

Natural history of the agave jumping spider, *Paraphidippus basalis* (Araneae: Salticidae: Dendryphantina)

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Abstract. We report field observations on the natural history of the agave jumping spider, *Paraphidippus basalis* Banks 1904, in the Patagonia Mountains, Santa Cruz County, Arizona. We describe for the first time the appearance of the male and the development in appearance of individuals. *P. basalis* lives on rosette-forming plants in the family Agavaceae. Silk shelters were found in these plants, usually at the bases of leaves, and were used for protection both at night and during rain events. We describe four instances of courtship behavior, all of which occurred in the evening. Nests were either perpendicular or parallel to rosette leaves, and were guarded by a female. Dissection of one nest revealed a clutch of 78 eggs. Prey consisted of a wide variety of arthropods including hymenopterans, hemipterans, dipterans, coleopterans, and spiders, with one instance of cannibalism. In light of these new natural history observations, we suggest several avenues for future research on this large and charismatic jumping spider.

Introduction. The agave jumping spider, *Paraphidippus basalis* Banks 1904, is a large and boldly-marked jumping spider that occurs in Arizona and New Mexico in the United States, and in Sonora, Mexico (Richman et al. 2011). Despite its conspicuous abdominal pattern and large size, the ecology and natural history of *P. basalis* is virtually unstudied. Incidental reports indicate that this species is associated with mountain ranges known as the Madrean sky islands (GBIF.org 2022, Cowles 2018), which stand above the desert lowlands and form isolated woodlands between the Rocky Mountains and the Mexican Sierra Madres (Warshall 1995). The only study to date on *P. basalis* found that in the Patagonia Mountains, Santa Cruz County, Arizona, this species is a habitat specialist on rosette-forming plants in the family Agavaceae, such as agave, yucca, and sotol (Cobbold & O'Donnell 2021). Here we present natural history observations of *P. basalis* in the Patagonia Mountains made between May 2019 and June 2020, on hillsides dominated by bunchgrasses, oaks, alligator juniper, and pines, at elevations ranging from 1325 to 1730 m.

Common name. "Agave jumping spider" refers to one of three plant genera on which the species has been documented (Cobbold & O'Donnell 2021). The name was first publicized by Zack Lemann, curator of animal collections at the Audubon Butterfly Garden Insectarium in New Orleans, Louisiana, on display signage when showing live specimens in the collection (Lemann pers. comm.). The National Geographic photographer Joel Sartore photographed one of those specimens at the Audubon Butterfly Garden Insectarium for his Photo Ark project and used the common name there (<https://www.joelsartore.com/inv003-00017>). The global citizen science project *iNaturalist* then took the common name for the species from Sartore's project (R. McCabe, *iNaturalist* curator pers. comm.), after which the name gained widespread use through *iNaturalist*. Although the name does not cover the diversity of rosette-forming plants on which *P. basalis* is known to occur, we advocate for its continued use as it is a convenient common name that accurately describes the affinity of the species for rosette-forming plants in the family Asparagaceae.

Distribution. Given the scarcity of distribution information for *Paraphidippus basalis* in published literature, we obtained distribution information from our own observations, personal communications from biologists, and online community science databases in which verifiable photographs were provided. In Arizona, *P. basalis* has been reported in the southern portion of the state (Figure 1) in the following mountain ranges: the Dragoon Mountains (iNaturalist 2022, Aaron Chambers pers. comm.), the Chiricahua Mountains (pers. obs., GBIF.org 2022), the Santa Rita Mountains (pers. obs., GBIF.org 2022) and the hills to the east in the Las Cienegas National Conservation Area (Aaron Chambers pers. comm.), the Pajarito Mountains (pers. obs), the Patagonia Mountains (Cobbold & O'Donnell 2021), the Huachuca Mountains (pers. obs., GBIF.org 2022), and the Mule Mountains (iNaturalist 2022). In New Mexico, *P. basalis* has also been reported in the southern part of the state (Figure 1) in the Peloncillo Mountains (GBIF.org 2022), the Animas Mountains (David. B. Richman pers. comm.), and the Organ Mountains (iNaturalist 2022). Richman et al. (2011) report *P. basalis* in Sonora, Mexico, with no mention of a specific locality. Based on our current knowledge of the distribution of *P. basalis*, we expect that future observations will occur in other mountain ranges of southern Arizona and New Mexico. Given that this species occurs in the Organ Mountains of New Mexico, it may also be present in nearby Texas, such as in the Franklin Mountains near El Paso. The distribution of *P. basalis* in Mexico remains almost completely unknown; the species likely occurs in several mountain ranges of Sonora and Chihuahua.

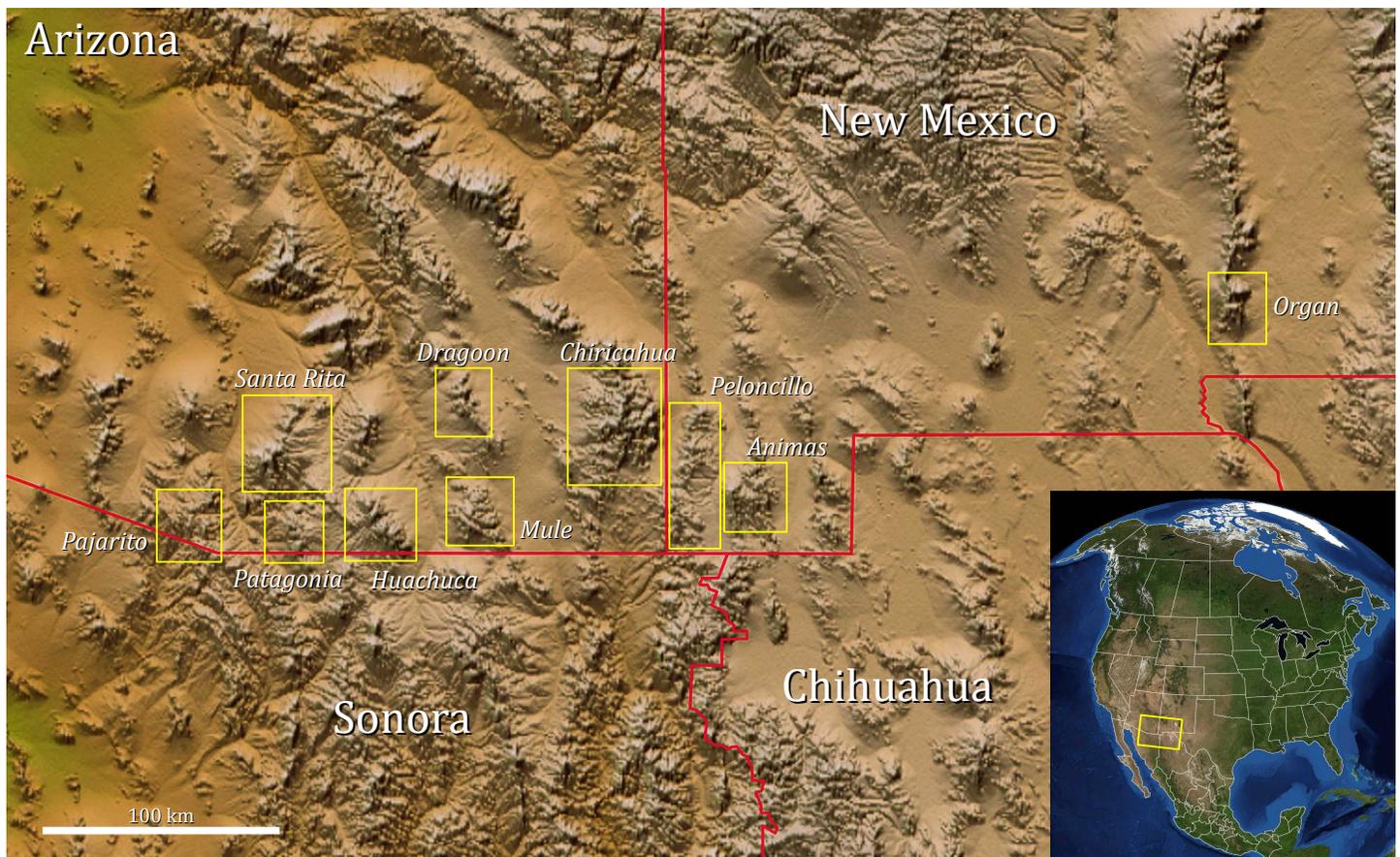


Figure 1. Mountain ranges in the southwestern United States where *Paraphidippus basalis* has been reported, based on published literature, our own observations, personal communications from biologists, and online community science databases with verifiable photographs. Background map based on data collected by the NASA/JPL Shuttle Radar Topography Mission (SRTM).

Habitus. *Paraphidippus basalis* has a distinctive abdominal pattern of white spots on a solid black background. While adult males are smaller than adult females (the largest adult females we observed

were 20 mm in length), both sexes have a similar unique appearance, which allows easy identification. The later instars and adults that we observed had a basal band on the abdomen that ranged from pale to deep orange, whereas the basal band was white to cream in the earliest instars (Figure 2). While the basal band was typically orange in adults (Figure 2f), we observed one adult male with a yellow basal band (Figure 2g).



Figure 2. Development of the abdominal basal band with age. **a**, Lack of basal band in the first instars. **b**, The basal band beginning to appear in a second instar. **c-d**, White basal band in early instars. **e**, Light orange basal band in an older instar (small tick marks indicate mm). **f**, Adult female with fully-developed orange basal band. **g**, Unusually pale basal band in an adult male.

All instars had white abdominal spots (Figure 2), except the first instars (Figure 2a), which had an entirely black abdomen. The abdominal pattern can be described somewhat similarly to that of the genus *Phidippus*, for which spots are located in four locations that can be numbered I, II, III, and IV from anterior to posterior (Edwards 2004). The *Paraphidippus basalis* that we observed often had four spots at location I; in some cases these spots formed two pairs of fused spots (Figure 3a). A pair of spots occurred at locations II, III, and IV. Spots III tended to be more linear than spots II and IV, which were more rounded. Variations that we observed at location II included spots composed of yellow scales instead of white scales (Figure 3b), an absence of spots (Figure 3c), and one spot instead of a pair (Figure 3d).

The carapace of *P. basalis* was black, and the legs generally dark, except the tarsi, which were lighter in coloration, especially in juveniles. Adult females could generally be distinguished from adult males by their overall lighter coloration and hirsuteness, although some females were relatively dark in color.

Females generally had a relatively dense covering of pale setae on their legs, carapace, palps, and clypeus, whereas males had significantly fewer pale setae overall, which typically gave them a darker appearance. The legs were fringed ventrally in both sexes, but in males (Figure 3e-f), the fringes on the first pair of legs were more developed and formed more contrasted alternating patches of black and white setae compared to the fringes in adult females (Figure 3g-h).



Figure 3. Late instars and adult *Paraphidippus basalis*. Variations of the abdominal spot pattern include (a) two pairs of fused spots at location I, (b) spots composed of yellow scales instead of white scales at location II, (c) absence of spots at location II, and (d) one spot instead of a pair at location II. The fringes on legs I of males (e-f) are more developed than those of females (g-h, with mm scale at bottom).

Microhabitat. We observed *Paraphidippus basalis* in four species of rosette-forming plant in the Patagonia Mountains: Palmer's agave (*Agave palmeri*), mountain yucca (*Yucca madrensis*), banana yucca (*Yucca baccata*), and common sotol (*Dasyllirion wheeleri*) (Figure 4). We have also incidentally observed *P. basalis*

on Parry's agave (*Agave parryi*) in the Huachuca Mountains, which are located just east of the Patagonia Mountains. These five plant species are similar in appearance in that they have relatively long, rigid, and fibrous to succulent leaves that radiate from a central stem, and form radially symmetric rosettes. We did not observe *P. basalis* on any other plant species in our study area, despite thorough searches (Cobbold & O'Donnell 2021). Thus, *P. basalis* appears to specialize on rosette-forming plants, which is unusual because jumping spiders do not typically have strong associations with the plants on which they live (Vasconcellos-Neto et al. 2017).

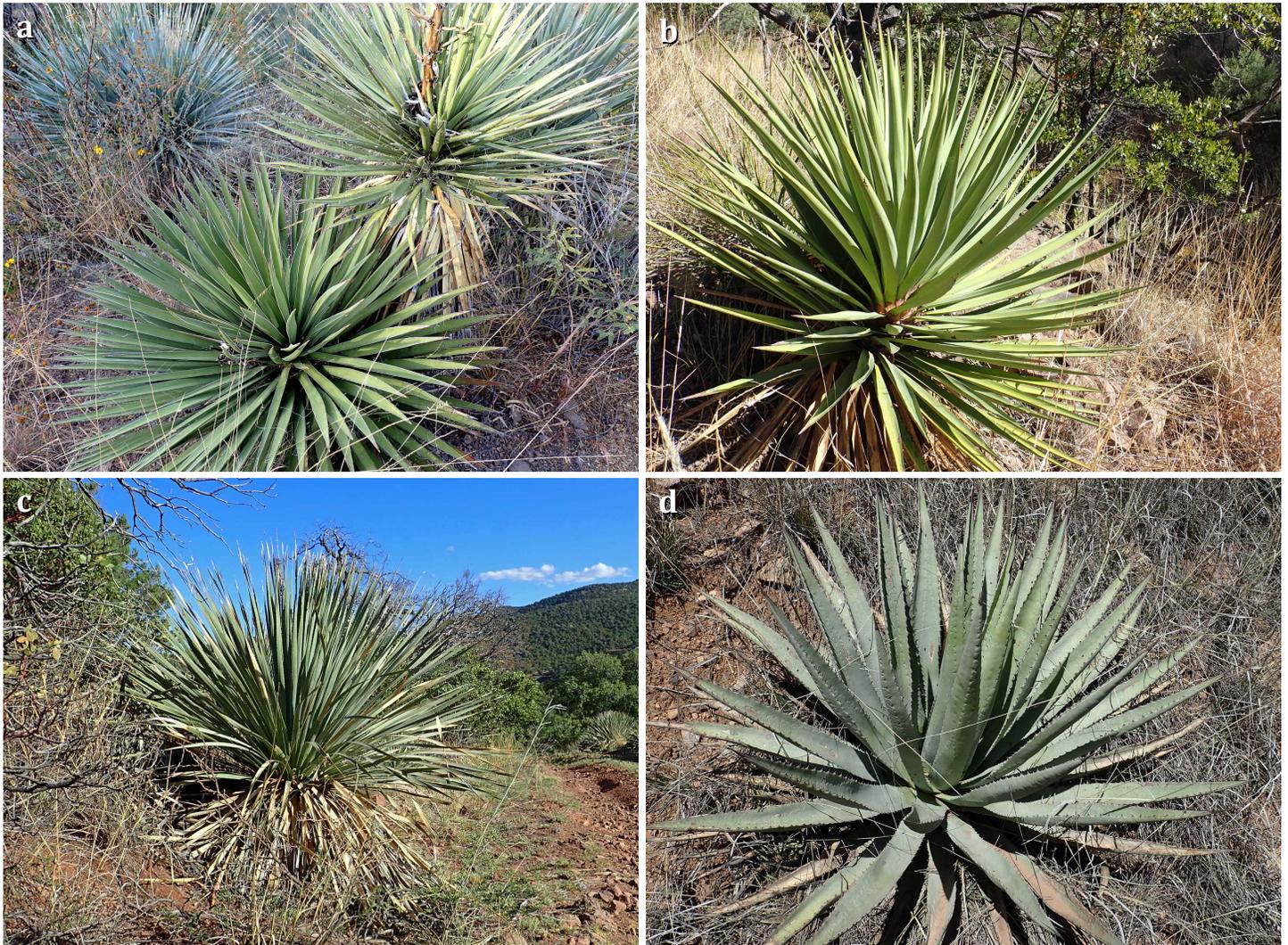


Figure 4. Rosette-forming plants in which we observed *P. basalis* in the Patagonia Mountains. **a**, Banana yucca (*Yucca baccata*). **b**, Mountain yucca (*Yucca madrensis*). **c**, Common sotol (*Dasylirion wheeleri*). **d**, Palmer's agave (*Agave palmeri*).

We usually found *P. basalis* on the leaves of healthy rosette plants, although we once observed an immature *P. basalis* on a dead sotol (Figure 5a-b). We also observed an immature *P. basalis* approximately two meters above ground level, on a sotol inflorescence, indicating that plant use is not restricted to the leaves, at least in juveniles (Figure 5c-d). It is possible that the inflorescences attract potential prey items for the spiders due to the availability of resources such as pollen and edible tissues. Adults appeared to occur more often at the base of the rosette leaves whereas immatures seemed more likely to also be found on the more distal portions of leaves. Given that the adults are significantly more conspicuous than juveniles, it is possible that the adults spend more time at the base of the leaves compared to juveniles as a predator avoidance strategy.

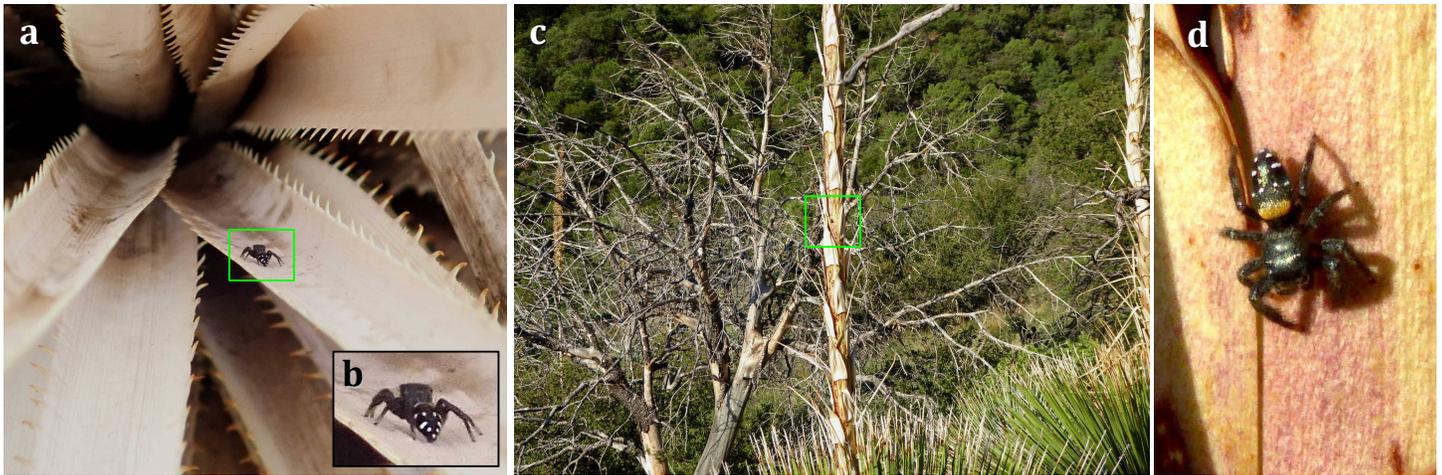


Figure 5. Unusual substrates. **a-b**, Immature *P. basalis* on a dead sotol leaf. **c-d**, Immature approximately two meters above ground level on a sotol inflorescence.

Regardless of age or sex, *P. basalis* showed avoidance behavior when approached by an observer. Spiders quickly moved to the base of the leaves where they became difficult to see or approach due to the spiny and sharp leaves of the rosette plant, or moved to the side of the leaf that faced away from the observer. *P. basalis* was more likely to be disturbed when observers were in motion, even when the observer was a couple of meters from the plant. However, spiders always remained on the rosette plant, even when they were followed around the plant for prolonged periods. *P. basalis* eventually resumed normal activities when observers remained motionless, including at close range. While rosette plants likely provide good defense against certain predators, we observed Bewick's wrens (*Thryomanes bewickii*) actively foraging between the leaves of mountain yucca on a few occasions, and encountered a Bewick's wren roosting in a mountain yucca. It is possible that Bewick's wrens are among the predators of *P. basalis*, given that these birds feed on a variety of invertebrates including spiders (Beal 1907; Yard et al. 2004).

Silk shelters. We found *P. basalis* silk shelters in yucca, agave, and sotol. The shelter typically consisted of a somewhat flattened tube with an opening at each end. These shelters occurred at the base of the rosette leaves, and were oriented either along the length of a leaf or perpendicular to the leaves (Figure 6a-b). The tube shelters of adult *P. basalis* were approximately 4 cm long and as wide as the spider. We observed several instances of *P. basalis* entering and exiting their shelter at dusk and the following morning respectively, and the shelters occurred within the same plant the spiders were observed on during the day. Juvenile *P. basalis* built smaller shelters and also used them as nighttime retreats. Molting occurs in these shelters, as suggested by exuviae we observed in some of the shelters (Figure 6a). On several occasions, we found individuals in their shelter during the daytime. For instance, we observed an individual enter its shelter following the start of a rainfall event.

We observed several instances of a different type of shelter occupied by *P. basalis* at night. This type of shelter was located along the middle portion of mountain yucca leaves, and consisted of a silk tube over which a flat sheet of silk was stretched between the edges of the yucca leaf (Figure 6c-d). Unlike agave and sotol leaves, mountain yucca leaves have a concave cross-section that allows a sheet of silk to be stretched from one edge of the upper leaf surface to the other. It is unclear whether this type of shelter was built by a different spider and opportunistically used by *P. basalis*, or vice versa. Indeed, we observed several silk shelters with the same structure occupied during daytime by huntsmen spiders in the genus *Curicaberis* Rheims 2015 (Figure 6e), and sac spiders in the genus *Cheiracanthium* Koch 1839. In addition, we observed an adult female *P. basalis* prey on a sac spider that was in one of these shelters; that night the female entered the shelter in which the sac spider had been present earlier, and she was observed spinning silk in the shelter after dark and spending the night in the shelter.

P. basalis did not always rely on silk shelters at night. In June 2020, we observed multiple young instars of *P. basalis*, and one adult or penultimate *P. basalis*, hanging from the end of draglines at night (Figure 6f). When disturbed, these spiders quickly moved up their dragline until they reached the rosette leaf to which the line was attached. However, when left undisturbed under natural dark conditions for a few minutes following the disturbance, we found that all spiders resumed hanging from the end of their draglines. It remains to be determined what factors may be causing *P. basalis* to select between a silk shelter and a dragline as a nocturnal retreat strategy. Robinson & Valerio (1977) mention frequently finding salticids suspended on draglines in Panama and Costa Rica, and suggest that this behavior may provide safety at night from potential predators by isolating the spider from the surrounding vegetation. Dragline vibrations may alert the spider of the possibility that a potential predator is approaching, and give an opportunity for the spider to quickly drop. Suspension from draglines at night has also been reported for salticids in the genera *Asemonea* O. Pickard-Cambridge 1869 in South Africa (Wesołowska and Haddad 2013), *Colonus* F. O. Pickard-Cambridge 1901 in the United States (as *Thiodina*, Carroll 1977), and *Evarcha* Simon 1902 in Germany (Roßler et al. 2021).

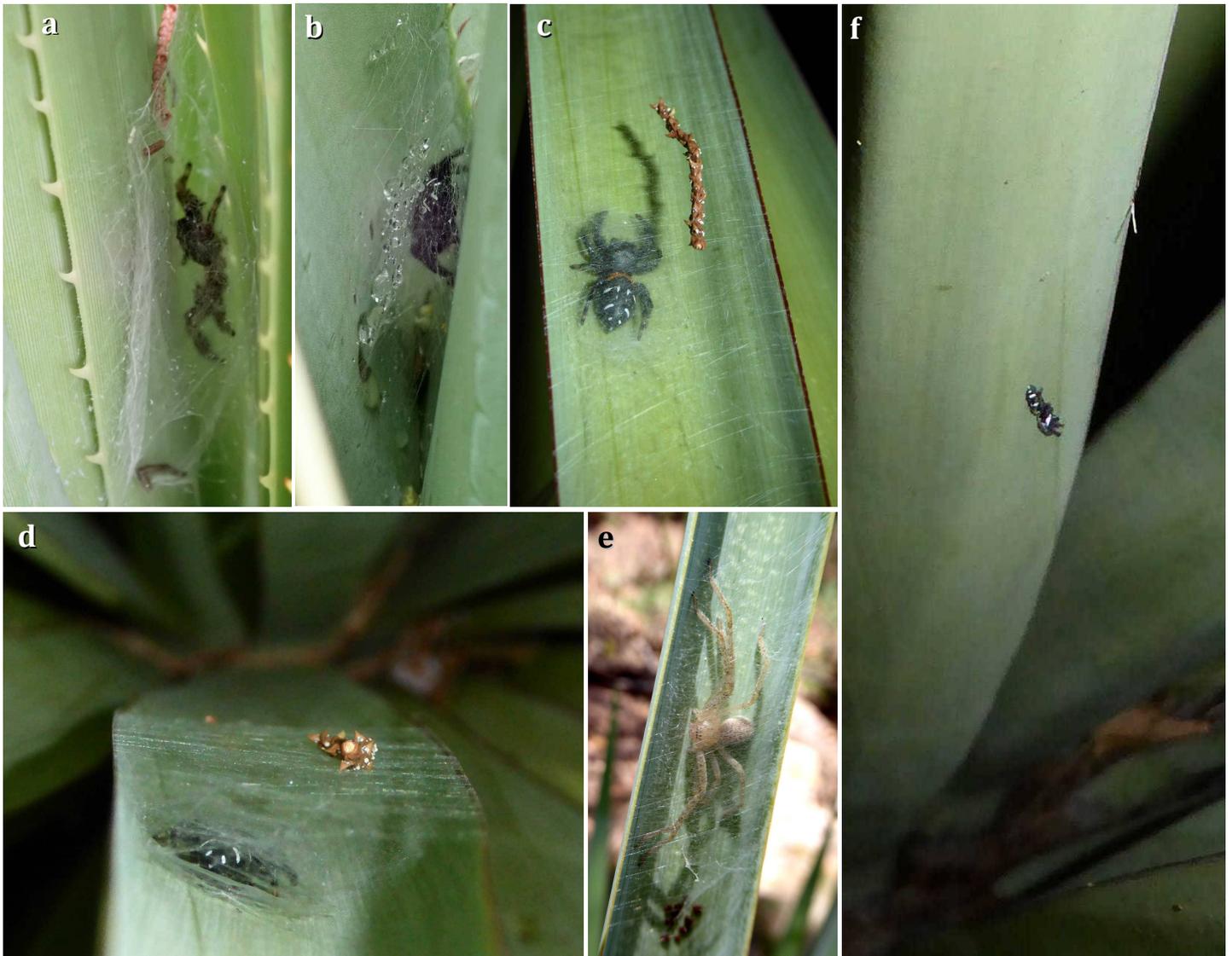


Figure 6. Silk shelters. **a**, *P. basalis* exuvium within a tube shelter that is oriented along the length of a sotol leaf. **b**, Tube shelter perpendicular to the leaves of an agave. **c-d**, Tube shelter under a flat sheet of silk stretched between the edges of a yucca leaf. **e**, The same type of silk shelter as in (c-d), occupied during daytime by a *Curicaberis* spider. **f**, Young instar of *P. basalis* in a mountain yucca, hanging from the end of a dragline at night.

Courtship and mating. We observed adult females and males sharing rosette plants in July, September, October, and November 2019. While we did not observe courtship or mating activity during the day, these pairs exhibited mating behavior at sunset and at night. Below, we describe four incidents during which we had the opportunity to observe adult female and male *Paraphidippus basalis* for relatively long periods of time. When it became too dark for us to make any observations in natural light, we periodically took photographs with flash to document portions of the interactions that occurred in the dark. While we attempted to minimize the number of photographs taken, it is likely that the flash disturbed some of the interactions. However, we were still able to capture photographs of *P. basalis* mating behavior after sunset. We describe four observations of male-female interactions below.

27 July 2019. We observed an adult male and an adult female *P. basalis* on a mountain yucca. The spiders did not interact with each other from the time we started observing them (15:30) to 18:29, and the spiders were located in portions of the plant that were relatively distant from each other (Figure 7a). At 18:30, the male began approaching the female, facing her with his forelegs extended laterally, but the female walked away and down a leaf (Figure 7b). The male followed her down the leaf, at which point the spiders were obstructed by the leaf and could not be observed. At 18:40, we could no longer locate the male. The female eventually entered her shelter for the night at 19:25, shortly after sunset (19:22). No male was observed at 19:54 when we stopped observing the female.

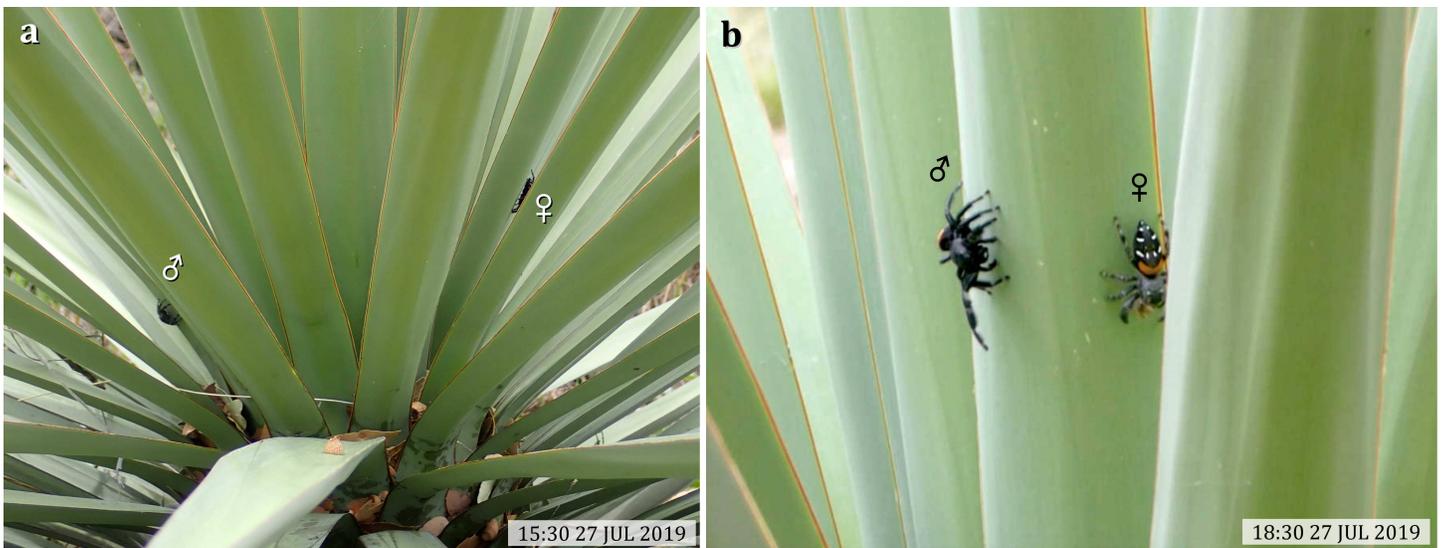


Figure 7. Interactions between an adult female and an adult male on 27 July 2019. **a**, Adult male and adult female in a mountain yucca. **b**, The male approaches the female with his forelegs extended laterally.

28-29 September 2019. We observed *P. basalis* courtship behavior on a mountain yucca, at dusk (Figure 8). At 17:41, we observed an adult female resting at the base of a leaf near her silk shelter; an adult male was on the other side of the plant out of the female's line of sight, and was not observed entering a shelter of his own. At 18:09, the male approached the female from above, but not facing her directly (Figure 8a). As he descended the leaf, the male (1) took three to four steps with the cephalothorax raised, the tip of the abdomen low, and the forelegs parallel and forward, (2) stopped briefly and placed the left foreleg on the substrate while the right foreleg stayed extended in front of him, then quickly lifted the tip of his abdomen once or twice, (3) repeated step 1 followed by stopping briefly and placing both forelegs against the substrate, then quickly lifted the tip of the abdomen once or twice (occurred three times in a row), (4) repeated step 1 then step 2, and (5) repeated step 1 followed by stopping briefly and placing both forelegs against the substrate, then quickly lifted the tip of the abdomen once or twice. After step 5, the male was behind the base of the leaf and could no longer be observed in detail.



Figure 8 (continued on next page). Interactions between an adult female and an adult male on 28-19 September 2019. **a**, An adult male approaches an adult female from above in a mountain yucca. **b**, After the female has entered her shelter, the male remains on the outer base of the leaf on which the female's shelter is located. **c**, The male moves toward the female in her shelter, and repeatedly touches the shelter. **d-f**, Photographs taken between approximately 19:00 and 20:40 documenting copulation within the female's shelter.



Figure 8 (continued from previous page). Interactions between an adult female and an adult male on 28-19 September 2019. **g-k**, Photographs taken between approximately 19:00 and 20:40 documenting copulation within the female's shelter. **l**, Male mounted on the female the following morning within the same shelter.

The female oriented toward the male as he walked down toward the base of the leaf. Once at the base of the leaf, the male oriented toward the female while taking a few steps back, at which point the female took a lunge backwards but stayed oriented toward the male. While the male was obscured by the leaf, we could still see that he was motioning his forelegs at the female. The female did a short lunge toward the male, then eventually turned around and walked away. Sunset on 28 September was at 18:11. At 18:13, the female entered her shelter, while the male remained on the outer base of the leaf on which the

female's shelter was located (Figure 8b). We observed the female moving within her shelter, raising and lowering her body, after which she became motionless. At 18:40, the male was still motionless, resting at the base of the leaf. At 18:46, the male moved toward the female in her shelter, and repeatedly touched the shelter, walked a short distance away, returned, and touched the shelter again (Figure 8c). Our photographs taken between approximately 19:00 and 20:40 (time when we stopped our observations), document that copulation occurred within the female's shelter during that time (Figures 8d-8k). The next morning at 07:34, we found the male mounted on the female within the same shelter (Figure 8l). Upon closer inspection of the pair, the female walked away from under the male, presumably disturbed by our presence. Sunrise on 29 September 2019 was at 06:16.

12-13 October 2019. We observed an adult female and an adult male *P. basalis* within a mountain yucca, at 17:10. The spiders were not observed interacting. The female entered her shelter at approximately 17:42, shortly before sunset (17:54). At 18:01, we noticed the male had changed location and was resting on the leaf immediately under the leaf on which the female's shelter was located; the male was observed at this location until 19:07, after which we disturbed the male inadvertently and were not able to observe him for a period of time. We found the male a distance away from the female and her shelter at 19:14. At this location, at 19:41, the male began moving his abdomen in a sweeping motion. Closer inspection of the male revealed that he had deposited a small layer of silk beneath him, on the yucca leaf (Figure 9). This layer was reminiscent of a sperm web, but we were not able to make further observations and therefore were not able to assess the role of the deposited silk. At 06:58 the next day, we found the pair adjacent to the female's shelter.



Figure 9. Male depositing a small layer of silk reminiscent of a sperm web beneath him on a mountain yucca leaf.

8-9 November 2019. At 17:43, we found an adult male and an adult female *P. basalis* within a horizontal tube shelter at the base of a mountain yucca leaf. Sunset had occurred at 17:28. We did not witness any courtship; the spiders were already tightly paired. We observed the pair in various positions indicative of copulation (Figures 10a-c). The next morning, at 06:38, the pair was still together and immobile (Figure 10d). Sunrise occurred at 06:46. At 08:15, the yucca started being exposed to the sun. At 08:21, we observed the female's abdomen moving periodically while the male still held her abdomen. At 09:06, we observed the female suddenly run up the yucca leaf, at which point the male relocated to the other side of the yucca. We observed the two spiders until 10:00; no further pairing interactions were noted except some faint waving of the first pair of legs from the male when the female was in his vicinity.



Figure 10. Interactions between an adult female and an adult male on 8-9 November 2019. **a-c**, Adult male and adult female found tightly paired within a horizontal tube shelter at the base of a mountain yucca leaf shortly after sunset. **d**, The pair in the same location the following morning.

The initiation of visual courtship behavior between a male and a female *P. basalis* only minutes prior to sunset on 28 September 2019 suggests that *P. basalis* may have the capacity to visually discern fine details under low light conditions. Salticids are typically considered to rely on their exceptional vision in well-lit habitats (Foelix 2011), however Cerveira et al. (2019) found that the salticids *Cyrrba ocellata* and *Cyrrba algerina* have vision-based discrimination under low ambient light levels previously associated with nocturnal spiders. Given the general lack of research on the subject of salticid visual abilities under low light conditions (Cerveira et al. 2019), it would be worth investigating the visual acuity of *P. basalis* under low light levels. Our observations of *P. basalis* mating activity after sunset suggest that male *P. basalis* likely switch from visual courtship displays to vibratory courtship on the silk of female retreats, as reported in salticids that build nests in locations with little light (Richman & Jackson 1992).

Our descriptions of males remaining paired with a female through the night until the following morning are suggestive of post-copulatory mate guarding as described by Alcock (1994), whereby a male prevents rivals from copulating with a female to reduce the risk of direct sperm competition. It is possible that female *P. basalis* remain receptive following insemination, and that males reduce the probability that females will mate with other males by preventing physical contact with rivals. The possibility of post-

copulatory mate guarding in *P. basalis* is interesting, because in entelegyne spiders the first male to mate with a female is generally thought to have a greater share of paternity than any subsequent mates; thereby decreasing the value of post-copulatory cohabitation (Austad 1984).

Nests. We observed *P. basalis* nests at the bases of sotol and agave leaves. An adult female *P. basalis* was present either within or adjacent to each of the active nests we observed. The female typically left the nest when disturbed by an observer, but remained in the vicinity and never left the plant. Nest orientation was either perpendicular to the leaves and horizontal (agave) or along the leaf length (sotol). Sotol leaves are significantly narrower than agave leaves; therefore, nests built along the length of sotol leaves likely receive more protection and support from the leaf than if the nest were built perpendicular to the leaf. In contrast, agave leaves are significantly wider and more likely to accommodate a horizontal, perpendicular nest.

Dissection of a horizontal tube nest found at the base of agave leaves on 9 November 2019 revealed two dense, adjacent, flattened silk layers (Figure 11a-b). This tube shelter was occupied by an adult female, but no spiderlings or eggs were present. The first layer adjacent to the shelter contained the exuviae of first instars; the second layer contained the remains of chorions still attached to the post-embryo membrane (Figure 13c-d).

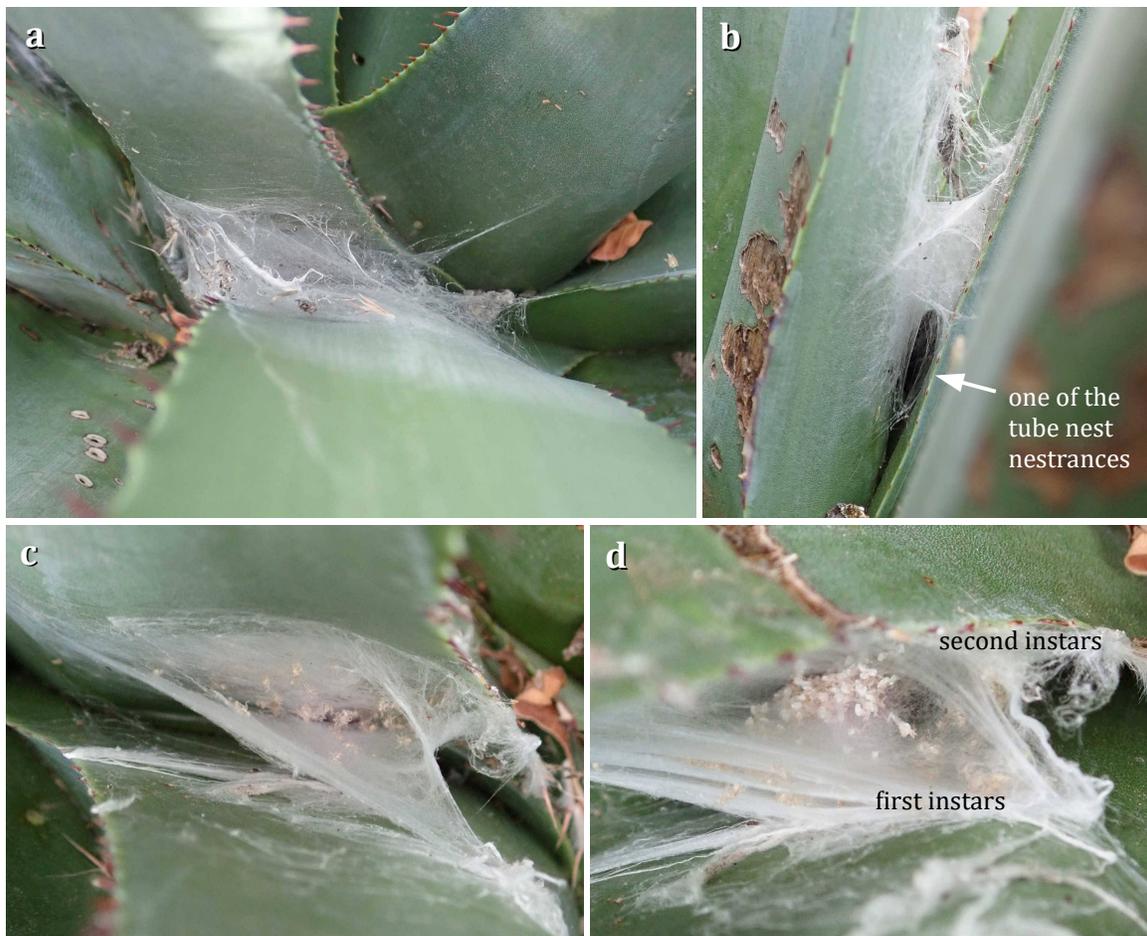


Figure 11. Structure and contents of a horizontal tube nest found at the base of the leaves of an agave. **a-b**, Horizontal tube nest composed of two dense, adjacent, flattened silk layers at the base of agave leaves. **c**, Exuviae of first instars within the first silk layer. **d**, Remains of chorions still attached to the post-embryo membrane in the second silk layer.

We observed four instances of female *Paraphidippus basalis* that were presumably guarding egg masses in sotol plants between April and May 2020. In each case, the egg mass was within a silk tube shelter that had been built at the base of a sotol leaf and along the length of the leaf. The tube shelter was secured with silk to adjacent sotol leaves. The tube was the same width as the leaf (approximately 2 cm), and located on the upper surface of the leaf. In each case, an adult female was found resting just below the egg mass (Figure 12). Following disturbance of the shelter, the female escaped via the basal exit of the tube, but remained nearby in the plant (Figure 12c). The length of these tube shelters was approximately 7 cm, and the egg mass was located closer to the basal opening of the tube than it was to the distal opening. We opened one of these shelters to inspect the egg mass. The egg mass was approximately 15 mm in diameter and contained 78 pale yellow spherical eggs, each approximately 1.8 mm in diameter (Figure 13).

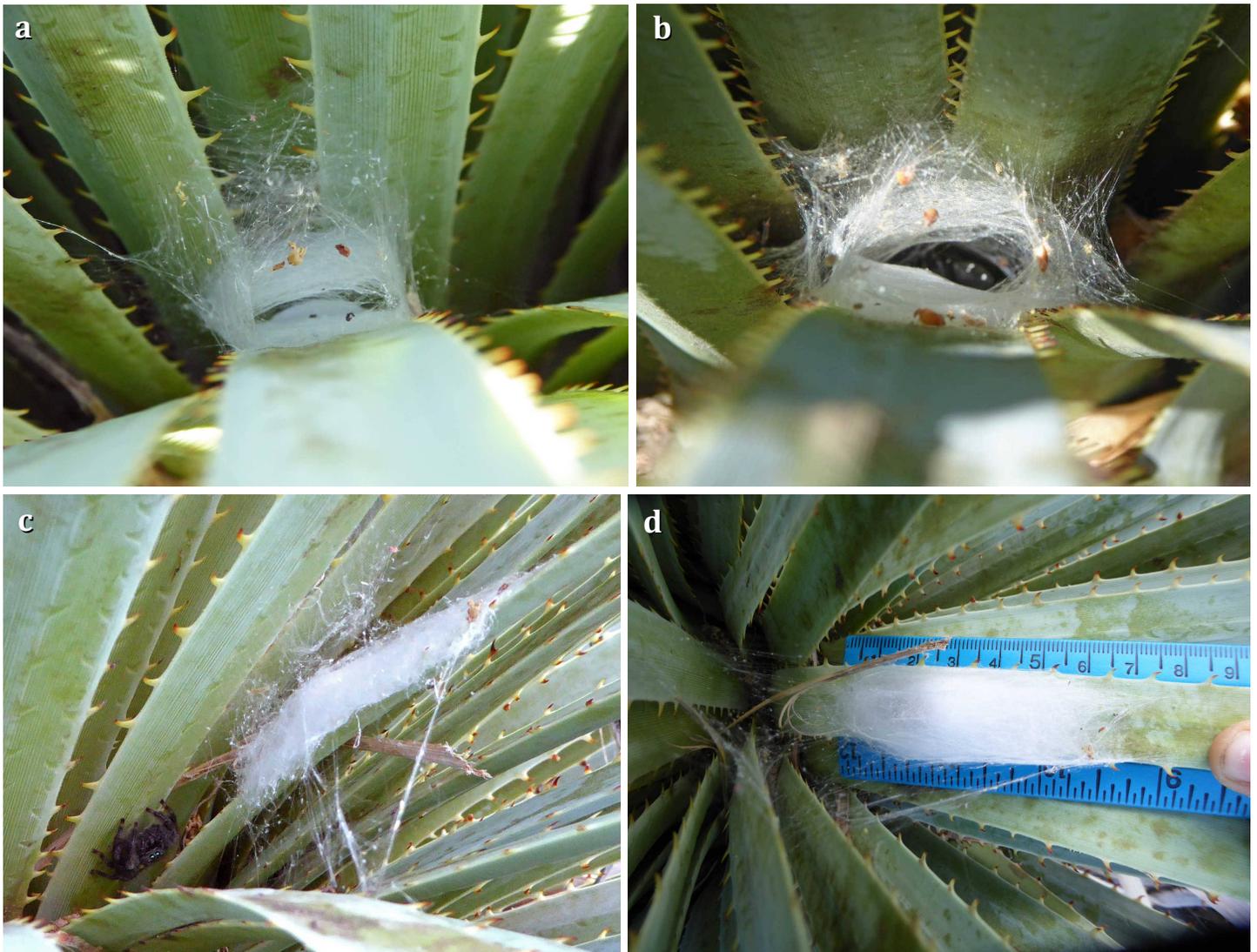


Figure 12. Nests and egg masses. **a**, Egg mass within a silk nest. **b**, Female within a silk nest containing an egg mass. **c**, Female that has left her nest and egg mass via the basal opening of the nest. **d**, Overall view of the nest with the egg mass visible as a round lump in the middle.

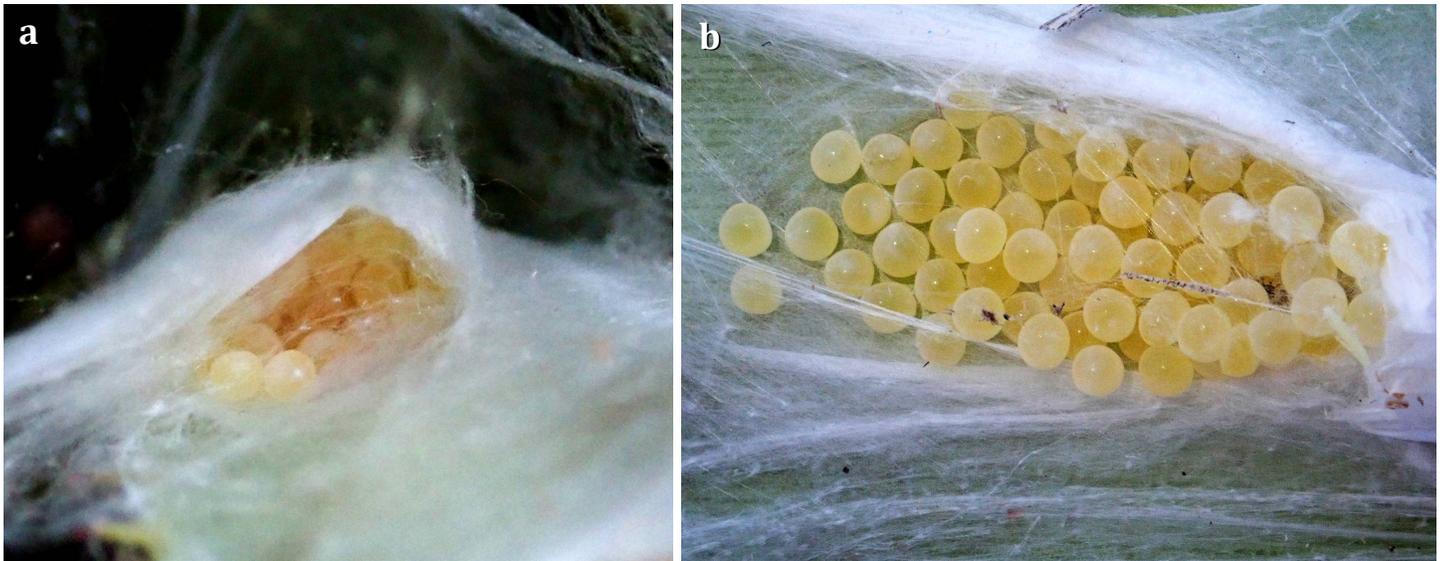


Figure 13. Eggs of *Paraphidippus basalis*. **a**, Partially-cut silk layer revealing the egg mass. **b**, Close-up of the eggs.

We observed two nests at the base of sotol leaves containing *P. basalis* spiderlings, on 26 July 2019 and 9 August 2019. Both nests consisted of a tube shelter associated with an adjacent silk structure containing spiderlings. The first nest contained several second instar *P. basalis* (Figure 2b). An adult female was present in the sotol, but not within the shelter; it is possible that she left the shelter upon being disturbed by the observers. The second nest contained several first instar *P. basalis* (Figure 2a). An adult female *P. basalis* that was present within this nest left the nest when disturbed, but later returned. Maternal care of eggs and recently-hatched juveniles is considered the norm in salticids (Richman & Jackson 1992).

Predatory behavior. *Paraphidippus basalis* adopted a mostly sit and wait predation strategy, whereby individuals spent most of their time at one location, occasionally orienting toward potential prey, before moving to a different location on the plant. Juveniles were found more often in the middle and distal portions of the leaves compared to the adults, which typically were observed closer to the base of the leaves. We also noticed that *P. basalis* continued to forage during light rains.

We found that *P. basalis* preyed on a variety of arthropods represented by hymenopterans, hemipterans, dipterans, coleopterans, and spiders (Figure 14). The largest prey item we observed was a paper wasp (*Polistes* sp.) caught by an adult female (Figure 14a). *Yucca* plant bugs in the genus *Halticotoma*, which damage *yucca* by feeding on their leaves (Wheeler 1976), were relatively common prey items (Figure 14d). Our observations of spider prey included huntsman spiders in the genus *Curicaberis*, sac spiders in the genus *Cheiracanthium*, and one instance of cannibalism of a young *P. basalis* (Figure 14g-h).

As mentioned earlier, we observed an adult female *P. basalis*, which had been resting at the base of a *yucca* leaf, suddenly run up the leaf toward a shelter containing a sac spider in the genus *Cheiracanthium*, and prey on the spider. Given that this event occurred in the late afternoon, it is likely that the *P. basalis* reacted to the visual stimulus of the spider exiting the shelter, as *Cheiracanthium* is mostly nocturnal.

On several occasions, we observed juvenile *P. basalis* stalking small hymenopterans and dipterans, sometimes walking on the side of the leaf opposite to that on which the prey was located as they approached their prey. We found several instances of *P. basalis* with ant prey, which is of interest because ants are unusual prey for salticids, and typically require specialized prey-capture techniques (Richman & Jackson 1992).



Figure 14. *Paraphidippus basalis* holding various prey items. **a**, Paper wasp (*Polistes* sp.). **b**, Ant. **c**, Possible hymenopteran. **d**, Yucca plant bug (*Halticotoma* sp.). **e**, Hemipteran (*Cuerna* sp.). **f**, Coleopteran. **g**, Spider. **h**, Immature *P. basalis*.

Conclusions. Our observations of *Paraphidippus basalis* shelter-use, copulation, nesting, and predation as inhabitants of agave, yucca, and sotol support the hypothesis that *P. basalis* not only prefers rosette-forming plants (Cobbold & O'Donnell 2021) but also completes its life cycle on these plants. Given that reports of host-plant specificity are rare in jumping spiders (Vasconcellos-Neto et al. 2017), and that *P. basalis* is relatively easy to identify in the field, further investigation of this species would provide useful insights into the ecology of salticids that have strong associations with the plants on which they live. As a large, locally common, and easily-identifiable species, *P. basalis* would make a good model organism for the study of spider behavior, including habitat specialization, mating behavior under poor light

conditions, and nocturnal retreat selection (silk shelters vs. draglines). Our hope is that these first insights into the species' natural history will provide a starting point for additional studies of this charismatic jumping spider.

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