

## Five new peacock spiders from Western Australia (Araneae: Salticidae: Euophryini: *Maratus* Karsch 1878)

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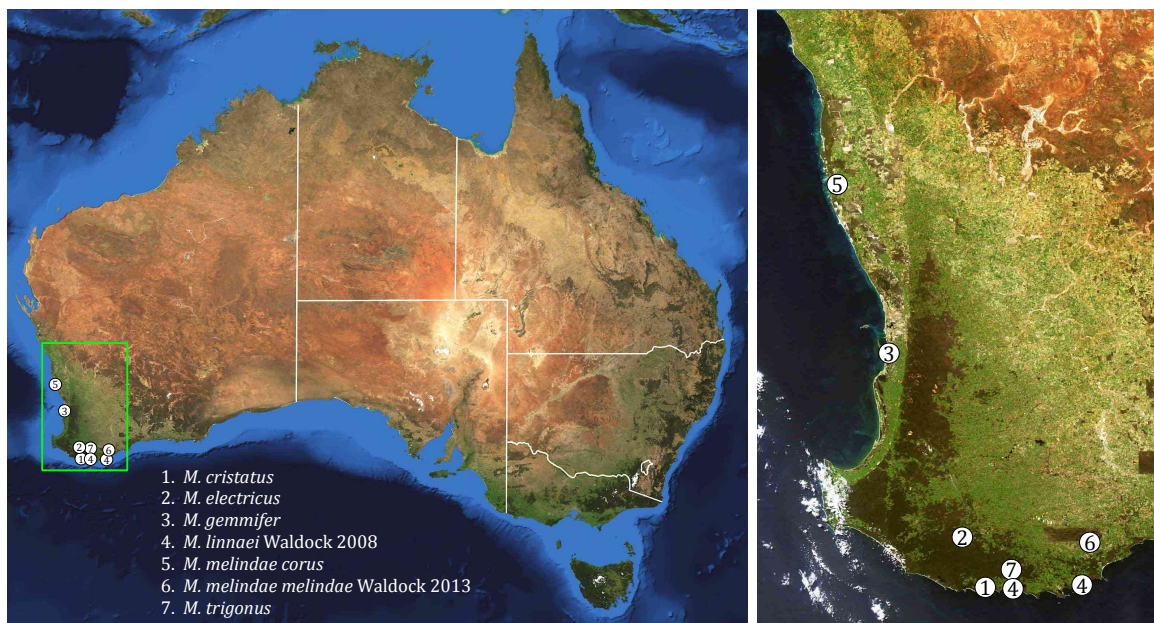
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**Abstract:** Four new species of the genus *Maratus* are described from Western Australia: *M. cristatus*, *M. electricus*, *M. gemmifer*, and *M. trigonus*. *M. electricus* is compared to the closely related *M. linnaei* Waldock 2008. A new subspecies of *M. melindae* Waldock 2013, *M. melindae corus*, is reported from a new locality east of Cervantes. The courtship display of all six species is also documented.

**Key words:** jumping spider, *Maratus cristatus*, *Maratus electricus*, *Maratus gemmifer*, *Maratus linnaei*, *Maratus melindae corus*, *Maratus melindae melindae*, *Maratus trigonus*, *linnaei* group, *mungaich* group, *vespa* group

### Introduction

The *Southwest Australia Ecoregion* (or *Southwest Australia Floristic Region*) is well known as one of the planet's major biodiversity hotspots (Gole 2006). This biodiversity has been attributed to a combination of steep climatic gradients (hence smaller species ranges) and a long time frame for speciation (Cook et al. 2015). The same region is also a major centre for peacock spider diversity with 27 species of *Maratus* described to date, including 21 species not found elsewhere (Otto & Hill 2017). Here we add four new species and one new subspecies to that total (Figure 1).



**Figure 1.** Localities associated with four new species and one new subspecies of *Maratus* from the southwestern corner of Western Australia. Localities are also shown for *M. linnaei* Waldock 2008 (4) and *M. melindae melindae* Waldock 2013 (6), previously described but mentioned in the text. Background courtesy of NASA Visible Earth.

### ***Maratus cristatus*, new species**

*Type specimens.* The holotype male (♂ #1), 12 paratype males (♂ #2-12, 21), and 10 paratype females (♀ #13-20, 22-23) were collected 34 km west of Denmark (34.96796667°S, 116.9794333°E, 11 OCT 2016, coll. J. Otto). Of these one male (♂ #21) and three females (♀ #17-18, 22) were collected as immatures and reared to the adult stage. All types will be deposited in the Western Australian Museum, Perth.

*Etymology.* The species group name (*cristatus*, Latin, m., adjective, English translation *crested* or *tufted*) refers to the presence of distinctive tufts of long white setae along the posterior margin of the male fan.

*Diagnosis.* *M. cristatus* is close to *M. vespa* Otto & Hill 2016 with respect to male and female genitalia, the presence of many long bristle-like setae on legs III, and general features of the courtship display which includes the close approach of an attentive female. We place both species in a new clade, the *vespa* group. Male *M. cristatus* are readily identified by the ornamentation of their fan which includes eight tufts of long white setae along the posterior margin, four of which are visible from above when the flaps are folded. Females are variable and resemble those of other *Maratus* species but tend to have three dark lines projecting toward the rear of the dorsal opisthosoma.

*Description of male* (Figures 2-9). Males were 3.5-4.2 mm in length without posterior tufts, 3.7-4.5 mm in length with tufts (n=13).

There are two distinct colour forms, one with mostly white setae on the carapace and legs, and the other with mostly light brown setae. Otherwise they appear to be identical. The clypeus and chelicerae are black and mostly glabrous with longer white setae directed anteromedially near the median (Figure 2:8). White setae cover the black carapace below the anterior eyes. The eye region has a background covering of either white, grey, or light brown scales. Dark red setae can be seen along the dorsal margins of the anterior eyes. Two broad, dark red stripes extend to the rear of the eye region, and usually there is a third, median stripe of the same colour but variable width between these. The PME are closer to the PLE than to the ALE. The posterior eyes are surrounded by setae that match the background colour of the eye region, and a variable but scattered cover of white or light brown setae may extend further along each side of the carapace beneath the eye region. The rear of the carapace is black and mostly glabrous with a median tract of white setae. There is a narrow marginal band of white setae along each side of the carapace.

The dorsal opisthosoma (Figure 2:1,5) bears a distinctive lattice pattern of dull red to red-orange or orange (Figure 5:8) pigmented scales, bordered by black to the rear, on a background of blue-green iridescent scales. Lateral flaps that are extended during courtship display are dark purple and lobate. Long white bristle-like setae extend forward over the pedicel from the anterior margin. Extending beyond the rear margin are eight prominent tufts of long white setae, four visible from above when the flaps are folded around the sides of the opisthosoma. The lateral pair of these tufts can be concealed beneath the flaps (Figure 2:2, Figure 3:8) or fully extended (Figure 2:5) during display. The venter of the opisthosoma (Figure 2:2) is covered with white scales on a dark brown background. The spinnerets and the underside of the flaps are black. Above the spinnerets is a small tuft of white colular setae that can be visible above the fan during display (Figure 2:5).

Legs I and II are shorter than legs III and IV, and legs III are by far the longest. The pedipalps and all legs are covered with either white or light brown setae. These setae are long and bristle-like on the patella, tibia, and tarsus of each leg III (Figure 2:4-5,7). The embolus of the pedipalp (Figure 8) has two pointed apices, the outer one heavier and longer.



**Figure 2.** Two adult male *Maratus cristatus* with light-brown setation. **1**, Anterior view of extended fan during courtship display. **2**, Ventral view of opisthosoma during display showing retracted lateral tuft beneath each lobe of the fan. The white colular tuft is found in many *Maratus* species. **5**, Display with lateral tufts of the fan fully extended. **8**, The black cuticle of the carapace is almost fully exposed on the clypeus. Background scales in the eye region of the first male ( $\sigma$  #1) are light brown and corresponding scales of the second male ( $\sigma$  #3) are grey.



**Figure 3.** Five adult male *Maratus cristatus*. All except ♂#5 (2) have white setation. **7**, The sides of the black carapace are glabrous behind the posterior eye row. **8**, View of the opisthosoma showing how the outer pair of white tufts can be retracted beneath the flaps.



Figure 4. Three adult male *Maratus cristatus*.



**Figure 5.** Six adult male *Maratus cristatus*. **8**, This male had brightly-coloured orange to red-orange scales on the fan, in contrast to the dull red that appeared to be more common.

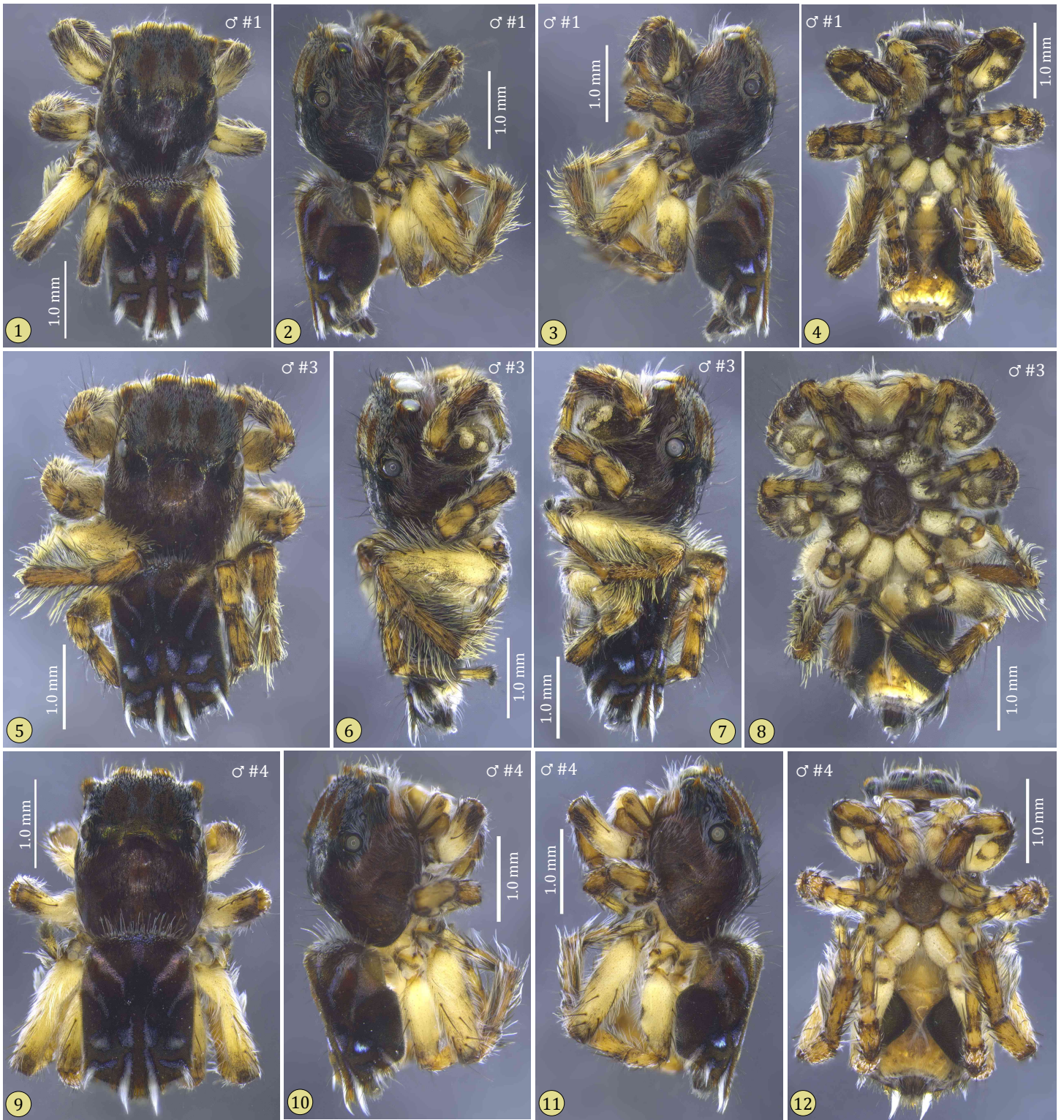


Figure 6. Three adult male *Maratus cristatus* preserved in alcohol.

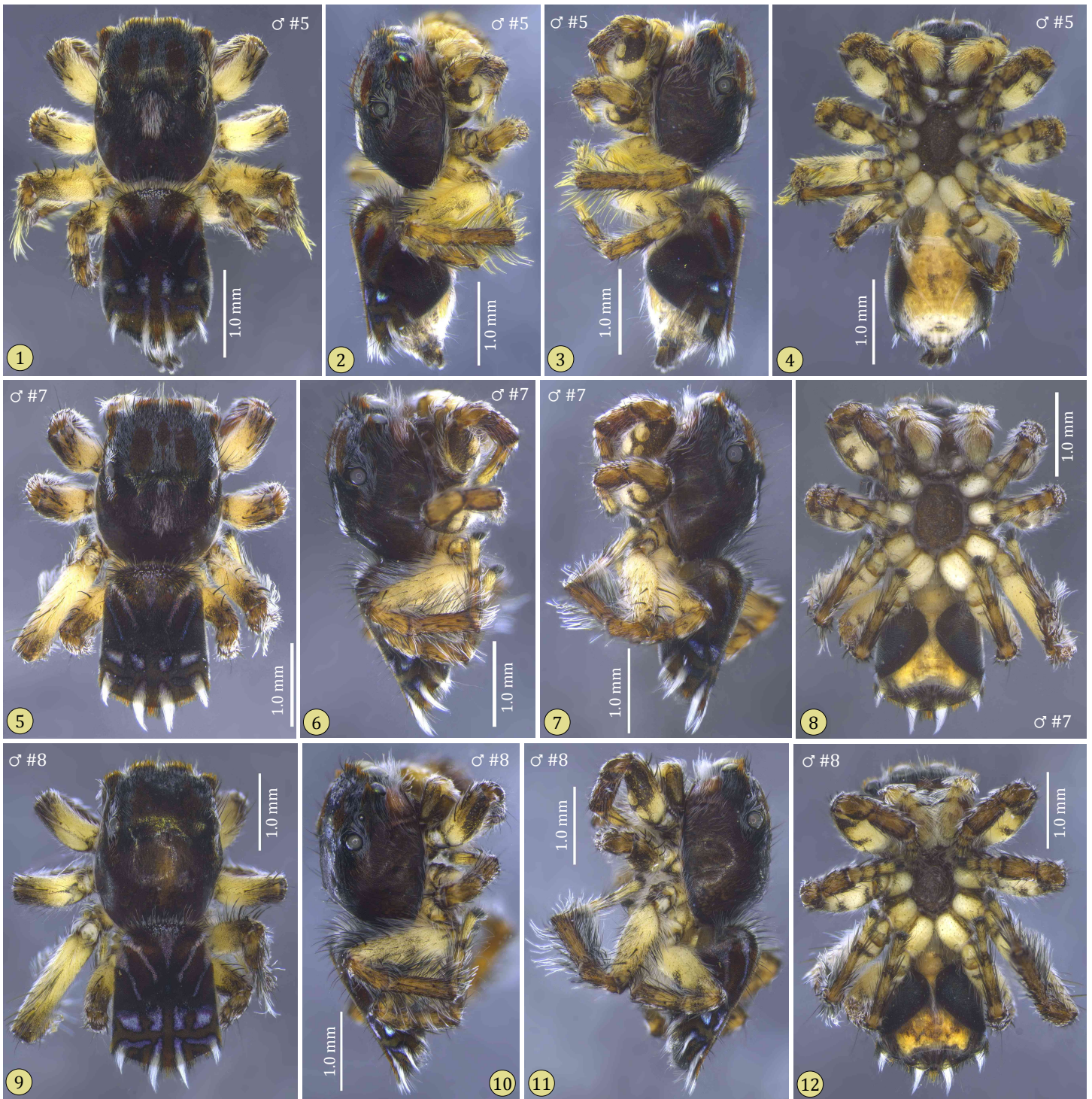


Figure 7. Three adult male *Maratus cristatus* preserved in alcohol.

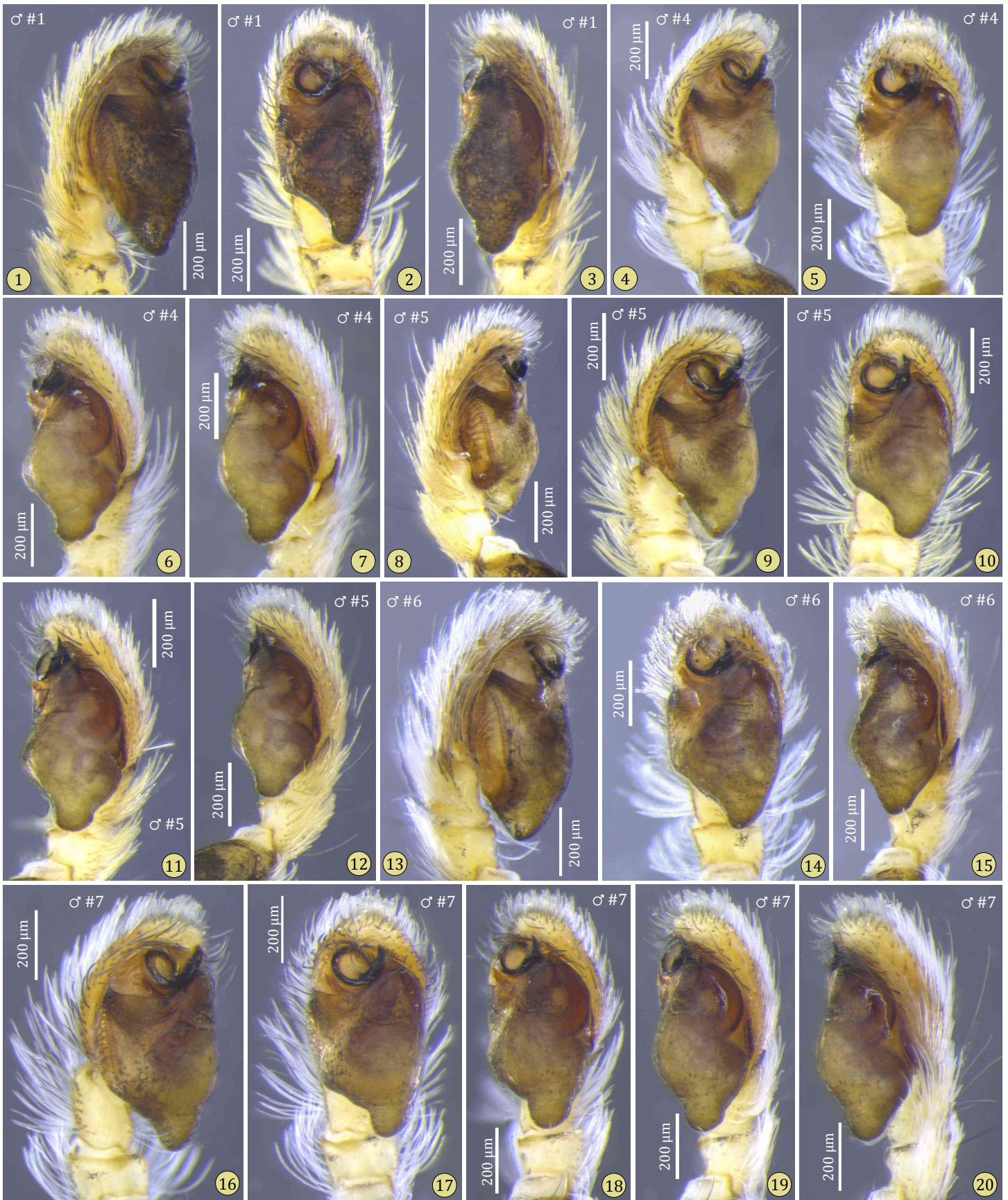


Figure 8. Medial to lateral views of the left pedipalp of five adult male *Maratus cristatus* preserved in alcohol.



**Figure 9.** Frontal view of three adult male *Maratus cristatus* preserved in alcohol.

*Description of female* (Figures 10-16). Females ranged from 4.7-5.6 mm in length (n=10).

The clypeus and chelicerae are translucent, dark yellow. Long white setae project anteromedially over the glabrous chelicerae. The eye region is variably covered with off-white to red-brown setae, sometimes interrupted with linear patterns of lighter setae or dark areas of the exposed carapace. Behind the eye region two black bands of exposed cuticle surround a median tract of off-white to red-brown setae that extends half-way to the rear margin of the carapace. The sides of the carapace are variably covered with setae of the same colours, mostly dorsally and below and behind each PLE. Toward the bottom the sides of the carapace are mostly glabrous, and there is no marginal band on either side. The PME are slightly closer to the PLE than to the AME.

The dorsal opisthosoma is generally dark brown with a wide off-white band on either side. Indistinct lines including a median line of lighter setae may be present toward the front. A set of three dark brown lines may extend toward the rear (Figure 10:5, Figure 11:6,9,12). There is a small triangular tuft of white colular setae above the black spinnerets. The venter is light brown with a moderate cover of uniform off-white setae (Figure 13).

Legs I and II are shorter than legs III and IV, and legs III are the longest. All legs are brown to dark brown and are covered with scattered off-white setae. Typical for *Maratus*, the epigynum has a pair of large, roughly circular fossae (or *fenestrae*) anterior to a pair of large posterior spermathecae (Figure 16). Variably sclerotized ducts anterior to the spermathecae can be seen through the posterior half of each fossa.

*Immatures* (Figure 17). Penultimate male *M. cristatus* resemble adult females but have a distinctive pattern of dark lines radiating in all directions from the dark brown center of the dorsal opisthosoma (Figure 17:1-3). Penultimate females (Figure 17:4-7) more closely resemble adult females but may also exhibit some of these radiating dark lines on the dorsal opisthosoma. As in adult females, a set of three dark lines may project from the central, dark brown area of the opisthosoma toward the rear, and a wide marginal band is present on either side.



Figure 10. Six adult female *Maratus cristatus*.



Figure 11. Five adult female *Maratus cristatus*.



Figure 12. Adult female *Maratus cristatus*.



Figure 13. Ventral view of six different adult female *Maratus cristatus*. The venter of the opisthosoma can be relatively unmarked (4), mottled (5), or striped (1).

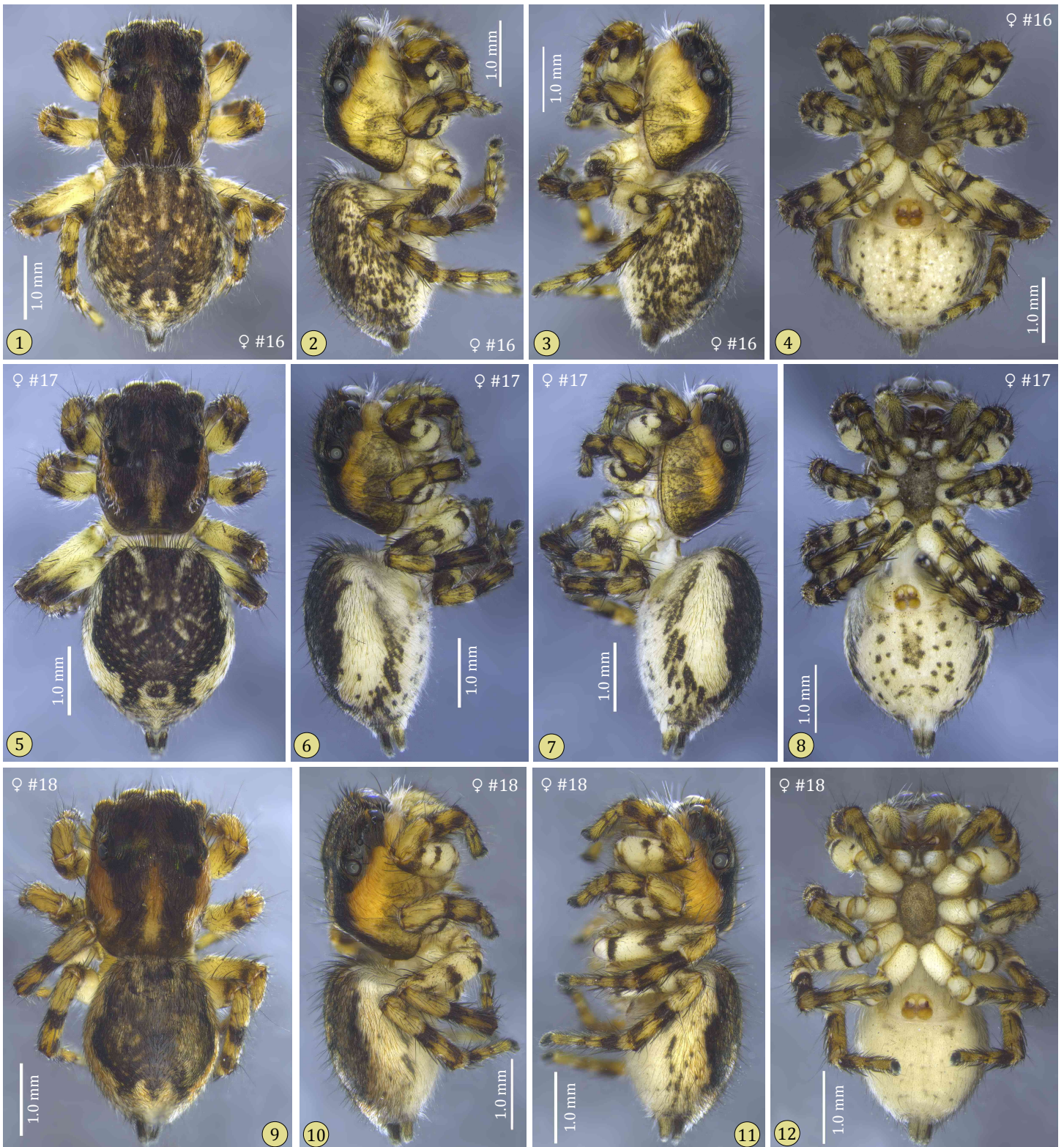


Figure 14. Three adult female *Maratus cristatus* preserved in alcohol.

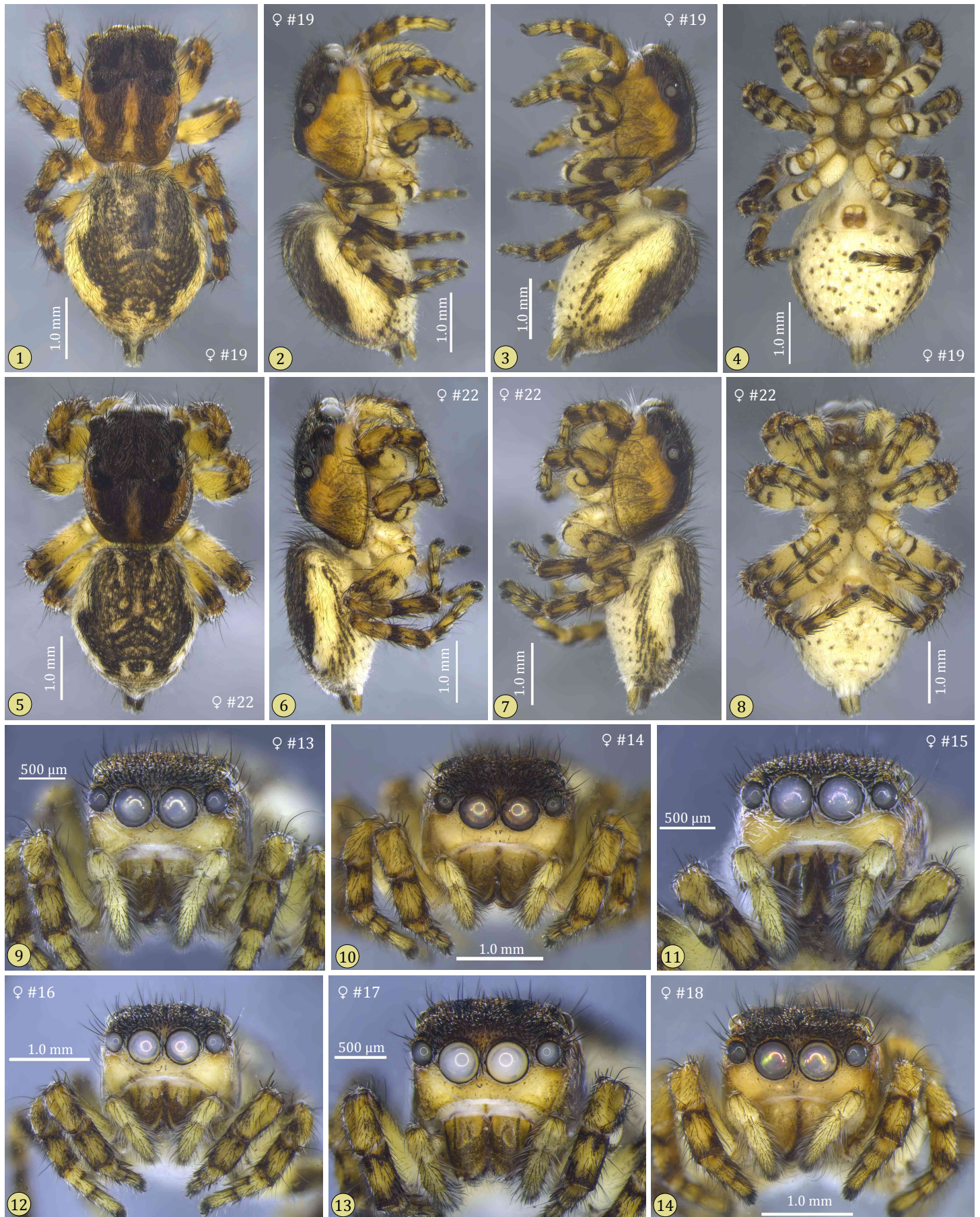
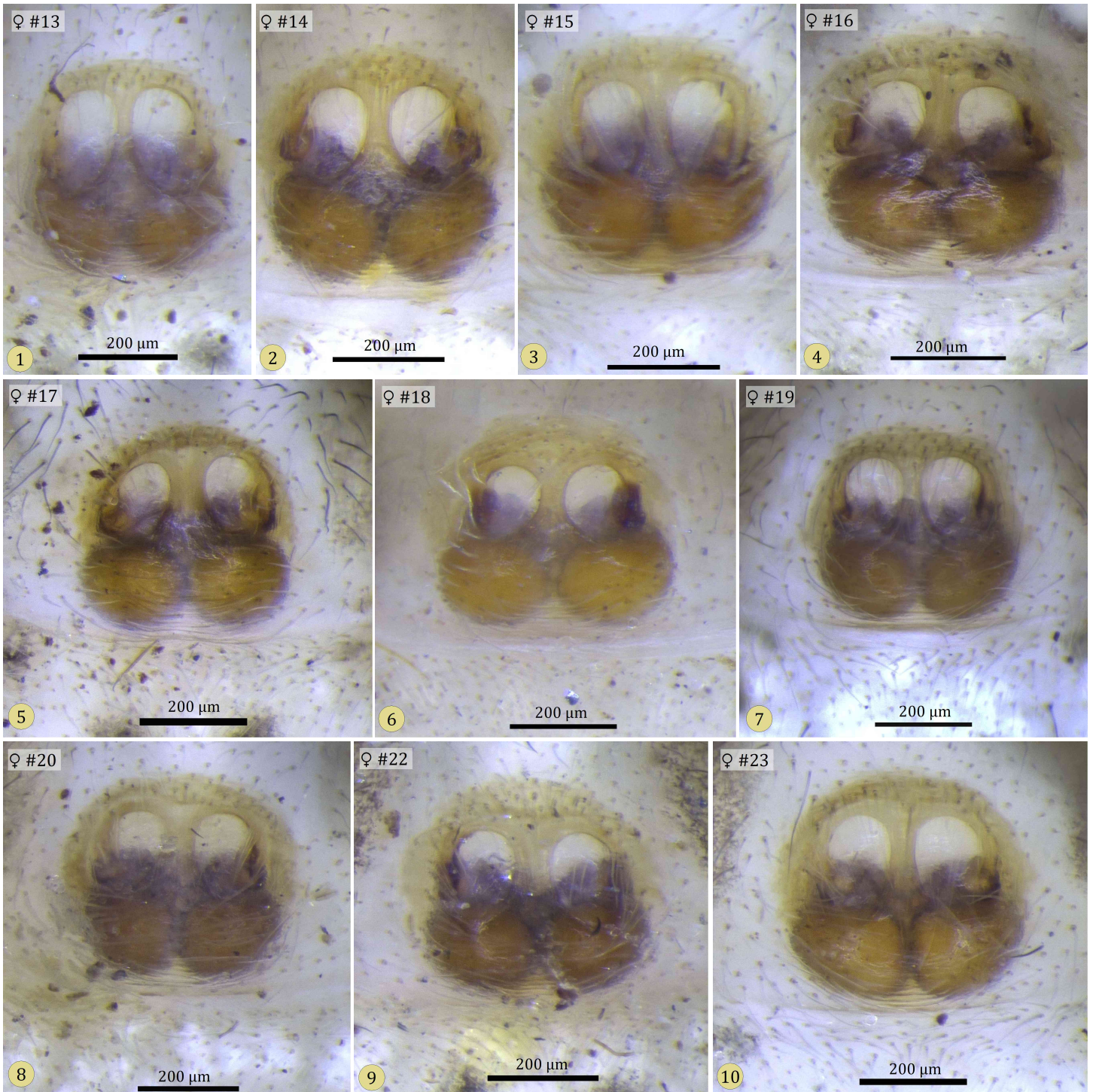


Figure 15. Eight adult female *Maratus cristatus* preserved in alcohol, with frontal views (9-14).



**Figure 16.** Ventral view of the epigynum of ten different adult female *Maratus cristatus* preserved in alcohol. The posterior spermathecae are larger than the fossae. Width of the septum and sclerotization of the ducts anterior (toward the top of the page) to the spermathecae are variable.



**Figure 17.** Penultimate male (1-3) and penultimate female (4-7) *Maratus cristatus*. 1-5, Here as in subsequent figures each juvenile spider carries the same identifier (e.g., ♂ #21) as the corresponding adult.

**Courtship display** (Figures 18-27). The courtship display of *Maratus cristatus* resembles that of *M. vespa* (Otto & Hill 2016) in that the female approaches the courting male very closely (Figure 24) and turns from side to side to follow movements of the male fan. In both species legs III are elevated and held in place as the fan is moved from side to side. In *M. cristatus* we observed two modes of fan rotation. In the first mode (Figures 21-24) the fan was rotated from side to side through an angle of  $\sim 16\text{-}23^\circ$  at 5.6-6.5 cycles/s. In the second mode (Figures 25-27) the fan was rotated only  $\sim 1\text{-}3^\circ$  at 1.9-3.8 cycles/s.



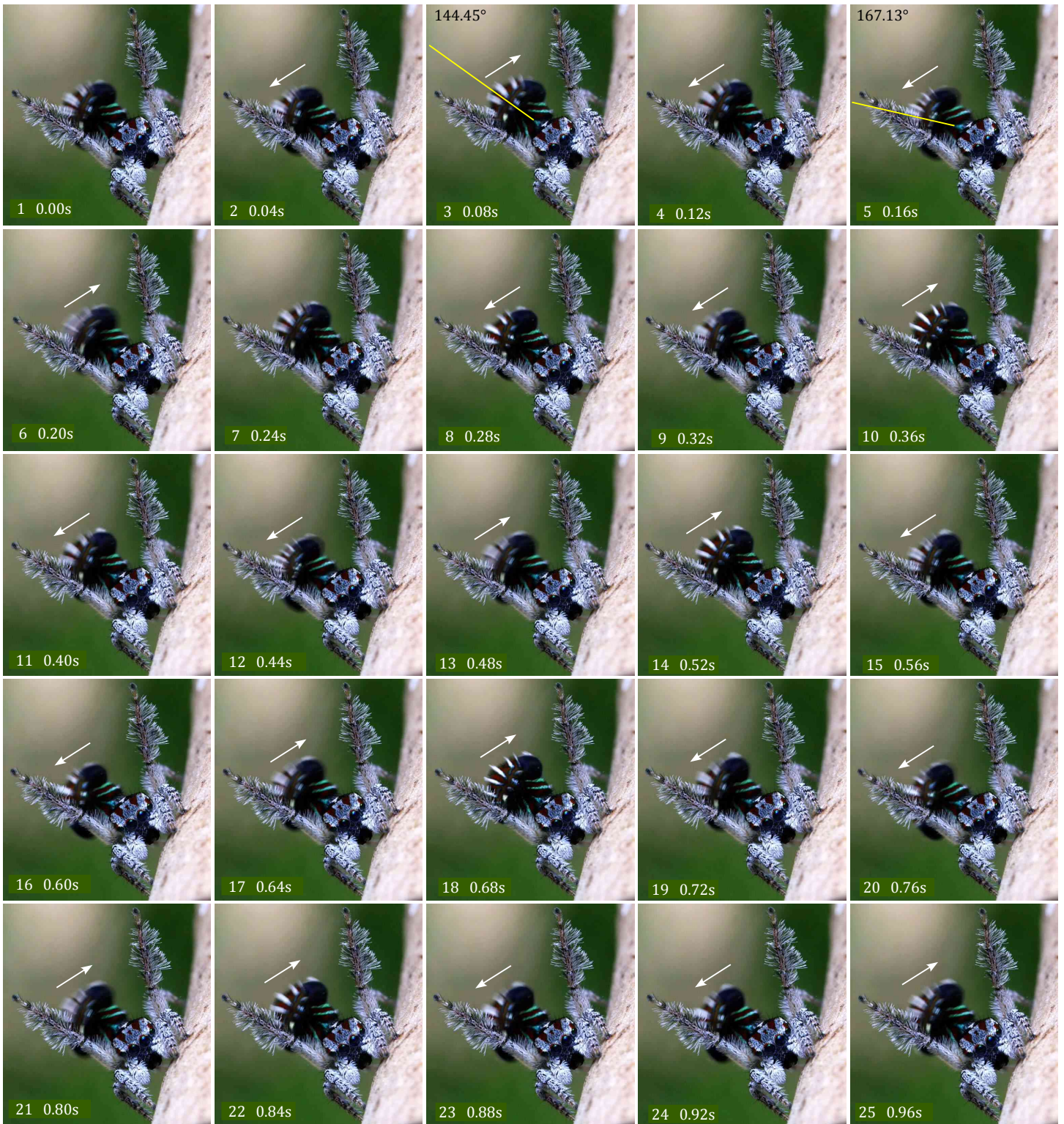
**Figure 18.** Positions assumed during courtship display by a male *Maratus cristatus*. 8-9, Here the fan was slightly lower and the tuft of white setae at the lateral margin of each lobe was retracted.



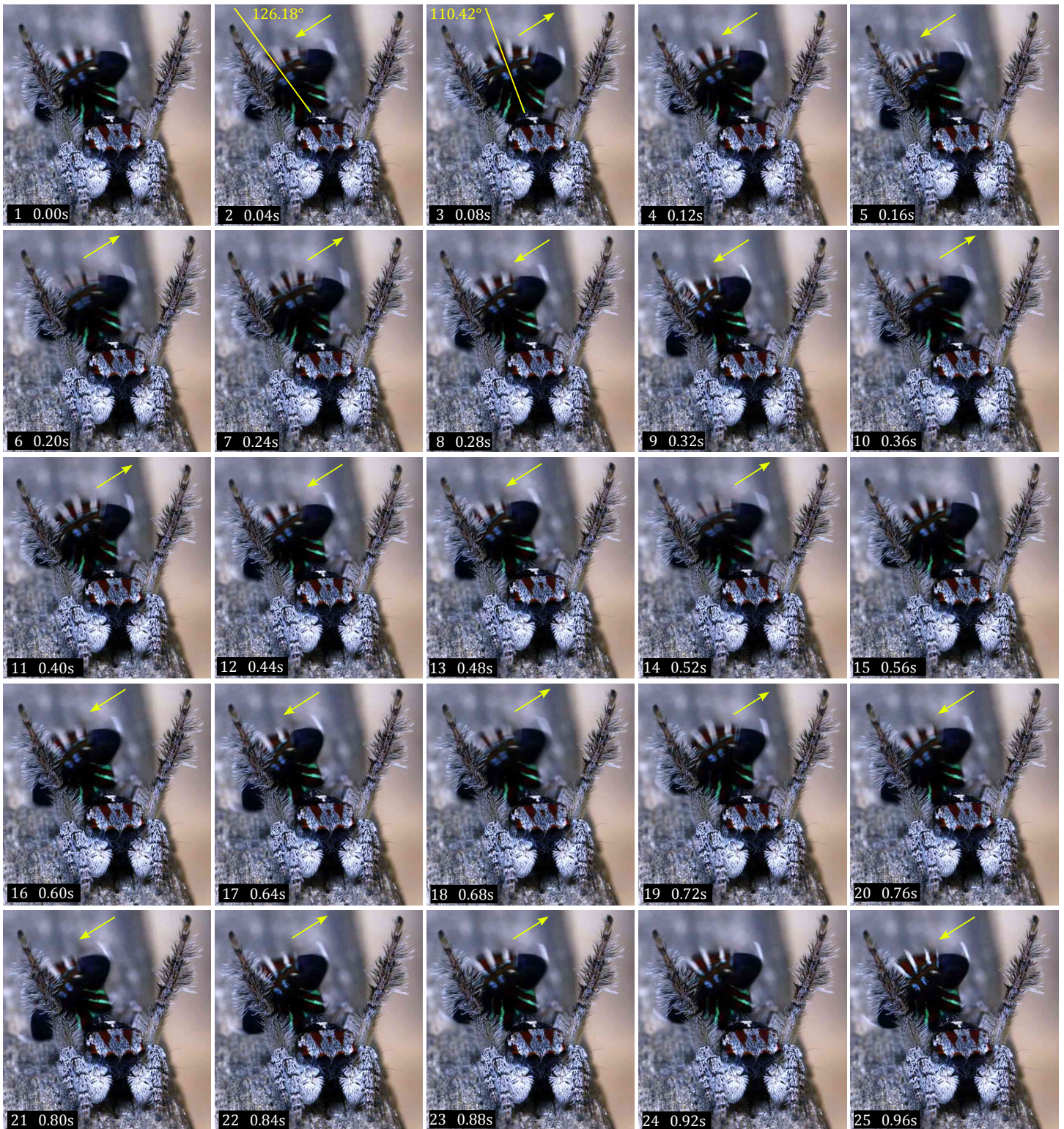
**Figure 19.** Positions assumed during courtship display by two male *Maratus cristatus*. **1**, Display with a partly lowered fan. **2-9**, Display with a fully extended fan. **6**, Notice the position of the posterior tufts of the fan behind the long setae of leg III when the fan is tilted far to one side.



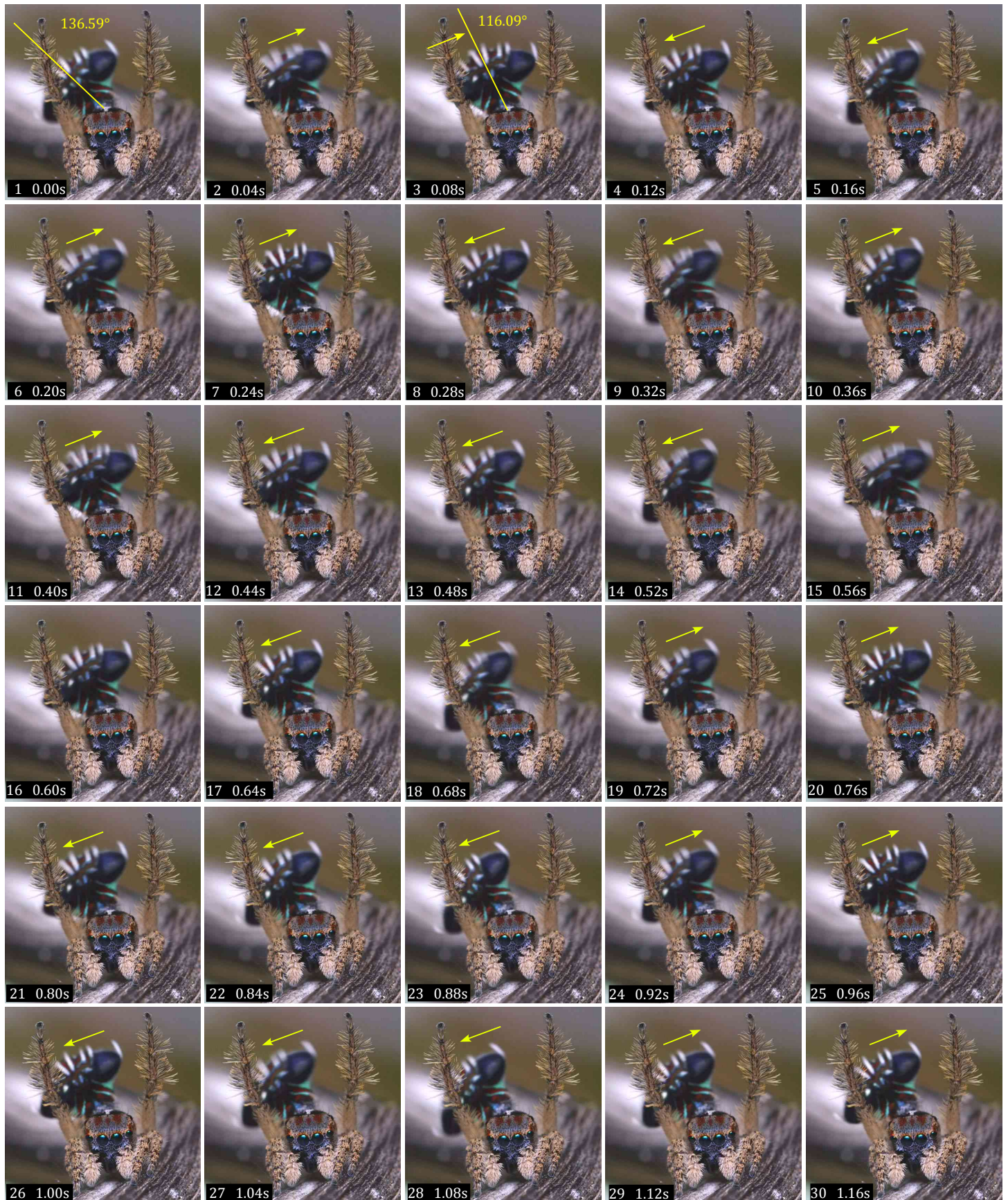
Figure 20. Positions assumed during courtship display by four male *Maratus cristatus*.



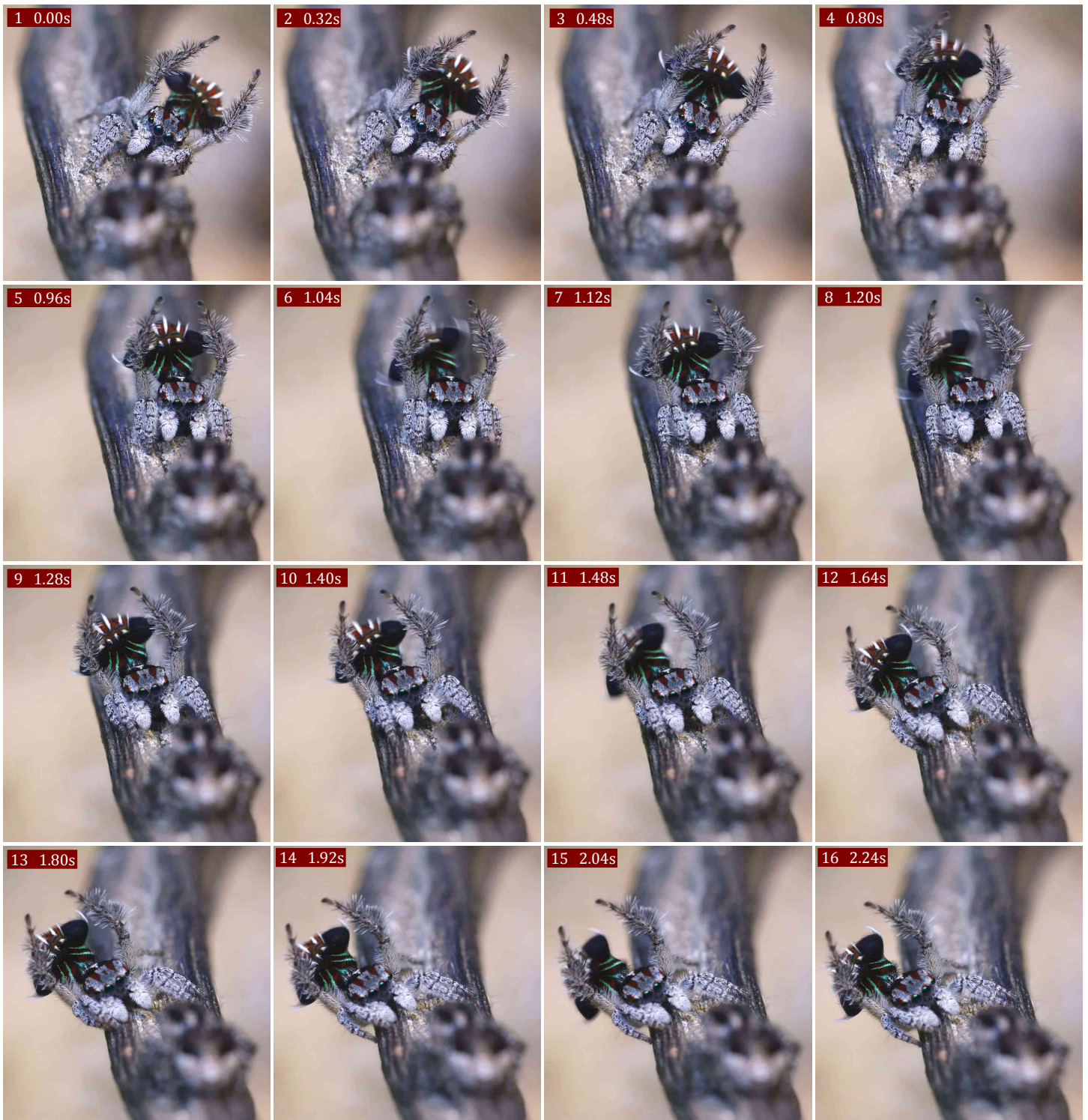
**Figure 21.** Consecutive video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. Arrows indicate rotation of the fan relative to each previous frame. In this example the fan was rotated through about 23° at a rate of ~6.5 cycles/s.



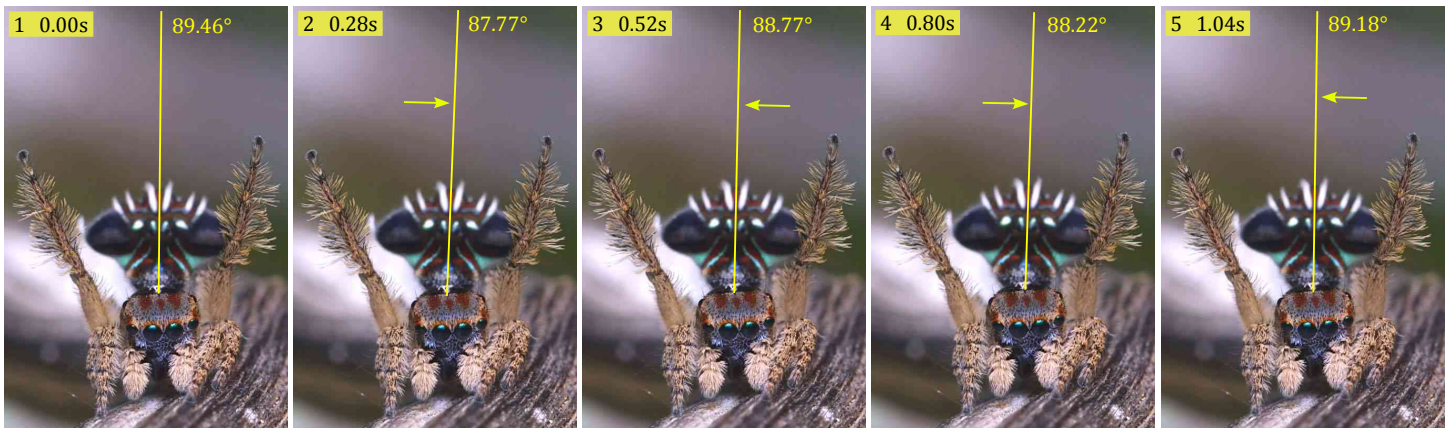
**Figure 22.** Consecutive video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. Arrows indicate rotation of the fan relative to each previous frame. In this example the fan was rotated through about  $16^\circ$  at a rate of  $\sim 6.5$  cycles/s.



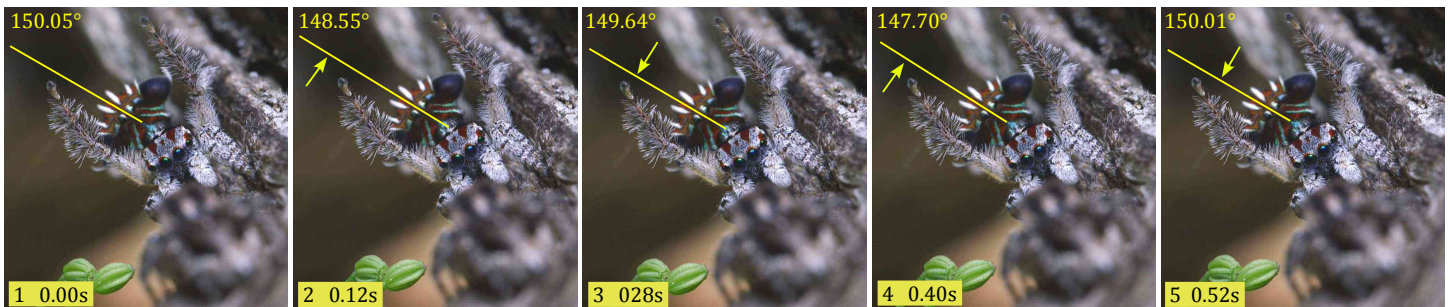
**Figure 23.** Consecutive video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. Arrows indicate rotation of the fan relative to each previous frame. In this example the fan was rotated through about 20° at a rate of ~5.6 cycles/s.



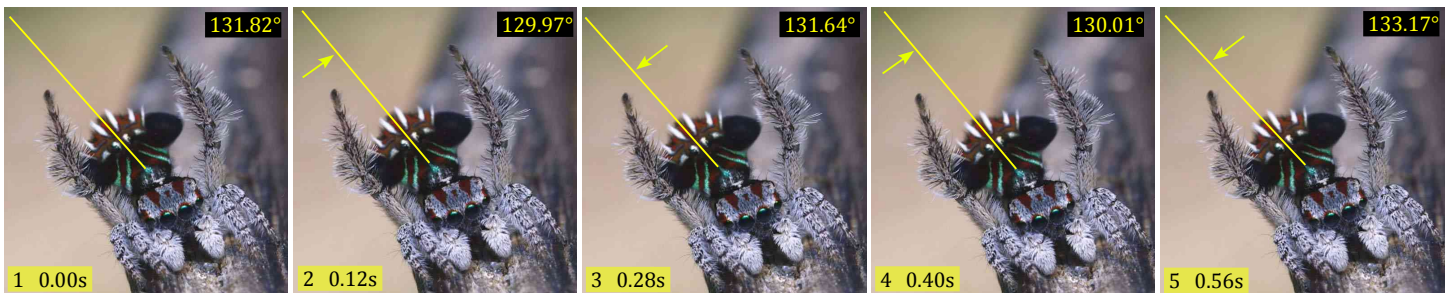
**Figure 24.** Selected video frames (25 FPS) showing sequential positions as an attentive female (foreground) turned to follow the display of a male *Maratus cristatus*.



**Figure 25.** Sequential video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. Arrows indicate rotation of the fan relative to each previous frame. In this sequence the fan was rotated through about 1-2° at a rate of ~1.9 cycles/s.



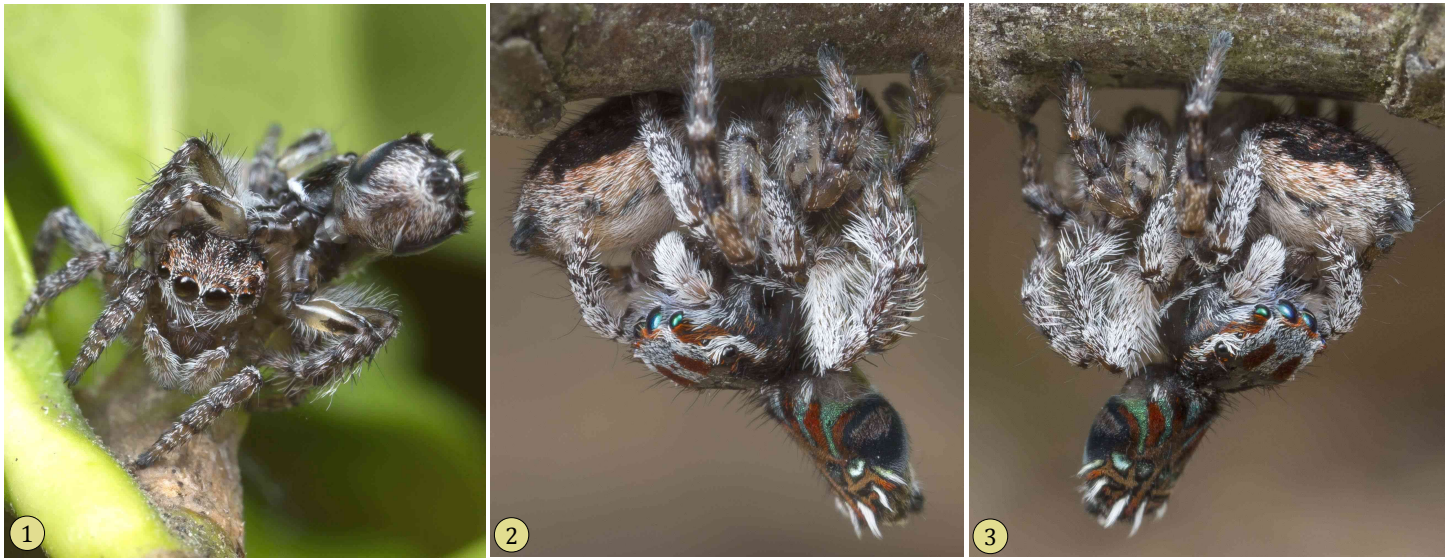
**Figure 26.** Sequential video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. In this sequence the fan was rotated through about 1-2° at a rate of ~3.8 cycles/s.



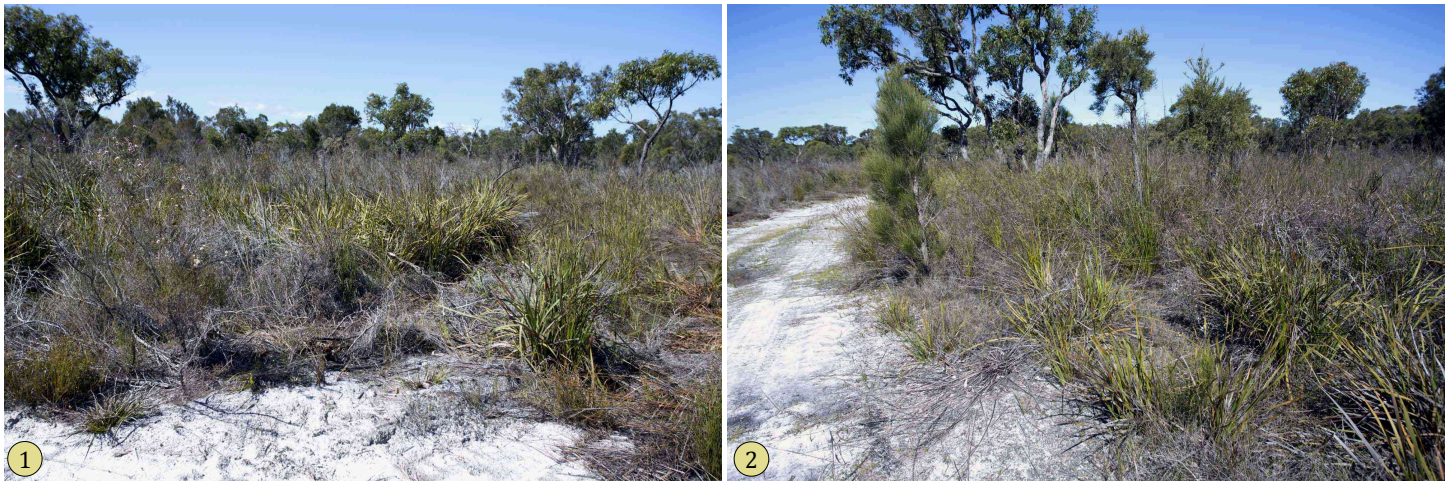
**Figure 27.** Sequential video frames (25 FPS) showing display by a male *Maratus cristatus* in front of a female. In this sequence the fan was rotated through about 2-3° at a rate of ~3.6 cycles/s.

**Mating.** As in other *Maratus*, mating *M. cristatus* females rotate their opisthosoma through an angle of about 180° (Figure 28).

**Habitat.** The type locality for *Maratus cristatus* is shown in Figure 29. All spiders were found along a sandy track adjacent to an ephemeral swamp and near a small body of water, either on twigs strewn along the edge of the track or on sedges.



**Figure 28.** Mating positions of *Maratus cristatus*.



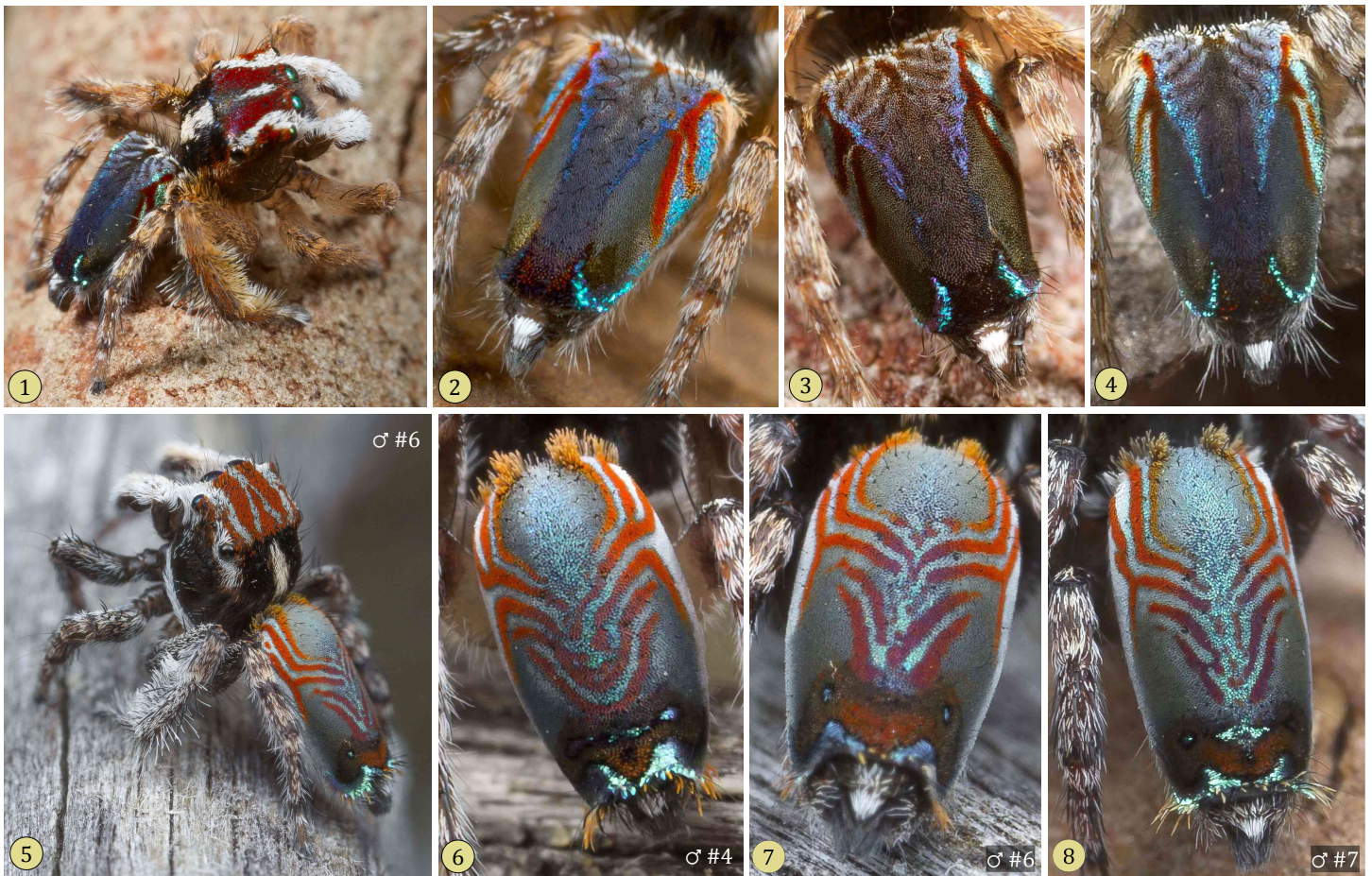
**Figure 29.** *Maratus cristatus* was found along this sandy track west of Denmark in Western Australia, adjacent to what appeared to be an ephemeral swamp.

### ***Maratus electricus*, new species**

**Type specimens.** The holotype male ( $\sigma$  #4), 2 paratype males ( $\sigma$  #6-7), and 4 paratype females ( $\text{♀}$  #1-3, 5) were collected at Lake Muir (34.4506°S, 116.6837667°E, 6 OCT 2016, coll. J. Otto and D. Knowles). All females as well as the holotype male ( $\sigma$  #4) were collected as penultimates and reared to adulthood. All types will be deposited in the Western Australian Museum, Perth.

**Etymology.** The species group name (*electricus*, Latinate form derived from the English word *electric*, m., adjective) refers to the presence of red parallel lines on the fan of the male that resemble electrical connections on an electronic circuit board.

**Diagnosis.** *Maratus electricus* is similar to *M. linnaei* Waldock 2008 and both species are placed in a new clade, the *linnaei* group. Males of the two species can be easily identified by the distinctive decoration of their dorsal opisthosoma or fan (Figure 30).



**Figure 30.** Comparison of adult male *Maratus linnaei* (1-4) with *M. electricus* (5-8). Although individual males vary in details of the scale pattern of the dorsal opisthosoma, the general patterns are quite different. The opisthosoma of *M. linnaei* also tapers more toward the rear, and that of *M. electricus* is more cylindrical. *M. linnaei* has an anterior herringbone pattern of dull red scales. Note the prominent pair of tufts of orange to brown setae at the anterior margin of the opisthosoma of *M. electricus*.

*Description of male* (Figures 31-35). Males were 4.1-4.9 mm in length (n=3).

The carapace including clypeus is black. The clypeus is mostly glabrous except for long white setae near the midline. The chelicerae are also black and glabrous at the base but bear long white setae that extend as far as the base of the fang. The dorsum of the pedipalps is covered with long, bright white setae, and bright white setae also form a distinctive vertical band between the AME and ALE on either side. Shorter grey setae are present between the AME and these also account for the grey background colour of the eye region. A band of dark red to red-orange scales extends to the rear behind each anterior eye, and three narrower bands of the same colour extend between these to the rear of the eye region. A patch of grey scales extends to the front and rear of each PLE. The sides and rear of the carapace are mostly black and glabrous, but there is a narrow medial tract of white scales behind the eye region that extends half-way to the rear margin of the carapace. There is a band of white setae on each lateral margin of the carapace, but this does not extend anteriorly beyond the PME. The PME are closer to the PLE than to the ALE.

The dorsal opisthosoma (Figure 30:5-8, Figure 32:8-9) is nearly cylindrical and has no flaps, with a background comprised of densely packed iridescent light blue scales. Against this background is a distinctive pattern of mostly parallel lines comprised of red-orange pigmented scales. The anterior margin is marked by two prominent tufts of brown to red-orange setae. Toward the rear is a black to dark red transverse band that may bear several small spots of bright iridescent blue scales (Figure 30:6-8, Figure 32:8-9, Figure 33:1,8), and along each posterolateral margin there is a crescent of similar bright

iridescent blue scales (Figure 31:6-7, Figure 32:9). Under the microscope these scales are intense blue in certain directions relative to illumination (Figure 33:5-6). These suggest a close relationship with *M. linnaei* which also has these bright scales along the posterior margin of the fan (Figure 30:1-4, Figure 67). Extending beyond the posterior margin of the fan on either side are long orange-brown and black setae (Figure 32:1) that become more prominent during display (Figure 31:5, Figure 32:6). Above the colulus is a triangle of white setae, and below this the spinnerets are black.

Legs I and II are shortest, legs III and IV longer, and legs III by far the longest. All legs are dark and covered with white setae. The patella, tibia and tarsus of each leg III is decorated with many long, white setae that figure prominently in courtship display. The pedipalp (Figure 35) resembles that of other *Maratus* with a longer outer and shorter inner apex of the embolus.

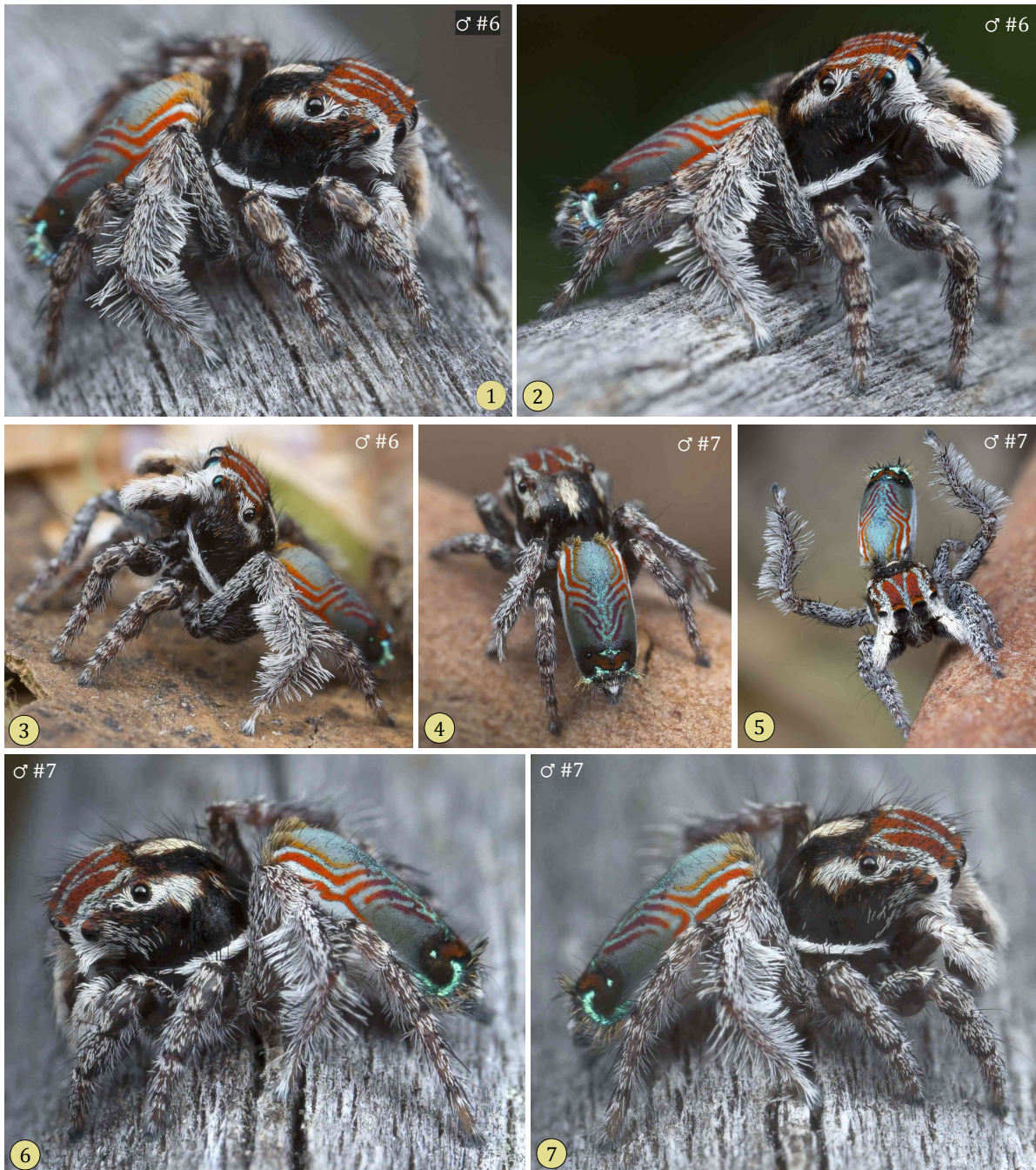


Figure 31. Two adult male *Maratus electricus*.



Figure 32. Two adult male *Maratus electricus*.



**Figure 33.** Two adult male *Maratus electricus* preserved in alcohol. **5-6**, Detail of bright iridescent scales at the rear of the opisthosoma. This striking blue colour could only be seen at a specific angle relative to the direction of illumination. **9**, Detail showing close packing of iridescent (light blue) and pigmented (red) scales on the dorsal plate of the opisthosoma.



Figure 34. Three adult male *Maratus electricus* preserved in alcohol.

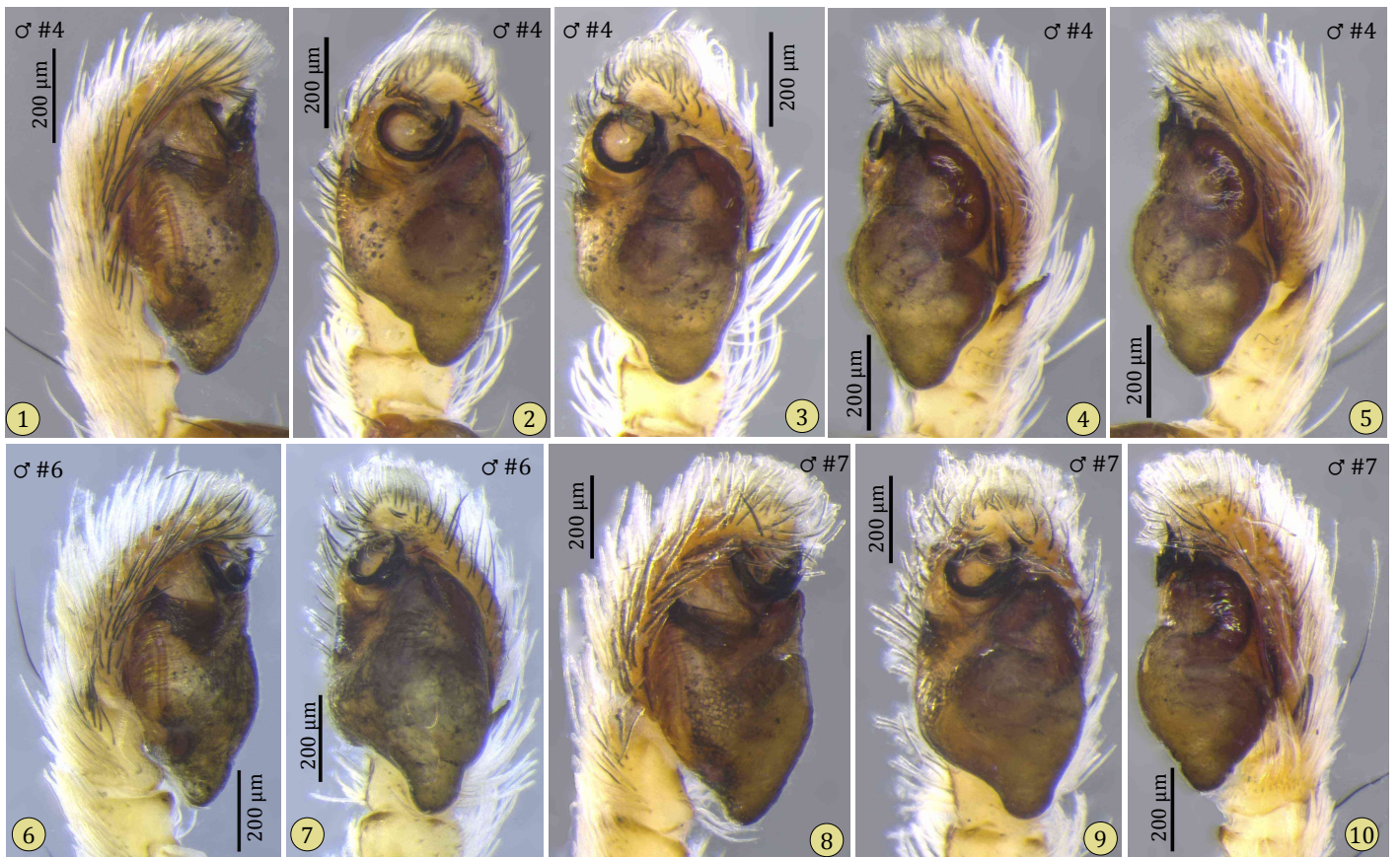


Figure 35. Medial to lateral views of the left pedipalp of three adult male *Maratus electricus*.

Description of female (Figures 36-41). Females ranged from 4.9-5.8 mm in length (n=4).



**Figure 36.** Two adult female *Maratus electricus*. **5**, This female had distinct patterns of the opisthosoma resembling those of the male.



Figure 37. Two adult female *Maratus electricus*.

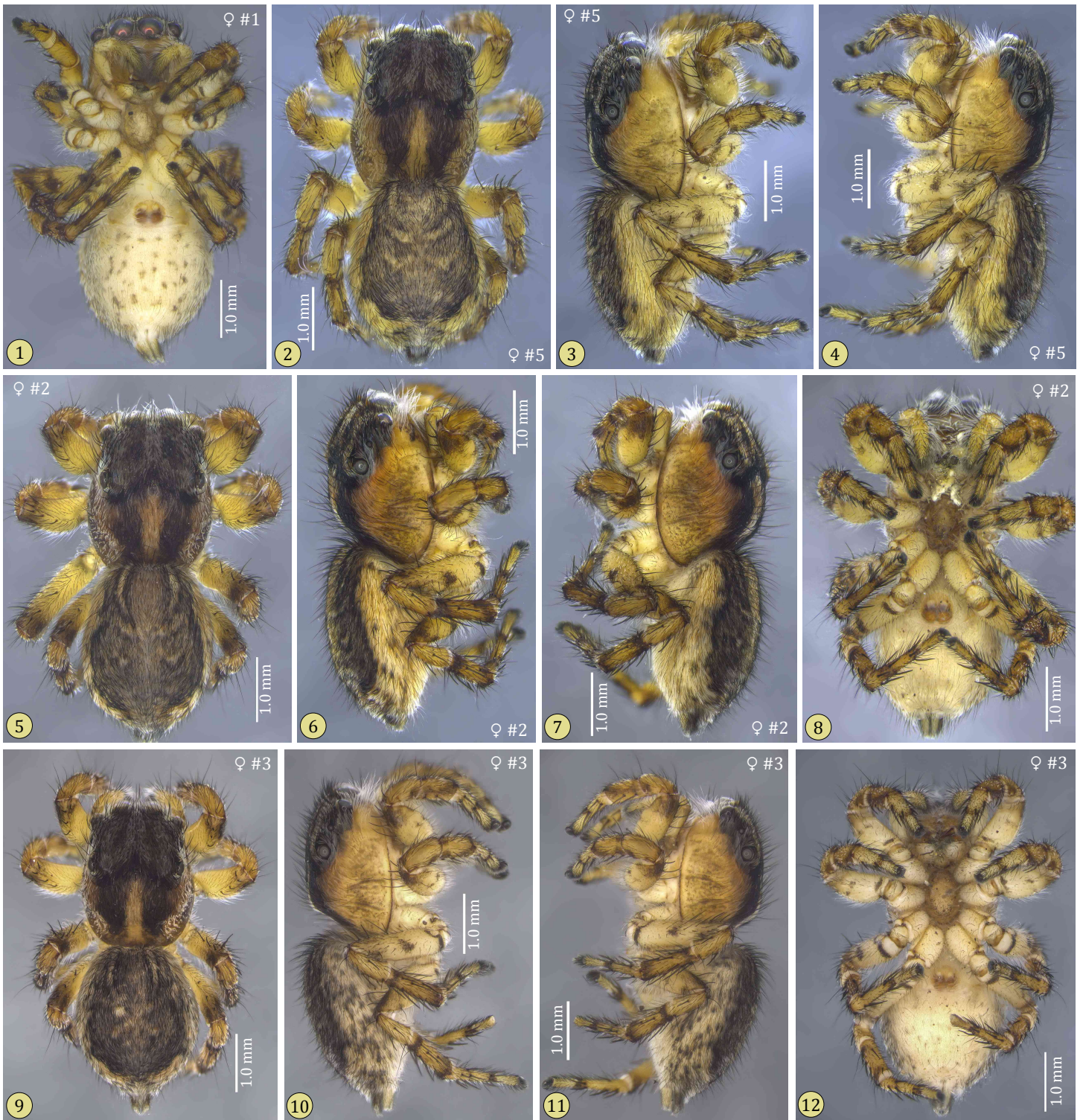


Figure 38. Four adult female *Maratus electricus* preserved in alcohol.

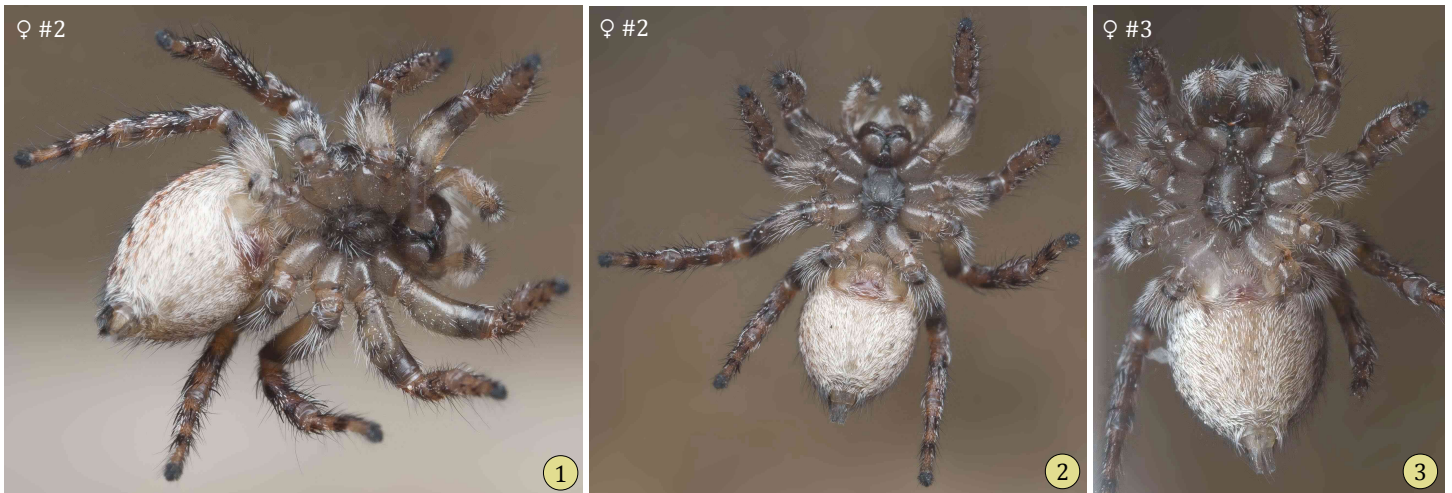


Figure 39. Ventral view of two adult female *Maratus electricus*.



Figure 40. Frontal view of two adult female *Maratus electricus* preserved in alcohol.

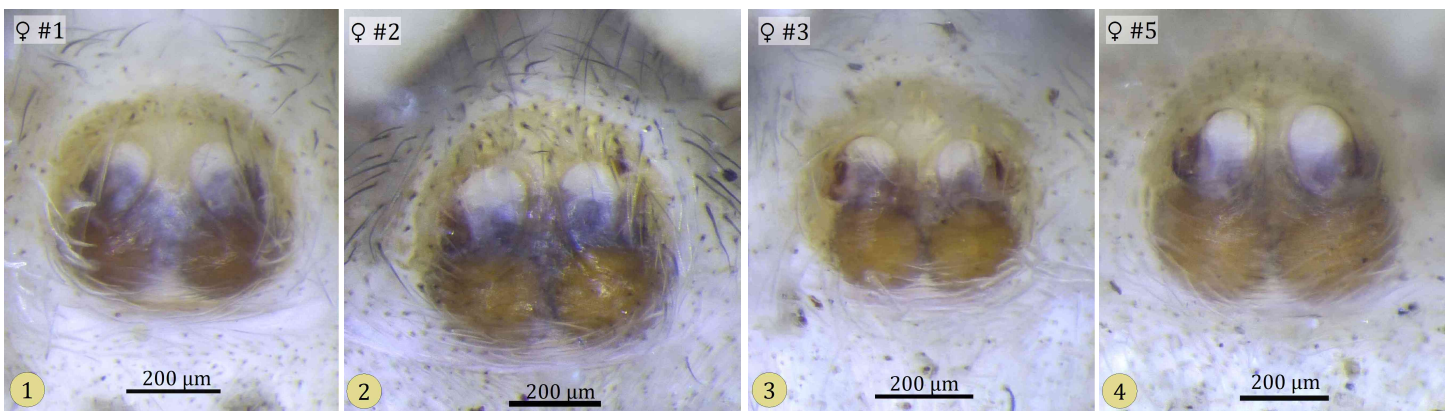


Figure 41. Ventral view of the epigynum of four female *Maratus electricus* preserved in alcohol. The anterior direction is toward the top of the page.

The clypeus and chelicerae are dark brown. As in the male, the clypeus is mostly glabrous except for long off-white setae projecting forward near the median. Similar setae extend to the distal end of each paturon of the chelicerae. The front eyes are also surrounded by off-white setae. The eye region is covered with red-brown to off-white setae, and a dark brown band may extend across the eye region behind each AME. Behind the eye region the carapace is mostly black and glabrous except for a median tract of off-white setae that extends half-way to the posterior margin. On each side off-white to light brown scales or setae comprise a band extending below the lateral eyes to the rear behind the PLE. Below this band the sides of the carapace are mostly glabrous and translucent, and there are no bands on the lateral margins. The PME are slightly closer to the PLE than to the ALE.

The dorsal opisthosoma is mostly dark brown but this may be interrupted with scale patterns suggestive of those of the adult male (Figure 36:5, Figure 37:1). A small white colular tuft is present. The sides and venter of the opisthosoma are light-brown. The posterior spinnerets are black and the anterior (ventral) spinnerets are brown. The sternum and endites are dark brown. The coxae and trochanters are light brown, glabrous, and translucent. The legs are brown but the proximal half of each femur is lighter in colour, bearing many long off-white setae. The pedipalps are also lighter brown and, like all of the legs, have a cover of off-white setae. Legs I and II are similar in length and shorter and legs III and IV are longer, with legs III the longest. The epigynum (Figure 41) resembles that of other *Maratus* species, with a pair of large fossae in front of a pair of large posterior spermathecae. Variably sclerotized ducts can be seen through the posterior half of each fossa.

*Immatures* (Figures 42-43). Penultimate males (Figure 42) have a cover of off-white to white setae on the dorsal opisthosoma interrupted by a distinct pattern of dark lines that suggest the pattern of red-orange scale tracts of the adult male. Sides of the carapace are glabrous and there are no marginal bands. Penultimate females (Figure 43) are darker in colour and resemble adult females. Like adult females, they tend to have variable scale patterns on the dorsal opisthosoma that are suggestive of the adult male pattern but less distinctive.



**Figure 42.** Penultimate male *Maratus electricus*.



**Figure 43.** Four penultimate female *Maratus electricus*.

*Courtship display* (Figures 44-53). Males can advertise by waving a single leg extended to one side at  $\sim 2.5$  cycles/s, accompanied by movement of both pedipalps up and down in unison (Figure 47). As in *M. cristatus*, *M. linnaei* and *M. vespa*, females approach males and closely follow the side to side movement of their opisthosoma behind the elevated legs III (Figures 48-49). In one sequence shown here (Figure 50) a male made caliper-like movements of the extended legs III while moving both pedipalps up and down. During display the elevated opisthosoma was moved or vibrated continuously. The opisthosoma may be bobbed in place at a rate of  $\sim 6-7$  cycles/s (Figure 51), or it may be bobbed continuously as the opisthosoma is rotated from side to side and back again at a rate of  $\sim 0.5-1$  cycles/s (Figures 52-53). This rotation was observed in the presence of side-stepping (Figures 48-49), or in place without stepping (Figures 52-53). When a male stepped from side to side in front of a female during display, the opisthosoma was turned in the direction of the stepping movement (to the right or left) and bobbed continuously.



**Figure 44.** Courtship positions of a male *Maratus electricus*. **1-6**, Elevated positions. The elevated opisthosoma was bobbed continuously as it was moved from side to side behind the elevated and partly flexed legs III. The bright white pedipalps were held in an extended lateral position, aligned with lines of bright white setae between the AME and ALE. **8**, Female studying the display of a male.



Figure 45. Courtship positions of a male *Maratus electricus*. 5-13, Female in foreground closely following the male.



Figure 46. Courtship positions of two male *Maratus electricus*.



**Figure 47.** Sequential video frames (25 FPS) showing a unilateral wave with the extended leg RIII by a male *Maratus electricus*. Arrows indicate movement of leg RIII and the pedipalps relative to each preceding frame. There were ~2-3 wave cycles/s. Note bilateral raising and lowering of the pedipalps (pedipalp flicker) at a rate of ~6 cycles/s toward the end of this sequence. This appears to represent a form of advertisement to get the attention of females that may be in the area.



**Figure 48.** Sequential but not consecutive video frames (25 FPS) showing a female closely following the display of a male *Maratus electricus* at an eye-to-eye distance of only ~4 mm. The opisthosoma was continuously bobbed as it was turned in the direction (alternately to the left or right) of side-stepping by the male.

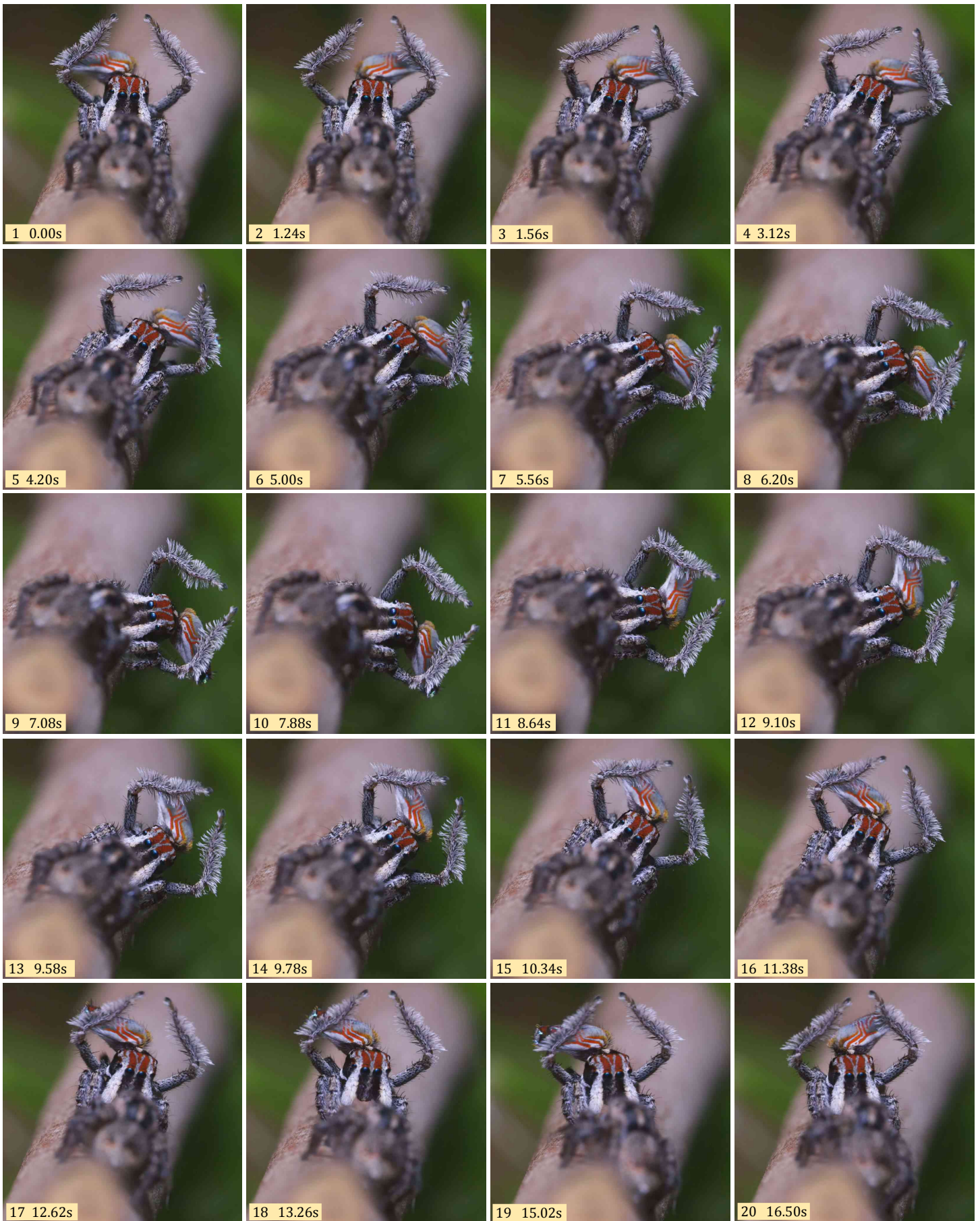
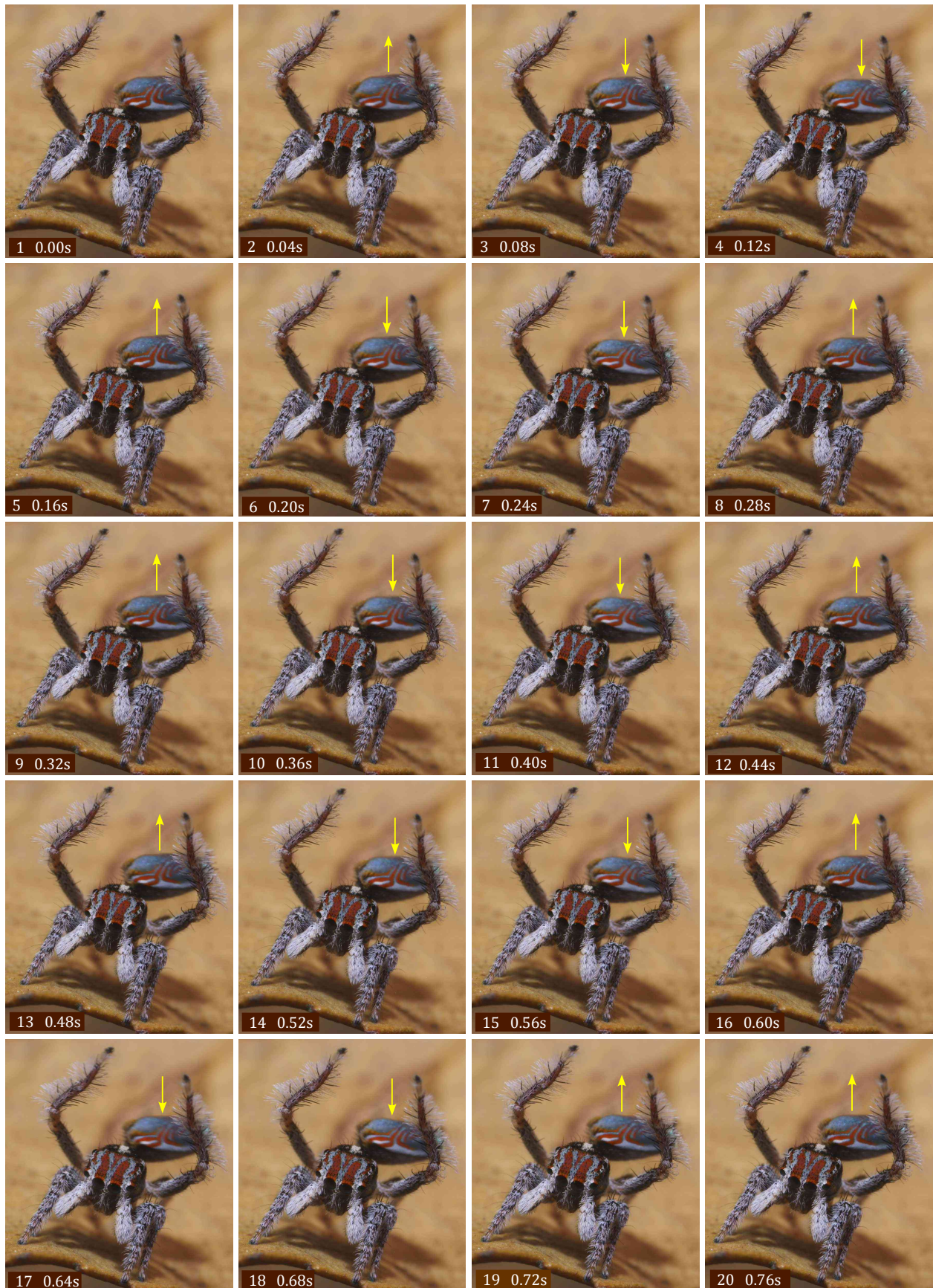


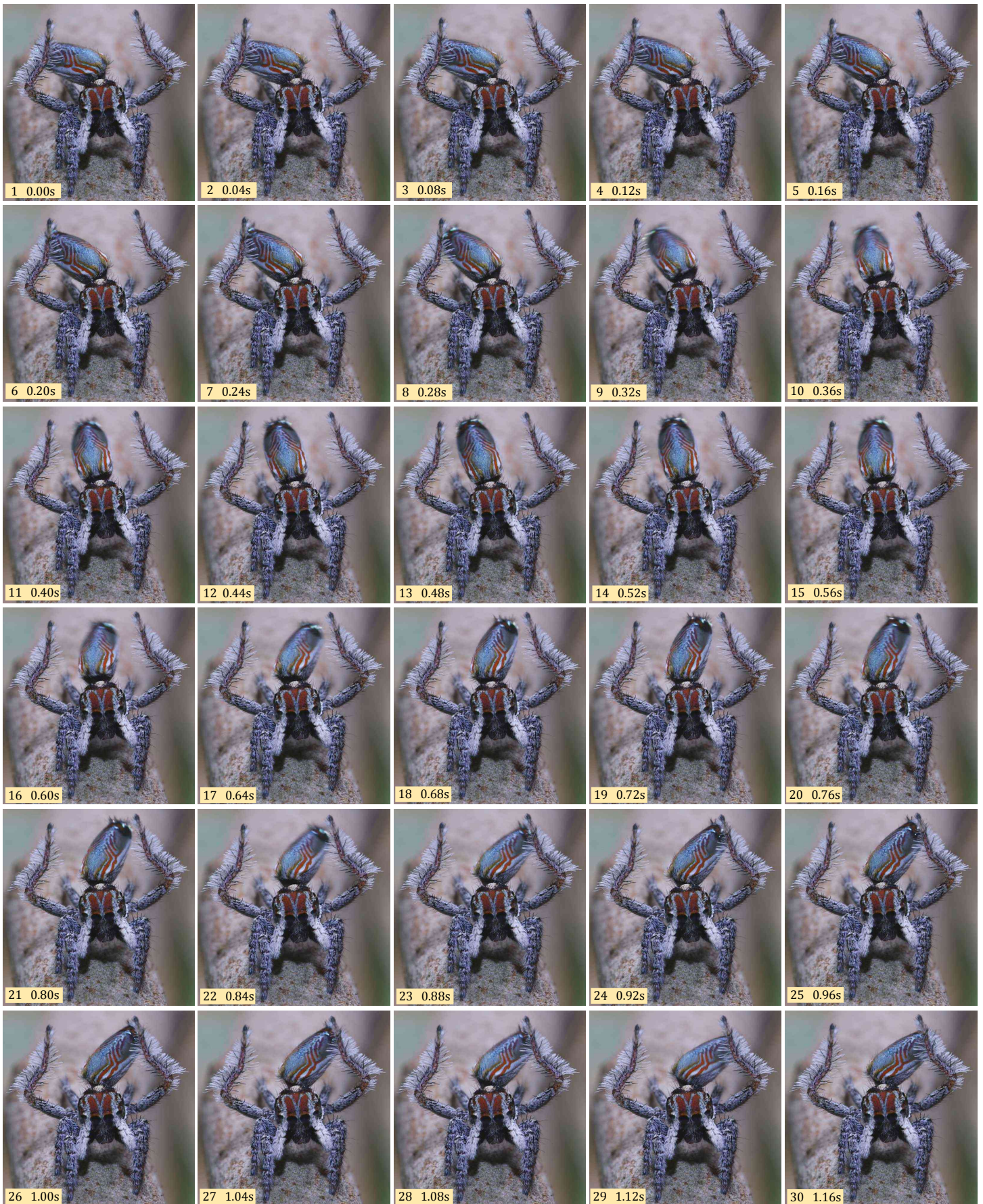
Figure 49. Sequential video frames (25 FPS) showing a female (foreground) closely following a male *Maratus electricus*.



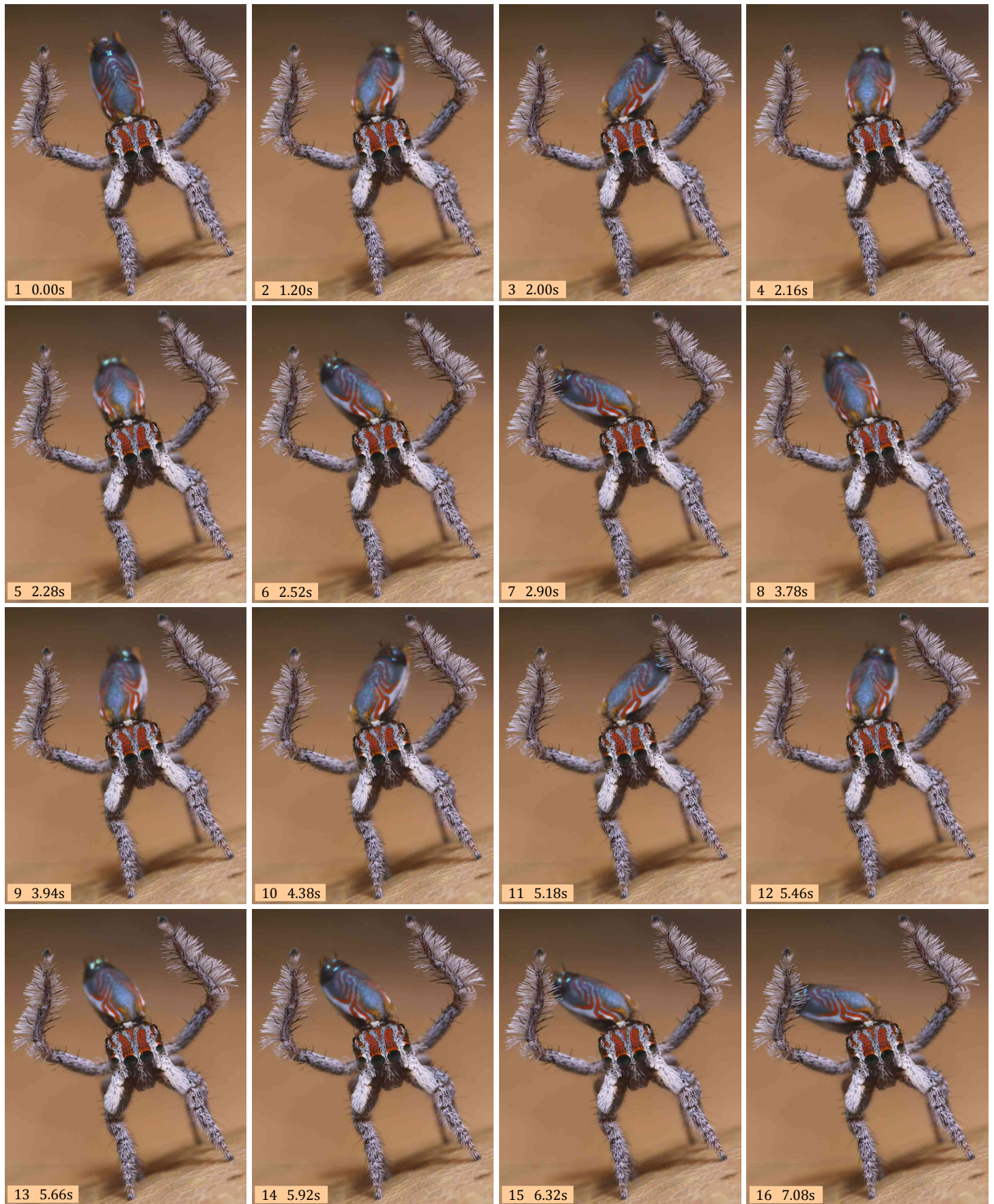
**Figure 50.** Consecutive video frames (25 FPS) showing "caliper" movement of legs III and moderate pedipalp flicker during the display of a male *Maratus electricus*. Arrows indicate movement relative to the preceding frame in this sequence. Caliper movement is easy to see in the video record but not so obvious in still frames like this.



**Figure 51.** Consecutive video frames (25 FPS) showing continuous (~6.6 cycles/s) movement or bobbing of the opisthosoma as it was held to one side during the display of a male *Maratus electricus*.

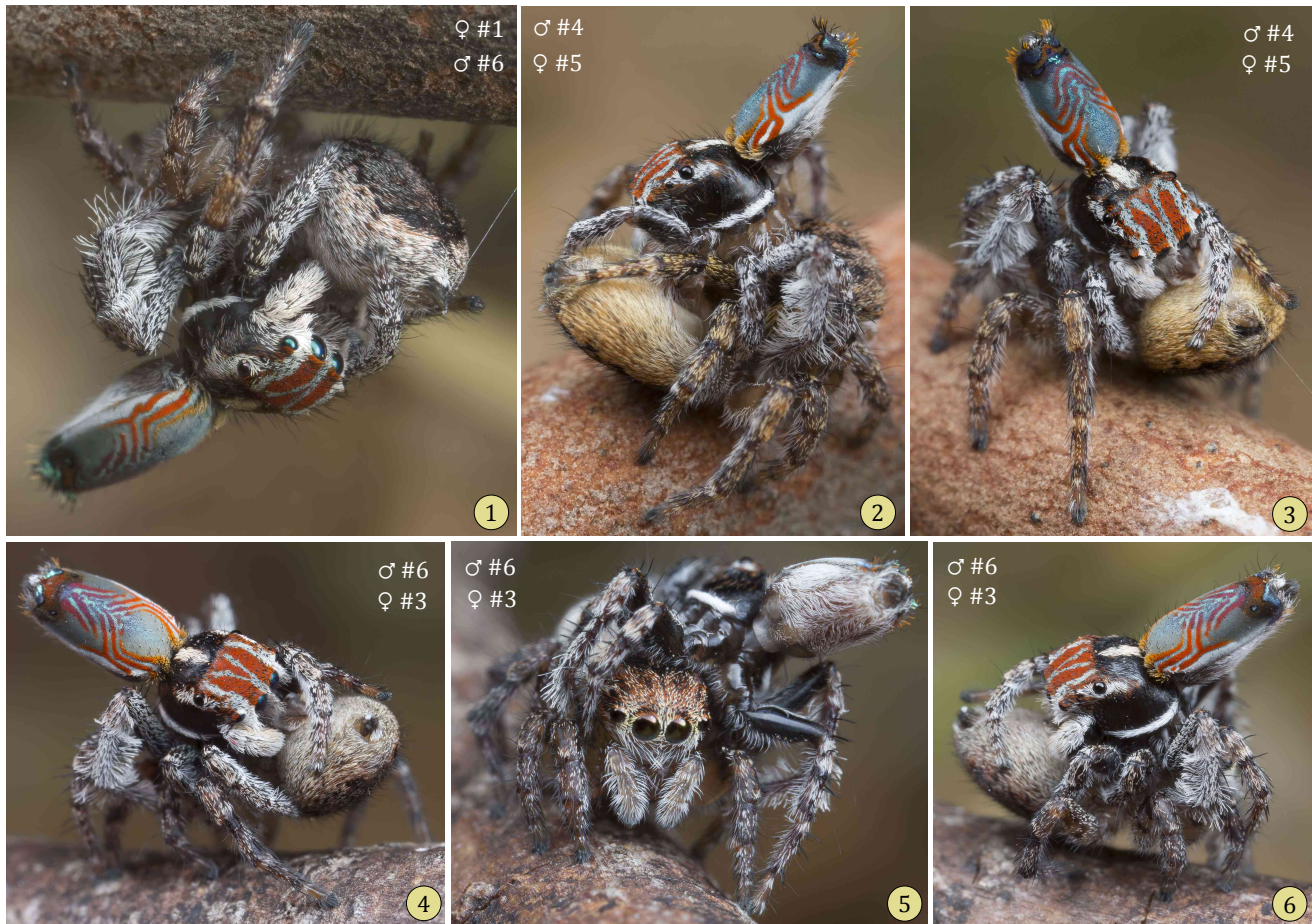


**Figure 52.** Consecutive video frames (25 FPS) showing rotation of the opisthosoma from the right to left side over 1.16s by a male *Maratus electricus* in place. Bobbing of the opisthosoma was continuous during this rotation.



**Figure 53.** Sequential video frames (25 FPS) showing  $\sim 3.5$  rotations ( $\sim 0.5/s$ ) of the opisthosoma as it was moved from one side to the other over  $\sim 7s$  by a standing male *Maratus electricus*. The opisthosoma was bobbed continuously as it was rotated.

**Mating.** Mating positions of *Maratus electricus* are shown in Figure 54. Like other *Maratus*, *M. electricus* commonly mate on the underside of twigs or other plant structures.



**Figure 54.** Mating positions of *M. electricus*. 2-6, Mating started in a hanging position beneath a twig that was rotated for better viewing.

**Habitat.** *Maratus electricus* was found on the banks of Lake Muir in Western Australia, among low-lying herbacious plants that covered the sandy soil in slightly elevated areas only meters away from the edge of the lake (Figure 55).

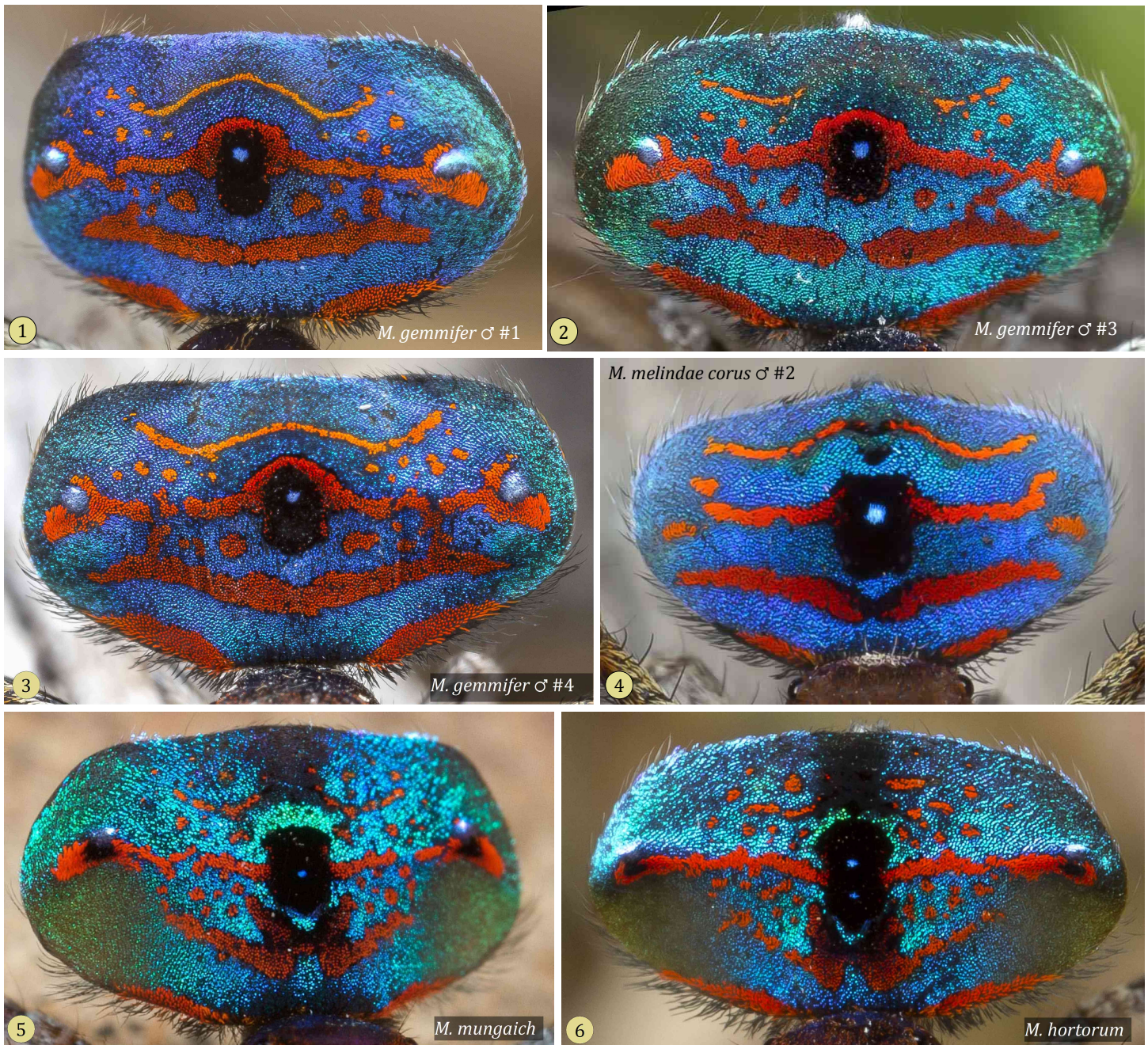


**Figure 55.** Habitat of *M. electricus* on the banks of Lake Muir, Western Australia. Higher ground in the foreground slopes down to a stand of white-barked *Melaleuca* trees standing in water at the edge of the lake.

***Maratus gemmifer*, new species**

*Type specimens.* The holotype male ( $\sigma$  #1), 3 paratype males ( $\sigma$  #2-4), and 1 paratype female ( $\text{♀}$  #1) were collected in *Banksia* woodland at Karnup Nature Reserve (32.371257°S, 115.827134°E, 8 SEP 2016, coll. D. Knowles). All types will be deposited in the Western Australian Museum, Perth.

*Etymology.* The species group name (*gemmifer*, Latin, m., adjective, English translation *bearing gems*) refers to the presence of a bright, iridescent gem-like spot on each lateral flap of the male fan.



**Figure 56.** Comparison of the extended fan of *M. gemmifer* with related members of the *mungaich* group. **1-3**, *M. gemmifer* from the type locality at Karnup Nature Reserve. **4**, *M. melindae corus* from the type locality for this subspecies at the Banksia Reserve (Verne Hill). **5**, *M. mungaich* from Mt. Dale, 46 km ESE of Perth. **6**, *M. hortorum* from Bungendore Park, 30 km SE of Perth.

*Diagnosis.* Six other species in the *mungaich* group have a large central black patch on their fan: *M. sarahae* Waldock 2013, *M. karrie* Waldock 2013, *M. mungaich* Waldock 1995, *M. madelineae* Waldock 2014, *M. melindae* Waldock 2013 and *M. hortorum* Waldock 2014. *M. sarahae* and *M. karrie* both have a wide central black patch on the fan with a blue transverse line at the center and a large black spot at the center of each flap, therefore cannot easily be confused with *M. gemmifer*. *Maratus madelineae* also can be easily distinguished from *M. gemmifer* by having the large unpaired black patch in a more posterior position. The differences between *M. gemmifer* and the remaining species are more subtle (Figure 56). *Maratus mungaich* has a small black spot near the centre of each flap, bordered by another spot of bright, blue-white iridescent scales to the rear, whereas *M. gemmifer* lacks the small black spot and instead has a larger patch of blue-white iridescent scales in this position. *Maratus melindae* has no spots at all in that position. *Maratus hortorum* can be distinguished from *M. gemmifer* by having two blue spots within the central black patch, a feature that also distinguishes this species from all other species in the *mungaich* group. *M. gemmifer* may also be separated from *M. melindae* *corus* by its lack of a more pronounced dorsomedial white tract behind the eye region.

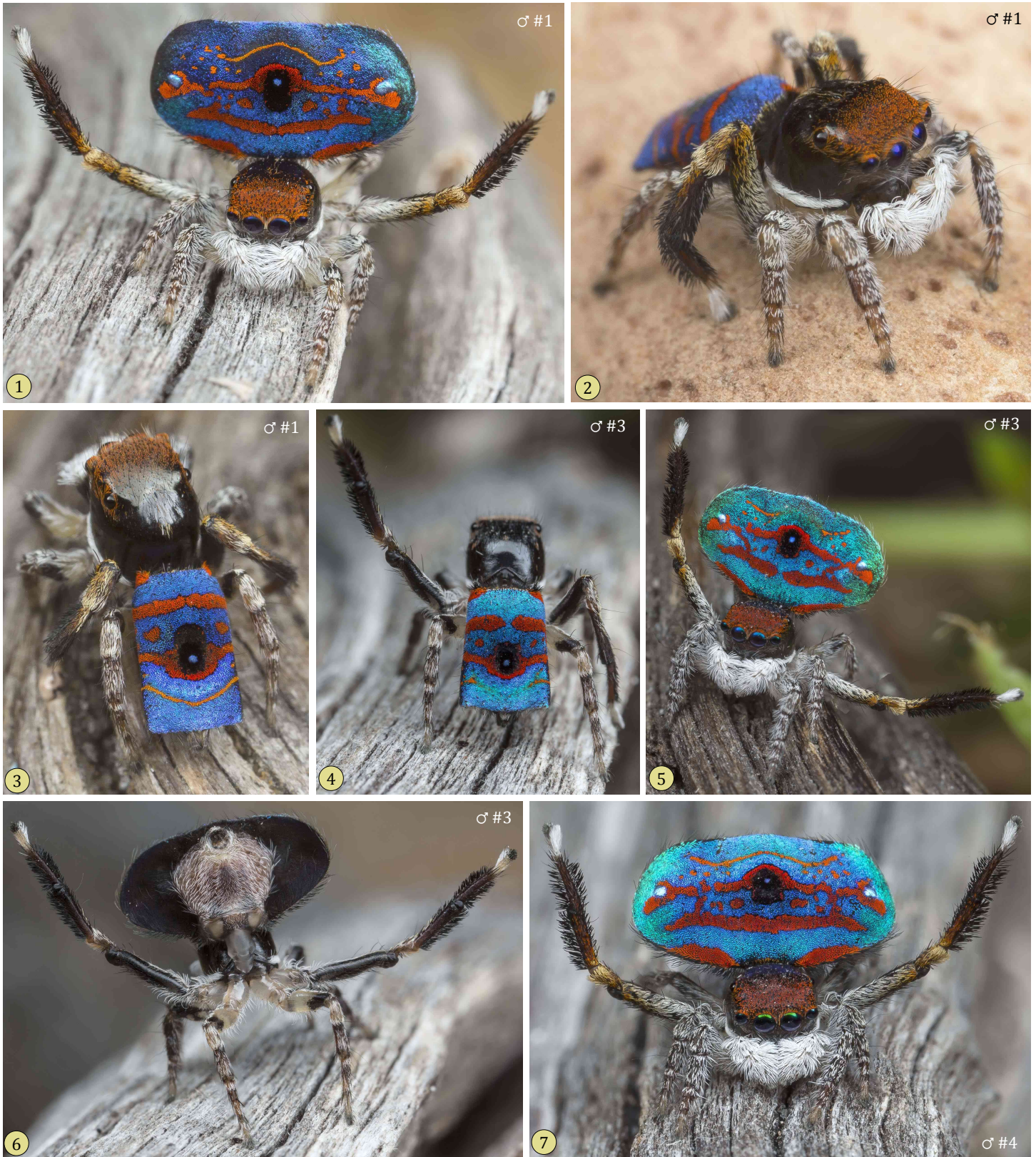
*Description of male* (Figures 57-60). Males were 4.7-5.1 mm in length (n=4).

The clypeus is dark with long off-white setae projecting forward near the median over the black, glabrous chelicerae. The eye region has a uniform, dense cover of dark orange or red-brown scales. Behind this the carapace is mostly black and glabrous except for the presence of scattered white to off-white scales along a middorsal tract that may extend half-way from the eye region to the rear of the carapace. The sides of the carapace are black and glabrous except for a narrow marginal band of white scales along each side. The PME are closer to the PLE than to the ALE.

The pattern of scales that cover the dorsum of the large fan of *M. gemmifer* resembles that of other members of the *mungaich* group with respect to the presence of figures comprised of red or orange pigmented scales on a background of blue to blue-green iridescent scales, but also has distinctive features identified previously in the *diagnosis* (Figure 56). Notably these include the presence of red scales that border the posterior and lateral margins of the central black area of the fan, a relatively large blue spot behind the center of that black area, and a small bright spot of blue-white iridescent scales at the center of each flap. The fan is moderately fringed with black setae, particularly along the anterior margin. The large flaps are black on the underside (Figure 57:6).

Below, the opisthosoma is light-brown to brown with a cover of many white to off-white setae (Figure 57:6, Figure 60). White setae surround the black spinnerets. The sternum and labium are black. The coxae and trochanters of the legs are grey or light brown and mostly translucent, covered with many scattered white setae. Legs I and II are shorter than legs III and IV, and legs III are by far the longest. Legs I, II, and IV are brown with a cover of white scales and other setae. Viewed from the front, legs III are decorated with long white setae along most of the length of each femur and off-white to orange or gold setae from the distal femur to the patella and proximal tibia. The posterior side of each femur III is black and glabrous. The tibia and metatarsus of leg III are dark brown and bear dorsal and ventral fringes of long black setae. Each tarsus III is covered with long white setae that extend over the grey setae of the foot pad.

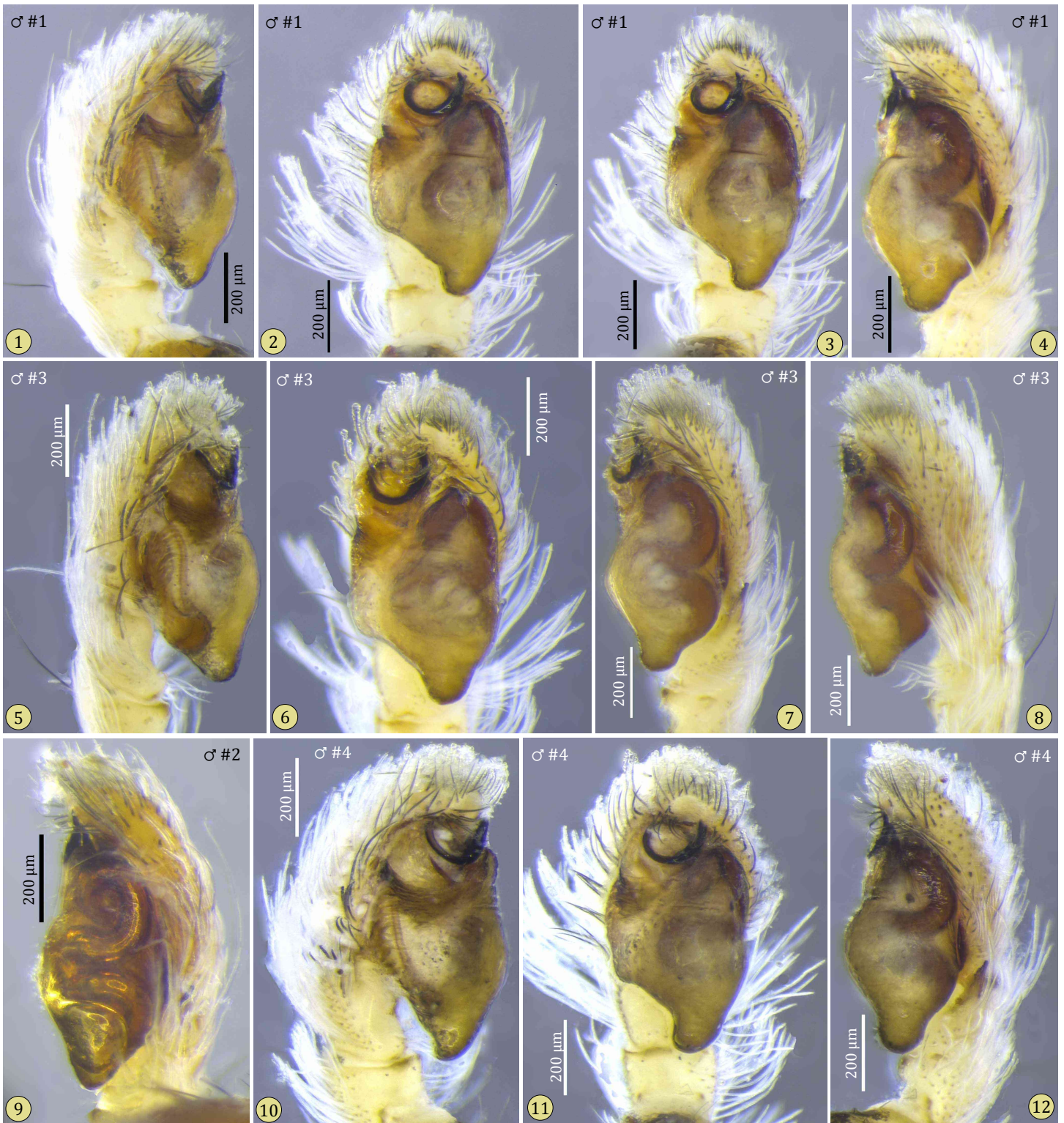
The dorsum of each pedipalp has a dense cover of long white setae. Below, the pedipalps are brown or dark brown. The pedipalp resembles that of many other *Maratus* species, with a shorter pointed apex behind a larger and longer pointed apex of the embolus (Figure 59).



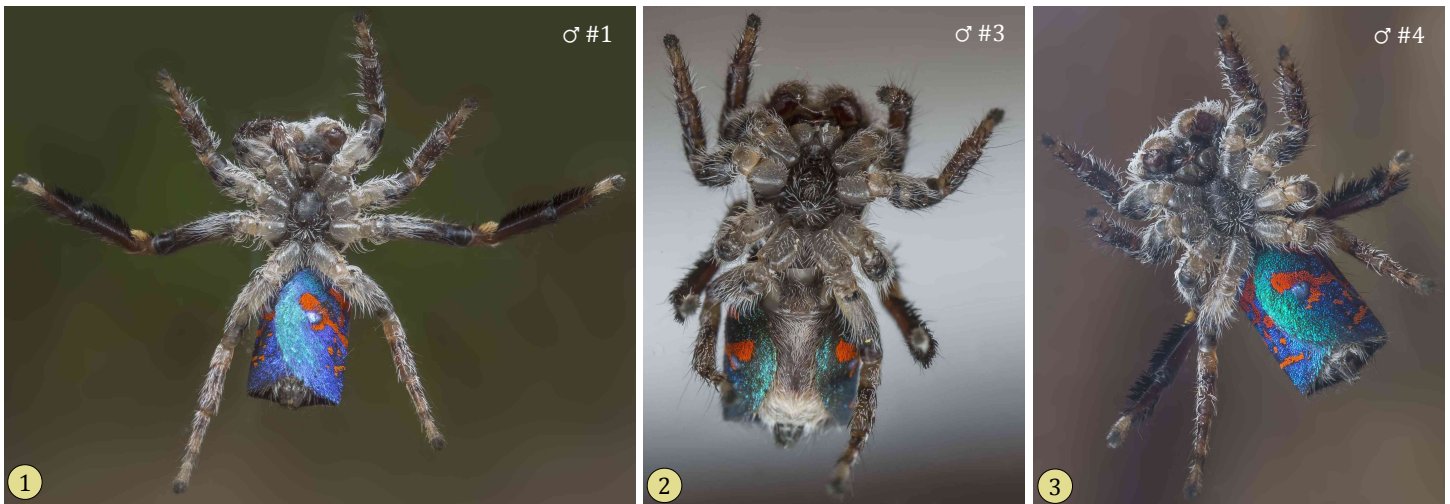
**Figure 57.** Three adult male *Maratus gemmifer*. **1, 5, 7,** Facing female with elevated and extended fan during courtship display. **6,** Rear view of male with elevated fan showing extension of the pedicel.



Figure 58. Two adult male *Maratus gemmifer* preserved in alcohol.



**Figure 59.** Medial to lateral views of the left pedipalp of four adult male *Maratus gemmifer*. Lateral views (4, 8, 9, 12) show the two apices of the embolus. The outer apex is larger and extended beyond the tip of the inner apex.



**Figure 60.** Ventral view of three adult male *Maratus gemmifer*. The long flaps of the fan overlap when completely folded around the opisthosoma (1, 3).

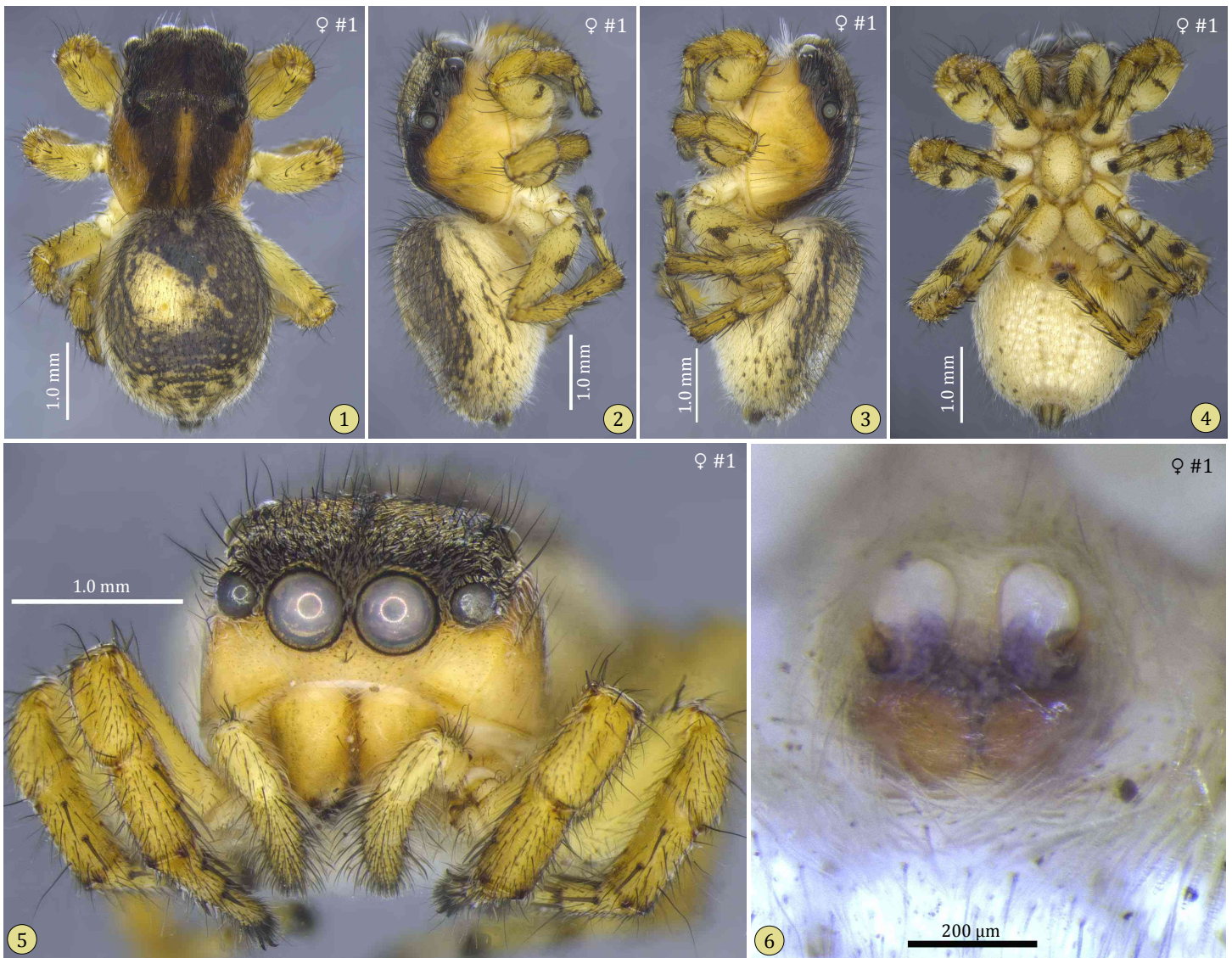
*Description of female* (Figures 61-62). The female paratype is 5.1 mm in length and quite unremarkable without obvious field marks to enable identification to species. The clypeus is light brown and translucent, bearing many long white to off-white setae directed ventromedially over the brown and mostly glabrous chelicerae. The eye region is covered almost uniformly with brown scales except for a dark brown line extending from the middle of the eye region to the rear. Behind the eye region the carapace is black and glabrous on either side of a central tract of off-white scales extending at least half-way to the rear margin. On each side of the carapace a wide band of brown to off-white scales and setae extends from the front to rear below the eyes, but below this the carapace is brown, glabrous, and translucent with no marginal band. The PME are slightly closer to the PLE than to the ALE.

The dorsum of the opisthosoma is dark brown with a cover of shorter brown to off-white scales, bordered by an indistinct black line on either side that separates this dark area from the off-white lateral margins and venter. The spinnerets are brown. Legs I and II are shorter and legs III are IV are longer, with legs III slightly longer than legs IV. Legs and pedipalps are brown and covered with scattered white to off-white scales and setae. The epigynum (Figure 62:6) is unremarkable, comprised of a pair of large nearly circular fossae anterior to a pair of large posterior spermathecae. Sclerotized ducts anterior to each spermatheca can be seen behind the posterior part of each fossa.

*Female display.* As previously reported for other *Maratus* species, this female reared her opisthosoma and extended her legs III in a display that appeared to represent rejection of a male in the vicinity (Figure 61:6-11).

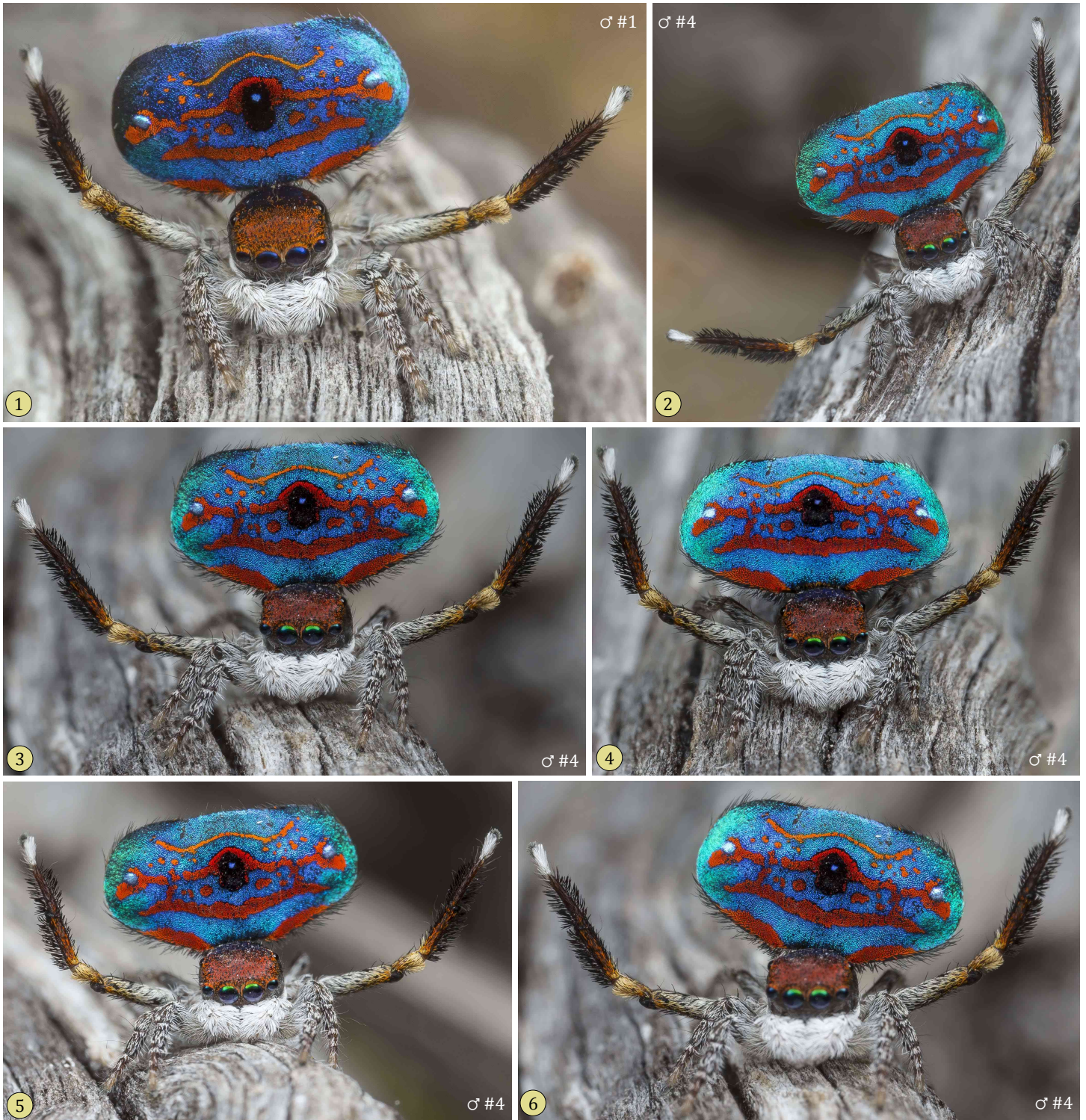


Figure 61. Adult female *Maratus gemmifer*. 6-11, Elevation of opisthosoma and extension of legs III during display.



**Figure 62.** Adult female *Maratus gemmifer* preserved in alcohol.

*Courtship display* (Figures 63-66). The display of *Maratus gemmifer* males is relatively simple but spectacular because of the large size of the fully extended fan. In a fixed position the male will face the female with legs III extended and partly flexed to cradle the elevated and expanded fan. In this position the fan is rotated quickly to one side through  $\sim 20^\circ$ , then returned to a center position about 0.08s later (Figures 65-66). About one second later the fan may be rotated quickly to the opposite side and then returned to the center in the same manner. When stepping from side to side in front of a female, a male may either hold the fan in place, or rotate it from left to right more quickly through a smaller amplitude (amplitude  $\sim 10^\circ$ , rate 8-12/s). When side-stepping the leading leg is generally raised and the trailing leg is lowered. During this display the pedipalps are held in place in front of the chelicerae, and movement of the extended legs III is minimal.



**Figure 63.** Courtship display by two male *Maratus gemmifer* facing a female. Note the small spot of very bright, iridescent blue-white setae at the center of each lateral flap of the fan. Legs III are held in place to frame this display and all movement is associated with side to side rotation of the fan or side-stepping in front of a female.

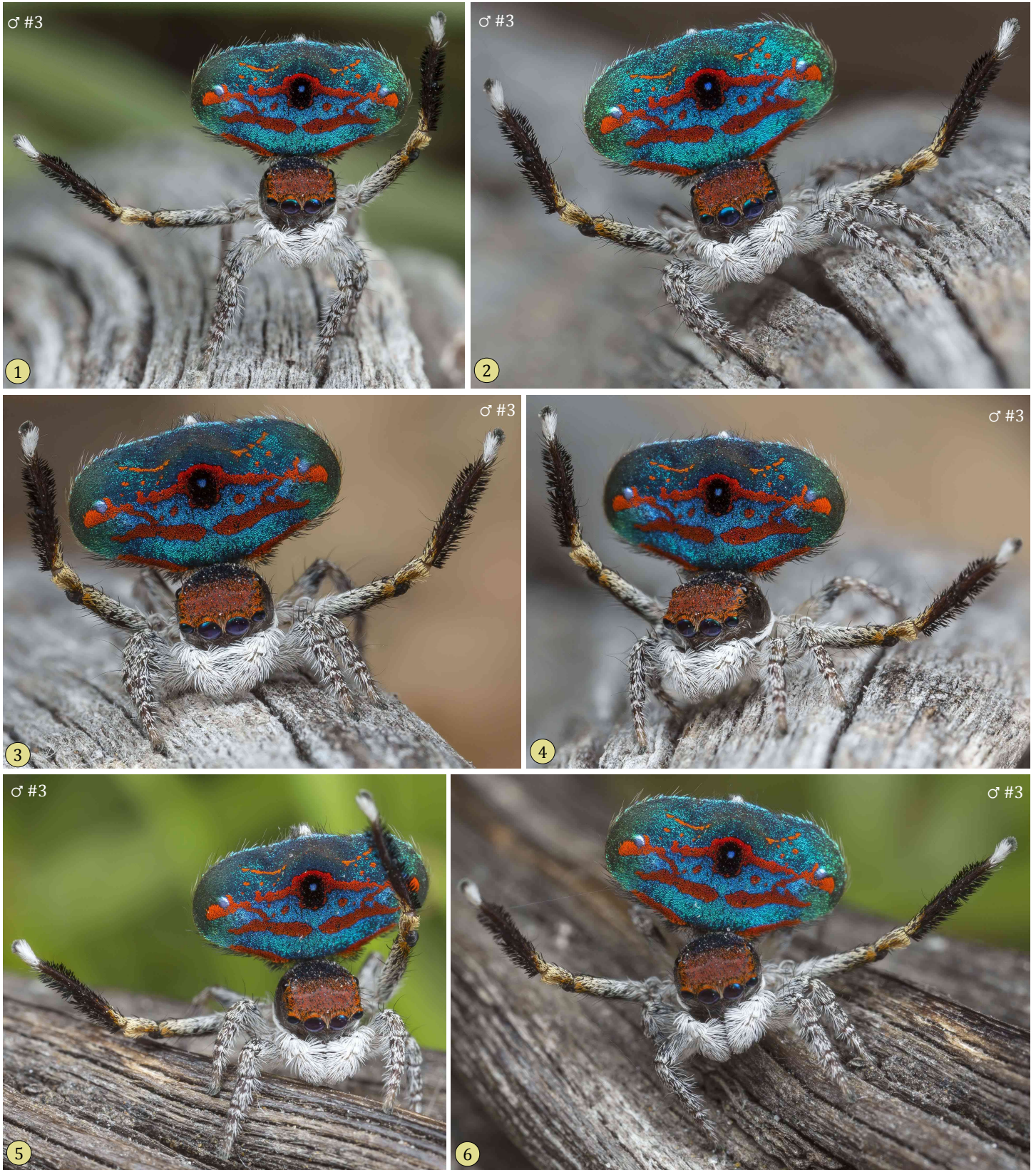
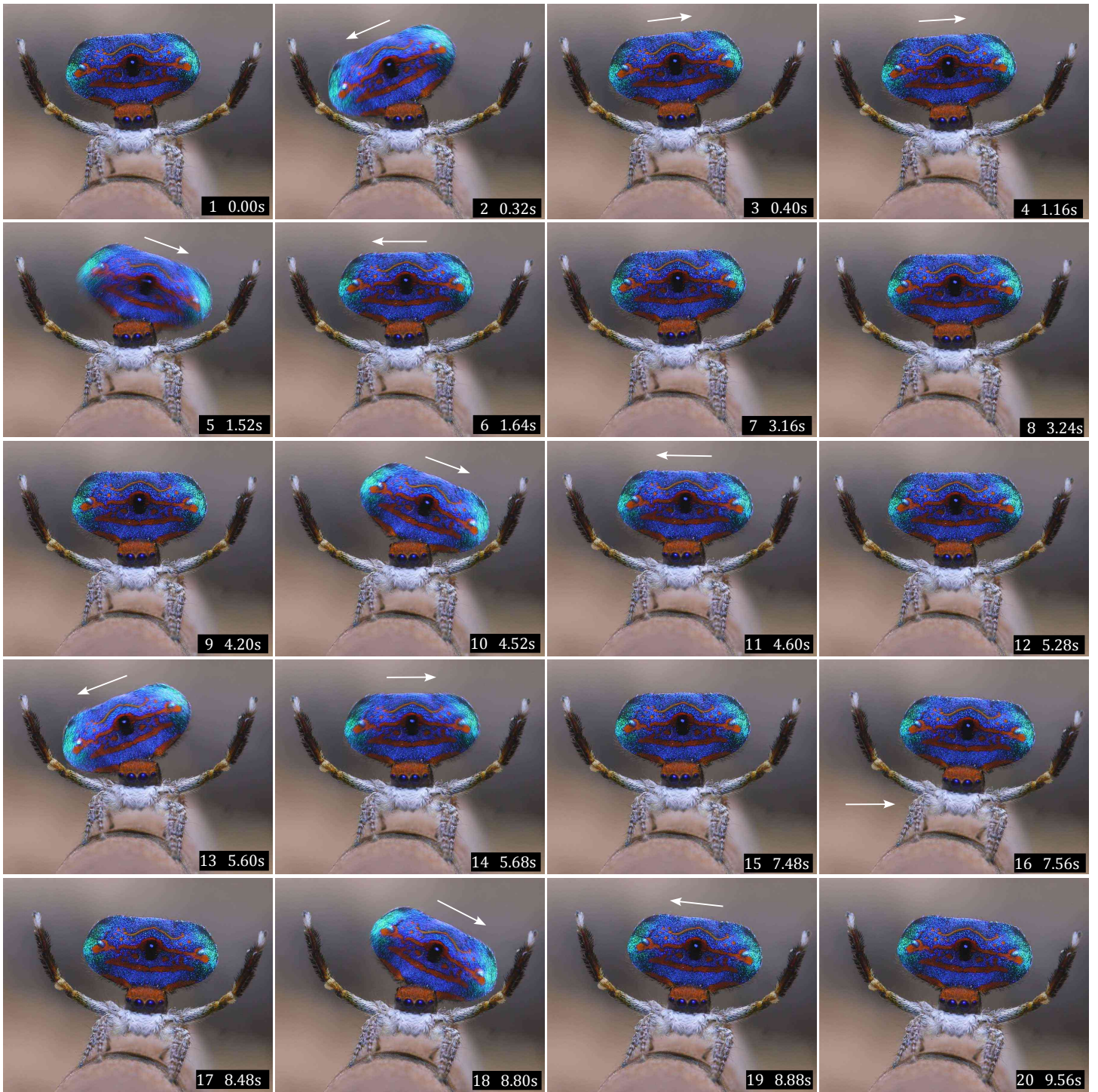
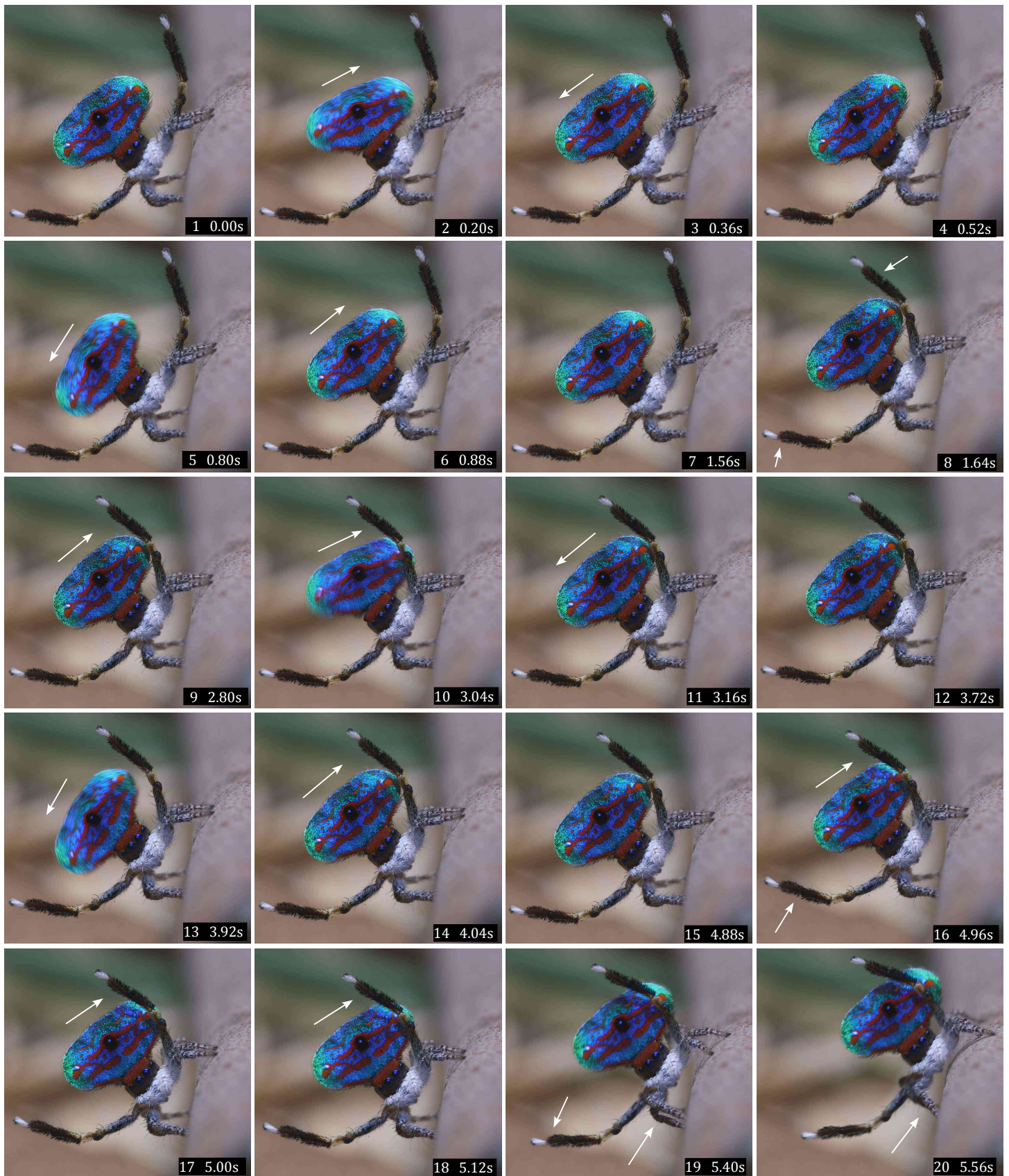


Figure 64. Courtship display by a male *Maratus gemmifer* facing a female.



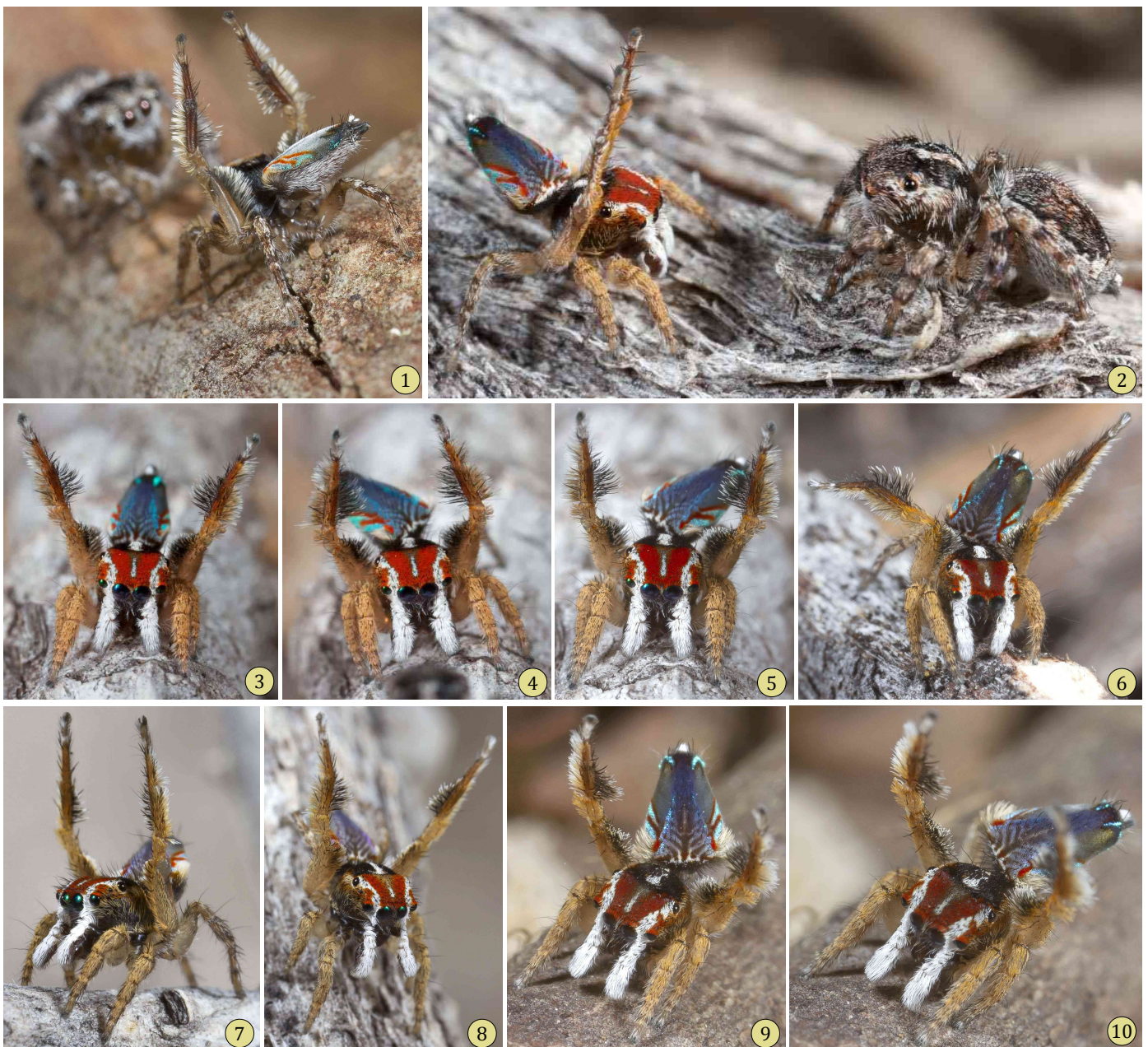
**Figure 65.** Sequential but not consecutive frames from a video (25 FPS) of courtship display by a male *Maratus gemmifer* facing a female. Arrows indicate rotation of the fan or side-stepping (16 only) relative to the preceding frame. Note rotation of the fan to one side (10) and return to a centered position (11), followed by rotation to the other side (13) and return to a centered position (14).



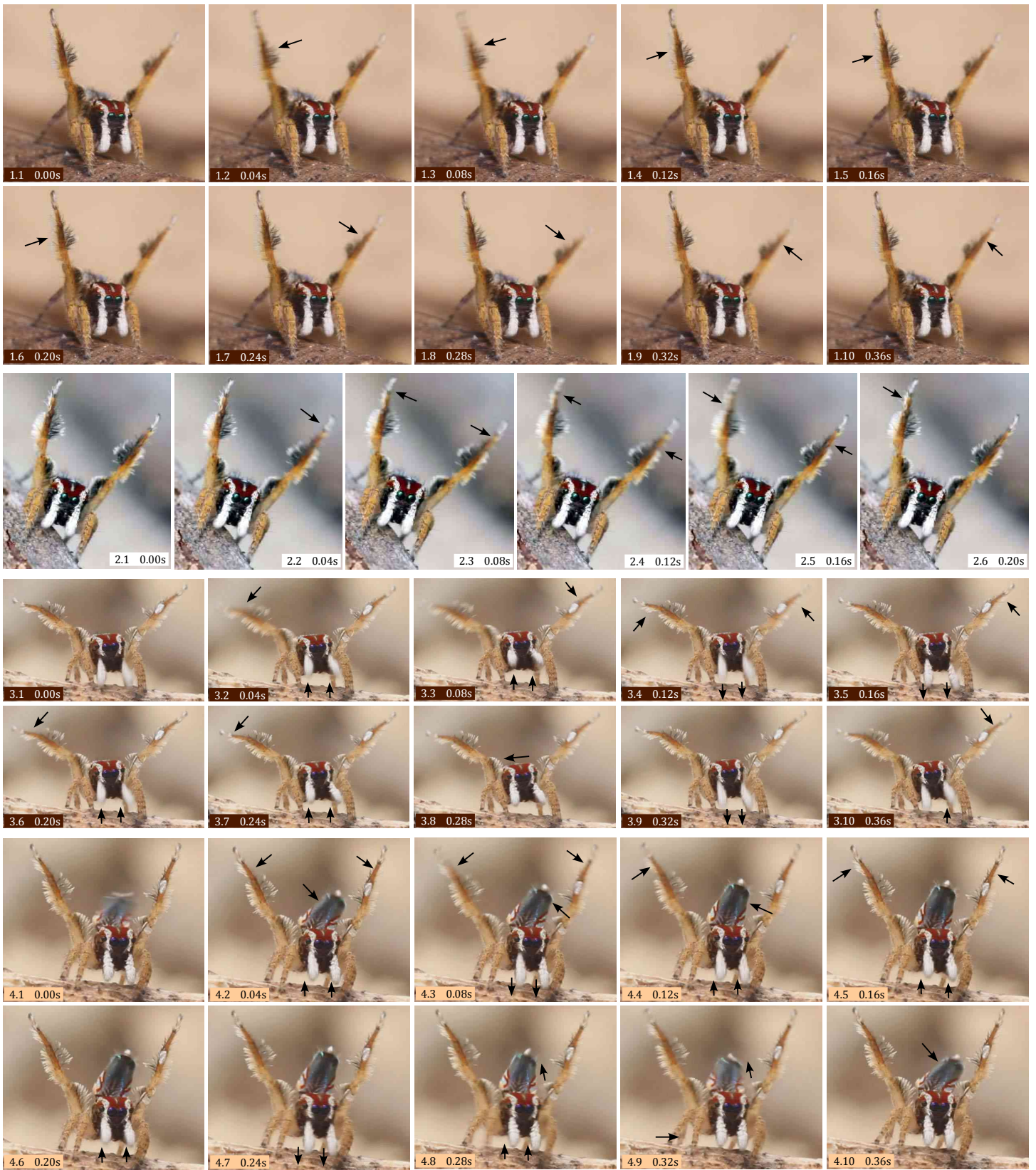
**Figure 66.** Sequential but not consecutive frames from a video (25 FPS) of courtship display by a male *Maratus gemmifer* facing a female. Arrows indicate rotation of the fan, movement of the extended legs III, or side-stepping relative to the preceding frame. When the male side-stepped in front of a female, the leading leg III was raised and the trailing leg III lowered as shown here (18-20).

***Maratus linnaei* Waldock 2008**

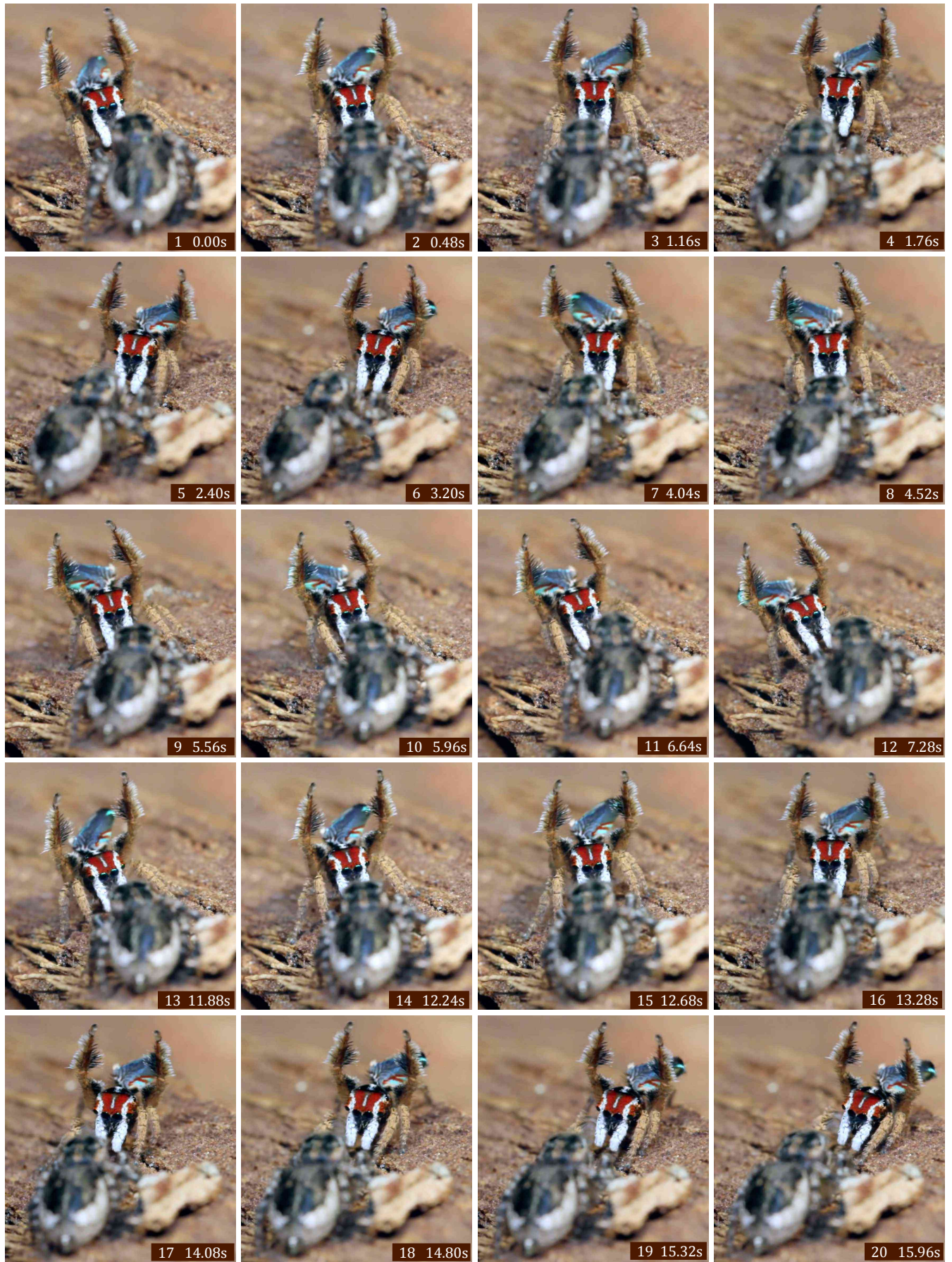
*Maratus linnaei* was first found at Two Peoples Bay Nature Reserve in Western Australia (Waldock 2008). We have also seen it at two other locations near Denmark in Western Australia: Rudyard Beach Nature Reserve (34.9797°S, 117.4217°E) and Mt. Lindesay National Park (34.8454°S, 117.3986°E). We include this account of the courtship display of *M. linnaei* (Figures 67-70) for purposes of comparison with the closely related *M. electricus*. As in that species, the female *M. linnaei* closely follows the male display from a distance of ~4-5 mm (Figures 67, 69). Males may advertise their presence by waving their extended legs III with or without elevation of the fan (Figure 68). As in *M. electricus*, the opisthosoma is turned in the direction of movement and bobbed continuously as a male side-steps in front of a female (Figure 69). Continuous bobbing of the opisthosoma in place was recorded at ~7.3 cycles/s (Figure 70). Legs III are held in a caliper-like position as the fan is waved and bobbed behind it during a close approach.



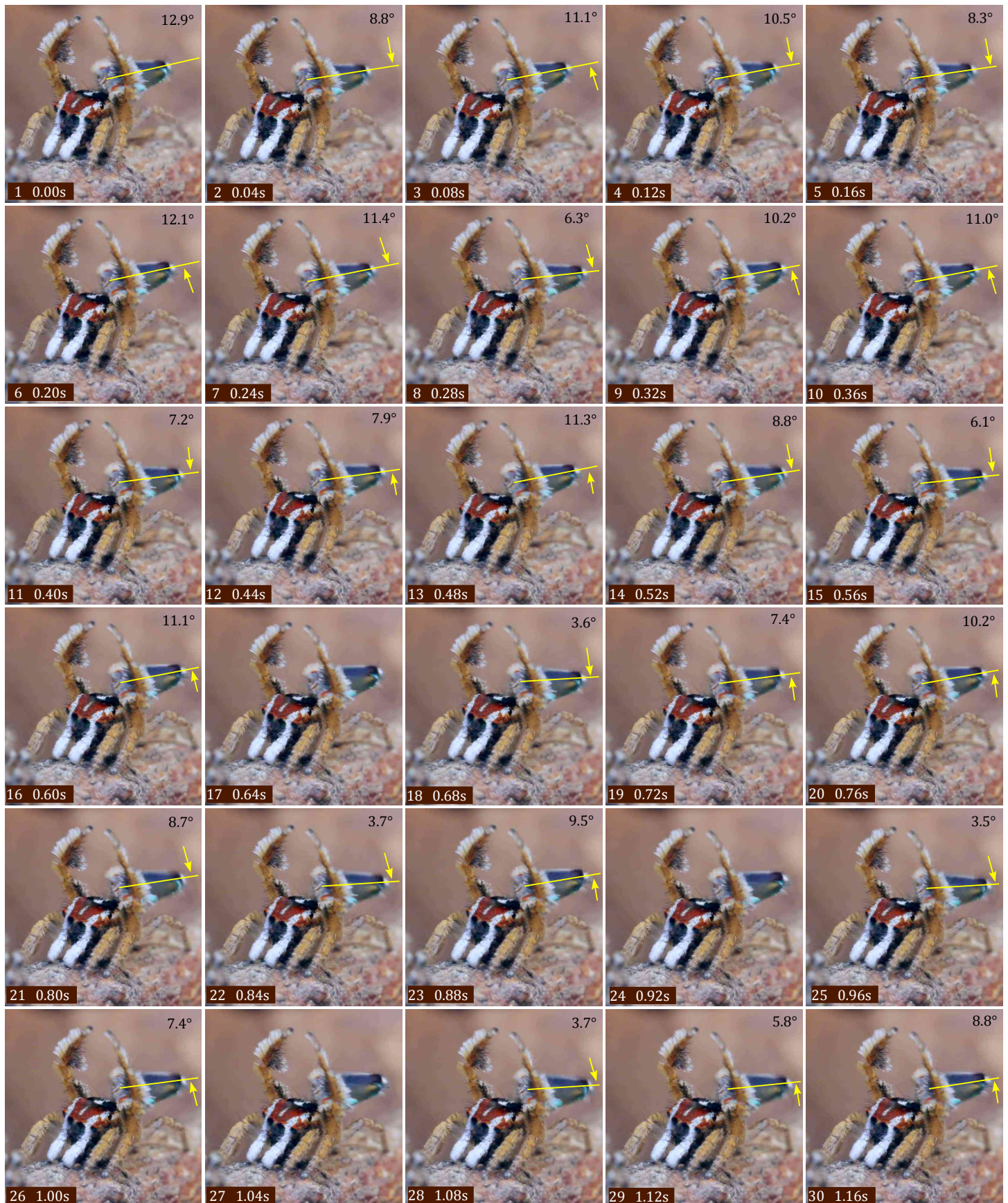
**Figure 67.** Courtship display by male *Maratus linnaei*. Legs III were held in a caliper-like position when the male waved and bobbed the opisthosoma near an attentive female.



**Figure 68.** Four series (1.1-1.10, 2.1-2.6, 3.1-3.10, 4.1-4.10) of consecutive frames from 25 FPS video clips of a male *Maratus linnaei*. **1**, Alternating slight wave of legs III. **2**, Bilateral scissors movement. **3**, Waving legs III with pedipalp flicker. **4**, Bobbing of the elevated opisthosoma with slight waving of legs III and pedipalp flicker. Arrows indicate movement of legs, pedipalps, or the opisthosoma, or side-stepping (4.9 only) relative to the preceding frame. All of these movements appear to represent advertisement to get the attention of a nearby female. When the male is close to an attentive female legs III are held in a caliper-like position (Figures 69-70).



**Figure 69.** Sequential frames from a 25 FPS video showing a female *M. linnaei* (foreground) closely following the display of a male stepping from side to side. The opisthosoma was turned in the direction of this stepping.



**Figure 70.** Consecutive frames from a 25 FPS video of a male *M. linnaei* continuously bobbing the opisthosoma at a rate of  $\sim 7.3$  cycles/s as it was held to one side in front of an attentive female. Arrows indicate the direction of rotation of the opisthosoma relative to the preceding frame, and the slope of the yellow line is given in the upper right corner of each frame.

***Maratus melindae corus*, new subspecies**

This is a subspecies of *M. melindae* Waldock 2013.

*Type specimens.* The holotype (♂ #1) and paratype (♂ #2) males were collected at the Banksia Reserve, Verne Hill (30.39397778°S, 115.1803861°E, 10 SEP 2016, coll. D. Knowles). This is an area of *Banksia* woodland, dominated by *Banksia prionotes*. Both types will be deposited in the Western Australian Museum, Perth.

*Etymology.* The subspecies name (*corus*, Latin, m., noun in apposition, English translation *northwest wind*) refers to the relative direction of the locality for this subspecies to the northwest of the type locality for *M. melindae*.

*Diagnosis.* *Maratus melindae corus* closely resembles the type of *M. melindae* Waldock 2013, here designated as *M. melindae melindae*, but both may be separated as follows. In *M. melindae melindae* (see Waldock 2013) the black central patch is bracketed by red scales along its entire length while in *M. melindae corus* this is not the case and the red transverse band meets the black patch without wrapping around it. Other characters by which the two subspecies differ are the small black mark just posterior to the large black patch (arrow in Figure 71.2) and the wide white tract of the middorsal carapace, both present in *M. melindae corus* but not described for *M. melindae melindae*. Both subspecies have been found far apart (Figure 1) at locations that differ in climate and habitat. Other species that *M. melindae* could be confused with are *M. mungaich*, *M. hortorum* and *M. gemmifer*. However, all three have a black or iridescent blue-white spot at the center of each lateral flap of the fan (Figure 56) which is absent in both subspecies of *M. melindae*. Females of both subspecies are unknown but can be expected to resemble females of related species in the *mungaich* group, including the *M. gemmifer* female described here.

*Description of male* (Figures 71-73). Males were 3.8-4.6 mm in length (n=2). This description pertains to the appearance of living males. See Waldock (2013) for a description of *M. m. melindae* preserved in alcohol. The clypeus is black with off-white setae projecting forward anteromedially. The chelicerae are black. The eye region including the carapace below the lateral eyes and to the rear of the PLE is covered with dark brown to dark red-brown scales. Otherwise the carapace is mostly black and glabrous except for a median tract of white scales that extends from the rear margin of the eye region half-way to the posterior margin. On either side of the carapace there is a marginal band of white scales and other setae. The PME are closer to the PLE than to the ALE.

The fan of the dorsal opisthosoma (Figure 71:2) is wide with a background cover of densely packed iridescent blue to blue-green scales. At the center of the fan is a large, subrectangular black patch within which is a smaller but still relatively large (for the *mungaich* group) light-blue spot, situated to the rear of the center of that large black patch. Behind the large black patch is a smaller black mark (arrow, Figure 71:2). From front to rear the fan is crossed by four bands comprised of tightly-packed bright red pigmented scales: a band broken into right and left parts along the anterior margin, a wider band anterior to the black patch, a band broken into two right and two left parts separated by the central black patch and contacting the posterior half of that patch on either side, and a narrow, curved posterior band. There is a small tuft of white colular setae above the black spinnerets.

Legs I and II are shorter than legs III and IV, and legs III are by far the longest. Legs I-II and IV are covered with white scales and other setae. Legs III are decorated as follows: femur black with cover of white to off-white setae in front, patella brown with black ventral fringe, tibia and metatarsus black with black dorsal and ventral fringes, and tarsus covered with long white setae extending over the grey foot pads.

Pedipalps are covered with long bright white setae dorsally. Structure of the pedipalps (Figure 73), with a larger outer apex of the embolus and a shorter inner apex, is unremarkable and typical for members of the *mungaich* group.



**Figure 71.** Two adult male *Maratus melindae corus*. 2, The small black mark (arrow) and limited contact of the third transverse band of red scales with the large central black spot distinguish this subspecies.

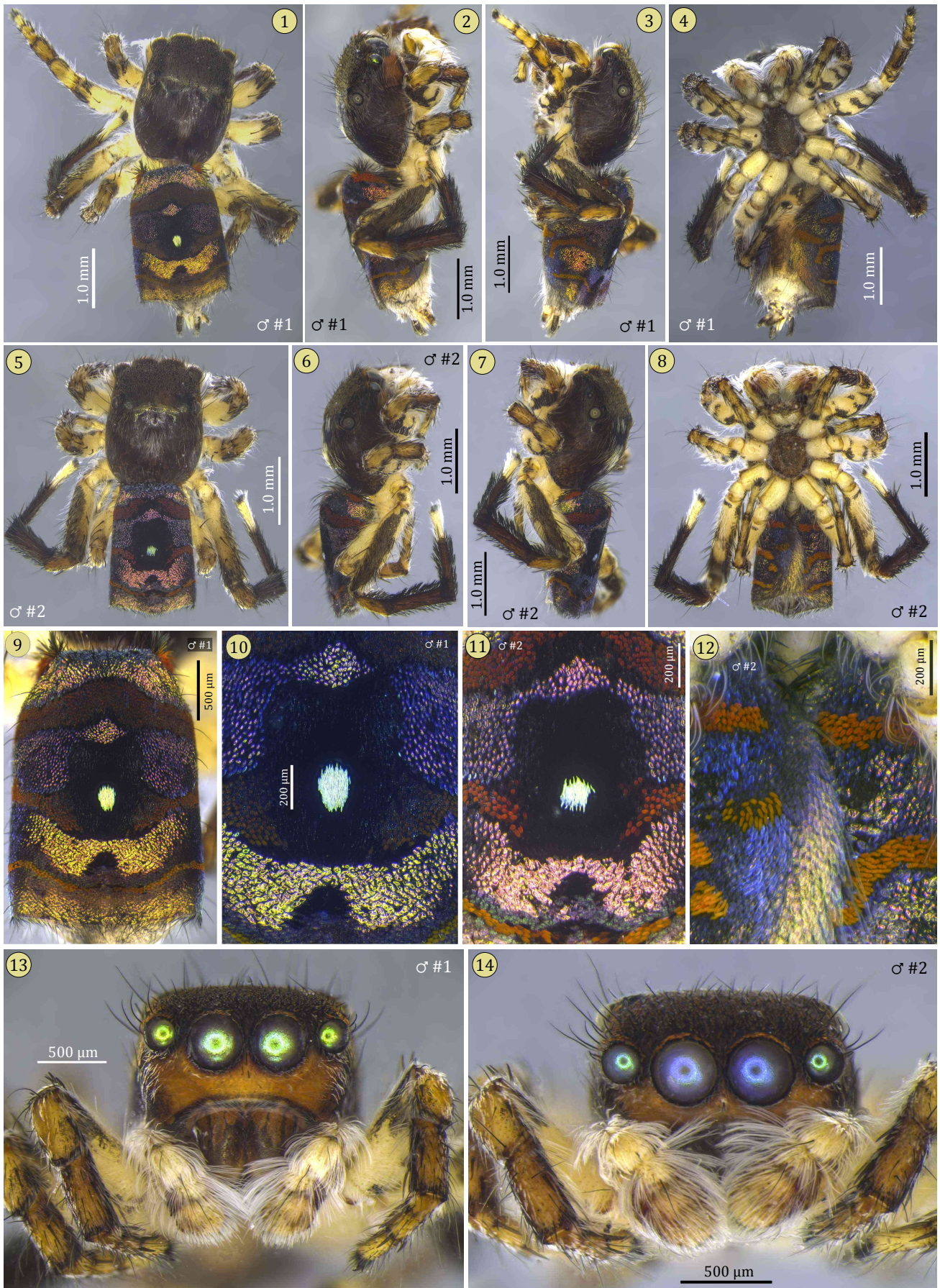
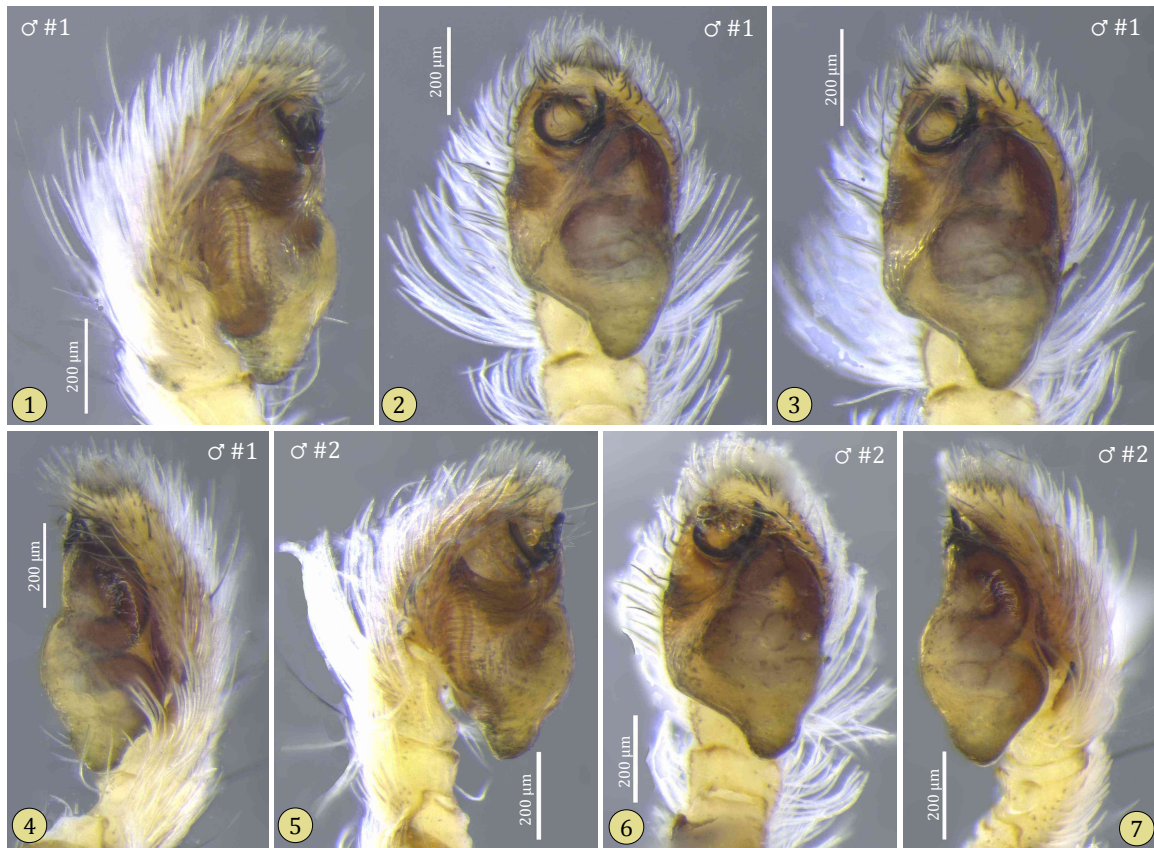


Figure 72. Two male *M. melindae corus* preserved in alcohol. 9-12, Detailed views of scales covering the fan.



**Figure 73.** Medial to lateral views of the left pedipalp of two male *M. melindae corus* preserved in alcohol.

*Courtship display* (Figures 74-76). As with other members of the *mungaich* group, the elevated and expanded fan of *M. melindae corus* is waved behind the raised and extended legs III as the male displays in place or steps from side to side in front of a female. Compared to *M. gemmifer* which holds legs III well to the side during courtship display to present the gem-like spots on the lateral flaps, *M. melindae corus*, lacking those spots, includes more active semaphore (raising and lowering) movement of legs III in this display and side to side movements of the fan were less regular and less pronounced (Figures 75-76).

Courtship display by males of several species in the *mungaich* group is compared in Table 1. This comparison supports our view that *M. avibus* is closely related to *M. caeruleus*, and *M. gemmifer* is closely related to *M. mungaich*.

**Table 1.** Courtship display by males in the *mungaich* group of the genus *Maratus*. The courtship behaviour of *M. hortorum* Waldock 2014, *M. karrie* Waldock 2013, *M. madelineae* Waldock 2014, and *M. melindae melindae* Waldock 2013 has not been described.

species	description of courtship display (fan dance only)	references
<i>M. avibus</i> Otto & Hill 2014	fan encircled or tightly bracketed with flexed legs III, fan and legs III waved quickly from side to side	Otto 2014; Otto & Hill 2014
<i>M. bubo</i> Otto & Hill	fan encircled or tightly bracketed with flexed legs III held in place, fan waved quickly from side to side as the male side-steps	Otto & Hill 2016
<i>M. caeruleus</i> Waldock 2013	like <i>M. avibus</i>	Otto 2015
<i>M. gemmifer</i> sp. nov.	discrete left then right waves of fan with legs III extended and held in place	this paper
<i>M. melindae corus</i> ssp. nov.	active semaphore movement (raising and lowering) of legs III with less frequent and less pronounced waving of the fan from side to side	this paper
<i>M. mungaich</i> Waldock 1995	like <i>M. gemmifer</i>	Otto 2013; Otto & Hill 2014
<i>M. sarahae</i> Waldock 2013	rapid movements of extended legs III and pedipalp flicker as fan is waved from side to side	Otto & Hill 2014

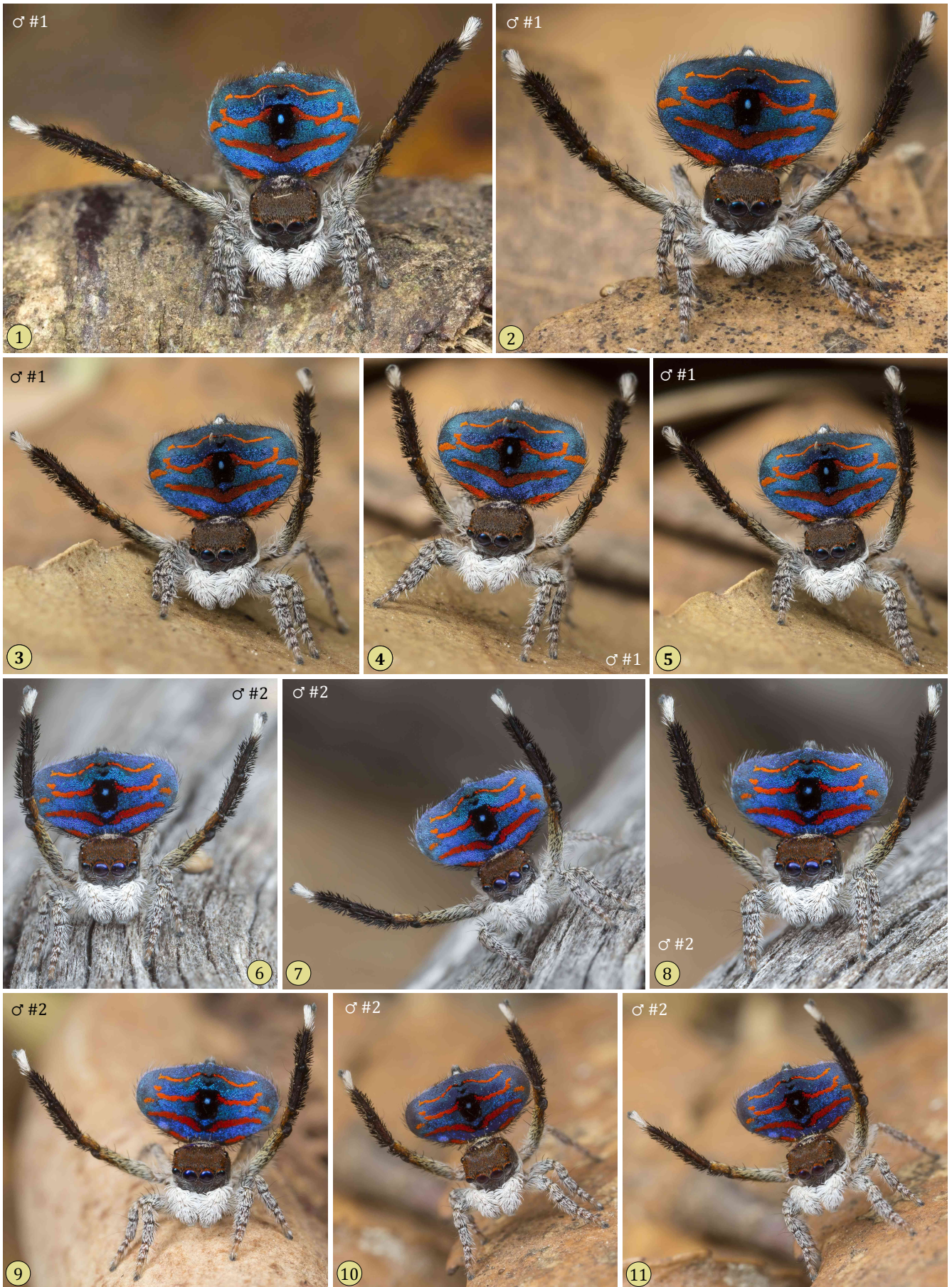
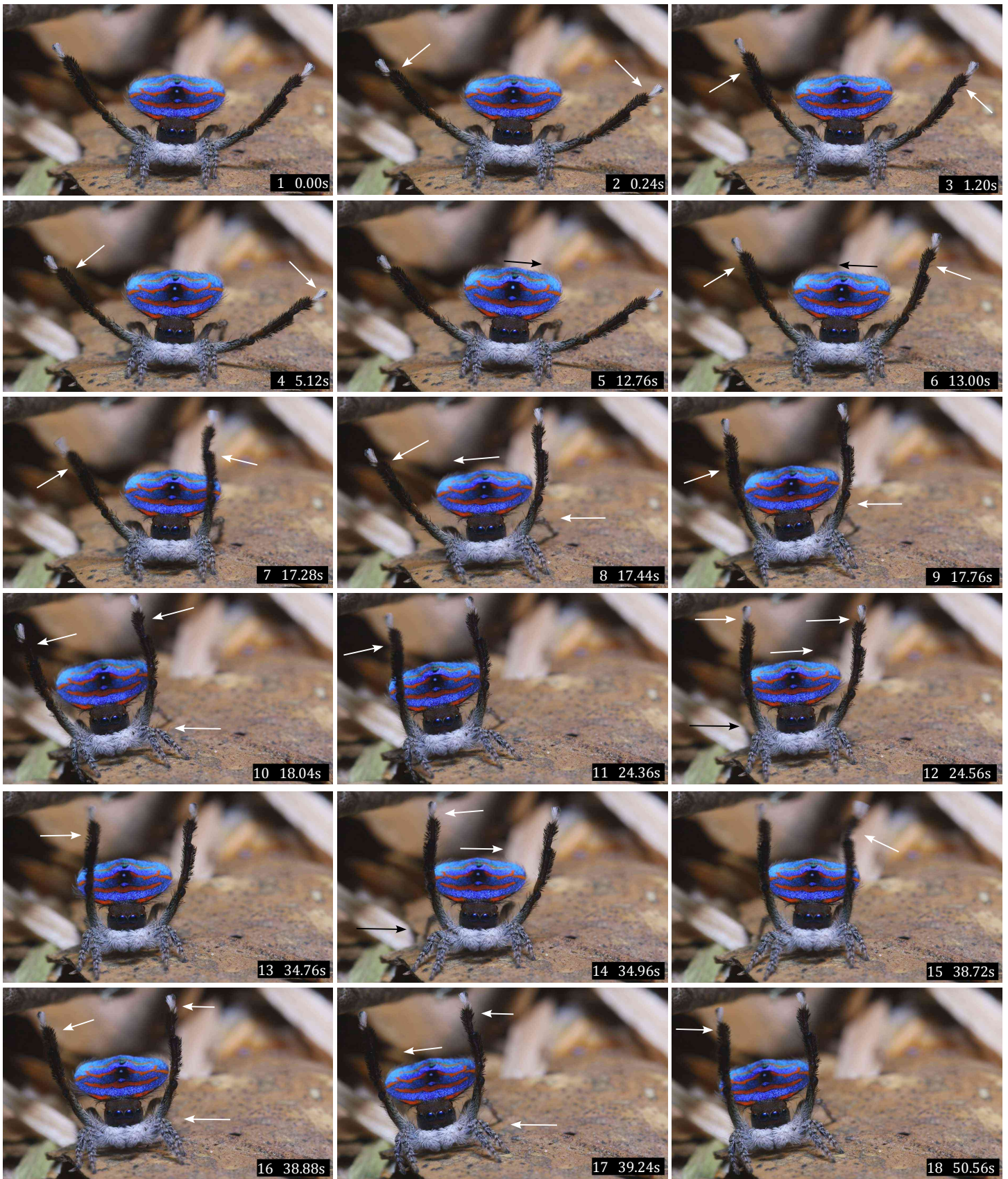
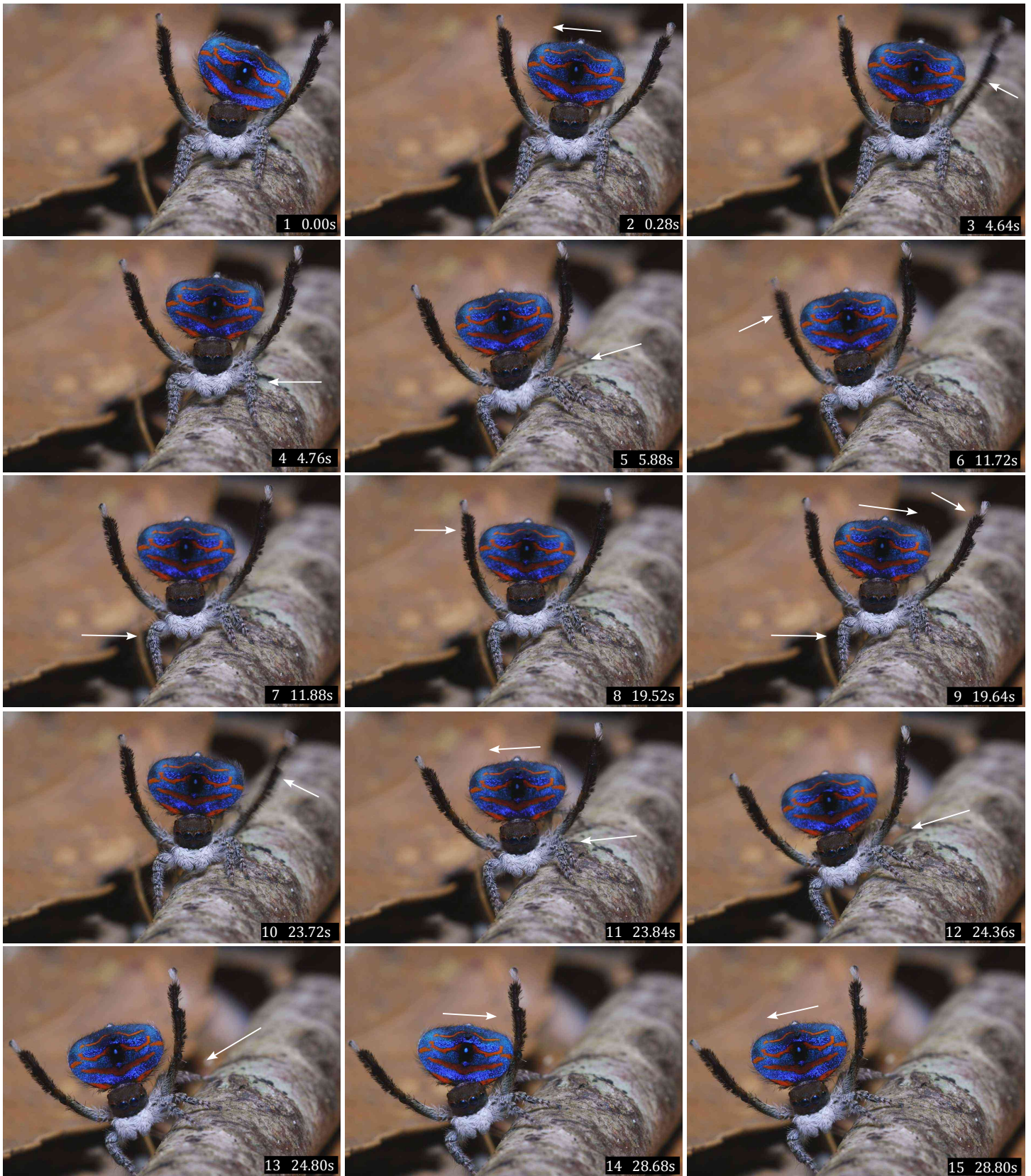


Figure 74. Two male *Maratus melindae corus* displaying to a female.



**Figure 75.** Sequential but not consecutive frames from a 25 FPS video of the courtship display of a male *Maratus melindae*. Arrows indicate movement of legs III, rotation of the fan, and side-stepping relative to the preceding frame. In this sequence symmetrical (1-6) and asymmetrical (10-18) waving of legs III can be seen. Note the range of elevations of legs III, including near-vertical positions.



**Figure 76.** Sequential but not consecutive frames from a 25 FPS video of the courtship display of a male *Maratus melindae* *corus*. Arrows indicate movement of legs III, rotation of the fan, and side-stepping relative to the preceding frame. **14-15**, Rapid rotation of the fan to the left and then to the right.

### ***Maratus trigonus*, new species**

*Type specimens.* The holotype male (♂ #13), 10 paratype males (♂ #3-5, 9, 18, 20, 23, 25, 28-29), and 12 paratype females (♀ #10-12, 14-17, 19, 21, 24-25, 34) were collected at Mt. Lindesay (34.83961667°S, 117.3083667°E, 4 OCT 2016, coll. J. Otto). The holotype male (♂ #13), 5 paratype males (♂ #18, 20, 23, 28-29), and 9 paratype females (♀ #12, 14-17, 19, 21, 24-25) were collected as immatures and reared to the adult stage. All types will be deposited in the Western Australian Museum, Perth.

*Etymology.* The species group name (*trigonus*, Latin, m., adjective, English translation *triangular*) refers to the distinctive triangular shape of the extended fan of the male.

*Diagnosis.* The pattern of scales on the fan of *M. trigonus* is unique for this species, including a three-pointed "crown" of bright white scales at the posterior margin. The sharp outer angles of the extended flaps of *M. trigonus* also give the fan of this species a distinctive triangular shape (Figure 82). Male and female genitalia of *Maratus trigonus* are very similar to those of other western *Maratus* including *M. cristatus* and *M. electricus*. The female is unremarkable and closely resembles the female *M. cristatus*. This similarity further supports our view that female specimens should not be used as holotypes for new species of *Maratus*.

*Description of male* (Figures 77-85). Males were 3.5-4.2 mm in length (n=16).

The clypeus is black and almost glabrous with just a few scattered long off-white setae near the midline. The chelicerae are black and glabrous. The eye region has a background cover of grey scales, with five lines of dark red scales crossing this from front to back. One of these lines is median, and the other four extend behind each of the anterior eyes. The rest of the carapace is almost entirely black and glabrous, except for a white marginal band on either side. A short dorsomedian tract of red-brown or off-white setae may also be present behind the eye region. The PME are closer to the PLE than to the ALE.

The fan (Figure 82) is distinctly triangular in shape when the angulate lobes, normally folded around the opisthosoma, are fully extended. Three tracts of tightly-packed iridescent scales project onto the fan from the anterior margin, two additional tracts of similar scales project onto the fan from each lateral margin, and one more tract of these scales lines the posterior margin of each flap. The center of the fan is occupied by a dark orange to brown figure lined with black, with a three-pointed crown of bright white scales at the posteromedian margin. This crown varies in shape from a nearly straight line with only a slight bulge at the centre (Figure 79:7-8) to a wave form (Figure 80:3) or even a trident (Figure 80:6). The entire figure on the fan has the appearance of a crouching, winged insect, with its legs in an anterior position (at the bottom of the fan when displayed). Although the "drawing" is quite different, the effect resembles the finely-drawn figure of an insect on the fan of *M. vespa* (see Otto & Hill 2016). The underside of the opisthosoma is light brown with a central brown area and a loose cover of off-white setae (Figure 81). There is a small tuft of white colular setae. Below this the spinnerets are black, and the underside of each flap is black. The pedicel is remarkably flexible and can be twisted in an S-shape when the fan is elevated during courtship display (Figure 81:4,6-7), something that we have not seen in other *Maratus* species.

Legs I and II are shorter, legs III and IV longer, and legs III the longest. Legs I-II and IV are loosely covered with white to off-white setae and are indistinctly banded with areas of dark pigment. Legs III are generally black except for white setae that cover each tarsus, and a small patch of white to off-white scales on the anterior side of the distal patellar margin. There is a short fringe of relatively short white setae and the underside of each tibia and metatarsus III. From above, the pedipalps are light brown in colour

and covered with long white to off-white setae. The pedipalps are unremarkable with a longer outer apex of the embolus above a shorter inner apex (Figure 83).



Figure 77. Four adult male *M. trigonus*. 10, Courtship display.



Figure 78. Five adult male *M. trigonus*. 12, Single leg-wave display.



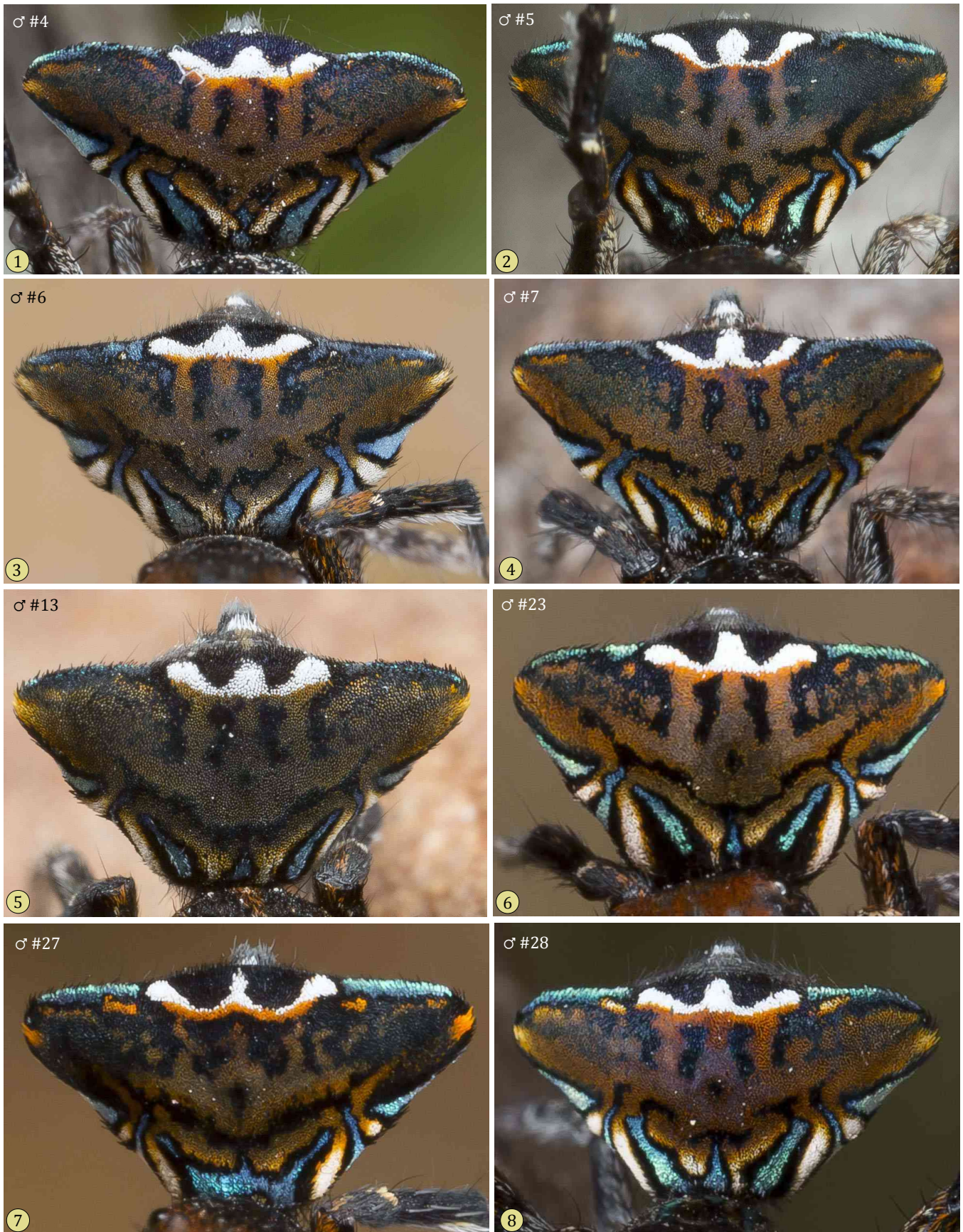
Figure 79. Seven adult male *M. trizonus*. 6, 8, 11-12, Single leg-wave display .



Figure 80. Five adult male *M. trigonus*.



Figure 81. 1-3, Venter of three adult male *M. trigonus*. 4, 6-7, ventral (or posterior) view of elevated fan during courtship display. The inset rectangle in (4) is enlarged in (7) to highlight the S-curve of the pedicel. 5, Lateral view.



**Figure 82.** Elevated and expanded fan of eight adult male *M. trigonus* during courtship display, showing subtle variations in colour and pattern. Note in particular variation in appearance of the bright white "crown."

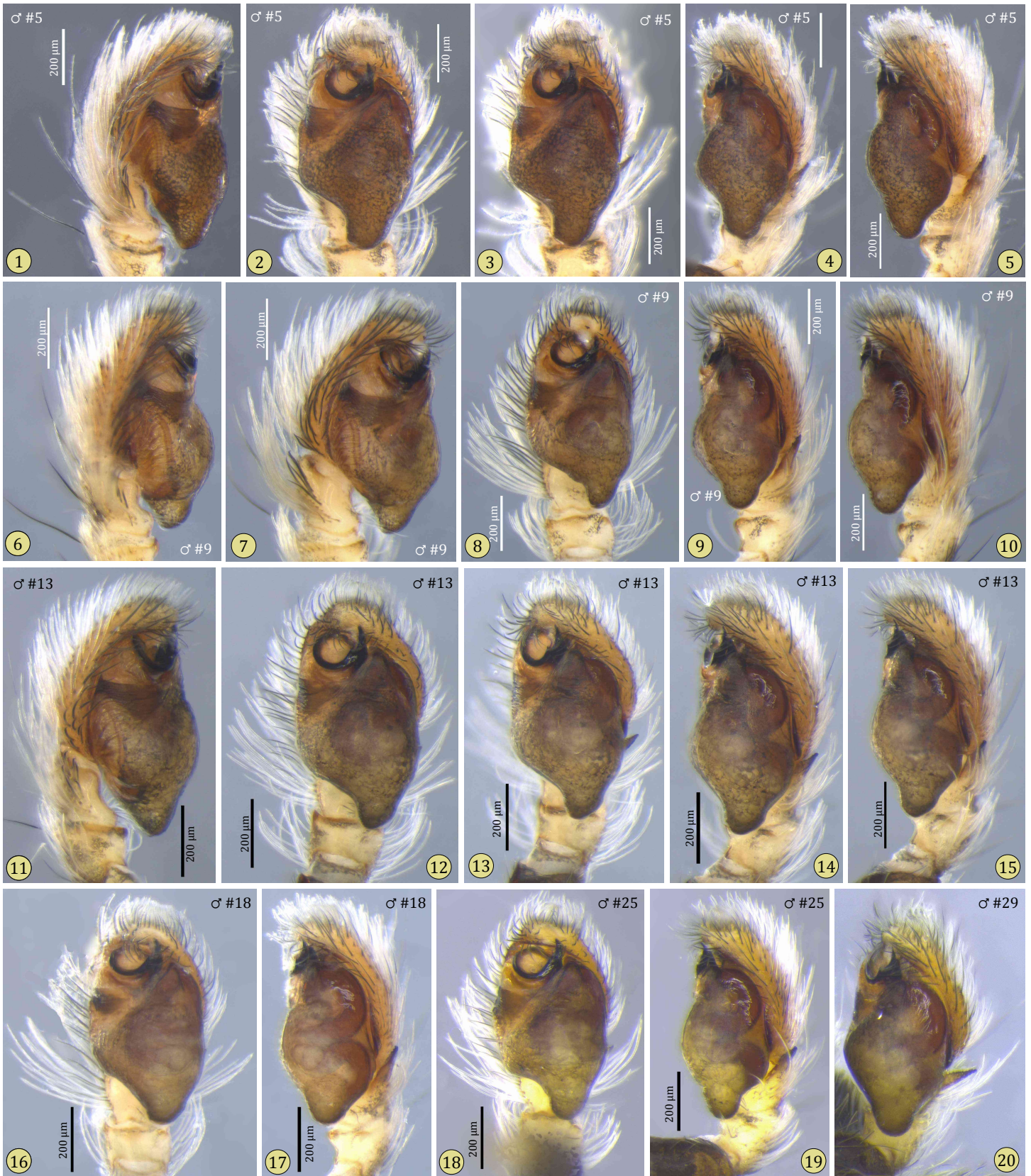


Figure 83. Medial to lateral views of the left pedipalp of six adult male *M. trigonus*, preserved in alcohol.

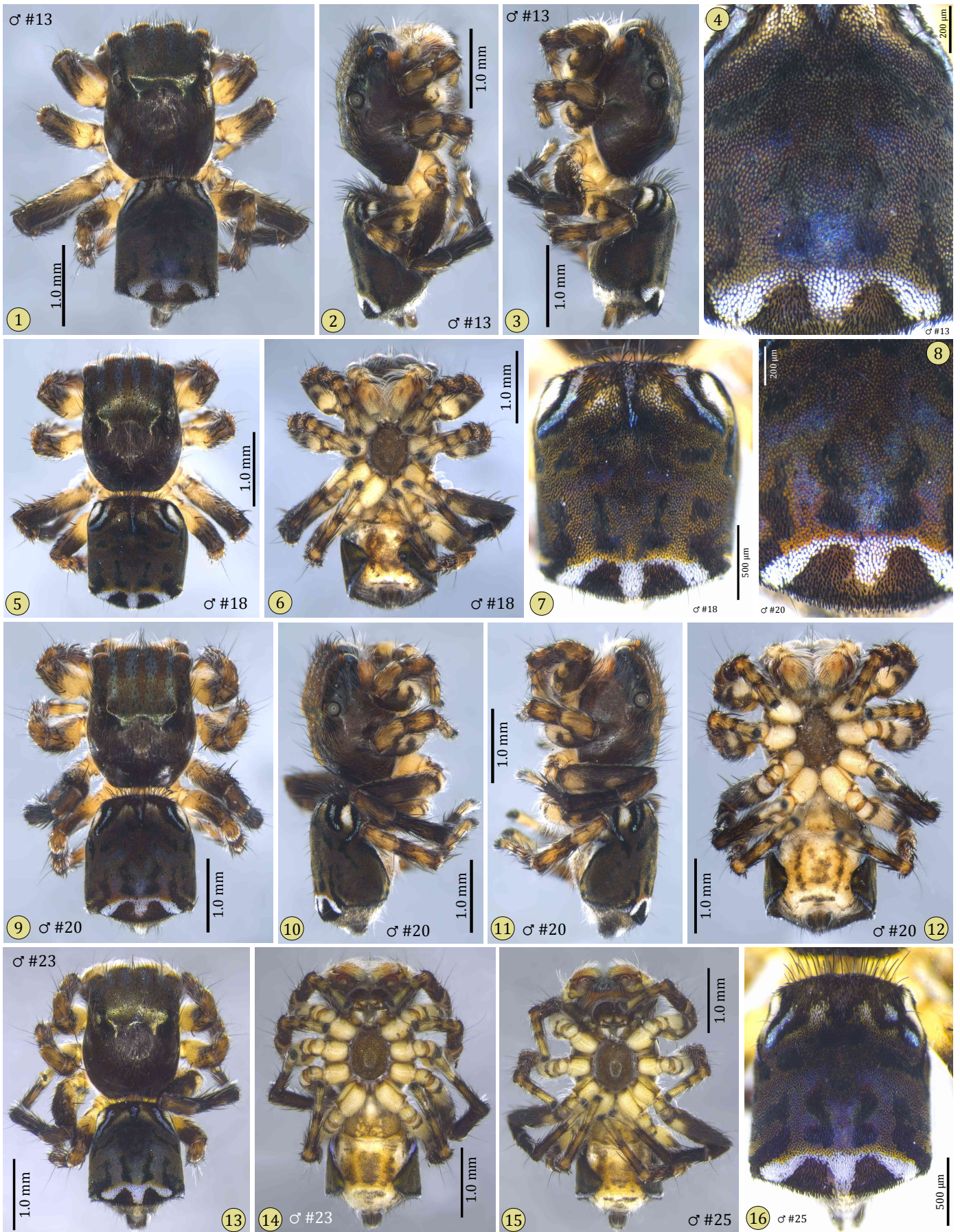
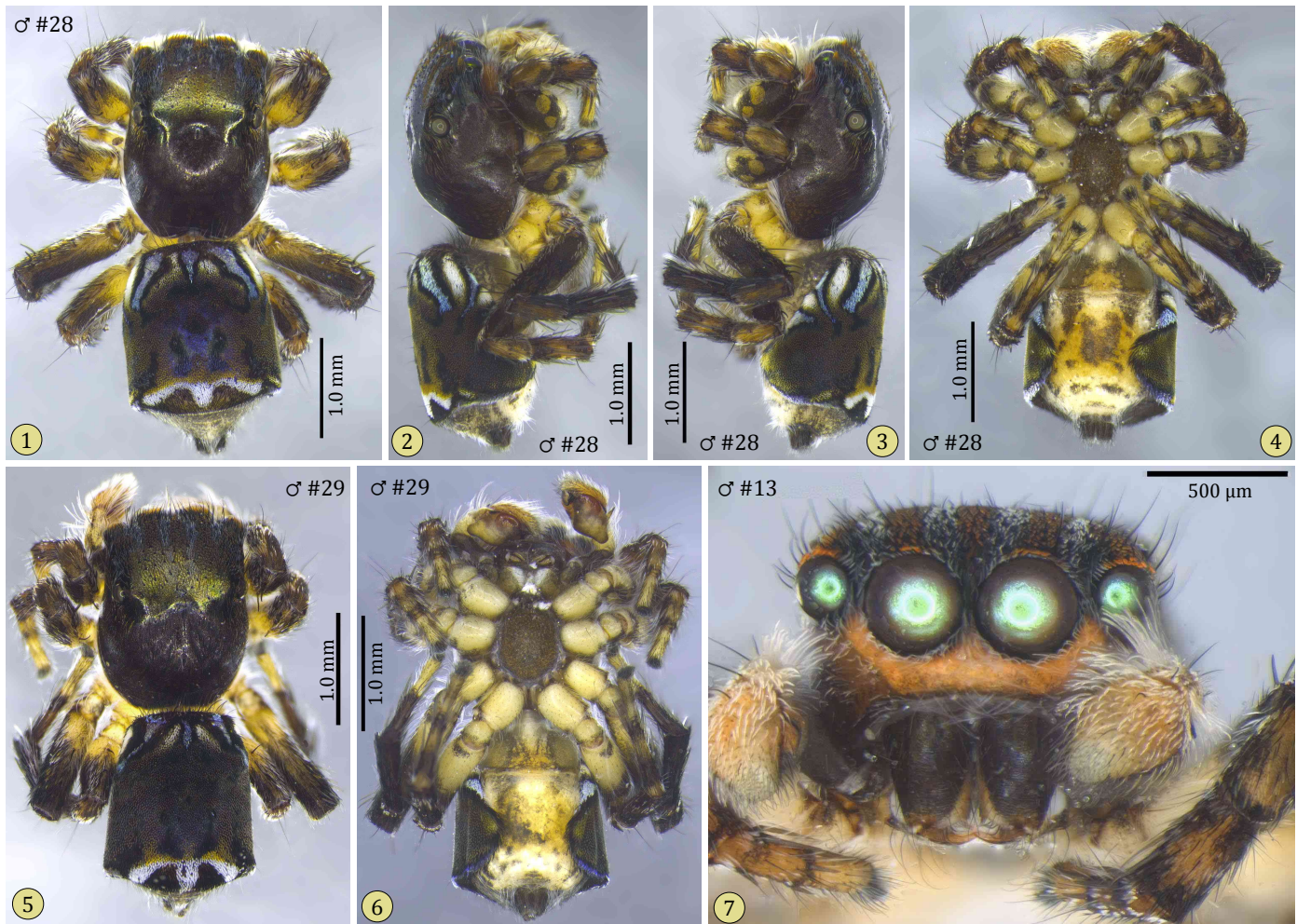


Figure 84. Five adult male *Maratus trigonus* preserved in alcohol.



**Figure 85.** Three adult male *Maratus trigonus* preserved in alcohol.

*Description of female* (Figures 86-92). Females ranged from 3.9-5.2 mm in length (n=12).

The clypeus is yellow-brown and translucent with long white setae oriented anteromedially over the chelicerae. The chelicerae are brown and glabrous. The pedipalps are brown with many long white setae. The face, eye region, and top of the carapace below the lateral eyes is covered with off-white or red-brown scales. In some cases a darker brown line can be seen extending over the eye region behind each AME. The sides and rear of the carapace are yellow-brown and mostly glabrous with only a few scattered scales, and there are no marginal bands on the sides.

The dorsal opisthosoma is dark brown with scattered red-brown, brown, or off-white scales and other setae. There is a wide marginal band of off-white scales and setae around the lateral sides of the opisthosoma, sometimes interrupted at the rear. Below, this band may be demarcated by darker lines. There is a small white triangle of colular scales above the grey to black spinnerets. The venter is light brown and mottled with brown spots, with a covering of shorter white to off-white setae (Figure 89). The coxae, trochanters, labium and endites are translucent brown, and the sternum is black.

Legs I and II are shorter, legs III and IV longer, and legs III the longest. The brown legs are indistinctly banded with segmental rings of white scales or setae. The epigynum (Figure 92) is unremarkable but typical for *Maratus*, with a pair of large, nearly circular fossae in front of an even larger pair of posterior spermathecae. Darker, sclerotized ducts are visible through the posterior part of each fossa.



Figure 86. Four adult female *Maratus trigonus*.



Figure 87. Five adult female *Maratus trigonus*.

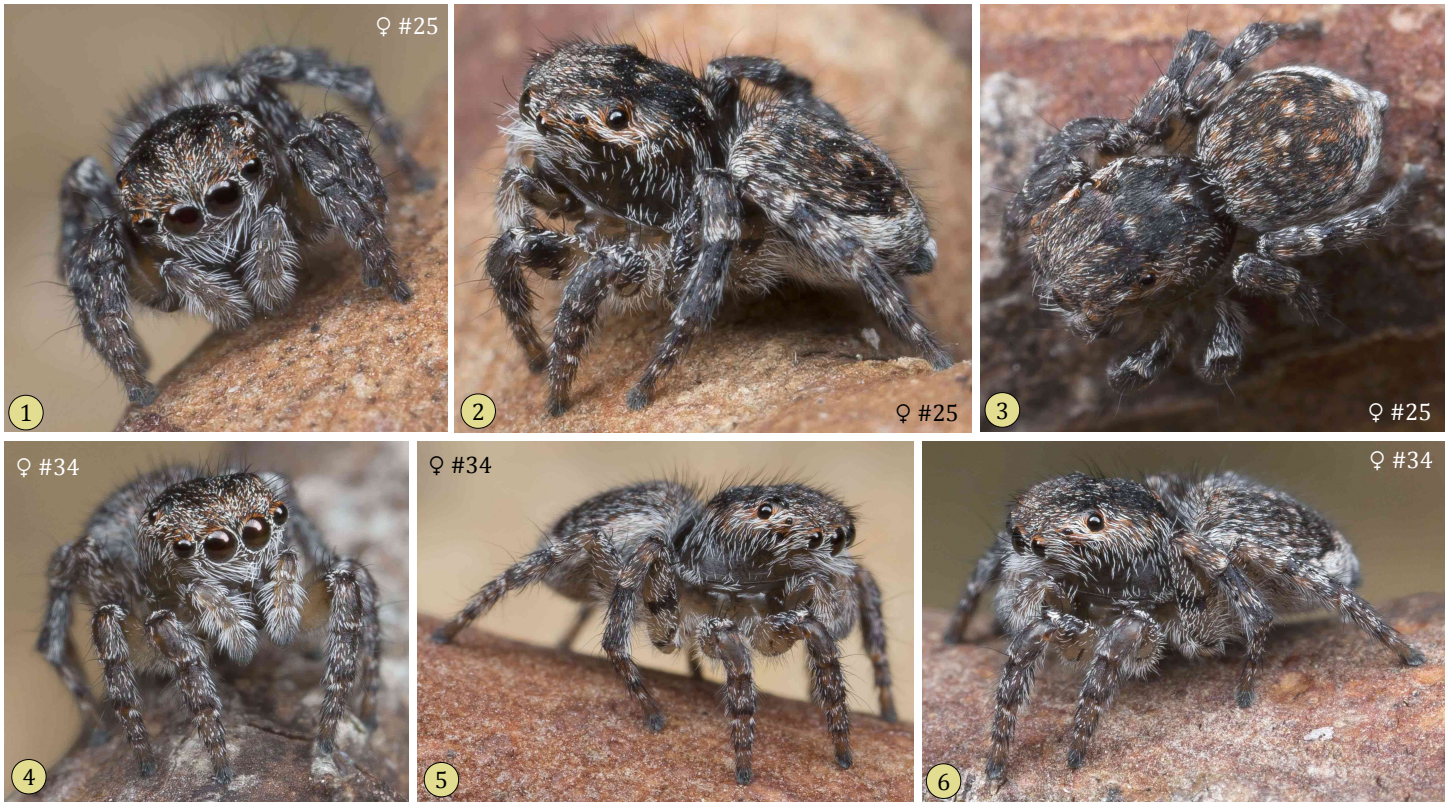


Figure 88. Two adult female *Maratus trigonus*.



Figure 89. Ventral view of six adult female *Maratus trigonus*.

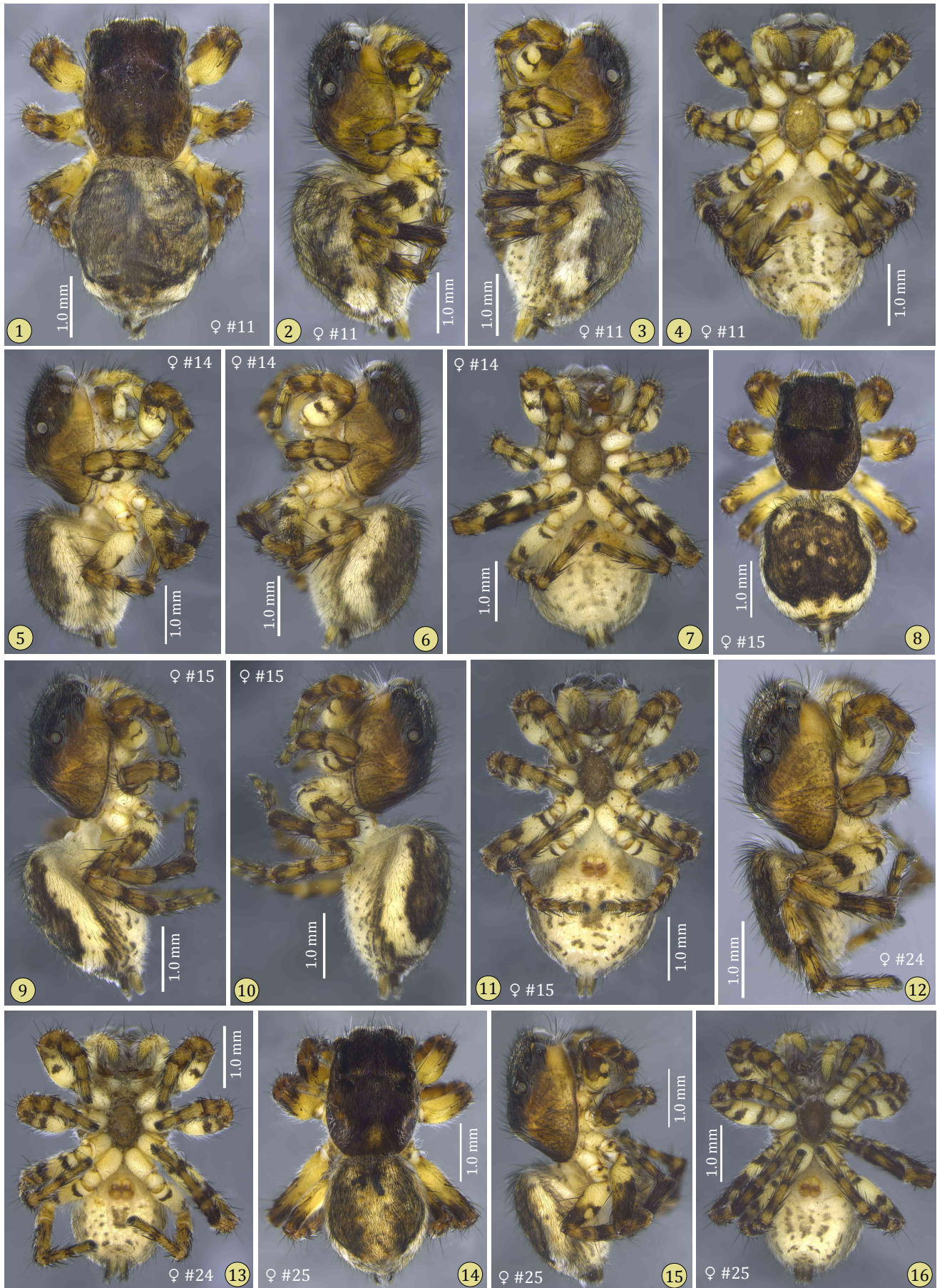
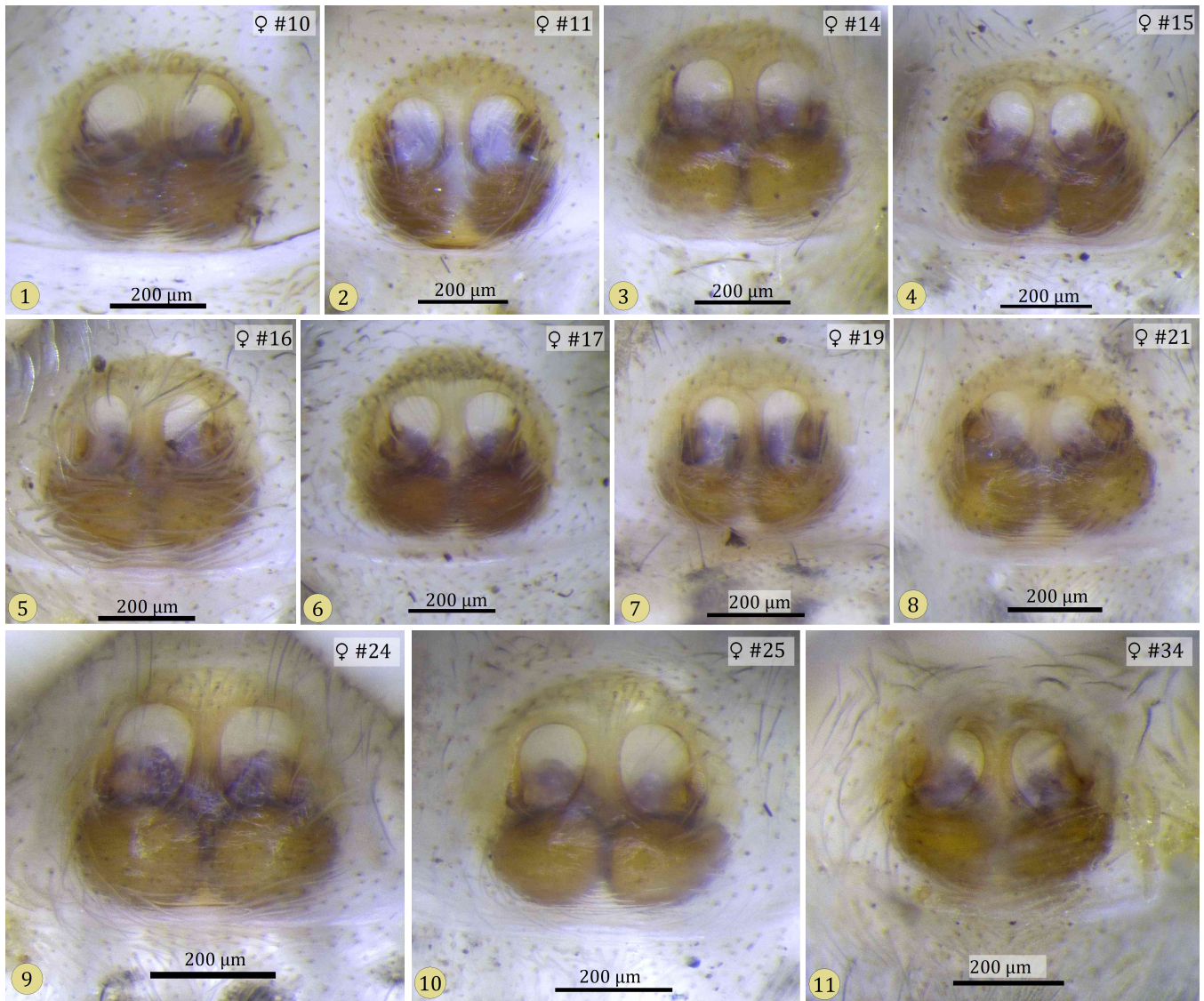


Figure 90. Five adult female *Maratus trigonus* preserved in alcohol.



**Figure 91.** Front view of three adult female *Maratus trigonus* preserved in alcohol.



**Figure 92.** Epigynum of eleven adult female *Maratus trigonus* preserved in alcohol, viewed from below. The anterior direction is toward the top of this page.

*Immatures* (Figures 93-94). Penultimate males (Figure 93) resemble adult females but have a more distinct pattern of large, paired white spots on the opisthosoma. Penultimate females (Figure 94) resemble adult females, with a wide marginal band of off-white scales around the opisthosoma.



**Figure 93.** Eight penultimate male *Maratus trigonus*. The dorsal opisthosoma is more boldly patterned than it is in females, with paired spots of light brown scales demarcated by dark lines.



Figure 94. Six penultimate female *Maratus trigonus*. These resemble adult females.

**Courtship display** (Figures 95-102). The male *Maratus trigonus* may alternate between two distinct displays. In the first display (Figures 98-100) both legs III are waved up and down as the fan is waved from side to side. Movement during this display is continuous. At  $\sim 3$  cycles/s legs III are first lowered more slowly (in  $\sim 0.25$ - $0.35$ s), then raised more quickly (in  $\sim 0.04$ - $0.12$ s), as the fan is rapidly rotated from side to side at a rate of  $\sim 5$  cycles/s. This display always precedes physical contact and subsequent mating. The second display (Figures 101-102) is quite different. In this display the fan is tilted to face the watching female and held in place as a single leg III is raised and rapidly waved up and down at a rate of  $\sim 6.2$ - $7.8$  cycles/s. In this display the extreme flexibility of the pedicel of *M. trigonus* is evident, as the fan is not only extended, raised and elevated, but it is also rotated and twisted away from (contralateral to) the leg III that is raised and waved. The twisted (S-shaped) pedicel during this display is shown in Figure 81:4,6-7.



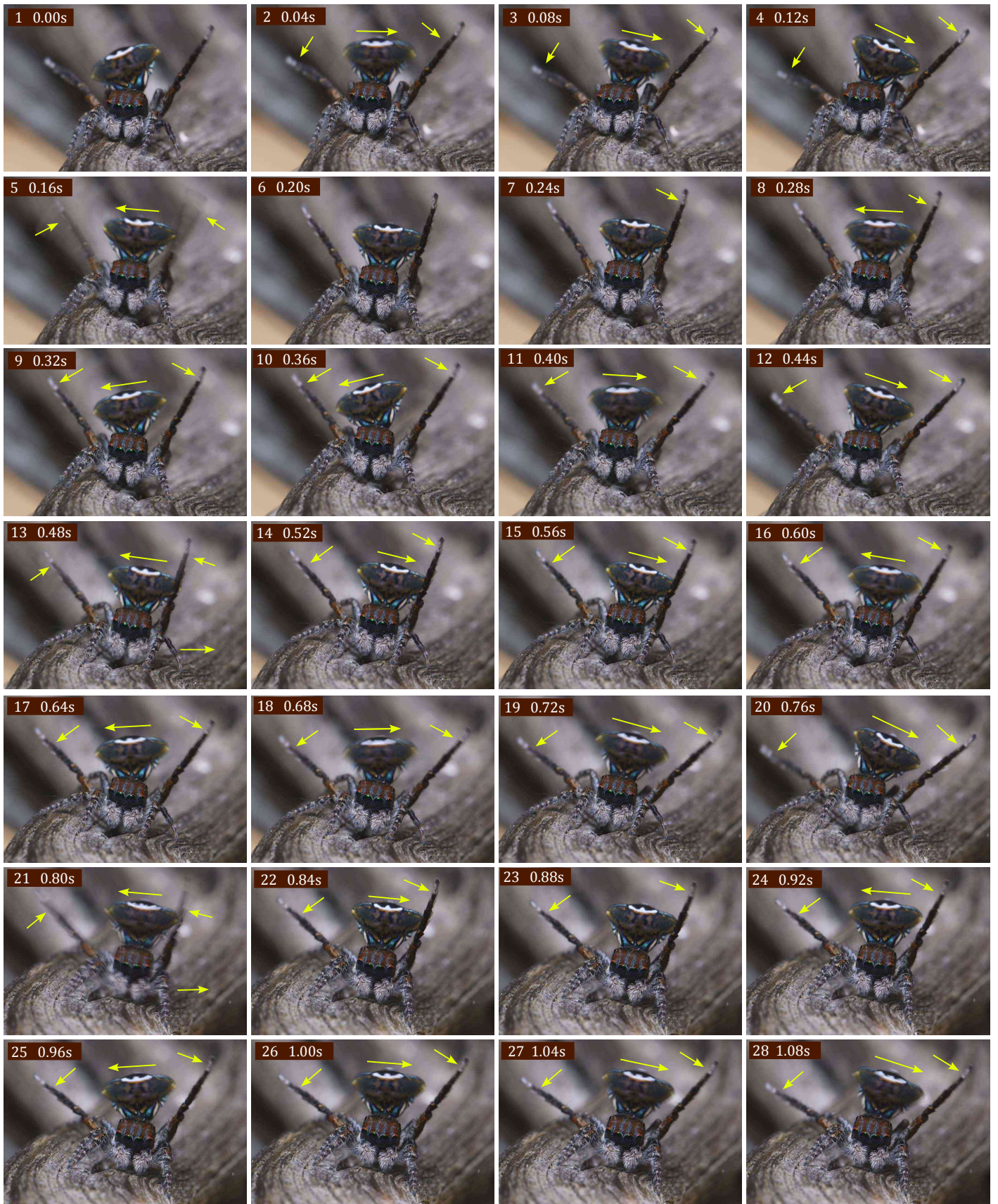
**Figure 95.** Courtship display by a male *Maratus trigonus*.



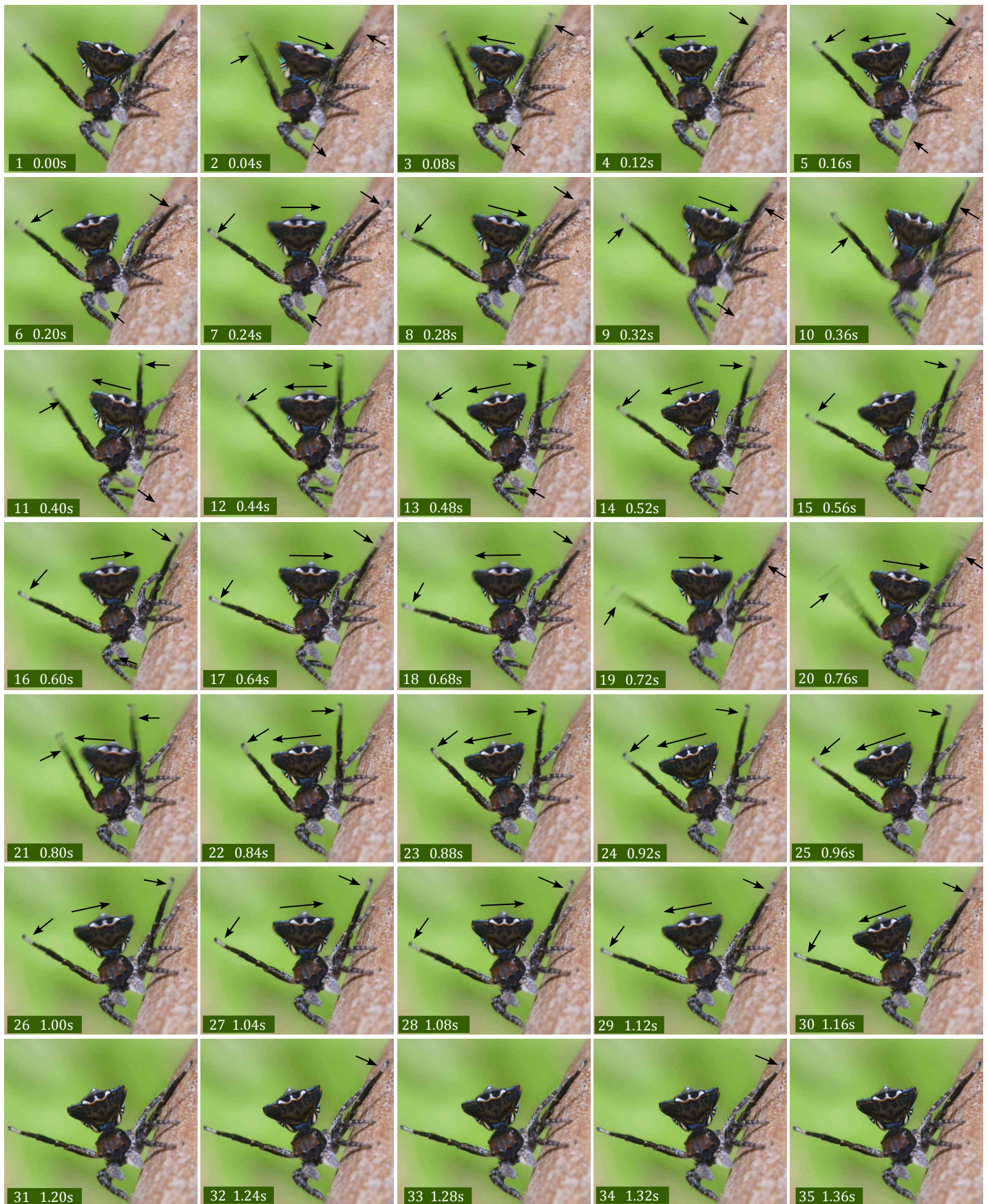
Figure 96. Courtship display by five male *Maratus trigonus*. 11-13, This male was more brightly coloured.



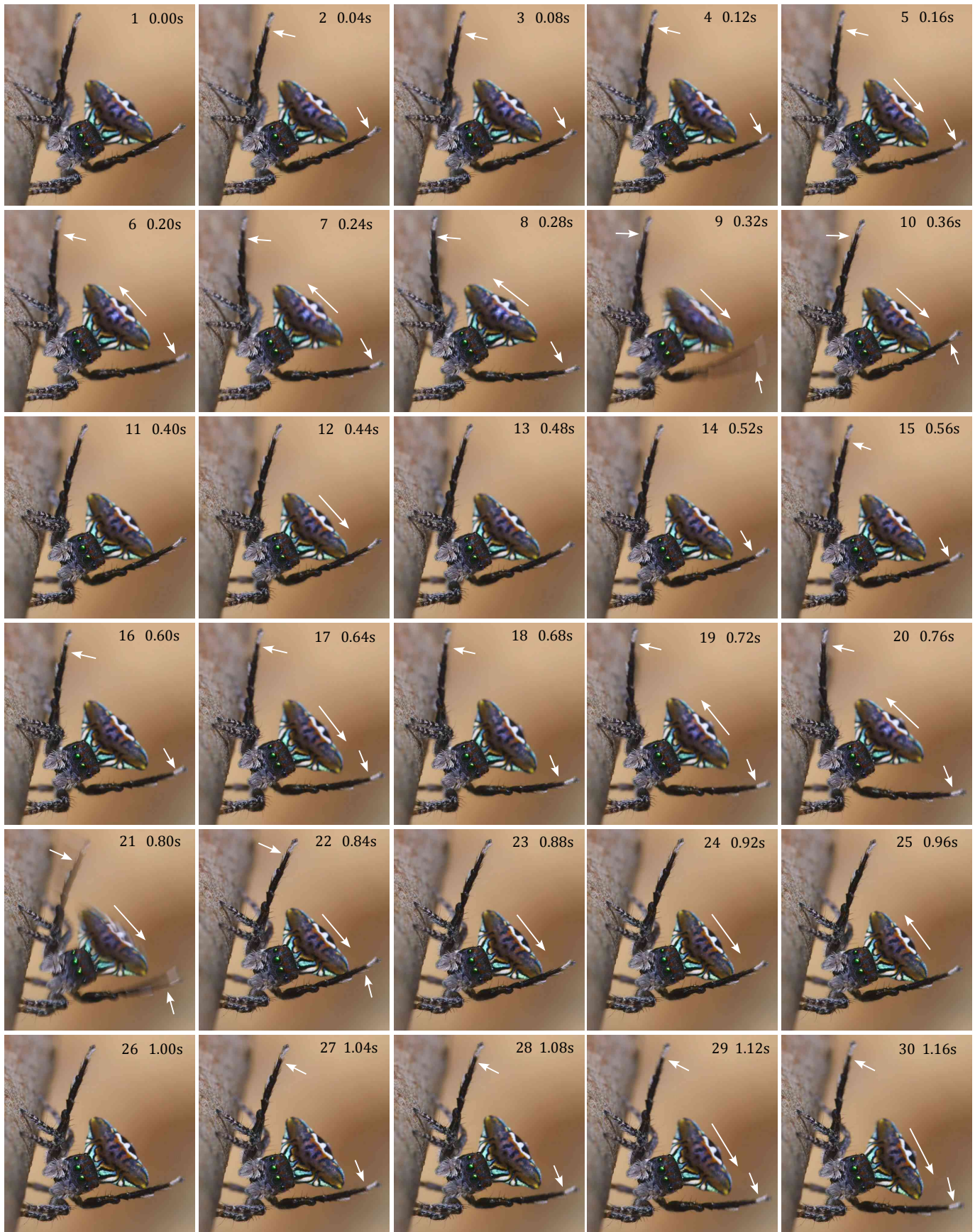
**Figure 97.** Courtship display by seven male *Maratus trigonus*. 4, Male (at left) encountering a female. 7, Side view of the single leg III display showing how the opisthosoma is rotated and twisted away from the moving leg III.



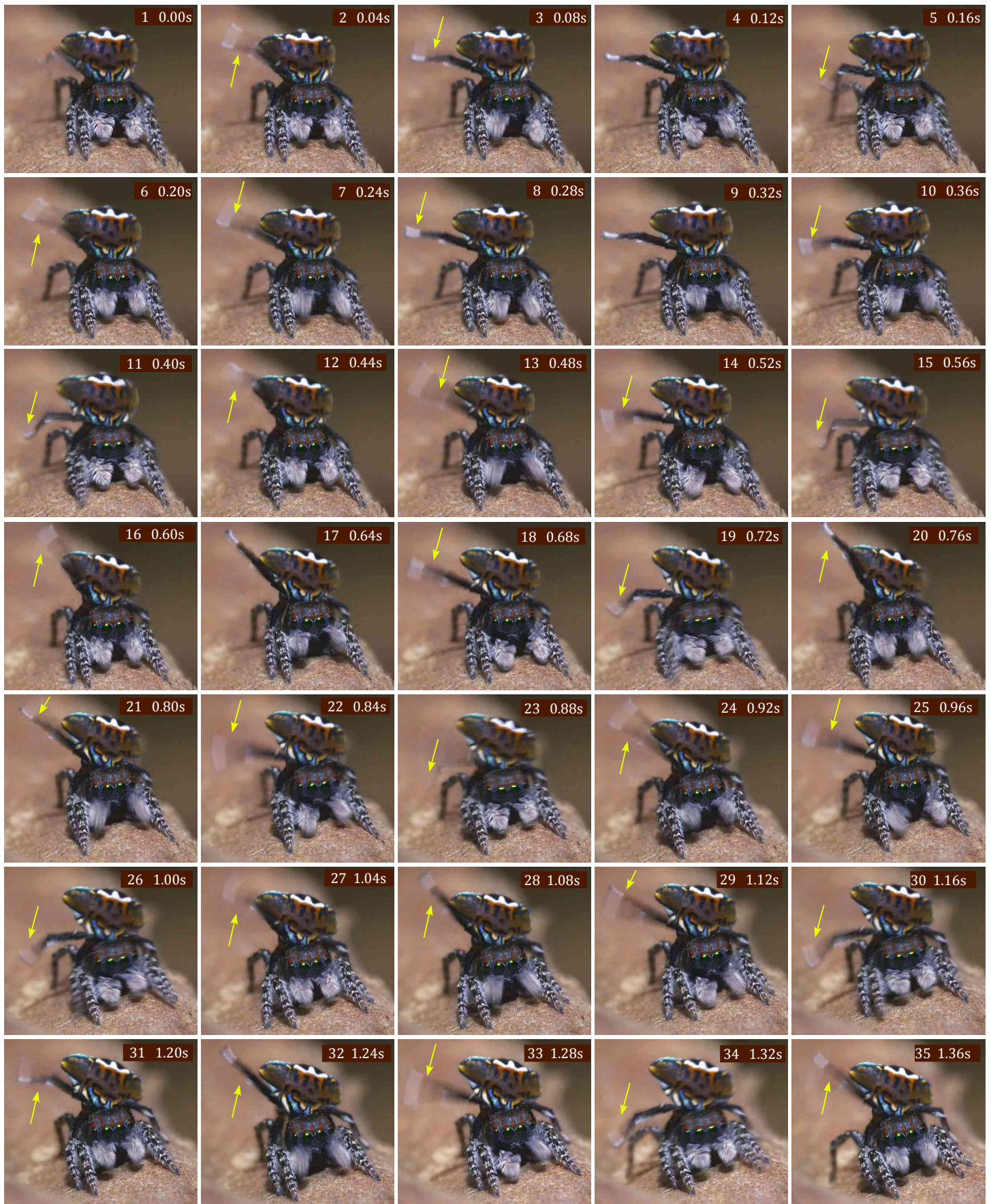
**Figure 98.** Sequential frames from a 25 FPS video of courtship display by a male *Maratus trigonus*. Arrows indicate movement of the fan and legs relative to the previous frame. Legs III were lowered for about 0.25s, then quickly raised in  $\sim 0.04$ s ( $\sim 3$  cycles/s), as the fan was moved from side to side at a rate of  $\sim 5$  cycles/s. This movement was continuous.



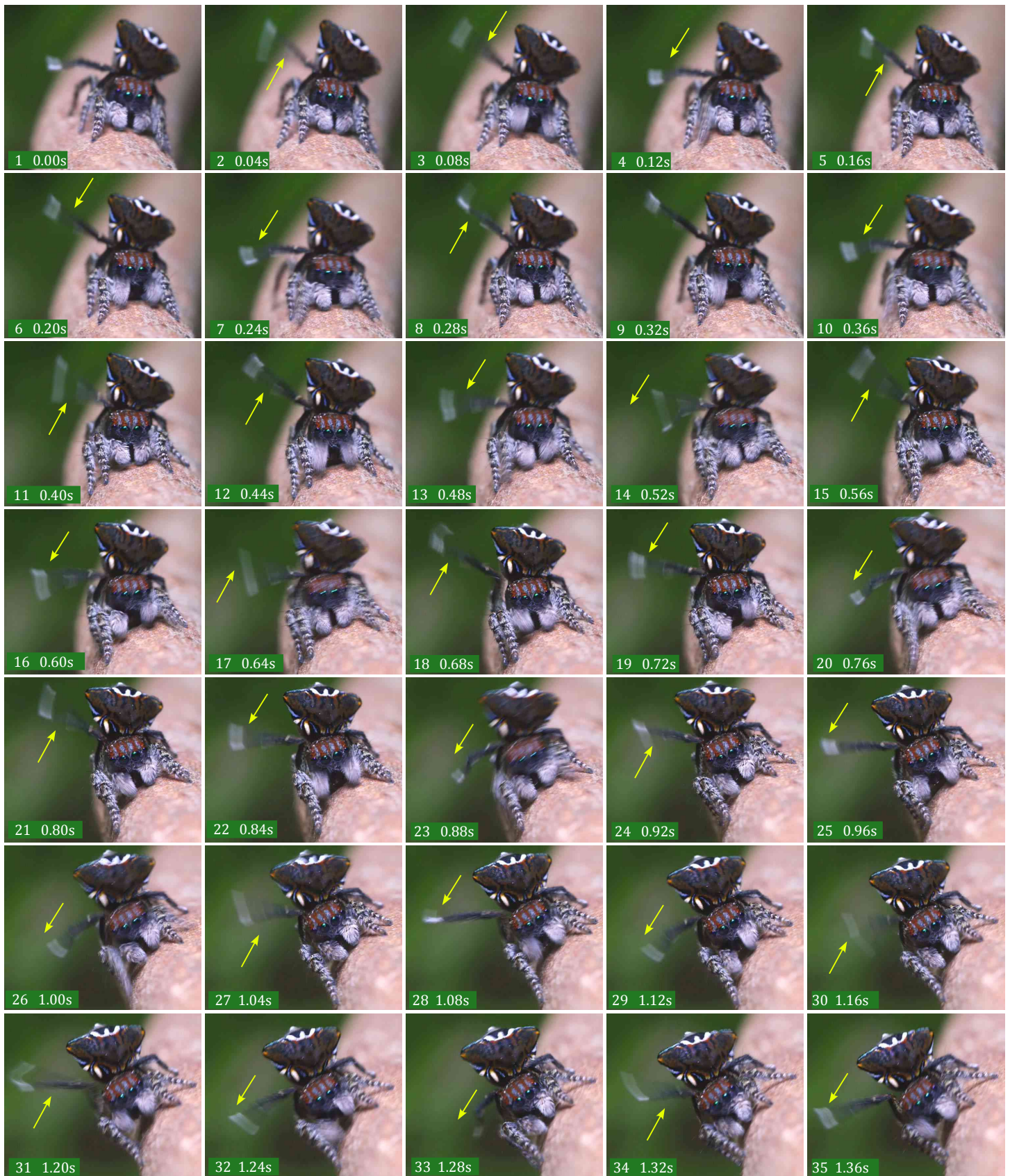
**Figure 99.** Sequential frames from a 25 FPS video of courtship display by a male *Maratus trigonus*. Arrows indicate movement of the fan and legs relative to the previous frame. Legs III were lowered for about 0.25s, then quickly raised in ~0.12s (~3 cycles/s), as the fan was moved from side to side at a rate of ~5 cycles/s.



**Figure 100.** Sequential frames from a 25 FPS video of courtship display by a male *Maratus trigonus*. Arrows indicate movement of the fan and legs relative to the previous frame. Legs III were lowered for about 0.25s, then quickly raised in  $\sim 0.08$ s ( $\sim 3$  cycles/s), as the fan was moved from side to side at a rate of  $\sim 5$  cycles/s.

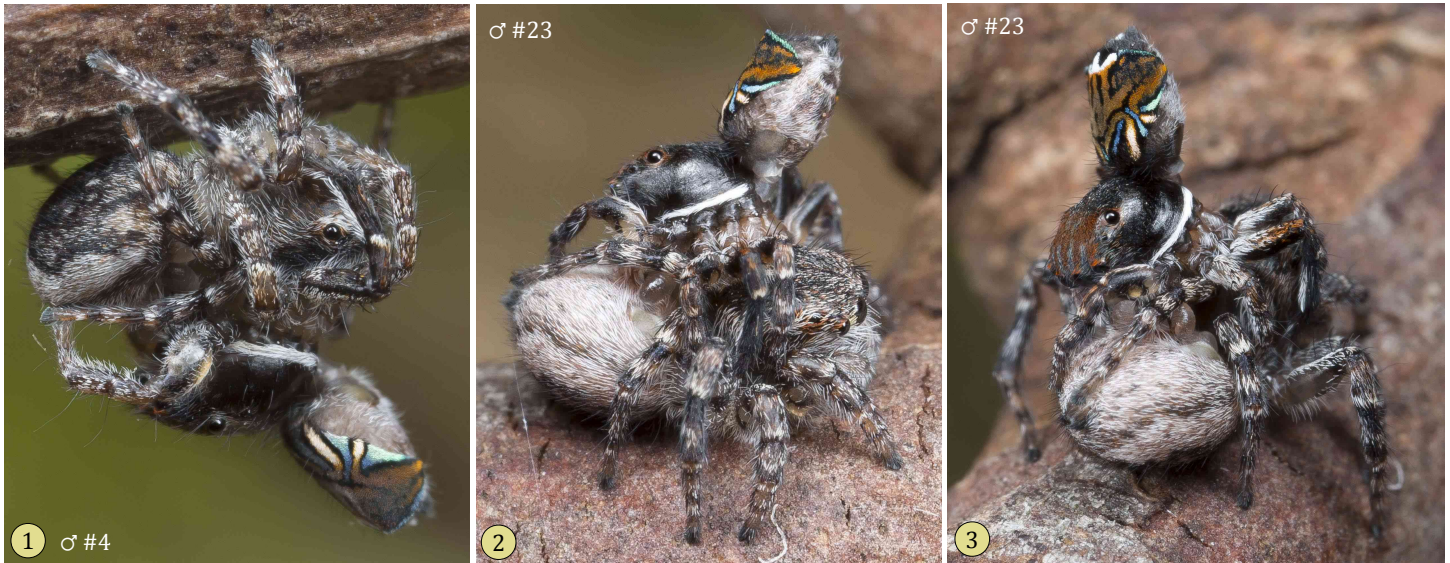


**Figure 101.** Sequential frames from a 25 FPS video of courtship display by a male *Maratus trigonus*. Arrows indicate movement of the fan and legs relative to the previous frame. Leg RIII was continuously waved up and down at  $\sim 6.2$  cycles/s.



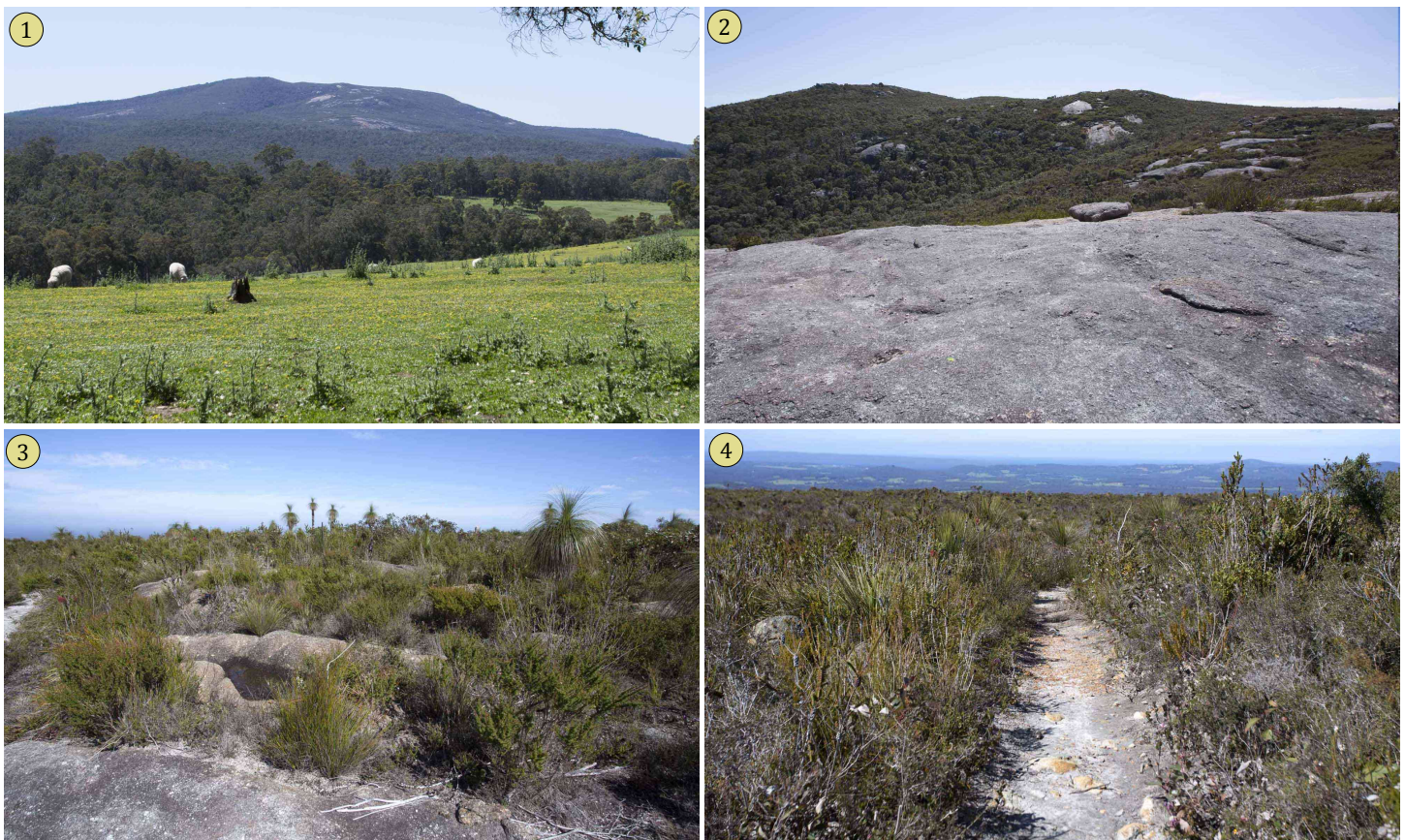
**Figure 102.** Sequential frames from a 25 FPS video of courtship display by a male *Maratus trigonus*. Arrows indicate movement of the fan and legs relative to the previous frame. Leg RIII was continuously waved up and down at  $\sim 7.8$  cycles/s.

**Mating.** As in other *Maratus*, female *M. trigonus* rotate their opisthosoma by  $\sim 180^\circ$  when mating (Figure 103).



**Figure 103.** Two mating pairs of *M. trigonus*.

**Habitat.** The locality where *Maratus trigonus* was found at Mt. Lindesay is shown in Figure 104. All spiders were found close to the summit among small shrubs or on the ground.



**Figure 104.** Rocky habitat of *M. trigonus* at Mt. Lindesay in Western Australia. **1**, Mt. Lindesay. **2**, Summit of Mt. Lindesay. **3**, Plateau at the summit with sculpted boulders. **4**, Path leaving the summit area. Most *M. trigonus* were found along this path.

## Acknowledgments

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