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Predation of *Tityus ocelote* (Scorpiones: Buthidae) by the lizard *Norops polylepis* (Sauria: Dactyloidae) in Costa Rica

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Abstract: A specimen of the anole *Norops polylepis* (Peters, 1874) observed consuming a female of *Tityus ocelote* Francke & Stockwell, 1987 in the Parque Nacional Manuel Antonio, Puntarenas Province, Costa Rica is reported. This is the only known natural enemy of this scorpion distributed in southern Costa Rica and northern Panama, and the report also involves the first recorded instance of scorpion predation by *N. polylepis*.
Key words: Scorpiones, Buthidae, *Tityus*, Sauria, Dactyloidae, *Anolis*, lizard feeding, prey, Costa Rica.

Depredación de *Tityus ocelote* (Scorpiones: Buthidae) por el lagarto *Norops polylepis* (Sauria: Dactyloidae) en Costa Rica
Resumen: Se registra la depredación de una hembra del alacrán *Tityus ocelote* Francke & Stockwell, 1987 por el lagarto *Norops polylepis* (Peters, 1874), sobre la base de una observación realizada en el Parque Nacional Manuel Antonio, provincia de Puntarenas, Costa Rica. Este es el único enemigo natural conocido de este alacrán que se distribuye en el sur de Costa Rica y el norte de Panamá; además, éste es el primer registro de depredación de escorpiones por *N. polylepis*.
Palabras clave: Scorpiones, Buthidae, *Tityus*, Sauria, Dactyloidae, *Anolis*, dieta de lagartos, presa, Costa Rica.

The predation of scorpions by lizards in the wild is well documented in the literature (Polis *et al*., 1981; Dupré, 2008; Žagar *et al*., 2011; Shehab *et al*., 2011; Rodríguez-Cabrera *et al*., 2020). But lizards are also occasionally included as part of the diet of several scorpions (McCormick & Polis, 1982; Armas, 2001; Pérez & Ávila, 2010; Teruel *et al*., 2020). Interestingly, the widespread buthid *Buthus occitanus* (Amoreux, 1789) has been reported consuming the endemic wall lizard *Podarcis atrata* Boscá, 1916 on the Columbretes Islands and vice versa (Castilla, 1995; Castilla & Herrel, 2008; Castilla *et al*., 2009). Therefore, it is clear that intraguild predation can occur both ways between lizards and scorpions, dependent on factors such as species, size, habitat and opportunity.

While on a short vacation on January 23, 2013, the authors RG and BB visited the Parque Nacional Manuel Antonio (9°22'N, 84°08'W), Puntarenas Province, Costa Rica. At 14:30 Central Standard Time, a male lizard was observed by BB running across the ground and then onto a tree trunk, exhibiting unusual behaviour was observed; a closer inspection showed that it had a small scorpion in its mouth, grabbed by the cephalothorax. Some photographs (Figs. 1–2) were hastily taken before the lizard disappeared into the undergrowth. The general area of the observation consists of secondary rainforest, approximately 100 m a.s.l.

On the basis of the photographs, Gunther Köhler (pers. comm. to RG, February 2013) identified the lizard as the anole *Norops polylepis* (Peters, 1874) (Dactyloidae), which is distributed in Panama and Costa Rica (Köhler *et al*., 2010). The scorpion was identified by Luis F. de Armas (pers. comm. to DS, February 02, 2021) as a female of *Tityus ocelote* Francke & Stockwell, 1987 (Buthidae), a species known from southern Costa Rica and northern Panama. Indeed several of the paratypes of *T. ocelote* originate from the Parque Nacional Manuel Antonio (Francke & Stockwell, 1987).

This represents the first record of scorpion feeding by *N. polylepis*, and also the only known natural enemy for *T. ocelote*. Other recorded predators of the Costa Rican scorpions are the snakes *Stenorrhina freminvillei* (Duméril, Bibron & Duméril, 1854), and *S. degenhardtii* (Berthold 1846), which predates on *Centruroides edwardsii* (Gervais, 1843) [cited as *C. margaritatus* (Gervais, 1841)], and *C. bicolor* (Pocock, 1898), respectively (Solórzano & Greene, 2012; Solórzano, 2018).

This contribution complements the currently scanty data on the natural enemies of Costa Rican scorpions, and also more generally on predation of scorpions by lizards in Central America.



Figs. 1–2. The scorpion *Tityus ocelote* as prey of the anole *Norops polylepis* in Parque Nacional Manuel Antonio, Costa Rica. Photos by Ray Gabriel.

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