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Misdirected amplexus and predation at a *Rana sauteri* Boulenger, 1909 lekking site in northeast Taiwan

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The cost of lek-breeding aggregation in anurans is likely reflected by increased predation risk for males (Grafe, 1997) and, on occasion, in misdirected amplexus. Ranidae is the third family most frequently involved in misdirected amplexus, with contributing factors including overlapping amplexus types, concurrent microhabitat use, explosive breeding strategies, and temperate climates (Soni et al., 2025).

Sauter's Frog, *Rana sauteri* Boulenger, 1909, is endemic to Taiwan, found throughout the main island at elevations between100–3000 meters, primarily on forest floors (Chou and Lin, 1997). This species exhibits explosive breeding aggregation behaviour during the relatively cooler seasons from late autumn (October) to winter (December) at low altitudes and in spring (May) at higher altitudes (Lai et al., 2003). Mature frogs aggregate in flowing-water habitats such as the headwaters of creeks and streams. In large populations, they can be found throughout the streambed and riparian zones during peak breeding periods (Chou and Lin, 1997; Lai et al., 2003). The most general sympatric species that are observed at site with *R. sauteri* breeding aggregations are the Central Formosan Toad (*Bufo bankorensis*) and Swinhoe's Frog (*Odorrana swinhoana*) (Kam et al., 1998).

During a night survey on 2 December 2024 at 21:00 h, we observed an *O. swinhoana* (sex unknown) perched on a rock approximately 15 cm from the stream, with a male *R. sauteri* in amplexus on its back, and its forelimbs around the head of the *O. swinhoana* (Fig. 1). These observations were made in the upper reaches of Kukeng Creek, Yuanshan Township, Yilan County, Taiwan (24.75784°N, 121.62256°E; 480 m elevation). We stood about 1 m away and watched without interfering. About 5 minutes later, the *O. swinhoana* individual, with the *R. sauteri* still on its back, leaped into the stream, ending the observation. This misdirected amplexus between *R. sauteri* and *O. swinhoana* is not the first instance: it was also observed in both November 2013 and 2014 under similar breeding-lek aggregation conditions at the same site (pers. obs. Jean-Jay Mao). In those cases, however, multiple male *R. sauteri* competed for mating positions on the back of an *O. swinhoana* individual (Fig. 2).

Two days later, on 4 December 2024 at 22:00 h in the same stream, we observed an *O. swinhoana* individual preying on a *R. sauteri* (24.75820°N, 121.62282°E; 480 m elevation; Fig. 3). This observation was also made from about 1 m away without interference. After about 3 minutes of observation, the *O. swinhoana* still held the *R. sauteri* in its mouth and leaped into the forest, ending the observation.

During the breeding season of *R. sauteri*, large numbers of males gather in streams and nearby banks and it is common for males to mistakenly attempt amplexus with other males. However, to our knowledge,



Figure 1. A male *Rana sauteri* engages in misdirected amplexus with *Odorrana swinhoana* (sex unknown). Photo by Bing-Cheng Sung.

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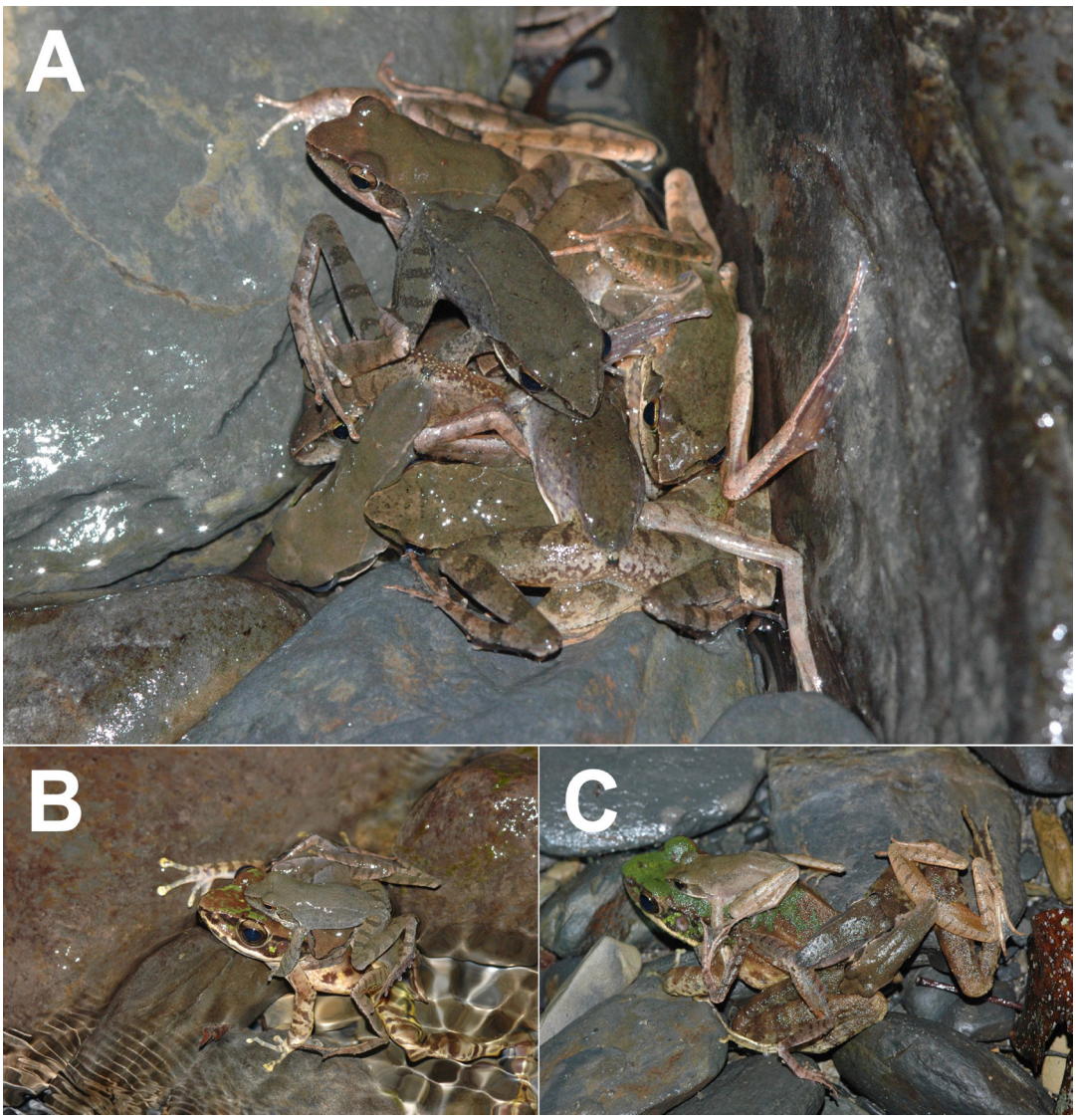


Figure 2. Males of *Rana sauteri* compete for the regular amplexus (A), and engage in a misdirected amplexus with an *Odorrana swinhoana* in November 2013 (B) and November 2014 (C). Photos by Jean-Jay Mao.

these are the first photographed instances of *R. sauteri* mistakenly attempting amplexus with *O. swinhoana*, as well as the first observation of *O. swinhoana* preying on a *R. sauteri*, and on another anuran in general. These observations suggest that the increase in *R. sauteri* density along streams during the breeding season serves as an opportunistic food source for *O. swinhoana* and other predators, such as *T. stejnegeri* (Creer et al., 2002) (Fig. 4).

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Figure 3. An *Odorrana swinhoana* predation on a *Rana sauteri.* Photo by Bing-Cheng Sung.

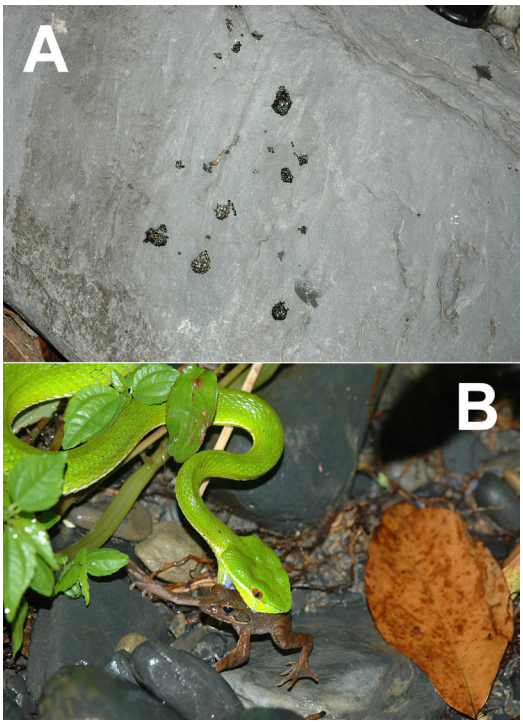


Figure 4. (A) Evidence of predation on a gravid female *Rana sauteri* by an unknown predator (note the egg mass and tissue remnants). (B) Ambush posture of *Trimeresurus stejnegeri* with prey, a typical predator of *R. sauteri* at breeding sites. Photos by Jean-Jay Mao.

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