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Kukulcania hibernalis

Southern house spider

Understanding one of the most common spiders, often confused with recluse spiders.

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Southern house spider or Recluse spider?

Southern House Spiders and Recluse Spiders are species that you can usually find near humans. One of them (Southern house spider) belongs to the Filistatidae family and the other one (Recluse spider) belongs to the Sicariidae family. Knowing that they belong to different families helps a lot, mostly, to identify each of them more easily, and to know when to avoid direct contact with them. How could you tell which one is which?

Trust the eye arrangement

We know most spiders have a total of eight eyes, but that is one of the main differences between Southern House Spiders and Recluse Spiders. The inofensive Southern House Spiders (*Kukulcania hibernalis* on Guatemala) have a total of eight eyes arranged in a small group at the front center of the carapace (Cephalotorax/Prosoma), which resembles a small tarantula. Six of these eyes are secondary eyes, which means those only capture different intensities of light. Only two eyes are primary, capable of receiving images and shapes; this makes these spiders almost blind.

Female *Kukulcania hibernalis*. Photographer: Katherinne Herrera. FLAAR Mesoamerica. May, 2020. Chinautla, Guatemala.

***Loxosceles* sp. illustration.** Artist: Katherinne Herrera. FLAAR Mesoamerica.

In the other hand, spiders from the Sicariidae family have only six eyes, and they're grouped three in pairs as you can see in the illustration above. All of them, are primary eyes, which gives them excellent sight. They're not even closely related, to the Filistatidae family and have huge differences, even when displaying behavioral treats.

Filistatids are described as spiders with small chelicerae ("jaws"), big cephalothorax and a velvety appearance. It's a conspicuous arachnid in Florida, due to its relatively large size and distinctive flat, tangled web. It is common in human populated areas, and males are often mistaken for Recluse spiders because of their color and general shape. Their venom is not of medical concern, as it has mainly toxins directed to insects (for example, the peptide A or "insectotoxin") (Kozlov, 2007). Also, they are not known to have a dangerous bite as it only causes a little pain and swelling for a few days -there are only two cases worldwide known of a *Kukulcania* bite, (Edwards & McCanless 2019).

Sicariids are described as brownish with a darker brown characteristic violin marking on the cephalothorax. Some spiders of this family look different but we don’t have them in Mesoamerica, so we’re going to skip talking about them. What makes this family so dangerous is a common venom called sphingomyelinase D, a related tissue-destroying substance. It is unique to the family among spiders (Binford & Wells 2003: 25-33). This venom is highly hemolytic and dermonecrotic, capable of destroying red blood cells and cause large lesions that can take a lot of time to heal (Magalhaes et al. 2017: 767-864). Significant morbidity is rare after a recluse bite, but there are cases of systemic loxoscelism that can be life threatening, causing acute renal failure and disseminated intravascular coagulation. An aggressive approach to patients with these symptoms is required to avoid emergencies (Rosen et al. 2012: 439).

Why are they mistaken?

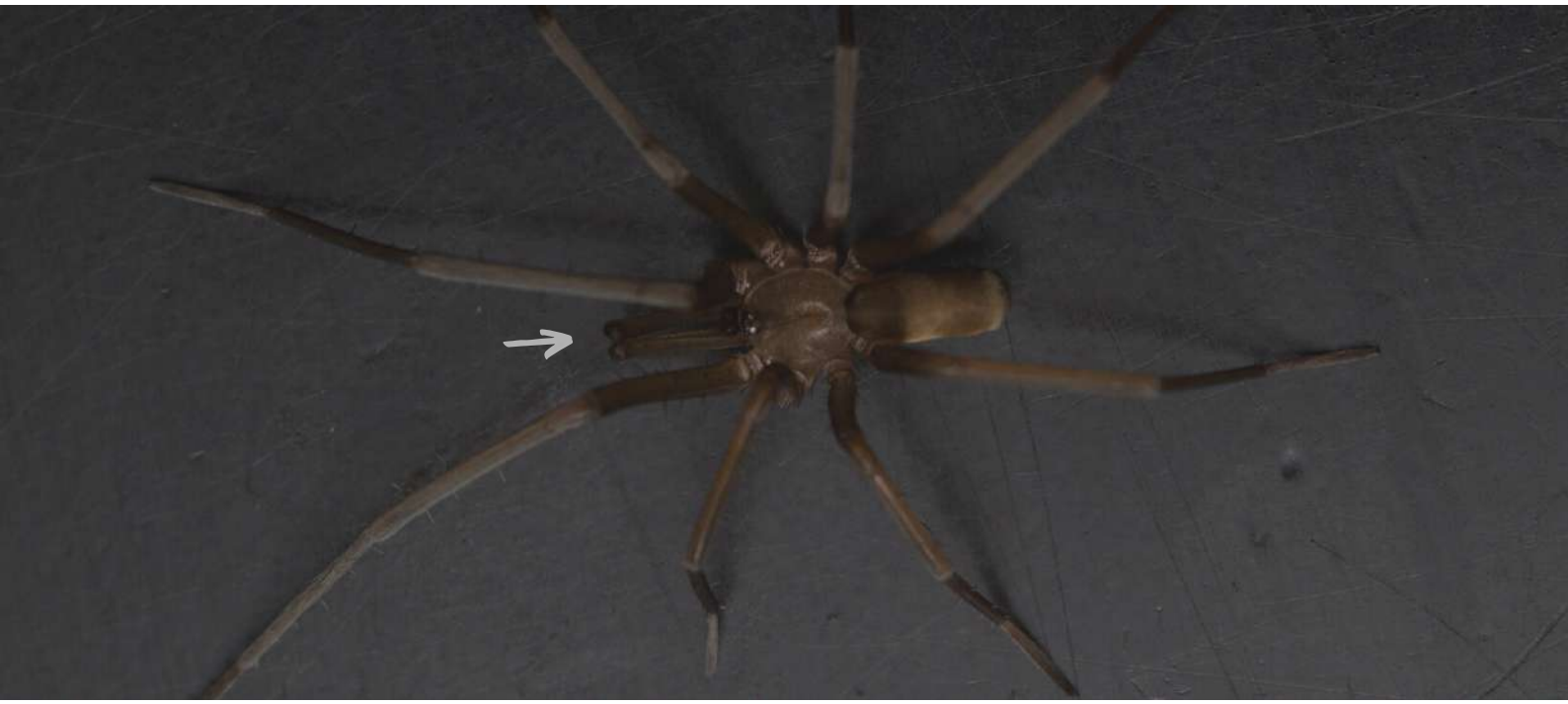
As you can read, there are a lot differences between one family and the other, and even comparing the first image and the first illustration you can see they don't look alike. However, very often, they're mentioned as arachnids misidentified as brown recluse spiders by medical personnel and other authorities, very often (Vetter 2009). But why is it?

Well, males of the *Kukulcania* genus are very similar to recluse spiders, as I mentioned before. You can see that in the picture below. The quickest way to differentiate a male Kukulcania from a recluse spider is to: 1) see the eye arrangement, which is the same as in the female of the first image and 2) look for the pedipalps.

The pedipalps

The pedipalps are the second pair of appendages that are lateral to the chelicerae, and anterior to the first pair of walking legs. Spider's pedipalps have the same segmentation as the legs, with little differences. They contain sensitive chemical detectors and function as taste and smell organs. In sexually mature male spiders, the final segment develops a complicated structure called palpal bulb, which is used to transfer sperm to the female seminal receptacles during mating.

The males of *Kukulcania* species have a pair of -very- large pedipalps, signaled in the picture below; elongated tibiae (first segment of the pedipalp) and cymbium not fused to the tengulum (parts of the pedipalp bulb that you can see only in a microscope) (Brescovit & Santos, 2013).



Male *Kukulcania hibernalis* looking for a female. Photographer: Katherinne Herrera. FLAAR Mesoamerica. May, 2020. Chinautla, Guatemala.

Female *Loxosceles* spp. Photographer: Katherinne Herrera. FLAAR Mesoamerica. November, 2019. Guatemala, Guatemala.

On the other hand, *Loxosceles* species have shorter pedipalps and actually, there are not bigger differences between males and females, so the same description can apply to both genders in order to differentiate between a *Loxosceles* and a *Kukulcania*. In Recluse females, each pedipalp consists of six segments and in adult males, there are seven (Bücherl, 1971). As each palp of the *Loxosceles'* is shorter than the ones of the *Kukulcania*'s males, you can see them at each side of the Recluse's "face", while in *Kukulcania*'s male, you are going to see them apparently at the front of its face.

We have both genus in Guatemala and very little has been studied about them. The species we can find here are:

Kukulcania genus:

- *K. hibernalis*
- *K. santosi*

Loxosceles genus:

- *L. yucatana*
- *L. rufipes*
- *L. guatemala*
- *L. boneti*

Classifying species can be difficult, as differences can be seen mainly on a microscope by comparing female genitalia at the epigynum, or male genitalia at the bulbs of the pedipalps. There are some color differences that aren't always the best way to classify species, as color sometimes depends directly on the spider's diet and it's not part of the species' phenotype.

Anyways, now that we can see the difference between both types of spiders, we might also, continue learning more about the main topic of this report: The Southern House Spider. These spiders are great moms, great for your house and are very common in most houses present in highly urbanized areas. In Guatemala and other latin american countries, they're known as the "doorbell spiders", as they're commonly found at house's doorbells and other small spaces outside and inside homes.

Kukulcania hibernalis. Photographer: Katherinne Herrera. FLAAR Mesoamerica. November, 2019. Chinautla, Guatemala.

Southern house spiders are a wonder of science

For the love of physics!

The Southern House Spider likes to live in spaces within cracks or small holes at buildings; more likely, you'll find them at dark recesses of windowsills, shutters and ovrehangs. They're frequently seen at houses, barns, bridges and other man-made structures. Females are the one's responsible for the webs you usually see when you find them; males don't build webs, instead, they wander in search of females in order to mate (Edwards & McCanless 2003). The female's web usually seems disorganized, and under microscope, the *Kukulcania*'s web looks wooly, as you can se in the picture above. This is because Southern House Spiders have a structure called cribellum, wich works as a comb that divides a strand of web into more strands smaller in diameter. This way of making their web results in a very interesting phenomenom for physics lovers.

Their web lacks of sticky droplets which are characteristic of entrapment strans in webs of some other spider families. That's because each strand of their web becomes so thin (thanks to their cribellum), that the "sticky" reaction it has on the spider's prey comes from van der Waals' forces! That means that the silk doesn't stick to the prey, it adheres atomically to it and that's what makes it so difficult for small insects to release themselves from these spiders' trap. These van der Waals' forces are sometimes accompanied by capillary action or hygroscopic forces. The van der Waals' and hygroscopic forces can explain the adhesive forces of cribellate threads on smooth artificial surfaces, but the increase in adhesive force between smooth prey surfaces and cribellate threads may suggest an additional, unrecognized adhesive mechanism. So, there's still a lot of investigation that needs to be done on the *Kukulcania*'s web (Bott et al. 2017).

Their beneficial existence around humans

Great for pest control

Their webs may seem to accumulate debris and may be unpleasant for some, but this harmless spider is beneficial and captures many pest insects as house flies, horse flies, mud daubers, cockroaches and many beetles (Edwards & McCanless 2003). There aren't studies about a direct relation between the quantity or diversity of prey that a *Kukulcania* spider can eat, but there's a study on the Scavenging behavior by Spiders (Araneae) and its relationship to Pest management of the Brown Recluse Spider. In this study, the authors proved that the *Kukulcania* spiders feed 100% of the times on dead preys when given the opportunity; this is important because it means they would help you get rid of alive and already dead insects (Vetter 2011).

Anecdotally, some people have noticed that *Kukulcania* spiders can feed on a great amount of prey. These spiders also prey on moths, mosquitoes, crickets, ants, other spiders or even, possibly on other *Kukulcania*. Cannibalism is a common source of mortality in some species, and in many species it's a necessity that males have extreme care to approach females in a safe way for mating. In the *Kukulcania* species there's no record or studies that have been done on this mating cannibalism behavior, though some anecdotical experiences and comments say they've found male carapaces on females' webs.

What we know is that they help a lot to reduce the quantity of unwanted insects at home and they're harmless for humans. They won't be wandering at your home and if they do, that's because they're scavenging for dead insects and will help you clean up your house while they feed and maintain healthy. That's sort of a great symbiotic relationship, don't you think?

***Kukulcania* hibernalis earing a cockroach.** Photographer: Nicholas Hellmuth. FLAAR Mesoamerica. July, 2012. FLAAR, Guatemala.

Kukulcania **hibernalis.** Photographer: Sofía Monzón. FLAAR Mesoamerica. Abril, 2014. FLAAR, Guatemala.

Maternity and teamwork

They're great mothers

Have you ever seen one of these spiders carrying something resembling a cotton ball with them? Well, that's their egg-sac. Female Kukulcanias have maternal care. After copulating, a female Southern House Spider lays cribellate silk on the outside of the egg sac (they can lay up to 2 egg sacs after 80 days of the copula) (Barrantes & Ramírez 2013). The egg sacs are maintained deep inside the retreats and it's guarded by the mother until the spiderlings emerge (Curtis & Carrel 1999).

When feeling threatened, the mother will abandon the retreat holding the egg-sac with the chelicerae and palps. A constant contact between the female and the egg-sac is reported for several species of the Kukulcania genus, suggesting that maternal care is common in this genus (Brescovit & Santos 2013). These mothers would carry their egg-sac for a lot of time in order to take it far from the threat. But, when they're stressed over a long period of time, they'll drop the egg-sac and run to safety. If the egg-sac remains in the same place where she dropped it, she'll come back and take it with her again. If the egg-sac gets injured in any way, the mother will check it and leave it there. The energy a female puts into an eggsac is big, as one single egg-sac can contain more than 80 eggs; but the energy it would lose if it stays taking care of an injured egg-sac, is even more than the energy she'll loose by leaving it there.

When the spiderlings hatch, something wonderful happens and shows a new form of social behavior and parental caring.

Team work and maternity

Maternal females feed often while incubating and also, after the spiderlings have emerged. Siblings are able to differentiate a prey from other sibling through contact. When spiderlings encounter one another, both rise the two front legs and touch the other sibling's legs. After this, they alter their movement and pass each other. When a prey appears, the sibling will wrap the prey and attack it all at the same time. After the prey dies, they continue eating it together (Barrantes & Ramírez 2013).

Although most spiderlings feed communally, the mother doesn't eat with its spiderlings. She'll capture a prey and eat it at the same spot to nourish herself. Sometimes, she can kill a prey and leave it to the spiderlings to feed on it. Although this kind of interaction happens, direct contact doesn't occur between spiderling and mother. (Curtis & Carrel, 1999). That is kind of a strange mother-son relationship, but it works for them and we could learn something from it.

Conclusion

The Southern House Spider is able to have a totally symbiotic relationship with humans. Understanding more about them is important as they can serve as pest controls at home and can save us heart attacks by avoiding confusing them with Recluse Spiders. Also, they have a very special behavior that show us how intelligent spiderlings can be and how caring can a mom-spider be.

Kukulcania **spiderlings and mom.** Photographer: Katherinne Herrera. FLAAR Mesoamerica. December, 2020. Chinautla, Guatemala.

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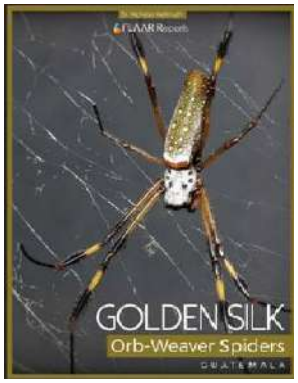

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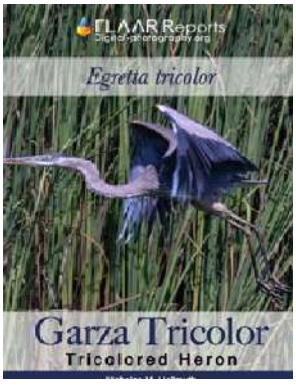

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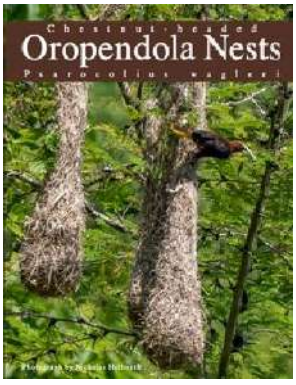

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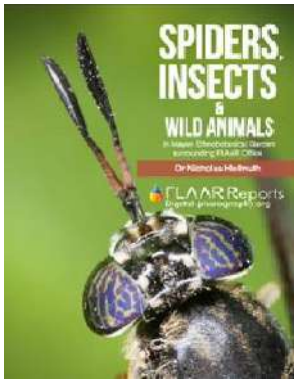

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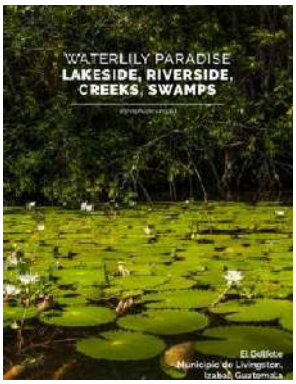

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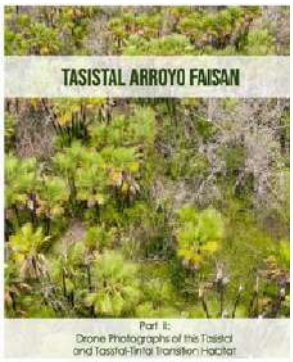

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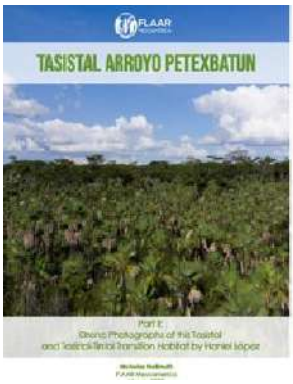

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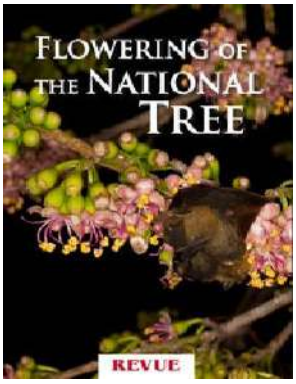

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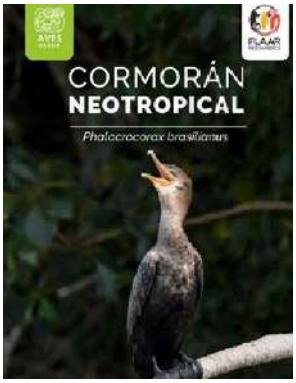

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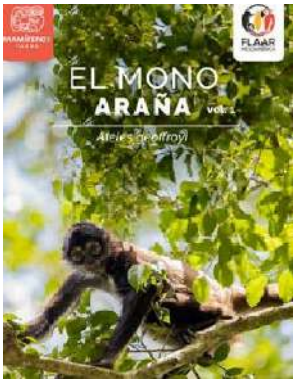

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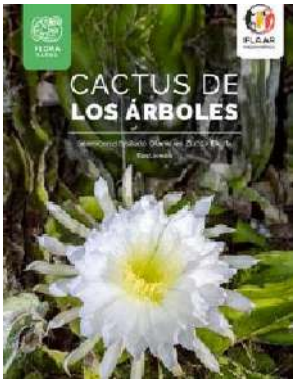

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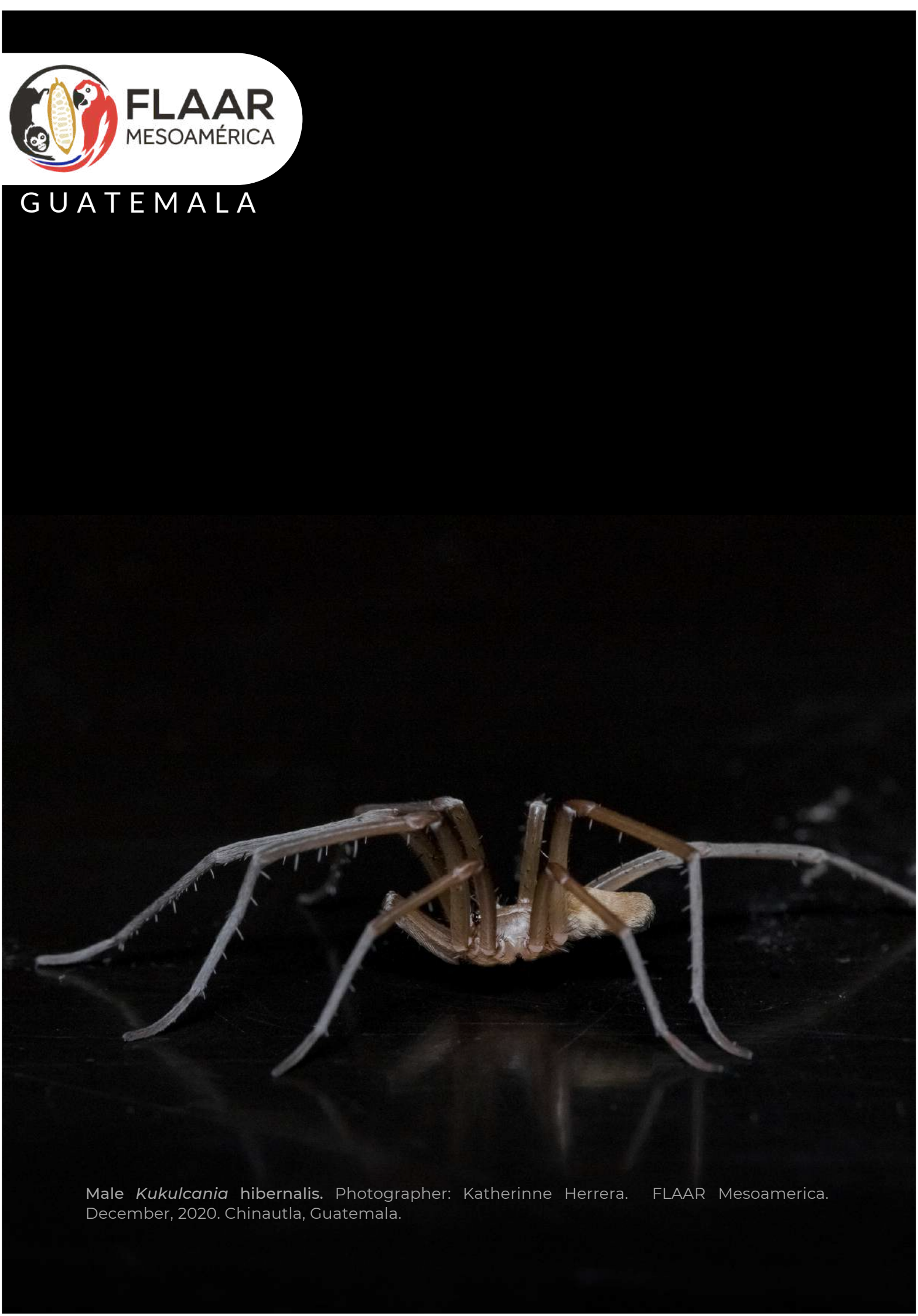

Male *Kukulcania* **hibernalis.** Photographer: Katherinne Herrera. FLAAR Mesoamerica. December, 2020. Chinautla, Guatemala.