

Maratus nambung, a new peacock spider from the southwestern corner of Australia (Araneae: Salticidae: Euophryini)

Jürgen C. Otto¹ and David E. Hill²

¹ 19 Grevillea Avenue, St. Ives, New South Wales 2075, Australia, *email* jurgenotto8@gmail.com

² 213 Wild Horse Creek Drive, Simpsonville SC 29680, USA, *email* platycryptus@yahoo.com

Abstract. *Maratus nambung*, a close relative of *M. bubo* from the southwestern coast of Western Australia, is described. Male courtship display by *M. nambung*, which differs from the display of *M. bubo*, is also described.

Keywords. courtship, jumping spider, *Maratus bubo*

Here we describe a new species of *Maratus* from the Wheatbelt region of Western Australia, near the coast some 200 km northwest of Perth. This species is closely related to *Maratus bubo*, presently known from a single locality near the southwestern coast of Western Australia (Figures 1-2).



Figure 1. 1-3, ♀ *Maratus bubo* Otto & Hill 2016. 4-6, ♀ *M. nambung*, new species. The female *M. nambung* has more cover of white to off-white scales, but like *M. bubo* has a characteristic pattern of five white spots at the center of the dorsal opisthosoma (identified by green rectangles in 1.3 and 1.6).

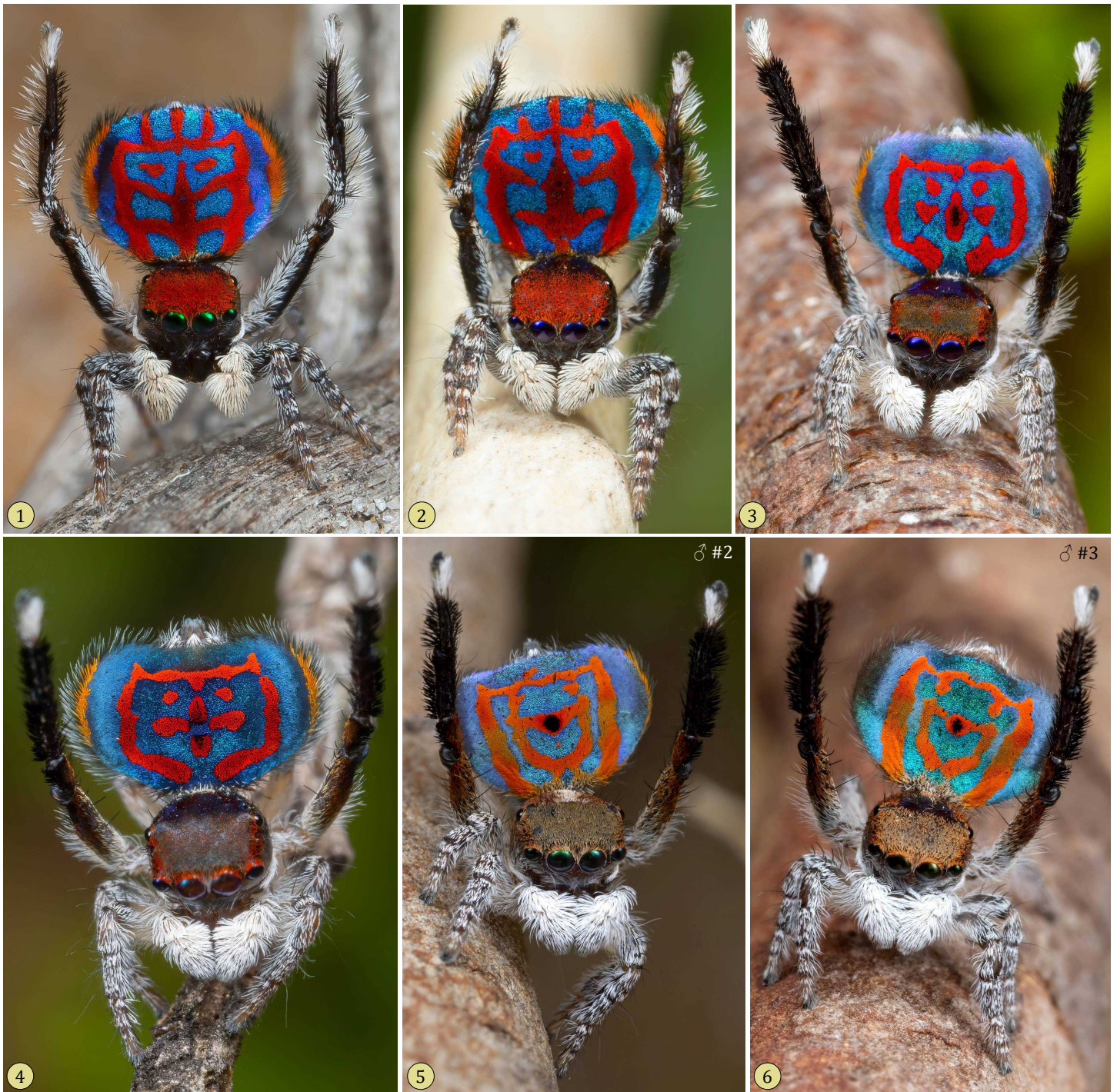


Figure 2. 1-2, ♂ *Maratus bubo* Otto & Hill 2016. 3-4, ♂ *M. cf. bubo*, undescribed. Except for the bright red colour of pigmented scales on the fan, this form appears to be closer to *M. nambung* than to *M. bubo*. 5-6, ♂ *M. nambung*, new species. *M. bubo* has a large fringe on tibia-metatarsi III, with a fan that is more rounded at the rear and marked in that place by three red lines. The other two species lack this fringe, but have a shorter fringe of black setae. The carapace of *M. nambung* (5-6) has a cover of brown (rather than dull red) scales, and pigmented scales of the fan are orange to red-orange rather than bright red, with a distinct black spot at the center.

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

Type specimens. The holotype male (♂ #1) was collected 10 km SE of Cervantes, Western Australia (30.56805°S, 115.24510°E; 6 AUG 2023; Michelle Peak collector). Seven paratype males (♂ #2-8), and two paratype females (♀ #1-2) were collected 32 km SE of Cervantes (30.55647°S, 115.39716°E; 13 AUG 2023; Flynn Prall collector). All types will be deposited in the Western Australia Museum, Perth.

Etymology. The species group name, *nambung* (English, noun in apposition), is a reference to the name of the locality where this spider was found. This is an indigenous Australian word that may refer to the crooked or winding course of the Nambung River.

Diagnosis. *Maratus nambung* is clearly a close relative of *M. bubo* Otto & Hill 2016 (Figures 1-2), both associated with the *mungaich* group of the genus *Maratus* (Otto & Hill 2021). Structure of the genitalia (male pedipalp and female epigynum) is similar to that of many related *Maratus* in Western Australia, and of little use for identification to species. Females of *M. bubo* and *M. nambung* (Figure 1) are similar and not easily separated, although females of *M. nambung* may be lighter in colour. The fan of male *M. nambung* is less rounded at the rear than that of *M. bubo*, the pattern of pigmented scales of this fan is different, and legs III have fringes of shorter black, rather than longer white, setae (Figure 2). In addition, the scale cover of the male carapace of *M. nambung* is brown rather than red, and the pigmented scales of the fan of *M. nambung* are orange rather than bright red. *M. nambung* males lack the three red lines at the rear of the fan that are characteristic of *M. bubo*, and they also have a single black spot at the center of the fan.

Description of male (Figures 2.5-2.6, 3-8). Apart from characters mentioned in the diagnosis, males are very similar to male *M. bubo*. Type males (n=8) ranged from 3.95-4.55 mm in length. The front (dorsal aspect) of each pedipalp is covered with dense, long, bright white setae. The chelicerae are dark brown to black and glabrous. The clypeus has a cover of white setae, oriented medioventrally, differing from the nearly glabrous clypeus of *M. bubo*. The eye region is covered with brown setae, with more dull orange to brown setae extending around the eyes to the rear. Scattered setae cover the sides of the carapace (variable), and a thick band of bright white setae follows the margin of the carapace on either side. Behind the eye region a wide dorsomedian tract of white to off-white setae is usually present, although this may be rubbed off in some specimens. The PME are closer to the PLE than to the ALE.

As noted in the diagnosis, the fan of *M. nambung* resembles that of the male *M. bubo*, but differs in several key features. A central black spot is present, there is less (or no) orange on the lateral fringes, and the rear margin is less curved, and more linear, without the three red lines characteristic of male *M. bubo*. Individual variation in the distribution of orange setae is described in Figure 3. In addition the pigmented scales are bright red orange rather than red, with orange to dull-orange scales in a band across the middle of the fan (Figure 3.9). Ventrally, males are mostly grey to dark brown, with many long white to off-white setae, and with glabrous endites and labrum (Figure 5). Legs I and II are shorter; legs IV longer, and legs III by far the longest. Legs I, II and IV are indistinctly banded, with a cover of white setae. Legs III have brown setae on the femora and patella, a black tibia and metatarsus with dense fringes of black setae, and bright white setae covering the tarsus (Figure 3). Detailed structure of the pedipalp closely resembles that of many other *Maratus* from southwestern Australia, with the single coil of the embolus retrolaterally (or apically) divided, with a distinct ventral projection or "tooth" of the outer apex (Figure 8).



Figure 3. Fan dance by the type males for *Maratus nambung*, showing variations in the scale pattern of the fan. **9**, Across the fan in the middle (inset rectangle) most pigmented scales are dull orange to orange, contrasting with the red-orange scales on other parts of the fan. In male *M. bubo* (Figure 2.1-2.2), all of these scales are bright, scarlet red. As shown here, the detailed pattern of pigmented orange scales varies somewhat between individuals. For example, in males 1 and 4-5 there is a small orange spot behind the central black spot. The amount of orange colour at the fringed lateral margins of the fan also varies, and is lacking in some individuals (e.g., 3-6, 8).



Figure 4 (continued on next page). Type males for *Maratus nambung*.



Figure 4 (continued from previous page). Type males for *Maratus nambung*.

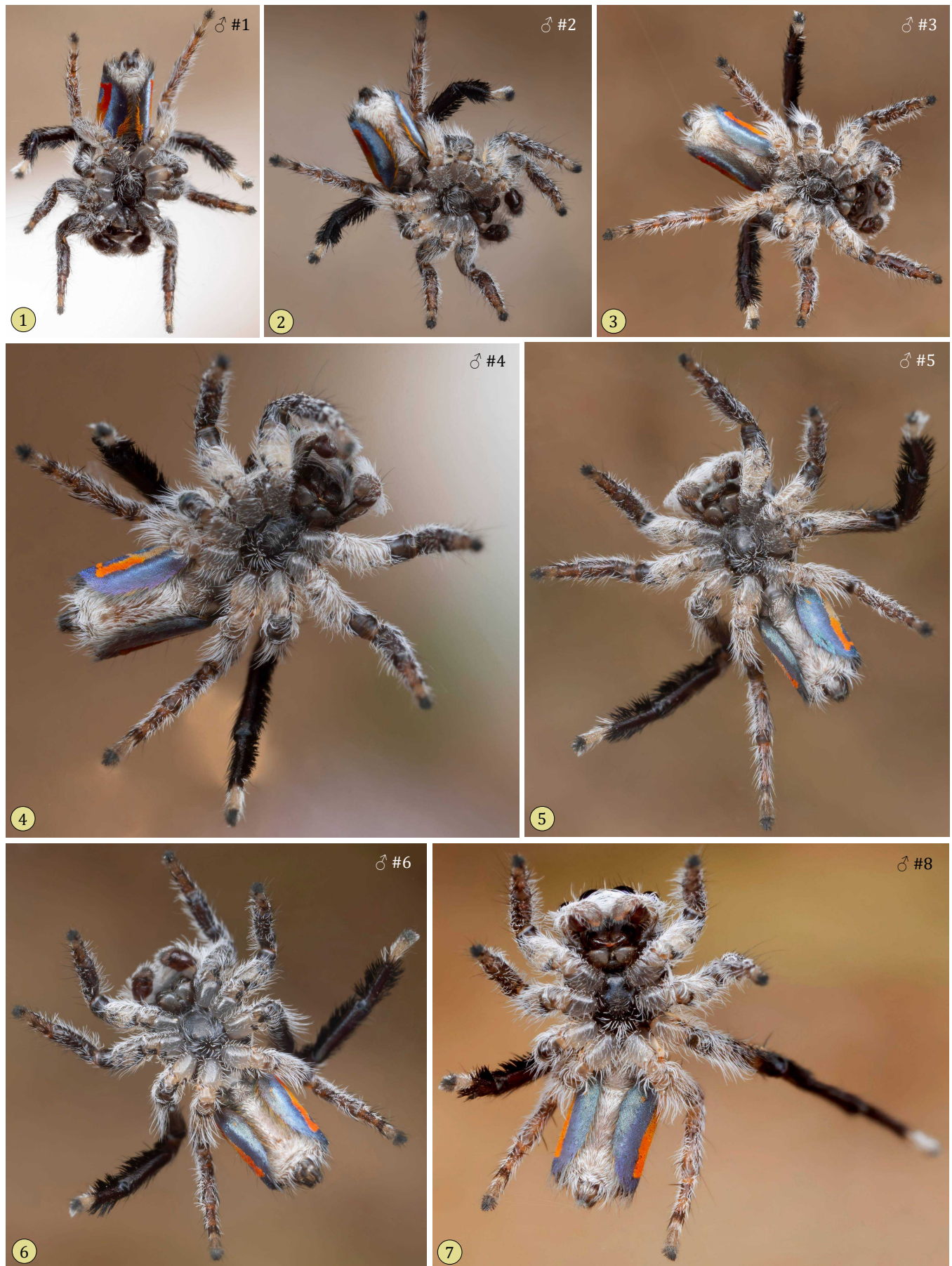


Figure 5. Type males for *Maratus nambung*, ventral view under glass.

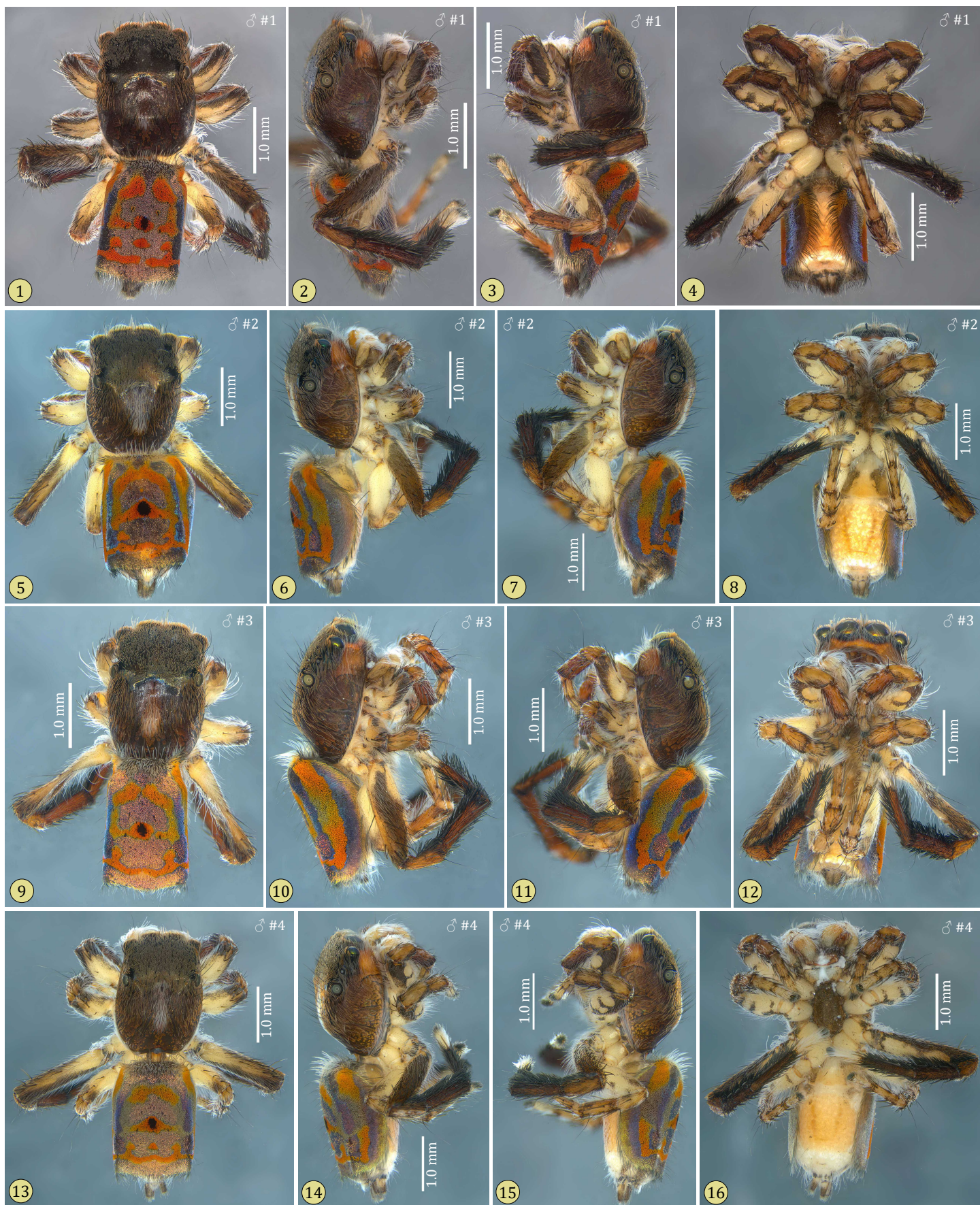


Figure 6 (continued on next page). Type males for *Maratus nambung*, in alcohol.



Figure 6 (continued from previous page). Type males for *Maratus nambung*, in alcohol.

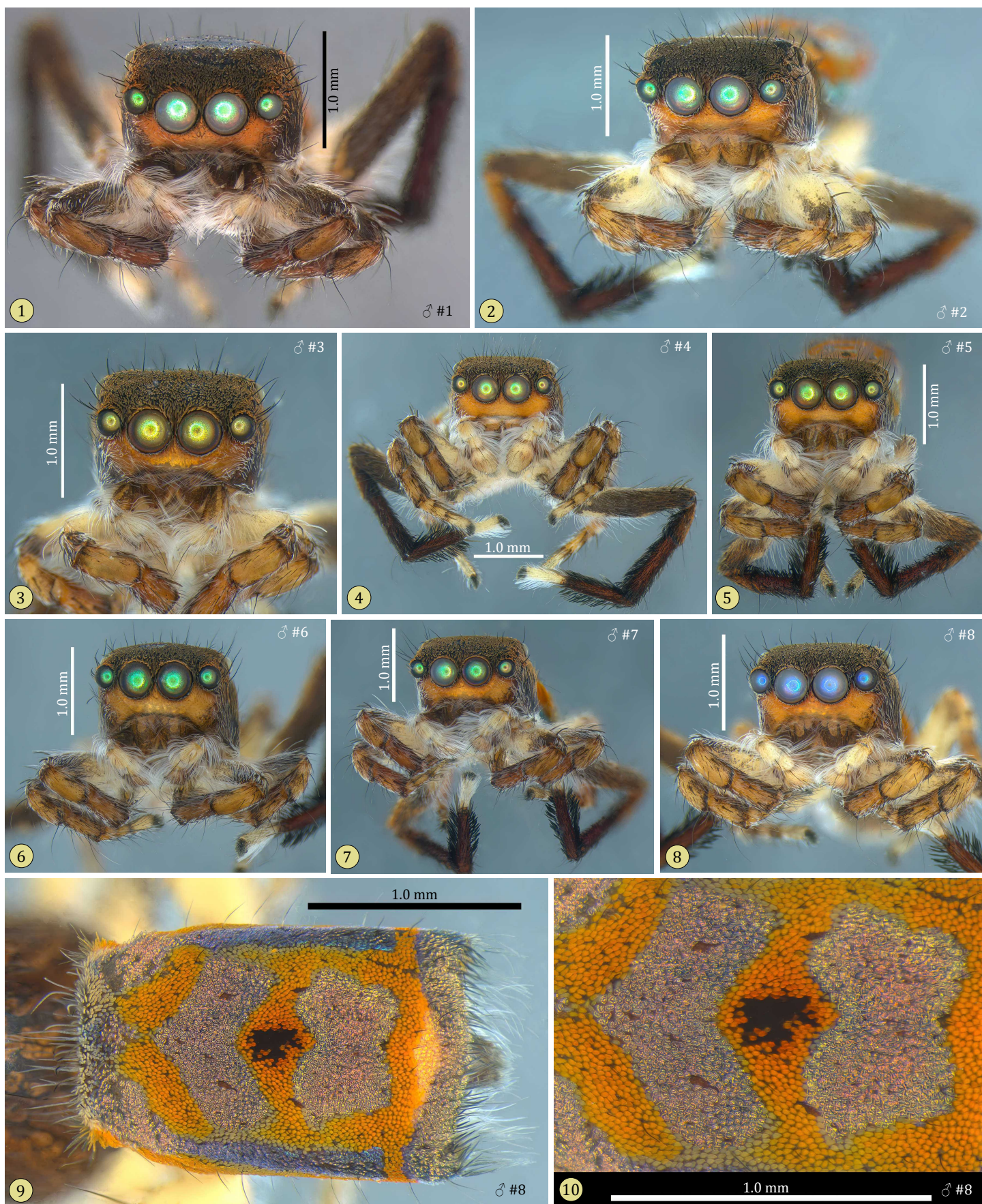


Figure 7. Type males for *Maratus nambung*, in alcohol. **1-8**, Frontal view. **9-10**, Detailed views of scales covering the fan (flaps retracted).

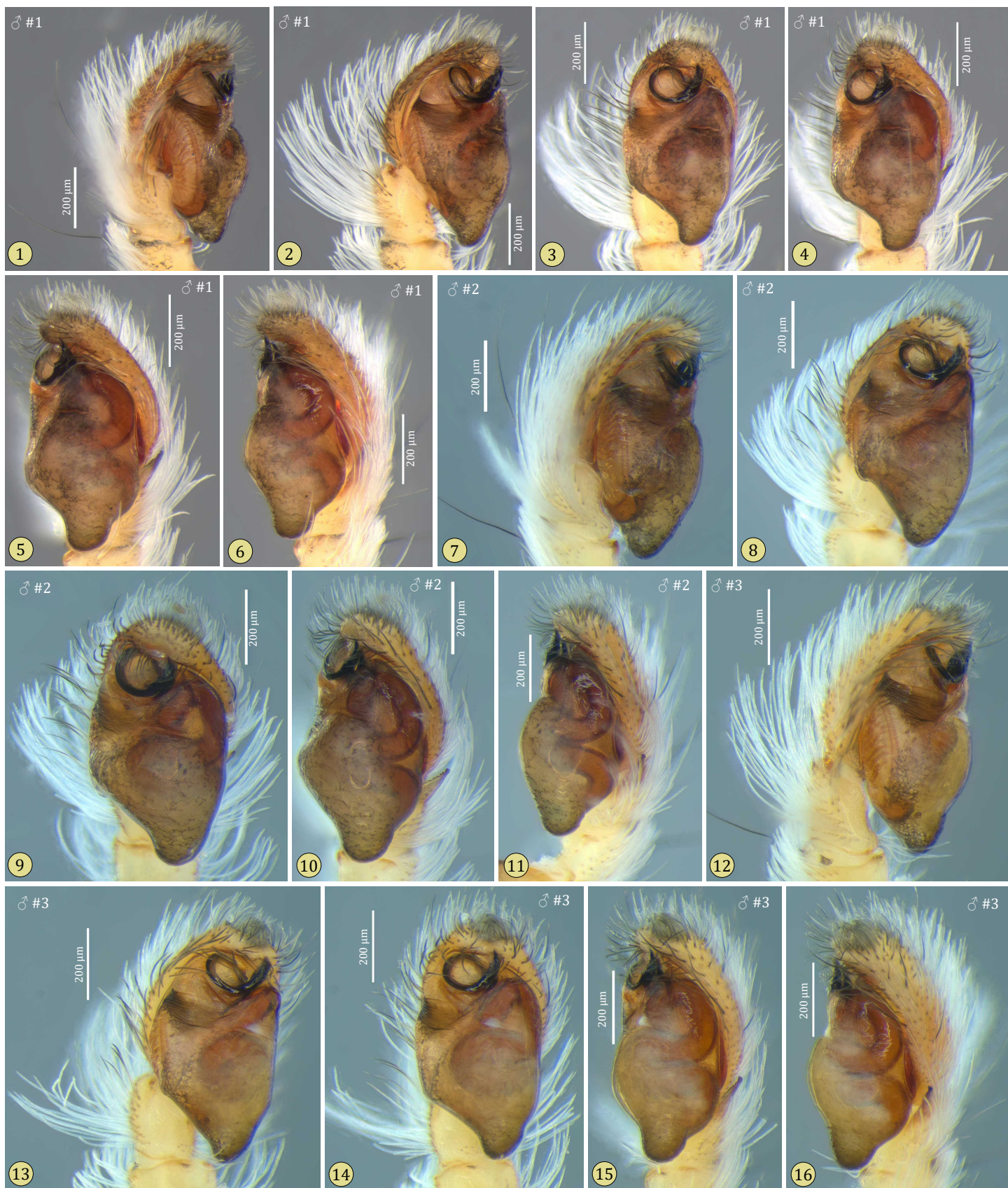


Figure 8 (continued on next page). Medial to lateral views of the left pedipalp of type males for *Maratus nambung*, in alcohol.

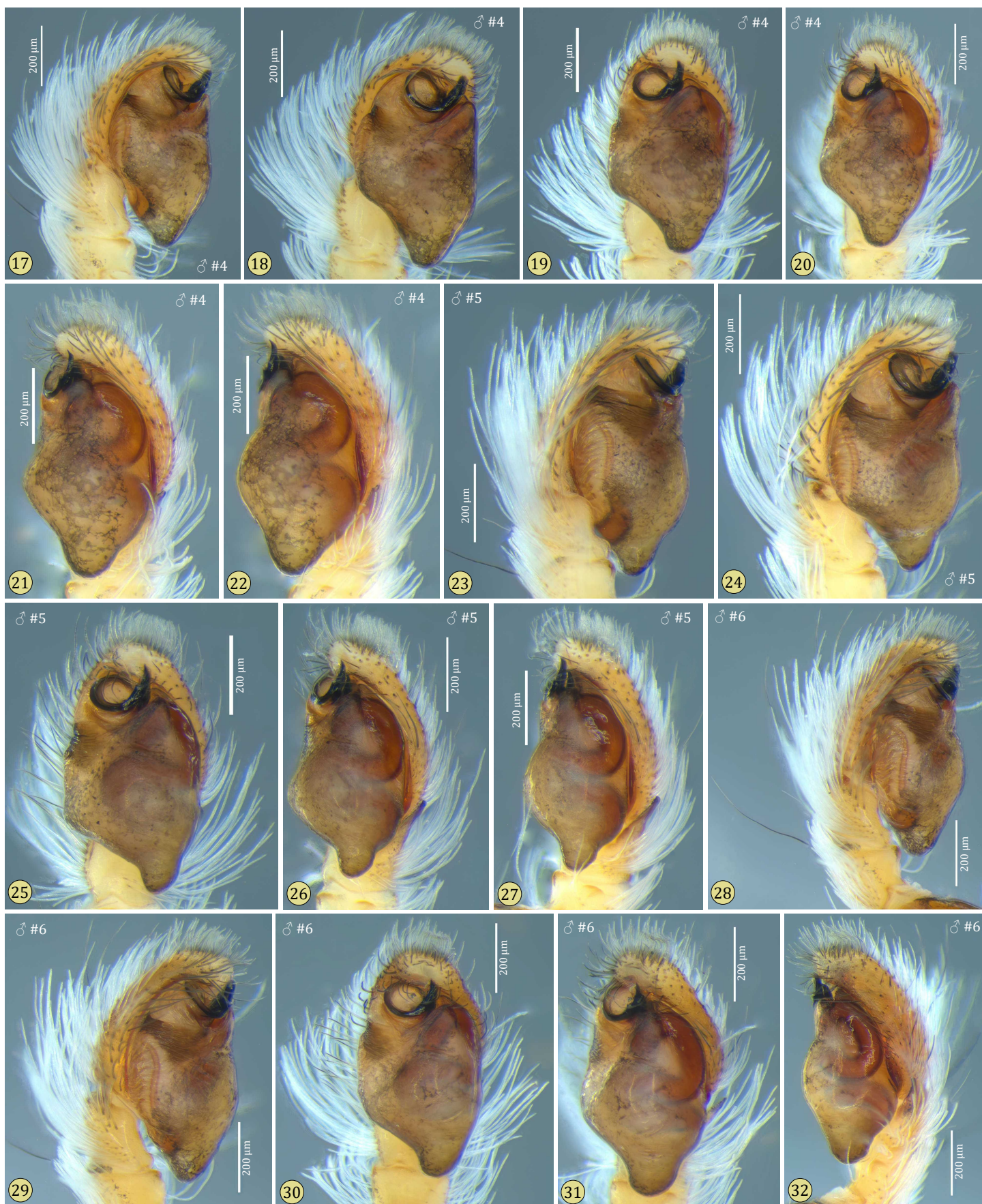


Figure 8 (continued from previous page, continued on next page). Medial to lateral views of the left pedipalp of type males for *Maratus nambung*, in alcohol.

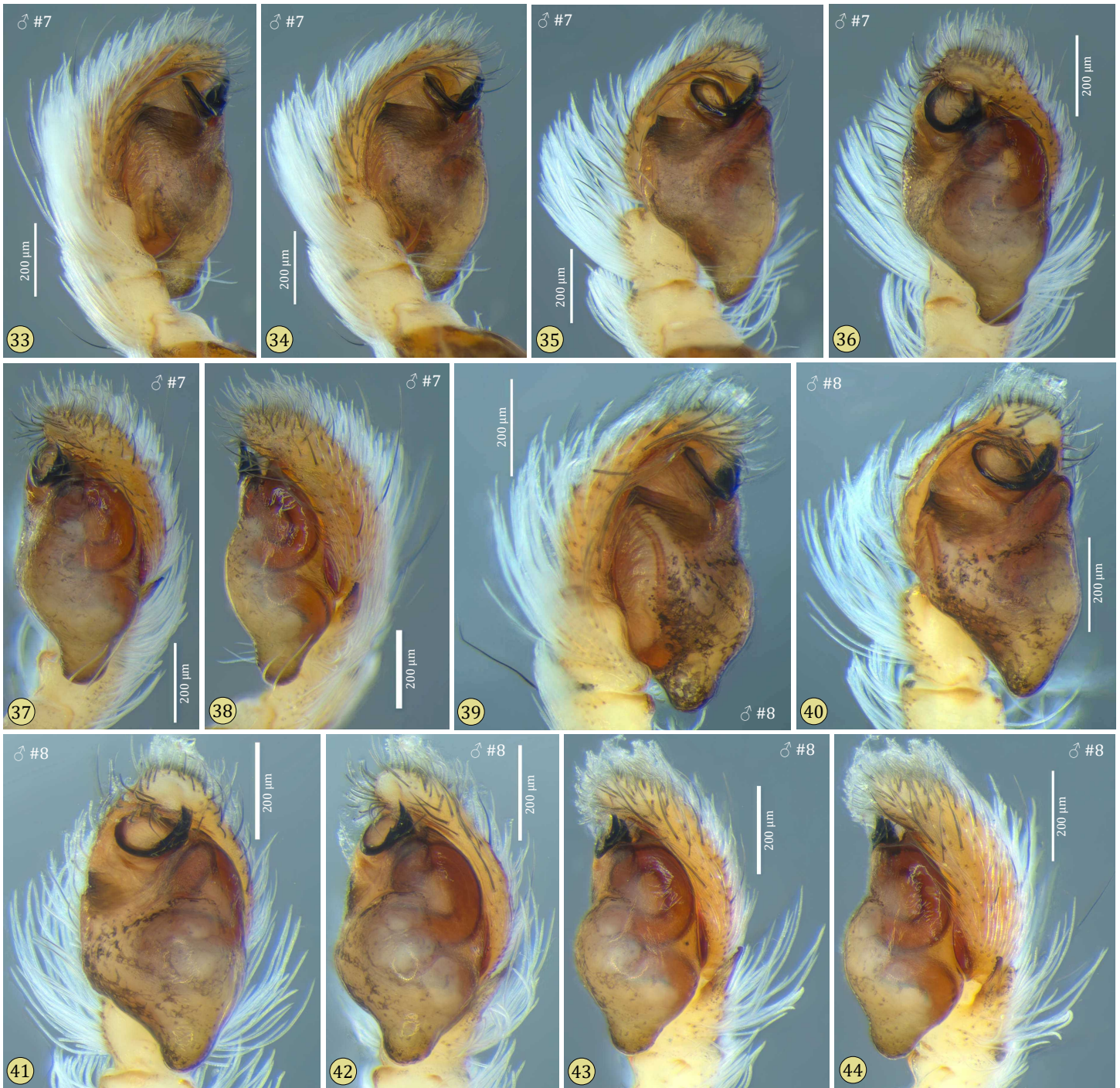


Figure 8 (continued from previous page). Medial to lateral views of the left pedipalp of type males for *Maratus nambung*, in alcohol.

Description of female (Figures 1.4-1.6, 9-12). Type females (n=2) ranged from 4.65-5.07 mm in length. These are not readily distinguished from the female *Maratus bubo* (Figure 1.1-1.3), but may have a more dense cover of off-white setae. The chelicerae are brown and mostly glabrous, with several medial off-white setae. The clypeus is covered with long white to off-white setae, dorsomedially directed above the chelicerae. Off-white or brown to dull orange setae cover much of the carapace, including the eye region, but are more sparse on the sides of the carapace. Unless rubbed, a distinct dorsomedial thoracic tract of off-white setae should be present behind the eye region, but there is no distinct marginal band as in the male. The PME is closer to the PLE than to the ALE.



Figure 9. Paratype females for *Maratus nambung*. The first of these (1-5) is more brown and less grey, with more rubbing on the dorsum.



Figure 10. Ventral views of paratype females for *Maratus nambung*, under glass.

The opisthosoma is covered with brown to grey and off-white setae, and distinct marginal bands may or may not be present. A pattern of five small spots comprised of light brown or off-white setae may be seen on the dorsum (Figures 1.6, 9.7, and less distinctly in 9.3). The underside of the opisthosoma is covered with off-white or white setae, with indistinct mottling. The coxae and endites are mostly glabrous and translucent, grey to light brown. The sternum and labium are darker grey to brown, glabrous except for long white setae projecting from the sides and rear of the sternum (Figure 10). Legs I and II are shorter, legs IV longer, and legs III the longest. All legs are similar in colour, with a covering of off-white setae and indistinct banding. The epigynum (Figure 12) is variable but similar to that of many other *Maratus* species. Similar variation in the structure of the epigynum was previously described for *M. bubo* (Otto & Hill 2016).

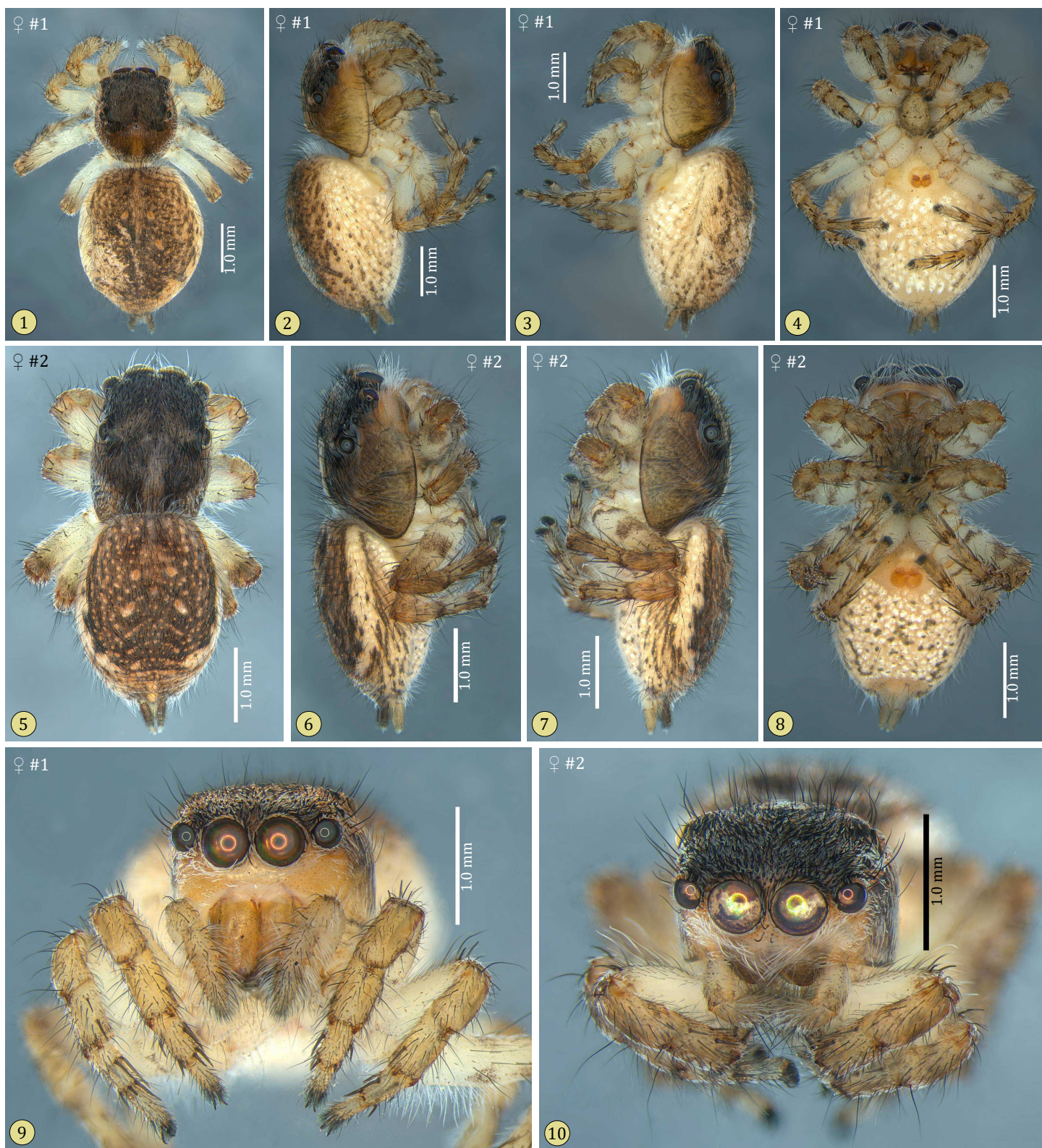


Figure 11. Paratype females for *Maratus nambung*, in alcohol.

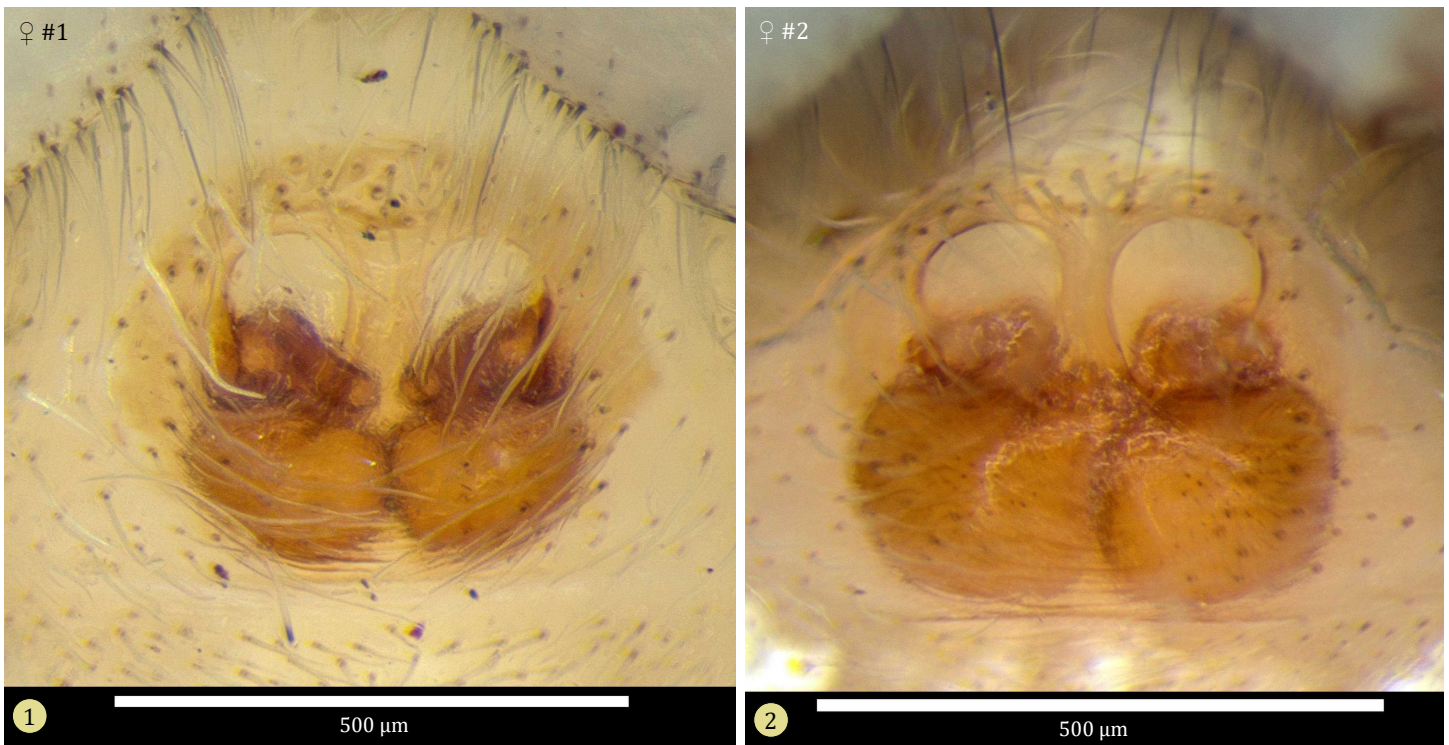


Figure 12. Ventral view of the epigynum of the paratype females for *Maratus nambung*, in alcohol. Note variation in the relative width of the septum (between the fossae), and the size of the spermathecae.

Courtship display (Figures 13-21). 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. The higher speed (100fps) is much preferred, as it can capture the more rapid movements of the male.

Like many *Maratus*, *M. nambung* males perform either unilateral (Figure 13) or bilateral (Figures 14-15) semaphore displays, at times when the male appears to lose sight of a female in the vicinity, and at times when a female has turned away from the display. These are considered to represent *advertisements*. The bilateral display may be symmetrical or assymetrical.

The *fan dance* (Figures 16-21) represents the primary display used by a male once the attention of a female has been secured. In this dance the male moves in a series of steps from side to side while facing the female, with the fan fully expanded and elevated, and legs III extended. This display combines side stepping (~3 steps/s or 3Hz) with side-to-side waving or rotation of the elevated fan (10-20 L/R cycles/s or 10-20Hz) at a relatively low amplitude (2-16°). In some cases the pedipalps are also moved up and down (U/D cycles at ~3-4 Hz). During this display movement of legs III is variable. The elevated legs III may be held in place, or they may also be waved to a variable extent. In some cases they are periodically flexed at the tibiometatarsal joint (metatarsal flexion), and then brought together at the midline (Figure 20, ~4.5 Hz).

Previously (Otto & Hill 2016) we described the courtship display of *Maratus bubo*. Although related to *M. nambung*, the fan dance of *M. bubo* is quite different in several important ways. First, the male *M. bubo* flexes both legs III at the patellotibial joint and holds this position without leg movement, bracketing the fan in a manner characteristic of *M. mungaich* and many other members of the *mungaich* group. L/R rotation of the fan was also slower (~6 Hz), as was side-stepping (~1.5/s). Although not measured, the amplitude of fan rotation by *M. bubo* was clearly much greater.

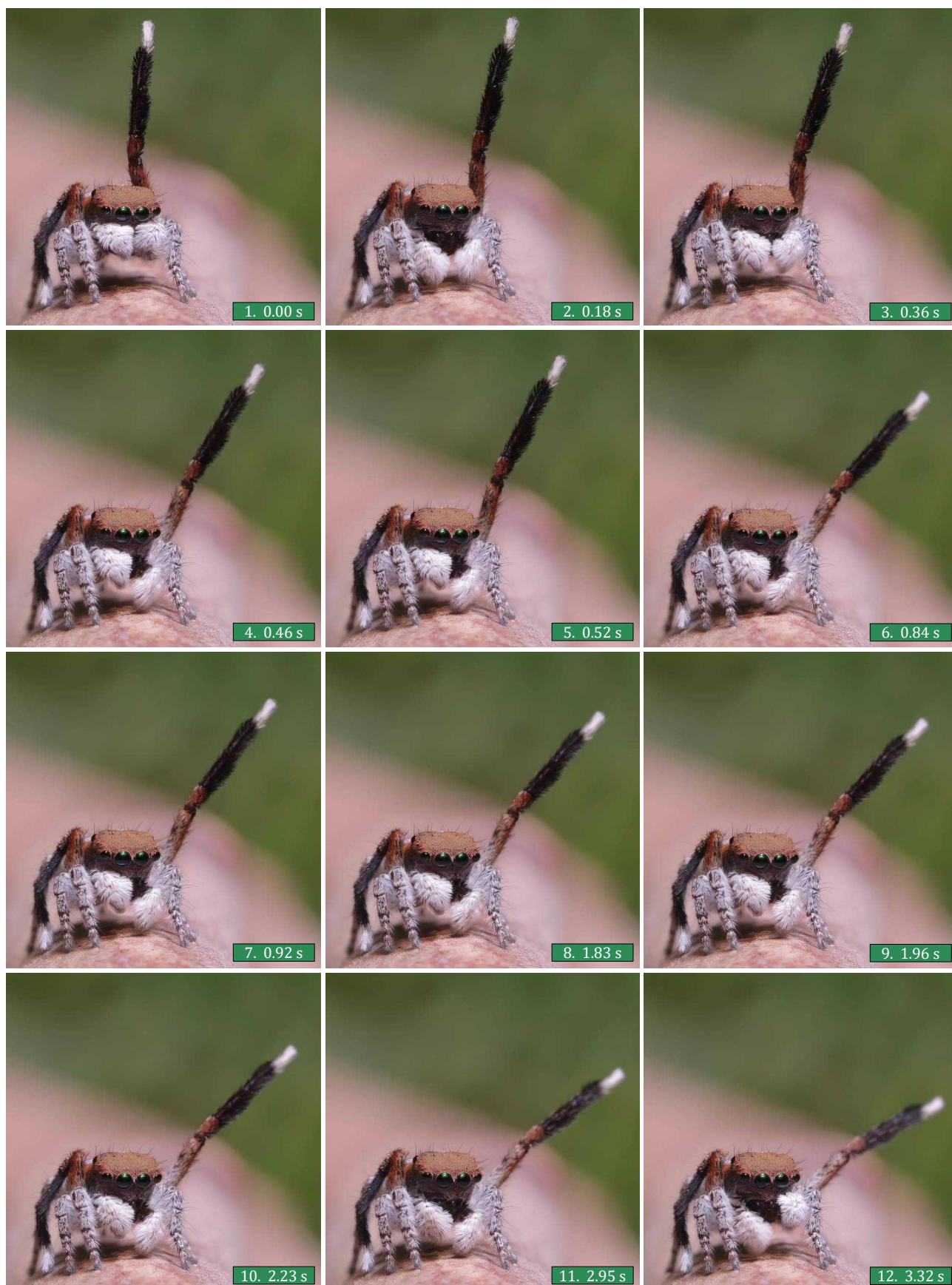


Figure 13. Selected frames (100fps) from a video of display by a male *Maratus nambung*. This is a unilateral advertisement display, including slow movement of an extended leg III and some up and down movement of the pedipalps to expose and then to cover the dark, glabrous chelicerae.

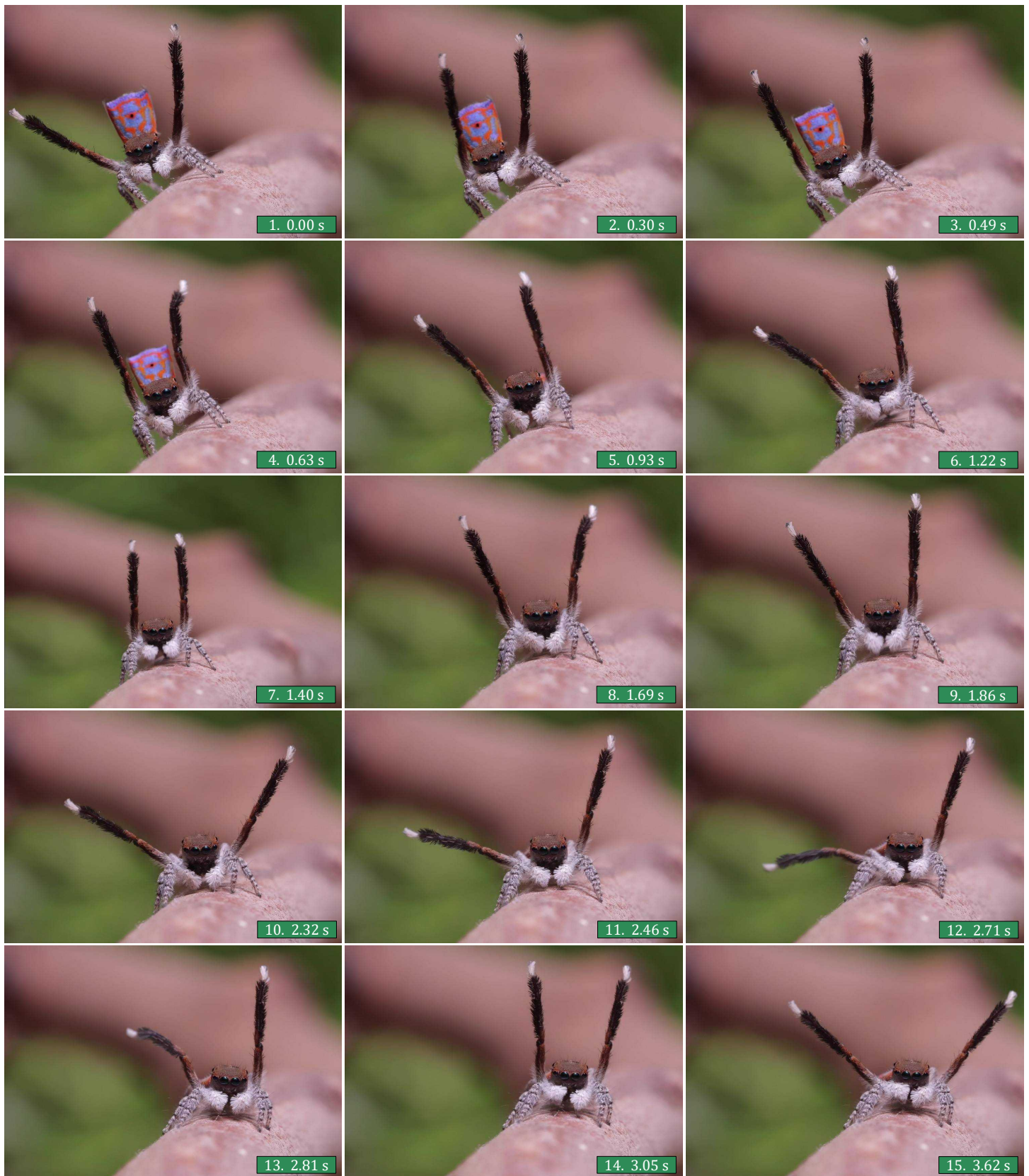


Figure 14. Selected frames (100fps) from a video of display by a male *Maratus nambung*, facing a female. This shows transition, with retracted flaps and lowering of the opisthosoma (1-4), from the fan dance to bilateral advertisement involving semaphore movements of the extended legs III. These movements were sometimes assymetrical (e.g., 11-13), and sometimes symmetrical (e.g. 9-10, 14-15).

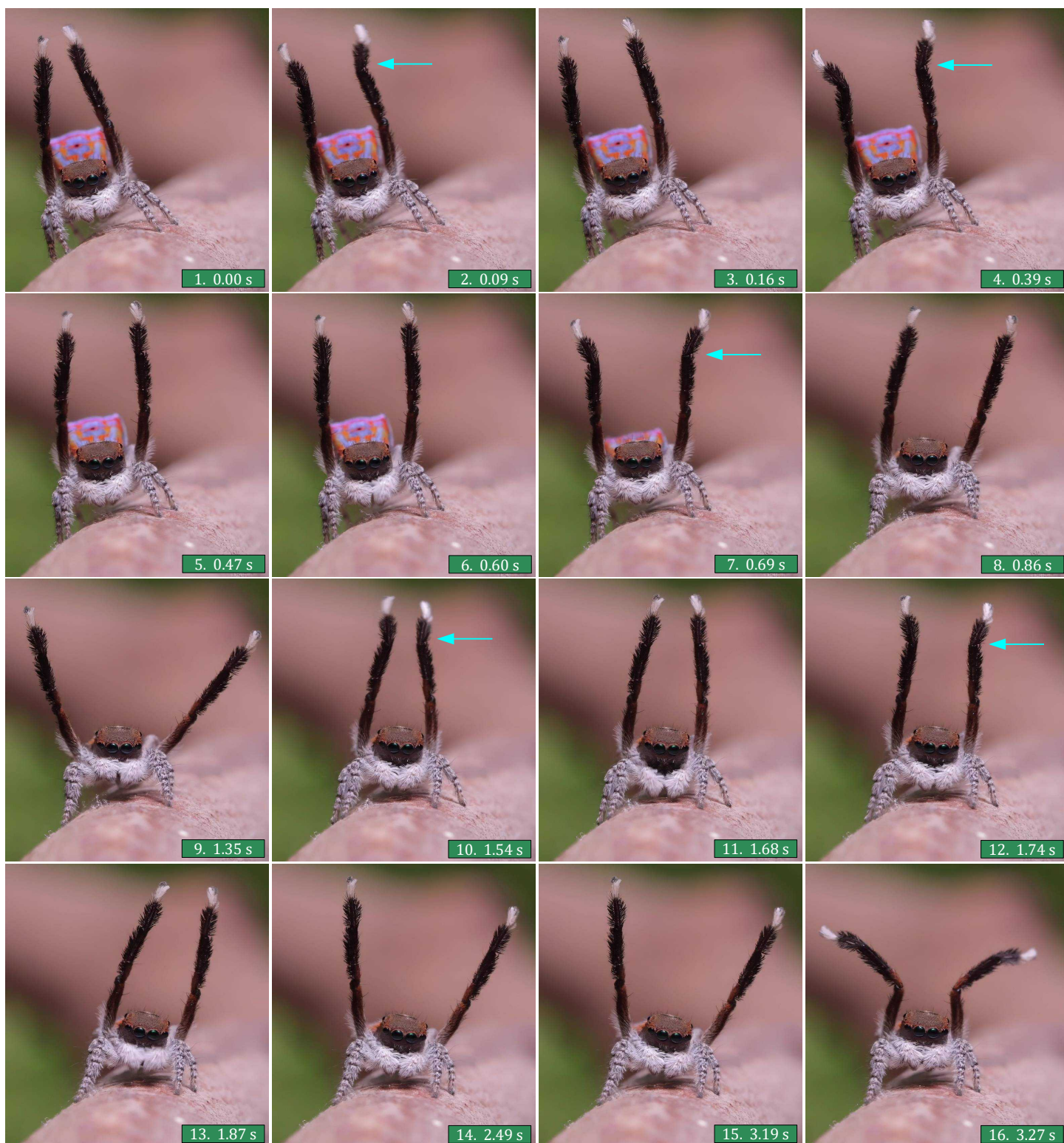


Figure 15. Selected frames (100fps) from a video of display by a male *Maratus nambung*, facing a female. This shows periodic flexion of the metatarsi III (arrows) during (1-7) and after (8-16) transition from the fan dance to advertisement.

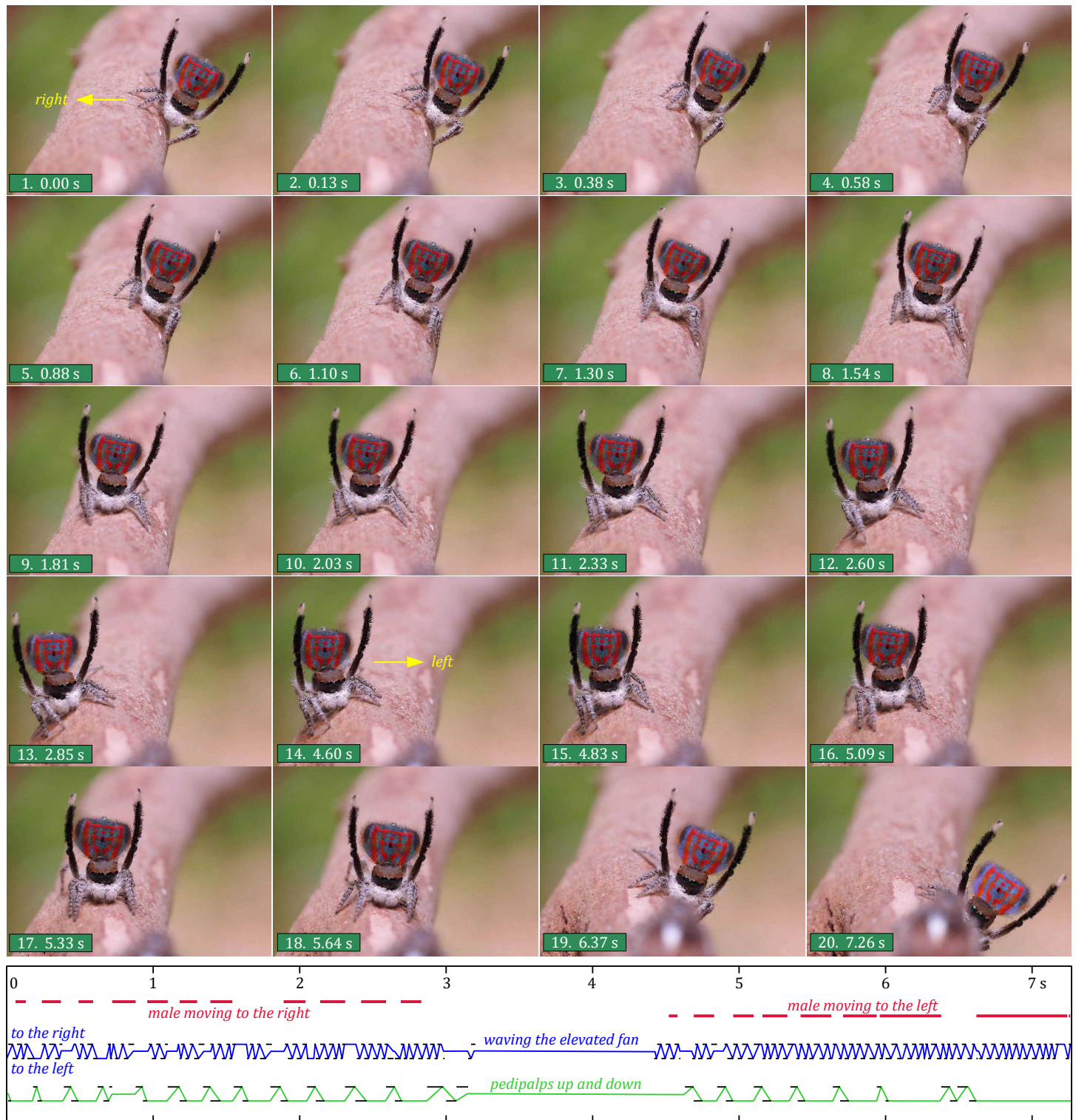


Figure 16. Analysis of frames (100fps) from a video of a fan dance display by a male *Maratus nambung*, facing a female. **1-20**, Selected frames showing movement of this male, first to the right (1-13), and then to the left (14-20). In the chart (below) movement of the male to the right and then the left, left/right waving of the elevated fan (left/right cycles at ~13-20 Hz), and slower up/down movement of the pedipalps (~3-4 Hz) is shown over the entire 7.26 s interval.

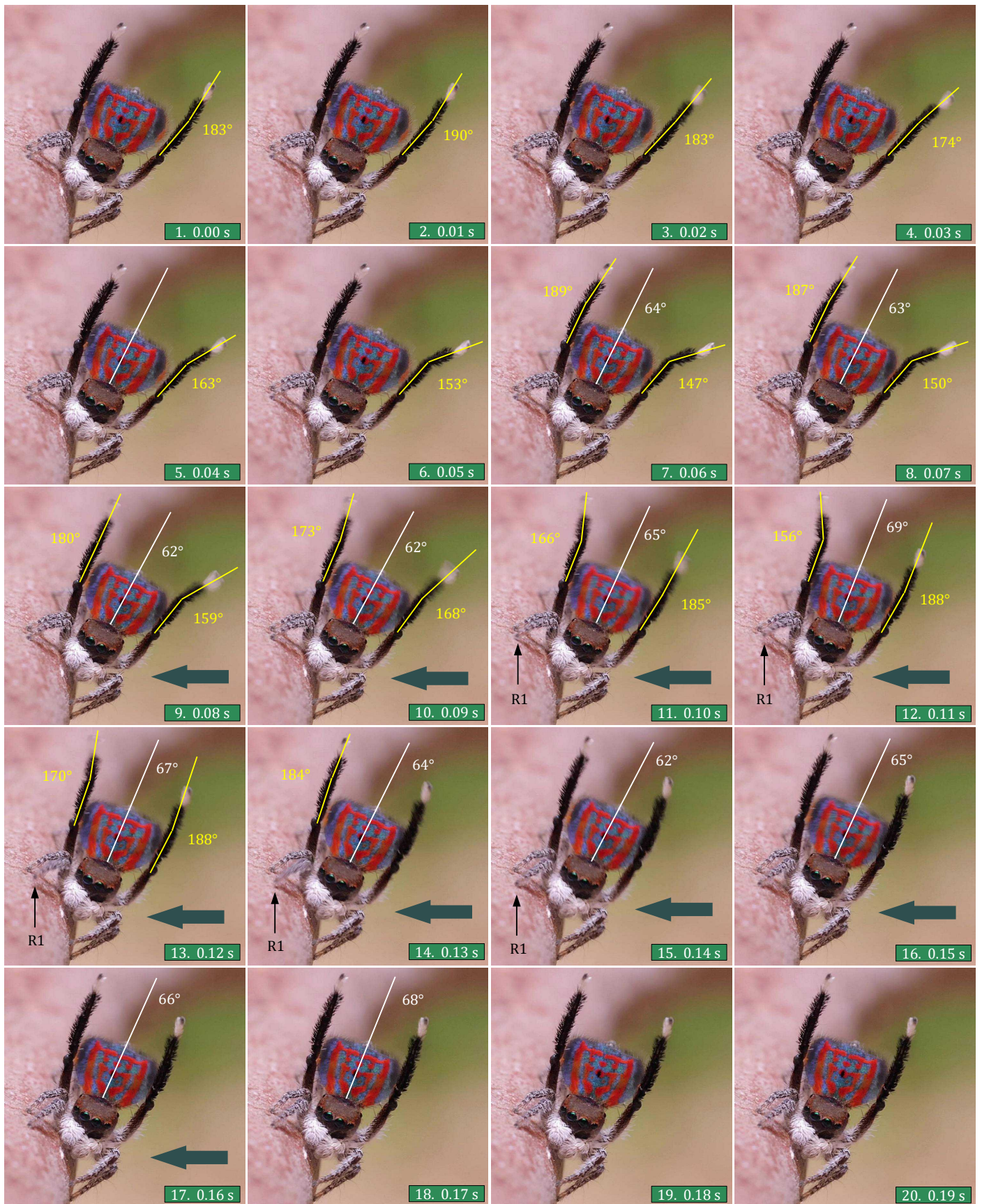


Figure 17. Analysis of sequential frames (100fps) from a video of a fan dance display by a male *Maratus nambung*, facing a female. This includes one step to the right (9-17, large arrows) over a 0.09 s interval, including movement of legs III and low-amplitude waving of the expanded fan. Leg repositioning is identified with small, vertical arrows.

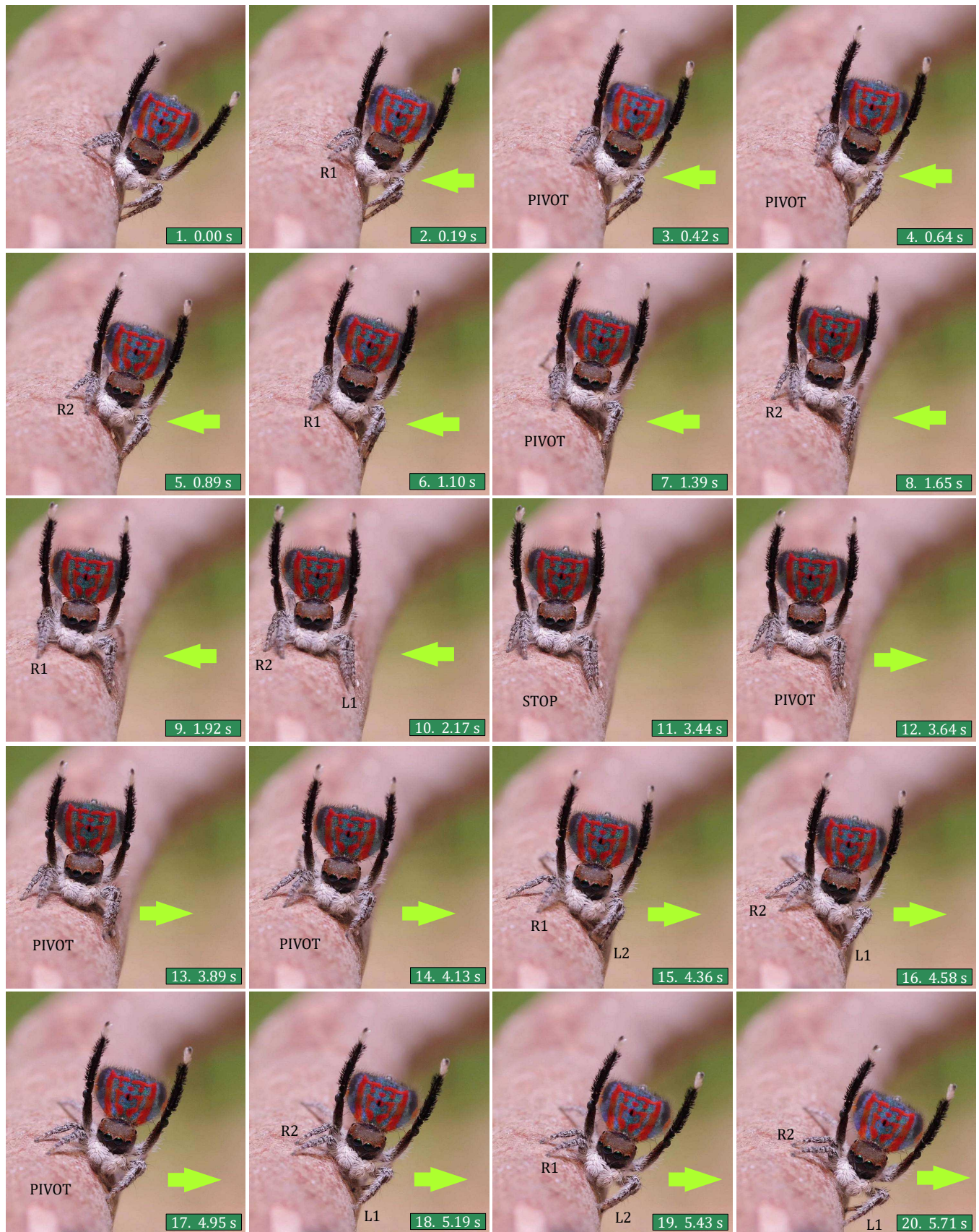


Figure 18. Analysis of selected sequential frames (100fps) from a video of a fan dance by a male *Maratus nambung*, facing a female. This includes a sequence of 9 steps to the right, followed by 9 steps to the left (large arrows) at a rate of ~3 Hz. The first step of this sequence is shown in more detail in Figure 17.

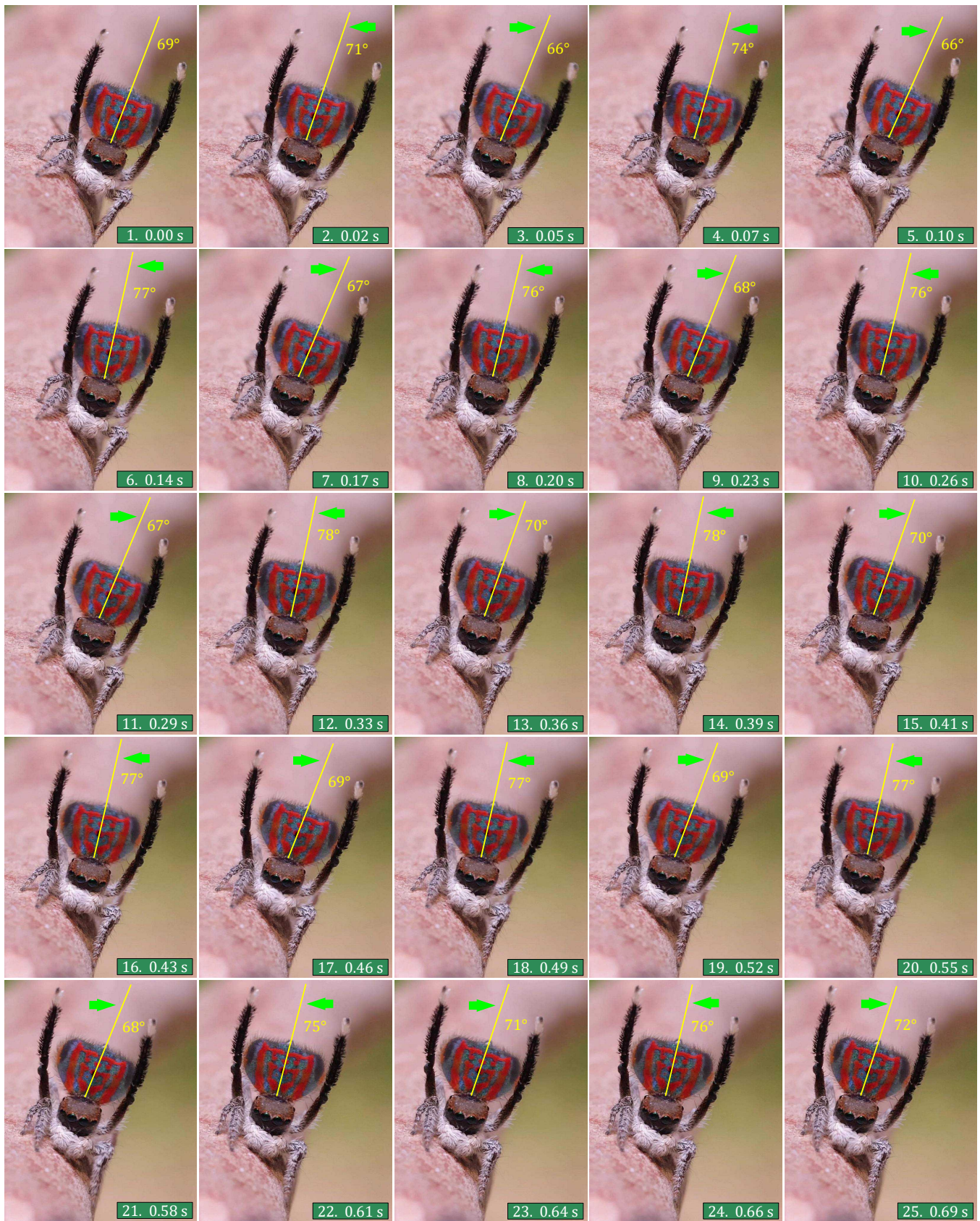


Figure 19. Selected sequential frames (100fps) from a video of a fan dance by a male *Maratus nambung*, facing a female. These frames represent successive positions of the fan as it was waved from side to side at a low amplitude (2-11°, average 7.54°). 12 L/R cycles over 0.69 s are shown (17.4 Hz). During this interval, the spider pivoted slightly to the right, but did not change any foot position.

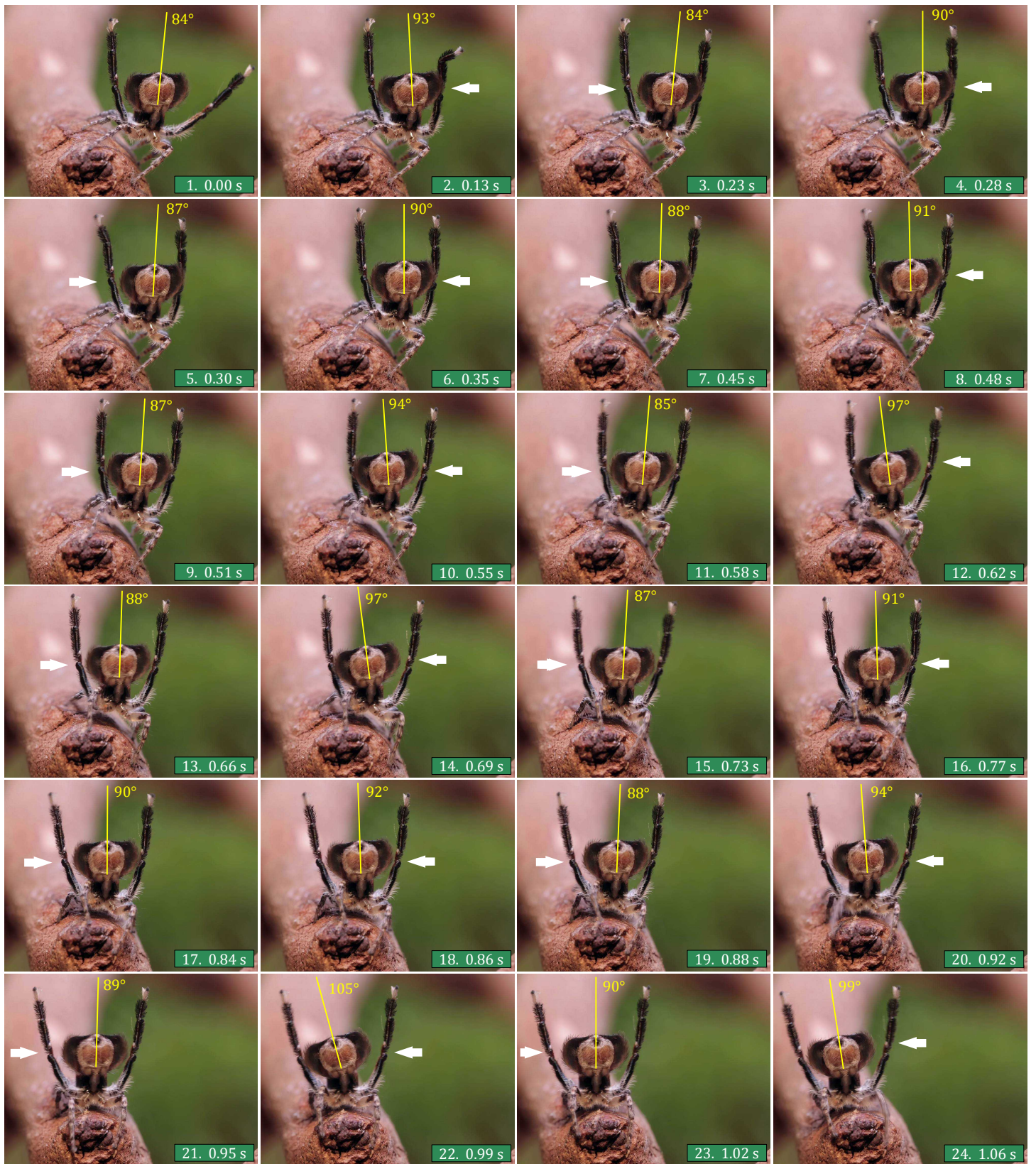


Figure 20. Selected sequential frames (100fps) from a video of a fan dance by a male *Maratus nambung*, facing a female, as viewed from the rear. During this sequence the male was moving toward the left. Here the fan was waved (arrows) at a low amplitude (2-16°) at 11 L/R cycles/s (11 Hz).

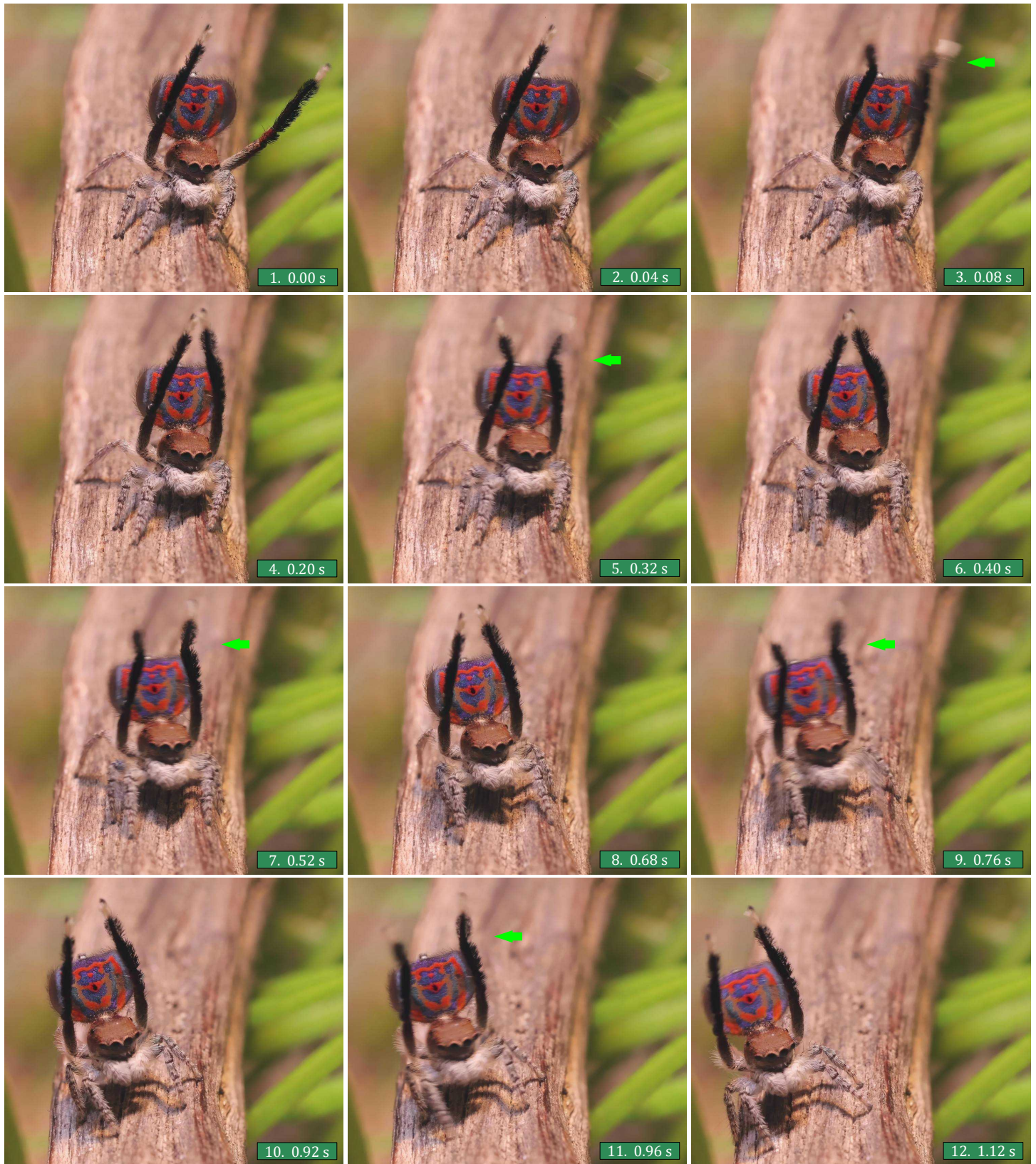


Figure 21. Selected sequential frames (25fps) from a video of a fan dance by a male *Maratus nambung*, facing a female. During this sequence the male was moving toward the left. These frames were selected to illustrate successive positions of the elevated legs III during this display. Note the periodic flexion of metatarsi III (arrows) during this sequence (5 times in 1.12 s, or 4.5 Hz).

Distribution and habitat. Localities where *Maratus nambung* and its close relatives have been found are shown in Table 1 and Figure 22.

Table 1. Localities for *Maratus nambung* and closely related species, all near the southwestern coast of Western Australia.

	locality		species	collector	date
1	34.86057°S, 116.66612°E	14.5 km NNW of Walpole	<i>M. bubo</i> ♂ #1-2, ♀ #1-3	David Knowles, Jürgen C. Otto	16 NOV 2015
2	31.36083°S, 115.79526°E	5 km SE of Muckenburra, Yeal NR	<i>M. cf. bubo</i> (Figure 1.3-1.4)	Joseph Schubert, Jonah Walker	14 OCT 2022
3	30.56805°S, 115.24510°E	10 km SE of Cervantes	<i>M. nambung</i> ♂ (not a type)	Bruno Buzatto	14 SEP 2020
			<i>M. nambung</i> ♂ #1	Michelle Peak	6 AUG 2023
4	30.55647°S, 115.39716°E	32 km SE of Cervantes, 2.7 km E of Wongonderrah NR	<i>M. nambung</i> ♂ #2-8, ♀ #1-2	Flynn Prall	13 AUG 2023

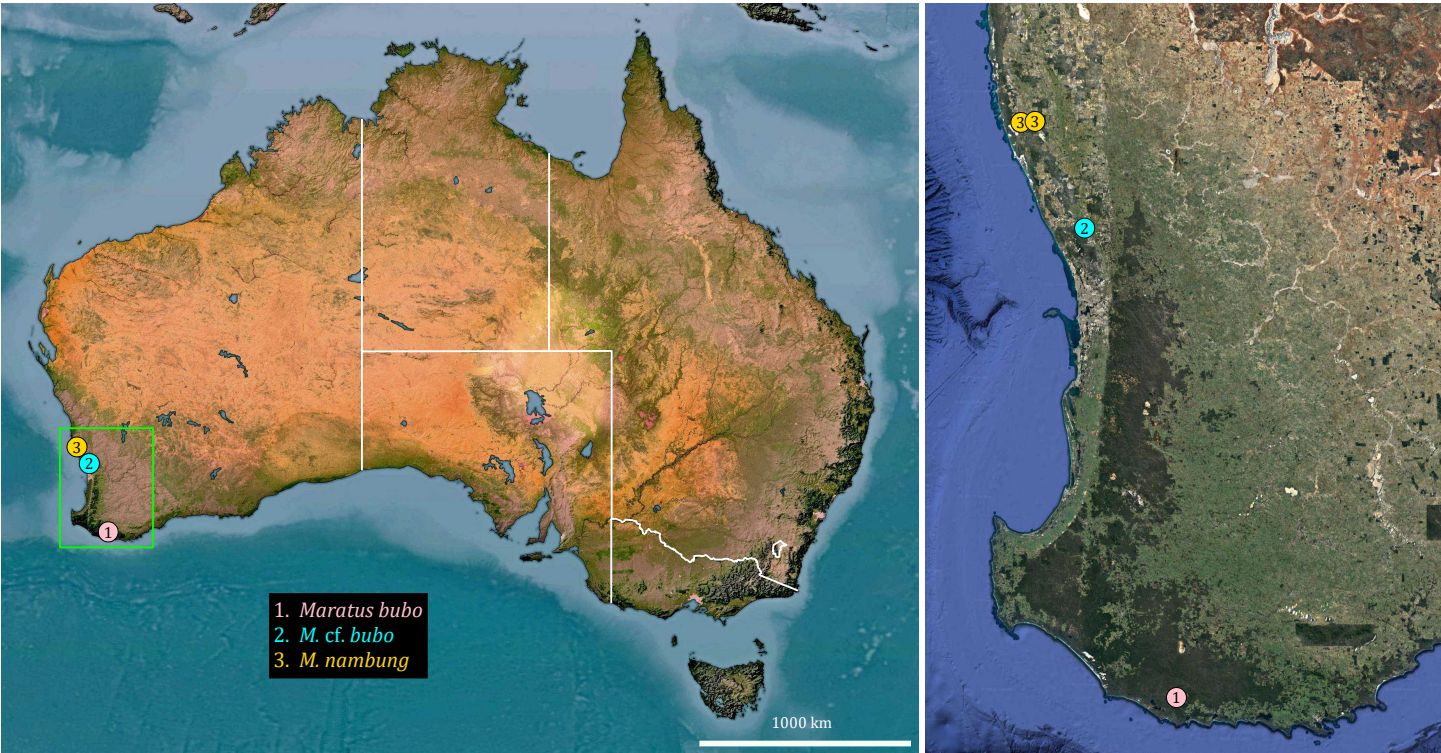


Figure 22. Localities where *Maratus nambung* and its close relatives (see Figures 1-2) have been found. The detailed map at right, prepared with QGIS, represents the inset rectangle at lower left in the larger map of Australia.

The habitat where *Maratus nambung* was found is shown in Figure 23. It is likely that this species can be found in other uncleared areas between Nambung National Park and the Brand Highway.

Discussion

Although the morphology, including detailed structure of male and female genitalia, of *Maratus bubo* and *M. nambung* is similar, significant differences in the courtship display of the two species support our view that they are distinct biological species. This highlights the importance of documenting the details of this display for *Maratus* species, including the detailed setation of leg III fringes and the fan.

The documentation of the appearance of living peacock spiders, including useful field marks, continues to be very important. This allows the citizen scientist, equipped with a macro lens and a camera, to determine whether a new species is at hand. More than any other factor, this has contributed to the rapid discovery of a large number of different species in the group.



Figure 23. Localities where *Maratus nambung* was found. **1-2**, Locality #4 in Table 1. **3-8**, Locality #3 in Table 1. **7-8**, Males on dried plants near the ground in their native habitat. Photo credits: 1-2, Flynn Prall; 3, Jürgen Otto; 4-8, Michelle Peak.

The habitats where these spiders are found are fragile and often subject to clearing for human activity. At this time we are not certain of the extent that human activity has contributed to the isolation of many locally endemic species, or the probability of the continued survival of species with a small natural range.

Acknowledgements

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References

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