



Predation of a Blue-sided Gliding Leaf Frog (*Agalychnis saltator*) by a Giant Waterbug (*Lethocerus* sp.) in Siquirres, Limón, Costa Rica

Craig Howard¹, Carlos González Quesada², and Raby Nuñez Escalante³

¹Ponder, Texas, USA (texasexotics88@yahoo.com)

²Siquirres, Limón, Costa Rica (vidasilvestrebajotigre2024@gmail.com)

³Sierpe de Osa, Puntarenas, Costa Rica (sierpefrogs@gmail.com [corresponding author])

The Blue-sided Gliding Leaf Frog (*Agalychnis saltator*) is a small species with distinctive red eyes and orange hands and feet that ranges in size from 34 to 66 mm. It is characterized by extensive webbing between its digits and large suction disks at their tips (Leenders 2016). During the mating season, *Agalychnis saltator* breeds on vines overhanging temporary ponds in forests. Males emit short, high-pitched calls from trees near breeding sites (Guyer and Donnelly 2005). Eggs are laid on moss-covered vines, making them vulnerable to predation by ants and various snakes. Known for their parachuting behavior, male frogs leap from heights to reach breeding grounds, extending their limbs and webbing during these jumps (Leenders 2016).

Like other members of the giant waterbug family, species of *Lethocerus* hunt by overpowering their prey and using their rostrum to pierce and inject a potent saliva. This saliva, which contains a complex array of enzymes with 132 identified

components (Rees and Offord 1969; Walker et al. 2018), breaks down the prey’s proteins, effectively liquefying its tissues. The bug then consumes the liquefied material using its proboscis. In addition to its role in feeding, the rostrum also functions as a defensive tool, capable of delivering a painful “bite” to humans (Haddad et al. 2010).

At 1306 h on 4 July 2024, CH encountered a Giant Waterbug (*Lethocerus* sp.) preying on an adult male *Agalychnis saltator* near the edge of a pond in Siquirres, Limón Province, on the Caribbean versant of Costa Rica (10.006495, -83.538499; elev. 503 m asl) (Fig. 1). Habitat consisted of a shallow open canopy over an ephemeral pond with fallen tree trunks and areas of submerged aquatic vegetation surrounded by primary rainforest with tall trees and tree ferns. The frog had apparently fallen into the water during an explosive breeding event (Fig. 2) when the waterbug seized it. However, the frog managed to pull the predator onto land, where it

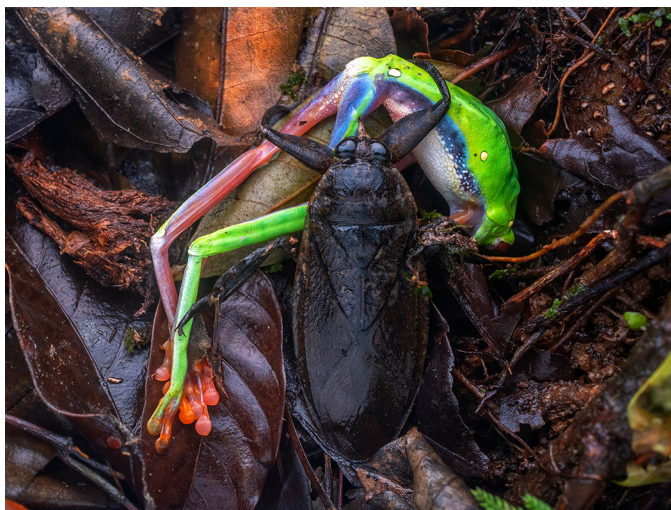


Figure 1. Giant Waterbug (*Lethocerus* sp.) holding and consuming a paralyzed adult male Blue-sided Gliding Leaf Frog (*Agalychnis saltator*) in Siquirres, Limón Province, Costa Rica. Photograph by Raby Nuñez Escalante.

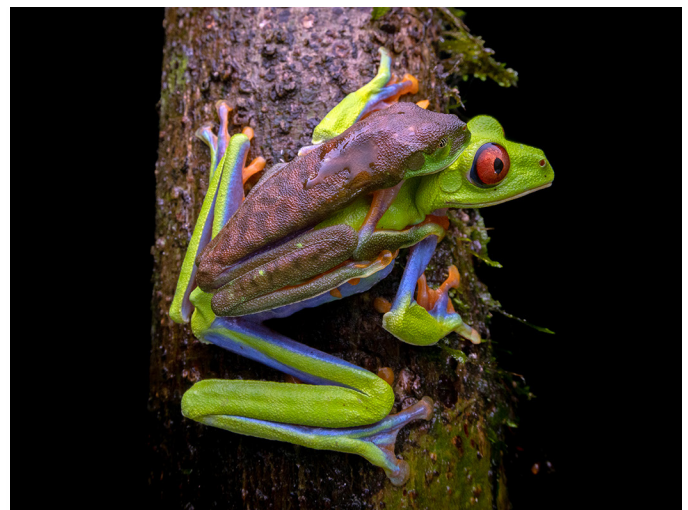


Figure 2. Amplexant pair of Blue-sided Gliding Leaf Frogs (*Agalychnis saltator*) near the pond in Siquirres, Limón Province, Costa Rica. Photograph by Craig Howard.

succumbed to the powerful enzymes of the predatory insect. This event highlights the intense dynamics of predator-prey interactions during explosive breeding events of these and some other species of frogs.

As of 2006, the genus *Lethocerus* included 22 recognized species (Perez-Goodwyn 2006). Identification of species within the genus *Lethocerus* requires expertise and the use of a stereoscope to discern subtle morphological distinctions between species. Consequently, we were unable to identify the species. However, based on comparisons of illustrations in Kunz et al. (2024), the bug in question closely resembled *Lethocerus colossicus*, a species known to be abundant in the area around Siquirres, Limón Province, Costa Rica.

Understanding predation is crucial for deciphering predator-prey dynamics and trophic networks in ecosystems (Toledo 2005; Hero et al. 2001). Predation can significantly influence the composition and distribution of anuran species (Morin 1981; Smith 1983). Anurans are integral to freshwater ecosystems, consuming invertebrates and detritus, but they face predation from various arthropod species, notably waterbugs (Belostomatidae), which prey on all stages of anuran life (Toledo 2003, 2005; Toledo et al. 2007). Lethocerine waterbugs are known for being formidable predators of vertebrates, with a diet that includes large prey such as fish, frogs, turtles, snakes, and woodpeckers (Christopoulos et al. 2022; Hungerford 1919). While the consumption of frogs seems to be common among species of the genus *Lethocerus*, only a few cases have been documented in Costa Rica (González-Maya et al. 2019).

Literature Cited

- Christopoulos, A., H. Daskalaki, K. Vlachopoulos, and P. Pafilis. 2022. Predation of the Balkan frog *Pelophylax kurtmuelleri* (Gayda, 1940) (Anura: Ranidae) by the giant water bug *Lethocerus patruelis* (Stål, 1854) (Hemiptera: Heteroptera: Belostomatidae). - *Entomological Science* 25: e12499. <https://doi.org/10.1111/ens.12499>.
- González-Maya, J.F., D.A. Gómez-Hoyos, R. Seisdedos-de-Vergara, I. Cruz-Lizano, and J. Schipper. 2019. Waterbug (*Abedus* sp.; Belostomatidae) Predation on the Critically Endangered *Atelopus Varius* (Bufonidae) at Las Tablas Protected Zone, Costa Rica. *Acta Biologica Colombiana* 24: 403–406. <http://dx.doi.org/10.15446/abc.v24n2.76924>.
- Guyer, C. and M.A. Donnelly. 2005. *Amphibians and Reptiles of La Selva, Costa Rica, and the Caribbean Slope: A Comprehensive Guide*. University of California Press, Berkeley, California, USA.
- Haddad, V., E.F. Schwartz, C.A. Schwartz, and L.N. Carvalho. 2010. Bites caused by giant water bugs belonging to Belostomatidae family (Hemiptera, Heteroptera) in humans: A report of seven cases. *Wilderness & Environmental Medicine* 21: 130–133. <https://doi.org/10.1016/j.wem.2010.01.002>.
- Hero, J.M., W.E. Magnusson, C.F. Rocha, and C.P. Catterall. 2001. Antipredator defenses influence the distribution of amphibian prey species in the central Amazon rain forest. *Biotropica* 33: 131–141. <https://doi.org/10.1111/j.1744-7429.2001.tb00163.x>
- Hungerford, H.B. 1919. Notes on the aquatic Hemiptera. *The Kansas University Science Bulletin* 11: 141–151.
- Kunz, G., S. Kunz, and R. Kunz. 2024. *Animals of Costa Rica App*. Kunz GesbR, Peggau, Austria. <<https://animalsofcostarica.com/>>.
- Leenders, T. 2016. *Amphibians of Costa Rica: A Field Guide*. Zona Tropical Publications, Comstock Publishing Associates, Cornell University Press, Ithaca, New York, USA. <https://doi.org/10.7591/j.ctvrf89s6>.
- Morin, P.J. 1981. Predatory salamanders reverse the outcome of competition among three species of anuran tadpoles. *Science* 212: 1284–1286. <https://doi.org/10.1126/science.212.4500.1284>.
- Perez-Goodwyn, P.J. 2006. Taxonomic revision of the subfamily Lethocerinae Lauck & Menke (Heteroptera: Belostomatidae). *Stuttgarter Beiträge zur Naturkunde* 695: 1–71.
- Rees, A.R. and R.E. Offord. 1969. Studies on the protease and other enzymes from the venom of *Lethocerus cordofanus*. *Nature* 221: 675–677. <https://doi.org/10.1038/221675a0>.
- Smith, D.C. 1983. Factors controlling tadpole populations of the chorus frog (*Pseudacris triseriata*) on Isle Royale, Michigan. *Ecology* 64: 501–510.
- Toledo, L.F. 2003. Predation on seven South American anuran species by water bugs (Belostomatidae). *Phyllomedusa* 2: 105–108. <https://doi.org/10.11606/issn.2316-9079.v2i2p105-108>.
- Toledo, L.F. 2005. Predation of juvenile and adult anurans by invertebrates: current knowledge and perspectives. *Herpetological Review* 36: 395–399.
- Toledo, L.F., R.S. Ribeiro, and C.F. Haddad. 2007. Anurans as prey: an exploratory analysis and size relationships between predators and their prey. *Journal of Zoology* 271: 170–177. <https://doi.org/10.1111/j.1469-7998.2006.00195.x>.
- Walker, A.A., M.J. Hernández-Vargas, G. Corzo, B. Fry, G. Bryan, and G.F. King. 2018. Giant fish-killing water bug reveals ancient and dynamic venom evolution in Heteroptera. *Cellular and Molecular Life Sciences*. 75: 3215–3229. <https://doi.org/10.1007/s00018-018-2768-1>.