444	170.714998	—	29/6/07	S. Dunavan

(Continues)

TABLE 1 | (Continued)

Specimen	GenBank	Species	Location	Latitude	Longitude	iNaturalist	Date	Collector
MPN_ GW1349	PV719996	*mataitai* sp. *nov.*	Sutton Salt Lake, Middlemarch	−45.56994	170.0846033	70033929	23/02/2021	D. Hegg
MPN_GW1350	PV719997	*mataitai* sp. *nov.*	Sutton Salt Lake, Middlemarch	−45.56994	170.0846033	70033929	23/02/2021	D. Hegg
MPN_GW682	MT623127	*merope*	Kapiti Island	−40.85279	174.931084	—	14/11/2011	B. Taylor-Smith
MPN_GW674	MT623126	*merope*	Kapiti Island	−40.85279	174.931084	—	14/11/2011	S. Trewick
MPN_GW371-CU77	JF895553	*pallitarsis*	Repanga (Cuvier Island), Coromandel	−36.43706	175.77106	—	16/01/2007	E. Chappell
MPN_GW271-AL107	JF895546	*pallitarsis*	Ruamahuanui I., Aldermen islands.	−36.95324	176.09473	—	24/01/2007	E. Chappell
MPN_GW399-MI98	JF895548	*pallitarsis*	Atiu (Middle Island), Mercury group	−36.63747	175.86057	—	22/01/2007	E. Chappell
MPN_GW1036a	MT623109	*sterope*	Branford Reserve, Nelson	−41.272033	173.304746	—	24/02/2014	B. Taylor-Smith, N. Smith
MPN_GW602	MT623101	*sterope*	Te Rua Bay, Marlborough Sounds	−41.24306	174.27056	—	11/11/2010	I. Henderson
MPN_GW596	MT623100	*sterope*	Te Rua Bay, Marlborough Sounds	−41.24306	174.27056	—	11/11/2010	I. Henderson
MPN_GW1044c	MT623098	*sterope*	Marybank Reserve, Nelson	−41.228815	173.321227	—	25/02/2014	B. Taylor-Smith, N. Smith
MPN_FD8	MW63358	*superbus*	Llawrenny Peaks, Sinbad Gully	−44.637329	167.822901	—	26/02/2011	E. Edwards
MPN_FD10	MW463357	*superbus*	Llawrenny Peaks, Sinbad Gully	−44.637329	167.822901	—	26/02/2011	J. Rearson
MPN_GW1031	MT623115	*taygete*	Red Hills hut, Mt Richmond	−41.731425	172.992037	—	31/12/2013	B. Taylor-Smith, K. O'keeffe
MPN_GW869	MT623114	*taygete*	Upper Clarence Valley, Kaikoura	−42.45174	172.9198	—	02/02/2012	T. Watson
MPN_GW491	MT623112	*taygete*	Middle Clarence Valley, Kaikoura	−42.150692	173.551529	—	29/01/2009	J. Clayton-Greene

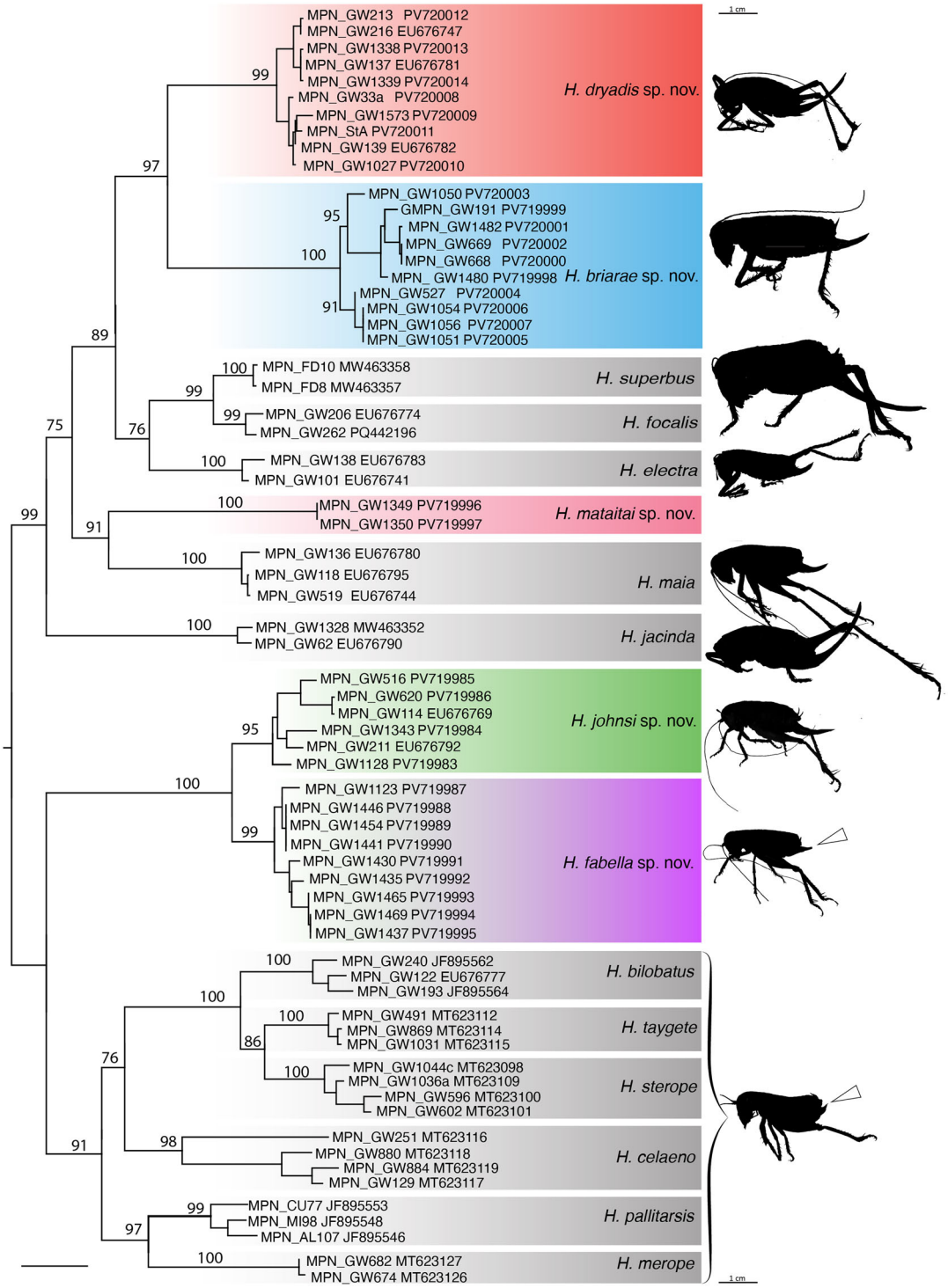

FIGURE 3 | Phylogenetic relationships among the sixteen species of New Zealand *Hemiandrus* ground wētā inferred using a Maximum Likelihood analysis of mtDNA COI sequences with best fit model TIM2+F+I+G4. Numbers at nodes are percentages of 1000 bootstrap replicates. Tip labels include sample code and GenBank accession number. Lateral silhouettes of adult female representatives of existing and new species to the same scale, with ovipositors indicated when very small. No adult female specimens of *H. mataitai* sp. nov. have been collected. DNA sequence clusters associated with new species described here are coloured rather than grey.

with two prolateral superior linear spines (Figure 4i). Mid tibiae with two prolateral and three retrolateral superior linear spines (Figure 4i). Hind tibiae with seven or eight strong, fixed spines along the prolateral and retrolateral angles of the superior surface, and five to eight small articulated spines on the ventral side (Figure 4k). The inner side of the hind femora and laterals of adjacent abdominal tergites with numerous stridulatory pegs.

Male: Posterior margin of eighth abdominal tergite (T8) is slightly convex and mostly overlapps T9 (Figure 4f). T9 lobed with corresponding darker patches on the posterior margin, adjacent to

TABLE 2 | Intra- and inter-specific genetic divergence among *Hemiandrus* species based on mtDNA COI sequences (as in Figure 3).

Hemiandrus species	Intraspecific distance	Closest species	Interspecies distance (closest)
dryadis sp. nov.	0.021	*superbus*	0.134
superbus	0.004	*focalis*	0.051
focalis	0.017	*superbus*	0.051
electra	0.018	*superbus*	0.103
briarae sp. nov.	0.029	*dryadis* sp. nov.	0.144
jacinda	0.019	*dryadis* sp. nov.	0.145
maia	0.022	*mataitai* sp. nov.	0.155
mataitai sp. nov.	<0.001	*maia*	0.155
johnsi sp. nov.	0.04	*fabella* sp. nov.	0.077
fabella sp. nov.	0.02	*johnsi* sp. nov.	0.077
taygete	0.013	*sterope*	0.105
sterope	0.034	*taygete*	0.105
bilobatus	0.037	*taygete*	0.115
merope	0.004	*pallitarsis*	0.139
pallitarsis	0.045	*merope*	0.139
celaeno	0.044	*bilobatus*	0.177

T10 falci (Figure 4h). T10 with stout, dark hooked falci directed diagonally towards midline (Figure 4h). Subgenital plate (SGP), sturdy, slightly wider than long, narrower towards apex with a shallow, wide V-shaped distal margin between short lobes bearing the styles (Figure 4e). Styles pale and tapered, projecting in line with basal profile of SGP (Figure 4g). Paraprocts pale, recurved with sclerotised tips, not meeting at midline and each outside respective falcus (Figure 4h). Cerci pale, with long hairs, longer than paraprocts (Figure 4g).

Female. Larger than male (Figure 4a,c). Stout ovipositor about half length of hind femur (Figure 4c). Simple triangular SGP.

Dimensions: Holotype: HD 10.5, BL20.9, HFL 18.7, HFW 4.1, HTL 18.2, PL 6.2, PW 7.2. Paratype: HD 11.0, BL 31.2, HFL 20.5, HFW 4.9, HTL 18.3, PL 6.1, PW 8.1, OL 10.0.

Distribution: KA, MB. Found at higher elevation on mountain ranges in the northeast coast South Island, New Zealand (Figure 9).

Additional material: Kowhai River, KA (MPN_GW668, MPN_GW669); Orr Stream, MB (MPN_GW522); Goat Valley Stream, Lake McRae, Molesworth, KA (MPN_GW191); Kahutara Saddle, Seaward Kaikoura Range, KA (MPN_GW928); Mt Tapuae-o-Uenuku, KA (MPN_GW1049–MPN_GW1061); Mt Fyffe, KA (NZAC no number, 11 Jan 2008). https://inaturalist.nz/observations/104747081

Comments: This species is probably the same entity represented by the tag-names *Hemiandrus* 'hapuku' (Johns 2001) and *Hemiandrus* 'tapuae-o-uenuku' (Sherley 1998) and probably the same entity tagged 'contrafocalis' in CMNZ collection. Most specimens have been found at high elevation. Night searching up to 1700 m in the vicinity of Mt Tapuae-O-Uenuku revealed that this wētā is very abundant, with more than 50 individuals observed in approximately an hour (Smith 2014). These wētā live in burrows on hillsides where females display maternal care, as documented in short-ovipositor *Hemiandrus* species (Gwynne 2004, 2005; Trewick et al. 2020; Browne and Gwynne 2022).

4.2 | *Hemiandrus dryadis* sp. nov.

Diagnosis: Fore tibiae with one articulated, superior, prolateral spine about midway. Mid tibiae with two articulated, superior, prolateral spines and three retrolateral spines. Hind femora with two fixed, apical spines. Adult males have two closely spaced short, dark, hooked falci on tergite 10 and a pair of narrow, curved, paraprocts with dark, blunt, sclerotised tips, usually held vertically and meeting medially between the falci, but with tips diverging. Adult females with long ovipositor, more than half body length.

Type material: Holotype. Male, Lake Head, Rotoiti, St Arnaud, South Island, New Zealand, latitude −41.875421, longitude 172.824573, 680 m asl, 14.IV.2005, Department of Conservation, MPN_GW1566, MNZ_AI.083201. Paratype. Female, Wairau Valley, South Island, New Zealand, latitude −41.86128, longitude 172.91964, 660 m asl, 14/12/2005, Department of Conservation, MPN_GW1638, MNZ_AI.083202.

Etymology: Referencing forest nymphs of Greek mythology. Genitive form 'of the dryad' implies association with graceful spirits of the trees.

Description: A large but svelte forest ground wētā found in northwest South Island, New Zealand (Figure 9). Pale brown to pale orange in colour (Figures 1 and 5a–c). Pronotum slightly wider than long, with large, pale lateral patches (Figure 5c,d). Head slightly narrower than pronotum. Numerous stridulatory pegs (~100) on lateral parts of tergites 1–3. Legs relatively slender and long. Hind femora pale at proximal and orange–brown dorsal distal half, each with two fixed, apical spines; the prolateral one orientated perpendicular to femur length and the retrolateral

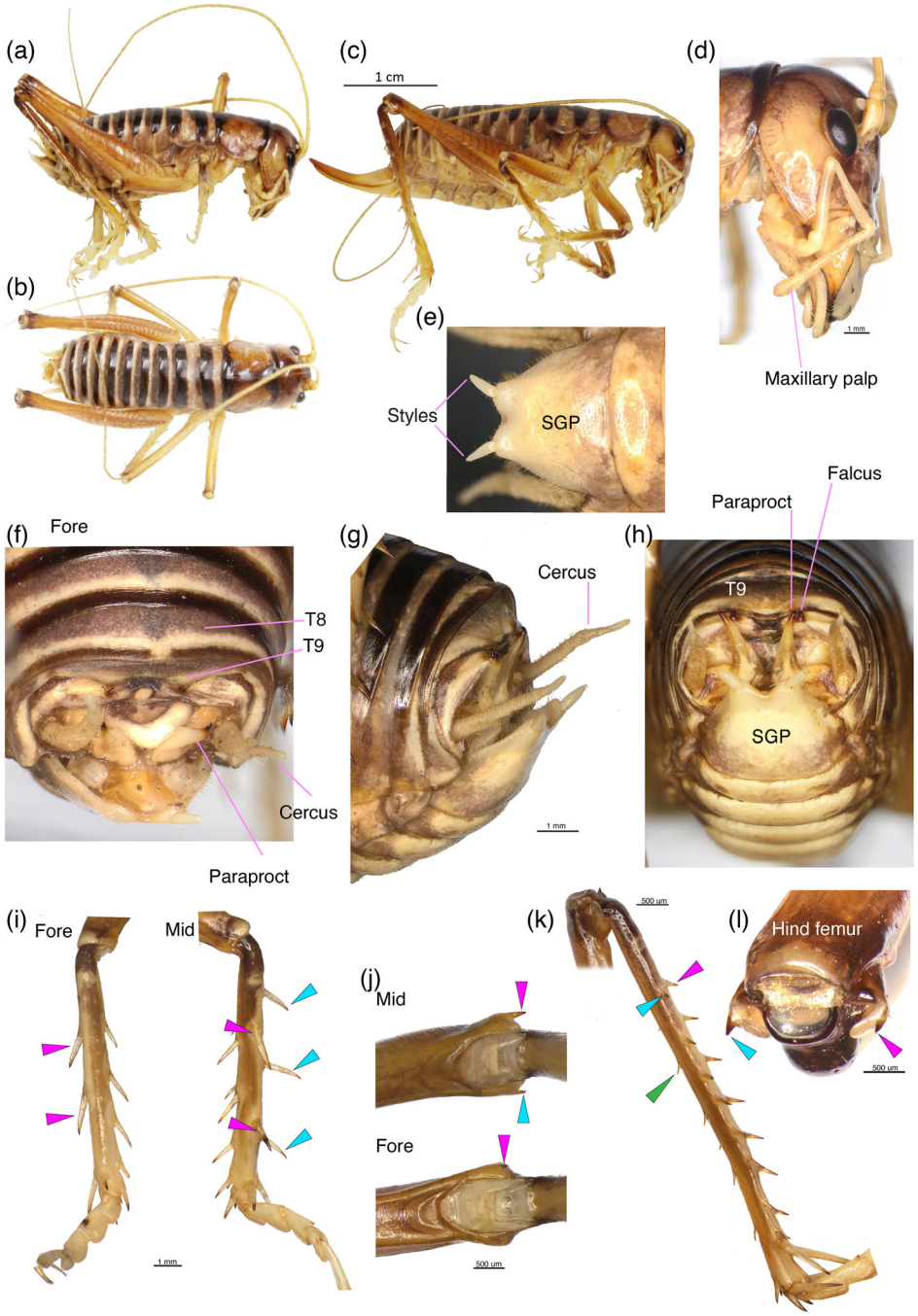

FIGURE 4 | External morphology of adult *Hemiandrus briarae* sp. nov. Male lateral (a) and dorsal (b), and female lateral (c) habitus. Male head lateral (d) with maxillary palp indicated. Male terminalia in ventral (e), dorsal (f), lateral (g) and posterior view (h). Articulated, linear leg spines on superior surfaces of fore and mid tibiae (i) indicating two prolateral (pink arrows) on each, and three retrolateral (blue arrows) on mid tibia. Ventral views of distal ends of fore and mid femora (j) indicating prolateral (pink arrows) and retrolateral (blue arrows) fixed, apical spines. Oblique retrolateral view of hind tibiae (k) indicating prolateral (pink arrows) and retrolateral (blue arrows) fixed, superior linear spines and articulated, inferior linear spines (green arrow). Distal end of hind femur (l) showing prolateral (pink arrows) and retrolateral (blue arrows) fixed, apical spines.

one orientated in line with femur length (Figure 5l,m). Fore and mid tibiae, each have four articulated apical spines in addition to linear spines, and hind tibiae with four articulated apical and four articulated sub-apical spines. Fore tibiae with one articulated, superior, prolateral spine about midway (Figure 5k). Mid tibiae with two articulated, superior, prolateral spines and three retrolateral spines. Hind tibiae with two (prolateral and retrolateral) rows of seven or eight fixed, triangular spines distributed along most of the superior surface, and about five small articulated spines on the ventral side (inferior) (Figure 5l). The inner side of the hind femora with 60–90 small pegs. Hind tibiae with eight apical spines.

Male: Abdominal tergite T8 with shallow medial projection on posterior margin, and T9 with wider and more pronounced convex curve forming medial lobe (Figure 5h,i). T10 with two closely

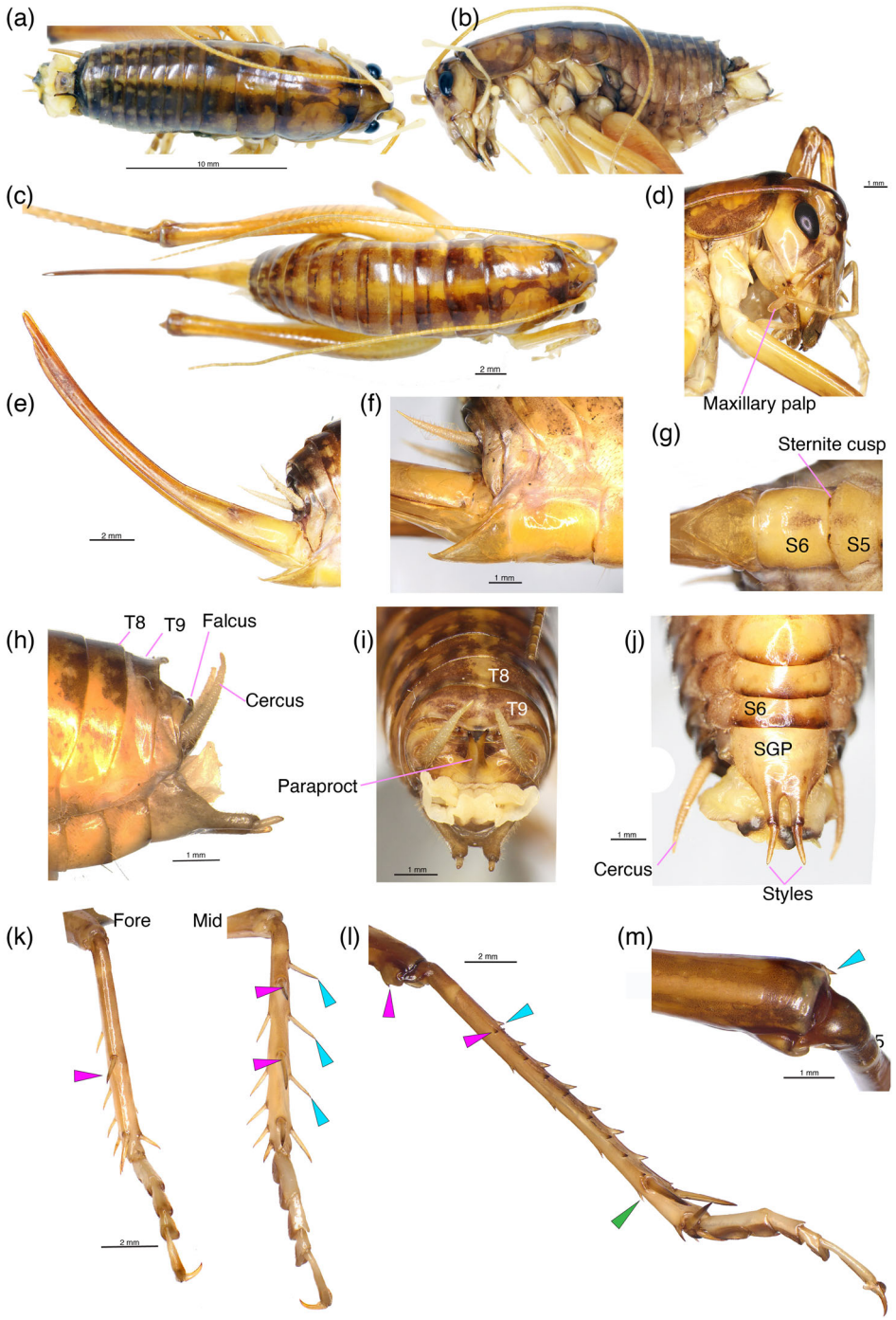

FIGURE 5 | External morphology of adult *Hemiandrus dryadis* sp. nov. Male dorsal (a) and lateral (b), and female (c) habitus. Lateral view of head indicating maxillary palp (d). Lateral ovipositor (e), with lateral (f) and ventral (g) views of subgenital plate. Male terminalia in lateral (h), posterior (i) and ventral (j) views. Articulated, linear leg spines on superior surfaces of fore and mid tibiae (k) indicating one prolateral (pink arrows) on fore tibia, and two prolateral (pink arrows) plus three retrolateral (blue arrows) on mid tibia. Hind tibiae (l) with a row of prolateral (pink arrows) and retrolateral (blue arrows) fixed, superior, linear spines, and sparse articulated inferior, linear spines (green arrow). Dorsal view of distal end of hind femur (m) indicating fixed, retrolateral apical spine orientated in line with femur (blue).

spaced short, dark, hooked falci projecting towards T9. Paraprocts narrow, curved, pigmented with dark, blunt, sclerotised tips, usually held vertically and meeting medially between the falci on T10, but with tips diverging (Figure 5h–j). When internal genitalia are everted (as in pitfall-trapped specimens), the paraprocts may appear separated and pointing backwards. Cerci, pale, tapered and slightly curved with long hairs (Figure 5i,j). Posterior margin of abdominal sternites S4–6 is dark sclerotised. SGP is wide at base but narrows rapidly in central third, to two parallel, distal extensions separated by a deep, narrow U-shaped notch about as wide as each of the extension (Figure 5j). Styles are slightly pigmented, nearly cylindrical, blunt, straight, parallel or slightly diverging, but directed in line with SGP projections (Figure 5j).

Female: Larger than male. Long ovipositor, more than half body length (Figure 5e). Abdominal sternites pale but with a pair of dark cusps on posterior margin of S5 (Figure 5f,g).

Dimensions: Holotype: HD 6.8, BL 20.1, HFL 17.05 HFW 3.9, HTL 15.7, PL 5.0, PW 5.5. Paratype: HD 8.1, BL 23.7, HFL 18.3, HFW 4.0, HTL 15.8, PL 5.1, PW 6.3, OL 17.2.

Distribution: NN, BR. Northwest South Island, New Zealand, east to St Arnaud. It is found in forested areas, manuka wetland on the Denniston Plateau and amongst scrub and tussock in Mt Richmond Forest Park.

Additional material: Wairau Valley (MPN_GW1638); Mt Haidinger, Southern Burnett Range, Kahurangi NP (MPN_GW213, MPN_GW216); Denniston Plateau (MPN_GW756, MPN_GW757); Gouland Downs (MPN_GW137, MPN_GW471A, MPN_GW781); Huia Caves (DOCORD055878A); Red Hills Range (MPN_GW1027); Huia Caves (DOCORD055878B, DOCORD057302); St Arnaud (MPN_GW139, MPN_GW926); Nelson Lakes, BR (GW33a) (Figure 9).

Comments: This species is probably the same entity represented by the tag-name *Hemiandrus* 'disparalis' (Johns 2001). This is the same entity as *H.* 'disparalis' in Taylor Smith et al. (2013) where it was shown to be sympatric with *Hemiandrus electra* and distinguished by ovipositor length. The same entity reported as *H.* 'disparalis' in a study of St Arnaud ground wētā, revealed an omnivorous diet with gut contents comprised 80% plant and 20% invertebrate material, and that females were less common in malaise traps than males (Chikwature et al. 2025).

4.3 | *Hemiandrus fabella* sp. nov.

Diagnosis: Fore tibiae usually with 1 prolateral spine (above the middle of the tibia) and no retrolateral superior articulated linear spines. The mid tibiae usually with two prolateral and two retrolateral superior linear spines. Hind femora with a single retrolateral apical spine. Adult males have large, dark-tipped, hooked falci that are widely separated on tergite 10, and paraprocts erect, narrow with dark tips are held close together. Adult females with very small and stout ovipositor.

Type material: Holotype. Male, Tekapo River delta, Lake Benmore, Canterbury, South Island, New Zealand, latitude −44.3387, longitude 170.2183, 350 m asl, 17.II.2015, B. L. Taylor-Smith, MPN_GW1120, MNZ_AI.083203. Paratype. Female, Mount Mary, nr Lake Pukaki, Mackenzie, Canterbury, South Island, New Zealand, latitude −44.085335, longitude 170.262669, 650 m asl, 26.I.2022, T. Murray, MPN_GW1462, MNZ_AI.083204.

Etymology: Latin diminutive form of the word for bean, faba. The 'little bean' in reference to the small compact bean-like form with female and male similar in overall shape. Noun in apposition.

Description: A small, compact species (Figure 1) associated with river margins and terraces of central Canterbury, New Zealand (Figure 9). Body dark from above and matt in texture (Figure 6a,c). Central dorsal and frons of head brown (Figure 6b), but thorax and abdomen darker, except for pale lateral patches on meso, meta and pronotum and sometimes pale medial patch on pronotum (Figure 6a,c). Posterior part of abdominal tergites darker than anterior parts (Figure 6e). Undersides of body and legs are very pale. Head is large in proportion to body and slightly wider than pronotum.

Fore and mid femora without spines. Hind femora with single posterior-pointing, retrolateral, apical spine (Figure 6k). Fore and mid tibiae, each have four articulated apical spines in addition to linear spines (Figure 6i,j), and hind tibiae with four articulated apical and four articulated sub-apical spines (Figure 6l). Fore tibiae usually with one prolateral above the middle of the tibia and 0 retrolateral superior articulated linear spines (asymmetric individuals recorded with two prolateral spines on one side) (Figure 6i). Mid tibiae usually with two prolateral and two retrolateral superior linear spines (asymmetric individuals recorded with one retrolateral spine on one side including holotype MPN_GW1120) (Figure 6j). Hind tibiae, pale brown, with inflated nearly cylindrical appearance, notably convex on the superior surface between two rows (7 or 8 prolateral and retrolateral each) of small, stout, fixed linear spines (Figure 6l). Hind tibiae with several tiny, pale articulated spines on inferior surface.

Male: SGP short, thick, slightly wider at base than long and with V shaped notch, posterior margin having curved base, with short, tapered arms tipped with short, pale styles that project downwards (Figure 6f). Abundant hairs on SGP margin. Cerci long, tapering from base to about ¾ length, then somewhat bulbous towards the tip, and projecting beyond the SGP (Figure 6e). Paraprocts erect, narrow with dark tips, and held close together medially (Figure 6d). Abdominal tergite T9 with wide and depressed marginal lobe bearing thickened, pigmented patches corresponding to T10 falci (Figure 6d). T10 with relatively large, dark-tipped, hooked falci that are widely separated; nearly as far apart as cerci (Figure 6d).

Female: Slightly larger than male. Ovipositor very small and stout; about 15% length of body (Figure 6a,g,h). Simple, translucent SGP (Figure 6g).

Dimensions: Holotype: HD 8.1, BL 17.5, HFL 10.0, HFW 3.2, HTL 9.8, PL 4.0, PW 5.1. Paratype: HD 8.2, BL 21.0, HFL 10.9, HFW 3.4, HTL 10.3, PL 4.5, PW 4.7, OL 2.9.

Distribution: MK. Lake Benmore, Twin Peaks Conservation area, Bendu Scientific Reserve, Ben Ohau Conservation Area (Figure 9).

Additional material: Maryburn south (MPN_GW1445, MPN_GW1446), Bendu Scientific Reserve (MPN_GW1435), Pukaki Flat (MPN_GW1429), Pukaki Falls (MPN_GW1428), Tekapo River north (MPN_GW1437, MPN_GW1438), Lake Benmore (MPN_GW1124).

Comments: Probably the same entity referred to as *Hemiandrus* 'furoviarius' (Johns 2001), and Tekapo ground wētā (Wyngaarden 1995). Among 20 adult individuals spanning the geographic range of this species that we examined for superior, prolateral and retrolateral linear spine number on fore and mid tibiae, 18 had the combination 1, 0/2, 2 on at least one leg (i.e., left or right side). Six of these were asymmetrical for the prolateral spine(s) on fore tibiae (i.e., 1 or 2 spines), or for the retrolateral spine(s) on mid tibiae (i.e., 1 or 2 spines). One individual from the Ben Ohau Conservation Area had the unusual combination on its mid tibiae of 2, 1/3, 1.

4.4 | *Hemiandrus johnsi* sp. nov.

Diagnosis: Fore tibiae with one superior, prolateral, linear, articulated spine about midway. Mid tibiae with two prolateral and two retrolateral superior articulated linear spines. Hind femora

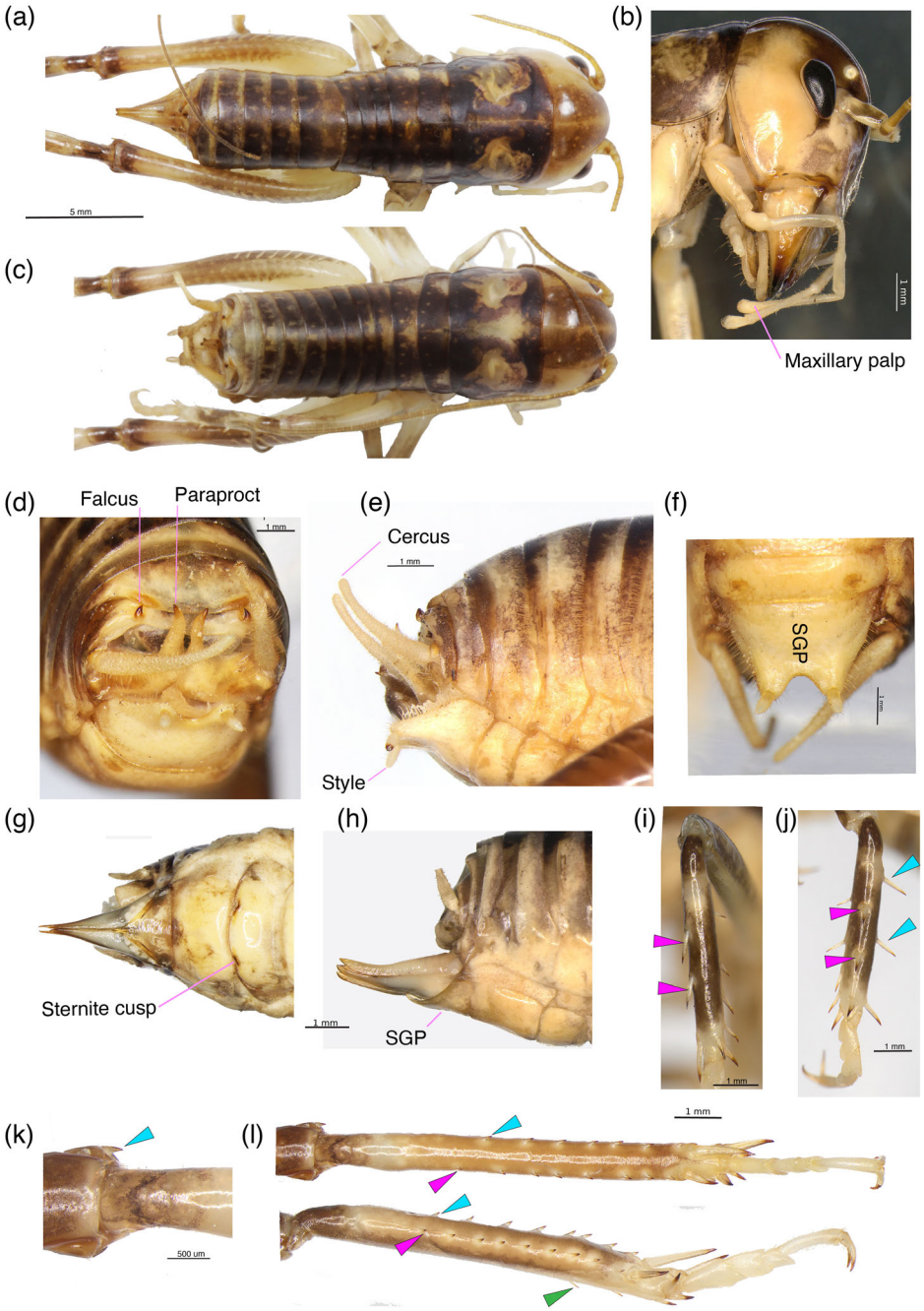

FIGURE 6 | External morphology of adult *Hemiandrus fabella* sp. nov. Dorsal view of female (a) and lateral view of head (b) showing maxillary palps. Dorsal view of male (c) and male terminalia in posterior (d) lateral (e) and ventral (f) views. Ventral (g) and lateral (h) views of female ovipositor and subgenital plate (SGP). Fore (i) and mid tibiae (j) detailing typical superior prolateral (pink triangles) and retrolateral (blue triangles) linear spines. Distal end of hind femur (k) showing retrolateral apical spine (blue triangle). Superior and oblique prolateral views of hind tibiae (l) indicating prolateral (pink arrows) and retrolateral (blue arrows) superior linear spines and inferior linear spines (green arrow).

lack apical spines. Adult males have widely spaced, stout, dark, blunt falci on tergite 10 adjacent to medial lobes of tergite 9 and long, straight paired paraprocts separated from one another along most of their length. Adult females have long, thin ovipositor, similar in length to the hind tibia.

Type material: Holotype. Male, Fox Peak, Sherwood Range, South Island, New Zealand, latitude −43.856737, longitude 170.81646, 1330 m asl, at night, 23.II.2015, S. A. Trewick, MPN_GW1128, MNZ_AI.083205 Paratype. Female, 5 km north of Macraes Flat village, South Island, New Zealand, latitude −45.350182, longitude 170.430136, 380 m asl, dug from dry ground, -.XII.2015. T. Jewell. MPN_GW1135, MNZ_AI.083206.

Etymology: Named for New Zealand entomologist Peter Malcolm Johns, who contributed to ground wētā biodiversity discovery (Johns 2001).

Description: A small-medium ground wētā found in east central South Island, New Zealand (Figure 9). Somewhat speckled in pattern with dark brown, pale and cream (Figure 7a–c,e). Side of

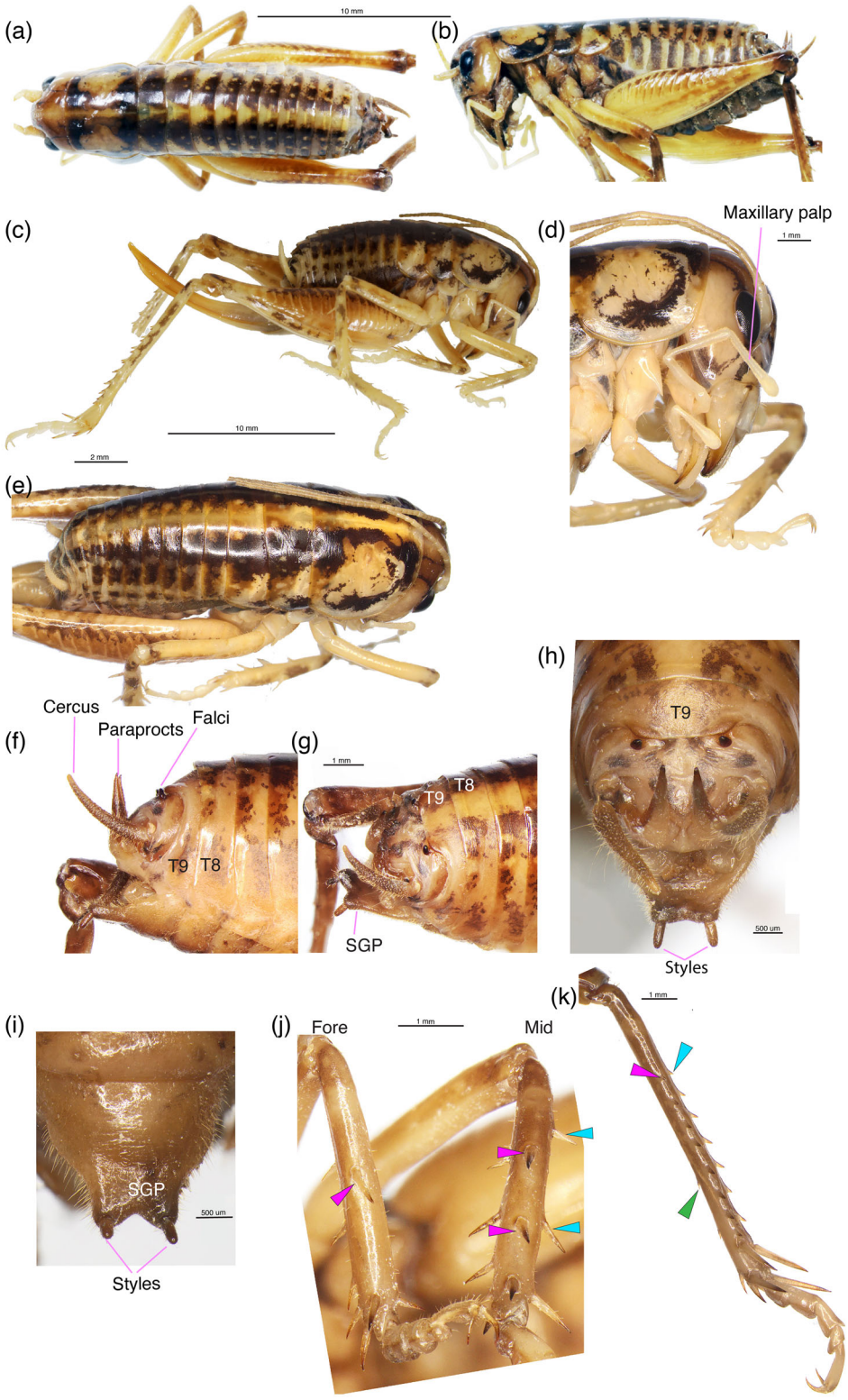

FIGURE 7 | External morphology of adult *Hemiandrus johnsi* sp. nov. Male dorsal (a) and lateral (b), and female lateral (c) habitus. Lateral view of head (d) showing maxillary palp. Dorsal view of female (e). Lateral (f), oblique dorsolateral (g) and posterior (h) and ventral (i) views of male terminalia indicating tergites and subgenital plate (SGP). Fore and mid tibiae (j) showing superior prolateral (pink triangles) and retrolateral (blue triangles) linear spines. Oblique prolateral view of hind tibiae (k) shows superior, prolateral (pink triangles) and retrolateral (blue triangles) fixed spines, and small articulated inferior (green triangles) spines.

head (Figure 7d), pronotal patches (Figure 7d,e), thoracic and abdominal medial line and lateral patches on mesonotum, metanotum and tergites predominantly cream (Figure 7a,e). Fore and mid femora is also cream. Hind femora is cream and pale brown with some dark brown marks (Figure 7b). Hind tibiae is cream with sparse, irregular dark brown marks (Figure 7k). Pronotum

with strongly contrasting cream and dark brown, with mostly cream perimeter; as a result, many individuals appear striped. Pronotum slightly wider than long (Figure 7a). Femora lack spines. Fore and mid tibiae, each have four articulated apical spines in addition to linear spines (Figure 7j), and hind tibiae with four articulated apical and four articulated sub-apical spines (Figure 7k). Fore tibiae with one superior, prolateral, linear, articulated spine about midway (Figure 7j). Mid tibiae with two prolateral and two retrolateral superior articulated linear spines (Figure 7j). Hind tibiae with two rows (prolateral and retrolateral) of seven or eight fixed linear spines on the superior surface, and three or four small articulated spines on the ventral side (inferior) (Figure 7k). The hind femora with 40–60 small pegs on retrolateral surface.

Males: Abdominal tergite T9 with wide medial lobe having dark sclerotised patches on each corner (Figure 7h). T10 with two widely spaced, stout, dark blunt falci adjacent to corners of T9 medial lobe (Figure 7f,g). Male SGP is short, thick, slightly wider at base than long and with shallow notch with slanting sides and curved base in posterior margin, and with short, tapered arms tipped with short, cylindrical blunt styles that project downwards (Figure 7i). Paraprocts, long, pointed, straight and upright and separated from one another along most of their length and tips flexed slightly forward (Figure 7f,h). Cerci long, pigmented, with long hairs and extending beyond SGP (Figure 7f,g).

Female: Similar size to male, but bearing long thin ovipositor, similar in length to hind tibia (Figure 7c).

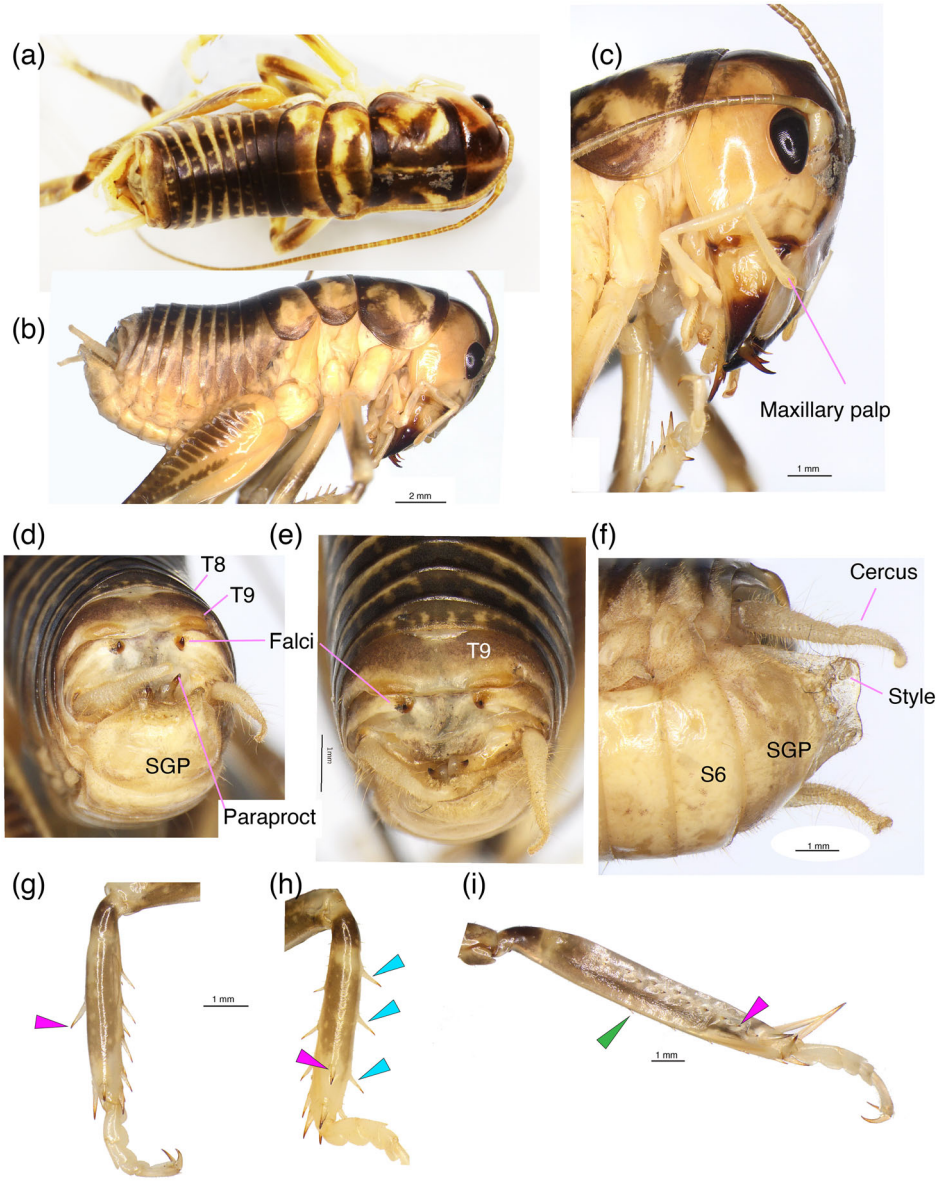

FIGURE 8 | External morphology of adult *Hemiandrus mataitai* sp. nov. Male dorsal (a) and lateral (b) habitus. Lateral view of head showing maxillary palps and entire male (c). Male terminalia in posterior (d), posterior-dorsal (e) and latero-ventral (f) view indicating tergites (T8, T9), sternite (S6) and subgenital plate (SPG). Fore tibia indicating superior, prolateral (pink triangle), linear spine (g), mid tibia indicating superior, prolateral (pink triangles) and retrolateral (blue triangles) linear spines (h). Lateral view of hind tibia (i) indicating very small, superior, prolateral, linear spines (pink triangle) and inferior, articulated linear spine (green triangle).

Dimensions: Holotype: HD 6.4, BL 16.9, HFL 10.3, HFW 3.0, HTL 8.9, PL 3.5, PW 4.6. Paratype: HD 6.7, BL 15.1, HFL 12.3, HFW 3.5, HTL 10.4, PL 4.4, PW 5.3, OL 10.

Distribution: MC, SC, MK, DN, CO. Predominantly in eastern Canterbury, South Island, New Zealand extending south to northern Otago near the coast (Figure 9).

Additional material: Kurinui, DN (MPN_GW114, MPN_GW620); Porters Pass, Springfield, MC (MPN_GW123); Fox Peak, Sherwood Range, SC (MPN_GW1127 – MPN_GW1129); Macraes Flat Village, Otago, CO (MPN_GW1135); Mt Trotter, Otago, DN (MPN_GW1134); Burkes Pass, MK (MPN_GW210, MPN_GW211); Mt Studholme, Waimate, SC (MPN_GW516). Kurinui Hampden

Comments: This species is probably the same entity represented by the tag-name *Hemiandrus* 'timaru' (Johns 2001). Referred to as *H.* 'timaru' with photograph in (Taylor Smith et al. 2013).

https://inaturalist.nz/observations/72074822

https://inaturalist.nz/observations/201108724

4.5 | *Hemiandrus mataitai* sp. nov.

Diagnosis: Fore tibiae with one prolateral superior linear spine above the middle of the tibia. Mid tibiae with one prolateral spine just below the middle of the tibia and three retrolateral superior linear spines. Hind femora lack apical spines. Adult males have a pair of short, dark, hooked, forward-facing falci on tergite 10 and short erect paraprocts are close but clearly separate along most of their length, within the spacing of the falci. Adult females have short ovipositor.

Type material: Holotype. Male, Sutton Salt Lake, Middlemarch, Otago, South Island, New Zealand, latitude −45.56994, longitude 170.0846033333, 250 m asl, 23.II.2021, D. Hegg. MPN_GW1351, MNZ_AI.083207. Paratype. Male, Sutton Salt Lake, Middlemarch, Otago, South Island, New Zealand, latitude −45.56994, longitude 170.0846033333, 250 m asl, 23.II.2021, D. Hegg. MPN_GW1349, MNZ_AI.083208.

Etymology: Māori word mātaitai means briny or salty, in reference to the type (and only known) location.

Description: A small ground wētā known only from the vicinity of Sutton Salt Lake, Otago, New Zealand (Figure 9). It has a compact body dark brown to black above and cream below (Figure 8a,c). Head and thorax have a pale medial line, the pronotum has two or three distinct pale cream lateral patches on either side, the foremost of which are distinctively somewhat triangular in shape (Figure 8a). Mesonotum has a broad pale transverse band (Figure 8a). Pronotumis dark on anterior and posterior margins, and tergites is pale on anterior margin but dark on posterior margin (Figure 8c). The sides of the head are pale and dark eyes are prominent (Figure 8b). Femora unarmed. Tibiae stout, nearly cylindrical (Figure 8h–j). Fore and mid tibiae, each have four articulated apical spines in addition to linear spines, and hind tibiae with four articulated apical and four articulated sub-apical spines. Fore tibiae with one prolateral superior linear spine above the middle of the tibia (Figure 8h). Mid tibiae with one prolateral spine just below the middle of the tibia and three retrolateral superior linear spines (Figure 8i). The hind tibiae have two rows of 7 or 8 min dark-tipped fixed linear spines on the superior surface and several smaller pale spines on the inferior surface (Figure 8j).

Male: Terminalia is short and broad. Abdominal tergite T9 with wide, shallow and slightly convex lobe spanning more than ¾ width in dorsal view, with a thickened sclerotised cusp at each side of this (Figure 8d,e). T10 with a pair of short, dark, hooked, forward-facing falci on an otherwise pale membrane (Figure 8d,e). Falci spaced to inner margins of T9 cusps. Paraprocts are short, erect, close but clearly separate along most of their length, but within the spacing of the falci (Figure 8d). Cerci are relatively long and tapered, pale with numerous long hairs, with blunt apex (Figure 8f). The SGP is wider than long and

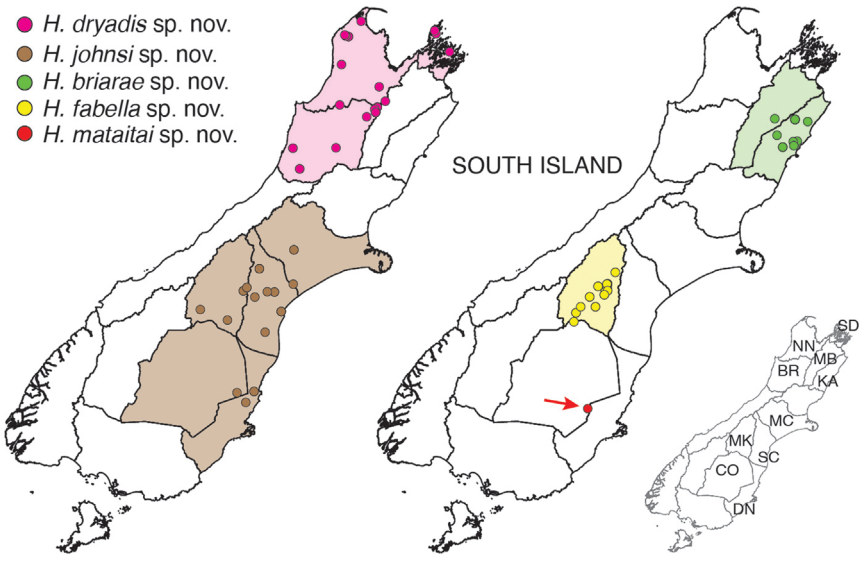

FIGURE 9 | The recorded distribution of five new *Hemiandrus* ground wētā species in South Island New Zealand. Two maps are shown for clarity of overlapping ranges. Boundaries of the New Zealand areas used for recording entomological localities (Crosby et al. 1998) are shown and inset map indicates their codes: BR Buller, CO Central Otago, DN Dunedin, KA Kaikoura, MB Marlborough, MC Mid Canterbury, MK Mackenzie, NN Nelson, SC South Canterbury.

transparent with pale hairs, posterior margin truncate with just a shallow medial indent (Figure 8f). Styles are small, pale and downward pointing.

Female only known from photographs (https://inaturalist.nz/observations/69910408). Ovipositor is very small, possibly not extending beyond the abdomen.

Dimensions: Holotype: HD 7.3, BL 15.5, HFL 10, HFW 2.9, HTL 8.6, PL 3.8, PW 4.6. Paratype HD 6.9, BL 15.3, HFL 8.6, HFW 2.75, HTL 7.9, PL 3.6, PW 4.4.

Distribution: CO. Sutton Salt Lake area in Strath Taieri, Otago (Figure 9).

Comments: Mid tibiae with superior, linear spine combination, one prolateral and three retrolateral, whereas phylogenetic sister *H. maia* has the combination two prolateral and three retrolateral on mid tibiae. The first known record of this species was made by Tony Jewell on iNaturalist (https://inaturalist.nz/observations/69910408).

5 | Discussion

The five new species of *Hemiandrus* described here can be distinguished using leg spines, which is valuable when identifying juvenile specimens or individuals from photographs. Variation in the number of superior spines on fore and mid tibiae create four unique combinations and if the apical spines of the hind femora are included, then each species has a diagnostic combination. However, we have identified spine variation within *Hemiandrus fabella* sp. nov. that could lead to confusion. Examination of the terminalia of adults also allows each species to be identified and mtDNA sequence variation is concordant with morphology.

Additional *Hemiandrus* species are likely to exist but are currently represented by very few specimens in collections. Among these are species with long ovipositors (Muckle and Chinn 2010) and species with small ovipositors, allied to *H. fabella* sp. nov. (Wyngaarden 1995). Continued research on this genus will help determine the extent of species diversity and help reveal pattern and rate of trait evolution. The hypothesis of the evolutionary relations of *Hemiandrus* species presented here from short mtDNA sequences (Figure 3) supports the inference that changes in ovipositor length have occurred multiple times in this lineage and are likely to be associated with different reproductive strategies (Browne and Gwynne 2022). Previously, ovipositor size was considered the key trait differentiating two genera of ground wētā (Salmon 1950); instead it has emerged that *Hemiandrus* comprises species of which adult females have a wide range of ovipositor lengths (Trewick et al. 2024). As an egg laying device, the length of the ovipositor determines the maximum depth in the substrate a female can deposit each of her eggs, and control of temperature and water loss during embryo development are likely to be under strong selection (Masaki 1986). However, many *Hemiandrus* species are known to lay eggs in their burrows, well below the soil surface, where a long ovipositor is unlikely to be of such importance and possibly a hinderance. It is possible that where closely related *Hemiandrus* species differ in relative and absolute ovipositor length this reflects selection for different reproductive strategies. For example, *H. fabella* sp. nov. females have a tiny ovipositor and show maternal care (Wyngaarden 1995) like that of the 'good mother' wētā *H. maia* (Taylor Smith et al. 2013), *H. pallitarsis* (Gwynne 2005) and *H. bilobatus* (Trewick et al. 2020), whereas the closely related and geographically overlapping species *H. johnsi* sp. nov. has a longer ovipositor and with no evidence for maternal care. Although observations of egg laying are few, the long ovipositor ground wētā *Anderus maculifrons* places long narrow eggs one at a time at the full depth of its ovipositor in soil and this can take place inside the female's shallow gallery or under moss (Cary 1981). Short ovipositor *Hemiandrus* species deposit ovoid eggs directly within a chamber at the end of a long burrow (Wahid 1978; Trewick et al. 2020). Further data are needed to help link diet, morphology and feeding strategies in *Hemiandrus* (e.g. Taylor Smith et al. 2013; Trewick et al. 2020) and *Anderus* (Chappell et al. 2014; Chikwature et al. 2025).

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Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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