

Australian jumping spiders of the genus *Hypoblemum* (Araneae: Salticidae: Euophryini)

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Abstract: The synanthropic Australian and New Zealand jumping spider commonly referred to as *Hypoblemum villosum* and sometimes misidentified as *Hypoblemum albovittatum* is identified as *Cytaea grisea*. As a result *Acmaea villosa* (type species for the genus *Hypoblemum*) is made a junior synonym of *Cytaea grisea* and *Cytaea grisea* becomes *Hypoblemum griseum*. A second species most recently referred to as either *Maratus scutulatus* or *Lycidas scutulatus* is transferred to the genus *Hypoblemum*. *Ergane dialeuca*, *Habrocestum albovittatum* and *Lycidas karschi* are found to be junior synonyms of that species. Both *Hypoblemum griseum* and *Hypoblemum scutulatum* are redescribed and illustrated from freshly collected material.

Key words: *Acmaea villosa*, *Cytaea grisea*, *Ergane dialeuca*, *Ergane scutulata*, *Habrocestum albovittatum*, *Hypoblemum griseum*, *Hypoblemum scutulatum*, *Hypoblemum villosum*, *Lycidas karschi*, *Lycidas scutulatus*, *Maratus scutulatus*, *Saitis*, *Saitis* group, *Sigytes*

Introduction

Previously (Otto & Hill 2012b, 2012c) we identified inconsistencies between the recent redescription of *Hypoblemum albovittatum* by Žabka & Pollard (2002) and the original description of this species as *Habrocestum albovittatum* by Keyserling (1882). We also questioned the placement of *Ergane scutulata* L. Koch 1881, *Cytaea grisea* Keyserling 1882 and *Lycidas karschi* Žabka, 1987 in the genus *Maratus* Karsch 1878. Here we resolve those issues by clarifying the identity of two Australasian euophryines and placing them in the genus *Hypoblemum* Peckham & Peckham 1885. We provide new illustrations to document important field marks for males and females of both of these common species which Whyte and Anderson recently (2017) figured in their guide to Australian spiders.

Hypoblemum Peckham & Peckham 1885

This genus now includes two common, widely distributed euophryine species from Australia and New Zealand. The type species is *Acmaea villosa* Keyserling 1883, described from a male, here regarded as a junior synonym of *Cytaea grisea* Keyserling 1882, described from a female. The species name *villosa* was an apt descriptor for the many long, shaggy setae that cover the dorsal opisthosoma of the male of this species. The species name *grisea* is a medieval Latin word that translates into English as *grey*. The second species now assigned to the genus *Hypoblemum* is *Ergane scutulata* L. Koch 1881, originally described from specimens of both sexes. The species name *scutulata* is also quite fitting, most likely based on the Latin word *scutum* which translates into English as *shield*. The male *H. scutulatum* has an oblong scute or plate covering the anterodorsal opisthosoma.

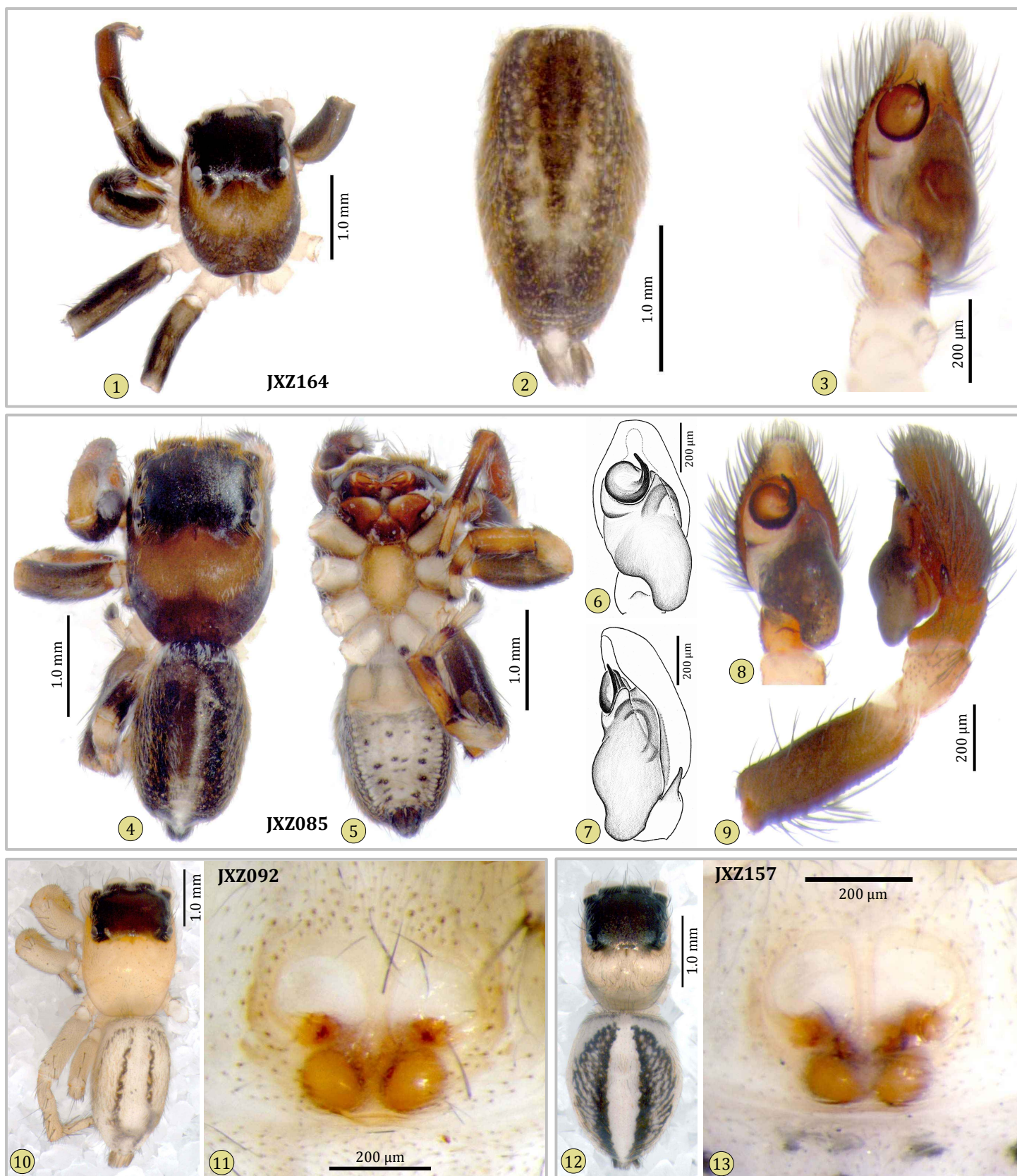


Figure 2. Four *Hypoblemum* specimens used by Zhang & Maddison (2013, 2015) in the DNA sequencing that formed the basis for their comprehensive study of the phylogeny of the Euophryini. 1-3, Male *H. griseum* from South Australia, labeled "*H. cf. albovittatum*." 4-9, Male *H. scutulatum* from New South Wales, labeled "*Hypoblemum* sp." 10-11, Light morph female *H. scutulatum* from New South Wales, labeled "*Lycidas cf. griseus*." 12-13, Dark morph female *H. scutulatum* from New South Wales, labeled "*Lycidas cf. karschi*." 3, 6-9, Left pedipalp. Photographs by Junxia Zhang, used with permission.

***Hypoblemum griseum* (Keyserling 1882), new combination**

Cytaea grisea Keyserling 1882 ♀ (p. 1386, pl. 117, fig. 5)

Acmaea villosa Keyserling 1883 ♂ (p. 1421, pl. 120, fig. 3), **new synonymy**

Drepanephora villosum: Keyserling 1883 ♂ (p. 1477)

Hypoblemum villosum: Peckham & Peckham 1885 ♂ (p. 326, type species for new genus *Hypoblemum*), Whyte & Anderson 2017 ♂♀ (p. 251, unofficial)

Euophrys parvula (not Bryant 1935): Forster & Forster 1972 (misidentified), Jackson & Willey 1995 ♂♀

Lycidas griseus: Żabka 1987 ♀ (p. 470, figs. 13, 48-49, transferred from *Cytaea* to *Lycidas* Karsch 1878)

Hypoblemum sp.: Davies & Żabka 1989 ♂♀ (p. 240, pl. 42)

Hypoblemum albovittatum (not Keyserling 1882): Żabka & Pollard 2002a ♂♀ (p. 65, figs. 1-15, misidentified), Paquin, Vink & Dupérré 2010 ♂♀ (p. 73, figs. 44.6-44.8), Otto & Hill 2012b, 2012c ♂ (p. 22, figs. 26-27, *sensu* Żabka & Pollard), Dolev & Nelson 2016, Prószyński 2017 ♂♀ (p. 83, figs. 33S, 37A); Annable 2017 ♂♀

Maratus griseus: Otto & Hill 2012b, 2012c ♀ (based on synonymy of *Lycidas* Karsch 1878 with *Maratus* Karsch 1878)

Hypoblemum cf. *albovittatum*: Zhang & Maddison 2013 ♂

The male and female of this common species were described separately, the female as *Cytaea grisea* Keyserling 1882 and the male as *Acmaea villosa* Keyserling 1883. Keyserling (1882) described *C. grisea* from a female collected at Caigan, New South Wales, in the private collection of "Mr. Bradley" (Figure 3). This type specimen, as with the all others in the Bradley collection, is considered lost. Keyserling also reported the occurrence of females with a less-developed white band behind the eye region in the vicinity of Sydney, as well as one specimen from Gayndah, Queensland in the Museum Godeffroy. The latter is the paratype later dissected and briefly described by Żabka (1987; Mus. Godeffroy Nr. 8642, ZMH; Figure 3:6). The large genus *Cytaea* includes some 40 named species and the recognized type species for this genus is *C. alburna* Keyserling 1882 (World Spider Catalog 2019). *Cytaea* spp. are also euophryines but they are not closely related to *Hypoblemum griseum* (Zhang & Maddison 2013; Maddison 2015).

Following Żabka & Pollard (2002a), we assume that the male type for *Acmaea villosa* no longer exists, and we must rely on the original description of this species based on a male specimen from "Peak Downs" in northeastern Australia (Keyserling 1883; Figure 4). An English translation of this description is available (Otto & Hill 2012b, 2012c, app. 3). Żabka & Pollard did not redescribe the male holotype for *Habrocestum albovittatum* Keyserling 1882 for their "*Hypoblemum albovittatum*" (Żabka, pers. comm.), but instead described a male and female *H. griseum* from New Zealand. They also listed many New Zealand records for this species. We previously identified some of the many differences between the description of *Habrocestum albovittatum* Keyserling 1882 and *Acmaea villosa* Keyserling 1883, to include the much longer legs III of the latter species (Otto & Hill 2012b, 2012c). Żabka & Pollard (2002a) listed *Euophrys parvula* Bryant 1835 [1935] as a synonym, although they also placed this unrelated species in a different genus, *Trite* Simon 1885, in a separate paper (Żabka & Pollard 2002b). Davies & Żabka (1989, pl. 42) also figured a male and female as *Hypoblemum* sp. Previously Forster & Forster (1972), followed by Jackson & Willey (1995), had mistakenly identified *Hypoblemum griseum* as *Euophrys parvula*. In recent years others have followed the lead of Żabka & Pollard (2002) in referring to this spider as *Hypoblemum albovittatum* (Paquin, Vink & Dupérré 2010; Dolev & Nelson 2016; Prószyński 2017; Annable 2017), although Whyte & Anderson (2017) recognized it as *Hypoblemum villosum*.

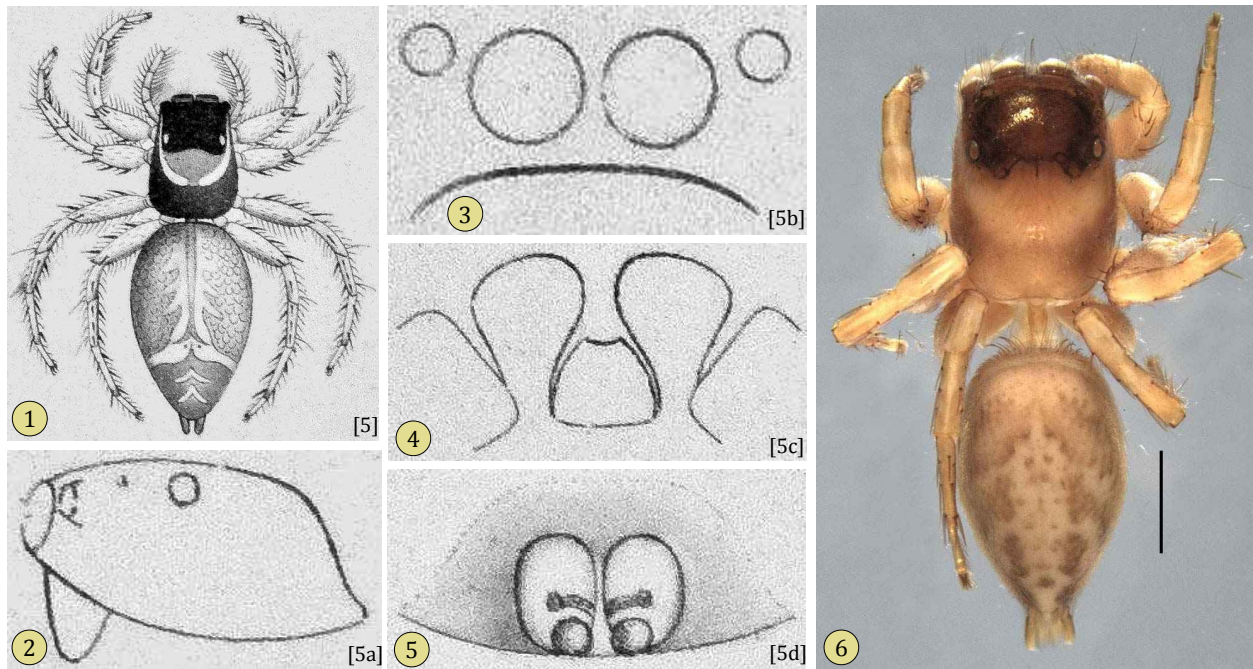


Figure 3. Type specimens for *Cytaea grisea* Keyserling 1882. **1-5**, Original drawings of female collected at Caigan, New South Wales (Keyserling 1882, pl. 117, fig. 5). Original figure numbers are shown in brackets. **1**, Dorsal view. The dimensions, light-coloured legs, dark eye region, white carapace band behind the eye region, and the detailed pattern of the dorsal opisthosoma all agree with respective characters of recent specimens collected in New South Wales when examined in alcohol. **2**, Left side of carapace in lateral view. **3**, Front eye row. **4**, Coxae I, endites and labium viewed from below. **5**, Ventral view of epigynum (anterior at top). Although stylized and much less accurate than the comparable drawings by Žabka (1987), this sketch clearly shows the relatively small, circular posterior spermathecae and the sclerotized ducts that extend anterolaterally from these spermathecae. **6**, Paratype from Gayndah (Mus. Godeffroy Nr. 8642, ZMH). Žabka (1987) dissected and cleared the epigynum of this specimen for his drawings. Photo courtesy of the ZMH.

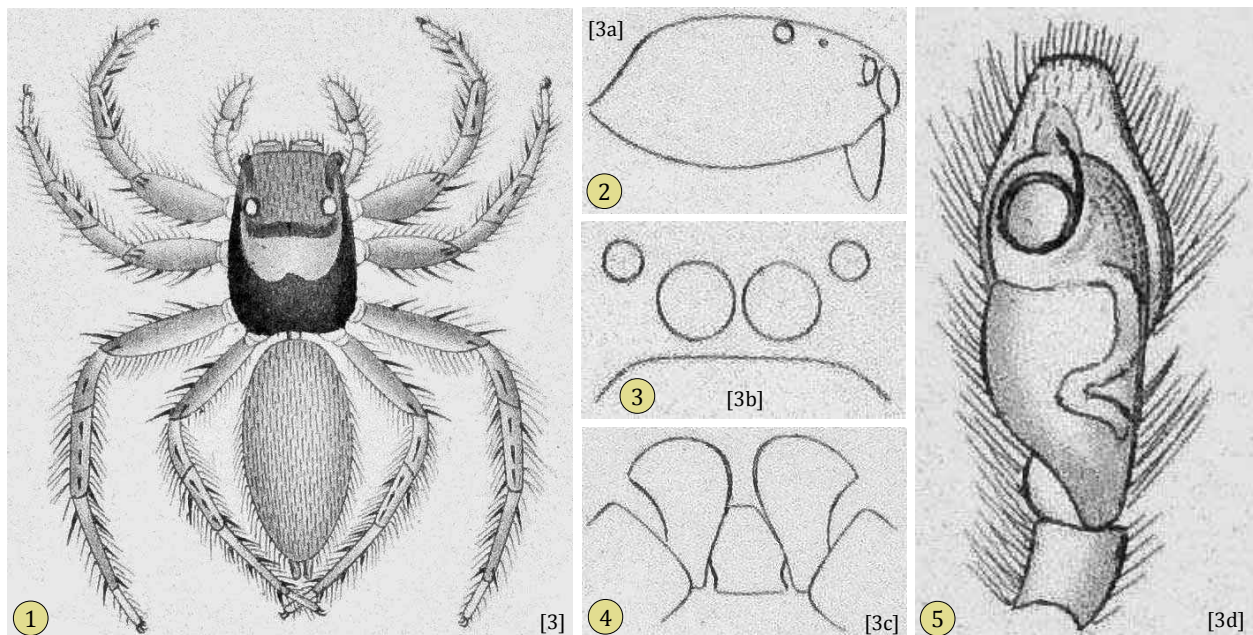


Figure 4. Original drawings of the male type specimen for *Acmaea villosa* Keyserling 1883 (Keyserling 1883, pl. 120, fig. 3). Original figure numbers are shown in brackets. **1**, Habitus showing long legs III. **2**, Right side of carapace and chelicera in lateral view. **3**, Front eye row. **4**, Coxae I, endites, and labium (anterior at top). **5**, Ventral view of right pedipalp, left/right reversed (mirrored) here for better comparison under our left pedipalp convention.

Description of male (Figures 2:1-3, 4-24). Male *Hypoblemum griseum* are generally black in colour with a variable length of 4.5-8 mm (Figure 12:10) and a variable cover of red-brown, brown or off-white setae. They are distinguished by the shaggy (villous) cover of setae on their dorsal opisthosoma.

Chelicerae, carapace and legs are black in colour in life. The front of each paturon bears irregular transverse grooves or ridges. There is a single, medial bicuspid tooth (sometimes described as two teeth) on the anterior margin of the fang groove, and a single, central unicuspid (simple or single-pointed) tooth on the posterior margin. Scattered off-white setae extend ventromedially from the clypeus across each proximal paturon. Otherwise the clypeus and sides of the carapace are mostly black and glabrous. The eye region, from the center of the anterior eye row toward the rear, may bear a variable cover of brown to red-brown setae, and below the lateral eyes a band of white setae extends to the rear of the top of the carapace behind the posterior eye row, not quite meeting near the rear midline. The PME are closer to the PLE than to the ALE. Several patches of off-white setae may be seen extending vertically along each lateral margin of the carapace, but a well-formed marginal band (like that seen in male *Maratus* spp.) is not present.

The opisthosoma has a dense cover of long, shaggy, brown or off-white setae on a brown background. The mixture of these setae varies and many males have a cover of uniformly brown setae. In others, colours are mixed and the appearance is variegated. An indistinct anterior marginal band of off-white setae may be present, and usually a distinctive, short anterior middorsal stripe of off-white setae offset on a darker brown background is present. A small anal tuft of bright white setae is present above the spinnerets. Below, the opisthosoma is covered with shorter off-white setae and may be variably mottled with brown spots. Coxae, trochanters and sternum are mostly translucent and glabrous, with light-orange colouration around the coxotrochanteral joints. The labium and proximal endites are darker brown. All legs are generally dark brown to black, with variable banding comprised of off-white setae proximally on each segment. In some individuals the legs are mostly black with fewer setae. Legs I and II are shorter and about the same length, legs III and IV longer, and legs III by far the longest.

Dorsally the proximal segments, medial side of the tibia, and the proximal cymbium of each pedipalp are covered with many long off-white setae. The dorsolateral tibia of the pedipalp may be light orange and glabrous. The center of each dorsal cymbium is black with a thin cover of black setae. Viewed from the front these are distinctive for the species. As in *H. scutulatum*, there is a long ventrolateral extension of each tegulum, and the apex of the thick outer ring of the embolus may appear to be divided into three sclerotized parts in a lateral view.



Figure 5. Adult male *Hypoblemum griseum* from Gloucester, New South Wales (AUS-235, 26 FEB 2012, collected by Iain Macaulay). Photos by Robert Whyte. **1**, Living spider. **2**, Posteroventral view of labium, left chelicera and pedipalp. **3-5**, Ventral to lateral views of left pedipalp.

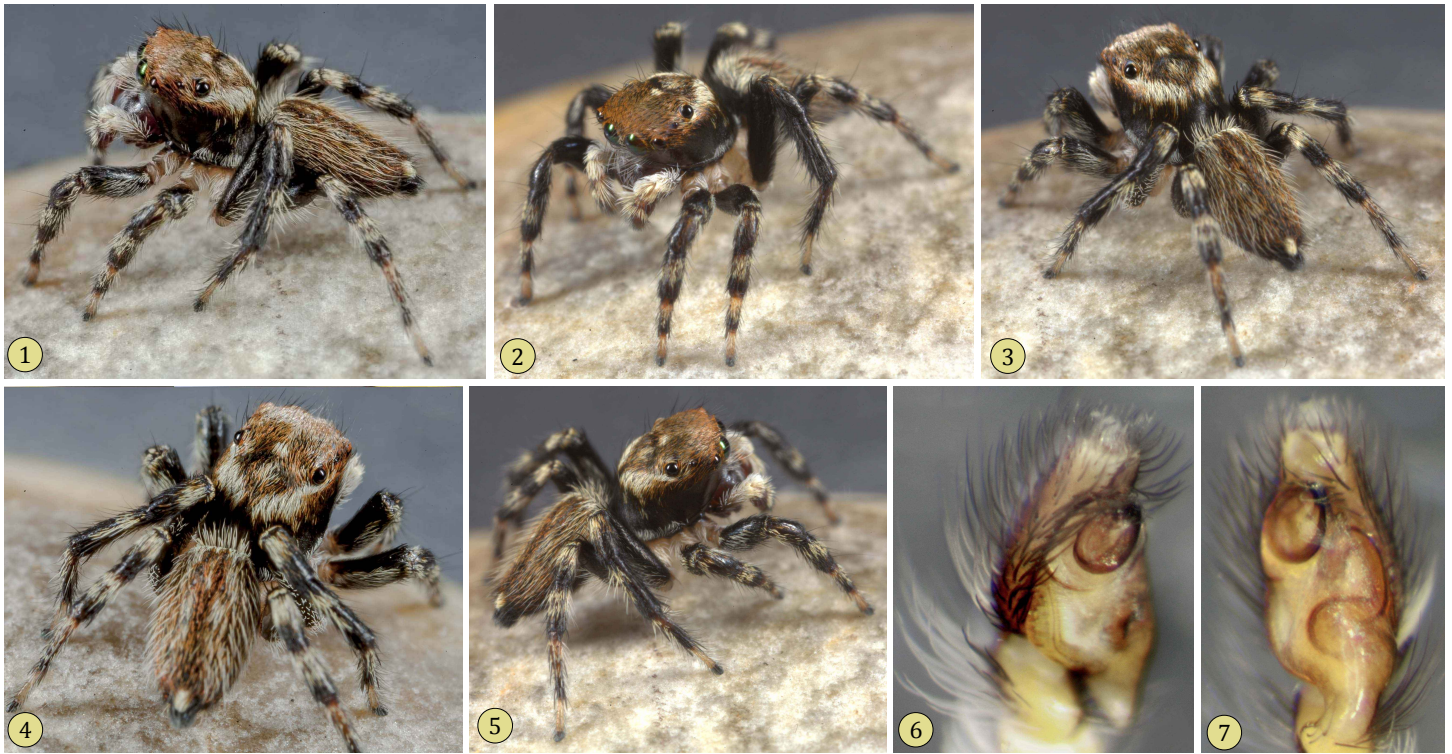


Figure 6. Adult male *Hypoblemum griseum* from the vicinity of Uki, New South Wales (AUS-2696, 29 OCT 2015, collected by Iain Macaulay). 1-5, Living spider. Photos by Iain Macaulay. 6-7, Two ventral views of left pedipalp. Photos by Robert Whyte.

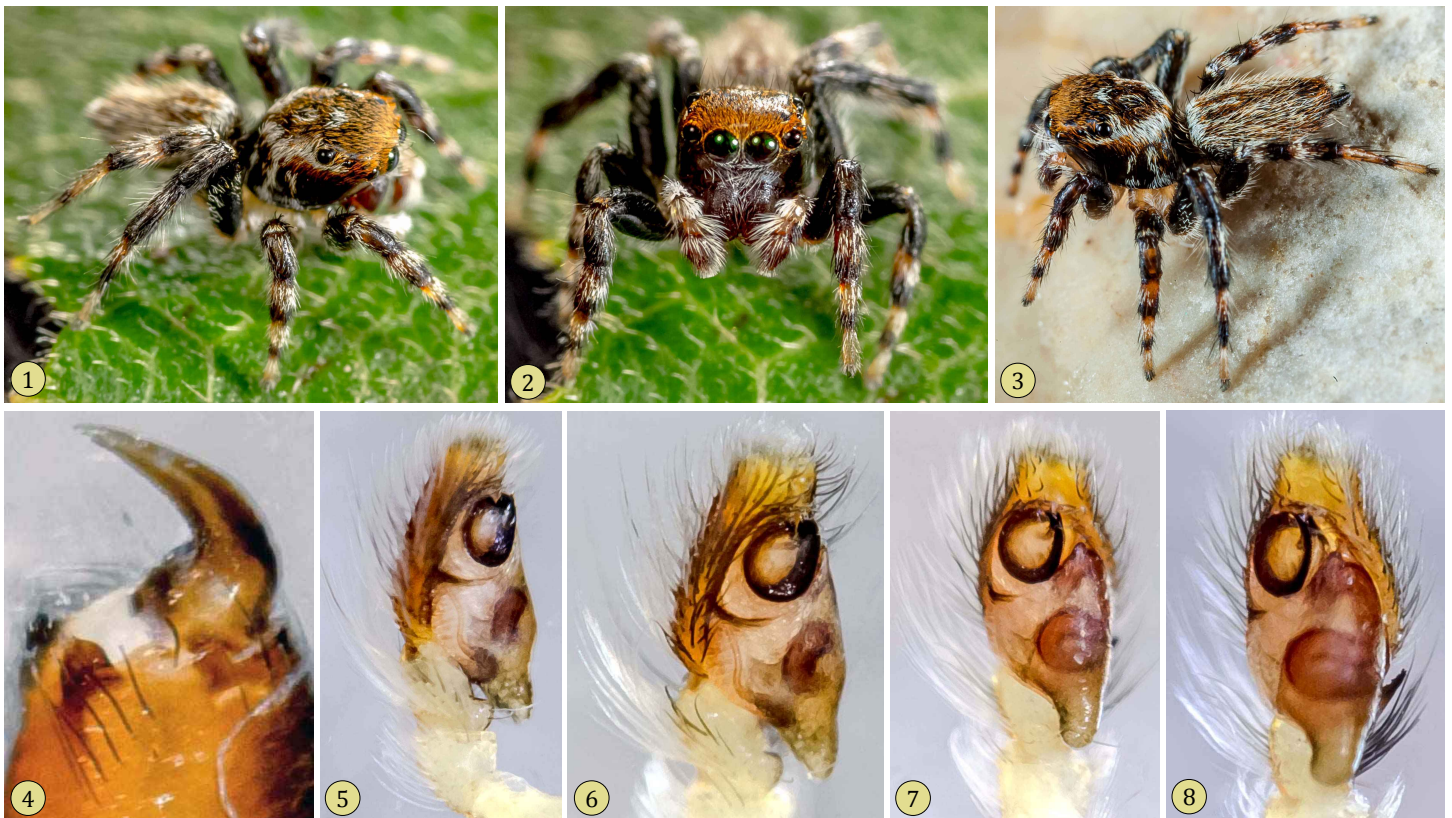


Figure 7. Adult male *Hypoblemum griseum* from Lismore, New South Wales (28.810789°S, 153.280454°E, AUS-1935, 27 OCT 2014, collected by Iain Macaulay). 1-2, Photos by Robert Whyte. 3, Photo by Iain Macaulay. 4, Posterior view of left chelicera. Photo by Robert Whyte. 5-8, Medioventral to lateroventral views of left pedipalp. Photos by Robert Whyte.



Figure 8. Adult male *Hypoblemum griseum* from Atherton, Queensland (AUS-898, 27 FEB 2013, collected by Iain Macaulay). Photos by Iain Macaulay.



Figure 9. Adult male *Hypoblemum griseum* from Woodford, Queensland (AUS-2280, 28 DEC 2014, collected by Iain Macaulay). 1, 3, Photos by Iain Macaulay 2, View of face. Photo by Robert Whyte. 4, Posterior view of distal left pedipalp showing teeth. Photo by Robert Whyte.



Figure 10. Adult male *Hypoblemum griseum* from Newcastle, New South Wales. Collected and photographed by Jürgen Otto.



Figure 11. Adult male *Hypoblemum griseum* from Paluma, Queensland (AUS-394, 15 NOV 2012, collected by Iain Macaulay). Photos by Robert Whyte. 1-3, Living spider. 4-5, Ventral to lateral view of left pedipalp.



Figure 12. Two large adult male *Hypoblemum griseum* from Canberra. **10**, Comparison of a large male from Canberra (at left) and a smaller male from Berowra, New South Wales (right). Collected by Stuart Harris and photographed by Jürgen Otto.



Figure 13. Two adult male *Hypoblemum griseum* from Canberra in alcohol. Collected by Stuart Harris and photographed by Jürgen Otto. 7-16, Medial to lateral views of left pedipalp.

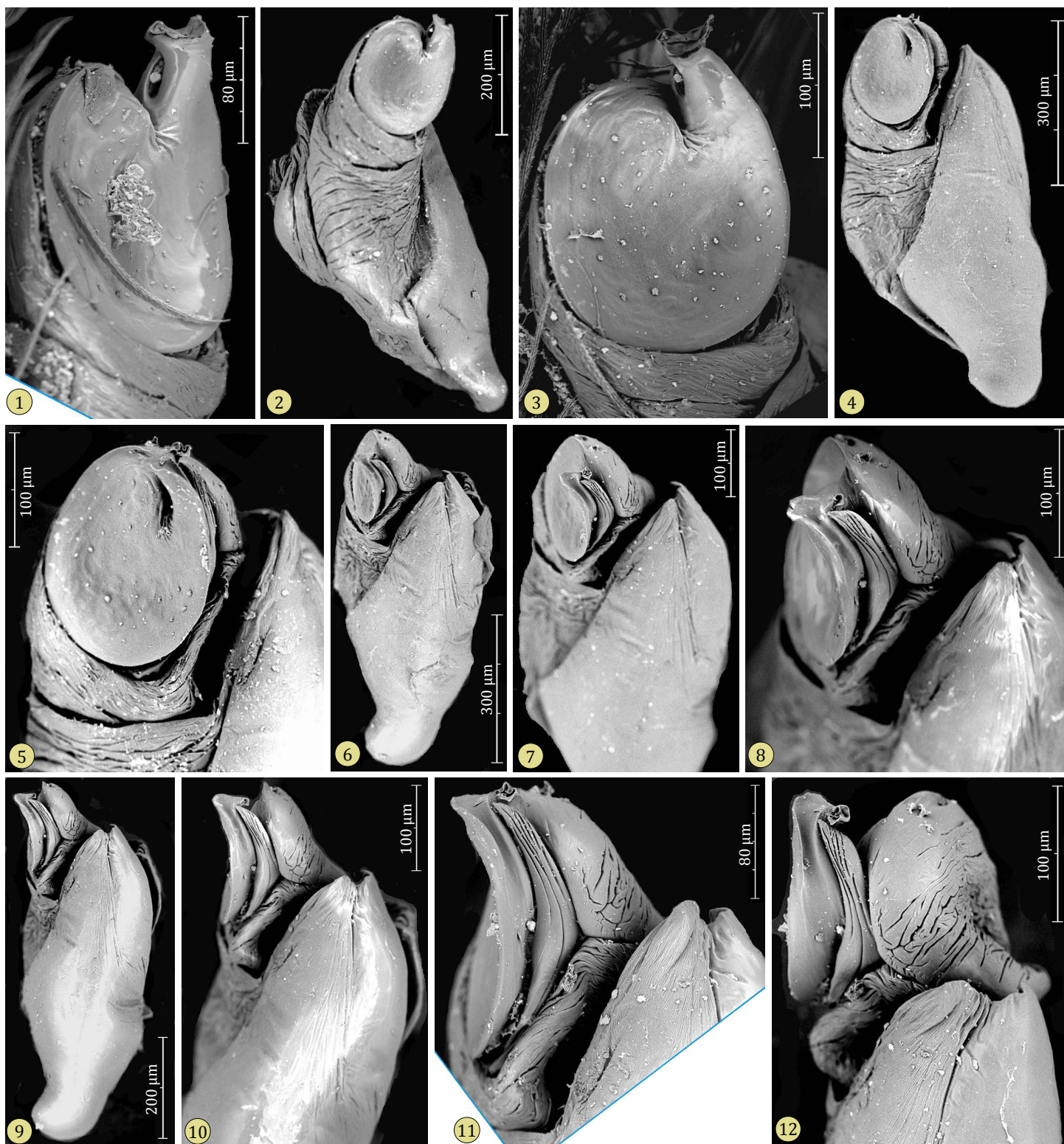


Figure 14. Ventromedial (1) to lateral (12) SEM images of tegulum with embolus removed from the right pedipalp of an adult male *H. griseum* from Canberra. Images are mirrored (flipped left-right) for comparison with the left pedipalp, according to the *left pedipalp standard*. **1-5**, Only the surface of the smooth disk of the embolus, and not the heavily sclerotized outer ring, is visible in SEM images. **8-12**, The sharply pointed inner apex of the embolus lies behind the blunt, grooved outer apex of the embolus. Separation of the blunt outer apex by a deep groove along its length contributes to the appearance of three rather than two apices under light microscopy. All images by Jürgen Otto.

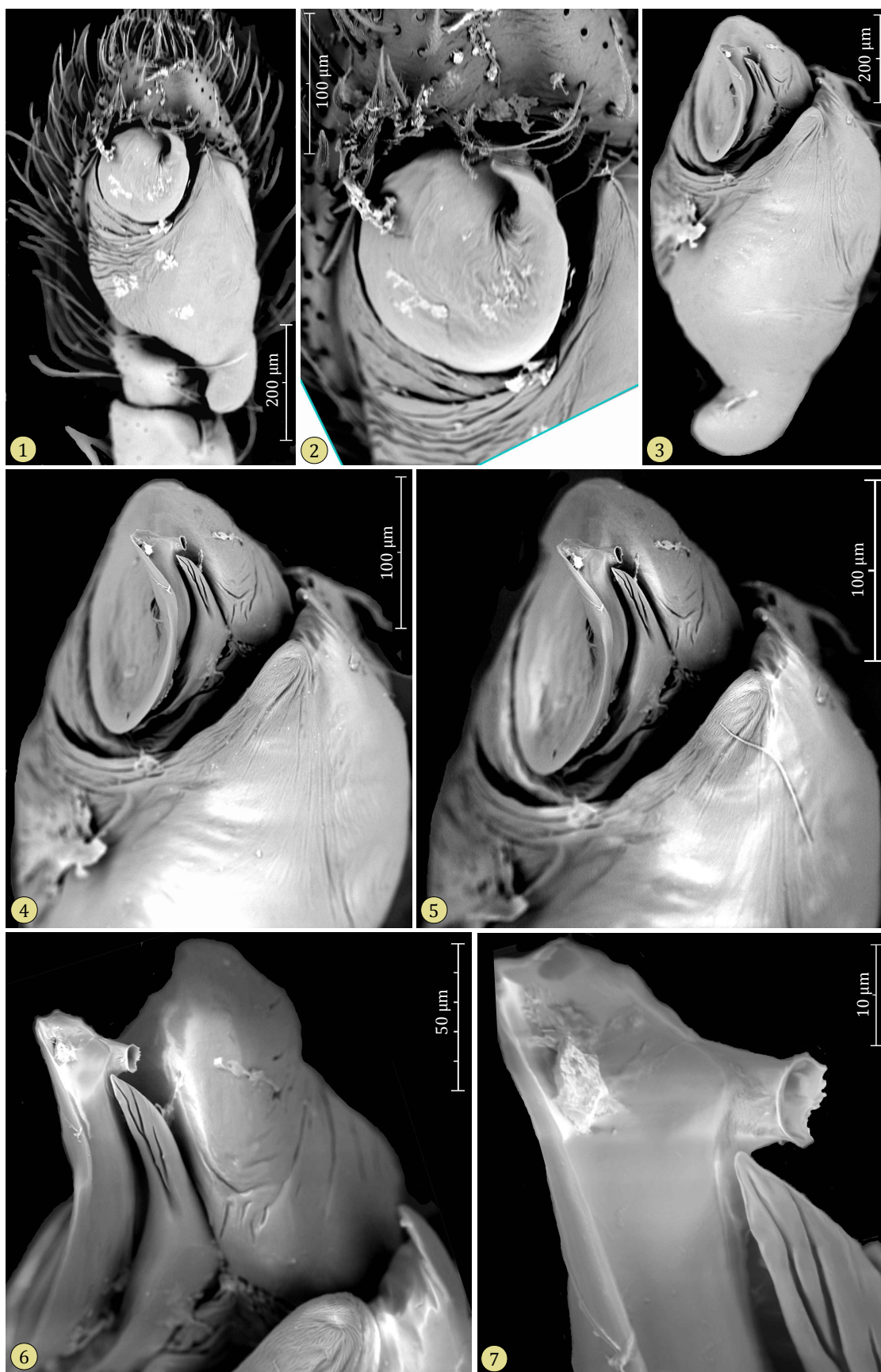


Figure 15. Ventral (1) to lateral (6-7) SEM images of the pedipalps of an adult male *H. griseum* from Canberra. 1-2, ventral views of left pedipalp. 3-7, Mirrored ventrolateral (3-5) to lateral (6-7) views of right pedipalp. 7, Detail of seminal duct near the distal end of the blunt outer apex. All images by Jürgen Otto.



Figure 16. Two adult male *Hypoblemum griseum* from Berowra, New South Wales. Collected and photographed by Jürgen Otto.

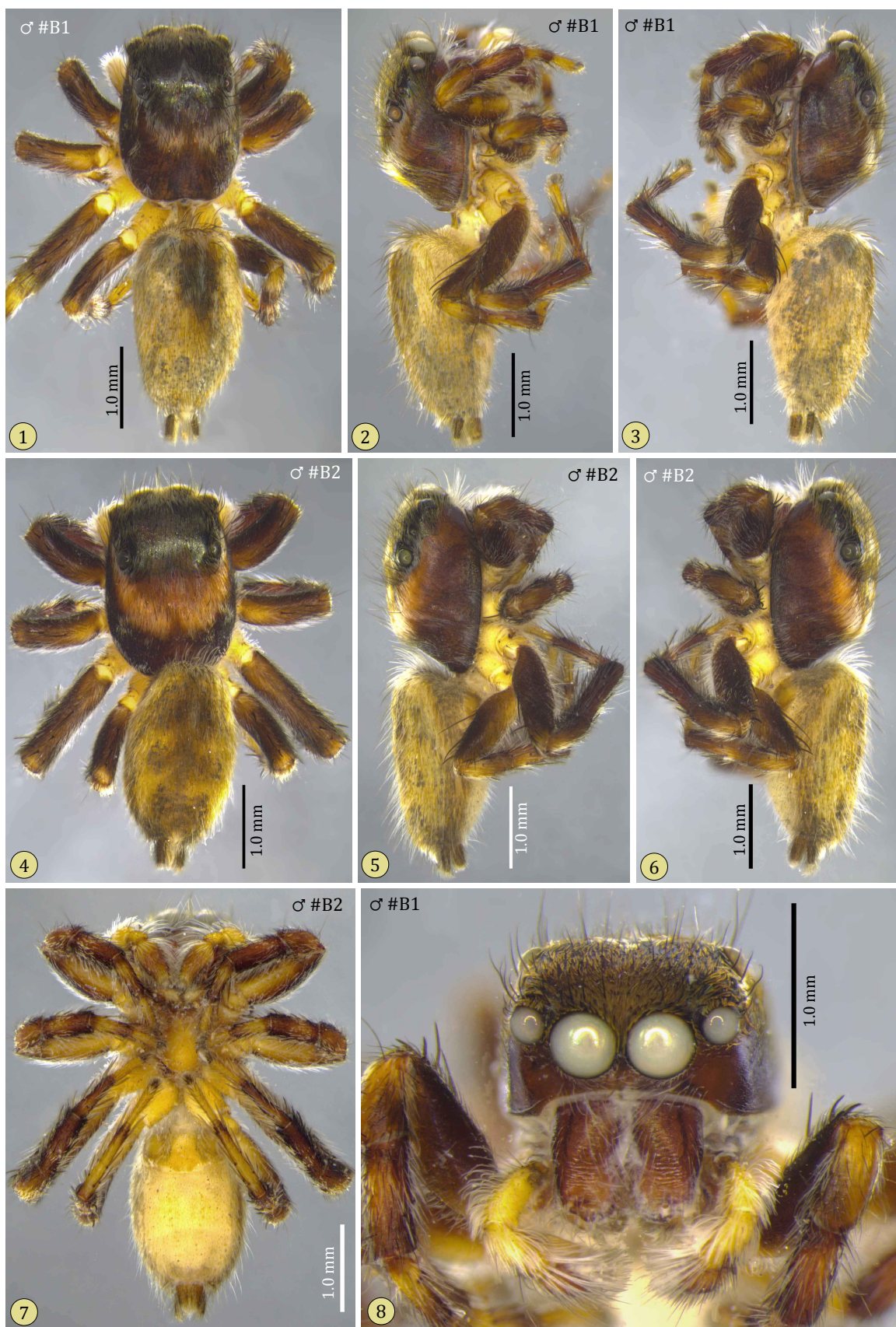


Figure 17. Two adult male *Hypoblemum griseum* from Berowra, New South Wales, in alcohol. Collected and photographed by Jürgen Otto.



Figure 18. Adult male *Hypoblemum griseum* from Berowra near Ku-ring-gai Chase National Park, New South Wales (AUS-559, 20 DEC 2012, collected by Iain Macaulay). Photos by Robert Whyte. **3**, Posterior view of chelicerae. **4**, Left pedipalp.

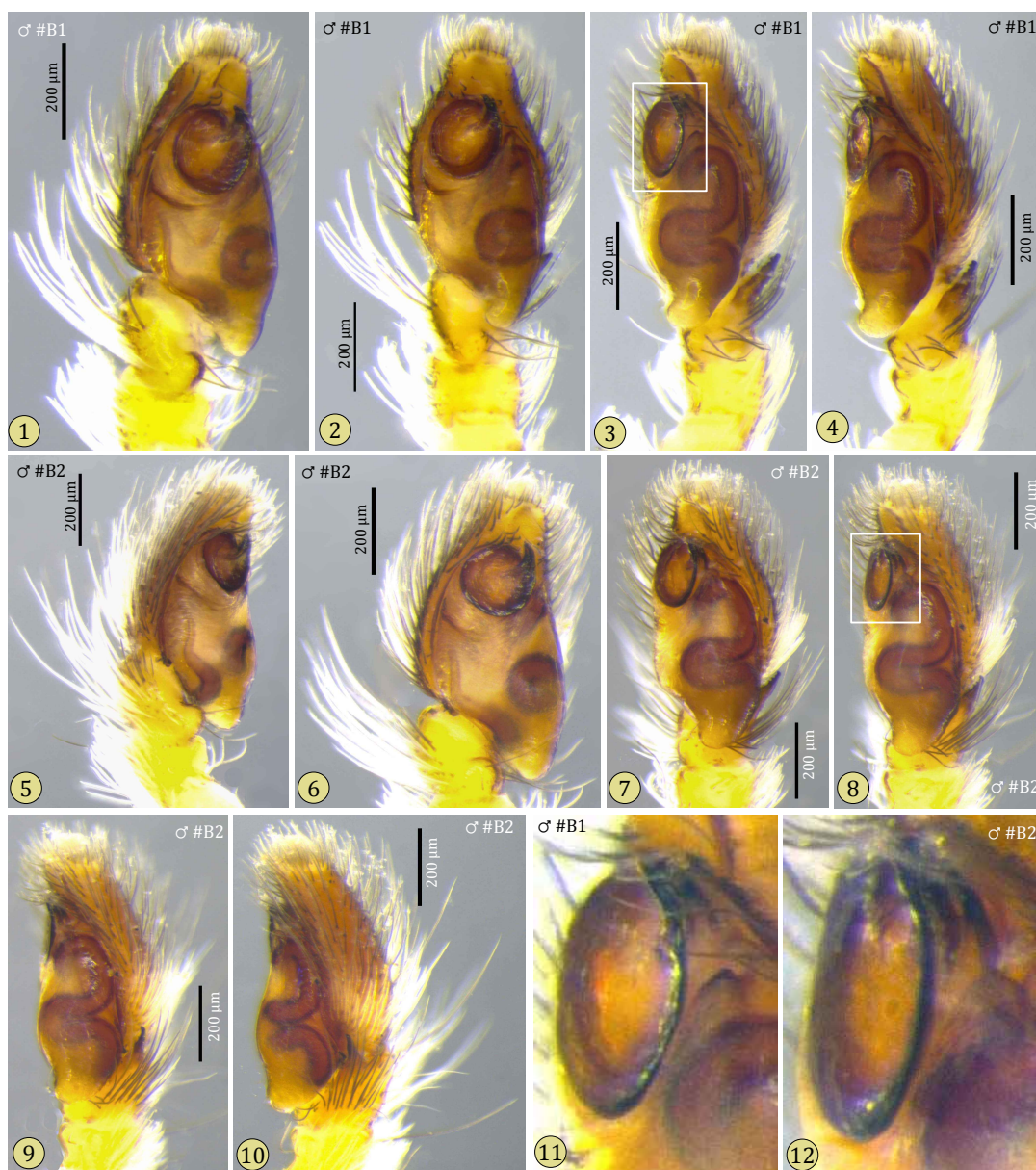


Figure 19. Medial to lateral views of the left pedipalp of two adult male *Hypoblemum griseum* from Berowra, New South Wales. **11-12**, Detail from insets in (3) and (8), respectively, showing apparent separation of the dark, sclerotized embolar apex into three parts in ventrolateral to lateral views. Collected and photographed by Jürgen Otto.



Figure 20 (continued on next page). Six adult male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 20 (continued from previous page, continued on next page). Six adult male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 20 (continued from previous page). Six adult male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 21. Ventral view of six adult male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

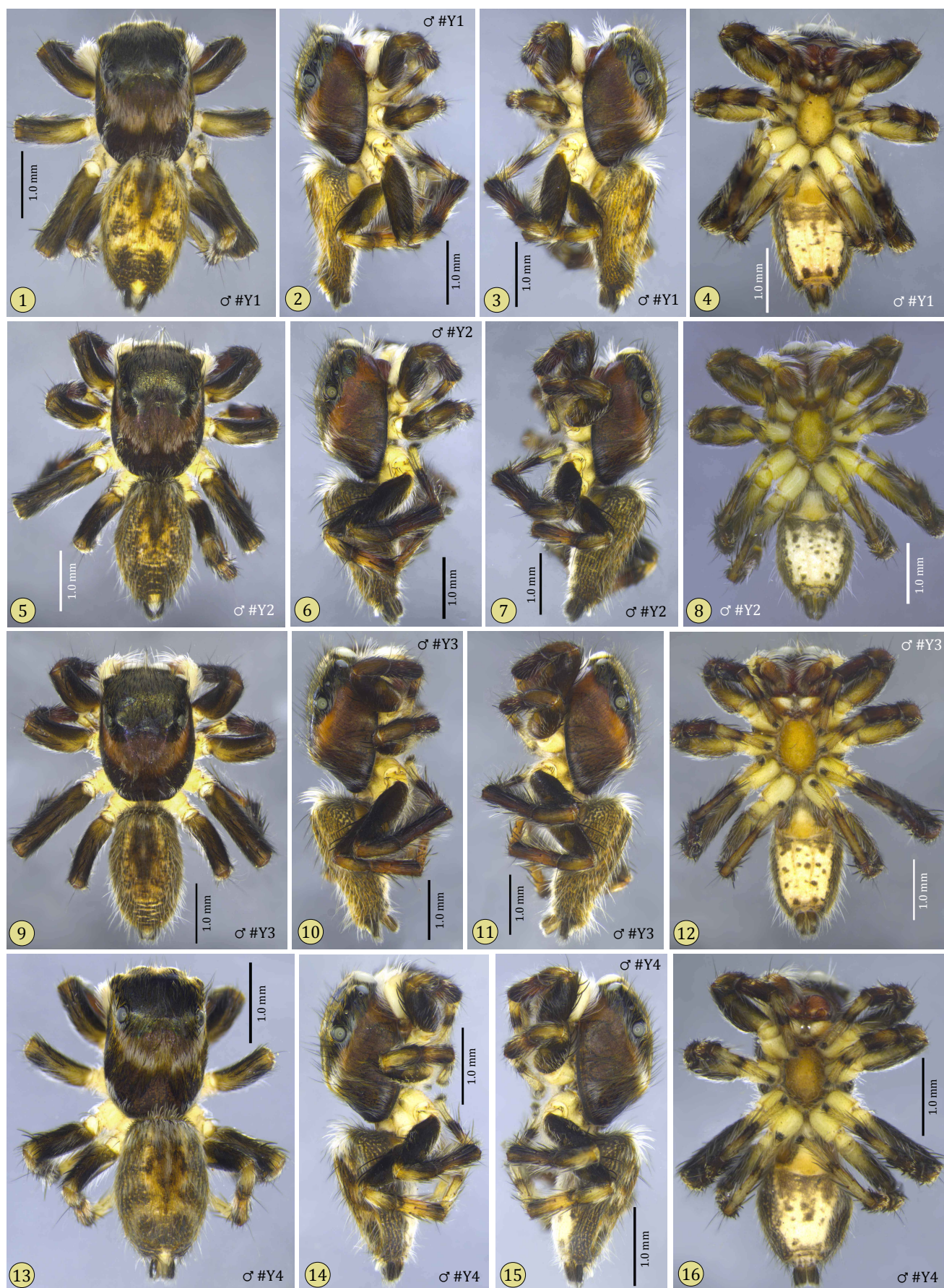


Figure 22 (continued on next page). Six adult male *Hypoblemum griseum* from Yarramundi, New South Wales, in alcohol. Collected and photographed by Jürgen Otto.



Figure 22 (continued from previous page). Six adult male *Hypoblemum griseum* from Yarramundi, New South Wales, in alcohol. 30, Detail of face showing one downward and two upward-curved spines between the AME. Collected and photographed by Jürgen Otto.

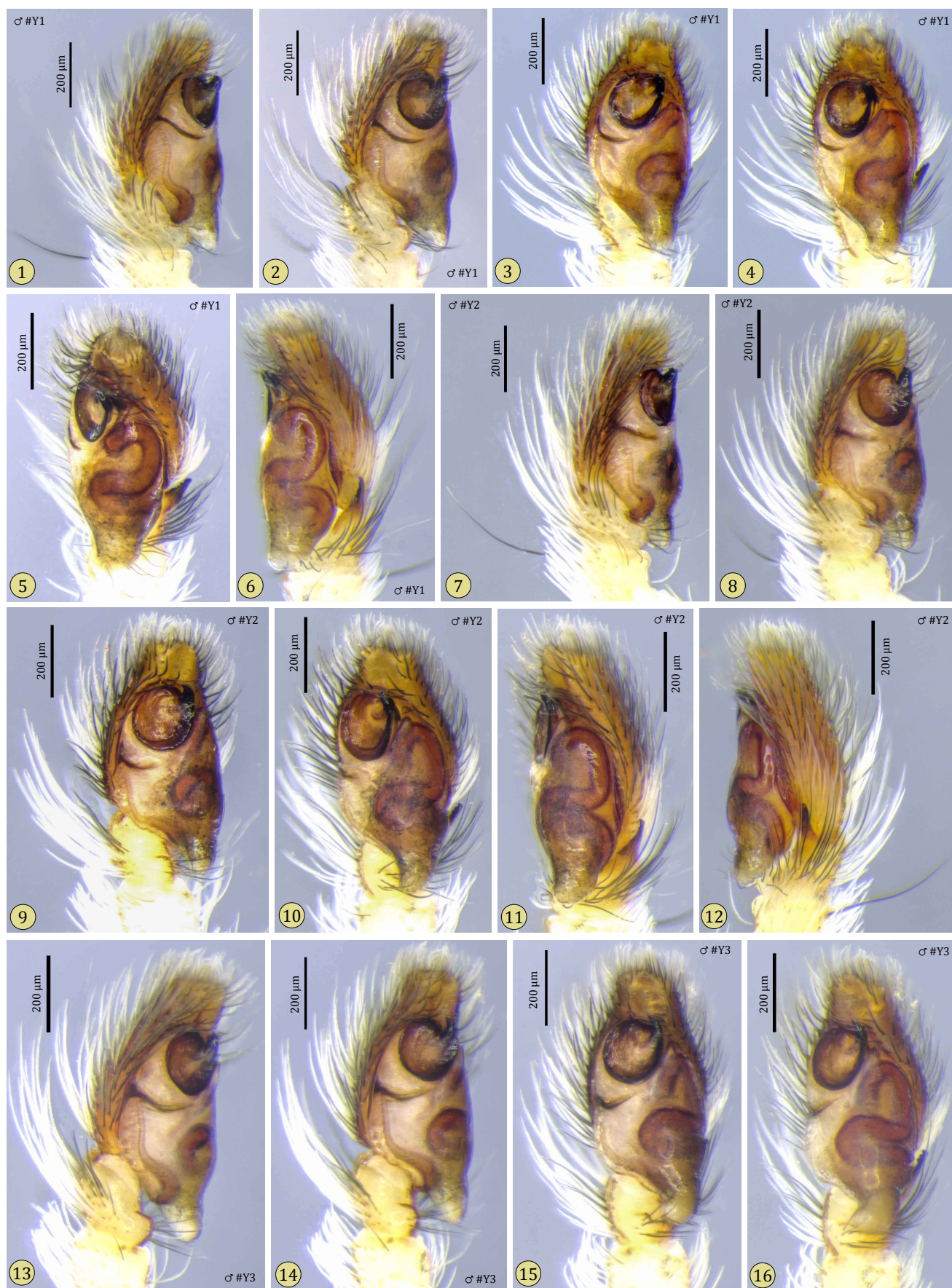


Figure 23 (continued on next page). Medial to lateral views of left pedipalp of six male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

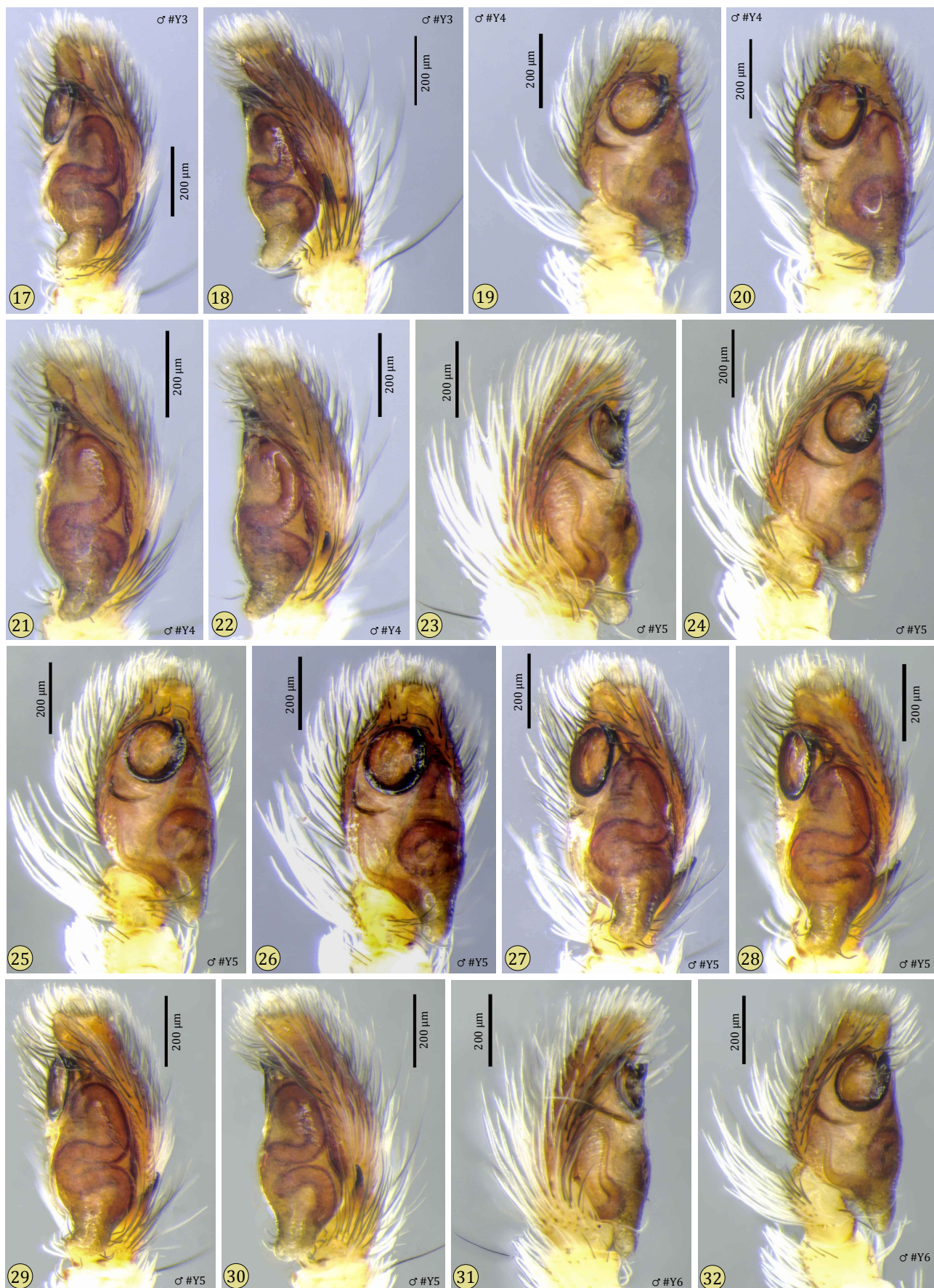


Figure 23 (continued from previous page, continued on next page). Medial to lateral views of left pedipalp of six male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

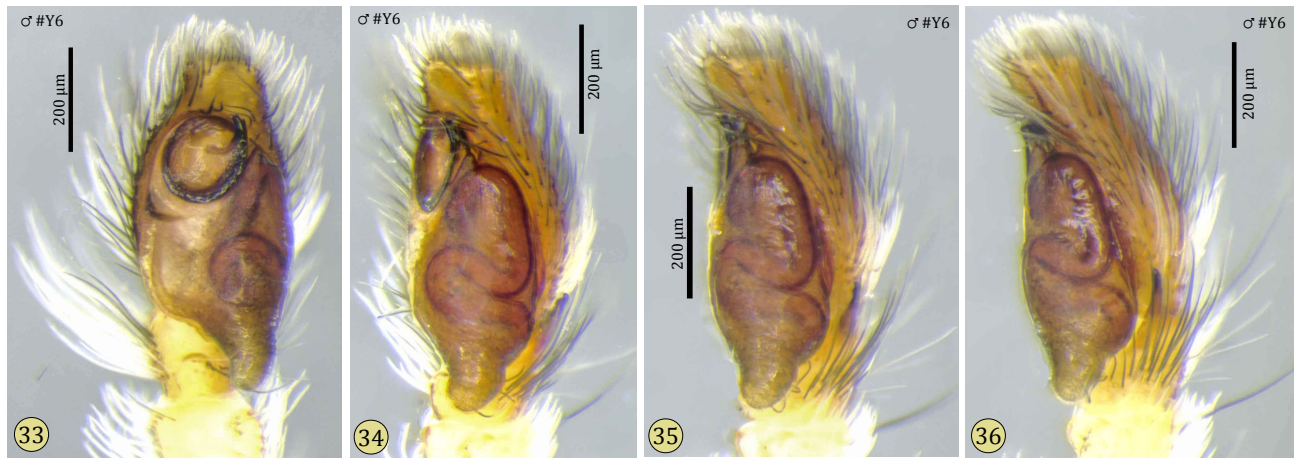


Figure 23 (continued from previous page). Medial to lateral views of left pedipalp of six male *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 24. Chelicerae of male *Hypoblemum griseum* from Yarramundi, New South Wales. 1-6, Anterior views. 7-9, Posterior views. Collected and photographed by Jürgen Otto.

Description of female (Figures 3, 25-31). The chelicerae of the female *Hypoblemum griseum* are relatively smooth and rounded, with some transverse ridges across each distal paturon. As in the male, a large medial bicuspid tooth is present on the anterior margin, and a large central unicuspid (simple or single-pointed) tooth is present on the posterior margin, of the fang groove. The carapace is largely glabrous and dark in the eye region, but the white band of scales that surrounds the eye region is complete in the front, extending ventrally over the clypeus. Unless scales are rubbed off, this band also tends to be complete at the midline to the rear of the eye region. The cover of the eye region varies but this is usually dark brown or black and mostly glabrous. In some individuals scattered dark red-brown scales may be present. Red-brown scales may also surround the eyes, resulting a distinctive "masked" appearance. The PME are slightly closer to the PLE than to the ALE. As in the male several patches of white scales may be present along the rear of each lateral margin of the carapace, extending vertically.

The dorsal opisthosoma is covered with mixed off-white or brown setae, sometimes forming indistinct figures or patterns but usually uniform in appearance. The scales and setae that comprise this cover are much shorter than those of the "shaggy" male. Lighter setae at the front form a more-or-less distinct anterior marginal band. At the rear a bright white anal tuft is present above the grey spinnerets. The venter of the opisthosoma is covered with off-white setae, with variable darker brown mottling. Coxae, trochanters, sternum and endites are mostly brown, translucent and glabrous, except for longer off-white setae around the posterior margin of the sternum.

Legs are uniform in colouration, with scattered off-white setae but no distinct banding. Legs I and II are shorter and of the same length, legs III and IV longer, and legs III only slightly longer than legs IV. The epigynum resembles that of *H. scutulatum* with a relatively small, rounded posterior spermatheca behind each window, but sclerotized ducts proceeding anterolaterally from each spermatheca, visible from below through the posterior part of each window, are narrower and better-defined than they are in that species.

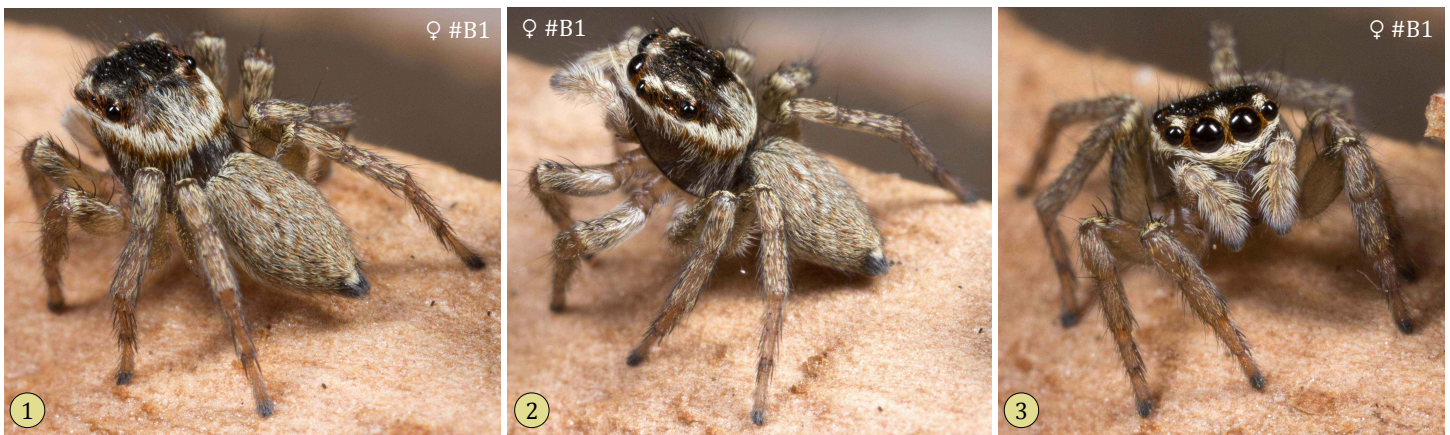


Figure 25. Three views of a female *Hypoblemum griseum* from Berowra, New South Wales. Collected and photographed by Jürgen Otto.



Figure 26. Female *Hypoblemum griseum*. Photos by Robert Whyte. 1-3, Two females (1-2, 3) from Applegrove Farm, Queensland, collected by Robert Whyte. 4, Female from Walcha, New South Wales (AUS-335, 31 OCT 2012, collected by Robert Whyte). 5, Female (~7.5 mm) from Marjorie Lane, Papamoa Beach, New Zealand in dense coastal foliage, collected by Robert Whyte. 6, Female from Gloucester, New South Wales (AUS-332, 30 NOV 2012, collected by Iain Macaulay). 7, Female from Wingham, New South Wales (AUS-1925, 25 OCT 2014, collected by Iain Macaulay).



Figure 27 (continued on next page). Six female *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 27 (continued from previous page, continued on next page). Six female *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 27 (continued from previous page). Six female *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

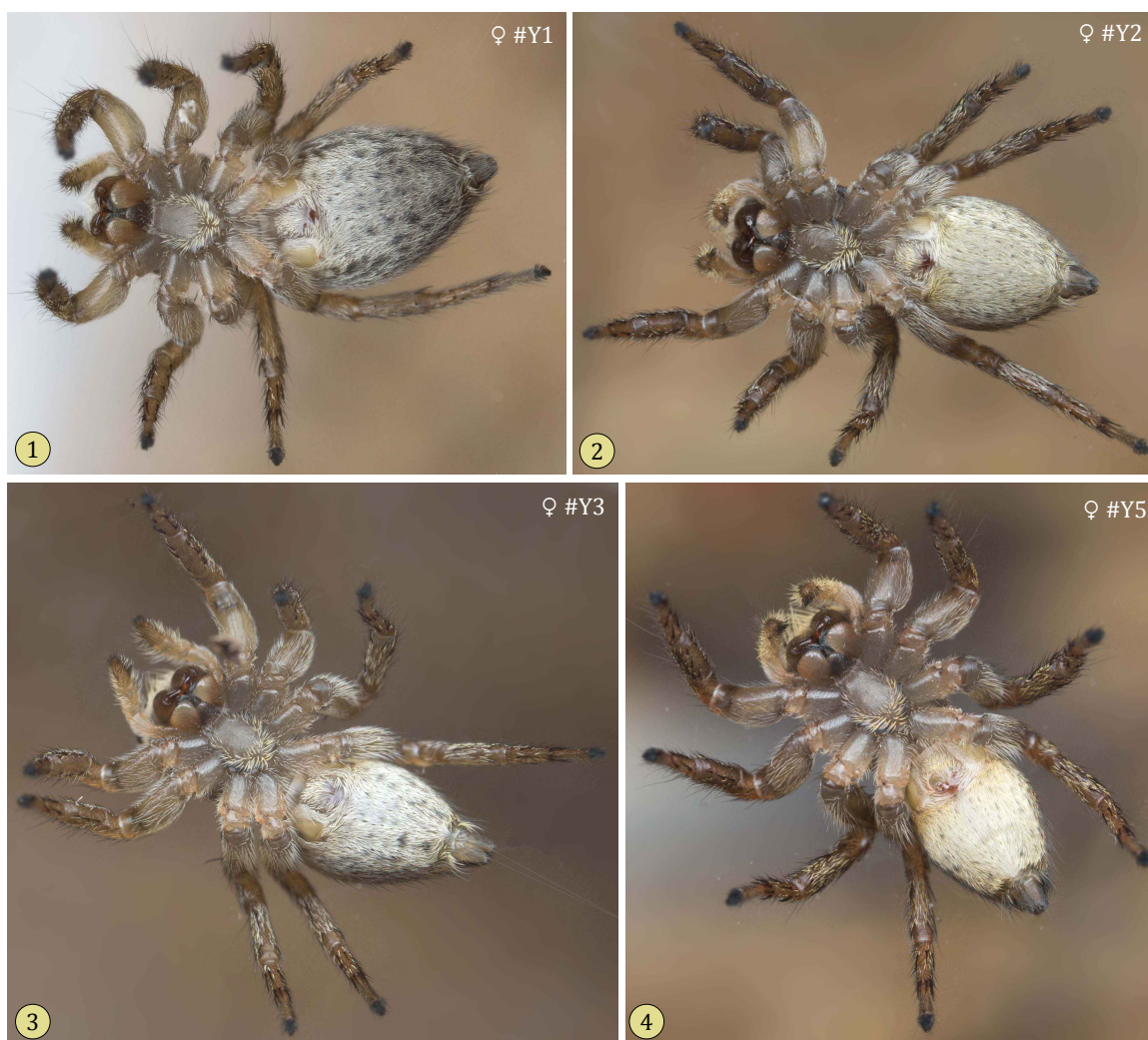


Figure 28. Ventral view of four female *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.



Figure 29 (continued on next page). Four female *Hypoblemum griseum* from Yarramundi, New South Wales, in alcohol. Collected and photographed by Jürgen Otto.

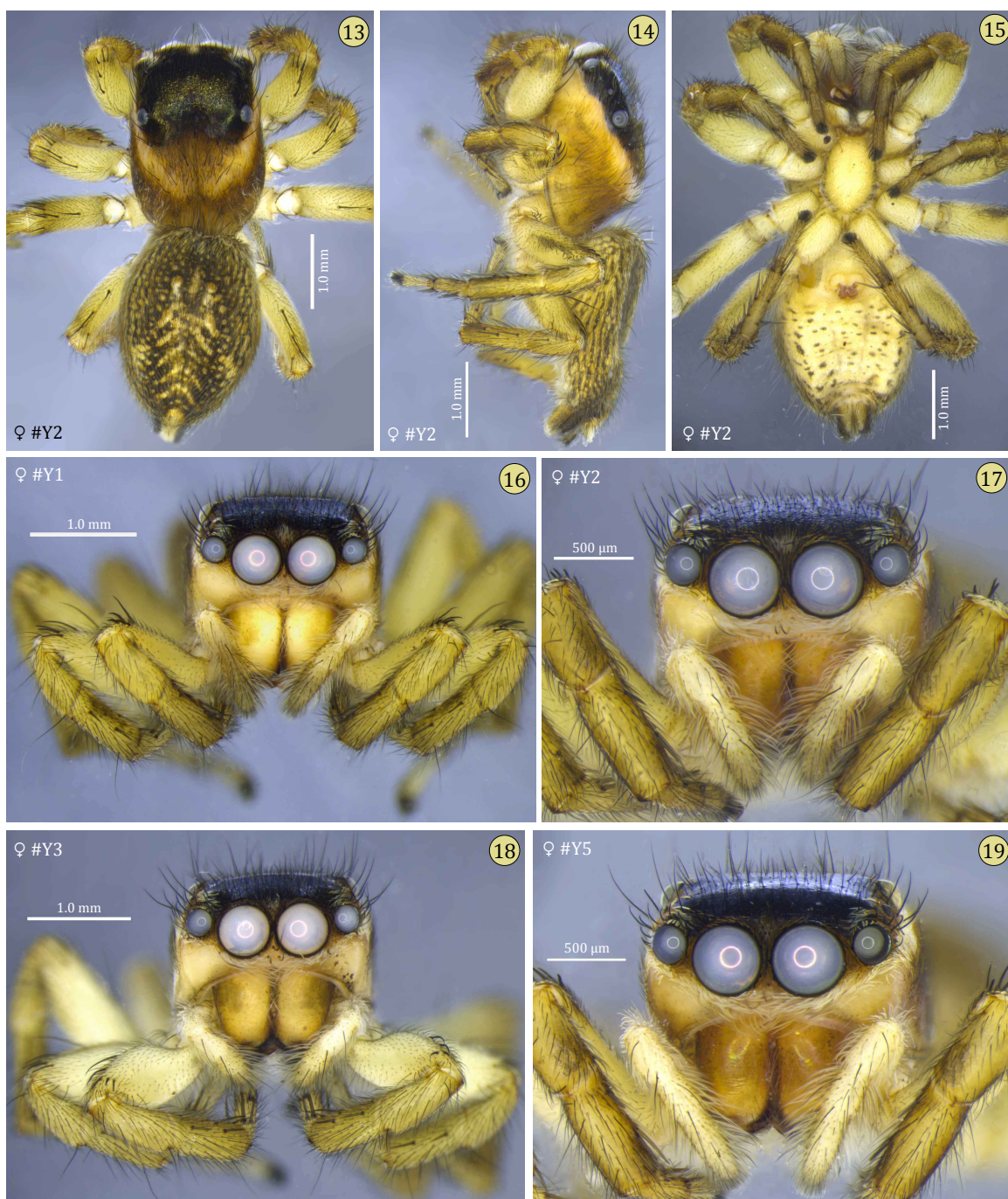


Figure 29 (continued from previous page). Four female *Hypoblemum griseum* from Yarramundi, New South Wales, in alcohol. Collected and photographed by Jürgen Otto.

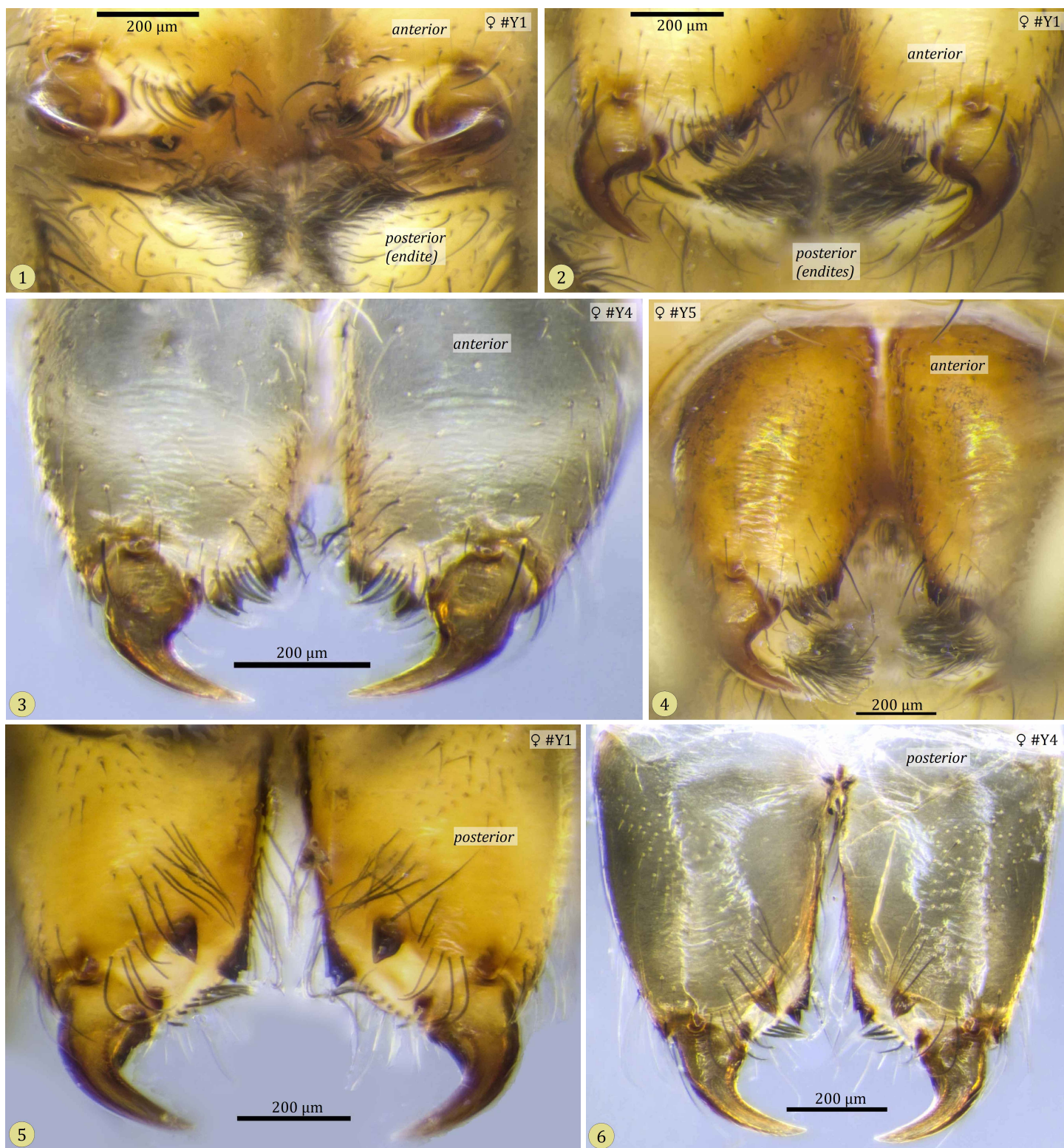


Figure 30. Chelicerae of female *Hypoblemum griseum* from Yarramundi, New South Wales, in alcohol. **1**, Ventral view, anterior at top. **2-4**, Anterior views. **5-6**, Posterior views. Collected and photographed by Jürgen Otto.

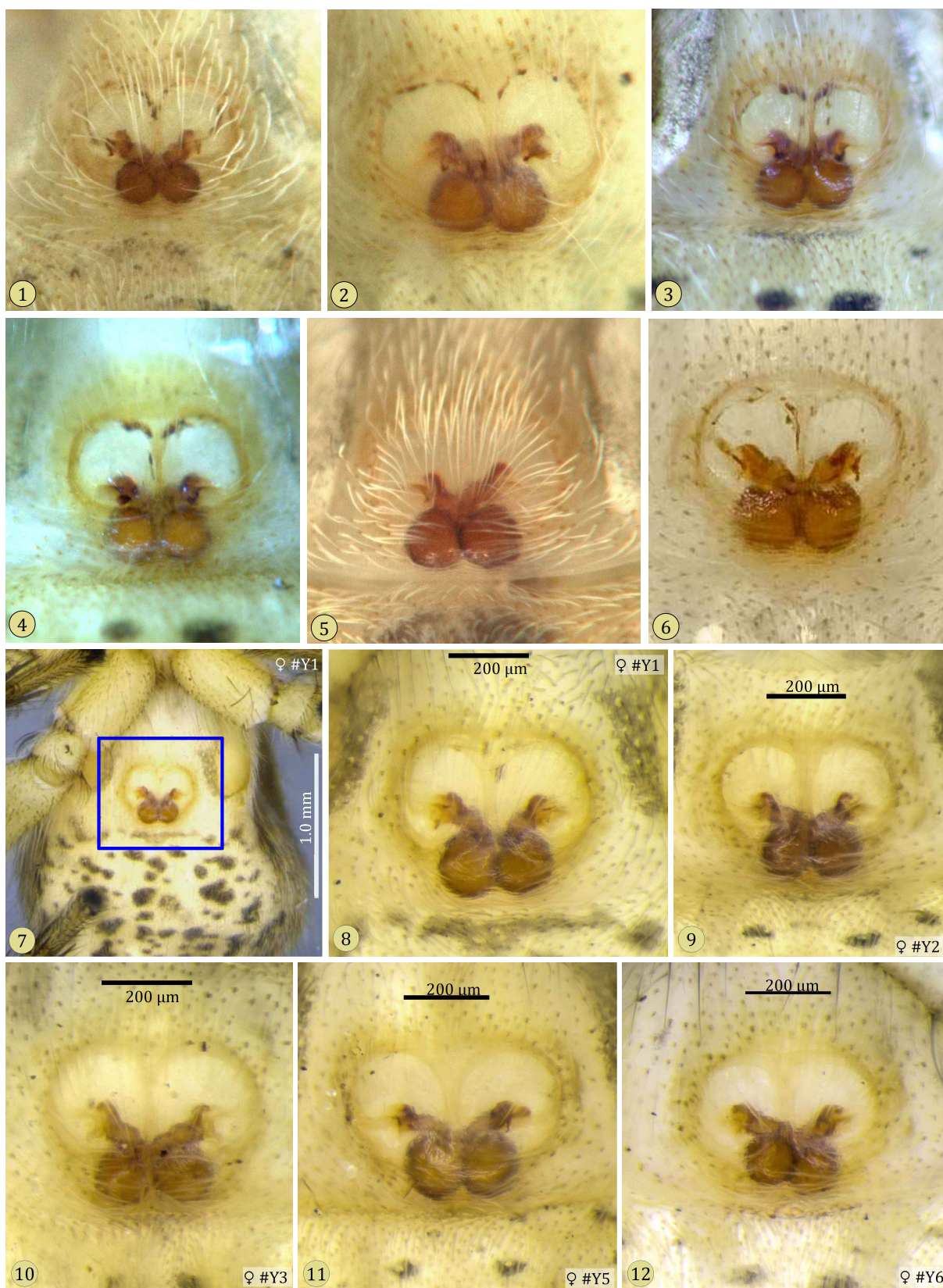


Figure 31. Ventral view of epigynum of *Hypoblemum griseum* in alcohol (anterior at top). **1-2**, Two females from Applegrove Farm, Queensland (collected by Robert Whyte). **3**, Nana Glen, New South Wales (AUS-305, 14 MAR 2012, collected by Iain Macaulay). **4**, Gloucester, New South Wales (AUS-332, 30 NOV 2012). **5**, Walcha, Queensland (AUS-334, 31 OCT 2012, collected by Iain Macaulay). **6**, Sydney (AUS-1922, 24 OCT 2014, collected by Iain Macaulay). **7-12**, Five females from Yarramundi, New South Wales (collected by Jürgen Otto). **8**, Inset detail from (7). Photos by Robert Whyte (1-6) and Jürgen Otto (7-12).

Immature female. As shown here (Figure 32), immature females closely resemble adults but may have a much more distinct pattern of off-white setae against a brown background on the dorsal opisthosoma.



Figure 32. Penultimate female *Hypoblemum griseum* from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

Courtship and mating (Figure 33). Jackson & Willey (1995) described the courtship and agonistic displays of males and display by female *Hypoblemum griseum* (misidentified as *Euophrys parvula* Bryant 1935) in New Zealand. Although in the genus *Maratus* only *M. vespertilio* are known to engage in ritual agonistic display (Otto & Hill 2012a), elevation of the opisthosoma and extension of legs III by both male and female *H. griseum* suggests a close relationship of these larger spiders to *Maratus*. An *H. griseum* female can also rotate her opisthosoma by 180° when she mates (Figure 33:10).



Figure 33 (continued on next page). Courtship and mating by *Hypoblemum griseum*. 1-8, Elevation of opisthosoma and extension of leg RIII (2) by a displaying male from Yarramundi, New South Wales. Collected and photographed by Jürgen Otto.

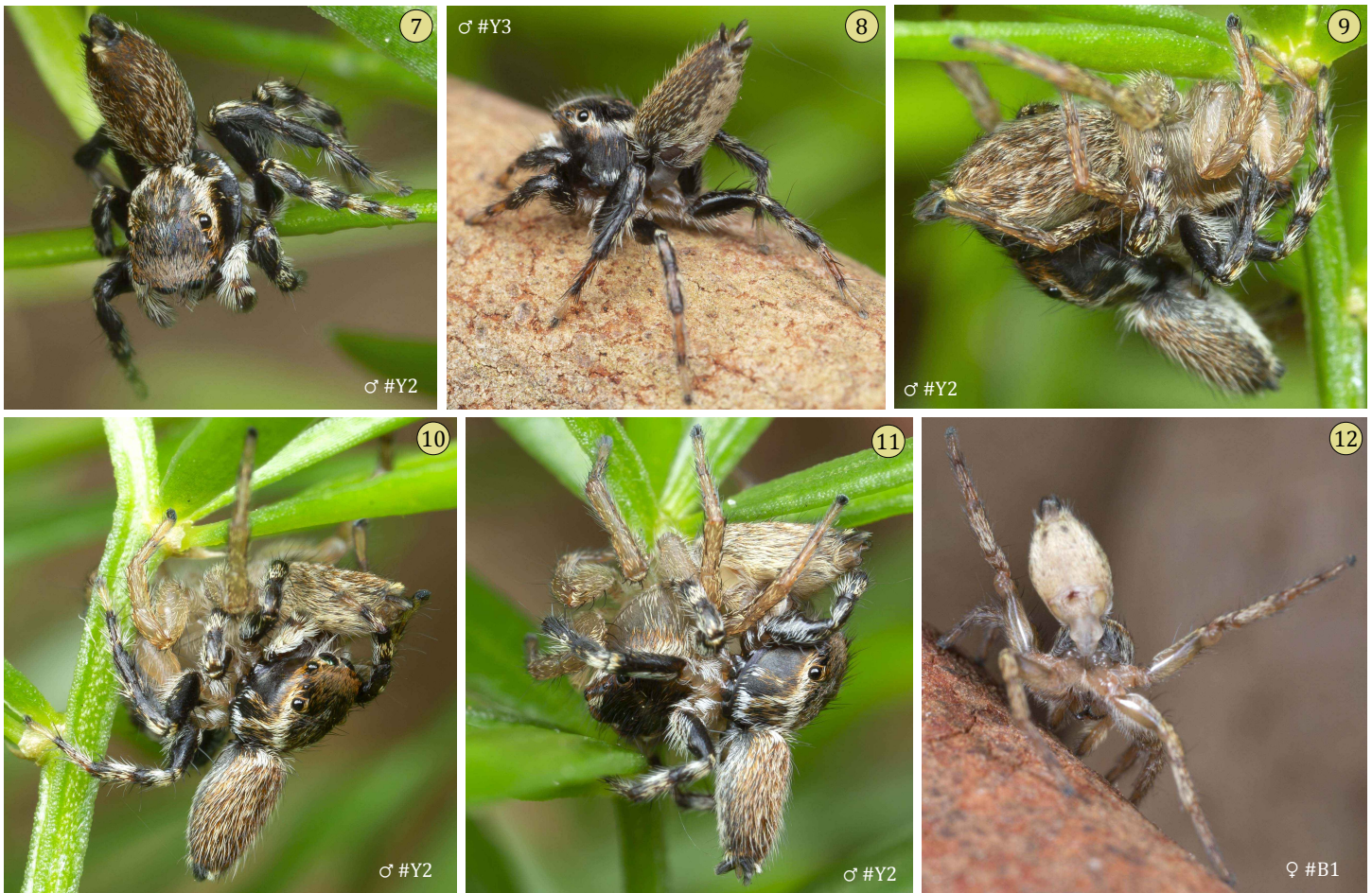


Figure 33 (continued from previous page). Courtship and mating by *Hypoblemum griseum*. **9-11**, Three views of a mating pair from Yarramundi, New South Wales. As with spiders of the genus *Maratus*, the female can rotate her opisthosoma by as much as 180°. **12**, Female from Berowra, New South Wales, displaying to a male with legs III extended and the opisthosoma elevated. As in the genus *Maratus*, we think that this is a rejection display. Collected and photographed by Jürgen Otto.

Hypoblemum scutulatum (L. Koch 1881), new combination

Ergane scutulata L. Koch 1881 ♂♀ (p. 1268, pl. 108, figs. 6-7)

Ergane dialeuca L. Koch 1881 ♂ (p. 1263, pl. 108, fig. 4), Keyserling 1883 ♂ (p. 1477), **new synonymy**

Hasarius lineatus Keyserling 1881 ♂ (p. 1275, pl. 109, fig. 3, synonymized with *E. dialeuca* by Žabka 1991)

Habrocestum albovittatum Keyserling 1882 ♂ (p. 1407, pl. 119, fig. 3), **new synonymy**

Hypoblemum albovittatum: Simon 1903 (transferred to *Hypoblemum* Peckham & Peckham 1885), Whyte & Anderson 2017 ♂♀ (p. 250, unofficial)

Sigytes scutulata: Simon 1903 (p. 734, *E. scutulata* transferred to *Sigytes* Simon 1902 with spelling error)

Sigytes dialeuca: Simon 1903 ♂ (p. 734, transferred to *Sigytes* Simon 1902)

Lycidas karschi Žabka 1987 ♀ (p. 468, figs. 11, 44-45), Žabka 1991 (p. 37), **new synonymy**

Lycidas scutulatus: Žabka 1987 ♀ (p. 460, figs. 7, 27-28, transferred to *Lycidas* Karsch 1878), Žabka 1991 (p. 39)

Lycidas sp.: Davies & Žabka 1989 ♂♀ (p. 239, pl. 41)

Lycidas dialeuceus: Žabka 1991 (p. 37, *Ergane dialeuca* transferred to *Lycidas* Karsch 1878 with spelling error)

Maratus dialeucus: Otto & Hill 2012b, 2012c (based on synonymy of *Lycidas* Karsch 1878 with *Maratus* Karsch 1878)

Maratus karschi: Otto & Hill 2012b, 2012c (based on synonymy of *Lycidas* Karsch 1878 with *Maratus* Karsch 1878)

Maratus scutulatus: Otto & Hill 2012b, 2012c (based on synonymy of *Lycidas* Karsch 1878 with *Maratus* Karsch 1878)

Hypoblemum sp.: Zhang & Maddison 2013 ♂, 2015 ♂ (p. 78, figs. 497-499)

Lycidas cf. *griseus*: Zhang & Maddison 2013 ♀

Lycidas cf. *karschi*: Zhang & Maddison 2013 ♀

Type specimens. The names *Ergane scutulata* and *E. dialeuca* were published together. We choose the former name as it is more descriptive of the male and better known. A type specimen for the male *E. scutulata* is not known, but published descriptions provide useful characters. L. Koch (1881) described *E. scutulata* from "Sidney, Rockhampton, Peak Down, Gayndah (Mus. Godefroy)" (Figure 34) and *E. dialeuca* from "Sydney, Port Mackay (Museum Godeffroy)" (Figures 35, 36:1-2). Žabka (1991) listed a male syntype for *E. dialeuca* from Port Mackay (Mus. Godeffroy, 8342, ZMH; Figure 36:1-2). Rockhampton, Peak Down, Gayndah and (Port) Mackay are locations in central and northeastern Queensland.

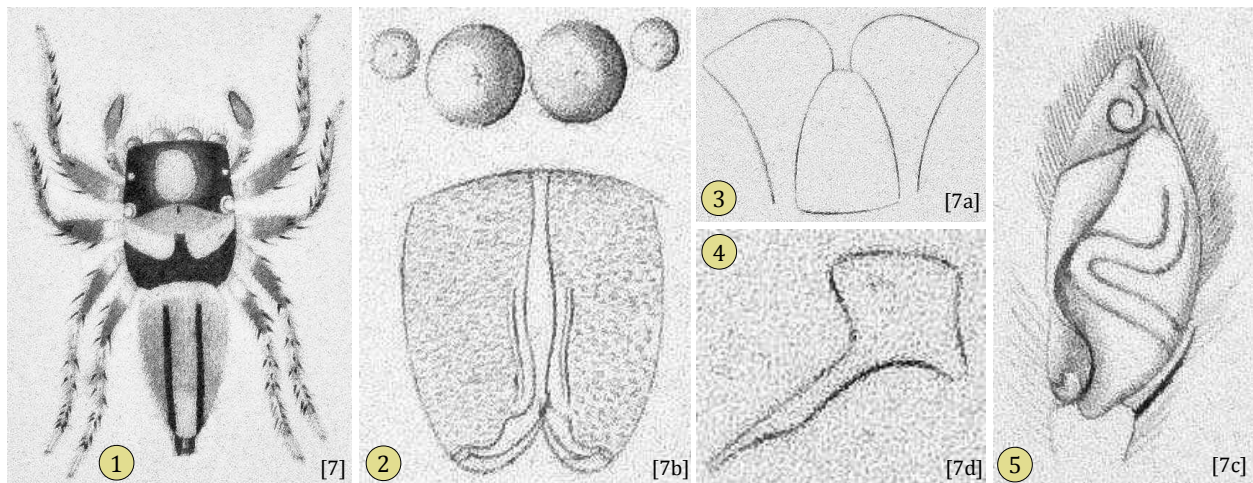


Figure 34. Drawings of male *Ergane scutulata* from the original description (L. Koch 1881, pl. 1, fig. 7, numbers in brackets). **1**, The interrupted white band behind the posterior eye row, the two dark stripes of the dorsal opisthosoma, and the general colouration of the legs can be seen in this drawing. **2**, Note the furrow along the anteromedial margin of each paturon. **3**, Ventral view of labium and endites. **4**, Retrolateral tibial apophysis (RTA). **5**, Drawing of right pedipalp flipped from right to left (mirror image) for better comparison according to our *left pedipalp convention*. This is not an accurate drawing and the relative size of the embolar ring is far too small.

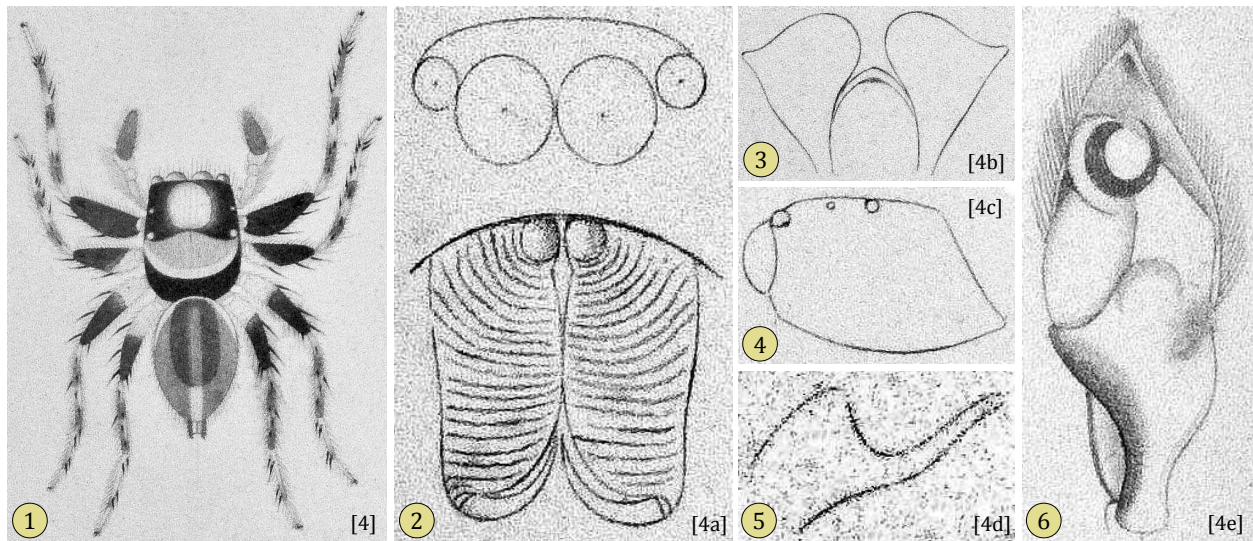


Figure 35. Drawings of the male *Ergane dialeuca* by L. Koch (1881, pl. 108, numbers in brackets). **1**, Dorsal view. **2**, Face. **3**, Ventral view of labium and endites (anterior at top). **4**, Lateral view of left side of carapace. **5**, Detail of RTA attached to tibia of pedipalp. **6**, Ventrolateral view of right pedipalp, reversed to support comparison according to our *left pedipalp convention*. This specimen agrees with the male *Hypoblemum scutulatum* with respect to colouration, white band around the eye region, an oval or oblong scute on the anterodorsal opisthosoma, a white stripe to the rear of this scute (visible in specimens), transverse ridges on the front of each paturon, position of the PME, and the shape of the pedipalp.

A male type specimen does exist for *Habrocestum albovittatum* Keyserling 1882 (Figure 36:3-4), but the condition of this specimen is extremely poor, lacking parts of all legs and pedipalps. We recognize this as a synonym of *Hypoblemum scutulatum* based on the original description and also on the appearance of this type specimen, bearing a darker pigmented scute on the dorsal opisthosoma that contrasts with lighter coloured, translucent cuticle on either side, consistent with our own male *H. scutulatum* specimens.



Figure 36. Type specimens associated with male *Hypoblemum scutulatum*. **1-2**, Two views of a male syntype for *Ergane dialeuca* L. Koch 1881 (from the Zoologisches Museum Hamburg, ZMH, originally Museum Godeffroy 8342). This faded specimen was listed as *Lycidas dialeuceus* by Žabka (1991). **3-4**, Damaged male holotype for *Habrocestum albovittatum* Keyserling 1882 from Peak Downs (Zoologisches Museum Hamburg ZMH-A0000899, originally Museum Godeffroy 7734). This specimen was listed but not used in the later description of "*Hypoblemum albovittatum*" by Žabka & Pollard (2002a).

The original drawings for the female *Ergane scutulata* (L. Koch 1881, pl. 108, fig. 6; Figure 37) clearly depict the white band behind the eye region, the two dark stripes of the dorsal opisthosoma, the uniform light-coloured legs and the small circular posterior spermathecae. A specimen that agrees with the original drawing of *E. scutulata* also exists (Figure 38:1-3), although Žabka (1987) apparently removed the epigynum from this specimen and redescribed it as a new species, *Lycidas karschi*. Davies & Žabka (1989, pl. 41) also figured a female *Hypoblemum scutulatum* as *Lycidas* sp.

The most recent assignment of this species to the genus *Maratus* Karsch 1878, resulting from a synonymy of *Lycidas* and *Maratus*, has been problematic. Otto and Hill (2012c, appendix 10) state that this species does not belong to *Maratus* as they define it. Previously it had been included in the genera *Ergane* and *Sigytes*. However, male *E. cognata*, the type species for *Ergane*, have very large, laterally divergent chelicerae with long, irregular fangs, and long tapering pedipalps that do not resemble those of the male *H. scutulatum*. *Sigytes* would be an equally poor choice since the type species for *Sigytes*, *S. paradisiacus* Simon 1902, is based on a single male from Sri Lanka that was described only briefly and inadequately. Two Australian species have been assigned to *Sigytes* but with no type specimen designated it is not possible to determine whether *S. paradisiacus* has any relationship to any of these. None of them bears any resemblance to *H. scutulatum*.

Davies & Żabka (1989, pl. 41) also figured a male *H. scutulatum* as *Lycidas* sp. Our placement of this species in the genus *Hypoblemum* Peckham & Peckham 1885, is based on its similar morphology and the close relationship to *H. griseum* indicated by recent DNA-based studies of euophryine phylogeny (Zhang & Maddison 2013, 2015; Figures 1-2).

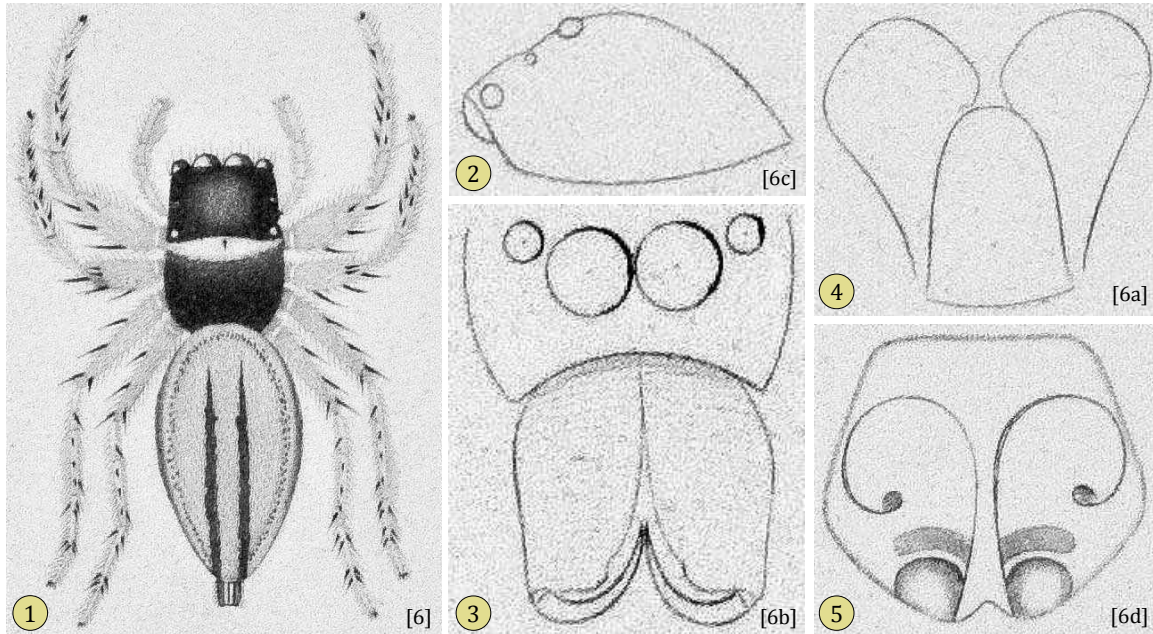


Figure 37. Published drawings of the female *Ergane scutulata* (L. Koch 1881, pl. 108, fig. 6, original figure numbers in brackets). **1**, The dark carapace with white band behind the eye region, the two dark stripes of the opisthosoma, and the uniform, light-coloured legs are important characters for identification of this species. **2**, Left side of carapace in lateral view. **3**, Face. **4**, Ventral view of labium and endites (anterior at top). **5**, Ventral view of epigynum (anterior at top). Note the small, rounded posterior spermathecae. This drawing is more schematic than accurate.

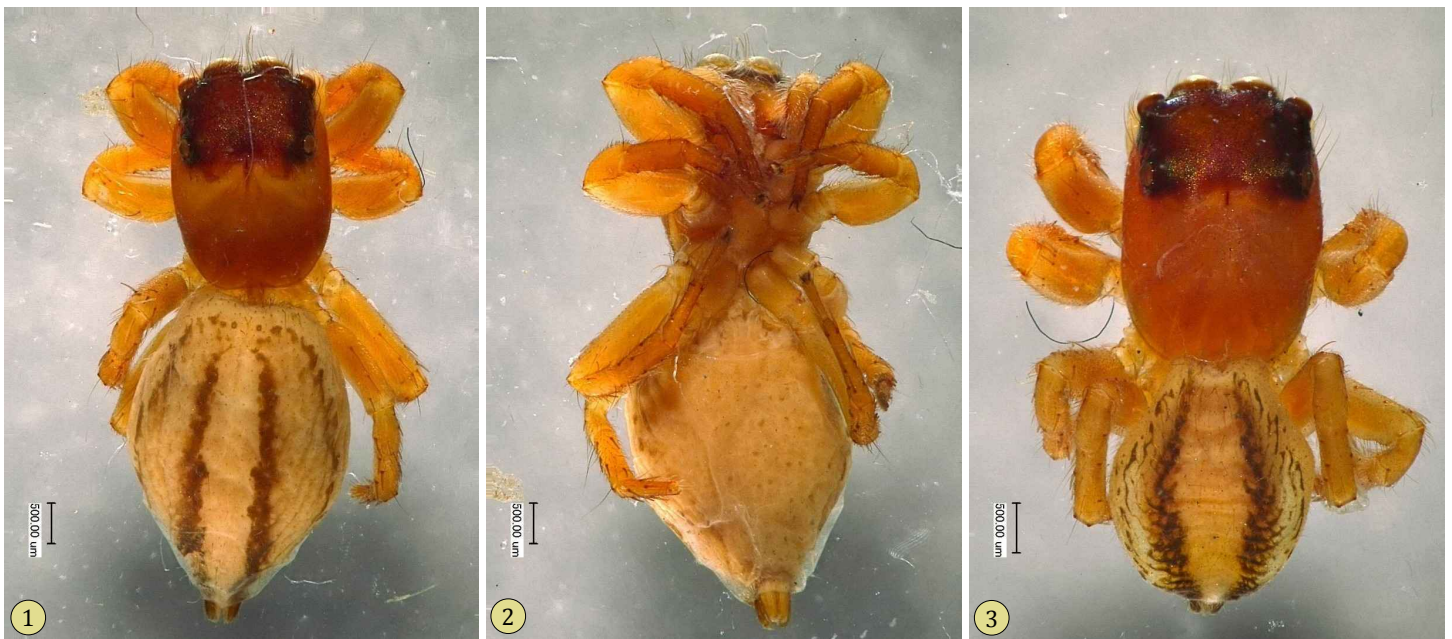


Figure 38 (continued on next page). Adult female type specimens for *Ergane scutulata* in the Zoologisches Museum Hamburg (ZMH). **1-2**, Specimen that most clearly represents the published drawing (Figure 37). Żabka (1987) apparently removed the epigynum of this specimen (ZMH 8627) and described it as a new species, *Lycidas karschi*. With a second specimen (3-4) this was labeled "1 ♀ holotypus 1 ♀ paratypus "*Jotus scutulatus* Koch, Sydney (Mus. Godeffroy Nr. 8627)."



Figure 38 (continued from previous page). Adult female type specimens for *Ergane scutulata* in the Zoologisches Museum Hamburg (ZMH). 5-6, Third specimen redescribed by Žabka (1987) as *Lycidas scutulatus*, also with epigynum removed. Reported as "*Ergane scutulata* Koch, Syntypus, Peak Downs (Mus. Godeffroy Nr. 8339), ZMH" by Žabka, this specimen (ZMH-A0000898) was most recently labeled "*Ergane scutellata*". Keyserling determin. Mus. God. 8339. Peak Downs."

Description of male (Figures 2:4-9, 34-36, 39-48). In life the paturon of each chelicera is black, narrowing only slightly from the base, with a lobed distal margin and a distinctive crease or compression keel extending along the distal half of the medial edge. The anterior surface of each paturon is textured with a series of indistinct transverse ridges. There is a single medial bicuspid tooth on the anterior margin, and a central unicuspid or simple tooth on the posterior margin of each fang groove. The anterior eyes are surrounded by red-brown or red-orange scales. The dorsal carapace including the eye region is black to dark brown and may be either glabrous in appearance and shiny or covered with brown scales. Below the posterior eyes a band of white scales extends to the rear on either side, turning toward but not meeting at the median at the rear. Below this on either side a band of red-brown or red-orange scales may extend to the rear behind the anterior eye row. This feature is not evident in all populations. The sides of the carapace are black to dark brown with only scattered white scales near the margin.

The dorsal opisthosoma is generally bronze in colouration and shiny, with an anterior scute or dorsal plate, and a more or less distinct longitudinal black stripe on either side. There are white scales on the anterior margin. To the rear there is a rearward-pointing white area of triangular shape at the midline, merging distally with a triangular patch of white setae above the spinnerets. The legs are fairly uniform in colouration, black to dark brown, with segmental bands of white to off-white scales on distal segments but not on the glabrous black to dark brown femora. Legs I are the longest, and legs III and IV are of about the same length.



Figure 39 (continued on next page). Adult male *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto.



Figure 39 (continued from previous page). Adult male *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto. **17, 20**, Note mantispid larva (arrows) wrapped around the pedicel of this male.



Figure 40. Adult male *Hypoblemum scutulatum* from Barrington Tops National Park, New South Wales, reared in captivity. Collected and photographed by Jürgen Otto.



Figure 41. Adult male *Hypoblemum scutulatum* from Sydney, New South Wales. Collected and photographed by Jürgen Otto.



Figure 42. Adult male *Hypoblemum scutulatum* from St. Ives, New South Wales, in alcohol. Collected and photographed by Jürgen Otto.

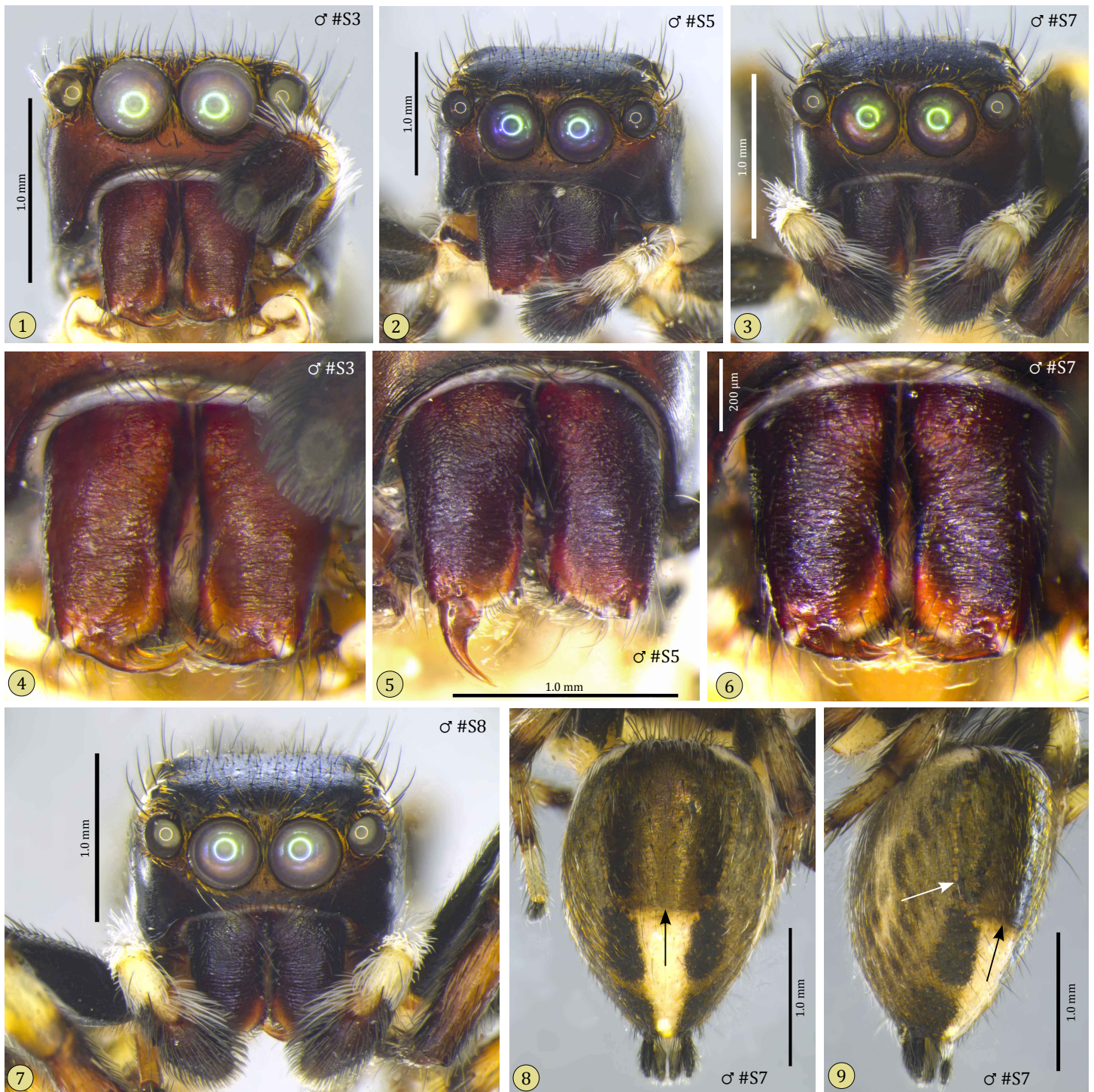


Figure 43. Adult male *Hypoblemum scutulatum* from St. Ives, New South Wales, in alcohol. **4-6,** The anterior surface of each paturon is textured with indistinct transverse ridges, a distal keel or crease along the medial margin, and distal lobes along the anterior margin of each fang groove. **8-9,** Detailed views of opisthosoma showing margins of a dorsal plate or scute (arrows) in front of white, middorsal triangular area. Although not well developed, the presence of this scute is a character shared with spiders of the genus *Maratus*. Collected and photographed by Jürgen Otto.



Figure 44. Detailed view of chelicerae of *Hypoblemum scutulatum* from St. Ives, New South Wales, in alcohol. **1-3, 8,** Anterior views of male chelicerae. **4-7, 9,** Posterior views of male chelicerae. **10,** Posterior view of female chelicerae. As in *H. griseum*, there is a single medial bicuspid tooth along the anterior margin, and a single central unicuspid tooth along the posterior margin of each fang groove. Collected and photographed by Jürgen Otto.

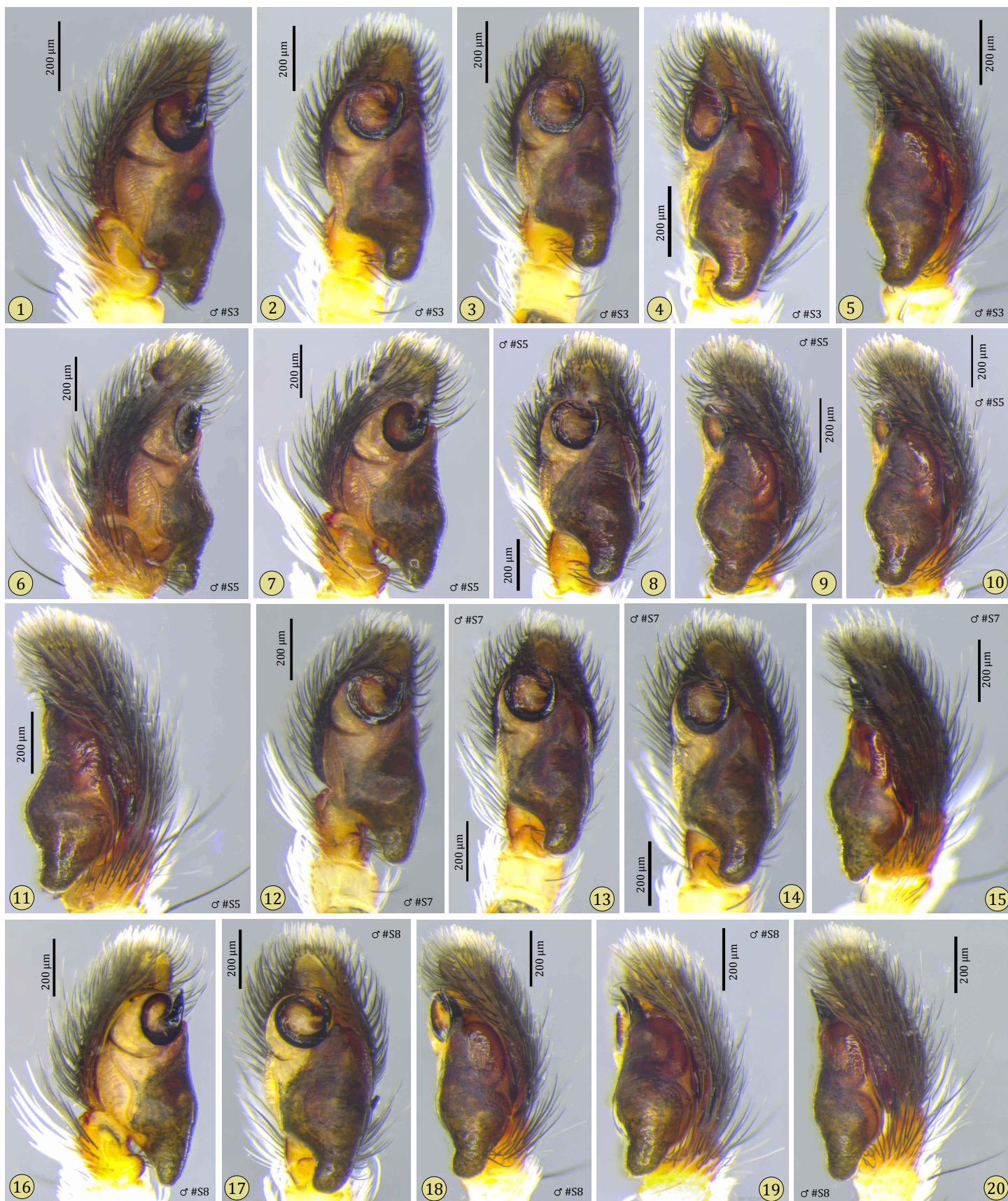


Figure 45. Medial to lateral views of the left pedipalp of four adult male *Hypoblemum scutulatum* from St. Ives, New South Wales, in alcohol. In some lateral views (e.g., 19) three dark, sclerotized apices of the embolus appear to be present. Collected and photographed by Jürgen Otto.

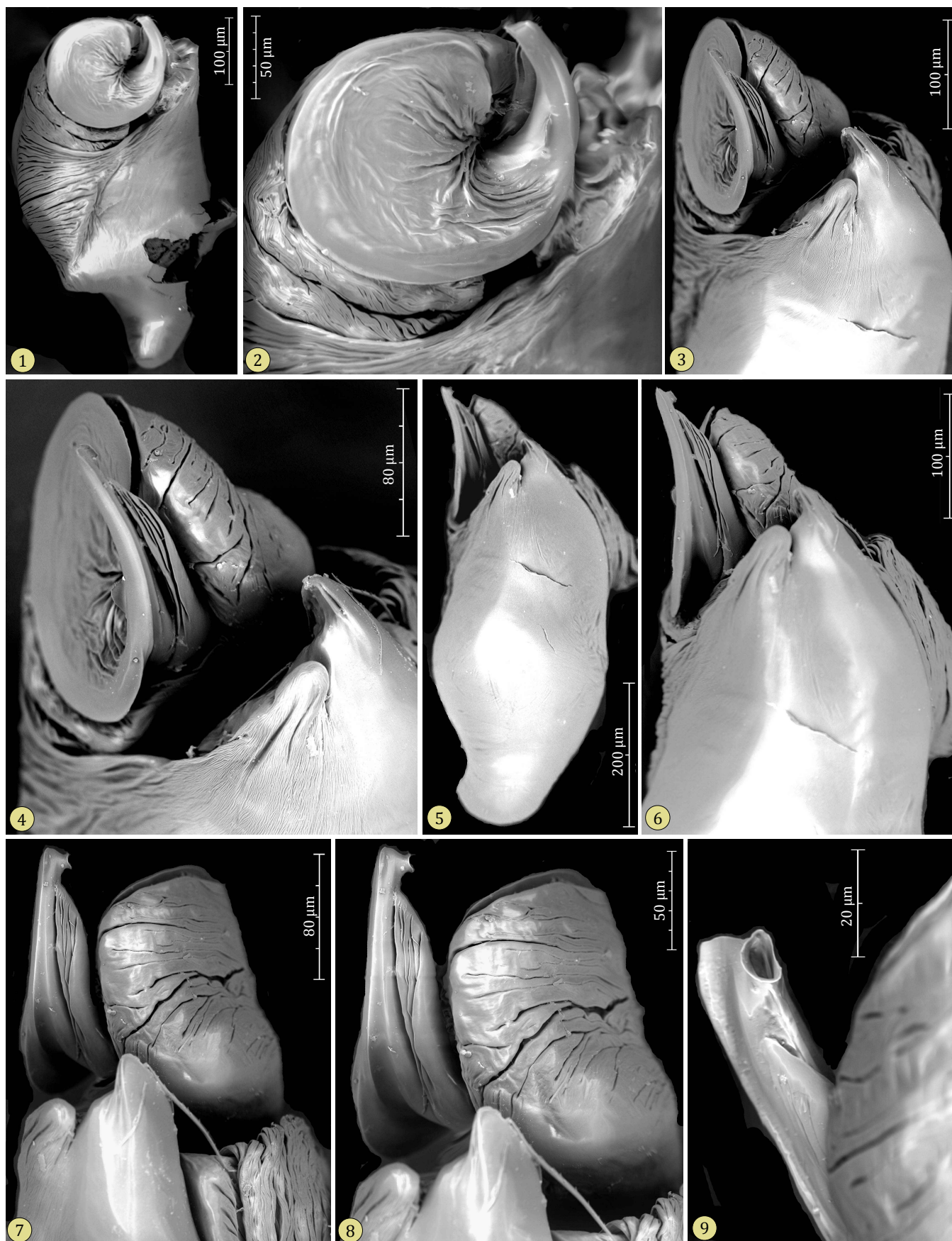


Figure 46. Ventral (1-2) to lateral (5-9) views of the left pedipalp of an adult male *H. scutulatum* from St. Ives, New South Wales (σ #S3). 9, Detail of seminal pore near end of blunt apex of the outer ring of the embolus. SEM images by Jürgen Otto.

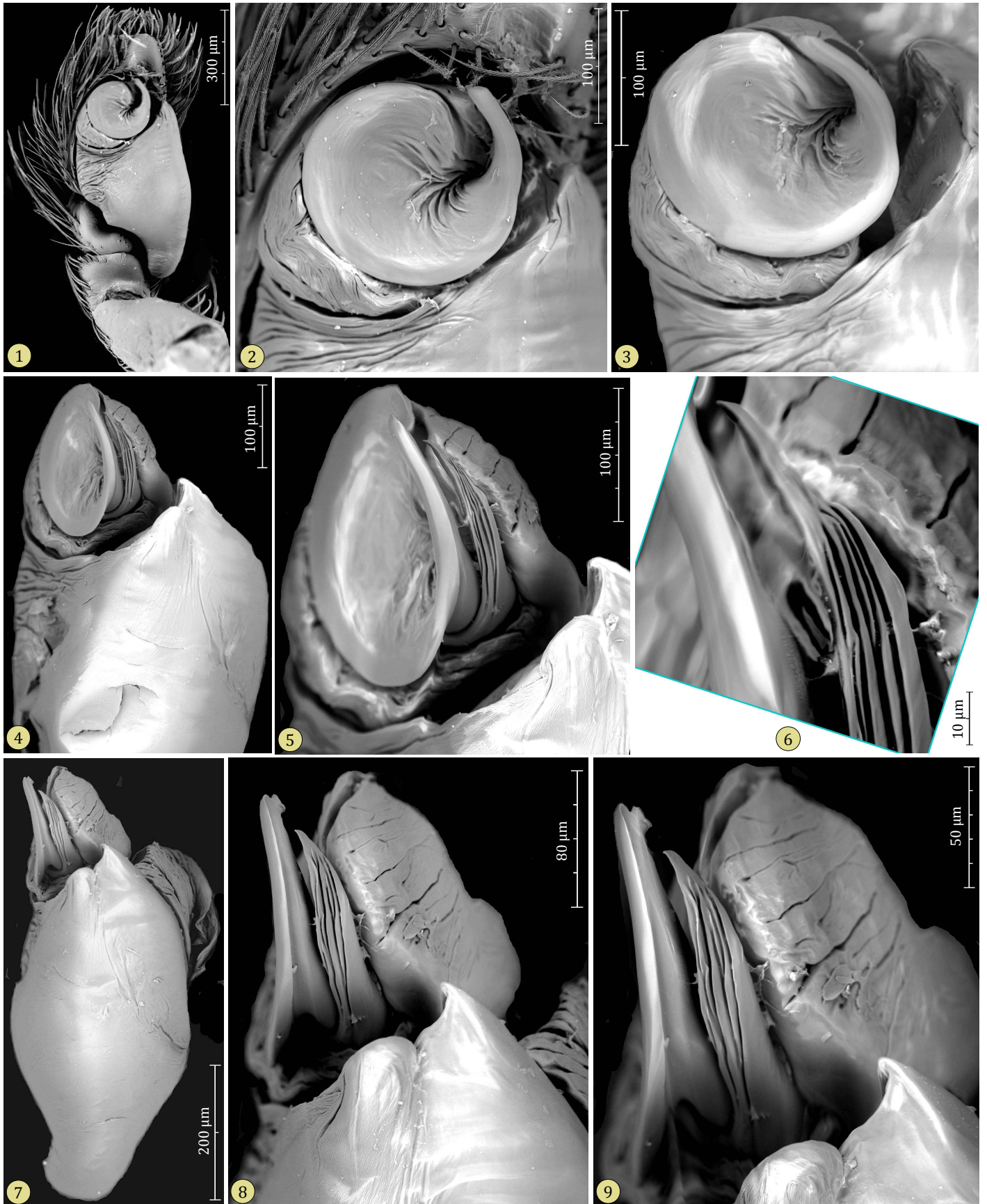


Figure 47. Ventral (1-2) to lateral (5-9) views of the left (1-2) and right (3-9, mirrored) pedipalps of an adult male *H. scutulatum* from St. Ives, New South Wales (♂ #S8). **6**, Detail of sharply pointed inner apex of the embolus. SEM images by Jürgen Otto.

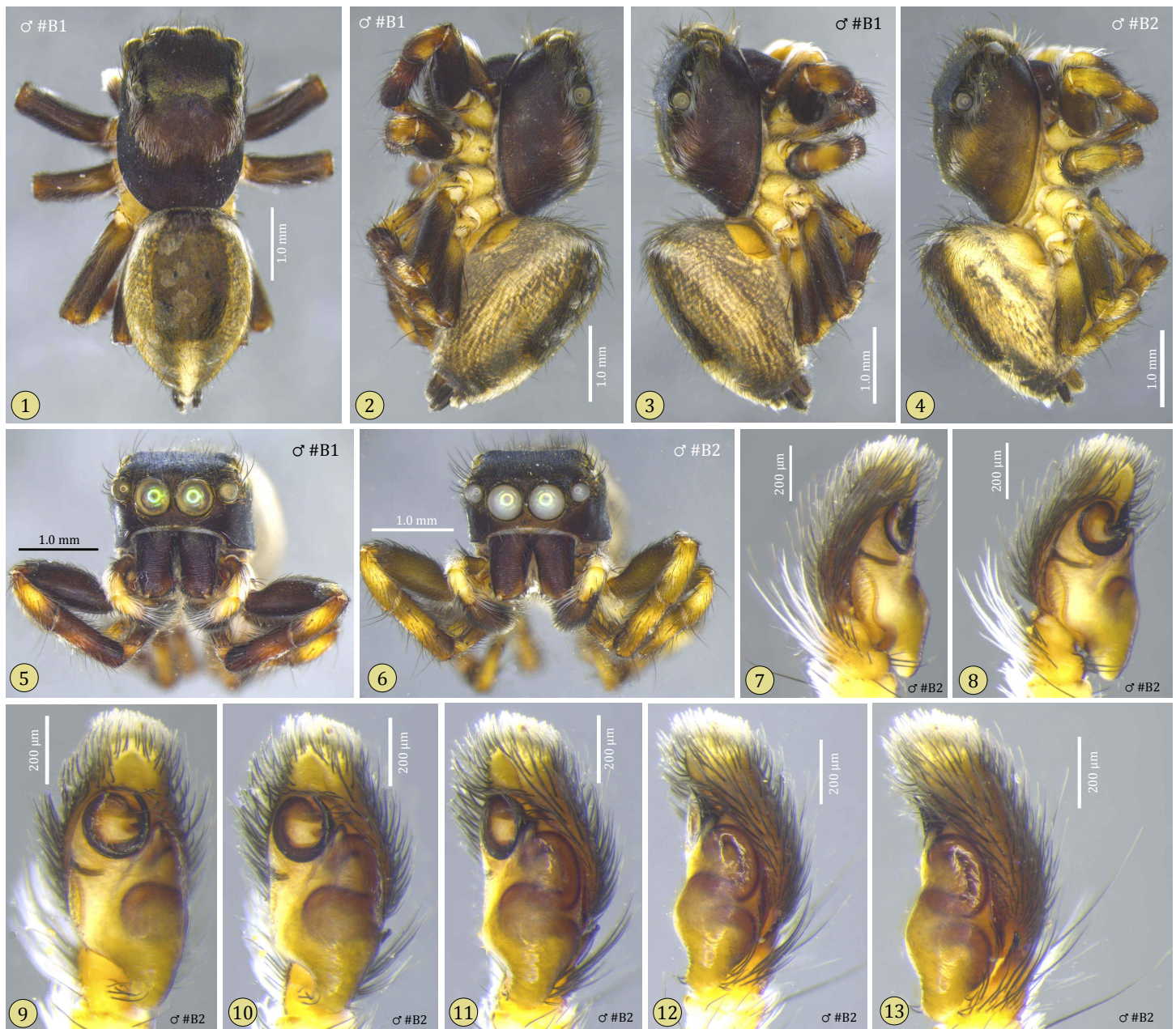


Figure 48. Adult male *Hypoblemum scutulatum* from Barrington Tops National Park, New South Wales, reared, in alcohol. 7-13, Medial to lateral views of left pedipalp. Collected and photographed by Jürgen Otto.

Proximally the pedipalps are covered with bright white setae, with a tuft of longer white setae extending anteromedially from each tibia. The cymbium and tegulum are dark brown to black. The tegulum has a long proximal extension, its rounded end bending at the lateral side. The outer ring of each embolus is heavy and black. As in *H. griseum* there are two apices of the embolus. The outer apex is heavier and blunt with a lateral groove, bearing the seminal pore near its tip. Beneath or behind this is the sharply pointed inner apex. In some cases three separate sclerotized parts of the embolar apex can be seen in a lateral view, giving the appearance of three apices under the light microscope. The translucent guard of the tegular sheath terminates in a prominent obtuse projection (tegular shoulder) to the lateral side of each embolus.

Description of female (Figures 2:10-13, 37-38, 49-53). Females are of medium length (5-8 mm) and generally translucent light brown.



Figure 49 (continued on next page). Female *Hypoblemum scutulatum* from St. Ives, New South Wales. 6-7, This female was lighter with more of an orange colour. Collected and photographed by Jürgen Otto.

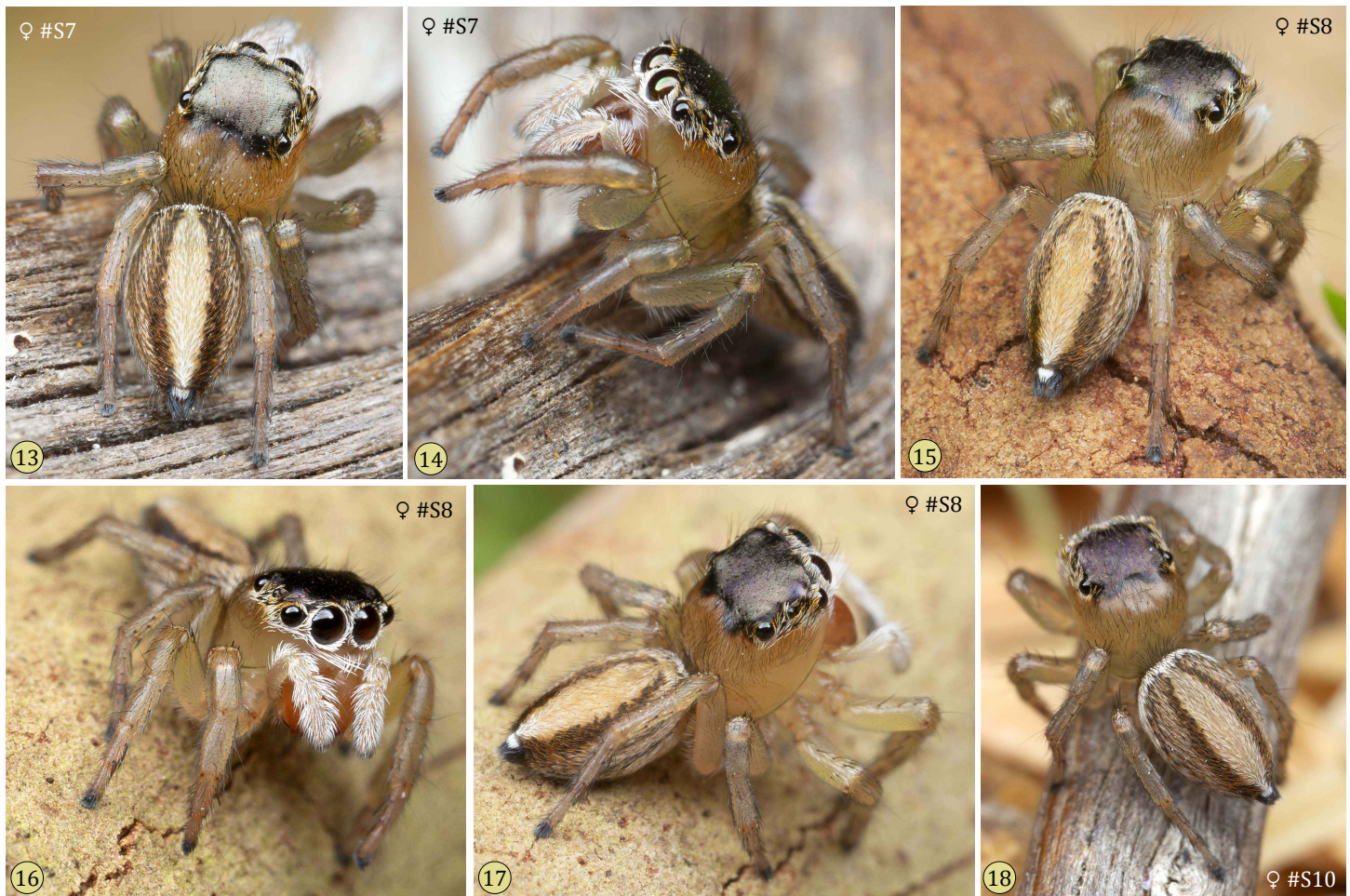


Figure 49 (continued from previous page). Female *Hypoblemum scutulatum* from St. Ives, New South Wales. 6-7, This female was lighter with more of an orange colour. 14, Preparing to jump with legs III flexed. Collected and photographed by Jürgen Otto.



Figure 50 (continued on next page). Ventral view of five adult female *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto.



Figure 50 (continued from previous page). Ventral view of five adult female *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto.

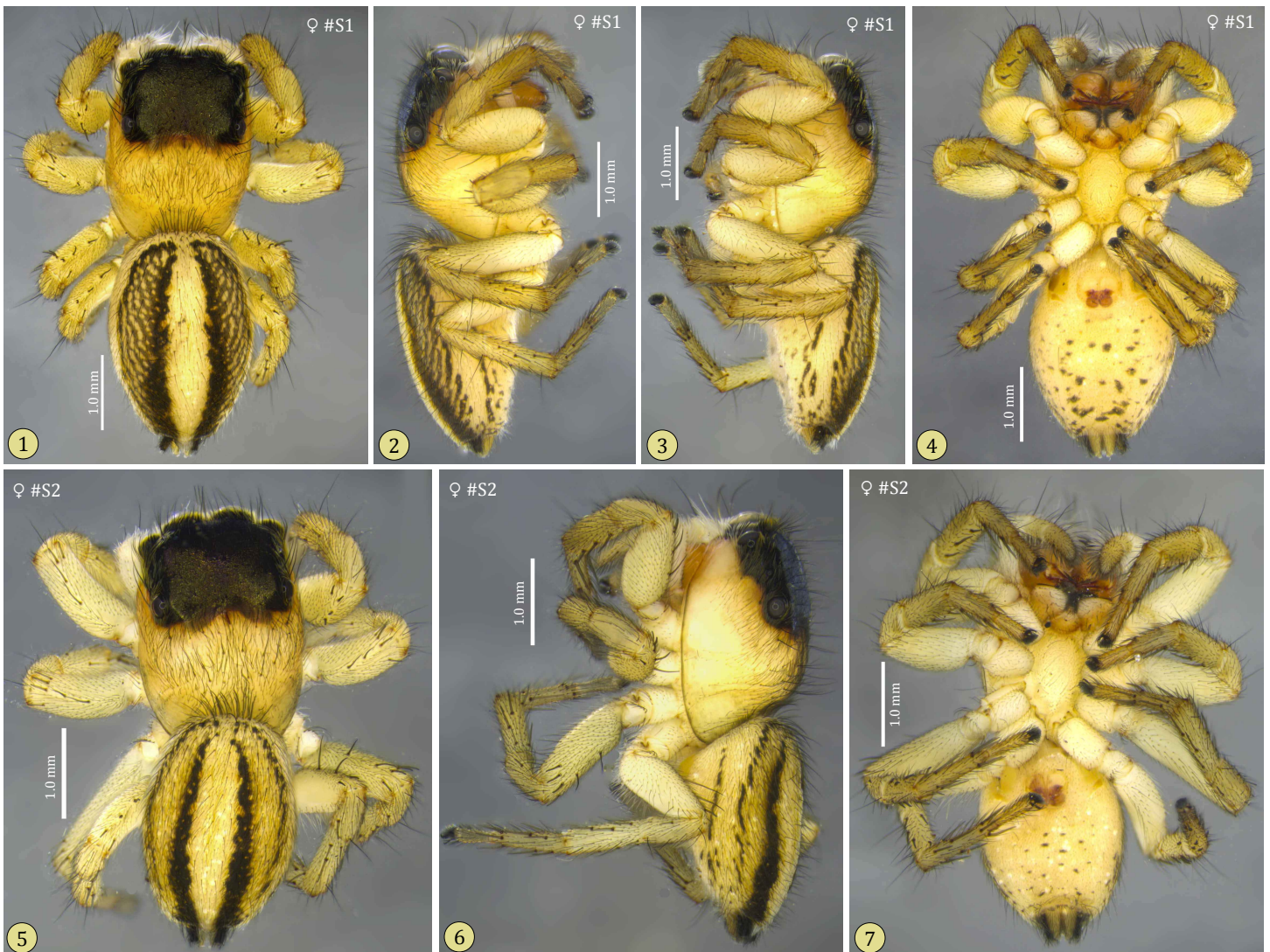


Figure 51. Two adult female *Hypoblemum scutulatum* from St. Ives, New South Wales, in alcohol. **1-4,** This female had a darker pattern of lines or reticulation flanking the dark stripes of the dorsal opisthosoma. Collected and photographed by Jürgen Otto.

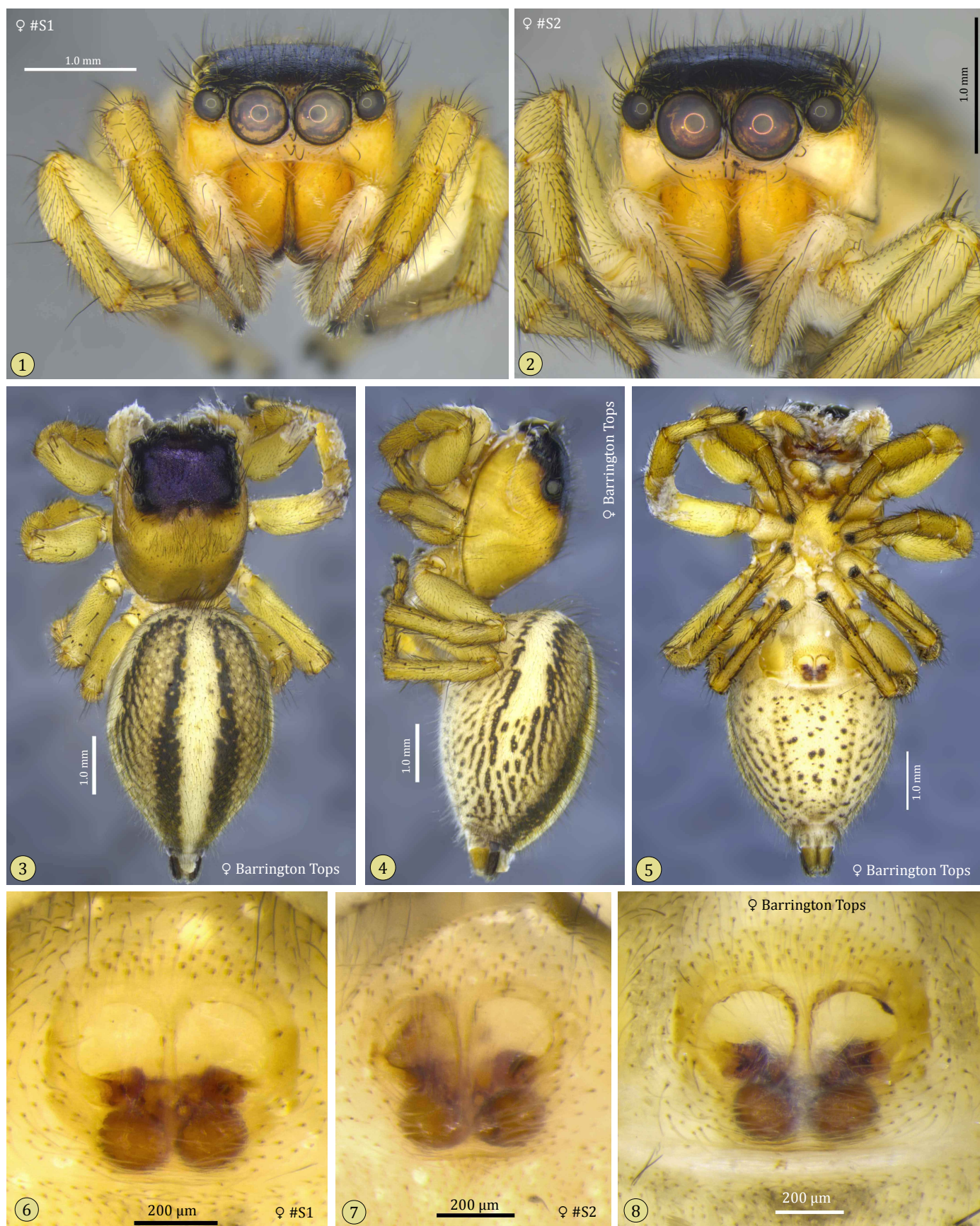


Figure 52. Female *Hypoblemum scutulatum* from St. Ives (1-2, 6-7) and Barrington Tops National Park (3-5, 8), New South Wales, in alcohol. 6-8, Ventral view of epigynum (anterior toward the top of the page). Collected and photographed by Jürgen Otto.

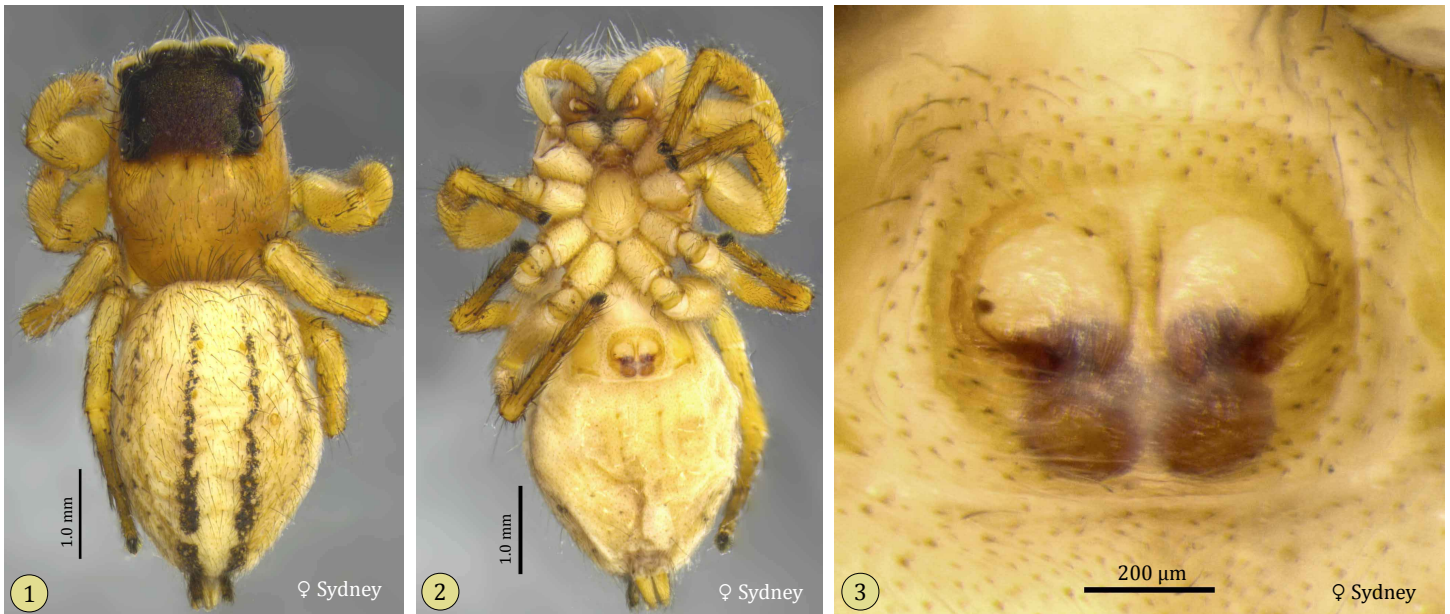


Figure 53. Female *Hypoblemum scutulatum* from Sydney, New South Wales, in alcohol. **3,** Ventral view of epigynum. Collected and photographed by Jürgen Otto.

The chelicerae are darker red-brown and glabrous. Off-white scales surround the eyes and longer off-white setae extend anteromedially from the clypeus. Otherwise the carapace is mostly glabrous, and there is no marginal band. The eye region is dark-brown to black and glabrous. On the dorsal opisthosoma a broad middorsal band of off-white setae is surrounded by a dark-brown stripe on each side. Each dark-brown stripe is flanked by a variably striped field of off-white setae alternating with dark cuticle. A marginal band of off-white setae is present, often demarcated by a line of dark cuticle. Above the spinnerets a small triangular tuft of white setae is present. All leg segments are light brown, translucent, and glabrous, lacking any significant markings or scale cover. The epigynum (Figures 52:6-8, 53:3) is similar to that of *Maratus* species, but with relatively small, rounded posterior spermathecae significantly smaller in diameter than the large windows. Darkly sclerotized ducts, usually poorly defined, are visible through the posterior part of each window.

Immatures (Figures 54-55). Penultimate *Hypoblemum scutulatum* of both sexes have a pair of prominent, dark stripes on the dorsal opisthosoma and closely resemble adult females in colouration. Like adults, they have a small triangular tuft of white setae above the spinnerets. At this stage males can be identified by the enlarged bulbs of their pedipalps and the presence of 1-2 pairs of dark spots, separated at the rear of the dorsal opisthosomal stripes.

Courtship and mating (Figures 56-60). Like *H. griseum*, male and female *H. scutulatum* elevate their opisthosoma during their respective displays. However, unlike *H. griseum*, male and female *H. scutulatum* do not extend or display their legs III. The signalling or courtship display of male *H. scutulatum* includes distinctive intermittent and very fast up-and-down movement (~ 2.7 cycles/s, ~ 0.06 s/cycle) of the entire body in place, with or without elevation of the opisthosoma (Figures 56-57). This up-and-down movement may alternate with very rapid ($\sim 4^\circ$ amplitude, ~ 50 cycles/s) bobbing or vibration of the opisthosoma in the lower position. Females elevate their opisthosoma to a near-vertical position and wave this from side to side (amplitude $\sim 9^\circ$, ~ 3.6 cycles/s) in what appears to represent a rejection response (Figures 58-59), essentially the same behaviour as that seen in *Maratus* but without extension of legs III. As with *H. griseum* and *Maratus* species, the flexible female opisthosoma is rotated by 180° as pairs mate (Figure 60).



Figure 54. Penultimate male *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto.

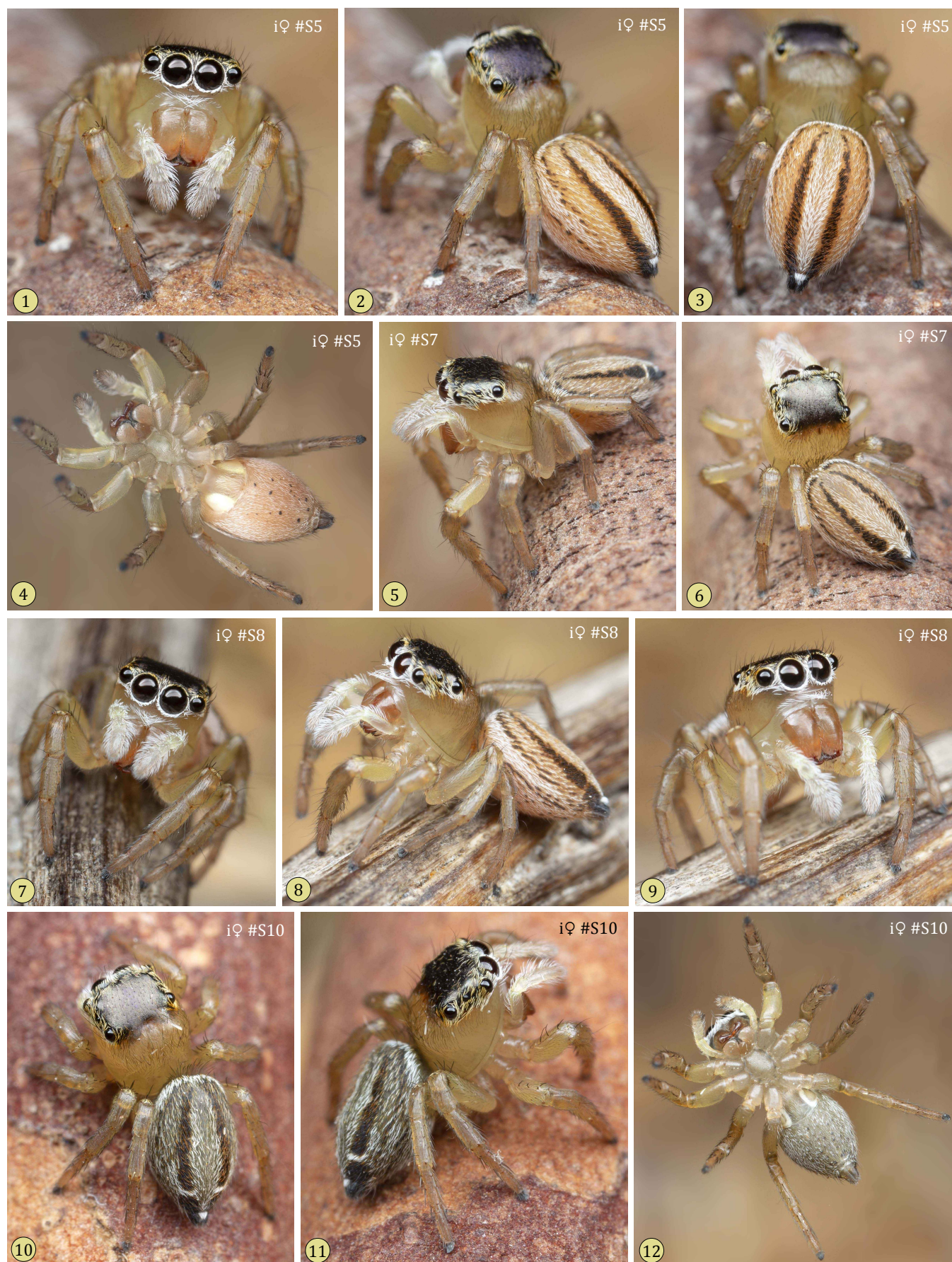


Figure 55. Penultimate female *Hypoblemum scutulatum* from St. Ives, New South Wales. Collected and photographed by Jürgen Otto.

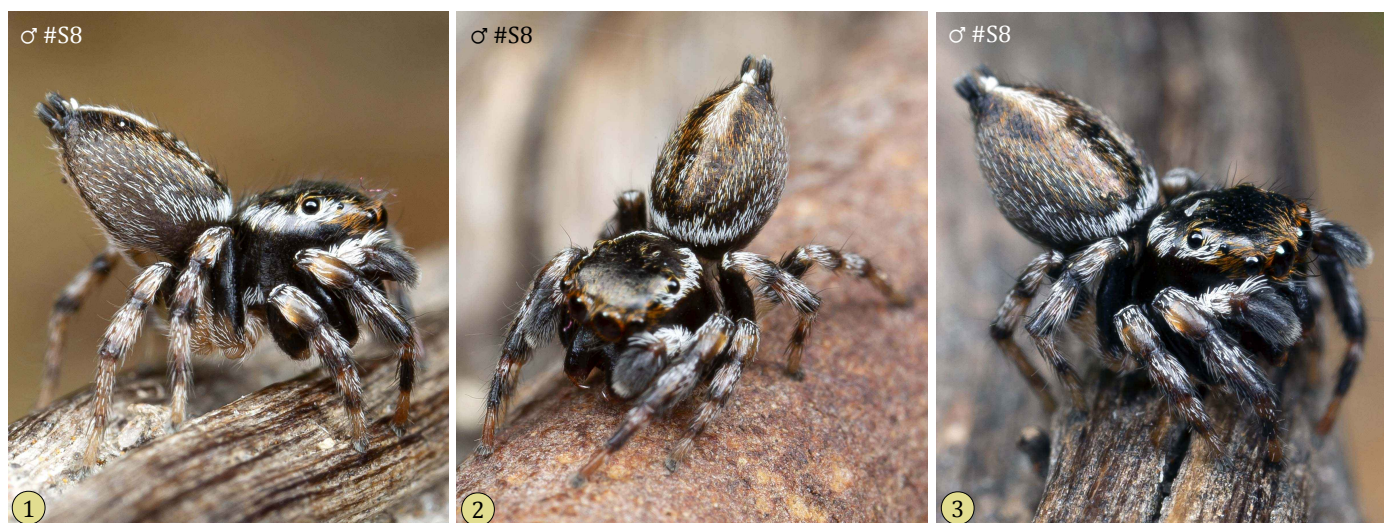


Figure 56. Male *H. scutulatum* from St. Ives, New South Wales displaying to females in the laboratory. Collected and photographed by Jürgen Otto.

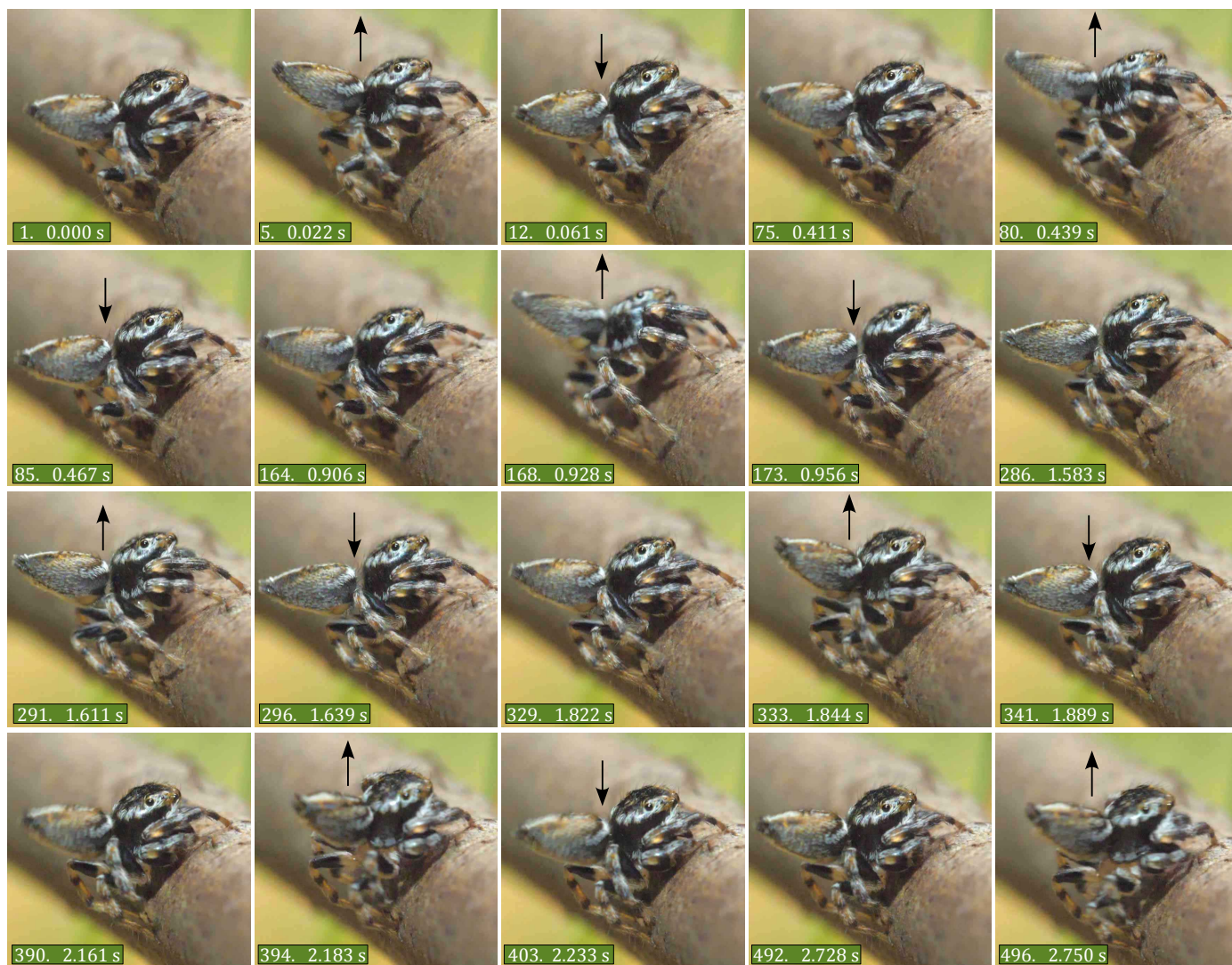


Figure 57. Selected frames (1-496) from 180fps video of male *H. scutulatum* displaying to a female in the laboratory. Collected and photographed by Jürgen Otto. Arrows indicate up rapid up and down movement of this spider (~ 0.06 s/cycle, ~ 2.7 cycles/s). In lower positions the opisthosoma was bobbed or moved rapidly up and down ($\sim 4^\circ$ amplitude, ~ 50 cycles/s). Video by Jürgen Otto.

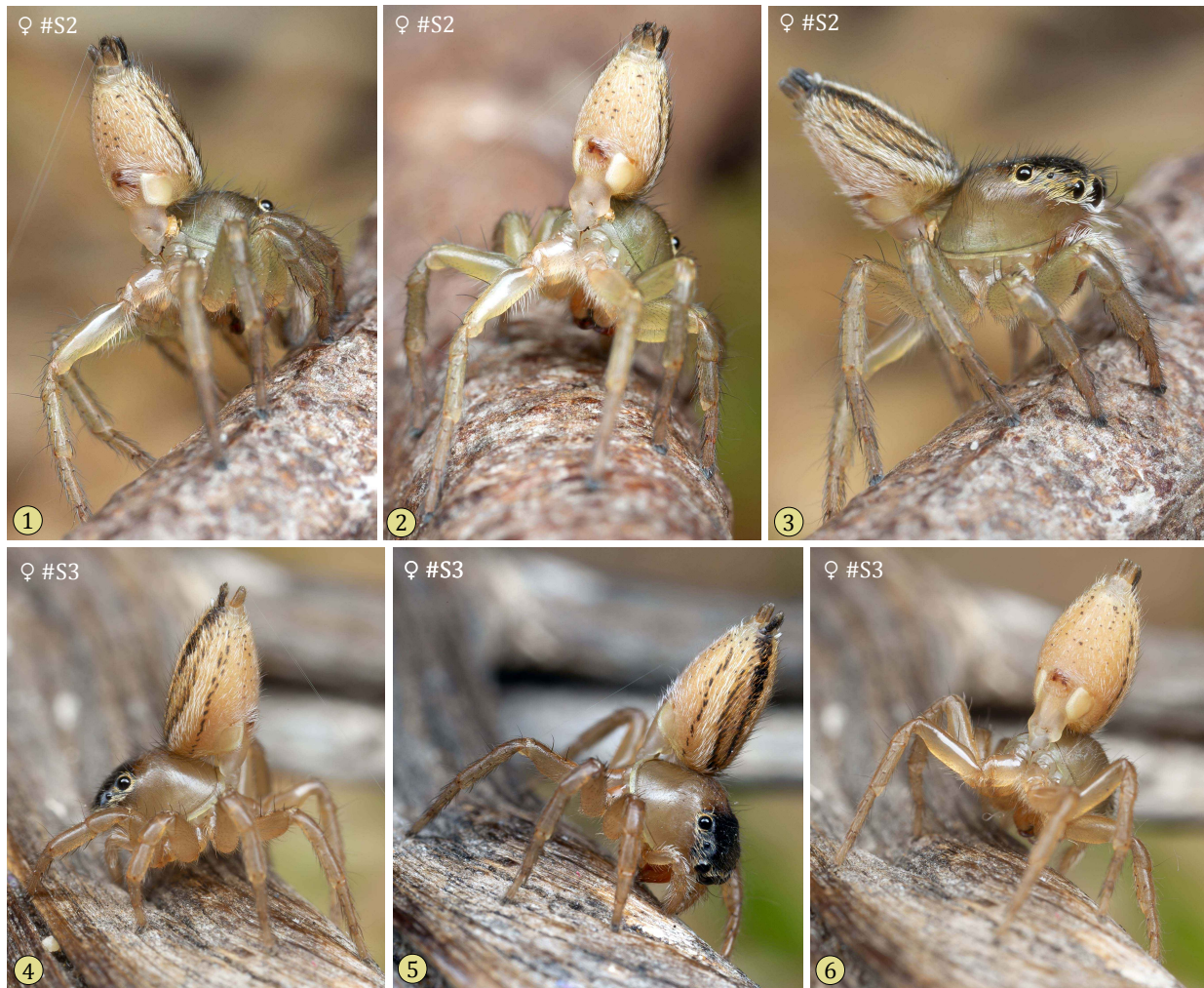


Figure 58. Female *H. scutulatum* from St. Ives, New South Wales displaying in the vicinity of males in the laboratory. Collected and photographed by Jürgen Otto.

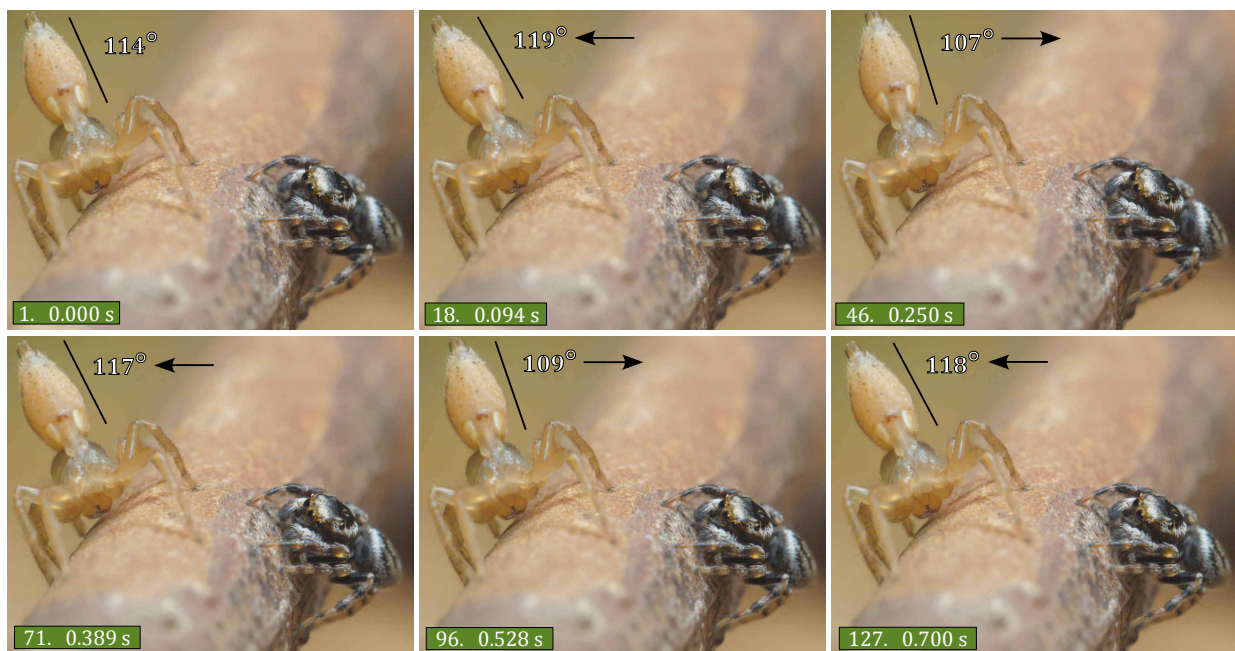


Figure 59. Selected frames (1-127) from 180fps video of a female *H. scutulatum* waving her elevated opisthosoma in front of a male in the laboratory (amplitude $\sim 9^\circ$, ~ 3.6 cycles/s). Video by Jürgen Otto.



Figure 60. *Hypoblemum scutulatum* from St. Ives, New South Wales mating in the laboratory. 4, Detail from inset in (3), showing expanded tegulum of the male and a mantispid larva coiled around the pedicel of the female. These larvae, common in this population, ride with females to their egg-sacs where they feed on the eggs (Hill 2011).

The *Maratus* group

We presently define the *Maratus* group (Figure 1) as a hypothetical clade that includes the genera *Hypoblemum*, *Maratus* and *Saratus* Otto & Hill 2017. Extreme flexibility of the pedicel and elevation of the opisthosoma by both males and females appear to be synapomorphic characters of this group, distinguishing these genera from the other members, including *Saitis* species, of a larger *Saitis* group. *Saitis barbipes* (Simon 1868), like most known members of the *Maratus* group, signals or displays with its long, extended legs III, but is not known to rear the opisthosoma as part of this display (Hill 2009; Wearing et al. 2014). There is little documentation of mating positions by *Saitis* species, but a posted photograph of mating *Saitis barbipes* (Biggi 2016) shows only the "normal" rotation of the female opisthosoma to one side that is seen in many salticid species.

It is curious to find one male *Hypoblemum* (*H. scutulatum*) with a reduced dorsal opisthosomal plate or scute, representing an important character of *Maratus*, while another *Hypoblemum* (*H. griseus*) lacks this plate altogether and uses its longer legs III in display. Yet this is the kind of variation that one might expect to find in a basal genus that appears to possess many of the ancestral *toolkit* capabilities of the larger group. A hypothetical ancestor for an even larger group of Australasian euophryines, including *Jotus* L. Koch 1881, may have evolved the ability to use either legs III or legs IV to power jumps, with legs III providing a greater vertical component (Otto & Hill 2012d, 2013, 2016; Hill 2018). Use of the long legs III in courtship display by males may not be a conservative character. We might consider females, with legs III and IV much closer in length, as more indicative of the optimal design of the respective species for survival. This idea is supported by the fact that immature males almost invariably closely resemble females. In this context the long and otherwise decorated legs III of many species in the larger *Saitis* group might be viewed more as secondary sexual characteristics and less as adaptations for improved locomotion.

Acknowledgments

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