

First report of leech parasitism on *Gekko (Japonigekko) hokouensis* Pope, 1928 (Squamata: Gekkonidae)

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ABSTRACT

Parasitism of haemadipsid leeches were commonly reported on mammals. However, it is rarely documented on herpetofauna, especially on reptiles. In this paper, we present the documentation of the haemadipsid *Tritetrabdella taiwana* (Oka, 1910) parasitizing *Gekko (Japonigekko) hokouensis* Pope, 1928 observed in northern Taiwan. Our account represents the first confirmed and reported haemadipsid parasitism on any gekkonid species in Taiwan, as well as the first record of leech parasitism on *G. hokouensis*.

Keyword: *Gekko*, Haemadipsidae, leech, Taiwan

INTRODUCTION

The Hokou Gecko, *Gekko (Japonigekko) hokouensis* Pope, 1928 is an East Asian endemic gekkonid, known to occur in eastern China, Japan (the Ryukyus Archipelago and Kyushu), and Taiwan, including Orchid and Green Islands (Uetz *et al.*, 2024). This gecko was first described in 1928 as a subspecies of *Gekko japonicus* based on specimens collected from Hokou County, Jiangxi Province, in eastern China (Pope, 1928). Subsequently, Zhou *et al.* (1982) elevated the subspecies status to a full species. *Gekko hokouensis* tends to be primarily nocturnal and typically inhabits lowland subtropical and temperate forests, as well as forest edges and urban areas (Ota *et al.*, 1988). In certain areas of mainland Japan (Honshu), it is considered an invasive species (Toda and Tsuyoshi, 2005; Toda and Hikida, 2011).

Leeches (Subclass Hirudinea) is a group of predatory and sanguivorous clitellates primarily characterized by the presence of anterior and posterior suckers. Although many leeches are haematophagous (Oceguera-Figueroa and Kvist, 2024), some species are predatory (Kutschera, 2003; Schikov, 2011; Nakano and Prozorova, 2024), and others have been reported cannibalizing other leeches (Kutschera and Roth, 2005; Aminov, 2019). Among the commonly encountered leeches in the tropical and subtropical forests of Asia are the jawed land leeches (family Haemadipsidae) (Borda and Siddall, 2011). They are frequently encountered parasitizing mammals (Tessler *et al.*, 2018) and are often found parasitizing amphibians, particularly frogs (Lai and Chen, 2010). In Taiwan, accounts of leech parasitism on herpetofauna were all recorded from anurans (sensu Lai and Chen, 2010; Lai *et al.*, 2011) and no published documentation of reptiles, particularly Gekkonidae. In this paper, we present the first report of leech parasitism on Gekkonidae in Taiwan as well as the first record of leech association on *G. hokouensis*.

MATERIALS AND METHODS

At 1940 h on 24 April 2024, an adult male *G. hokouensis* (weight = 3.26 g; SVL = 57.81mm; TL = 64.78mm) was collected on the Hushan Hiking Trail, Xinyi District, Taipei, Taiwan (25.034055, 121.587074; WGS 84) (Figure 1). While still perching on the man-made hiking railing, the gecko was observed to have a leech attached to the dorsal region of its head (Figure 2). The gecko along with the attached unidentified leech was carefully collected and sent to the first author for identification. Following the taxonomic description provided by Lai and Chen (2010), the leech specimen was identified as *Tritetrapdella taiwana* (Oka, 1910). Leech and its gecko host are currently deposited at the Herpetology Laboratory-National Taiwan Normal University.

RESULTS AND DISCUSSION

Tritetrapdella taiwana (Figure 3) is a species of terrestrial leech belonging to the family Haemadipsidae. It is native to East and Southeast Asia. It was initially described as a subspecies of *Haemadipsa japonica* Whitman collected in southern Taiwan (Oka, 1910). This species is distributed from Indo-China and Taiwan to the Ryukyus Archipelago in Japan, where it inhabits the forest floor and is often found in leaf litter and vegetation (Lai *et al.*, 2011). In Taiwan, it is primarily associated with frogs and capable of parasitizing different species from the families Bufonidae, Ranidae, and Rhacophoridae (Lai and Chen, 2010). *Tritetrapdella taiwana* has also been reported facultatively parasitizing mammals, including dogs and humans (Lai and Chen, 2010). To the best of our knowledge, this is the first published documentation of *T. taiwana* parasitizing a *G. hokouensis* anywhere in its range as well as the first report of *T. taiwana* parasitism on any gekkonid species in Taiwan.

Leech-herpetofaunal associations are frequently observed in anurans (e.g., Siddall and Bowerman, 2006; Lai and Chen, 2010; Rocha *et al.*, 2012) and freshwater turtles (e.g., Tucker *et al.*, 2005; Trivalairat *et al.*, 2019; Amarga and Lin, 2023). In addition, leeches have been reported on salamanders (Platt *et al.*, 1993; Stark *et al.*, 2017; Lunghi *et al.*, 2018), sea turtles



Figure 1. Locality map showing the collection site of *T. taiwana* parasitizing *G. hokouensis* (pink dot).



Figure 2. An adult male *G. hokouensis* perching on hiking railing with an unengorged *T. taiwana* attached to its head (white arrow). Photo by Y-S. Lin.

(Bunkley-Williams *et al.*, 2008; Rodenbusch *et al.*, 2012), and crocodilians (Govedich *et al.*, 2002; Richardson *et al.*, 2017). However, leech parasitism on lizards is rarely reported, including leech parasitism of presumed *Hirudinaria manillensis* (Lesson) on *Varanus salvator macromaculatus* (Deraniyagala) in Singapore (Zdunek, 2023). Interestingly, leeches have been reported attached to internal organs of their hosts, including *H. manillensis* in the lungs of *Crocodylus porosus* Schneider in Malaysia (Jeffrey *et al.*, 1990) and *Philaemon cf. grandieri* Blanchard in lymph spaces beneath the skin of *Litoria becki* (Loveridge) in Papua New Guinea (Mann and Tyler, 1963). Furthermore, several microbes detected in vertebrate blood apparently survive in the guts of leeches for several weeks (Marsden and Pettitt, 1969; Nehili *et al.*, 1994) indicating the potential role of leeches as vectors for blood-borne pathogens (Marden *et al.*, 2016).

These pathogens capable of surviving in leech guts include some species in the genera *Aeromonas* (Flouh *et al.*, 2019), *Ehrlichia* (Zhou *et al.*, 2019), *Toxoplasma* (Nehili *et al.*, 1994), and *Trypanosoma* (Marsden and Pettitt, 1969). Leech-associated pathogens have been detected in several herpetofaunal species, mainly amphibians. For example, Hopkins *et al.* (2016) detected unidentified trypanosomes on the glossiphoniid leech, *Placobdella appalachiensis* Moser and Hopkins, parasitizing a Hellbender, *Cryptobranchus alleganiensis alleganiensis* (Daudin), in North America. Also, Desser (1987) suggested that the amphibian



Figure 3. Close-up image of *T. taiwana* photographed under stereomicroscope. Photo by A.K. Amarga and A.B. Flores.

leech *Desserobdella picta* (Verrill) (reported as *Batracobdella picta*) served as a vector for the anuran rickettsial parasite, *Aegyptianella ranarum*. Additionally, Raffel *et al.* (2006) provided field evidence identifying *D. picta* (reported as *Placobdella picta*) as a vector of an unidentified *Ichthyophonus* (Ichthyosporea) in an Eastern Newt, *Notophthalmus viridescens* (Rafinesque), in North America.

CONCLUSION

Prior to this report, there is no published documentation of any leech species parasitizing gekkonid in Taiwan. In addition, *T. taiwana* has never been reported to parasitize reptiles. Although, our report is a case of facultative occurrence as *T. taiwana* is primarily associated with anurans, our findings provide an additional record of leech-herpetofaunal parasitic association in Asia as well as its first record on *G. hokouensis*. Furthermore, detecting

microbial strains associated with leeches parasitic on herpetofauna and their transmission dynamics merits investigation as these are among the knowledge gaps regarding sanguivorous clitellates associated with Taiwanese reptiles and amphibians.

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