Huntsman Spider Biology: Life-History, Reproduction & Husbandry

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Abstract

Huntsman spiders (Sparassidae) are large, showy, and long-lived spiders that are increasingly imported and displayed in captive settings. Although huntsman spiders are familiar to humans in regions where they are common, surprisingly little is known about their behavioral biology in the wild. Captive rearing situations can provide useful insight into their behavior and biology. For the last 16 years, I have studied the behavioral ecology of over 40 huntsman species in the wild and in my lab. Most of my work has focused on the Australian endemic spiders (Deleninae), but I have also studied non-endemic Australian huntsman, SE Asian, and the US species. Based on my research, I describe the basic biology and behavior of huntsman spiders along with suggestions on their husbandry.

Basic diversity and anatomy of huntsman spiders

The sparassids are the 11th largest spider family with 1225 species identified as of September 2018 (World Spider Catalog 19.5, https://wsc.nmbe.ch). Huntsman spiders are widely distributed throughout the world, with increased species diversity in tropical and subtropical regions.

Huntsman are big, fast spiders! Most species are large to medium sized as adults, with relatively few that remain small bodied at maturity. All are characterized by long powerful laterigrade legs. Instead of the legs being oriented downward, as in most spiders, they are oriented laterally outward from the body and are twisted backwards at an upper joint so the legs move rather like crab legs. In practical terms, laterigrade legs allow the spiders to run sideways as efficiently as forwards and backwards. The orientation of the legs combined with the flat bodies of many species allows rapid, flexible movement in tight spaces. Their feet (tarsus and metatarsus) have large iridescent pads known as scopula. Scopula are composed of many short, bifurcated hairs that function like suction cups, and allow the huntsman to easily move about on any surface in any orientation. We have not yet discovered any polished surface that the spiders can't run on with ease.


Figure 1a. Female golden Huntsman, Beregama aurea, from Queensland, Australia. 1b. Female orange huntsman, Heteropoda davidbowie, a popular Malaysian species new to the pet trade.

The huntsman spiders have eight eyes in two rows with relatively good eyesight. Although huntsman have cryptic coloration which makes them difficult to see in the daylight, they can be located easily by their eye shine at night. All of the huntsman are nocturnally active, remaining in critically important retreats (under bark, in leafy retreats, under rocks, etc.) during the day. All captive huntsman need to be provided with a protective retreat that they can sit on or 'hide behind', even if they are still visible to the viewing public. The many dorso-ventrally flattened huntsman species prefer to live in tight spaces, such as under flat rocks or loose bark. An effective retreat for spiders that live under bark are sheets of clear acrylic plastic, e.g., plexiglass, attached or leaned next to the glass viewing window to create a small gap (~1 cm). Less flattened species tend to live in more open retreats, and are content with open retreats of flat or curved cork bark resting against the side of a cage.

Huntsman spiders do not build prey capture webs. Huntsman use silk primarily to cover their egg sacs, attach and waterproof their retreats, and occasionally in draglines. Huntsman display well because they add so little silk to their cages, and with thoughtful retreat placement the spiders are always on show. Prey is not wrapped, but many species have a 'victory dance' similar to that of tarantulas, where the spider 'dances' around larger prey items held in their chelicerae while touching its spinnerets to the ground. This undoubtedly puts down some silk that helps constrain the prey, although the silk is not easily seen.

Life-history

The huntsman spiders are exceptionally long-lived for spiders, with most living for about 2 to 2.5 years, based on spiders reared from birth in my laboratory and correspondent with field data. This doesn't compare to the 8 to 25 years that mygalomorph spiders, such as tarantulas live, but it is far longer than the 8 months to 14 months that most araneomorph spider species live. Male and female huntsman have similar life-spans. In all species I've studied, sexual maturity occurs between ~10 to 13 months of age, and

the spiders live for 1-year or longer after reaching sexual maturity. The sole exception are the world's second largest huntsman spiders, the Golden Huntsman, *Beregama aurea*, which reach sexual maturity at 1.5 years old and consistently live to be 3.5 years old (Figure 1a). It is possible that the smaller huntsman species may reach sexual maturity a little earlier and die somewhat sooner than large species. Sexual maturity is easily recognized in huntsman; the female's genital opening, or epigynum, on her ventral abdomen becomes darkly sclerotized, and the male palps become enlarged and complex. The palps on males tend to become enlarged several instars prior to sexual maturity, making males relatively easy to identify prior to sexual maturity. The palps of penultimate males are typically smooth, black or brown, and shiny, while mature male palps clearly have various structures sticking out, some orange structures, and are not shiny.

Female and male huntsman spiders are similar sizes in the wild. Like females of all spiders, mature females typically have wider, heavier abdomens than the males. Males in the wild are the same size as females, albeit with proportionally longer legs and thinner abdomens. In captivity, males tend to mature sooner and at much smaller body sizes than females. Given choice tests, the females prefer larger males over smaller males, and are more likely to kill smaller males, but they will readily mate with smaller males.

In order to mate with virgin females, male huntsman often search out females that are not quite mature and guard them for long periods. Among the Australian social spiders, *Delena cancerides*, male and female pairs are commonly found together in retreats. Pairs are also found in other huntsman, and this may be a general pattern in sparassids. Pairs are typically composed of mature males, and either mature or penultimate females who remain together for long periods peacefully. Male mortality is most common immediately before the female lays egg sacs, but I have had males of a number of species remain with the female and offspring for many weeks to months.

Courtship and mating in huntsman is direct and without conflict. Males put in cages with mature females typically commence mating within 15 to 30 minutes. They approach the female directly, may briefly vibrate the palps or front legs, step onto her back and insert their palp embolus into her epigynum (Figure 2a). The spiders mate first with one palp, then change sides and mate with the other palp. Mating is prolonged, lasting between 1 to 8 *hours*! No "Slam bam, thank you, Mam" for huntsman spiders! The male may be at risk of attack after mating, but because many of these species appear to mate multiple times with their partners, I generally leave the males in the female's cage for days to weeks. Behaviorally, most males appear to be comfortable remaining in the female's cage, are not in a panic to escape from the cage, and may even attempt to guard her. Some males guard the female by sitting on her back with legs wrapped around her for days. (Note: males that do this guarding excessively tend to be killed eventually.)

Figure 2 a) Social Australian huntsman, Delena cancerides mating. Male on the left, female on the right. Mating in this species lasts between 3 to 8 hours. Females mate repeatedly. b) Australian solitary species, Isopeda canberrana, with egg sac, 1st and newly molted 2nd instar spiderlings. Note the hole the female has chewed in the egg sac.

All huntsman females are attentive mothers who actively guard their egg sacs and new born offspring for ~3 weeks (Figure 2b). Most must chew a hole in the sac for the young to emerge. Do not remove sacs from the mothers, if at all possible. Some new mothers apparently do not know to chew the emergence hole, so pay attention to the sac and when it swells up (as the eggs hatch to 1st instar and spiderlings climb to the top of the sac). The sacs should be opened by the mother as the 1st instar are just about to molt to the 2nd instar, which happens as they are released from the sac and have room to grow. Once the spiderlings are 1st instars, the sac looks full. If the sac suddenly enlarges, without the spiderlings being released, you may need to open the egg sac yourself or the youngsters will (1) die in the sac or (2) have deformed legs by the time you open the sac.

Huntsman females lay two to five egg sacs over their year-long reproductive life. Clutch size often decreases over time, as females appear to run out of sperm. If provided with the opportunity to remate, many females will mate again and clutch size will increase. Clutch size varies with the species, but ranges from 20 to over 400 young per clutch. As a general rule, the majority of large bodied solitary species I have looked at produce 75 to 120 young per clutch. Spiderlings disperse in their 2nd or 3rd instar. If you wish to rear spiderlings, remove them from the natal cage during their 3rd instar and rear individually. Cannibalism among siblings, and sometimes by the adult female, is common by the 3rd or 4th instar. Once the art of husbandry required for a given species has been figured out experimentally, I have been able to continuously rear most species for two to four generations, but new blood from unrelated animals is key to long-term successful breeding.

Huntsman spiders rely on speed and crypsis (camouflage) to evade predators. When trying to capture huntsman spiders, they can appear to teleport. Limiting the spiders escape options, and using light doses of CO_2 or just vials (if you are confident about the behavior of the species) will add in moving them. Having handled many thousands of huntsman spiders, I have been gently nipped without skin breakage many times. Admittedly, most of these spiders have been the social *Delena cancerides* which are calm when held gently. I have been painfully bitten 11 times over 15 years, typically by spiders recovering from CO_2 narcosis. The pain was largely due to the large size of the fangs, which can go deep into a finger. Although most bites were probably dry, on four occasions I reacted to the bite with pain and inflammation that lasted a few days. Only a few genera (*Neosparassus* – AU, *Thelticopis* – Asia) are reported to have medically significant toxic effects from the venom. More to the point, it is easy to move captive huntsman using

Husbandry

Cages: Huntsman are masters of escape. They are fast, have effective scopula which allow them to hang upside down on glass, and are accustomed to slipping between narrow spaces. Cages designed to hold huntsman need to be tightly sealed and allow food to be inserted without opening the cage widely. I have used clear plastic boxes (Amac) of various sizes and clear plastic round cages (Pioneer Plastics) (Figure 3), as well as glass aquaria (2.5 or 5 gallon) to house the spiders (Figure 4). All plastic cages have cork holes burned in with a soldering iron and closed with a tight fitting cork, so prey can be slipped in without opening the cage. Additionally, we drill 3 cm (1 ¼") holes in the top and, in large cages, sides of the plastic cages to provide plenty of air flow. Screening (usually plastic window screen and bridal veil/ tulle) is glue gunned across the air holes.

The glass aquaria need to have screened cage tops that can be modified to contain the huntsman. After much experimentation, my lab uses tightly fitting metal screened tops whose sides can be bent/ hammered/ knocked inwards to increase the fit on the cage. The ends of the screens are also taped shut when spiderlings are small. The metal screened tops are then covered with plastic window screening and tulle, which is glued down. The screening is unnecessary if you only have large animals, but immature huntsman can escape from anything that isn't screened off securely. The screened tops have cork holes or larger holes (that can be blocked off) for delivering food.

Cages should have a substrate on the bottom to hold humidity and reduce odor. I currently use Exoterra Jungle Mix. Shallow water dishes are added, except when small spiderlings that are vulnerable to drowning are present. The huntsman spiders vary enormously in the amount of humidity they are accustomed to, with some species requiring fairly dry cages, while others are from tropical rainforests with high humidity. Inquire about the native habitat of the huntsman. My laboratory is kept at ~80^{o}F.

Figure 3. Plastic cages for different sizes of huntsman spiders. Note cork holes for prey, and large screened air holes. Cork holes are soldered. Air holes are drilled with a hand drill, with the plastic supported by wooden 2x4's.

Figure 4. Glass terraria for huntsman with clear plexiglass attached by Velcro to the sides of the cages. Cork holes and larger openings are constructed in the screened top.

When other spiders go low, huntsman spiders go high. Many huntsman species actively prefer to rest on the ceilings of cages, and assume that all will go up rather than down if given the opportunity. The tendency to go up means that clear tops to cages increase viewing, unless the species prefers tight spaces provided by acrylic plastic or cork on the sides of cages. Similarly, huntsman that escape are more likely to be found on the ceiling or behind posters on the wall, than on the floor. Slick surfaces like glass or polished aluminum do not present any barrier to huntsman spiders.

Prey: Crickets are the primary prey in my lab. Depending on the size of the spiderlings, I start feeding with *Drosophila hydeii* or *D. melanogaster*, but shift to pinhead crickets and house flies as soon as possible. Many of the spiderlings move upwards in cages, so flying prey is a necessity until the spiders are older and more aggressive hunters. To increase the nutritional content, Frank Somma suggests dusting the prey in Repashy SuperVite microfine vitamins prior to feeding. My crickets are reared on Dry Cat food (Purina Cat Chow Naturals Plus Vitamins & Minerals – Indoor works very well) and Flukers Cricket Quencher with Calcium.

Providing high lipid content food, primarily palatable moths like cabbage loopers (*Trichoplusia ni,* or similar species) is key to egg sac production. Mothers often refrain from feeding while guarding their egg sacs, but will lose weight while brooding which reduces their overall number of egg sacs produced. Offer the brooding female food that will not damage her egg sac, like moths or house flies to maintain her weight.

Carbon Dioxide: Carbon dioxide is an effective short-term anesthetic for huntsman spiders, used judiciously. I use 'food grade' CO_2 which is blown from my CO_2 tank through a regulator into a long length of Tygon tubing which can be inserted into cages. Using CO_2 makes it far easier to move huntsman spiders between cages or to clean cages. I don't use CO_2 most of the time, but it really speeds up transfers.

Keep in mind that huntsman spiders' large scopula function even when the spider is anesthetized. They can be hung up on the side of cages by their feet. But when moving spiders, be careful to gently pull the legs off the glass/ plastic as you lift them, or it is easy to pull the leg from the spider. When they are anesthetized, I move spiders using the flexible featherweight forceps or by hand. When the spiders wake up from CO_2 they are cranky and more inclined to bite, so be attentive as they start to wake up.

Acknowledgements

An enormous number of people have helped me in the field in Australia and Singapore, and in my lab to learn about huntsman biology. Special thanks to the following who provided exceptional assistance: Dr. Cole Gilbert (CU), Dr. David Rowell (ANU), Dr. Daiqin Li (NUS), David Hirst, Dr. Eric Yip (PSU), Dr. Mark Harvey (WAM), Dr. Marissa Carrillo, Jacob Hurst, Joe Giulian, Kacie Hargett, Anne Jones, Kayla Garcia, David Court, Nicky Bay, Caroline (LaRow) Wickham, and Frank Somma.