

***Maratus personatus*, a masked peacock spider from Cape Riche, Western Australia (Araneae: Salticidae: Euophryinae)**

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Key words: courtship, euophryine, jumping spider, *Maratus*, peacock spider, salticid

Abstract: A new peacock spider, *Maratus personatus*, is described from Western Australia.

Nine new peacock spiders (*Maratus* Karsch 1878) have been described recently from areas near the southern coast of Western Australia: *M. caeruleus*, *M. karrie*, *M. melindae* and *M. sarahae* Waldock 2013; *M. madelineae* Waldock 2014; *M. avibus* Otto & Hill 2014a; *M. pardus* Otto & Hill 2014b; *M. maritimus* and *M. montanus* Otto & Hill 2014c. To this collection we add a distinctive new species that has been found at a single locality at Cape Riche, east of Albany.

***Maratus personatus*, new species**

Type specimens. One holotype male (♂ #10), eight paratype males (♂ #1-6, 11-12), and eight paratype females (♀ #4-6, 8-12) will be deposited in the Western Australian Museum. Three additional males (♂ #7-9) and four additional females (♀ #1-3, 7) were examined but not preserved. ♂ #1-9 and ♀ #1-6 were collected at Cape Riche (S 34°36', E 118°45', 18 OCT 2013, coll. J. Otto); ♂ #10-13 and ♀ #7-12 were the offspring of the aforementioned field-collected females, reared to adulthood.

Etymology. The species group name (*personatus*, Latin, m., adj., English translation *masked*) refers to the presence of a prominent mask of deep blue scales covering the face of adult males of this species.

Diagnosis. With their mask of bright blue scales, male *M. personatus* cannot be confused with any other *Maratus*. Unlike most (but not all) *Maratus*, *M. personatus* males do not rear or display their dorsal opisthosoma during courtship. However, the structure of the male pedipalp and the female epigynum, as well as the presence of a dorsal opisthosomal plate, support the generic placement of this species.

Description of male (Figures 1-7). Males (n=8) ranged from 3.84 to 4.59 mm in length.

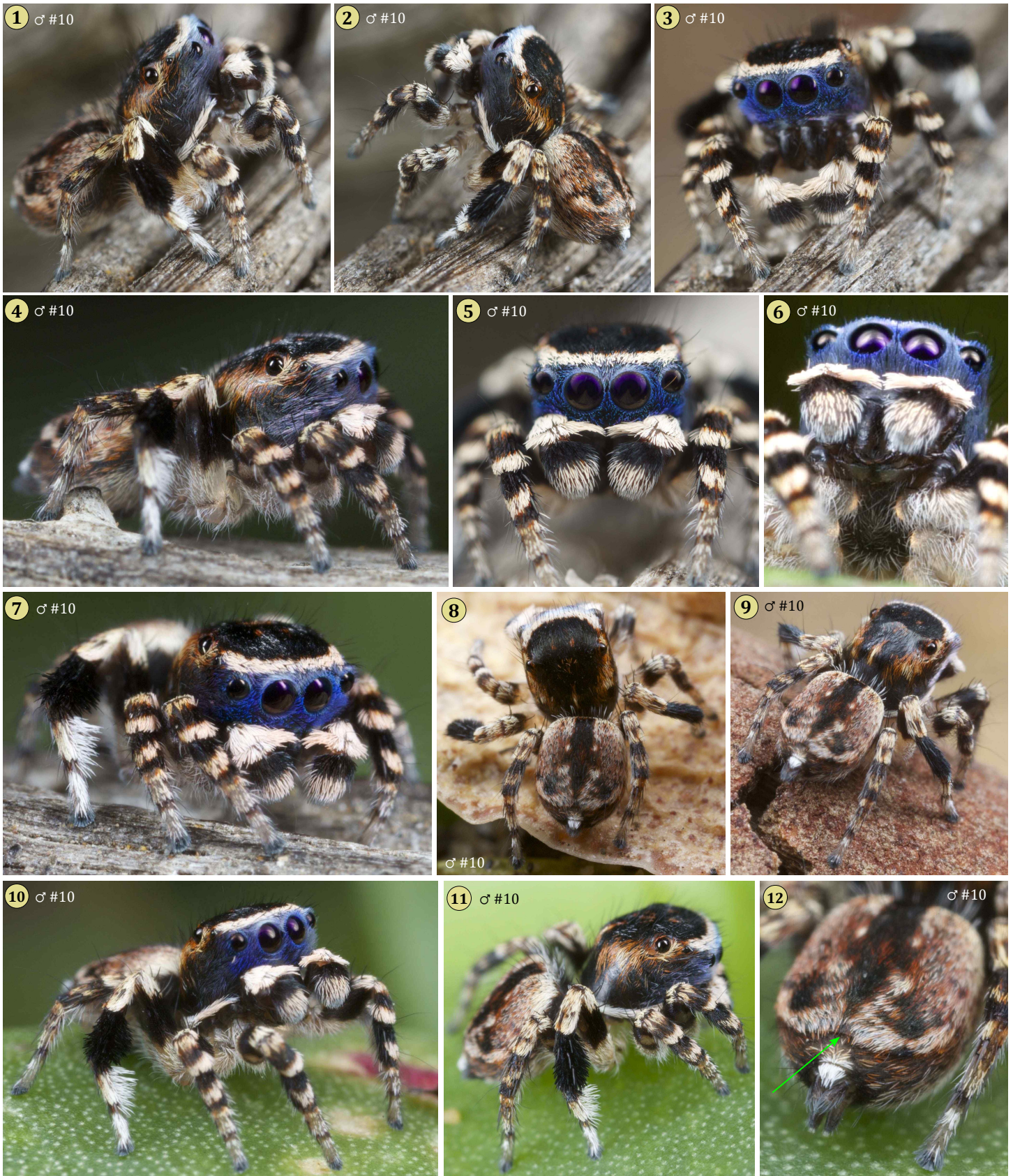


Figure 1. Views of the living adult male holotype for *Maratus personatus*. **5**, From the front, deep blue scales surround the blue anterior eyes, offset by white setae of the eye region, above, and the pedipalps, below. **12**, Like other *Maratus*, *M. personatus* has a dorsal opisthosomal plate with a distinct edge (arrow), as well as a triangular tuft of white colular setae.

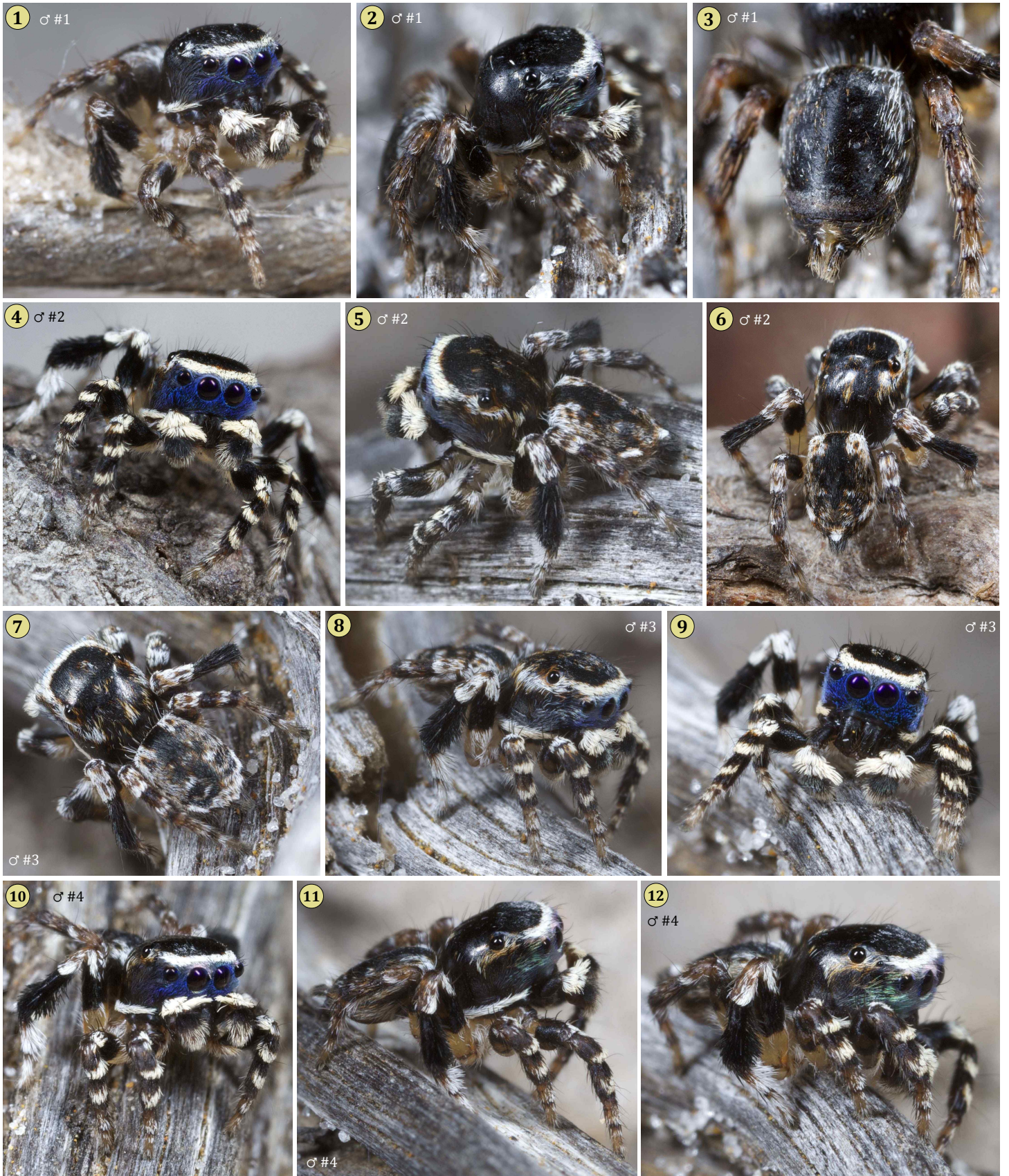


Figure 2. Four different living adult male *M. personatus*. **3**, The scales of this male have rubbed off, exposing the black cuticle of the dorsal opisthosomal plate. **9**, The small chelicerae are black and glabrous, separated on either side from a marginal band of white setae.



Figure 3. Four different living adult male *M. personatus*.



Figure 4. Three different living adult male *M. personatus*.



Figure 5. Two views of the underside of a living adult male *Maratus personatus*. Coxae and trochanters of legs I and II are dark brown; those of legs III and IV are light brown or translucent.

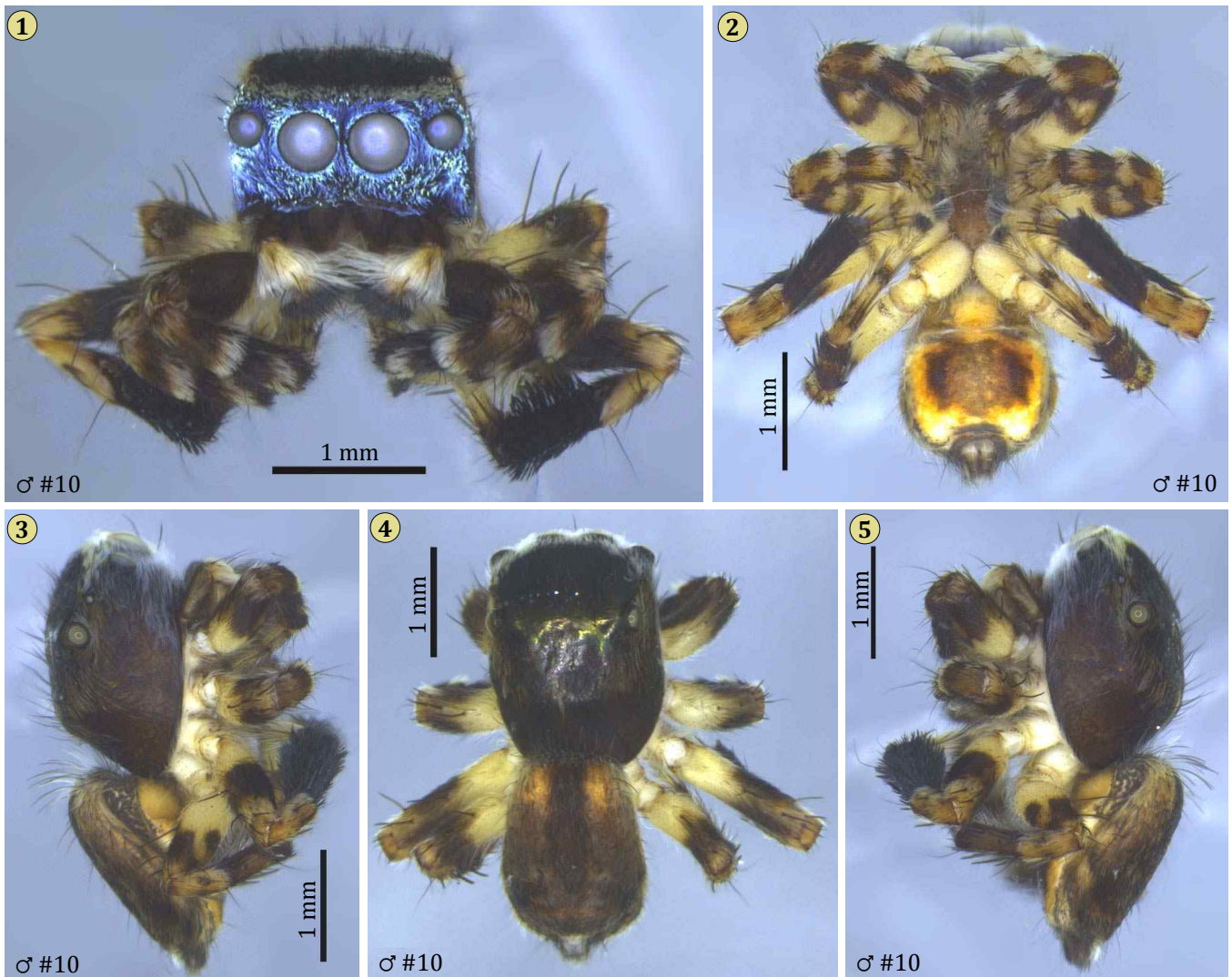


Figure 6. Views of the adult male holotype *M. personatus* in ethanol. **1**, The eyes and facial scales of this specimen retained their blue colouration, suggesting that their colours are structural.

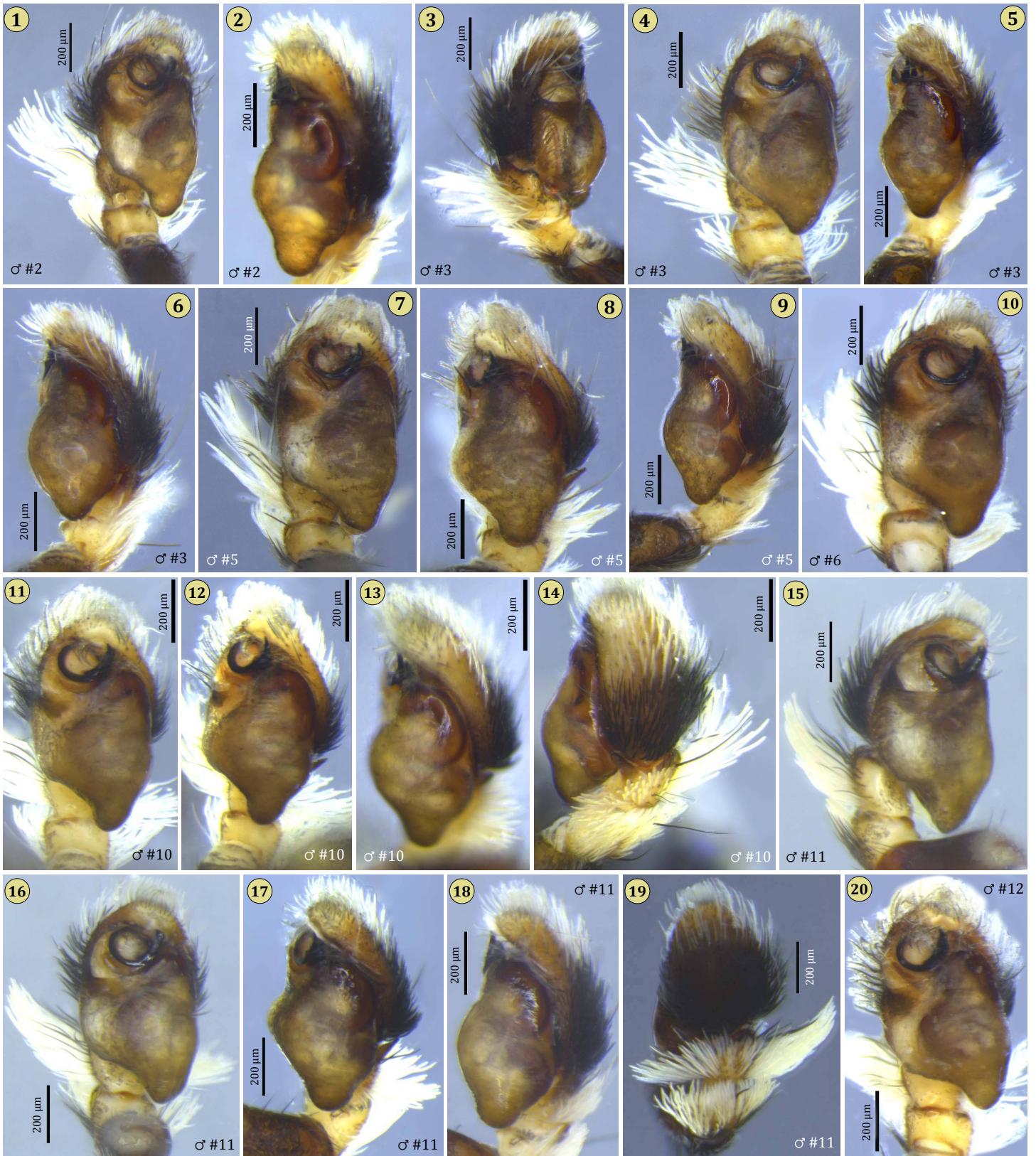


Figure 7. Medial to lateral view of the left pedipalp of six different male *Maratus personatus*. Separation of the inner and outer apex of the embolus can be seen in lateral views (distinctly in 5, less distinctly in 2, 6, 9, 13 and 18). General features, including the shape and relative size of the embolus, the presence of medial tegular sclerotization proximal to the embolus, the pedipalp of the male *M. personatus* is much like those of other *Maratus*.

The carapace is black in life, fading to dark brown in ethanol. The clypeus is black and glabrous, lacking the longer setae found in most *Maratus*. The chelicerae are also black and glabrous. The width across both chelicerae is less than 1/2 the width of the carapace. All four anterior eyes are deep blue in reflected light, each bordered with deep blue scales that match the scale cover of the entire face in colouration. The ALE are approximately 3/5 the diameter of the AME, separated from the AME on either side by about 1/3 of the diameter of an AME. The dorsal carapace including the eye region is covered with scales or setae, but appears dark and reflective, with a band of bright white scales anteriorly, and mixed white to orange-brown scales on the sides forming a band that extends to the rear along the top of the carapace, below the lateral eyes. A narrow, indistinct medial thoracic tract of white to orange-brown scales extends to the rear behind the eye region. There is a prominent white marginal band on either side, separated by a glabrous black area from the chelicerae on either side. The PME are distinctly closer to the PLE than to the ALE.

A dorsal plate of the opisthosoma is present and can be identified by the presence of a distinct margin (Figure 1:12), but this has no lateral flaps and it is neither elevated nor expanded during courtship display. Typically this plate is covered with a distinct but variable pattern of white to tan or brown scales, surrounding a dark figure (Figures 1:8, 2:7, 3:5, 4:1), but in older individuals white scales may have rubbed off rendering the opisthosomal plate mostly black (Figure 2:3). A white triangle comprised of bright white scales is usually associated with the colulus just above the brown to grey spinnerets. The ventral opisthosoma is mostly glabrous and brown, bordered by tracts of white setae to the front and rear, and on the sides (Figure 5). The coxae and trochanters of legs III and IV are light-brown or translucent, as are the proximal femora of all legs. Coxae and trochanters of legs I and II, the sternum, the labium, and the endites are all dark brown and glabrous.

Legs I and II are about the same length, much shorter than legs III and IV. Legs III are the longest. Legs I and II are strongly banded, particularly from the front, with dark bands alternating with bands of long white setae. The most prominent white bands are associated with the femuro-patellar joint, the patellar-tibial joint, and mid-way along the length of each tibia, where the band is somewhat diagonal (not transverse) with respect to the axis of the leg. From their proximal to distal end legs III are decorated with long white setae on the front of each otherwise brown or translucent proximal femur, followed by a longer black middle section of the femur, a light brown or translucent distal end of the femur and patella bearing long white setae, a black tibia fringed with long black setae, a brown or translucent metatarsus fringed with long white setae, barely separated distally from the tarsus by a black ring, and a brown or translucent tarsus bearing long white setae.

As viewed from below (Figure 7), the structure of the pedipalp is much like that of other *Maratus* species, with an inner and outer apex of the embolus, and sclerotization of the medial tegulum proximal to the embolus. The dorsal pedipalp (Figures 4:4, 7:19) is, however, distinctive with long white fringes proximal to the cymbium, shorter black setae on the cymbium, and grey setae distally. When the pedipalps are held together in front of the chelicerae (Figure 1:5), these fringes form a single white line that contrasts with the deep blue colour of the face.

Description of female (Figures 8-14). Females (n=6) ranged from 4.87 to 5.85 mm in length. They closely resemble females of other *Maratus* with respect to shape and colouration. Chelicerae are brown, translucent and glabrous. The clypeus is brown and translucent, with long white setae directed anteromedially above the chelicerae. Ivory to light-brown scales surround the eyes in front and on the sides of the eye region, in irregular tracts extending to the rear on either side behind the PLE. The medio-dorsal carapace is mostly black to dark brown and glabrous, but a median thoracic tract of ivory to light brown scales may be present. The sides of the carapace are mostly brown and translucent, and there is no marginal band. The PME are slightly closer to the PLE than to the ALE.



Figure 8. Views of three different living female *Maratus personatus*. From above, these are mostly dark brown to black, with tracts of off-white or ivory scales on the sides of the carapace and opisthosoma. Two or more pairs of spots (scale patches) may be seen on the dorsal opisthosoma.

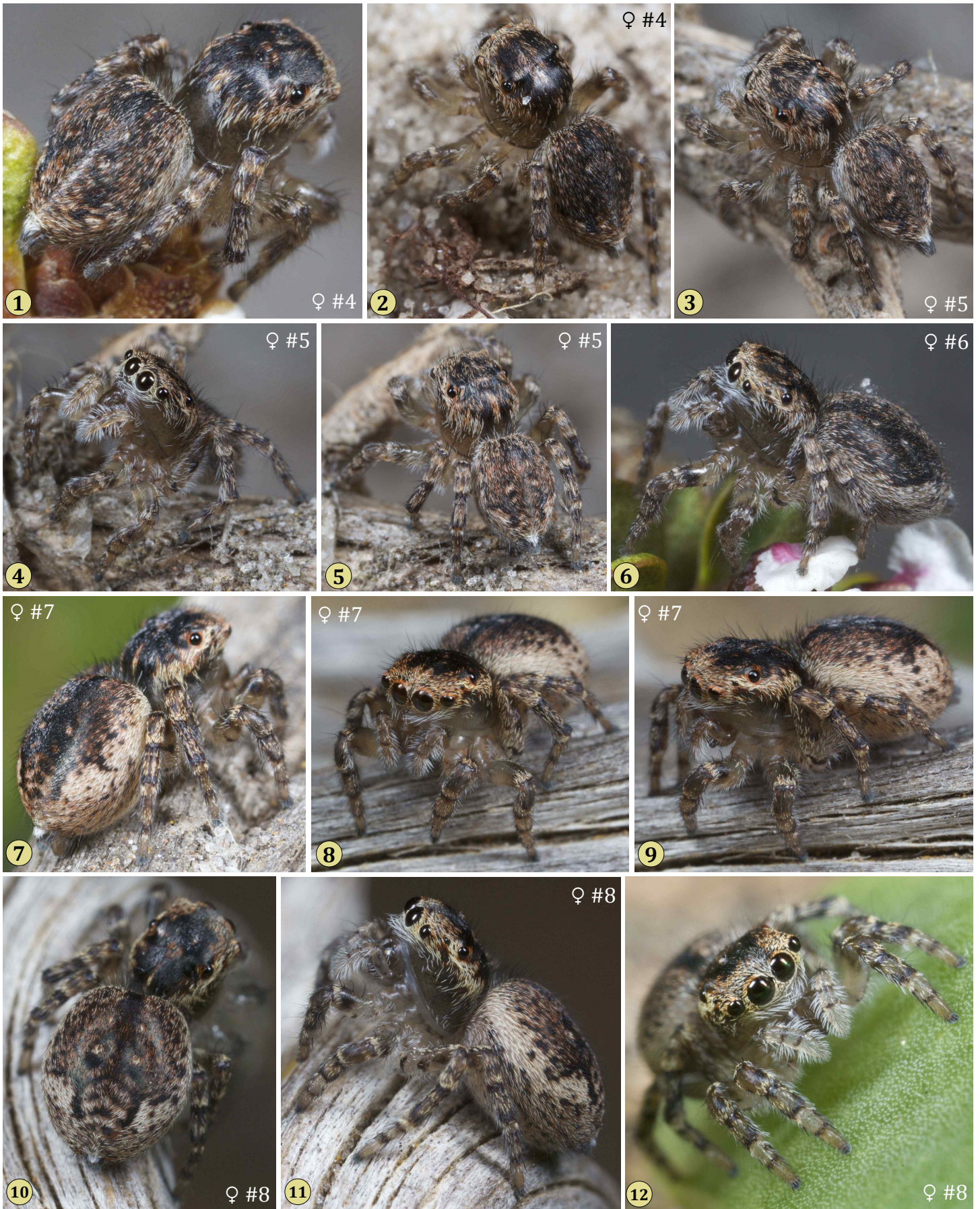


Figure 9. Views of five different living female *Maratus personatus*.



Figure 10. Views of three different living female *Maratus personatus*. 5, In some individuals four distinct chevrons at the rear of the dorsal opisthosoma can be seen. In other individuals these are indistinct.



Figure 11. Underside of two different living female *Maratus personatus*.



Figure 12. Two different female *Maratus personatus* in ethanol. Colours vary according to the state of preservation.

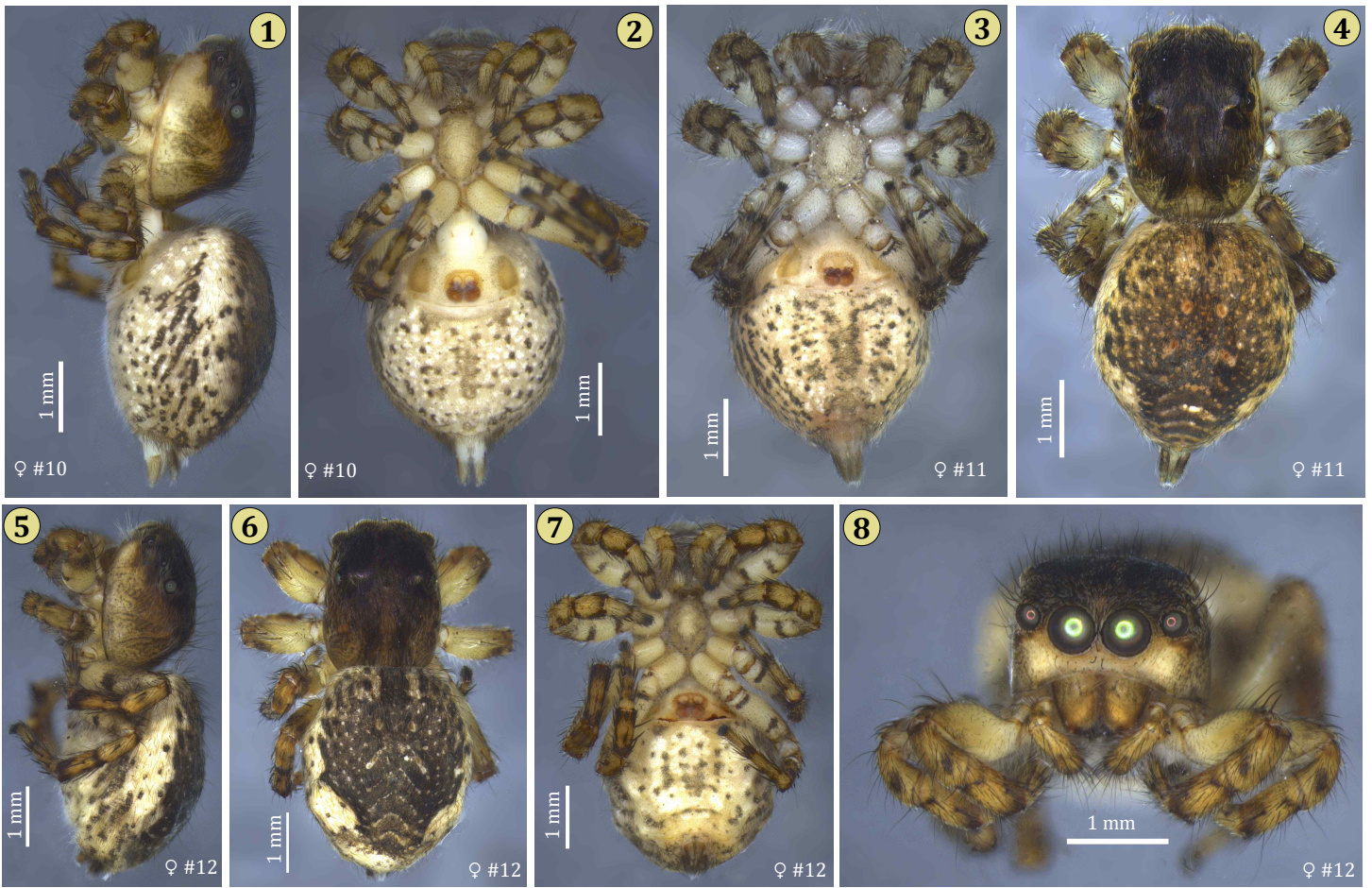


Figure 13. Three different female *Maratus personatus* in ethanol.

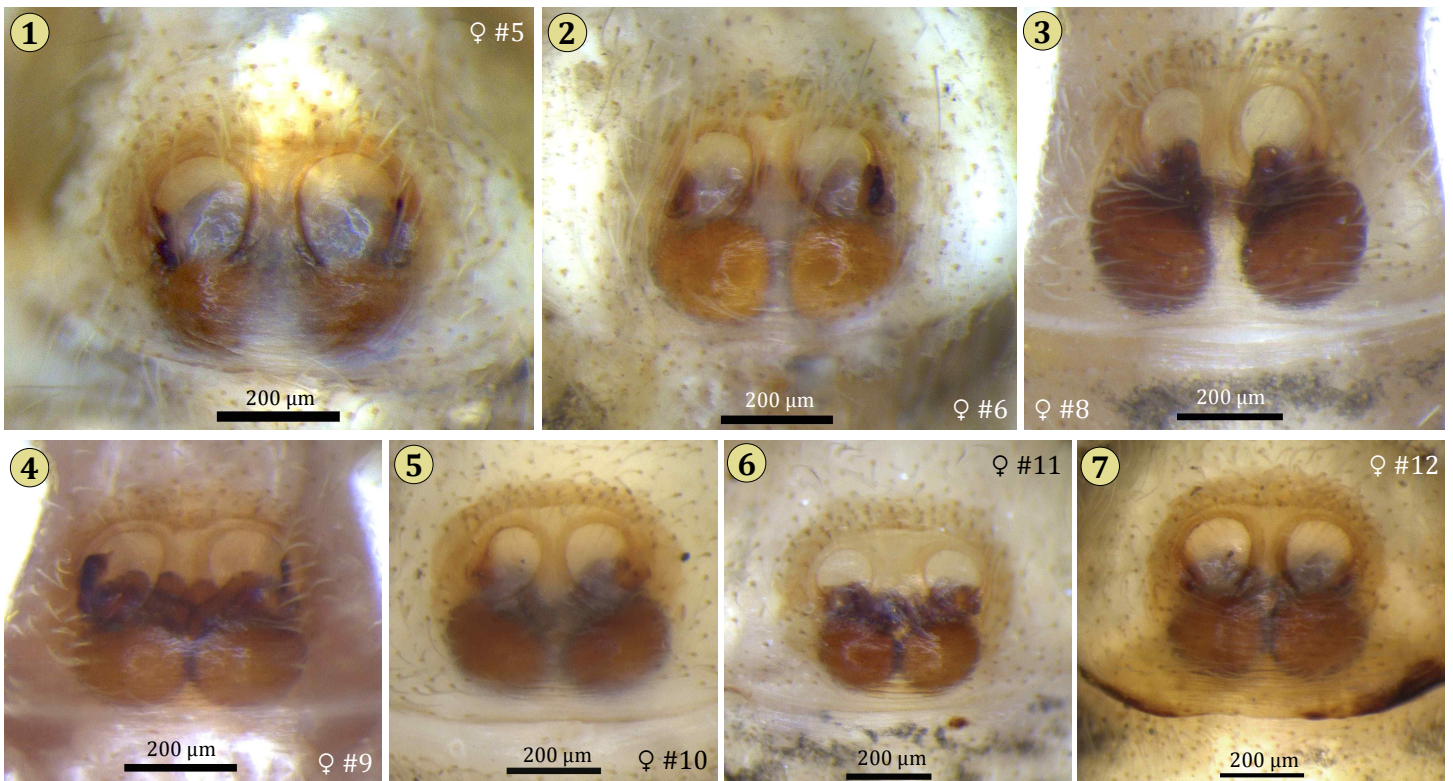


Figure 14. Ventral view of epigynum of seven different female *Maratus personatus* in ethanol.

The dorsal opisthosoma varies from dark brown and glabrous in older individuals that have lost scales (Figure 10:6) to dark brown covered with a pattern of off-white to brown scales (Figure 10:5). For individuals with a distinct pattern, there are two pairs of distinct ivory spots (scale patches) anteriorly, and four chevrons of brown scales toward the rear. Margins of the opisthosoma are light brown, covered with off-white or ivory setae. The venter (Figure 11) is light brown or tan, with a covering of white to ivory setae and scattered brown spots, and a central figure consisting of two brown lines comprised of coalesced spots, converging toward the rear.

The coxae, sternum, labium, and endites are mostly glabrous, translucent, and almost colourless. Scattered, longer white setae radiate out along the margins of the sternum. All of these translucent structures appear as solid white or light yellow in ethanol. Legs I and II are shorter than legs III and IV and nearly equal in length, and leg III is the longest. The legs are distinctly banded, with dark pigmentation at the distal end of each segment, but otherwise they are light brown and translucent. The pedipalp is of similar colour.

The epigynum (Figure 14) is similar in general form to that of other *Maratus*, with prominent fossae and a pair of large posterior spermathecae. Although females collected with the distinctive males of this species varied little with respect to their general appearance and the placement of scale tracts (*e.g.*, the paired spots and chevrons on the opisthosoma), they varied greatly with respect to the detailed structure of the epigynum. We have not observed this extent of variation in a *Maratus* species before, and it challenges the widely-held assumption (however see Crews 2009 for counterexamples) that fine distinctions in the structure of the epigynum can be used for taxonomic purposes. Variations included separate versus contiguous spermathecae, fossae larger or much smaller than the spermathecae, narrow versus wide septum between the fossae, degree of sclerotization of the fossae, and both complexity and placement of the sclerotized ducts visible beneath the fossae. Yet both the association with and willingness to mate with males of this species in the field, the rearing of male offspring from several of these females, and the agreement of the form and appearance of developing males and females with adult females (Figures 17-19) confirm that they are indeed the same species.

Immatures. A number of different conventions have been used to label the developmental stages of spiders, some of which identify one or more post-eclosion stages as prelarvae or larvae (Pfannenstiel 2008, Mittmann & Wolff 2012). Here we follow the convention of labeling the post-eclosion, pre-first moult stage as the first instar, the post-first moult stage as second instar, and so on. At the time that a salticid emerges from the egg it is soft and undeveloped with a gut filled with yolk (Figure 15:1-3). These first instars develop quickly within the egg sac (nest) with growth of the appendages and internal structures of the eyes, including the pigmented retinae is evident (Figure 15:4-9). First instars have a pair of claws at the end of each leg and limited mobility, but appear to be blind and do not feed.

After their first moult, the second instars have a working set of eyes and a pattern of setation that suggests that of the adult female (Figure 16). As they continue to develop to the penultimate or 6th instar, both males (Figures 17-18) and females (Figure 19) look more and more like adult females. The enlarged pedipalps of the 6th instar males (Figures 17:12, 18:4, 12) distinguish these from females. In both sexes the 7th instar is the adult stage.

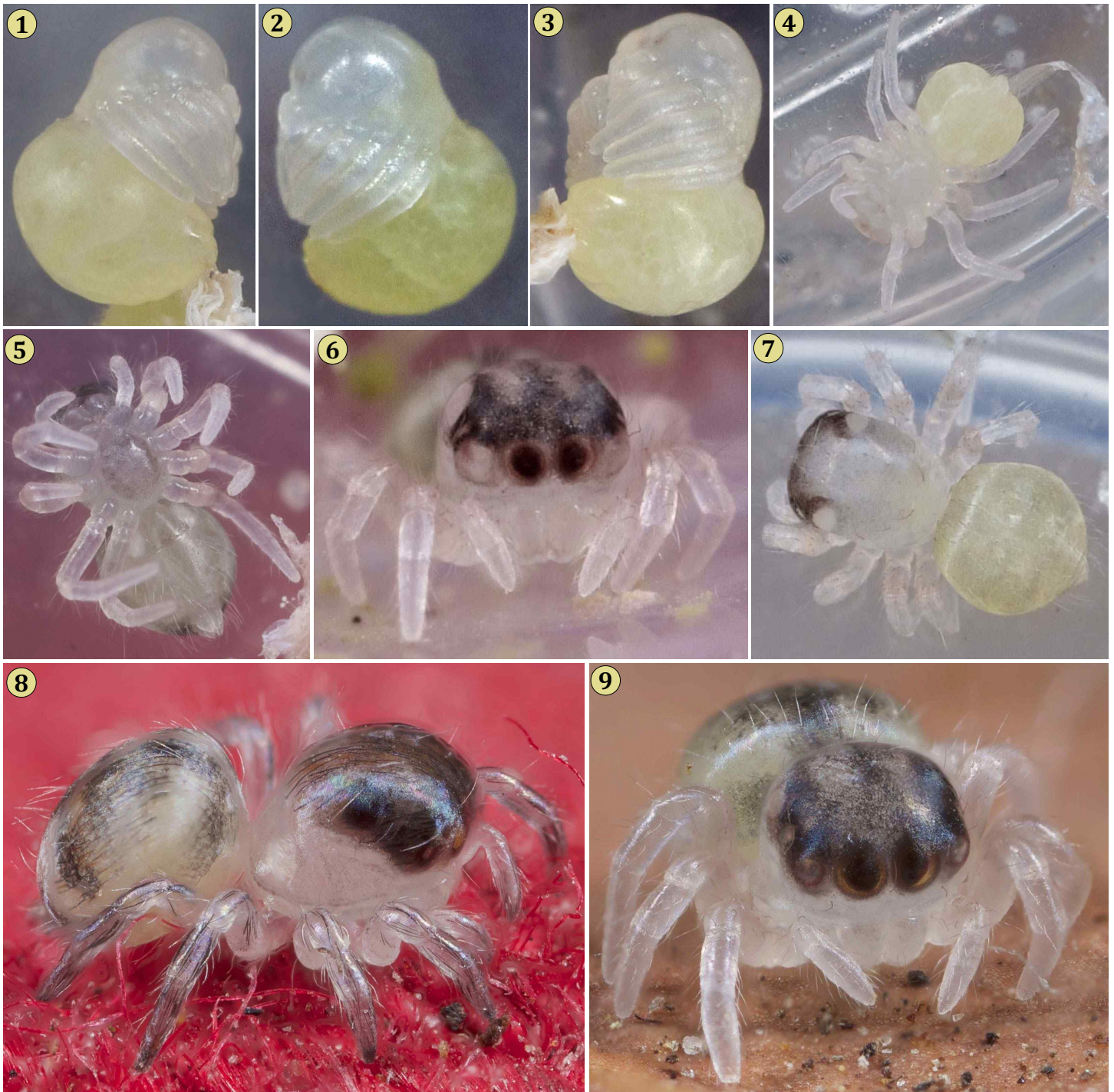


Figure 15. Development of first instar *Maratus personatus*. When these first emerge from the egg (1-3), they are little more than naked embryos, with short legs and unpigmented eyes that continue to grow and develop prior to the first moult. Some authors call these *prelarvae*. As these grow, pigment of the retinae, dorsal carapace, and opisthosoma appears, and the legs develop to the point that the spiderlings can move about in the egg sac. Although development is continuous during most of the first instar, the more developed pre-first moult spiderlings are sometimes called *larvae*.

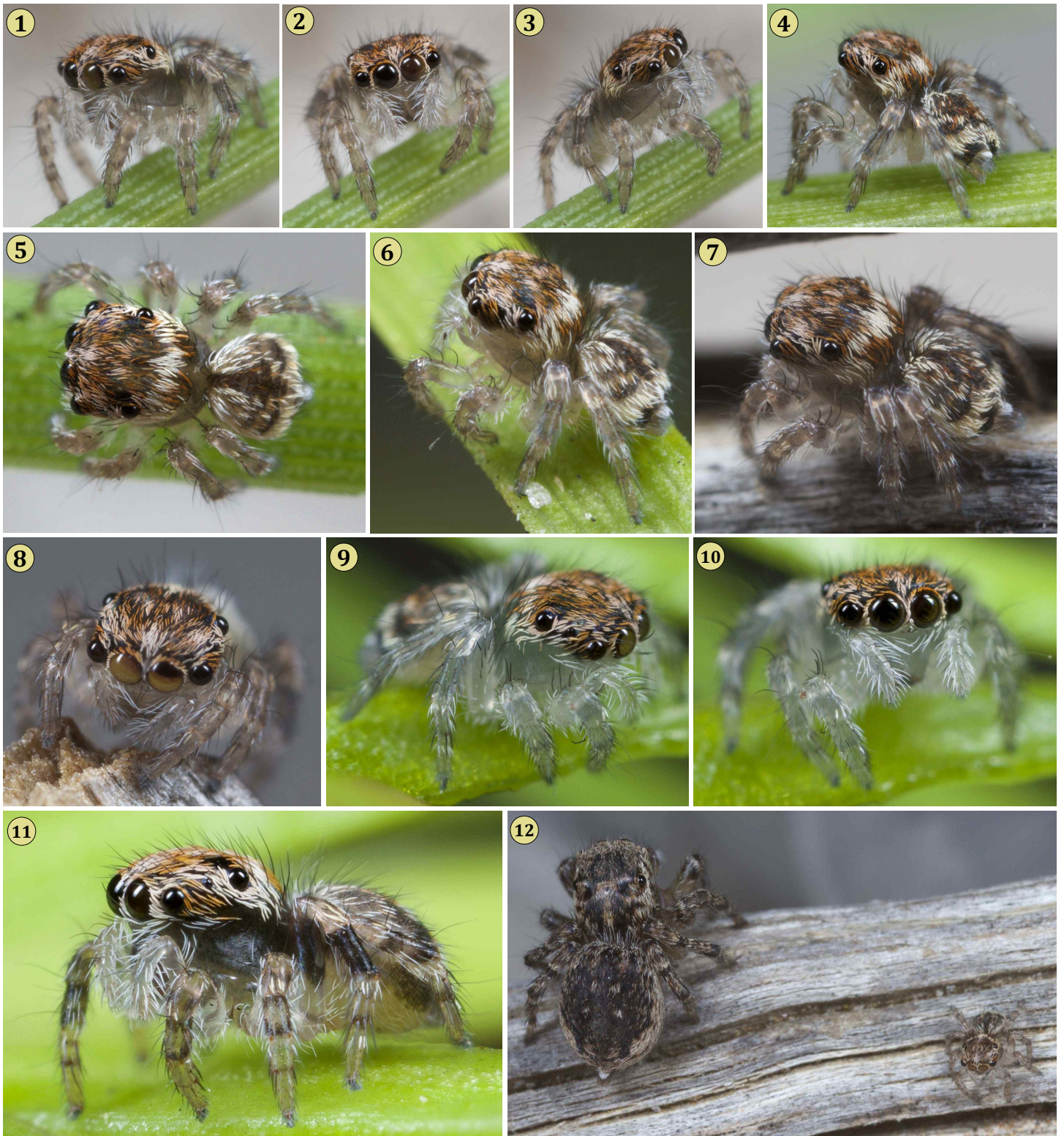


Figure 16. Second instar *Maratus personatus*. After their first moult, these spiderlings emerge from the egg-sac (nest) with well-developed eyes and footpads, and a covering of setae that suggests the appearance of an adult female. **12**, The adult female (left) is about 4 times the length of a second instar (~1.6 mm).



Figure 17. Developmental stages of the holotype male *Maratus personatus*. **12**, The penultimate male (6th instar) is readily identified by its expanded pedipalps, but still has white clypeal setae like those of the female. The carapace of the 3rd instar is about 1 mm wide.



Figure 18. Developmental stages of two different male *Maratus personatus*.



Figure 19. Developmental stages of four different female *Maratus personatus*. Note the light (6) and dark (17) colour variation of penultimates (6th instar).

Courtship display by males (Figures 20-26; see Otto 2015 for an online video of this display). As they display to females, males raise and wave their legs III, either unilaterally or bilaterally, but they do not raise or display their opisthosoma. Usually a male lifts and waves only the leading leg III (rate ~10-15/s) when stepping from side to side in front of a female (Figures 22-25). Side-stepping is also accompanied by movement of the pedipalps up and down. When a male holds his position during display, both legs III are extended and waved in a lateral plane, with the axis of each leg oriented in a variable direction, ranging from near horizontal (Figure 21:10) to vertical (Figure 20:3). As it is waved, each leg may be 'flopped' at the femuro-patellar joint (Figure 21:5-6). The pedipalps may be held in a stationary position to expose the black chelicerae during this bilateral display (Figure 26).

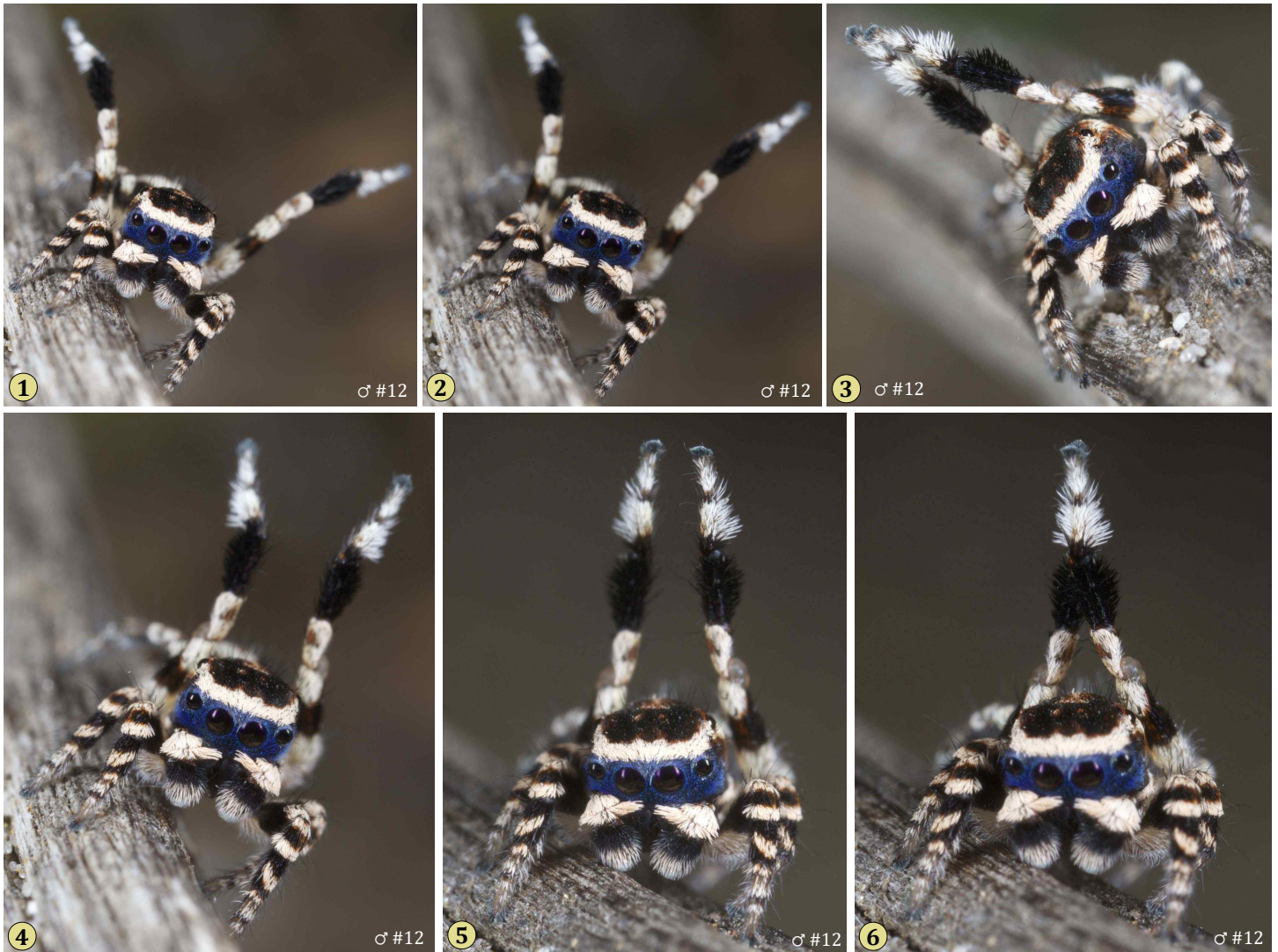


Figure 20. Bilateral display positions by a male *Maratus personatus*. As the extended and elevated legs III are waved in a transverse plane, the distal segments (beyond the femur) are often 'flopped' relative to the axis of the leg, as shown here (1, 2). Legs III may also be waved in a near vertical position (4, 5), and brought together above the spider (3, 6). Bilaterally symmetric displays like these are usually seen when the male is in a stationary position facing the female, and not stepping from side to side.



Figure 21. Bilateral (1-3, 5-12) and unilateral (4, 13-14) display positions by six different male *Maratus personatus*. When stepping from side to side (13-14), males raise and wave the leading leg III. Bilateral display may be brief, when the male is not stepping to one side or the other.



Figure 22. Sequential (1-24) video frames (25FPS, exposure 20 msec/frame) showing a male *Maratus personatus* stepping to the left and waving the leading leg LIII while facing a female. To enhance comparison of position, sequential frames are arranged in columns (as in Figures 23-25). **11-13**, During a brief (~0.1 s) pause in lateral movement, one wave cycle was completed, accompanied by up and down movement of the pedipalps.

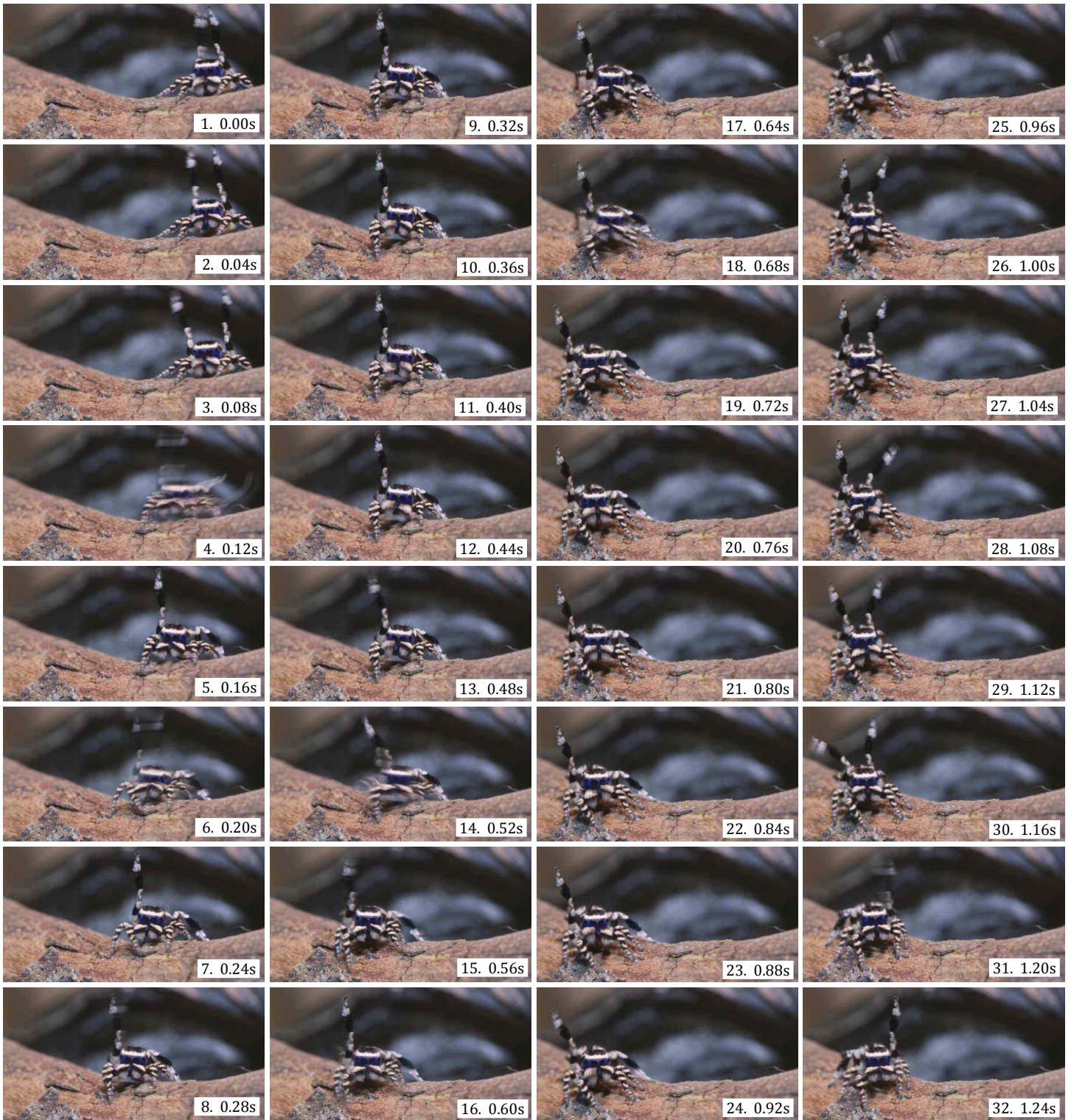


Figure 23. Sequential (1-32) video frames (25FPS, exposure 20 msec/frame) showing a male *Maratus personatus* stepping to either side and waving the leading leg LIII while facing a female. **1-3**, Bilateral display from a fixed position in front of the female. **4-24**, Unilateral display of the leading right leg III while stepping to the right. **25-30**, Bilateral display in position. **31-32**, Unilateral display of the leading left leg III while stepping to the left.

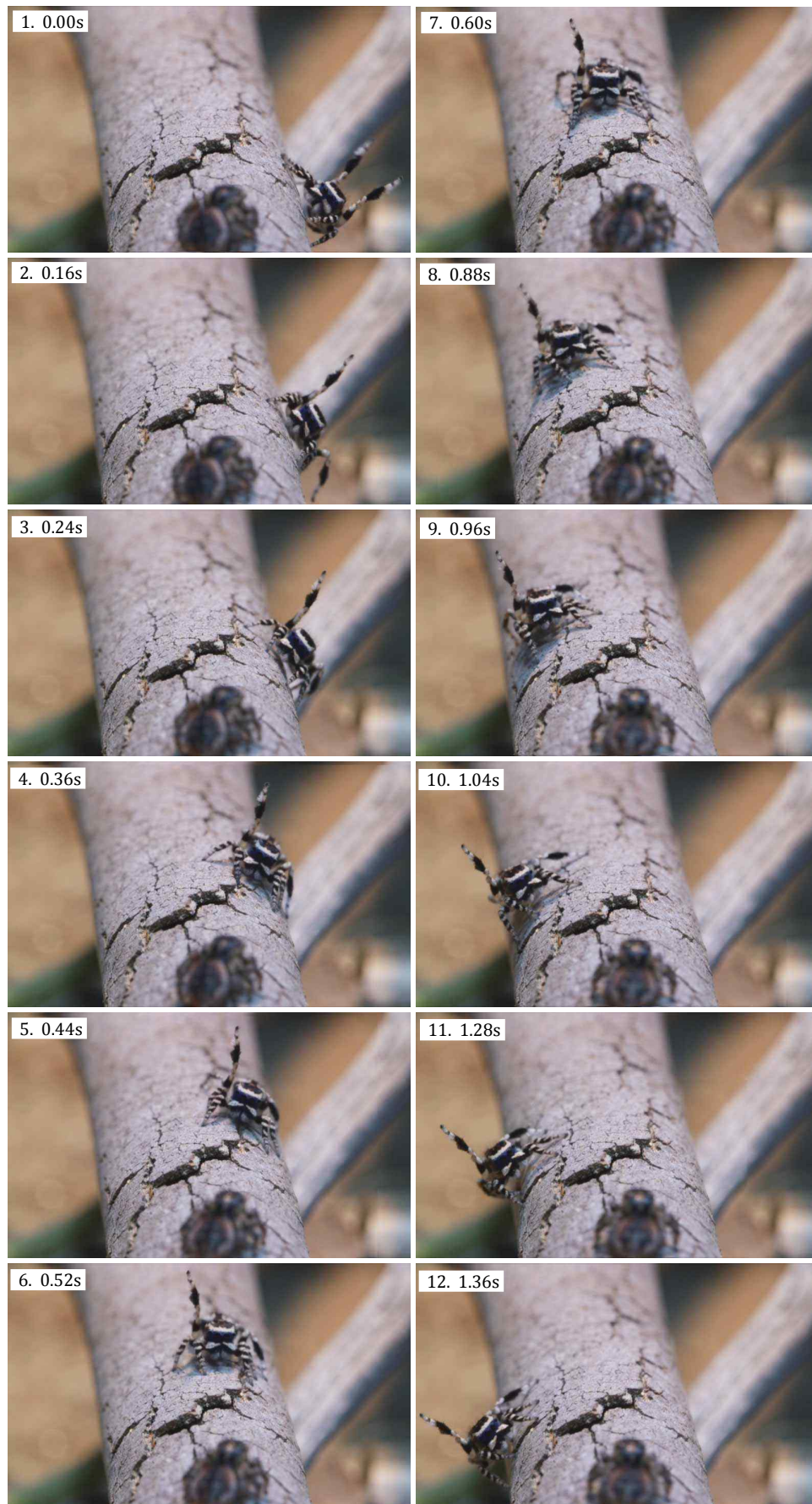


Figure 24. Sequential (1-12) but non-consecutive video frames showing a male *M. personatus* displaying to a female (foreground) while stepping to the right.



Figure 25. Sequential (1-12) but non-consecutive video frames showing a male *M. personatus* displaying to a female (foreground) while stepping to the left.

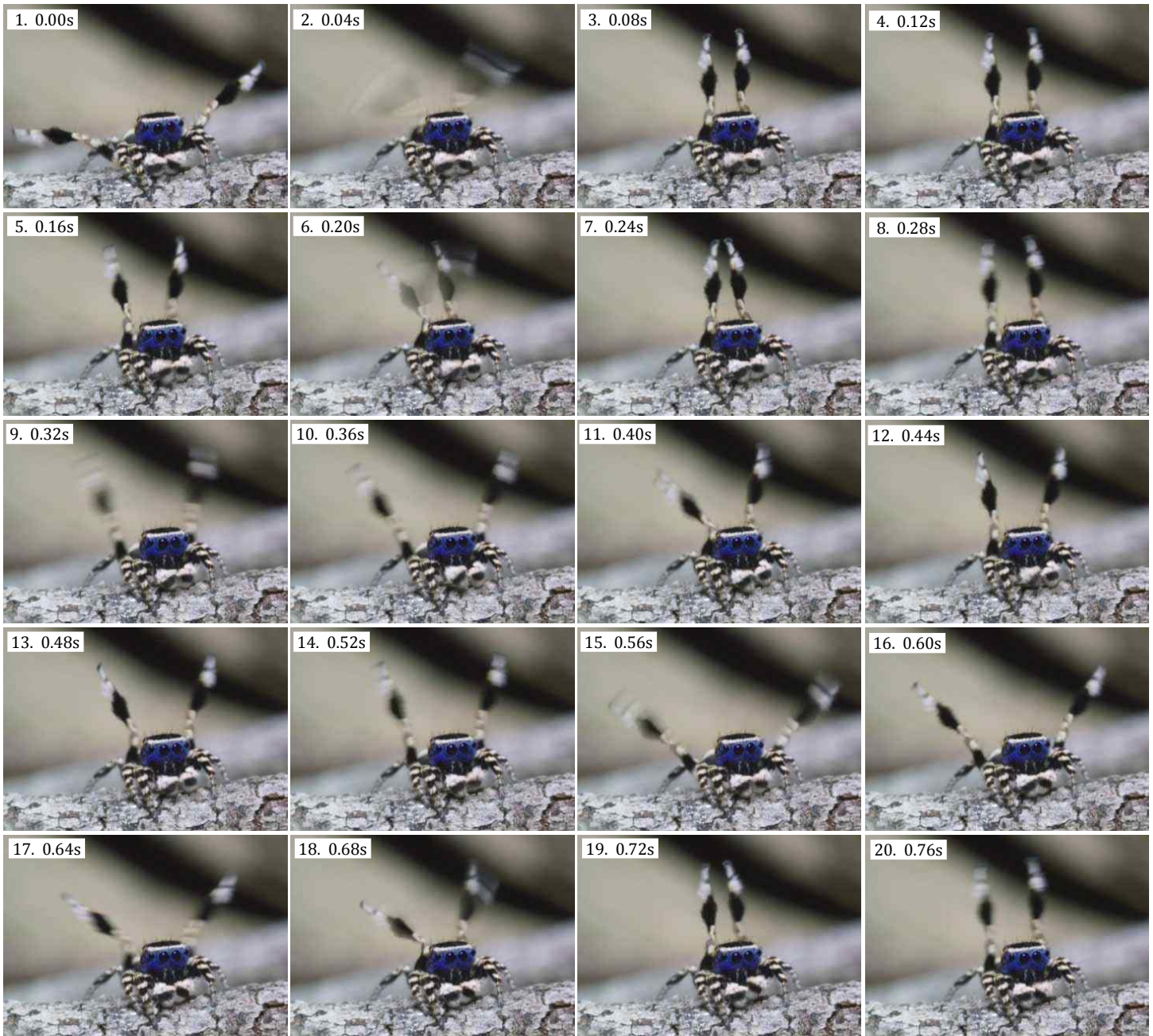


Figure 26. Sequential (1-68, continued on next two pages) video frames (25FPS, exposure 20 msec/frame) showing a male *Maratus personatus* displaying to a female from one position. Here consecutive frames are arranged in rows. **2**, Movement of legs III from a horizontal to a vertical orientation was recorded here in a single frame (estimated duration 20-40 msec). Note the constant movement of legs III from frame to frame, including 'floppy' flexion at the femuro-patellar joint (11, 18). During pauses between rapid leg movement, legs III were generally in one of three positions: near-horizontal, near-vertical, and intermediate (V-shaped position). There was little visible movement of the pedipalps during this sequence, as the pedipalps were held in a lower position to expose the black, glabrous clypeus and chelicerae.

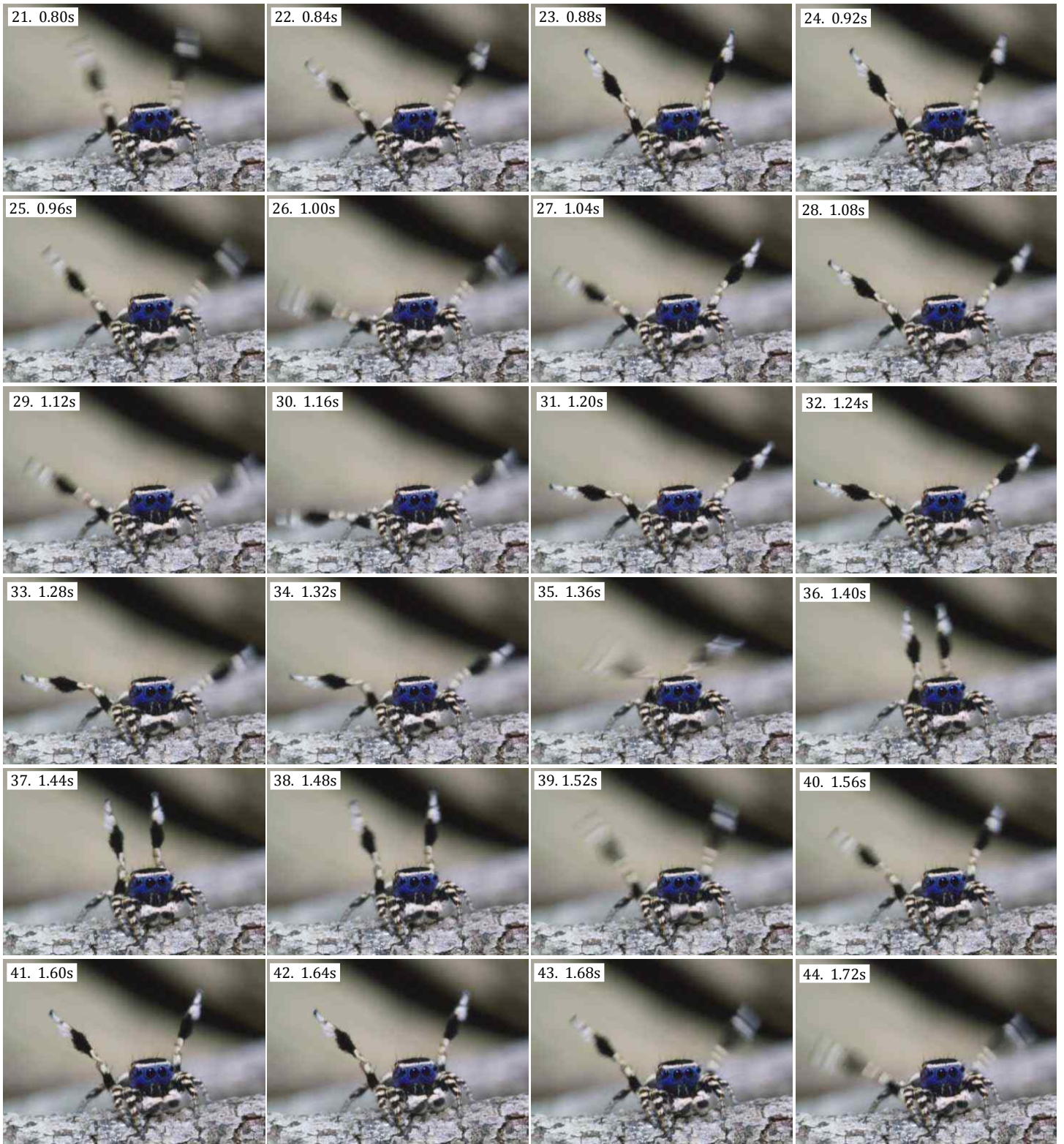


Figure 26 (continued). Brief intervals of no movement (*e.g.*, 41-42) alternated with very rapid movement or vibration of the extended legs (*e.g.*, 35, 39, and 44).

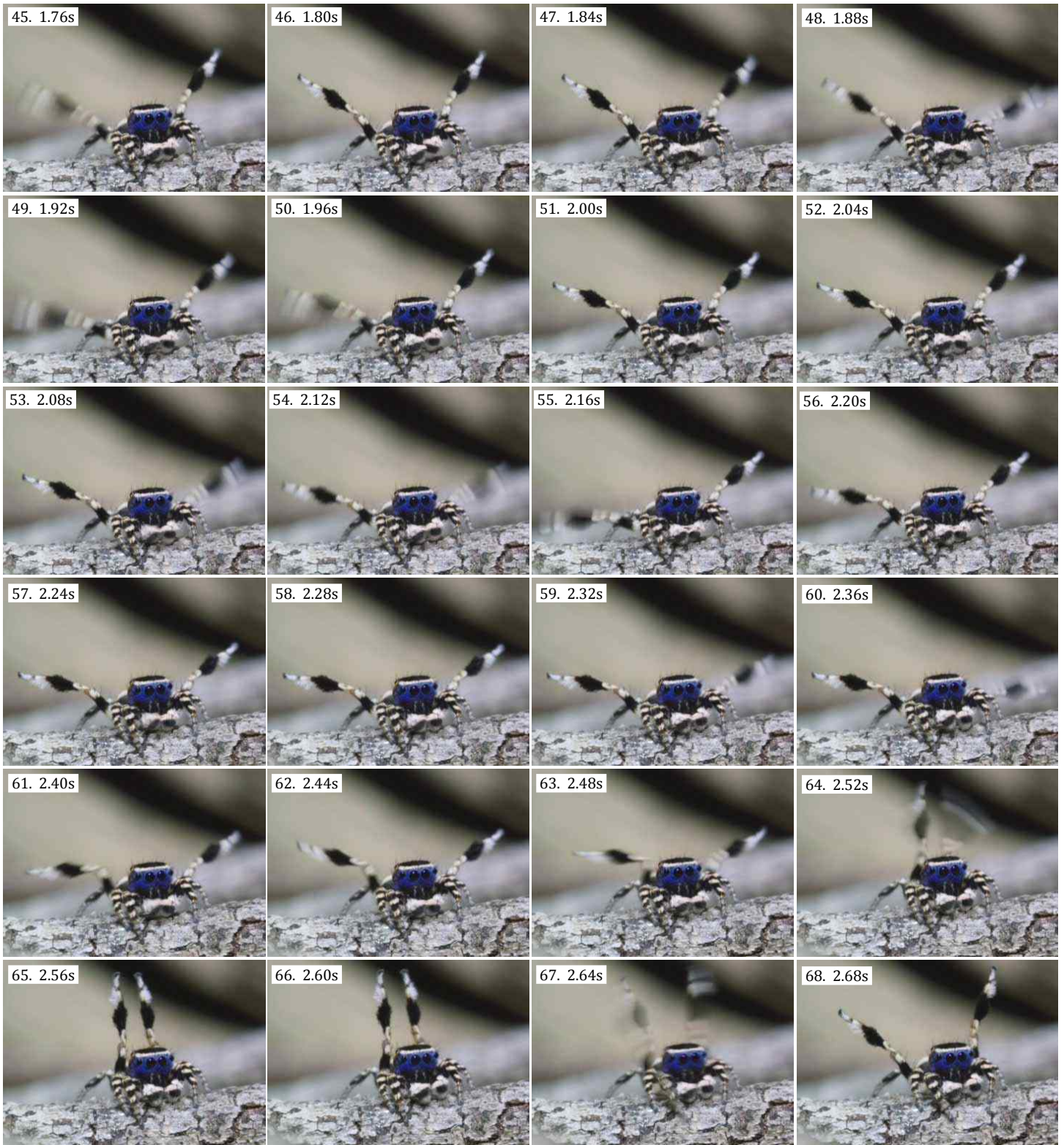


Figure 26 (continued). Rapid movement of legs III was sometimes asynchronous during this bilateral display (45, 48-50, 53-56, 59-62, 64).

Display by the courted female. As we have described for other *Maratus* species (Otto & Hill 2014b, 2015), a female *M. personatus* may turn away from a courting male, raise her opisthosoma, and wave it from side to side (Figure 27). This appears to communicate rejection of the male.

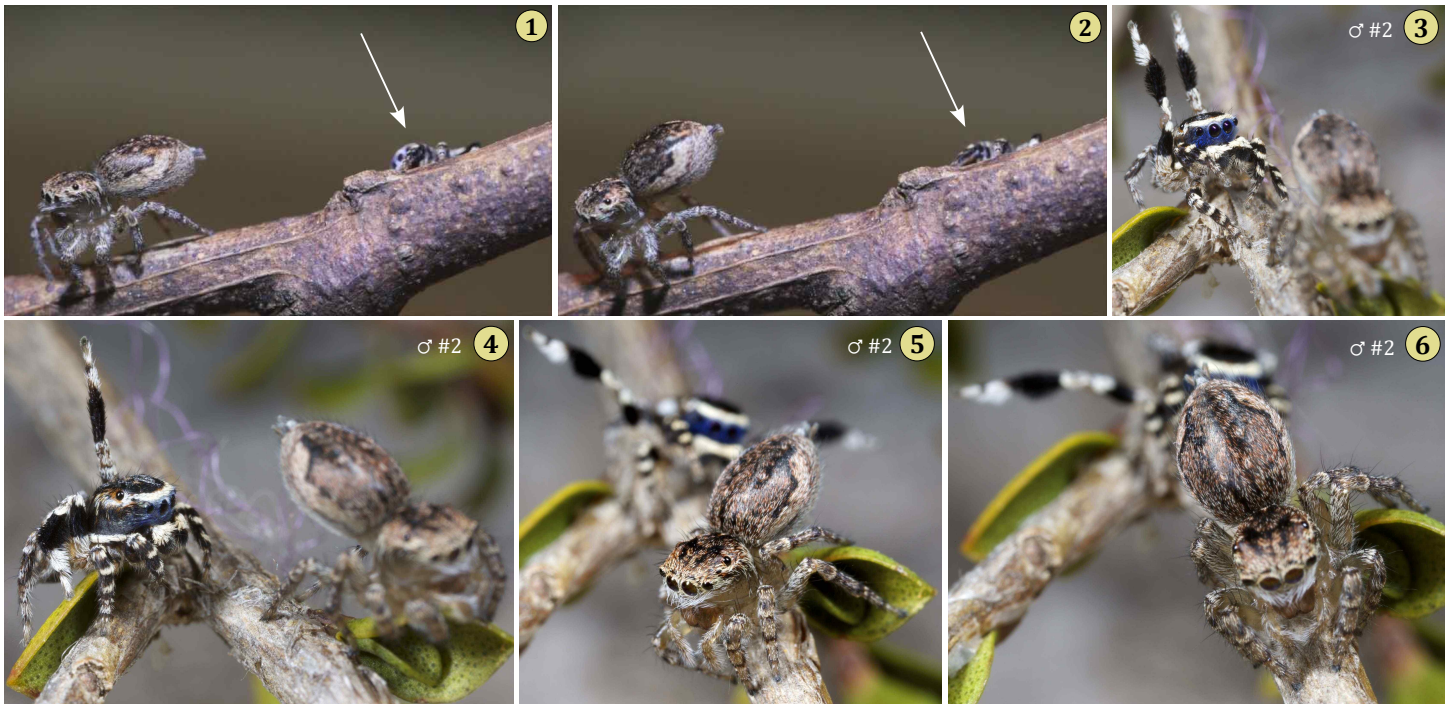


Figure 27. Display by a female *Maratus personatus* in response to male courtship display. 1-2, Sequential frames from a video showing a female (at left) raising and turning her opisthosoma from side to side while facing away from a nearby male (arrows). 3-6, Male displaying to a female that has turned away and raised her opisthosoma.

Mating. As we have observed in other *Maratus*, the male lowers his laterally extended legs III and makes contact with the carapace of the female by reaching forward with legs I during his final approach (Figure 28:1-2). As a pair mates, the opisthosoma of the female is rotated by 180° (Figure 28:3).

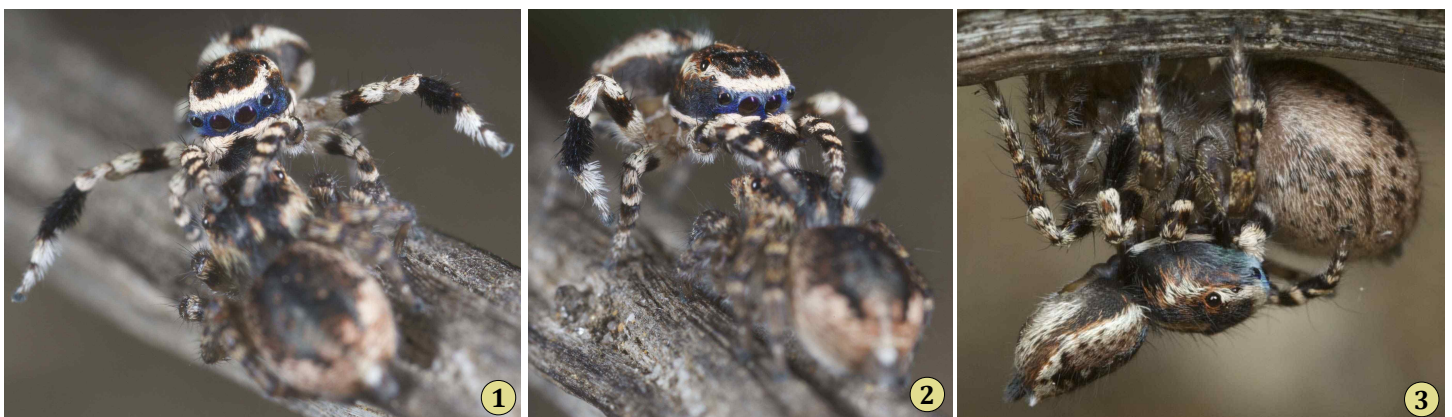


Figure 28. Final approach of a male *Maratus personatus* (1-2) and mating beneath a stem (3).

Habitat. This species was found among small herbaceous plants and in leaf litter at Cape Riche, east of Albany, Western Australia (Figure 29).



Figure 29. Leaf litter and ground cover at Cape Riche where *M. personatus* was found.

Acknowledgments

We thank David Knowles for sharing his discovery of this new species with us, and the Department of Parks and Wildlife of Western Australia for permission to collect and export the spiders used in this study. All photographs presented here are copyright © J. C. Otto.

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