

Maratus yanchep, a new peacock spider from Western Australia (Araneae: Salticidae: Euophryini: Australphryni)

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Abstract. *Maratus yanchep*, a close relative of *M. suae* from the southwestern coast of Western Australia, is described. The distinctive courtship display of *M. yanchep*, which includes elevation and depression of the abdomen during the fan dance, is also described.

Keywords. courtship, *flavus* group, habitat loss, jumping spider, narrow endemism

The Australian peacock spider genus *Maratus* Karsch 1878 now includes almost 100 species, with many more remaining to be discovered and described. In recent years, many new and narrowly endemic species of *Maratus* have been found in the southwestern corner of Australia. Four major, hypothetical clades within the genus have been found here: the *flavus* group, the *linnaei* group, the *mungaich* group, and the *vespa* group (Otto & Hill 2021). The male pedipalps and female epigyna of all four groups are very similar, but these groups can nonetheless be separated by characters of the male appearance and courtship display. The least defined of these groups is the *flavus* group, which may represent a basal *paraphyletic clade* (or *grade*) with respect to the other groups. Males in this group have relatively simple ornamentation of legs III, and a variable degree of development of the fan. Some do not use the fan in their courtship display.

Here we describe *Maratus yanchep*, a new species within the *flavus* group (Table 1, Figures 1, 18) of the genus *Maratus* Karsch 1878.

Table 1. Members of the *Maratus flavus* group. *M. felinus*, once placed in this group (Otto & Hill 2021), is now placed in the *linnaei* group (Otto & Hill 2022).

species	reference for description	collectors	locality
<i>M. boranup</i>	Otto & Hill 2018	D. Knowles, J. C. Otto	S34.07698°, E115.01557°
<i>M. constellatus</i>	Schubert 2020		S27.55315°, E114.44609°
<i>M. flavus</i>	Otto & Hill 2018	J. C. Otto	S32.63988°, E115.62740°
		C. Anderson	S32.63942°, E115.62753°
<i>M. suae</i>	Schubert 2020		S33.29983°, E115.67436°
<i>M. tessellatus</i>	Otto & Hill 2016	D. Knowles, J. C. Otto	S33.36683°, E115.62243°
<i>M. tiddalik</i>	Otto & Hill 2020	R. Walker	S33.53738°, E115.00844°
<i>M. trigonus</i>	Otto & Hill 2017	J. C. Otto	S34.83962°, E117.30837°
<i>M. yanchep</i> , new species	this paper	F. Prall, M. Lun	S31.58465°, E115.65782°



Figure 1. Male representatives of the eight species now placed in the *flavus* group of the genus *Maratus*. 1-7, Fan dance in front of a courted female. *M. yanchep*, new species (1-2) is most similar to *M. suae* (3-4). Like *M. yanchep*, male *M. suae* are also known to alternately elevate and depress their fan during courtship display. Courting male *M. tessellatus* (9), with a similar pattern of scales on their fan do not raise or display this to the female (Otto & Hill 2016). Courting male *M. boranup* (8) and *M. tiddalik* (10) also do not raise their fan (Otto & Hill 2018, 2020)

Genus *Maratus* Karsch 1878Type species *Maratus amabilis* Karsch 1878***Maratus yanchep*, new species**

Type specimens. The holotype male (♂ #1), ten paratype males (♂ #2-11), and four paratype females (♀ #1-4) were collected about 3 km south of Yanchep, Western Australia (S31.584649°, E115.657821°; 18 AUG 2023; Flynn Prall and Michael Lun, collectors). All types will be deposited in the Western Australia Museum, Perth.

Etymology. The species group name, *yanchep* (English, noun in apposition), is a reference to the name of the locality where this spider was found. This is derived from the word *Yandjip* or *Yanget* which is the local aboriginal (Nyoongar) name for a bulrush (*Typha*) that grows around lake margins in the area.

Diagnosis. *Maratus yanchep* closely resembles *M. suae* Schubert 2020, and both are placed in the *flavus* group of the genus *Maratus* (Table 1, Figure 1). Male *M. yanchep* differ from *M. suae* with respect to the presence of seven indistinct or incomplete (rather than four distinct and complete) lines crossing the eye region from front to rear, a less rounded rear margin of the fan, and the presence of a definitive, dark figure at the center of the fan. Structure of the genitalia (male pedipalp and female epigynum), and the appearance of females, is similar to that of many related *Maratus* in Western Australia, and of little use for identification to species.

Description of male (Figures 1.1-1.2, 2-6). Apart from characters mentioned in the diagnosis, males are very similar to male *M. suae*. Type males (n=11) range from 3.9-4.2 mm in length. The front (dorsal aspect) of each pedipalp is covered with dense, long, bright white to off-white setae. The chelicerae and clypeus are dark brown and mostly glabrous, except for isolated white to off-white setae projecting in a medioventral direction from the clypeus. The eye region is covered with dense grey scales oriented in an anterior direction, except for seven indistinct or incomplete front-to-rear bands of dull red-brown scales. The PME are closer to the PLE than to the ALE. Usually (unless rubbed) a wide mediotrochial band of bright white to off-white scales is present at the top of the carapace, behind the eye region. Behind each PLE there is a wide band of mixed white to off-white and dull red-brown scales. The sides of the carapace are mostly glabrous, with scattered white to off-white setae. A prominent marginal band of white to off-white scales is present on either side of the carapace. The underlying cuticle of the carapace is dark brown to black.

With flaps fully expanded the fan is roughly triangular in shape, and wide at the rear where the bright white anal tuft extends above the fan during courtship display. Although the detailed pattern and colouration of the fan varies greatly between individuals (Figure 3), a dark central figure is always present, surrounded by a complex pattern of spots comprised of pigmented scales on a background of iridescent, blue to green to violet or purple scales. The underside of the opisthosoma is, as in other *Maratus*, unremarkable, with a cover of long off-white setae (Figure 4). From below, the coxae, sternum, labium and endites (coxae of pedipalps) are mostly grey to light brown and relatively glabrous, with longer off-white setae extending from the rear of the sternum.

Legs I and II are shorter, legs III and IV longer, and legs III by far the longest. Legs I-II, IV have a uniform cover of off-white setae, interrupted by dark bands at or near the joints. From the patella to the metatarsus legs III are ornamented with a dense cover or fringe of long black setae. Each tarsus has a

dense cover of bright white setae, a feature found in many other *Maratus*. The pedipalps (Figure 6) are unremarkable, similar in their detailed structure to other *Maratus* found in southwestern Australia.



Figure 2 (continued on next page). Living type males for *Maratus yanchep*.



Figure 2 (continued from previous page, continued on next page). Living type males for *Maratus yanchep*.



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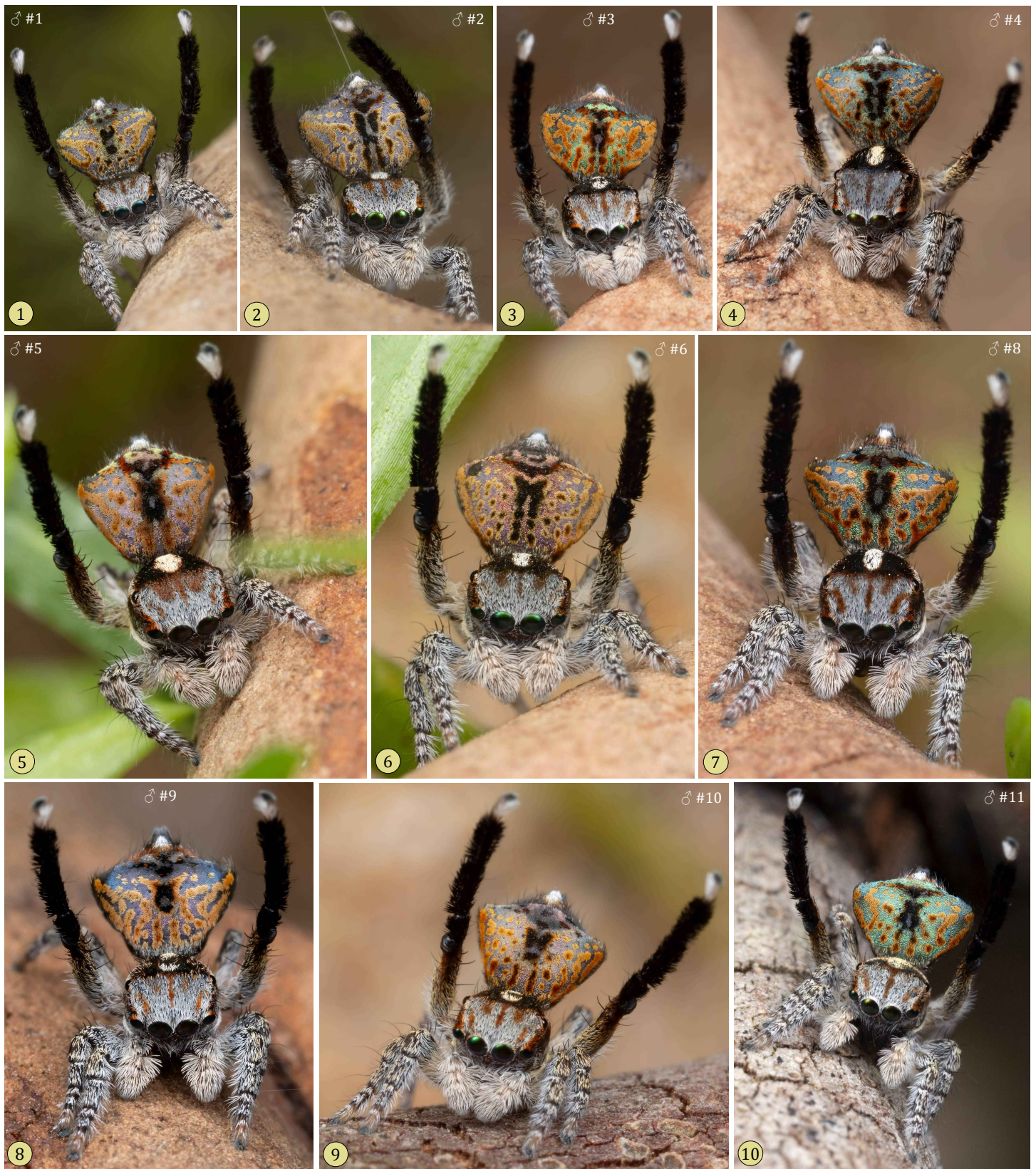


Figure 3. Type males for *Maratus yanchep* displaying to a nearby female, to reveal the variety of colours and patterns associated with the fan of this species. All were collected at the same (type) locality.



Figure 4. Ventral view of type males for *Maratus yanchep*, under glass.

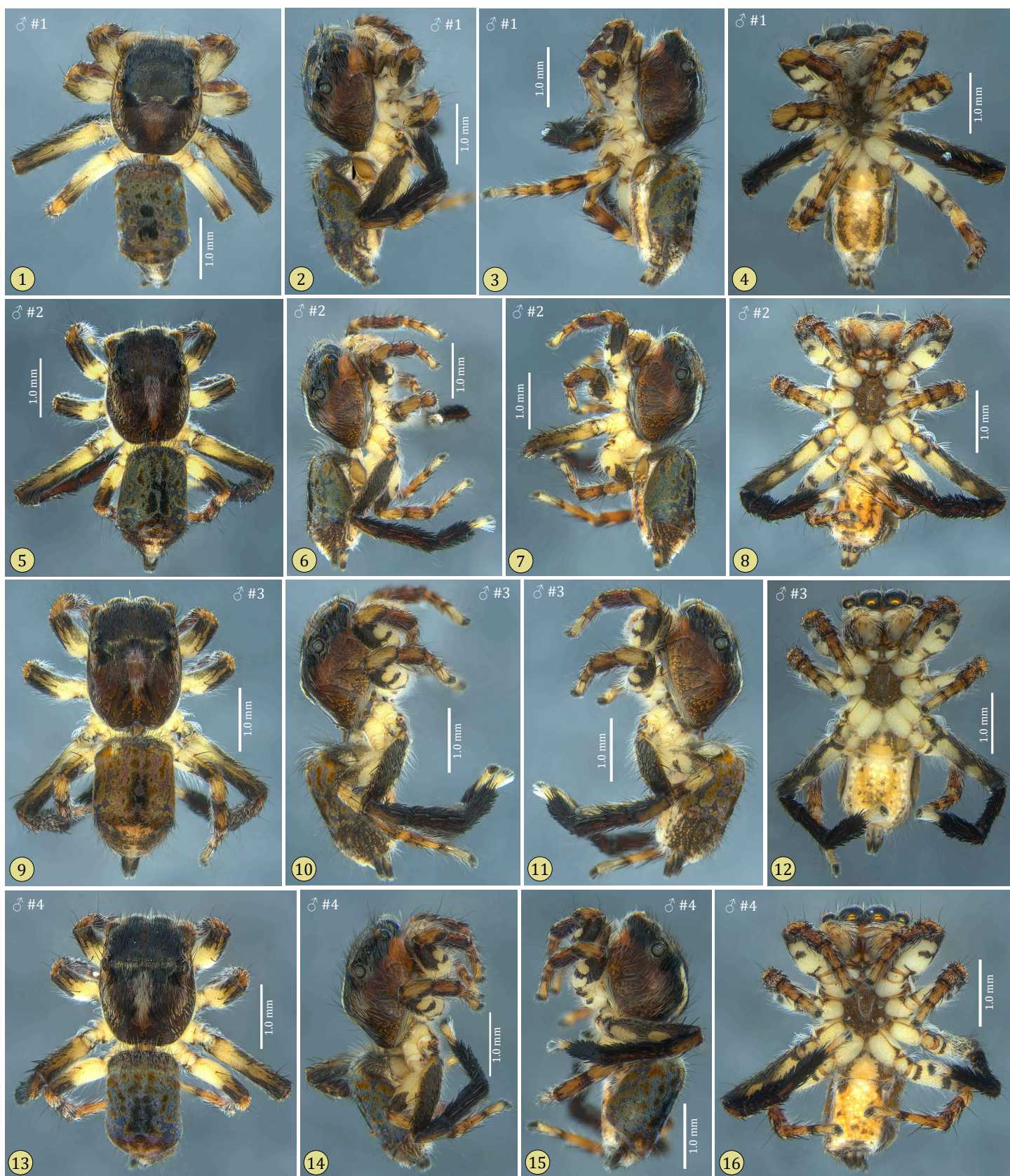


Figure 5 (continued on next page). Type males for *Maratus yanchep*, in alcohol.



Figure 5 (continued from previous page, continued on next page). Type males for *Maratus yanchep*, in alcohol.



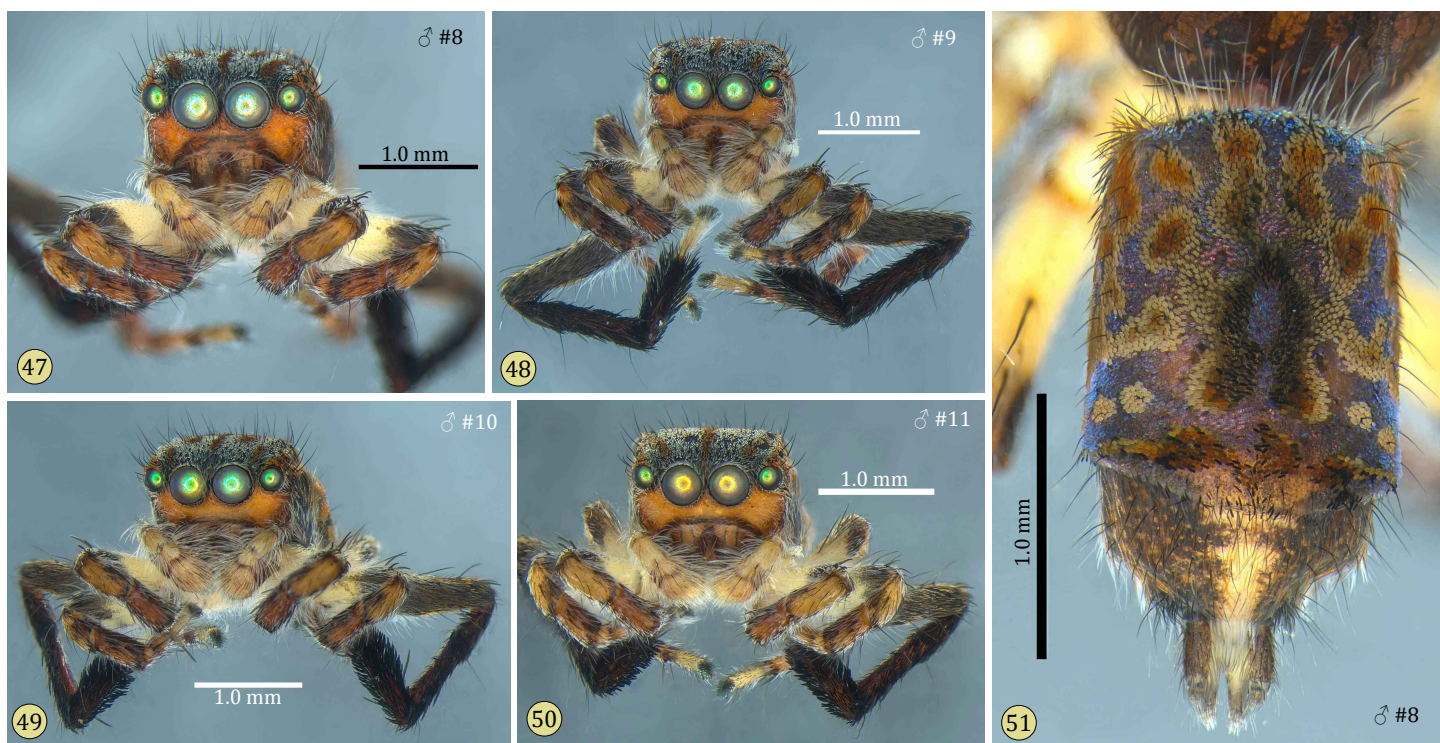


Figure 5 (continued from previous page). Type males for *Maratus yanchep*, in alcohol. **51**, On the fan, darker pigmented scales are surrounded by lighter pigmented scales, on a background of iridescent scales.

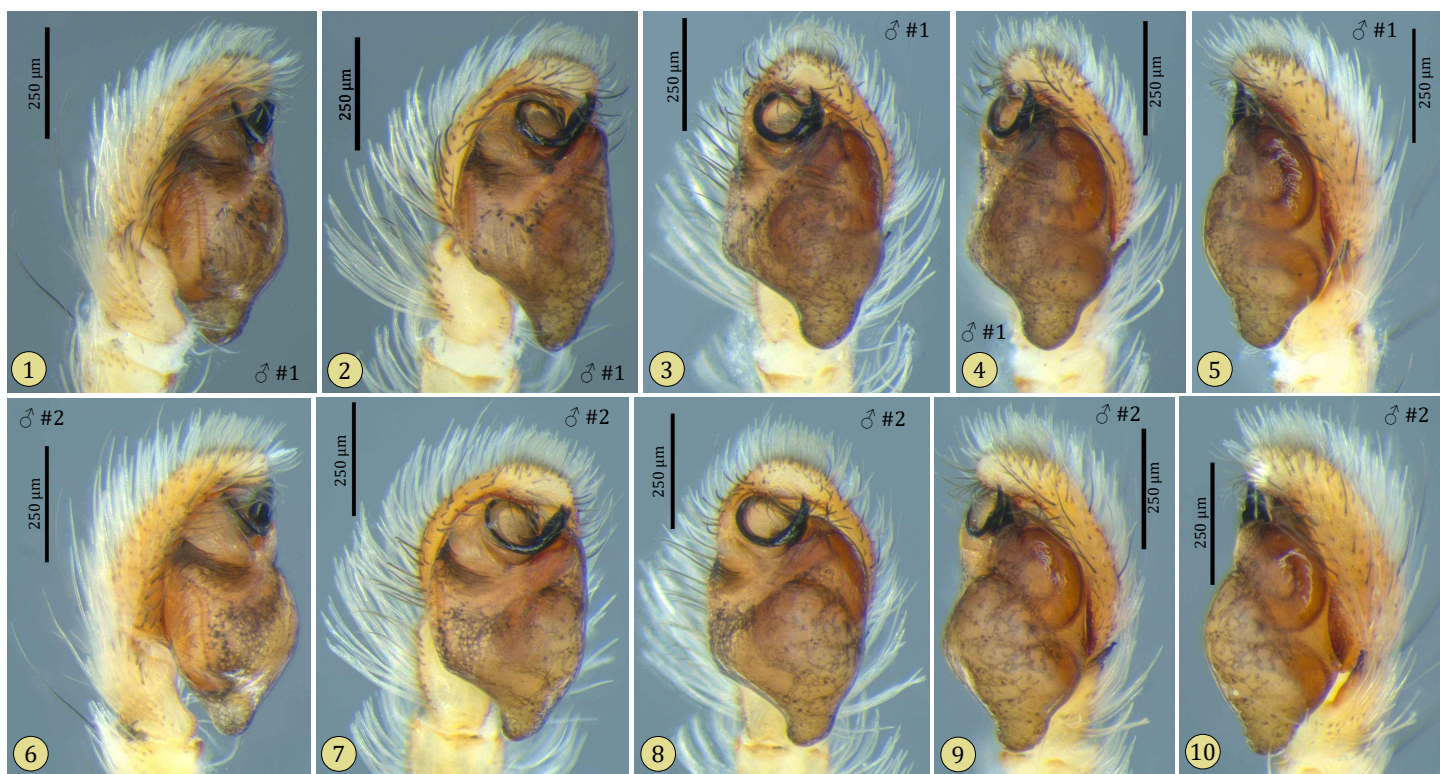


Figure 6 (continued on next page). Medial to lateral views of the left pedipalp of type males for *Maratus yanchep*, in alcohol.

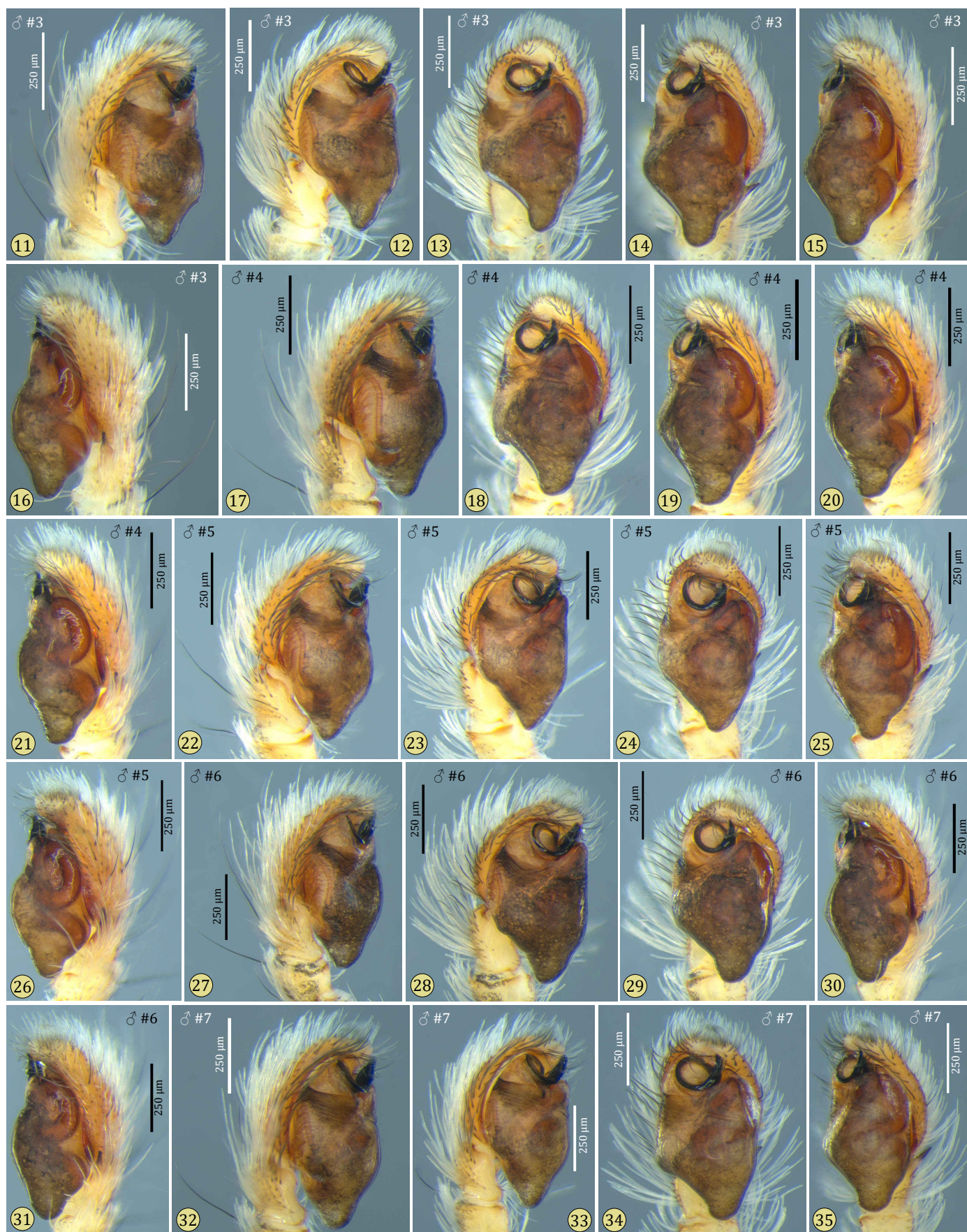


Figure 6 (continued from previous page, continued on next page). Medial to lateral views of the left pedipalp of type males for *Maratus yanchep*, in alcohol.

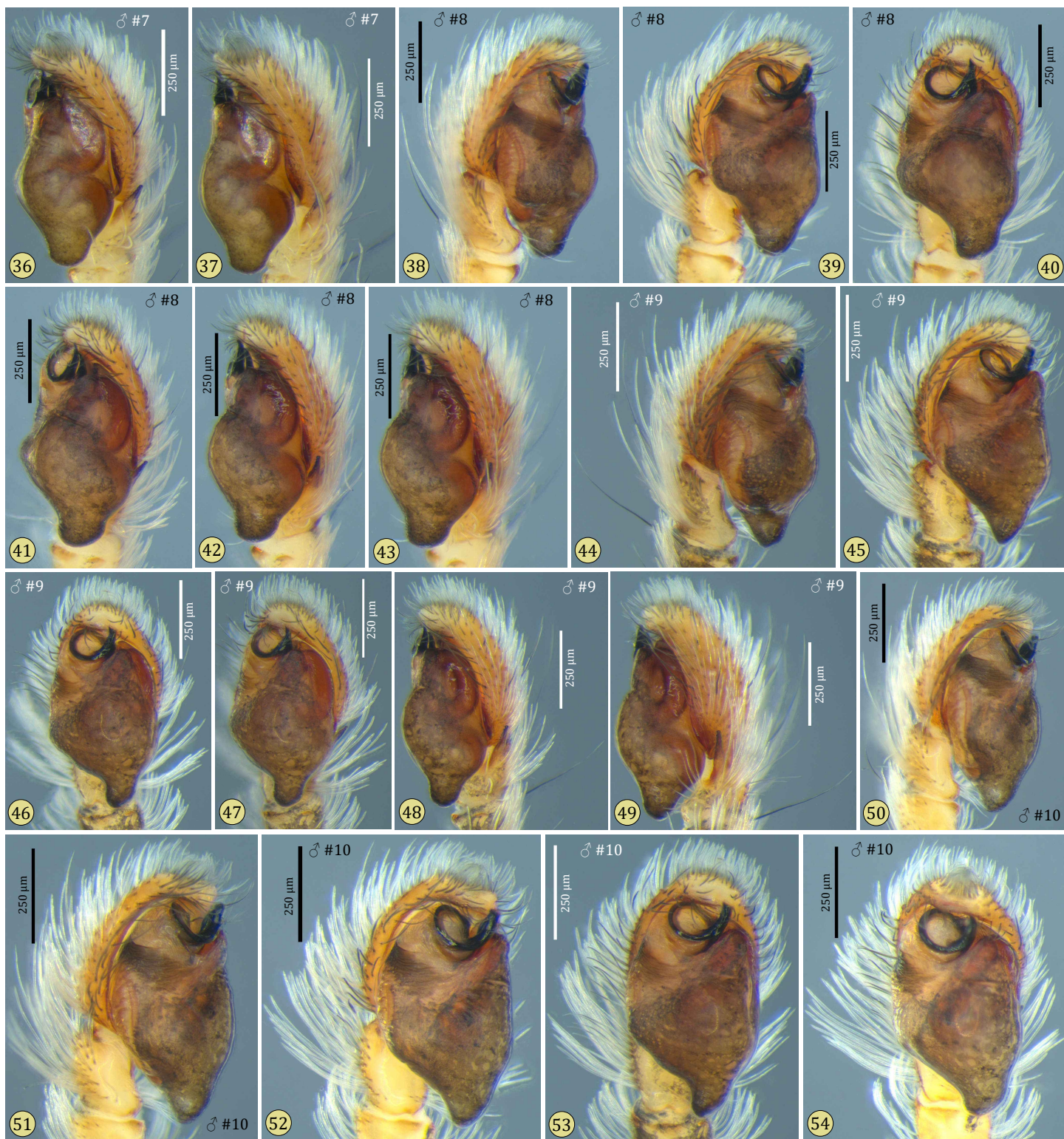


Figure 6 (continued from previous page, continued on next page). Medial to lateral views of the left pedipalp of type males for *Maratus yanchep*, in alcohol.

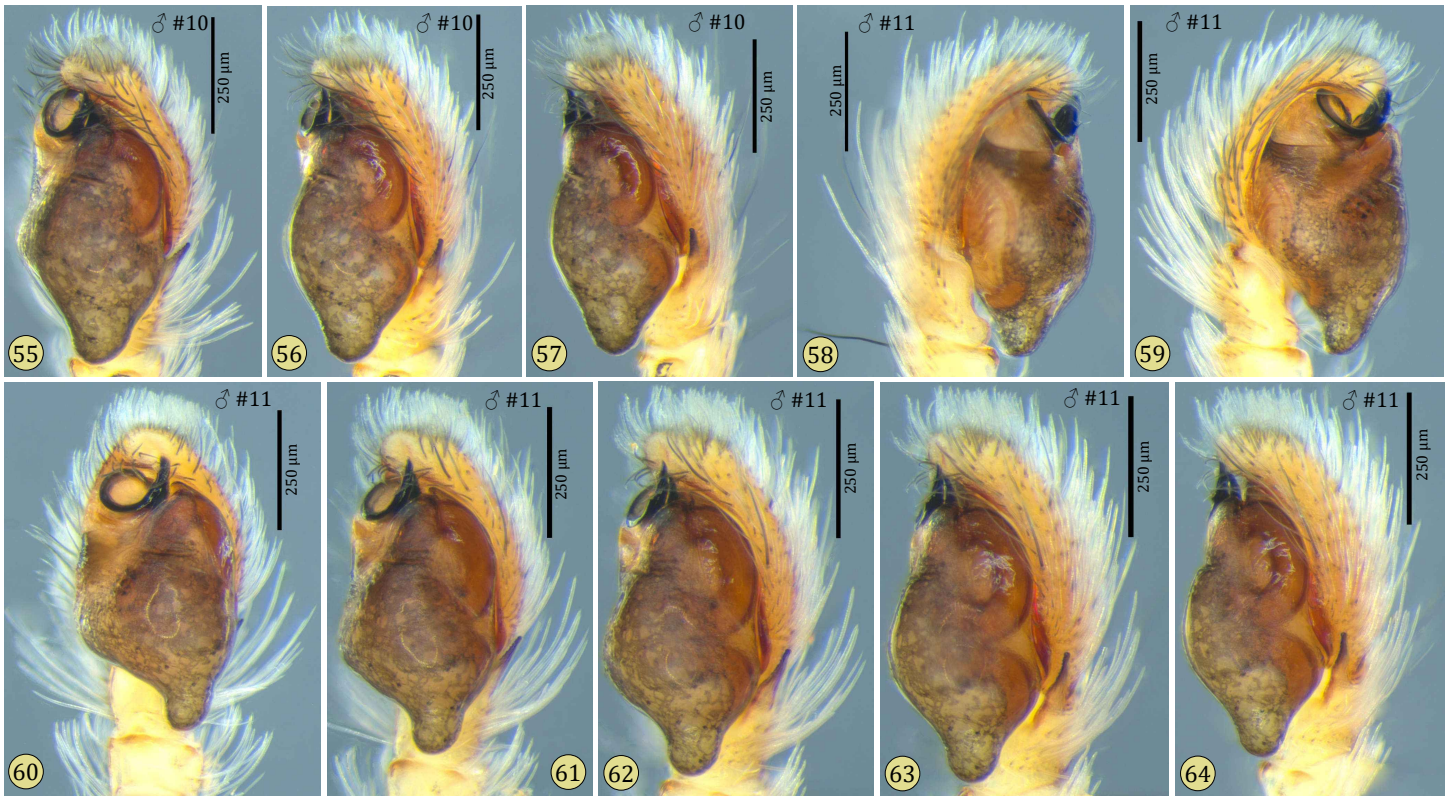


Figure 6 (continued from previous page). Medial to lateral views of the left pedipalp of type males for *Maratus yanchep*, in alcohol.

Description of female (Figures 7-11). Type females (n=4) range from 4.5-5.6 mm in length. These closely resemble the female paratypes figured by Schubert (2020) for *M. suae*, although they lack the ventral spotting of the abdomen of that species. The pedipalps have a uniform cover of scattered off-white setae. The chelicerae are brown and glabrous. Longer off-white setae extend in a medio-dorsal direction from the clypeus. The eye region is covered with fairly uniform light brown setae. Behind this a wide mediothoracic band is present on the top of the carapace. The PME is closer to the PLE than to the ALE. The cuticle of the carapace is light brown to yellow-brown, and translucent on the sides, dark brown on top, with scattered long off-white setae on the sides below the lateral eyes, but without marginal bands on the sides.

The dorsal opisthosoma is dark brown at the center, surrounded by a darker margin, and then by a wide off-white to yellow-white marginal band on the sides. A distinct or indistinct pattern (compare Figure 7.17 to Figure 7.23; note the variation in colour) of lighter spots, including chevrons toward the rear, may be seen on the dorsum of the opisthosoma. The underside of the opisthosoma has a generally uniform cover of off-white setae, with some small darker spots, but none of the size shown for the female *M. suae* (Schubert 2020). From below (Figure 8) the coxae, sternum, labium and endites are mostly light brown, translucent and glabrous, except for longer off-white setae projecting from the rear of the sternum.

Legs I and II are shorter, legs III and IV longer, and of similar length. All legs have a nearly uniform cover of off-white to light brown setae, and, if present, segmental banding is indistinct. The fossae of the epigynum are smaller than the spermathecae (Figure 11), and relatively smaller than those figured for the paratype *M. suae* by Schubert (2020). However, these proportions tend to vary between individuals in *Maratus* species, and thus the structure of the epigynum is not a useful character for recognition of *M. yanchep*.



Figure 7 (continued on next page). Paratype females for *Maratus yanchep*.



Figure 7 (continued from previous page, continued on next page). Paratype females for *Maratus yanchep*. 18-27, Note that this female has more yellow-brown colouration, and more contrast in scale patterns, than the other three females shown here.



Figure 7 (continued from previous page). Paratype females for *Maratus yanchep*.



Figure 8. Ventral view of paratype females for *Maratus yanchep*.

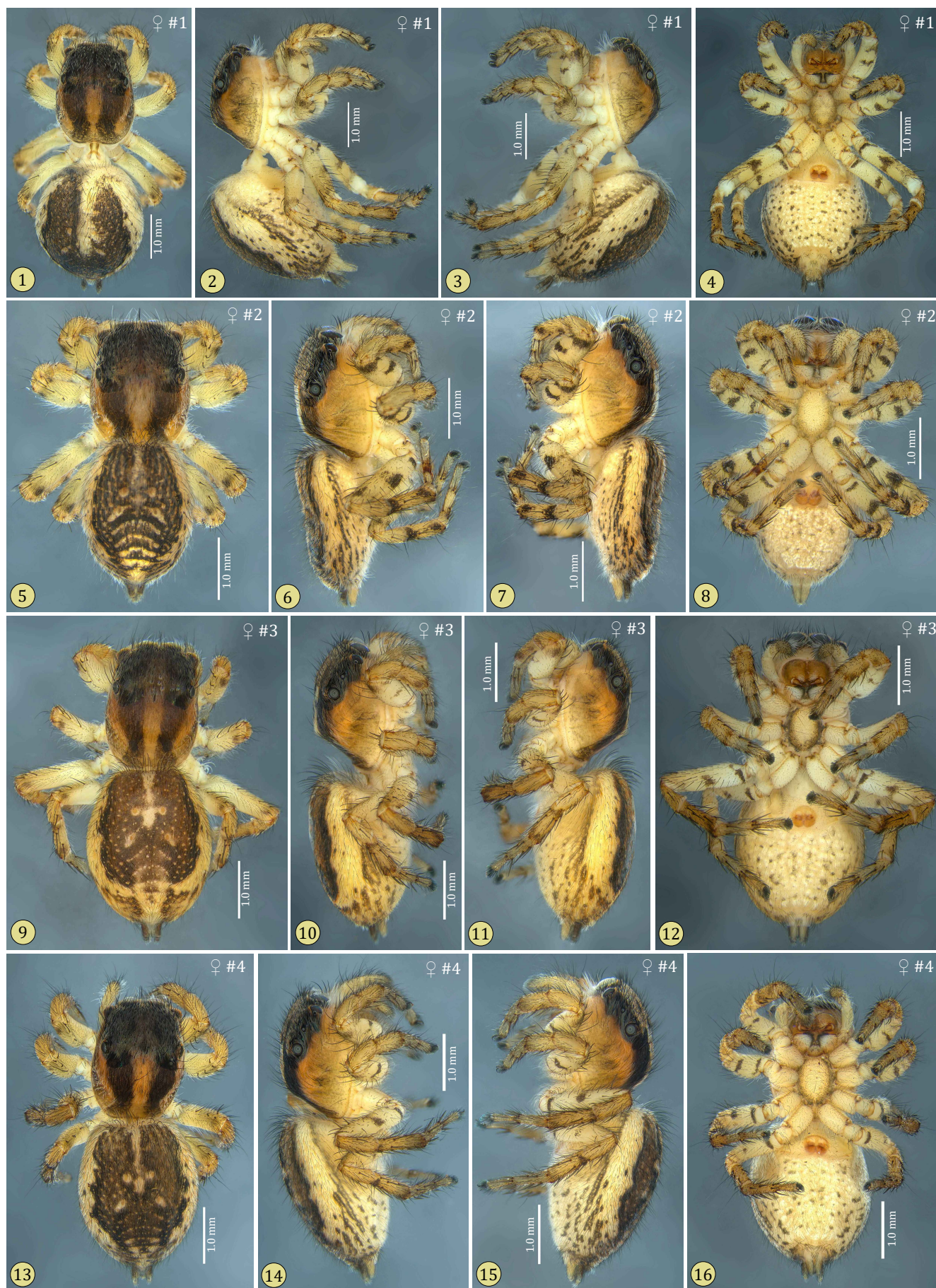


Figure 9. Paratype females for *Maratus yanchep*, in alcohol.

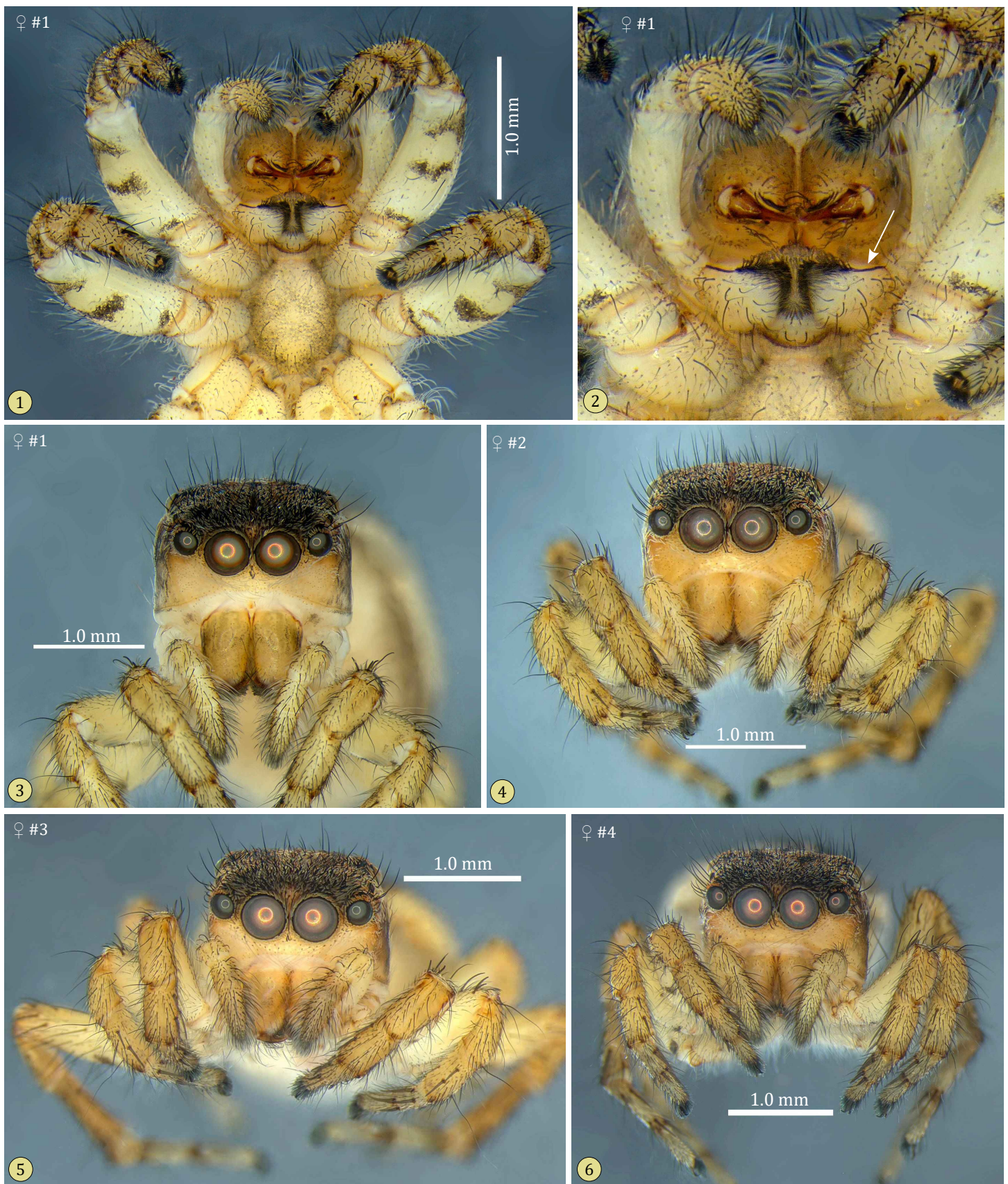


Figure 10. Paratype females for *Maratus yanchep*, in alcohol. **1-2**, Detail from figure 9.4. Note the *serrula* (2, arrow), a fine-toothed comb on the anterior edge of each endite that may play a role in the collection of silk as the spider climbs a dragline.

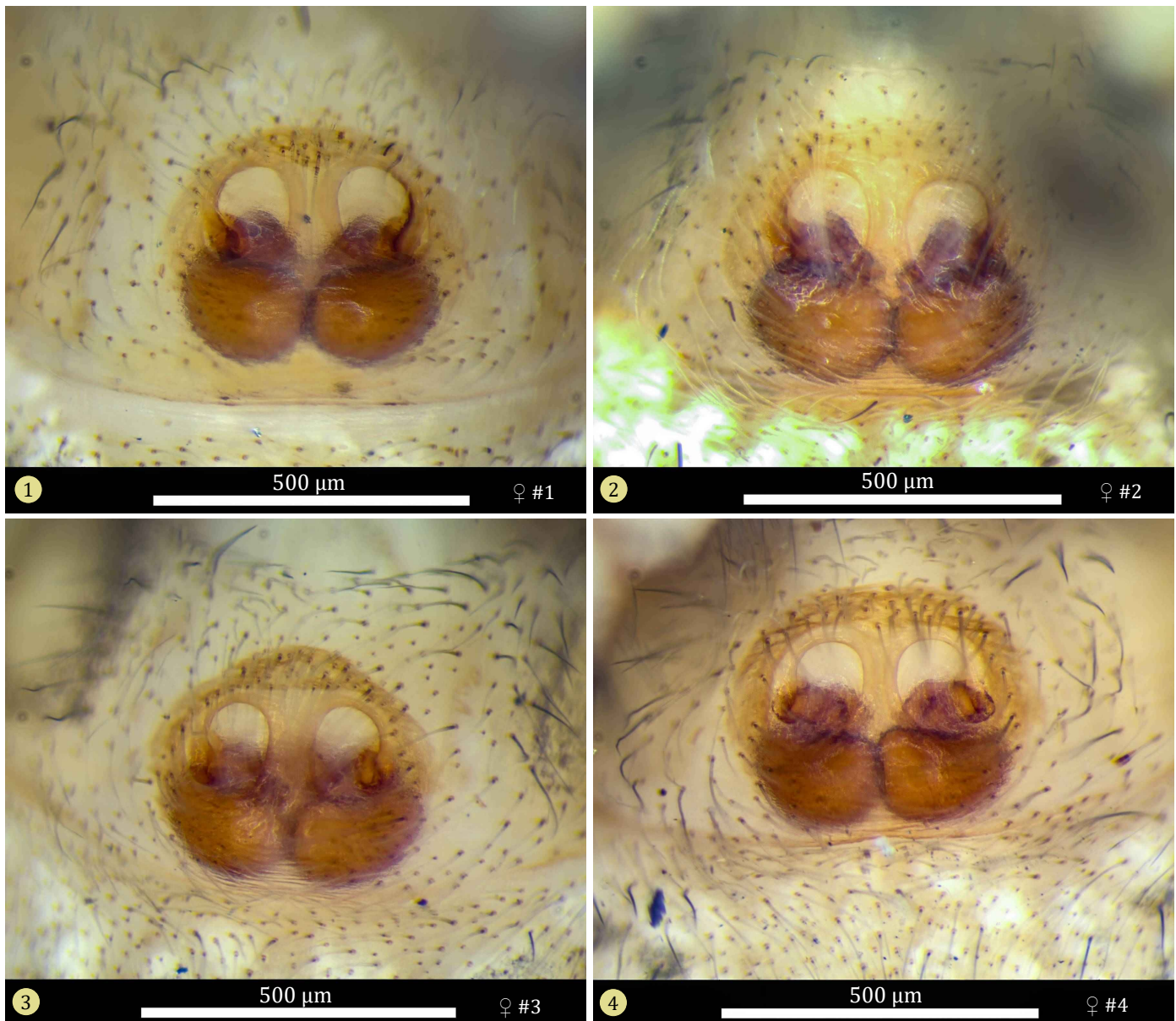


Figure 11. Exterior (ventral) view of epigynum of paratype females for *Maratus yanchep*, in alcohol. The anterior direction is toward the top of the page.

Courtship display (Figures 12-16). The courtship display of males was observed and recorded with 25fps and 100fps video when they were placed in a naturalistic setting in the laboratory. Females of a different species were used to elicit this display, as the female *M. yanchep* that were available tended to flee and were otherwise unresponsive to the males. As a result these observations do not represent interactions between the male and female of this species, but only the display behavior of the male.

During this display, the opisthosoma (fan) was either held in a lower position with flaps retracted (Figures 12-13), or elevated with the flaps expanded (Figures 14-16). In an encounter with a female, the lower position with flaps retracted is the first form of display. In both cases the fan was alternately raised and lowered (bobbed) at a rate of $\sim 3\text{Hz}$, as the extended legs III were moved together from side to side. When the fan was elevated, it was usually waved from side to side through $\sim 2\text{-}5$ L/R cycles through a small to moderate amplitude ($2\text{-}13^\circ$) at a rate of $\sim 15\text{-}20\text{ Hz}$. Bobbing of the *elevated* fan by a *Maratus* is unusual, although this has also been observed in the related *M. suae* (Schubert 2020).

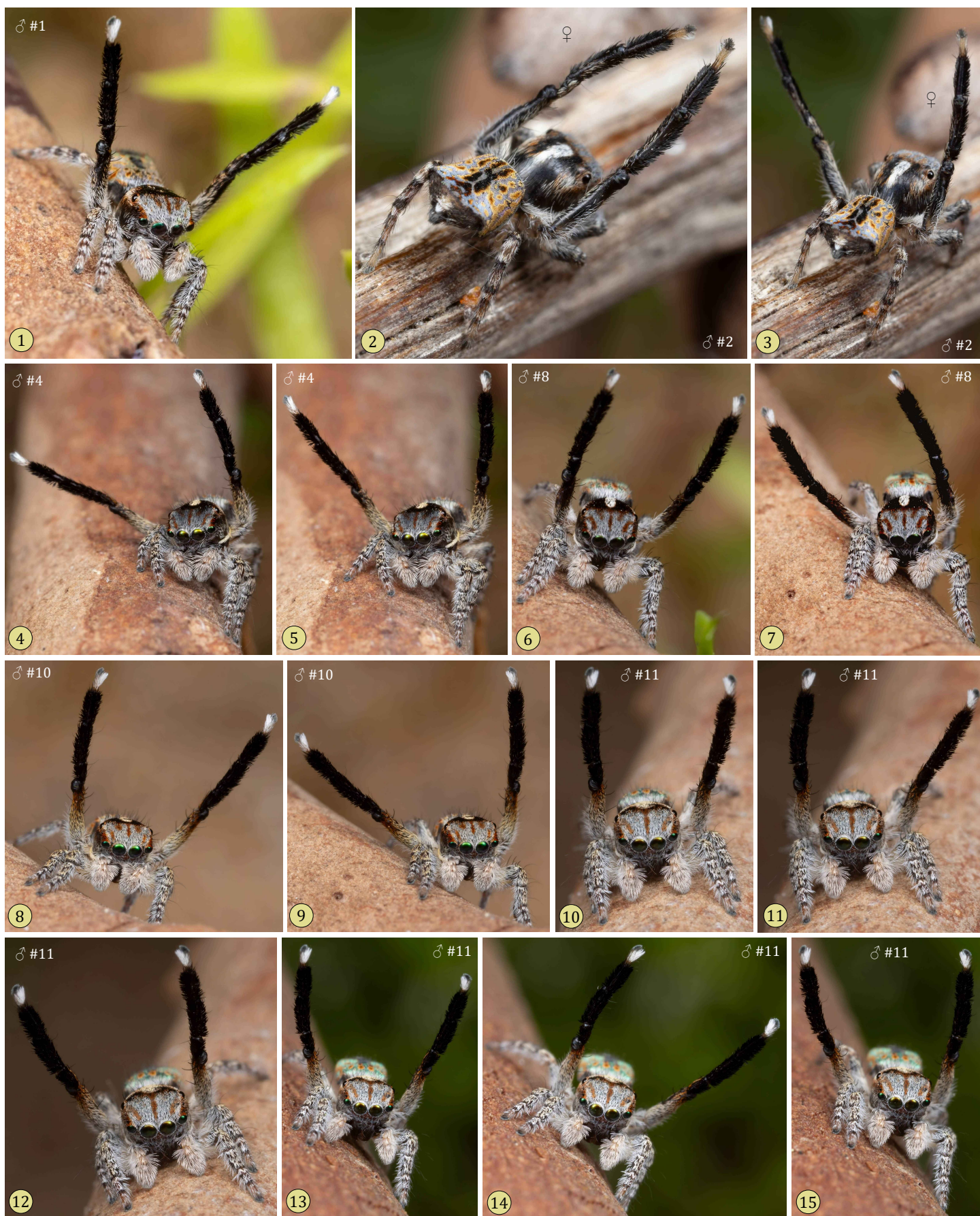


Figure 12. Serial photographs (1, 2-3, 4-5, 6-7, 8-9, 10-12, 13-15) showing positions of male *Maratus yanchep* displaying to a female *Maratus*, with the fan depressed and flaps retracted.

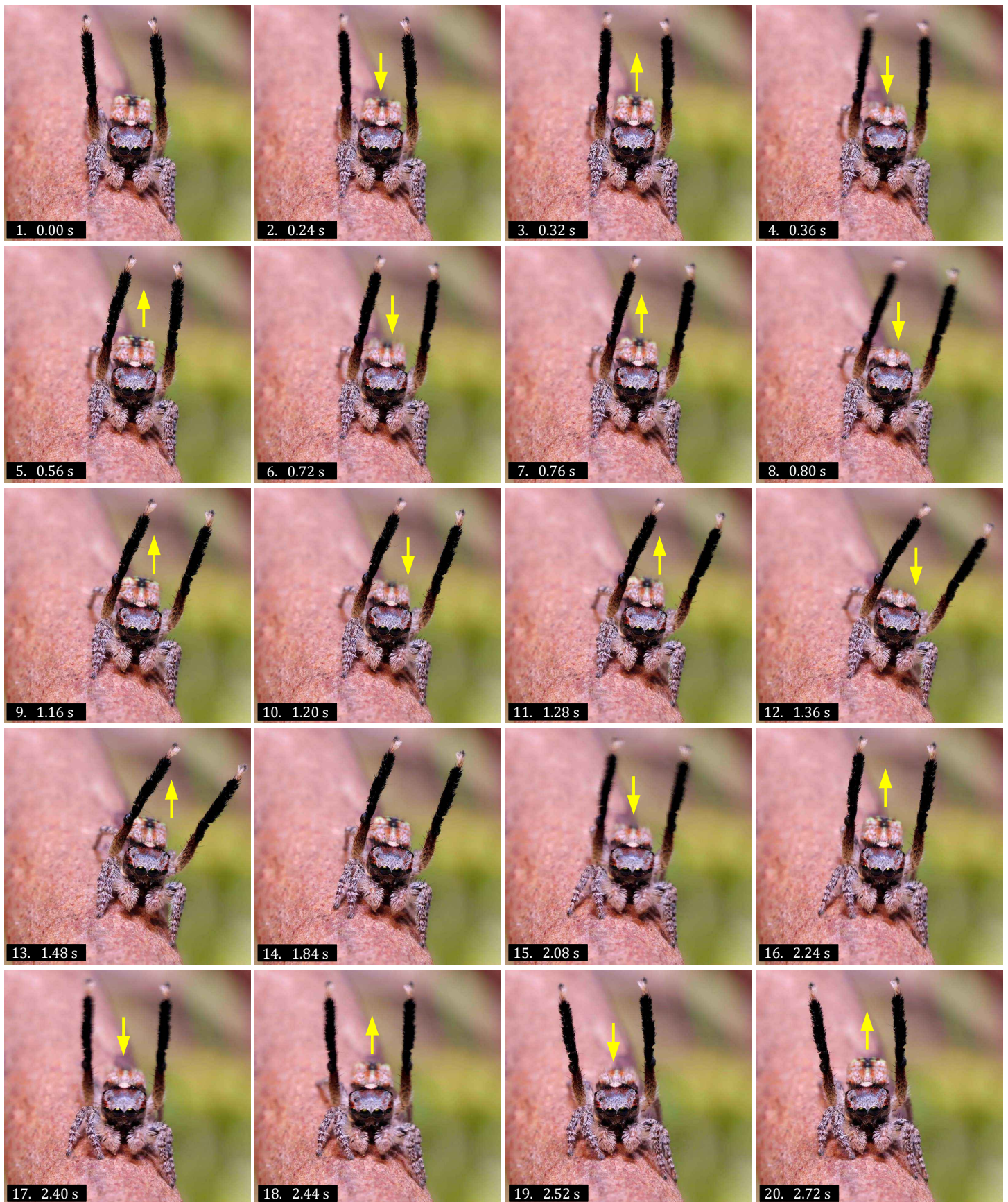


Figure 13 (continued on next page). Selected sequential frames from a 25 fps video showing positions of male *Maratus yanchep* displaying to a female *Maratus*, with the fan depressed and flaps retracted. Alternate depression and elevation of the fan (bobbing) relative to the preceding frame is indicated with arrows.

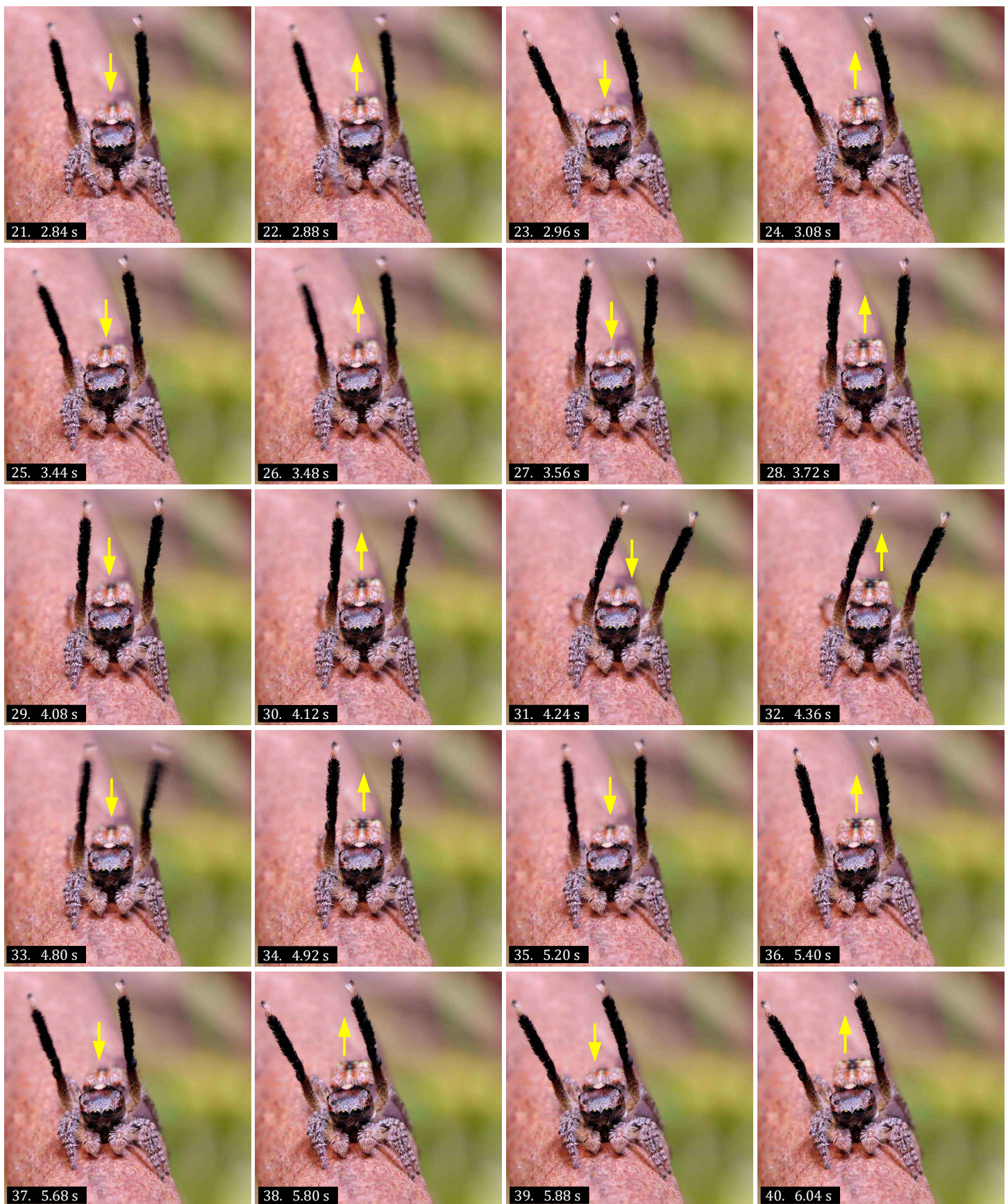


Figure 13 (continued from previous page). Selected sequential frames from a 25 fps video showing positions of male *Maratus yanchep* displaying to a female *Maratus*, with the fan depressed and flaps retracted.

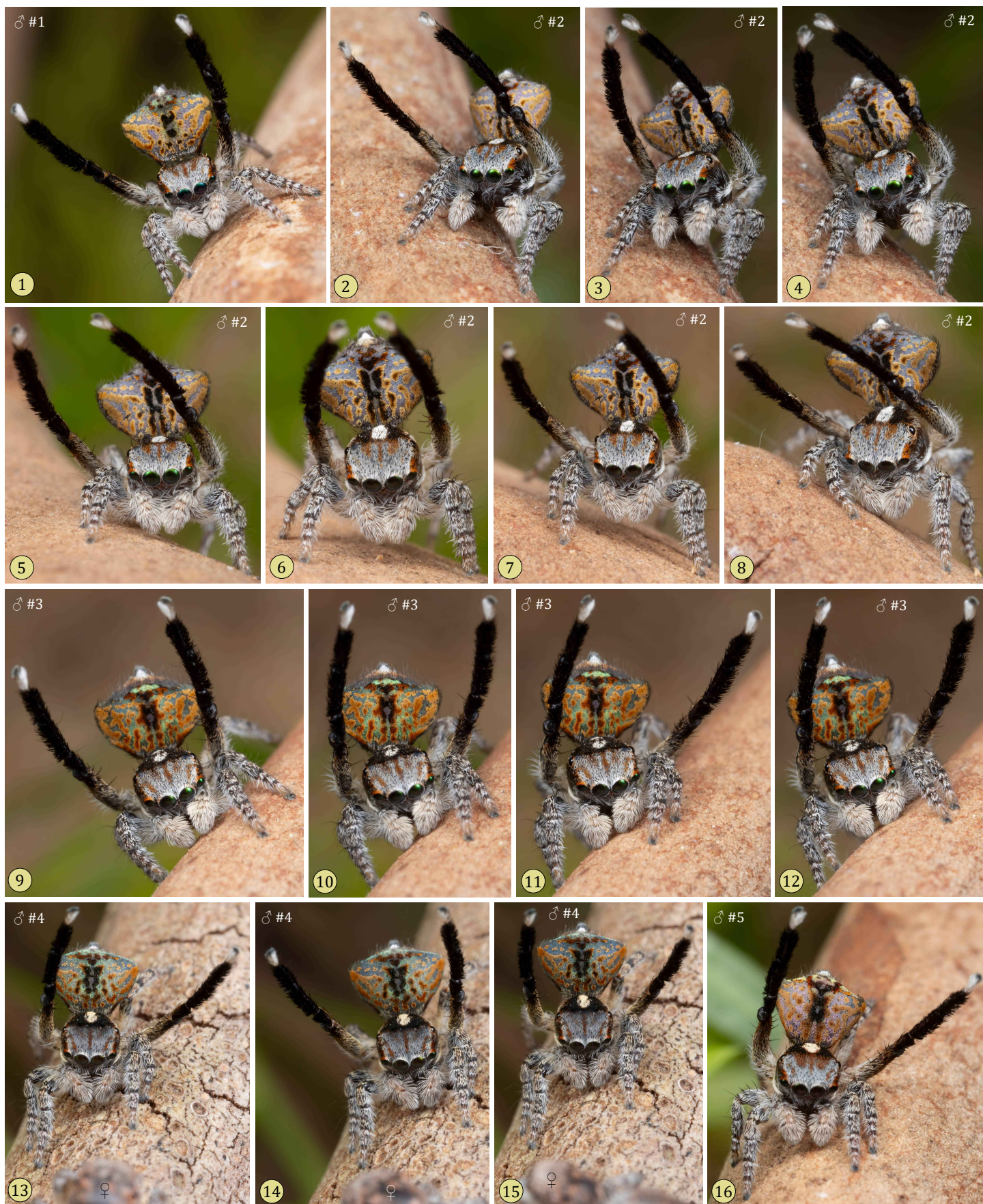


Figure 14 (continued on next page). Serial photographs (1, 2-4, 5-8, 9-12, 13-15, 16) showing positions of male *Maratus yanchep* displaying to a female *Maratus*, with the fan elevated and flaps extended.

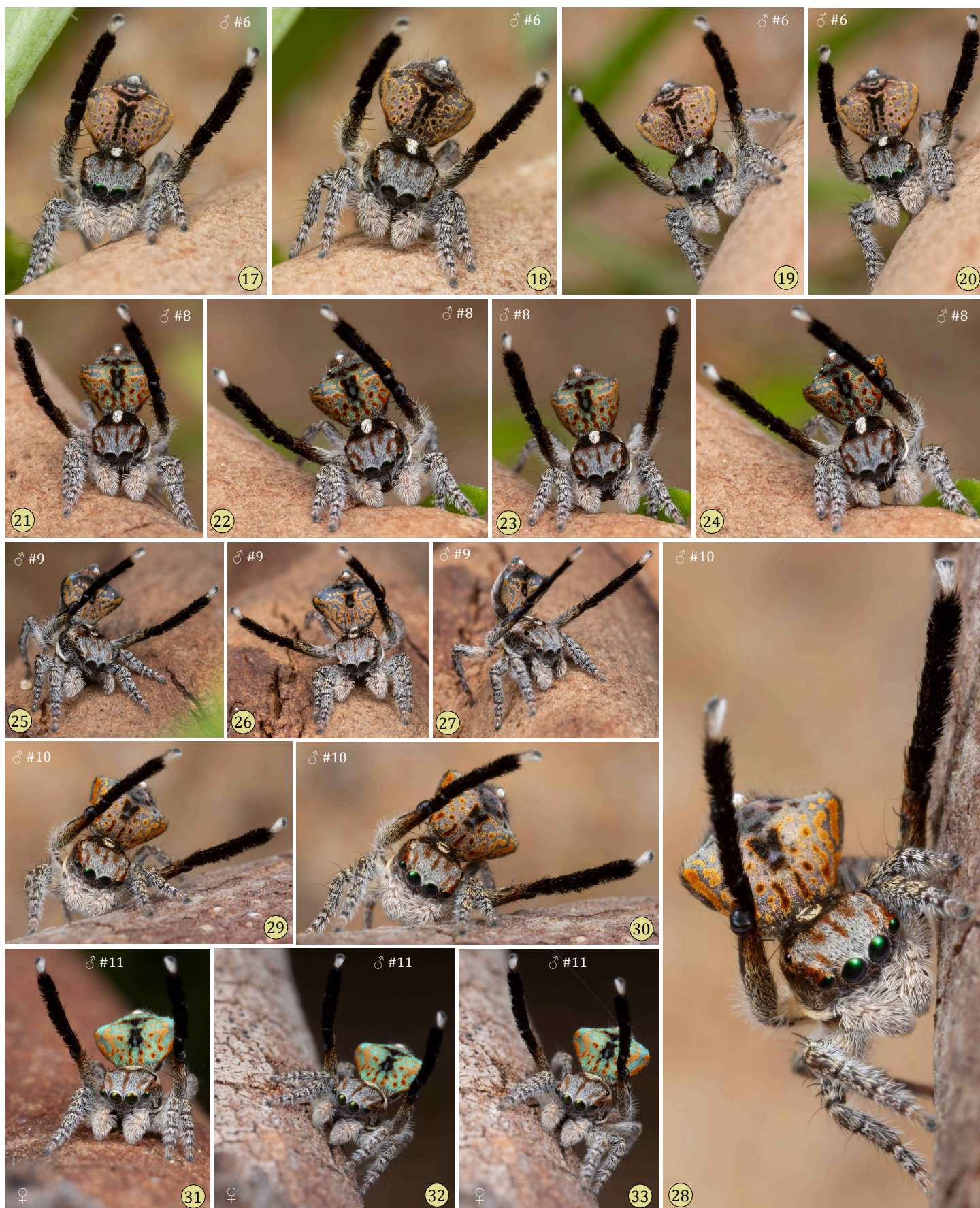


Figure 14 (continued from previous page). Serial photographs (17-18, 19-20, 21-24, 25-27, 28, 29-30, 31, 32-33) showing positions of male *Maratus yanchep* displaying to a female *Maratus*, with the fan elevated and flaps extended.

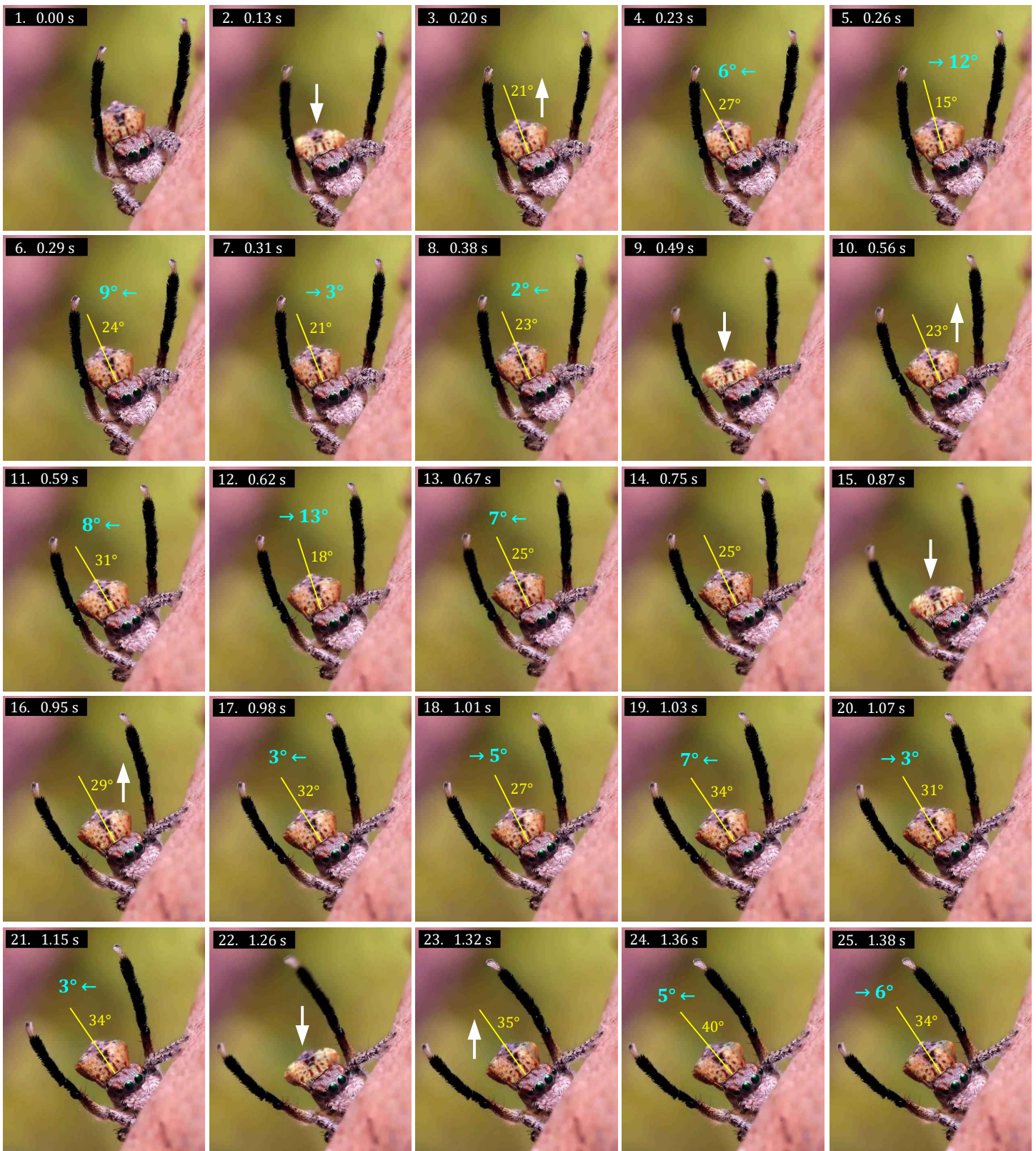


Figure 15 (continued on next page). Selected sequential frames from a 100 fps video of a male *M. yanchep* displaying with the fan elevated and flaps extended. Larger, vertical arrows indicate depression or elevation of the fan relative to the previous frame (down/up cycles), at a rate of ~ 3 Hz. Yellow lines and numbers indicate the inclination of the sagittal plane of the fan. Numbers associated with smaller, horizontal arrows indicate the low to moderate magnitude (2 - 13°) of side-to-side rotation (waving) of the fan relative to the previous frame, at a rate of 10 - 23 Hz (average ~ 16 Hz), but only for about 2 - 3 cycles each time that the fan was elevated.

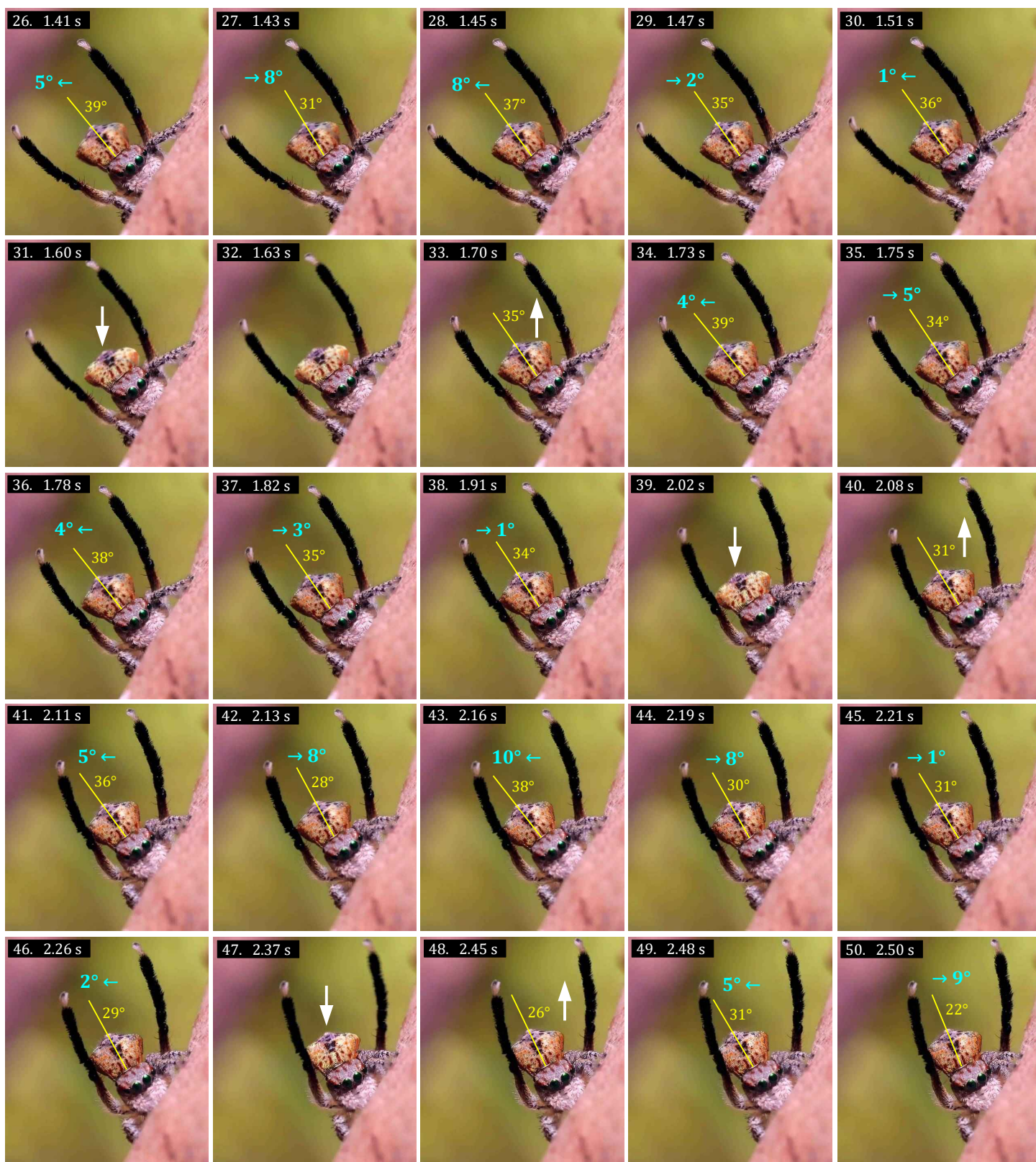


Figure 15 (continued from previous page). Selected sequential frames from a 100 fps video of a male *M. yanchep* displaying with the fan elevated and flaps extended.

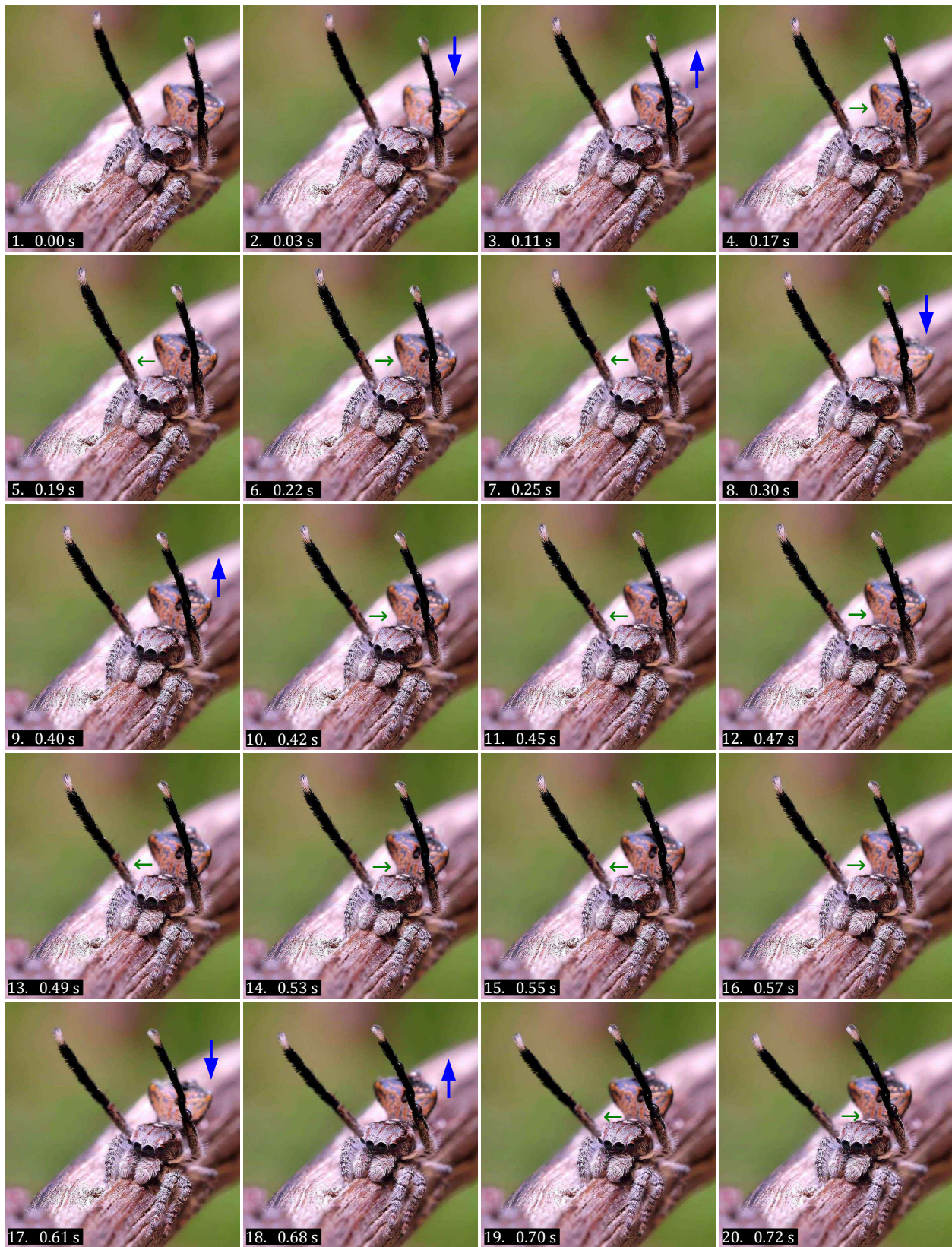


Figure 16 (continued on next page). Selected sequential frames from a 100 fps video of a male *M. yanchep* displaying with the fan elevated and flaps extended. Blue arrows indicate depression or elevation of the fan relative to the previous frame (down/up cycles), at a rate of ~ 3.6 Hz. Smaller green arrows indicate side to side rotation (waving) of the fan in an elevated position (2-5 L/R cycles per position, cycles at ~ 20 Hz).

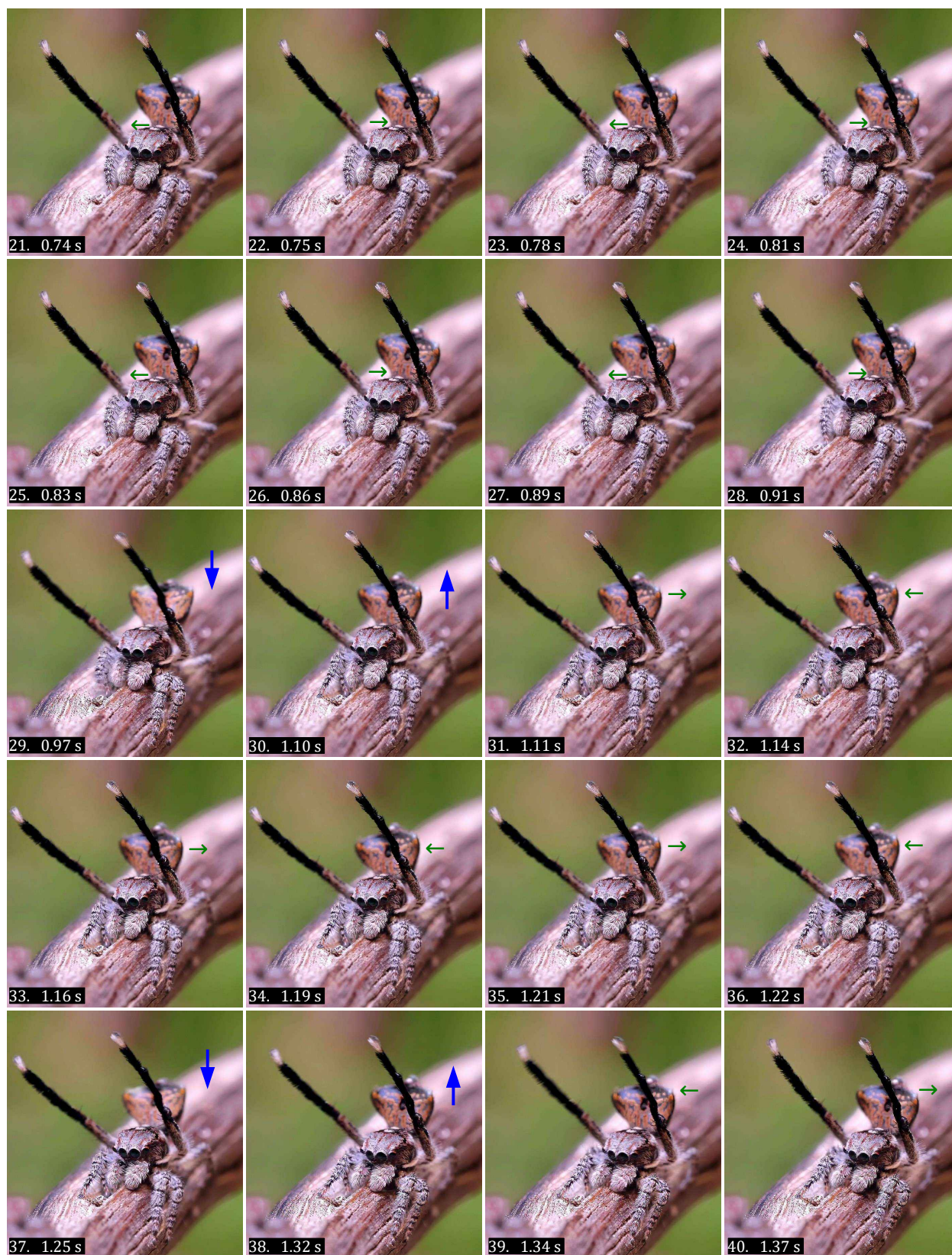


Figure 16 (continued from previous page). Selected sequential frames from a 100 fps video of a male *M. yanchep* displaying with the fan elevated and flaps extended.

Habitat and distribution. Two views of the type locality, in coastal sand dunes to the north of Perth, are shown in Figure 17. All known members of the *flavus* group have been found in isolated localities with an allopatric distribution, all near the southwestern coast of Western Australia (Figure 18).



Figure 17. Type locality for *Maratus yanchep*, in coastal sand dunes north of Perth. **1**, Toward the coast. **2**, Away from the coast. Photographs by Michael Lun.

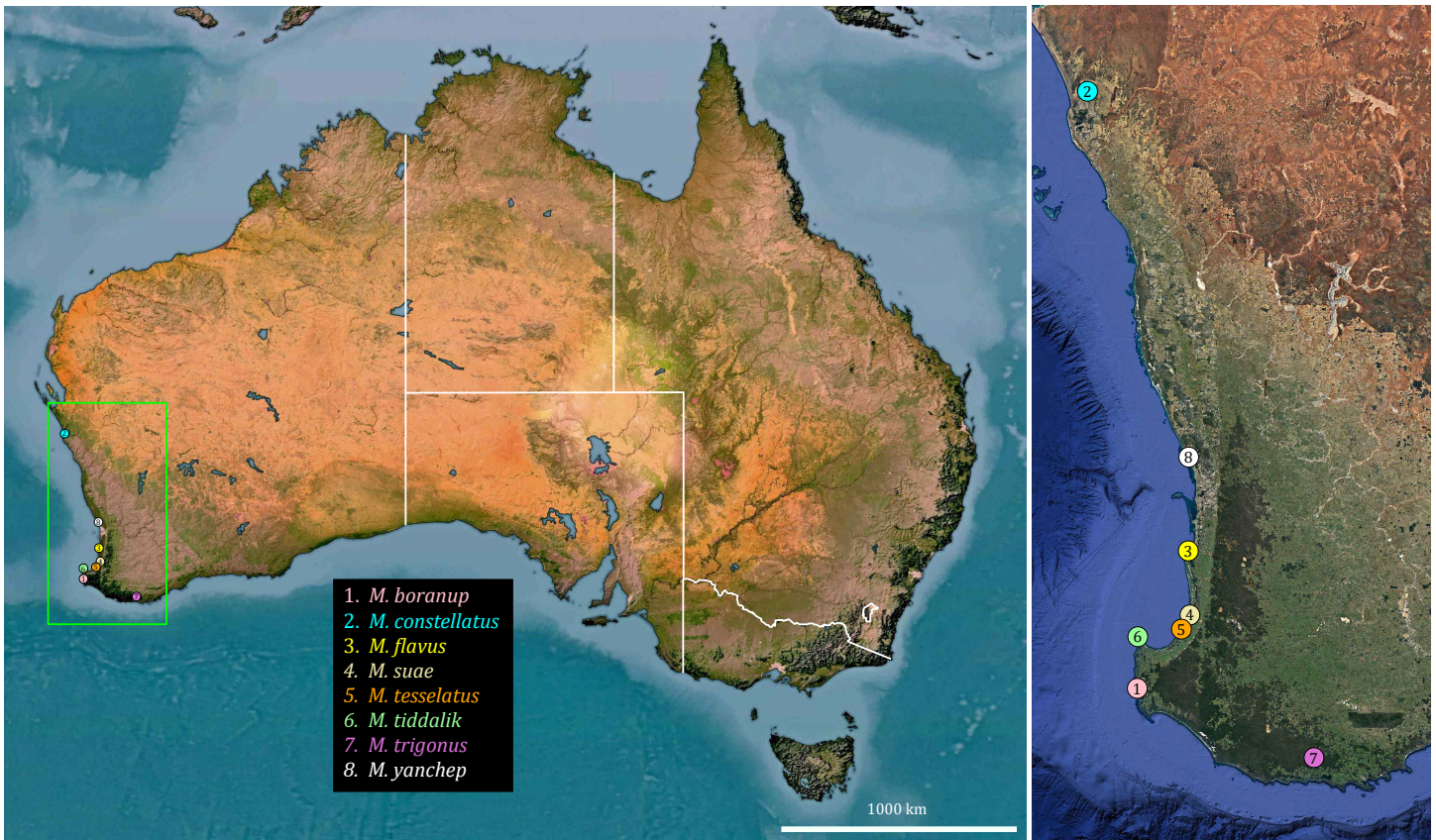


Figure 18. Known distribution of the eight members of the *flavus* group, near the southwestern coast of Western Australia (detail at right prepared with QGIS).

This *narrow endemism* can be associated with a high risk of extinction for these species, should habitat be lost. Narrow endemism by itself is an interesting phenomenon, with a number of correlated features that may include the following: local geographic isolation, a high degree of sexual selection by females, the rapid evolution of local secondary sexual characters, selection for low dispersal (at least in part the result of a high degree of local male/female coevolution of sexual selection), and stability of the environment. Stability of the environment would suggest that large fluctuations of the local population do not occur, so a higher level of dispersal is not needed. The small size of these spiders may also support relatively large populations in small areas, contributing to population stability and persistence.

Acknowledgements

We thank Reef Coakley, Lucyna Kania and Nick Volpe for sharing their discovery of this species. We are also grateful to Michael Lun and Flynn Prall for providing specimens for study, and for sharing their habitat photographs. We also thank the Department of Parks and Wildlife, Western Australia. Unless otherwise indicated, all photographs are copyright © Jürgen C. Otto.

References

- Karsch 1878.** F. Karsch. Diagnoses Attoidarum aliquot novarum Novae Hollandiae collectionis Musei zoologici Berolinensis. Mittheilungen des Münchener Entomologischen Vereins 2 (1): 22-32.
- Otto & Hill 2016.** Jürgen C. Otto and David E. Hill. 22 MAY 2016. Seven new peacock spiders from Western Australia and South Australia (Araneae: Salticidae: Euophryini: *Maratus*). Peckhamia 141.1: 1-101.
- Otto & Hill 2017.** Jürgen C. Otto and David E. Hill. 26 AUG 2017. Five new peacock spiders from Western Australia (Araneae: Salticidae: Euophryini: *Maratus* Karsch 1878). Peckhamia 152.1: 1-97.
- Otto & Hill 2018.** Jürgen C. Otto and David E. Hill. 27 FEB 2018. Two new peacock spiders from Western Australia (Araneae: Salticidae: Euophryini: *Maratus* Karsch 1878). Peckhamia 160.1: 1-42.
- Otto & Hill 2020.** Jürgen C. Otto and David E. Hill. 13 OCT 2020. *Maratus tiddalik*, a new peacock spider in the *flavus* group from Western Australia (Araneae: Salticidae: Euophryini). Peckhamia 223.1: 1-26.
- Otto & Hill 2021.** Jürgen C. Otto and David E. Hill. 24 FEB 2021. Catalogue of the Australian peacock spiders (Araneae: Salticidae: Euophryini: *Maratus*), version 4. Peckhamia 148.4: 1-35.
- Otto & Hill 2022.** Jürgen C. Otto and David E. Hill. 9 APR 2022. *Maratus candens*, a new peacock spider in the *linnaei* group from southwestern Australia (Araneae: Salticidae: Euophryini). Peckhamia 263.1: 1-33.
- Schubert 2020.** Joseph Schubert. 27 MAR 2020. Seven new species of Australian peacock spiders (Araneae: Salticidae: Euophryini: *Maratus* Karsch, 1878). Zootaxa 4758 (1): 1-44.