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Think Pink: *Tanaostigmodes johnlasallei* Atkin-Zaldivar & Zhang, sp. nov., a New Species of Tanaostigmatidae (Hymenoptera: Chalcidoidea) Associated With Pink Galls on *Bossiaea sericea* (Fabaceae)

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ABSTRACT

Tanaostigmodes johnlasallei Atkin-Zaldivar & Zhang, **sp. nov.** is a gall-forming wasp that induces bright pink, fluffy galls on *Bossiaea sericea* I.Thomps. (Fabaceae). Within the Australian Alps, citizen science sightings of the galls were used to locate and rear the new species and additional gall-associated taxa. Three species of Hymenoptera: one Ichneumonidae (*Poecilocryptus nigromaculatus* Cameron, 1901) and two Coelocybidae (*Liepara dentata* Bouček, 1988, and *Acoelocyba* sp. Bouček, 1988) were found to utilise these galls of *Tanaostigmodes johnlasallei* **sp. nov.**, potentially through parasitism or inquiline behaviours. This description marks the first new Australian Tanaostigmatidae description in 20 years, and the first Australian tanaostigmatid species with identified inquiline and gall-associates.

1 | Introduction

Plant–insect relationships are a cornerstone of environmental and agricultural research; from their use in biocontrol and biosecurity (Dofuor et al. 2024) to providing crucial information in conservation (Moir 2021), the importance of these relationships is well known. However, issues such as co-extinction risks (Moir 2021) and introduced pests (Dofuor et al. 2024) become difficult to manage when plant-associated insects are not formally described or are incorrectly identified. Within Australia and New Zealand, the Taxonomy Decadal Plan Working Group (2018) estimates that only 30% of species have been named and described. When considering hyperdiverse orders such as Hymenoptera, which alone is estimated to contain over a million different species (Forbes et al. 2018), a focus on increasing taxonomic expertise in these groups needs to be considered (Taxonomy Decadal Plan Working Group 2018).

One product of plant–insect interactions are galls, which are abnormal formations of plant tissue triggered by external agents including

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fungi, viruses and insects such as those in the order Hymenoptera. Hymenopterans that elicit galls are inducers, whereas taxa that solely utilise the galls of others are inquilines (Csóka et al. 2005); the term gall-associate is used when the lifestyle of a species is unknown but is still tied to the ecosystem within galls. Although hymenopteran galls can form on a great variety of plant species, species within the plant families Myrtaceae (e.g., *Eucalyptus* L'Hér.) (Le et al. 2020; Barbosa et al. 2018; Nugnes et al. 2015) and Fabaceae (e.g., *Acacia* Mill.) (La Salle 2005; Prinsloo and Neser 2007; Paretas-Martínez et al. 2011) are particularly known to be hosts for multiple hymenopteran families in Australia.

Gall-inducer and inquiline species of Hymenoptera are found in multiple superfamilies including Ichneumonoidea (Dangerfield and Austin 1998), Cynipoidea (Ronquist 1999; Paretas-Martínez et al. 2013) and Chalcidoidea (La Salle 2005; Heraty and Woolley 2025). Chalcidoidea is extremely diverse with 50 extant families (Heraty and Woolley 2025), some of which have only recently begun to be understood (Burks et al. 2022); this contributes to some families lacking keys to genera, molecular data or updated taxonomy.

Tanaostigmatidae Ashmead (Hymenoptera: Chalcidoidea) is a cosmopolitan family of gall-associated wasps, currently comprised of 101 described species (Heraty and Woolley 2025; UCD Community 2023). Throughout their distribution, Tanaostigmatidae are known gall-inducers, although in rare cases they have been known to act as inquilines (Kieffer and Jörgensen 1910; La Salle 1987). The shape, colour and texture of the galls created by Tanaostigmatidae can vary greatly across species, from woody stem galls to fragile elaiosome galls (La Salle 1987; Hardwick et al. 2005).

Tanaostigmatidae is composed of eight genera, three of which are monotypic (UCD Community 2025). The genus *Tanaostigmodes* Ashmead, 1896, contains the majority of known species, with 66 described species from Oceania, Asia, Africa and the Americas (Gibson and Van Noort 2025). The large number of *Tanaostigmodes* species, compared to other tanaostigmatid genera, may be a result of the lack of synapomorphies that are used to define *Tanaostigmodes*; taxa that do not fit within the morphological characteristics of other genera are often placed within the genus (La Salle 1987), resulting in large amounts of morphological variation. Future revisions of the genus may see fit to split the current species placed in *Tanaostigmodes* into several genera when a line of molecular evidence is available. *Tanaostigmodes* and Tanaostigmatidae as a whole have been the focus of very little molecular research apart from a few representatives included in broader-scale Chalcidoidea systematic studies (Cruaud et al. 2024; Munro et al. 2011). Recently, four genera of Tanaostigmatidae were included in a Chalcidoidea-wide phylogeny in Cruaud et al. (2024). Two representatives of *Tanaostigmodes* were included but did not emerge as sister taxa, suggesting that *Tanaostigmodes* is not monophyletic and requires additional research to better understand the limits of the genus.

Within Australia, *Tanaostigmodes* accounts for 10 of the 11 described species of Tanaostigmatidae (Bouček 1988; Hardwick et al. 2005), with one species of *Protanaostigma* Ferrière, 1929, described from tropical regions of Queensland (Bouček 1988). Collection records of the family span all mainland states and territories (Bouček 1988) with Queensland showing the most diversity (seven species), followed by Western Australia (three species). Currently no species of *Tanaostigmodes* or Tanaostigmatidae have been formally described from Tasmania, although a single specimen from an unidentified species has been collected from the east coast of the island (Atlas of Living Australia 2025).

Host records of Australian tanaostigmatids are very limited or only referenced to by a single sweep net collection record (Girault 1933; Girault 1915). One confirmed host is the plant genus *Bossiaea* Vent. (Fabaceae); *Tanaostigmodes shrek* Apsec, 2005, was described from reared material from an unidentified *Bossiaea* pea-plant in the Australian Capital Territory (ACT) (Hardwick et al. 2005).

In the Australian Alps, galls induced by an unknown species of *Tanaostigmodes* have been sighted multiple times since 2016, but the gall-inducer has yet to be formally described. The species was first formally recorded by Farrow and Kelly (2016) as a '"Velvet gall" [...] by an unidentified gall wasp larva (Chalcidoidea)'. Following this, in 2017, galls were collected and wasps were reared, with one species identified as the genus *Tanaostigmodes* by K. Walker and J. La Salle. Images of the gall and the unknown *Tanaostigmodes* were then uploaded to the citizen science platform iNaturalist (https://www.inaturalist.org/) (Walker 2017). Since the genus identification and images of the galls were uploaded, more than 10 additional sightings have been reported from citizen scientists from New South Wales (NSW), Victoria (VIC) and the ACT.

Galls are often uploaded on citizen science platforms without the collectors knowing that the organism that has caused it is an undescribed species. Citizen science resources such as iNaturalist and NatureMapr (https://naturemapr.org/) give opportunities to collect data on time-sensitive activities such as feeding (Hu et al. 2025) or seasonal galling. This project acts as an example of how citizen science-led data sets can be used to further taxonomic progression and as a tool for recording plant–insect interactions (Mesaglio and Callaghan 2021; Skvarla and Fisher 2023; Zhang et al. 2022).

The platforms iNaturalist and NatureMapr, where these gall images are uploaded, presented an opportunity to describe a species that the wider public is already curious about and interested in. By using the sightings of the galls on iNaturalist, locations in the alpine regions of VIC and NSW were able to be resampled in 2023. We here describe this new species of *Tanaostigmodes* and document the relationships of the species with the host plant, *Bossiaea*, and associates of the gall as a contribution towards revitalising work on Australian Tanaostigmatidae.

2 | Materials and Methods

2.1 | Collection and Rearing

2.1.1 | 2017 Collection

In late January 2017, cuttings with galls were taken from *Bossiaea* plants in Falls Creek, Victoria. The cuttings were placed in plastic bags and refrigerated for transportation.

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Insects emerged only after the galls were left at room temperature (Walker 2017).

2.1.2 | 2024 Collection

In November 2024, additional collecting was conducted in an attempt to rear fresh material from locations based on sightings from iNaturalist and NatureMapr. Twenty-nine galls were collected from six locations across the Victorian high country or in and around Kosciuszko National Park (Figure 1). Each gall was composed of numerous smaller segments. When galls were on the same stem touching each other, they were classified as a 'single gall'. Along with the gall, a plant voucher was also taken from each site to be used for identification. Galls were stored in sealed ziplock bags with paper towel to reduce condensation; the paper towel was changed every 1–2 days. All insect material from the 2017 collection event is deposited at Museums Victoria, whereas insect material from the 2024 collection event is deposited at the Australian Museum. Plant and gall material are deposited at the National Herbarium of New South Wales (NSW) or the Royal Botanic Gardens Victoria (MEL) based on collection locality.

2.2 | Morphology

The specimens of Chalcidoidea that emerged from the galls (Figures 2 and 3) were identified to family using Bouček (1988) and Burks, Heraty, et al. (2025); *Liepara dentata* Boucek, 1988, was compared against the holotype to confirm identification. The species of *Acoelocyba* was compared against the holotype of the only known species *Acoelocyba nemorum* (Girault, 1927) to confirm it is a new species; it is not described in this paper due to the only specimen available being male. Specimens of Ichneumonidae (Figure 4) were identified to family using the key in Goulet and Huber (1993), then narrowed to subfamily using Gauld (1984). For the subfamily Labeninae, the identification to genus was determined through the key included in Gauld (2000).

Host plant species were identified at the State Herbarium of South Australia (AD) using the treatment to eastern Australian species of *Bossiaea* by Thompson (2012).

Tanaostigmodes johnlasallei (Figures 5 and 6) was diagnosed against the holotypes of seven species of *Tanaostigmodes* in the QM, one species in the SAMA, and one species in the ANIC through morphological comparison. It was also diagnosed

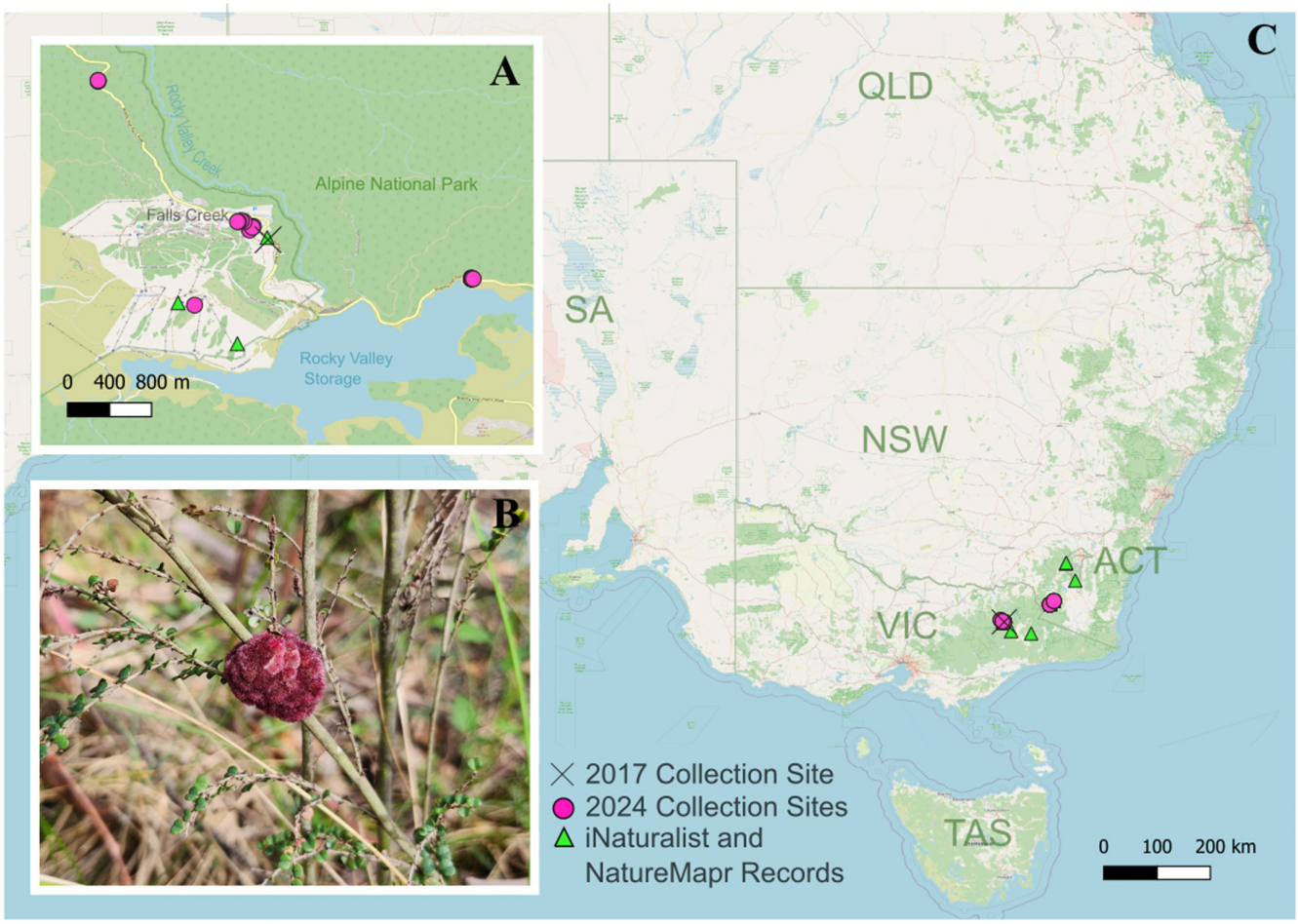

FIGURE 1 | (A) Map of the Alpine National Park and Falls Creek area, holotype location of *Tanaostigmodes johnlasallei* sp. nov. is indicated by the cross. (B) Image of gall collected in Mt Kosciuszko during the 2024 collection period. (C) Map of the south-eastern coast of Australia, with the locations of the 2017 (cross) and 2024 collection trips (circles), and other iNaturalist and NatureMapr sightings (triangles). Additional iNaturalist and NatureMapr sightings are hidden if they were collected during the 2024 collections but can be found in Table S1.

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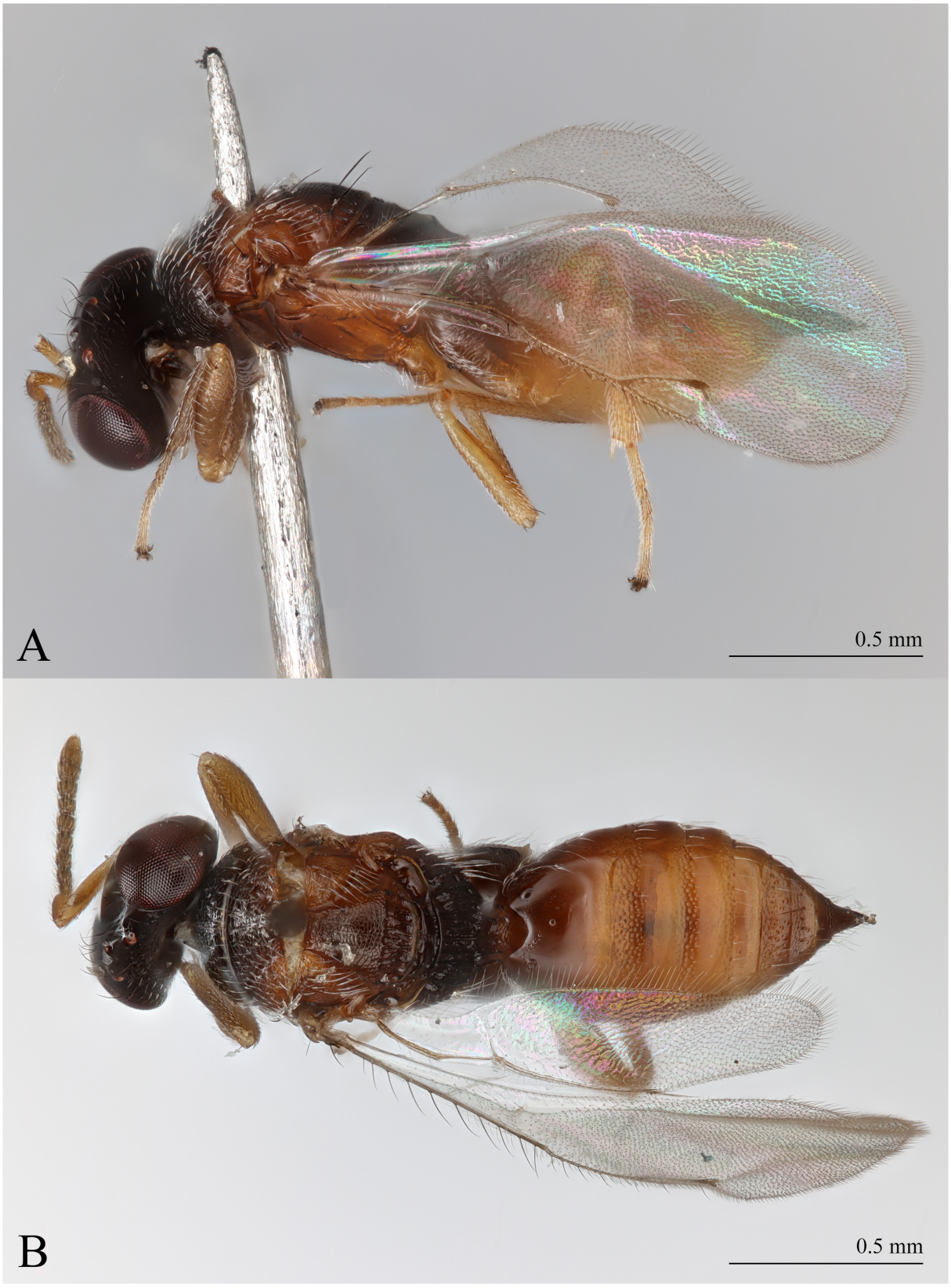

FIGURE 2 | *Liepara dentata* (HYM-96003) female, reared from galls formed by *Tanaostigmodes johnlasallei* sp. nov. (A) Lateral habitus. (B) Dorsal habitus.

against the original description of *Tanaostigmodes megalarus* (Walker, 1838); however, this description is very brief, in Latin, and with mostly colour characters. The holotype specimen in the NHMUK (5c 1061) is damaged and missing diagnostic characters, limiting the ability to accurately diagnose new species against *T. megalarus*.

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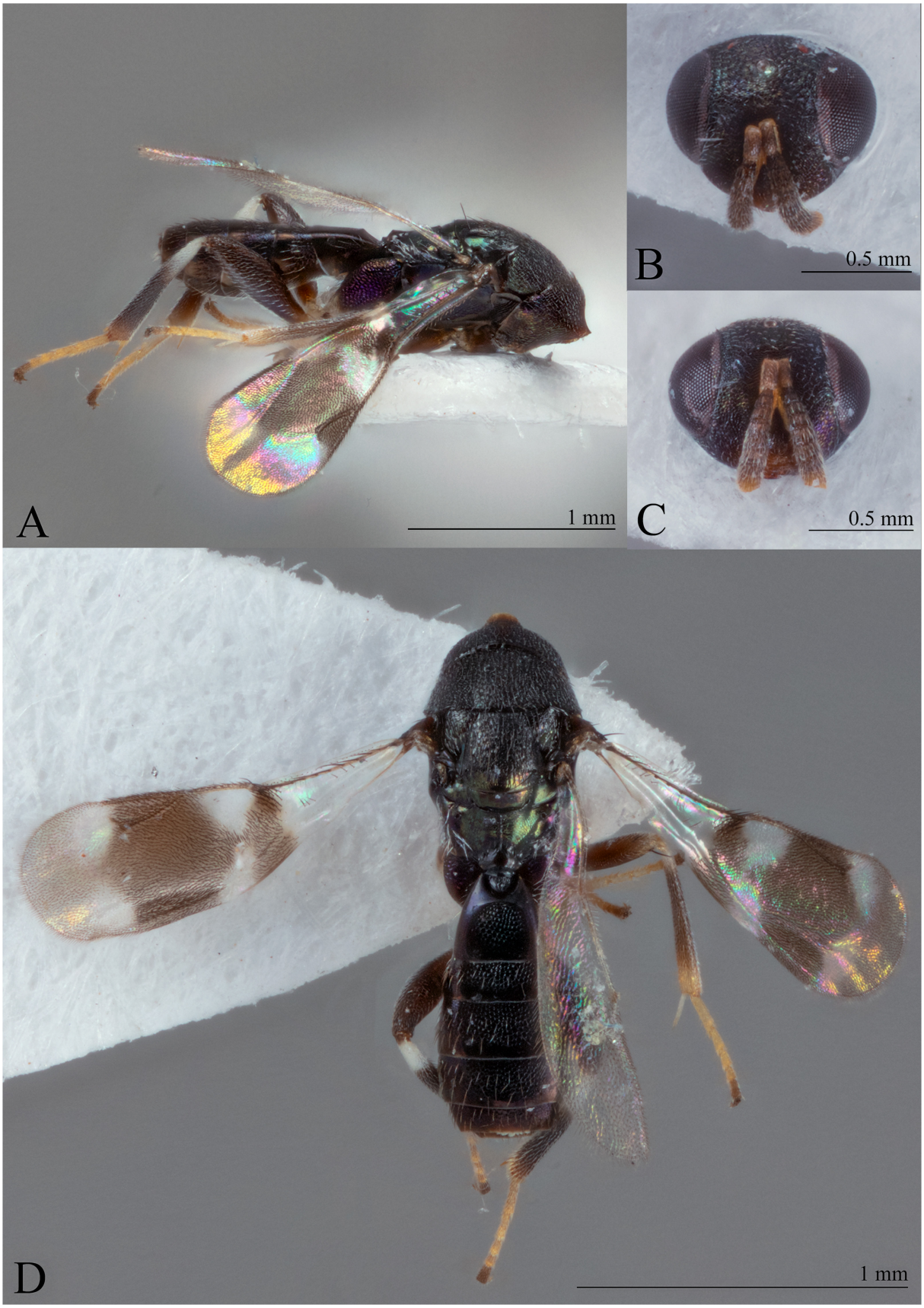

FIGURE 3 | *Acoelocyba* sp. (HYM-96006) male, reared from galls formed by *Tanaostigmodes johnlasallei* sp. nov. galls. (A) Lateral habitus. (B) Head and ocelli. (C) Anterior head. (D) Dorsal habitus.

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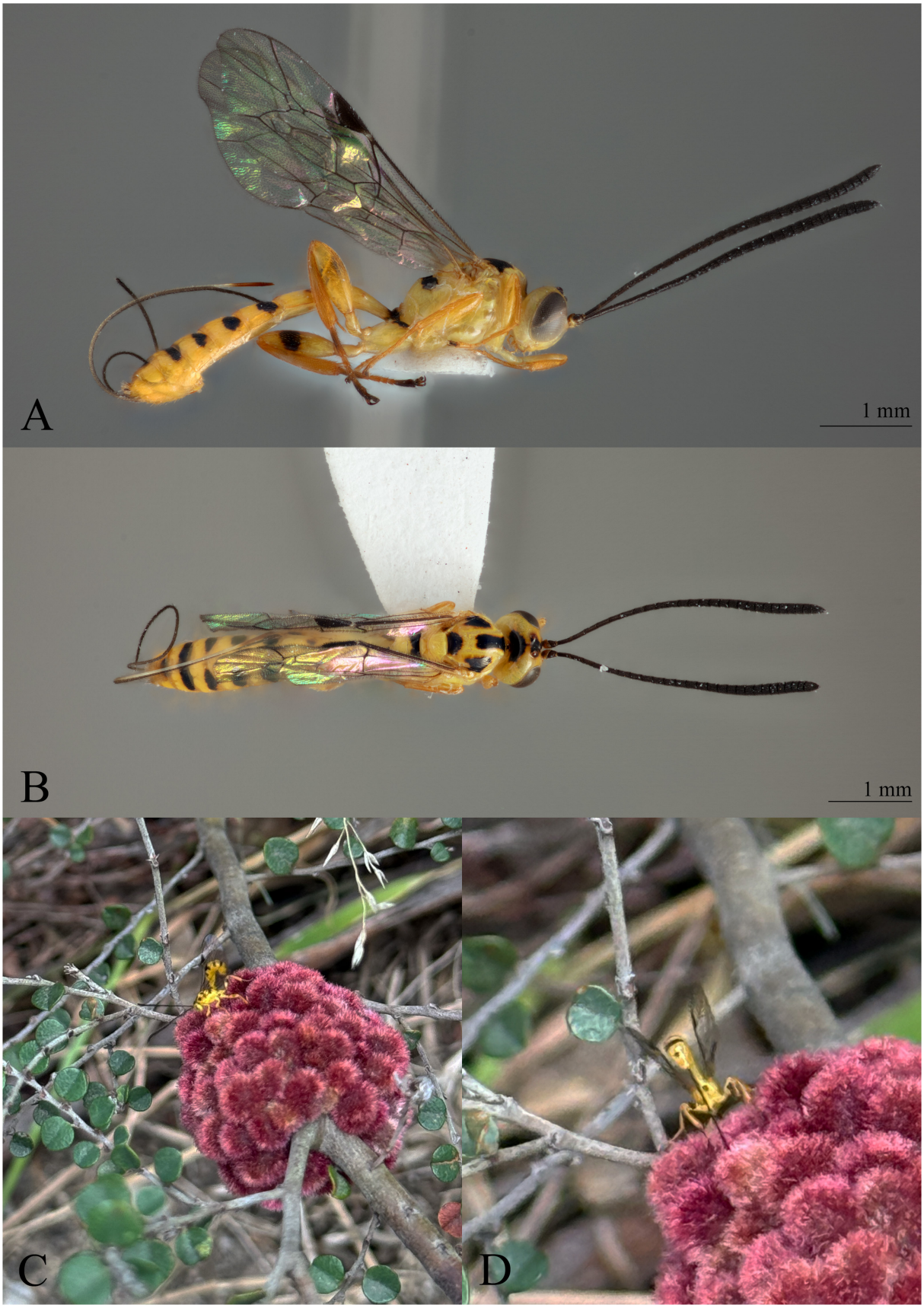

FIGURE 4 | (A,B) *Poecilocryptus nigromaculatus* (K.701128) reared from *Tanaostigmodes johnlasallei* sp. nov. galls. (A) Lateral habitus. (B) Dorsal habitus. (C,D) Images of *Poecilocryptus nigromaculatus* ovipositing into *T. johnlasallei* sp. nov. gall in Ngarigo, NSW.

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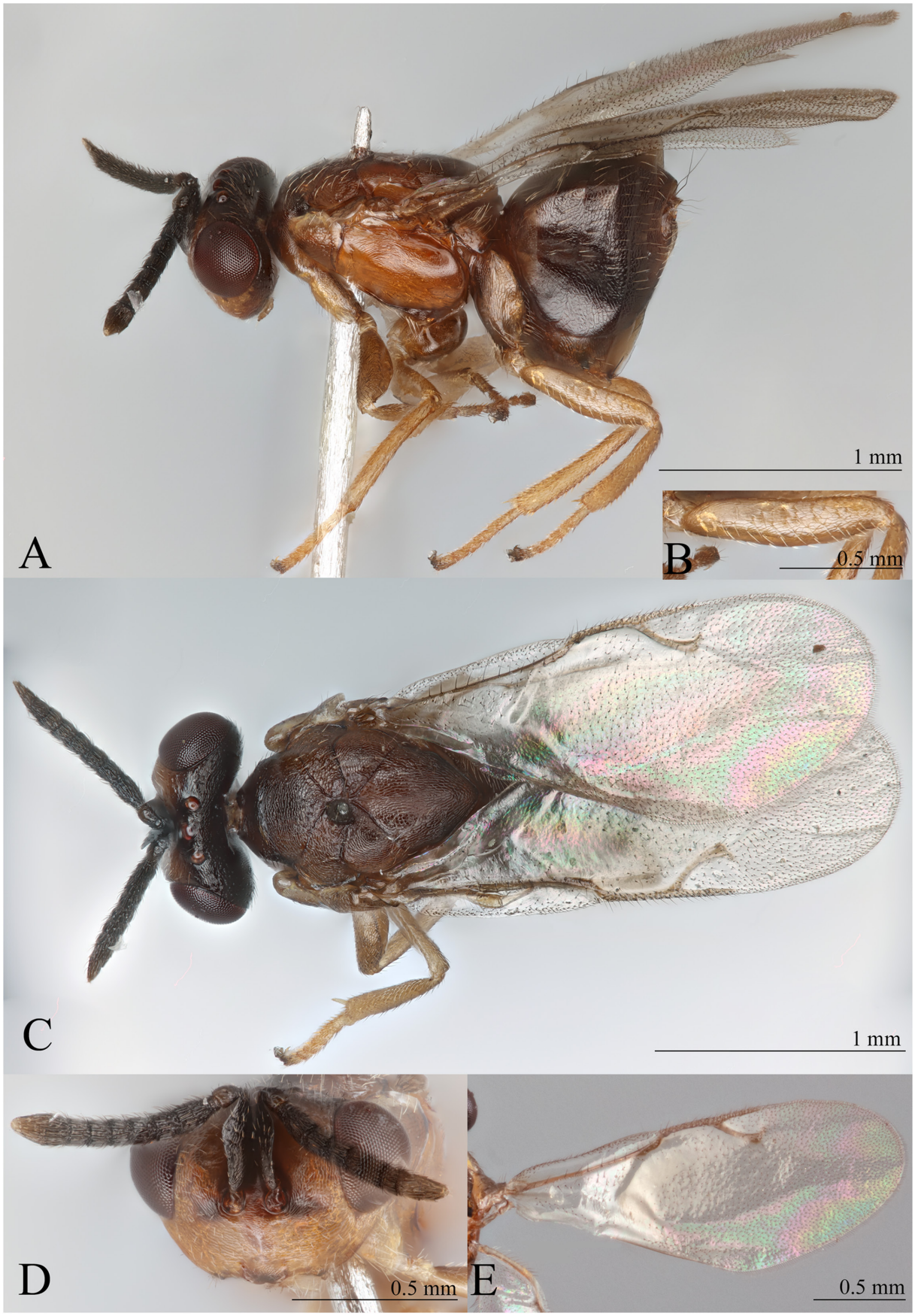

FIGURE 5 | (A,D) *Tanaostigmodes johnlasallei* Atkin-Zaldivar & Zhang, sp. nov., holotype female. (A) Lateral habitus. (B) Hind femur. (C) Dorsal habitus. (D) Anterior head. (E) Paratype female, fore wing.

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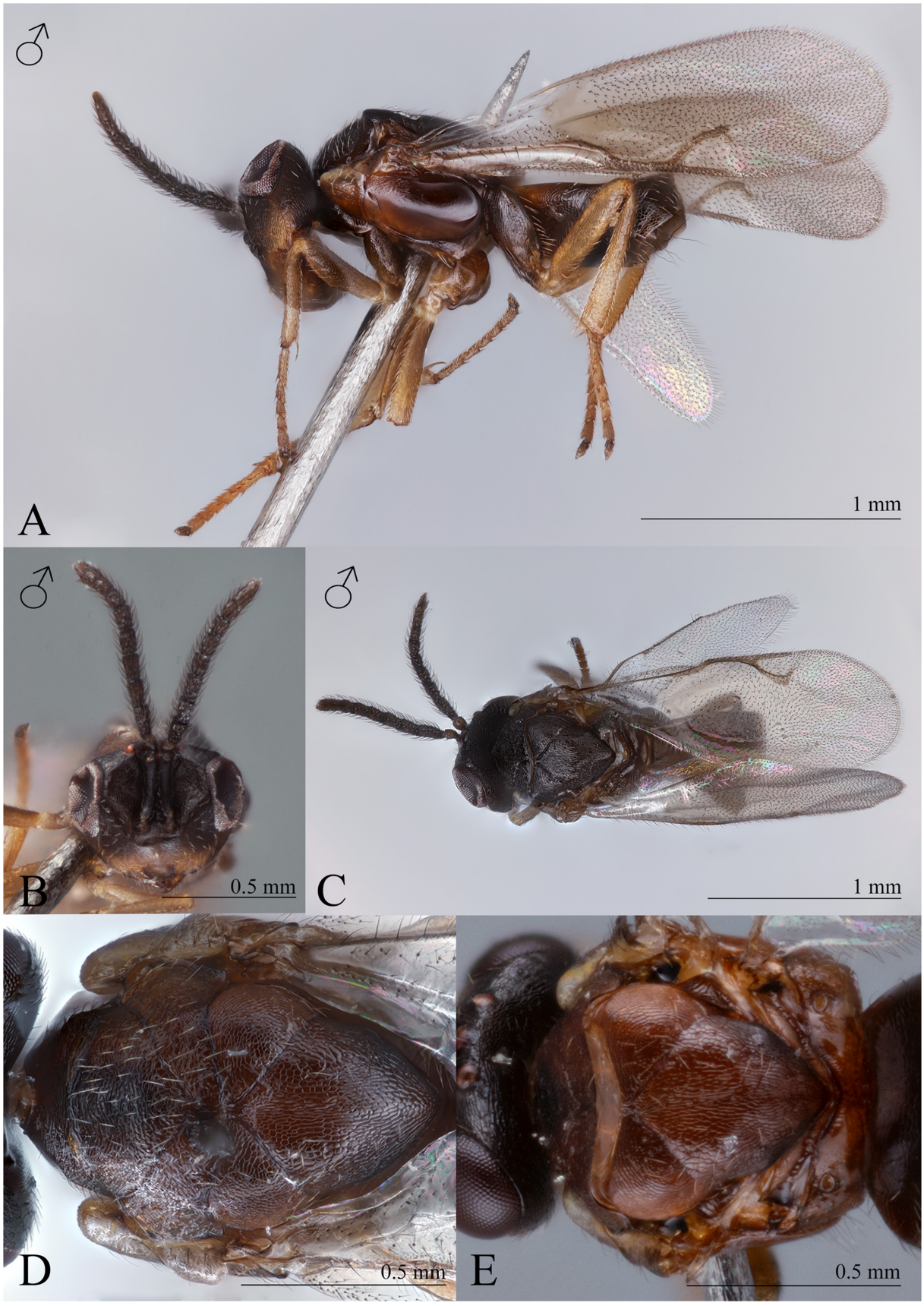

FIGURE 6 | (A–C) *Tanaostigmodes johnlasallei* Atkin-Zaldivar & Zhang, sp. nov., paratype male HYM-96005. (A) Lateral habitus. (B) Anterior head. (C) Dorsal habitus. (D) Holotype female; sculpturing present on mesoscutellum. (E) Paratype female HYM-96000; mesoscutellum and propodeum.

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External morphological terminology follows the Hymenoptera Anatomy Ontology Portal (Yoder et al. 2011) for general hymenopteran morphology and Burks, Gibson, and Heraty (2025) for chalcid morphology. Sculpturing terminology follows Harris (1979) and La Salle (1987). In the description of the new species of *Tanaostigmodes*, the term 'dark brown' is used to mean dark brown to almost black as seen on the hind coxa in Figures 5A and 6A, whereas 'brown' is used to mean any shade of brown lighter than what is described as 'dark brown' as seen in the hind femur (Figures 5A and 6A).

Measurements were taken using an Olympus SZX16 stereo microscope and measured with Olympus cellSens software; they are given to two decimal places and follow Burks, Gibson, and Heraty (2025). Measurements in the description of *Tanaostigmodes johnlasallei* are based on the holotype alone, with the paratype measurements found in variation.

Figure plate images were taken on a Canon 5DSR MP-E 65-mm lens (Figure 4A,B) or a Nikon 5× lens (Figures 3, 5B,E and 6B,E). Target areas were captured on a Macropod (Macroscopic Solutions) equipped with a Canon EOS R6 with a Mitutoyo M Plan Apo 10× objective mounted onto the Canon EF Telephoto 70–200 mm zoom lens and the Canon MT-24EX Macro Twin Lite Flash (Tokyo, Japan) with custom-made diffusers to minimise hot spots (Figures 2, 5A,C,D and 6A,C,D). Images were merged into a composite image using Zerene Stacker v1.04. Post-imaging processing and the construction of figure plates were completed in Adobe Photoshop V26.10.

2.3 | Molecular Methods

From the 2017 rearings, two specimens of *T. johnlasallei*, a specimen of *Liepara dentata* and a specimen of the ichneumonid species were extracted, and Sanger sequencing of the *COI* region was attempted. DNA extractions were conducted using the Gentra Puregene DNA Purification Kit for all non-tanaostigmatid specimens, and the Qiagen DNeasy blood and tissue kit was used for extractions conducted on Tanaostigmatidae samples. Instructions for both kits were followed with minimal modifications. PCRs were conducted on an Eppendorf MasterCycler Pro using 15.5 μL of nuclease free water, 5 μL of MRT buffer at 5× dilution, 1.2 μL of both the forward and reverse primer, 0.1 μL Immolase and 2 μL of DNA. LCO1490 was used as the forward and HCO2198 as the reverse primer (Folmer et al. 1994). The total of each reaction volume was 25 μL per sample. For amplification, cycles consisted of 95°C for 10 min, 95°C for 45 s, 48°C for 45 s and 72°C for 60 s, all repeated for 35 cycles followed by 72°C for 10 min. The PCR product was processed and sequenced at the Australian Genome Research Facility (AGRF), and the raw trace file was visualised and trimmed using Geneious Prime 2025.0.3 (https://www.geneious.com).

As PCR amplification had been unsuccessful for all but the ichneumonid specimen, one of the extractions of *T. johnlasallei*, alongside an extraction (conducted using the Qiagen DNAeasy kit) of a complete gall from the 2024 collections, underwent a low coverage genome skim to attempt to retrieve molecular data to accompany the new species description, and for use in future phylogenomics studies. Library preparation was conducted by AGRF using the xGen cfDNA and FFPE DNA library preparation kit, with the resulting libraries sequenced on an Illumina NovaSeqX. The tanaostigmatid library was sequenced at a theoretical average coverage of ~3.1× (this assumes a genome size of ~461 Mb similar to closely related family Ormyirdae [Genbank Assembly GCA_981126395.1]).

Raw reads were adapter trimmed using Cutadapt (Martin 2011) and processed through MitoFinder 1.4.2 (Allio et al. 2020). Geneious Prime 2025.0.3 was used to compare and further trim the *COI* sequences retrieved through the MitoFinder pipeline and trimmed to the standard barcoding region.

We downloaded all publicly accessible Tanaostigmatidae *COI* sequences through the Barcode of Life Data Systems (BOLD) (https://boldsystems.org) (Ratnasingham et al. 2024), along with *Trichilogaster acaciaelongifoliae* (Froggatt, 1892) (Melanosomellidae) as outgroup. The sequences were aligned using AliView (Larsson 2014). We reconstructed a phylogenetic tree using maximum likelihood in IQ-TREE v2.36 (Minh et al. 2020), with the best evolutionary model TIM + F + I + G4 determined using ModelFinder (Kalyaanamoorthy et al. 2017). Node support was estimated using Ultrafast Bootstrap (UFBoot, Hoang et al. 2017). FigTree v1.4.4 (Rambaut 2018) was then used for tree visualisation.

2.4 | Acronyms

Locations

ACT—Australian Capital Territory

NSW—New South Wales

QLD—Queensland

SA—South Australia

TAS—Tasmania

VIC—Victoria

Museums

ANIC—Australian National Insect Collection, Canberra, Australia

NMV—Museums Victoria, Melbourne, Australia

QM—Queensland Museum, Brisbane, Australia

SAMA—South Australian Museum, Adelaide, Australia

NHMUK—Natural History Museum, London, UK

Morphology

POL—Postocellar line

OOL—Ocellocular line

LOL—Lateral ocellar line

SMV—Submarginal vein

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MV—Marginal vein

SV—Stigmal vein

PMV—Post-marginal vein

F#—Funicle one to six

C#—Clava segments (one to three)

T#—Tergite one to eight

3 | Results

In total, 10 specimens were reared from the 2017 collections, five of which were identified as a new species of *Tanaostigmodes*, two *Poecilocryptus nigromaculatus* Cameron, 1901 (Ichneumonidae), two as *Liepara dentata* (Coelocybidae) and one as an undescribed species of *Acoelocyba* (Coelocybidae) (Table 1). A single specimen of *P. nigromaculatus* was reared from the 2024 collections; *P. nigromaculatus* was able to be recorded ovipositing into the galls during aforementioned collections (Figure 4).

The *COI* sequence (652 bp) from *T. johnlasallei* is recovered as sister to the other two tanaostigmatids collected from Australia (Figure S1). A *COI* sequence (1006 bp) recovered from the *Bossiaea* gall which closely matches (97.7% similarity) the sequence of *T. johnlasallei*, is deposited under TANJL003-25 and GenBank accession number PZ587234; the voucher for this plant sample (T.C. Atkin Zaldivar, TC-KNP24-06) is housed at the National Herbarium of New South Wales.

4 | Taxonomy

Chalcidoidea Latreille, 1817

Tanaostigmatidae Ashmead, 1904

Tanaostigmodes Ashmead, 1896

Type species: *Tanaostigmodes howardii* Ashmead, 1896 (by original designation).

Diagnosis

We do not alter the diagnosis of *Tanaostigmodes* (Bouček, 1988). *Tanaostigmodes* can be distinguished from *Protanaostigma* (the only other genus recorded in Australia) as it lacks the subapical tooth present in all species of *Protanaostigma*. No other genera have been recorded in Australia to date (Bouček 1988).

Tanaostigmodes johnlasallei Atkin-Zaldivar & Zhang, sp. nov.

(Figures 5 and 6)

https://zoobank.org/urn:lsid:zoobank.org:act:16420761-7E4D-473C-9DAE-13FE81150C0F

Material Examined

Holotype

♀: Australia, Victoria, Falls Creek; −36.866, 147.287 [‘−36.877S, 147.295E’]; 26 January 2017; collector L. Gillbank [‘ex *Bossiaea foliosa*’] (NMV: HYM-95998).

Paratypes

3 ♂: same collection data as holotype, NMV: HYM-96002; HYM-96005; HYM-96001; HYM-95999 (BOLD TANJL001-25). 1 ♀: same collection data as holotype, NMV: HYM-96000.

TABLE 1 | Table displaying rearing results from the 2017 and 2024 rearing events from areas within the Alpine National Park, VIC, and Kosciuszko National Park, NSW.

Collection trip	Location(s) and associated molecular data	Family	Species	Hypothesised ecology	# of specimens reared
2017	**Rocky Valley, Falls Creek, VIC** *BOLD: TANJL001-25* *GenBank: PZ587233*	Tanaostigmatidae	*Tanaostigmodes johnlasallei* sp. nov.	Gall-inducer	5
2017	**Rocky Valley, Falls Creek, VIC** *BOLD: TANJL002-25* *GenBank: PZ587232*	Ichneumonidae	*Poecilocryptus nigromaculatus* Cameron, 1901	Inquiline	2
2024	**Ngarigo, Kosciuszko National Park, NSW**				1
2017	**Rocky Valley, Falls Creek, VIC**	Coelocybidae	*Liepara dentata* Boucek, 1988	Gall-associated	2
2017	**Rocky Valley, Falls Creek, VIC**	Coelocybidae	*Acoelocyba* sp. Bouček, 1988	Gall-associated	1

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Description

Female

Colour. Occiput and vertex dark brown with anterior of head brown; eye reddish-brown; anterior head brown apart from circular dark brown markings expanding from outer sides of torulus and stopping halfway between torulus and eye (Figure 5D); ventral clypeal margin dark brown; antenna uniformly dark brown; mesosoma brown, prepectus and mesopleuron lighter than mesosoma; fore, mid, and hind coxa dark brown; legs excluding coxa, brown (same colour as anterior head); fore wing hyaline with brown infuscation visible below the costal cell and covering 1/3 of the wing (Figure 5E); metasoma dark brown.

Body length. 1.96 mm.

Head. Ratio of head length: width in dorsal view 0.39; ratio of head length: width in frontal view 1.76; POL:OOL:LOL is 2.9:2:1. Lateral ocelli closer to median ocelli than eye margin. Sculpturing imbricate; scattered setae across anterior and back of head; scrobal impression present and glabrous; inter-antennal projection very small. Toruli insertion above ventral edge of compound eye. Malar sulcus absent; interantennal distance 0.10; malar space: eye height 0.56 mm. Clypeus emarginate, three-toothed mandible.

Antenna. Clavate, six flagellomeres, two anelli, three segmented clava. Ratio of Scape:Pedicel:Combined Anelli:F1:F2:F3:F4:F5:F6:C1:C2:C3 is 8.9:2.1:1:2.7:2.8:2.2:2:2:1.7:2.1:1.1:1.9. Scape 1.9 × longer than width, flattened ventral expansion present (Figure 5D).

Mesosoma. Sculpturing coriaceous to alutaceous becoming finer towards the centre of mesoscutellum (Figure 6D); setae irregularly scattered across mesoscutum and sides of mesoscutellum and axilla, setae absent in centre of mesoscutellum. Notauli complete, meeting anterior to trans-scutellar suture; propodeum with incomplete shallow striations below dorsellum (Figure 6E). Mesopleuron glabrous with shallow costate sculpturing. Hind coxa with row of setae on posterior edge (Figure 5A).

Fore wing. Length 2.00 mm; SMV length 0.81 mm; MV length 0.29 mm; PMV length 0.21 mm; SV length 0.29 mm; ratio of SMV: MV: PMV: SV is 3.9:1.4:1:1.4. Stigmal vein forming 45° angle to anterior margin of wing. Speculum forming 'L' shape in basal third of wing (Figure 5E).

Metasoma. Sculpturing imbricate, T2 and T5 with weak medial incision; weak medial line present, T4–T8 equal in length and width. Setae found on the posterior edge of T3–T8 becoming denser on T5–T8. Pygostyle with three setae and two elongated cercal setae.

Variation

Colour in females can vary in shade of brown but still maintain the lighter anterior head and colour patterns. Body length variation in females 1.91–1.96 mm; fore wing vein ratio in female paratype 4.1:1.5:1:1.2. Antennae ratio in female paratype 8.9:2.3:1:2.5:2.2:2:2:2:1.8:1.7:1.5:1.8. Length variation in males 1.70–1.72 mm. The speculum is in the most basal third of the fore wing but can stop at the start of the marginal vein or stop any point before the stigmal vein.

Male

As female except entire head dark brown to black; mesopleuron darker brown than in females, but lighter than the mesosoma excluding the prepectus. Antennae with dense setae longer than seen in females, with funicular segments longer than wide. Sculpturing on the mesopleuron may be reduced in some of the male specimens compared to the female holotype (Figure 6A).

Diagnosis

Tanaostigmodes johnlasallei can be distinguished:

- From *T. unifascia* (Girault, 1927) by the fore, mid and hind legs all with dark brown coxa, brown femur and brown tibia, boundary between metanotum and propodeum angular (Figure 6E). *Tanaostigmodes unifascia* with hind leg black, with curved propodeum edge that is almost semi-circular.
- From *T. eupermiformis* (Girault, 1915) by fully brown mesosoma, with axilla, mesoscutellum and mesoscutum matching the colour of the rest of mesosoma; *T. eupermiformis* is described as having a yellow mesosoma with axilla, mesoscutellum and mid lobe of mesoscutum being a metallic purple (when viewing the holotype the purple is no longer visible but the pattern is still visible and distinct). *Tanaostigmodes eupermiformis* also lacks brown wing infuscation that *T. johnlasallei* displays.
- From *T. megalarus* (Walker, 1838) as pedicel is dark brown, as opposed to *T. megalarus* with pedicel described as 'flavus', which we interpret as meaning pale or yellow.
- From *T. eja* (Girault, 1921) and *T. globosus* (Girault, 1915) based on mesoscutellum sculpturing; on *T. johnlasallei*, sculpturing becomes finer and more alutaceous towards the centre of the mesoscutellum. On *T. eja* and *T. globosus*, sculpturing on the mesoscutellum is consistent across the area and does not change as it approaches the centre.
- From *T. ajax* (Girault, 1915), *T. bifasciatifrons* (Girault, 1915), *T. silviae* (Girault, 1922) and *T. velasquezi* (Girault, 1933) by the deep punctate sculpturing along the metanotum (6E). This sculpturing is not found on *T. ajax*, *T. bifasciatifrons*, *T. silviae*, with these three species having only shallow sculpturing or no metanotum sculpturing. *Tanaostigmodes velasquezi* shows punctate-septate sculpturing on metanotum with distinct septa not seen in *T. johnlasallei*.
- From *Tanaostigmodes shrek* by sculpturing found on the mesoscutellum; *T. johnlasallei* displays elongated coriaceous sculpting on the mesoscutellum while *T. shrek* displays imbricate sculpturing. *T. shrek* does not display flattened ventral expansion on scape as opposed to *T. johnlasallei*. The biology of the two species is also distinctive: with *T. johnlasallei* creating galls on the stem, while *T. shrek* creating fleshy galls on the elaiosomes of *Bossiaea* sp. (Hardwick et al. 2005) seeds.

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Remarks

Tanaostigmodes johnlasallei has only been diagnosed in detail against Australian species in the genus, based on the assumption that Australian Tanaostigmatidae, like many Australian Hymenoptera, have a high rate of endemism (Austin et al. 2004). *Tanaostigmodes johnlasallei* was compared against the 'Key of New World Genera of Tanaostigmatidae' (La Salle 1987) in which it can be keyed to *Tanaostigmodes anexochus* La Salle, 1987, in couplet 35 within the Fisheri group. As this group and species is defined by a scape without ventral expansion (which is present in *T. johnlasallei*), it is clear that *T. johnlasallei* cannot be accurately identified using this key.

From the four species reared from the pink *Bossiaea* galls, *T. johnlasallei* has been credited as the gall-inducer because Tanaostigmatidae have very few cases of inquiline behaviour (La Salle 1987) but are extensively known as gall-inducers (La Salle 2005; Heraty and Woolley 2025).

The GPS coordinates recorded for *T. johnlasallei* have been taken from the iNaturalist listing made alongside the 2017 collection trip due to the label data lacking a precise GPS locality.

Etymology

This species was named in honour of Dr John La Salle in recognition of his contributions to the taxonomy of this family around the world and his work in Australian entomology as a whole.

Distribution

Victoria; Bogong High Plains and Victorian Alpine region. Specimens of the species have only been collected from VIC; however, the associated galls are also found in the Snowy Mountains, NSW, and in Namadgi National Park, ACT (seen through citizen science sightings). This suggests that the species may be found throughout the Australian Alps which spans from VIC, through NSW, and into the ACT; all sightings of this species have been within the Australian Alps or directly adjacent.

Biology

This species has been reared from stem galls on *Bossiaea sericea* which is part of a species complex with *B. alpina* I.Thomps., *B. foliosa* A.Cunn. and *B. distichoclada* F. Muell (Thompson 2012).

Galls induced by *T. johnlasallei* form either at the base or along the stem of the shrub with a sessile attachment style; they often form in clusters but can show a scattered arrangement (Deans et al. 2021). Galls are globose (sensu Isaias et al. 2013; Maia 2011), spherical, covered in short trichomes which give a hairy or 'fluffy' appearance, and are mono-coloured ranging from red to hot pink in colour (Deans et al. 2021) (Figures 1B and 4C,D).

The ichneumonid wasp *P. nigromaculatus* acts as an inquiline (Gauld 1983; Goulet and Huber 1993) for the galls created by *T. johnlasallei* (Figure 4). Three specimens (two from 2017, one from 2024) of *P. nigromaculatus* were reared from the galls (HYM-96007 and K.701128; Figure 4), and direct oviposition into the gall was witnessed during the 2024 collection (13/Nov/2024, 4:54 pm, Ngarigo campground, NSW; Figure 4C,D). Three specimens of the family Coelocybidae (Chalcidoidea) were also reared from the 2017 galls, *Liepara dentata* (Figure 2) and an undescribed species of *Acoelocyba* (Figure 3). The family Coelocybidae is not known to be gall-inducers but has records of inquiline or parasitoid lifestyles (Noble 1941; Heraty and Woolley 2025). The biology of these previously unknown coelocybids is reported for the first time as associated with *T. johnlasallei* galls, but it is unknown whether they act as inquilines or parasitoids of an inquiline species within the galls.

5 | Discussion

Tanaostigmodes johnlasallei was compared against the holotypes of nine of the 10 species of *Tanaostigmodes* species known in Australia. One issue that arose during this process was the state of the holotypes. Many tanaostigmatid species in Australia were first described by A. A. Girault, whose type material is often in poor condition (McClelland et al. 2023; Dahms 1986). The type material present in the QM was stored as point mounted specimens with heads, wings or legs mounted separately on slides (Dahms 1986). Many slides were cracked or chipped obscuring the specimen, with some slides featuring multiple other specimens with only a hand-drawn arrow indicating multiple different holotypes. The state of the holotypes of the genus limits the characters that can be used to identify new species; for severely damaged material in the type series, the designation of a lectotype or neotype may need to be considered to aid in future research of the group. Due to these factors, we do not include a species key in this publication; however, an identification key to the Australian fauna is underway currently.

Tanaostigmodes johnlasallei induces galls that are physically unique from other known Tanaostigmatidae species, through their bright pink colour and fine hairs creating a 'fluffy' texture. This allows their identification to be accessible to specialists and citizen scientists alike. It is a species currently known only from the Australian Alps, which is classified as a biodiversity priority place by the Australian government in the Threatened Species Action Plan 2022–2032 (DCCEEW 2022).

The distribution of the host plant, *Bossiaea sericea*, is restricted to NSW, ACT and VIC (AVH 2025), which matches the known state distribution of *T. johnlasallei*. *Bossiaea sericea* has a distribution outside of the Australian Alps, spreading south of the alpine region of NSW into the Southern Tablelands (AVH 2025). Currently, there are no collection records of *T. johnlasallei* in non-alpine areas.

The attempted rearing of *T. johnlasallei* in 2024 was not successful despite using similar methods to the 2017 rearing. One possible cause of this may be the month that the galls were collected in. While sightings of the galls span November to January (reiner 2020; jessicaslade 2023), the original collection for the 2017 rearing was done in late January as opposed to the 2024 collections, which took place in mid-November. It is hypothesised that *T. johnlasallei* may only reach maturity in December–January.

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The re-collection of *T. johnlasallei* galls could not have been accomplished without the sightings provided by iNaturalist users; these sightings allowed field work to be targeted in areas with recent gall records as opposed to broader collection areas. With continued citizen science records, the distribution and host records of *T. johnlasallei* may continue to expand and help confirm the biology of the gall-associated chalcids. This species marks the first description of an Australian Tanaostigmatidae in 20 years and hopes to act as a step towards revitalising work on the family and gall-inducing chalcids in the country.

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Conflicts of Interest

None of the authors have a conflict of interest to disclose.

Data Availability Statement

The data that support the findings of this study are available in the Supporting Information of this article.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Figure S1:** Maximum likelihood tree of Tanaostigmatidae relationships using all public Tanaostigmatidae *COI* sequences available on BOLD, built using IQ-TREE v2.36, with

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Trichilogaster acaciaelongifoliae (Froggatt, 1892) as the outgroup, with node supports displayed. The position of *Tanaostigmodes johnlasallei* sp. nov. is displayed in pink. **Table S1:** iNaturalist and NatureMapr sightings of *Tanaostigmodes johnlasallei* galls (as of publication).

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