LIVING WORLD
Journal of the Trinidad and Tobago Field Naturalists' Club
admin@ttfnc.org

ISSN 1029-3299

Observations of a Semi-Aquatic Spider Attack: An Overlooked Fish Predator in a Well Studied Ecosystem?

Amy E. Deacon, Aidan D. Farrell and Douglas F. Fraser

Deacon, A. E., Farrell, A. D., and Fraser, D. F. 2015. Observations of a Semi-Aquatic Spider Attack: An Overlooked Fish Predator in a Well Studied Ecosystem? *Living World, Journal of The Trinidad and Tobago Field Naturalists' Club*, 2015, 57-59.

NATURE NOTES

Observation of a Semi-Aquatic Spider Attack: An Overlooked Fish Predator in a Well-Studied Ecosystem?

We describe here a noteworthy spider encounter that took place on the bank of the Ramdeen Stream in Trinidad's Arima Valley (10º41'32"N; 61º17'36"W) on 23 August, 2014. This stream forms part of one of the most intensively-studied freshwater ecosystems in the tropics; for more than four decades international researchers have been visiting this valley to discover more about the ecology and evolution of the fishes that it supports – primarily the Trinidadian guppy *Poecilia reticulata* and the killifish *Rivulus hartii* (recently revised as *Anablepsoides hartii*). This unrivalled body of research has greatly expanded our understanding of natural selection, evolution and community ecology (Magurran 2005).

A series of semi-naturalistic pools have been constructed on the bank of this second-order stream to study interactions between guppies and rivulus as part of another study. While conducting a fish census of one of these pools in the mid-afternoon (around 1430 h), a large male rivulus (~80 mm) jumped out of the pool and onto the surrounding leaf litter, attempting to evade the dip net with its characteristic tail-flip. Within seconds, before it was possible to capture the fish, a large spider had leapt onto it grasping it firmly.

After a few minutes, possibly disturbed by the presence of the observers, the spider moved a few centimetres towards the pool and rested on the water (Fig. 1). It then reclimbed the bank and remained there, completely still, with the motionless fish still in its grasp for some time (Fig. 2).

The authors are very familiar with *R. hartii* and have a good intuition for estimating lengths of this species visually. Therefore, the estimated length of the fish (80mm) was used to calculate the size of the spider using the software package ImageJ (Rasband 1997-2014). Using this method, the cephalophorax (combined abdomen and thorax) of the spider measured about 35mm x 15mm, with a ~120mm legspan.

From our photographs and description, Dr Hubert Höfer of the State Museum of Natural History Karlsruhe (SMNK) in Germany identified the spider as being from the family Ctenidae (tropical wolf spiders) of the genus *Ancylometes* (giant fishing spiders) and of the species *Ancylometes bogotensis* (Keyserling 1877). The individual here is a female; the male of this species has white stripes on his abdomen. A body length of 35mm is typical for an adult female *A. bogotensis* (Brzostowicz and Greven 2007). It is found from Bolivia to Nicaragua, and is the only species of this genus to be found in Trinidad (Höfer and Brescovit 2000).

Nyffeler and Pusey (2014) reviewed accounts of spider predation on fish worldwide by collating 80 published and anecdotal reports. According to this paper, the sighting described here is the first recorded incidence of fish predation by a spider in Trinidad. This is most likely because few people have witnessed the event, and/or that previous descriptions have remained unpublished rather than reflecting the actual rarity of fish predation by spiders.

The pools in this case are manmade, but mimic pools that are often found in such habitats and are naturally colonised by rivulus. Over the course of 84 pool visits by the authors over two years, fishing spiders were observed in 10% of cases; anecdotal evidence suggests this frequency is typical of the stream over the past two decades (unpublished data). One of the authors (DFF), who has worked in this habitat for over two decades, has seen a spider with *rivulus* in its grasp before (unpublished observation) but never witnessed the attack itself.

According to Nyffeler and Pusey's review, 10% of reports of fish predation by spiders can be attributed to the family Ctenidae. The vast majority (80%) are associated with *Dolomedes* sp. of the family Pisauridae; this family is also present in Trinidad (Sewlal and Cutler 2003).

A. bogotensis is typically found on banks or on aquatic vegetation, ready to attack when the surface of the water is disturbed (Brzostowicz and Greven 2007). In a separate encounter, at the same pool around one year earlier, two of the authors witnessed a similar spider, poised, abdomen out of the water with its thorax submerged vertically; on being disturbed, the spider swam *underwater* across the pool and emerged on the other side. Indeed, *A. bogotensis* often uses diving to avoid predators as well as for temperature regulation (Brzostowicz *et al.* 2007) and has been observed to stay underwater for considerable periods (Höfer and Brescovit 2000; Brzostowicz and Greven 2007). The ability to move on the water surface and to remain submerged for extended periods seems to be aided by a coating of fine hairs that trap air bubbles around its body. These hairs are also used to detect disturbances in the water and alert the spider to the presence of prey (Brzostowicz and Greven 2007).

The prey in this case, *R. hartii,* and the other dominant species in the habitat, *P. reticulata,* both belong to the Cypridontiformes, which account for 28% of all identifiable fish species in spider predation reports worldwide (Nyffeler and Pusey 2014). *A. bogotensis* appears to be a generalist feeder. As well as fish, it is also known to feed

Fig. 1. *A. bogotensis* resting on the water with a freshly caught killifish, *R. hartii*.

Fig. 2. *A. bogotensis* grasping its prey.

on frogs and insects on the water surface (Brzostowicz and Greven 2007; White *et al*. 2015) and, as described for the first time in this issue, crustaceans (Bhukal *et al*. 2015).

In general, fish predation by spiders tends to be more common in the tropics. On average, prey species tend to be 2.2 times longer than the spider predator. Our fish was ≈ 2.3 times larger than our spider, which is well within the range of previous observations (Nyffeler and Pusey 2014).

The streams and pools of the Arima Valley are extremely well studied in terms of fish, and predation is often a focus of these evolutionary ecology studies (e.g. Croft *et al*. 2006; Dugatkin and Godin 1992; Fraser and Lamphere 2013). This encounter, coupled with the frequency at which similar spiders are seen poised by our pools, suggests that the role of arachnid predators may be underplayed in the literature thus far, and may be an important source of mortality and selection in these populations, especially in pools and streams where the main fish predators such as the pike cichlid *Crenicichla frenata* and the wolf-fish *Hoplias malabaricus* are absent. Owing to its ability to breathe cutaneously, *R. hartii* can evade immediate aquatic predators by flipping out to riparian habitats (Gibb *et al.* 2011). This behaviour, however, may make them susceptible to predation from semi-aquatic, edge-dwelling spiders.

It would be of great interest to find out more about the distribution and abundance of *A. bogotensis*, and other fish-eating spiders, in Trinidad and to better understand the role they play as predators in aquatic habitats. It would be especially pertinent to address these questions within the Northern Range freshwater ecosystem, given the considerable existing knowledge on other taxa and habitat characteristics in this location.

ACKNOWLEDGEMENTS

The authors are grateful to Dr Martin Nyffeler, Dr Antonio Brescovit and Dr Hubert Höfer for their helpful responses to our queries and for ultimately helping us to identify the species in question. We are also grateful to Dr Höfer and an anonymous reviewer for constructive comments on the manuscript. Dr Höfer's website is an excellent resource for anyone wanting to find out more about this fascinating group of spiders: http://www.wandering-spiders.net/

REFERENCES

Bhukal, R., Rutherford, M.G. and **Mohammed, R.S.** 2015. Predation on a Freshwater Crab, *Dilocarcinus dentatus* by Several Tropical Wolf Spiders, *Ancylometes bogotensis* (Ctenidae) in Trinidad, W.I. *Living World, Journal of The Trinidad and Tobago Field Naturalists' Club,* 2015*:* 59-60.

Brzostowicz, F. and **Greven, H.** 2007. Beobachtungen an der Fischerspinne *Ancylometes bogotensis* Keyserling, 1877 (Araneae). *Acta Biologica Benrodis*, 14, 39-54.

Croft, D.P., Morrell, L.J., Wade, A.S., Piyapong, C., Ioannou, C.C., Dyer, J.R.G., Chapman, B.B., Wong, Y. and **Krause, J.** 2006. Predation Risk as a Driving Force for Sexual Segregation: A Cross-Population Comparison. *The American Naturalist,* 167: 867-878.

Dugatkin, L.A. and **Godin, J.G.J.** 1992. Predator Inspection, Shoaling and Foraging under Predation Hazard in the Trinidadian Guppy *Poecilia reticulata. Environmental Biology of Fishes,* 34: 265-276.

Fraser, D.F. and **Lamphere, B.A.** 2013. Experimental evaluation of predation as a facilitator of invasion success in a stream fish. *Ecology*, 94: 640-649.

Gibb, A.C., Ashley-Ross, M.A., Pace, C.M. and **Long, J.H.** 2011. Fish out of water: terrestrial jumping by fully aquatic fishes. *Journal of Experimental Zoology Part A: Ecological Genetics and Physiology*, 315A: 649-653.

Höfer, H. and **Brescovit, A.D.** 2000. A revision of the Neotropical spider genus *Ancylometes* Bertkau (Araneae: Pisauridae).

Insect Systematics and Evolution, 31: 323-360.

Magurran, A.E. 2005. Evolutionary Ecology: The Trinidadian Guppy. Oxford, Oxford University Press.

Nyffeler, M. and **Pusey, B.J.** 2014. Fish predation by semi-aquatic spiders: A global pattern. PLoS ONE, 9, e99459.

Rasband, W.S. 1997-2014. ImageJ, U.S. National Institutes of Health, Bethesda, Maryland, USA. http://imagej nih.gov/ij/, 1997-2014.

Sewlal, J.A.N. and **Cutler, B.** 2003. Annotated list of spider families (Araneida) of Trinidad and Tobago. *Living World, Journal of The Trinidad and Tobago Field Naturalists' Club,* 2003: 9-13.

Sewlal, J.N. 2013. Checklist of Trinidad and Tobago spider families. [Online]. Available at: http://www.caribbeanspiders.com/checklist_of_spiders_in_trinidad htm (Accessed 10 July, 2015).

White, G. 2015. Observation of a spider, *Ancylometes bogotensis* (Ctenidae), preying on the frog *Rhinella beebei* (Bufonidae) in Trinidad. *Living World, Journal of The Trinidad and Tobago Field Naturalists' Club,* 2015:61-62.

Amy E. Deacon[1*], Aidan D. Farrell[2] and **Douglas F. Fraser[3]**

1. Centre for Biological Diversity, University of St Andrews, Scotland.
2. Department of Life Sciences, The University of the West Indies, Trinidad.
3. Siena College, Loudonville, New York.