

## Scientific note

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## Crossing the Weber Line: First record of the Giant Bluetongue Skink *Tiliqua gigas* (Schneider, 1801) (Squamata: Scincidae) from Sulawesi, Indonesia

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**Abstract.** We report for the first time the Giant Bluetongue Skink *Tiliqua gigas* (Schneider, 1801) from the Indonesian island of Sulawesi. This find constitutes the westernmost record for the species and represents the first record of *Tiliqua* Gray, 1825 from west of the Weber Line and for Wallacea. The possible origin of the specimen found and its taxonomic status are discussed in a biogeographical context.

**Key words.** New record, Wallacea, Scincidae, *Tiliqua*, Sulawesi, Indonesia, biogeography.

### INTRODUCTION

Bluetongue skinks of the genus *Tiliqua* Gray, 1825 are exceptional large representatives of the Scincidae, one of the most diverse lizard families with nearly 1700 species described (Uetz et al. 2020). They are well-known for stretching out their bright blue to blackish coloured tongue towards potential predators when disturbed, though this behaviour might also serve as intraspecific signaling (Abramjan et al. 2015).

As popular reptiles that often can be found in herpetoculture, bluetongue skinks are of particular interest for the international pet trade (Yuwono 1998; Iskandar & Erdelen 2006; Chng et al. 2016), although they can be easily bred also in captivity (Brauer 1980; Schade 1980; Lapthorne & Lapthorne 1987; Gassner 2000).

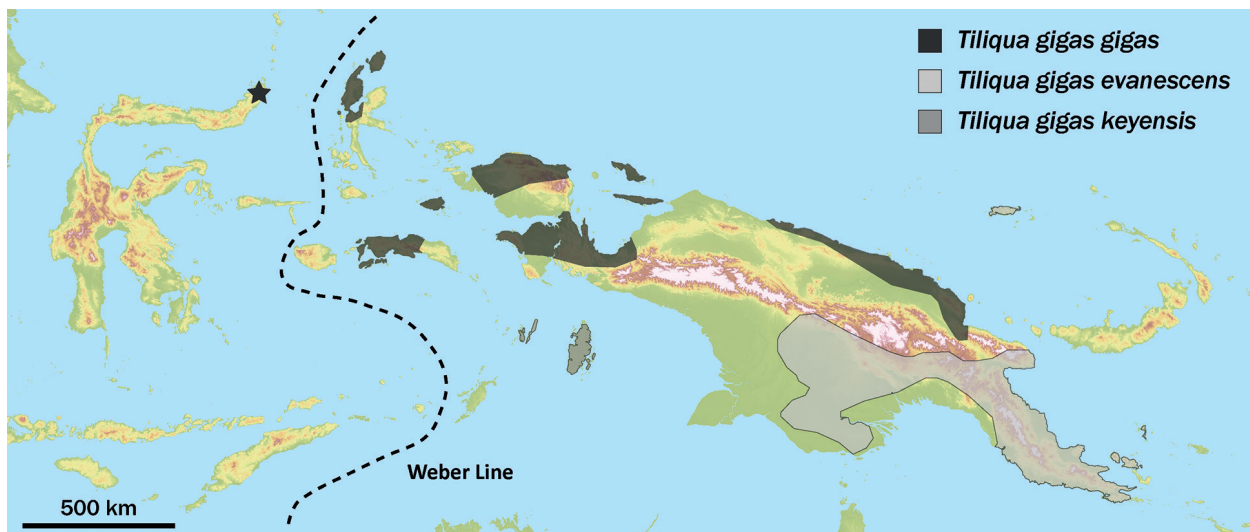
Five of the seven species of *Tiliqua* are distributed in Australia, where they occur in various habitats from arid to humid climate conditions and at different elevations (Shea 2000a). Only two species of bluetongue skinks are found outside of the Australian continent: *Tiliqua gigas* (Schneider, 1801) and *Tiliqua scincoides* (White, 1790) (Hitz & Hauschild 2000).

For a long time all non-Australian bluetongue skinks were assigned to *T. gigas*. However, based on studies by Shea (1992), populations from the Tanimbar and Baber Islands (eastern Lesser Sundas, Indonesia) were found

to be different from *T. gigas* and were described as *Tiliqua scincoides chimaerea* Shea, 2000, i.e., a subspecies of a taxon previously known only from Australia (Shea 2000b). In the southeastern region of Irian Jaya (Merauke) bluetongue skinks with a phenotype sharing characteristics of both *T. gigas* and *T. scincoides* were reported and appear as “Irian Jaya Bluetongue” in the pet trade (Hitz & Hauschild 2000; Noël 2009).

As shown on Figure 1, *T. gigas* has a widespread but fragmented distribution reaching from the eastern parts of New Guinea to eastern Indonesia and being spread over several islands (Shea 2000c).

Within this range three subspecies are distinguished showing differences in head scalation, body size and colouration. Populations found in the Aru and Kei archipelagos (southeastern Maluku Islands, Indonesia) are assigned to the endemic subspecies *Tiliqua gigas keyensis* Oudemans, 1894 (Shea 2000c; Karin et al. 2018). *Tiliqua g. evanescens* Shea, 2000 occurs in southern and eastern New Guinea and also on islands off the north-eastern and eastern coast of New Guinea (Admiralty, D’Entrecasteaux and Trobriand Islands) (Shea 2000c). This subspecies is geographically separated from the northern subspecies *T. g. gigas* by the central New Guinea Highlands and its mountain chains. This biogeographical pattern is also present in other New Guinean reptiles, see, for example, the recent separation of the southern *Crocodylus*



**Fig. 1.** Distribution map of *Tiliqua gigas* and its subspecies (modified from Shea, 2000c). *T. g. keyensis* is restricted to the Aru and Kei Islands. *T. g. evanescens* is geographically separated from the northern subspecies *T. g. gigas* by the central New Guinea Highlands and its mountain ranges. The black star denotes the new distribution record for Sulawesi, Indonesia.

*halli* Murray et al., 2019 from the northern populations of *C. novaeguineae* Schmidt, 1928.

*Tiliqua g. gigas* shows the westernmost distribution of all non-Australian bluetongue skinks with records from the Maluku Islands: Ambon, Halmahera (though not recorded recently by Setiadi & Hamidy [2006]), Misool, Morotai, Saparua, Seram and Ternate, but it can be also found in northern New Guinea and islands along its northern coast (Biak, Doom, Karkar, Seleu, Yapen) (Kopstein 1926; Mys 1988; Shea 1982, 1992, 2000c).

Some old mentions of bluetongue skinks from Java and Sumatra (Boulenger 1887; Duméril & Bibron 1839; Werner 1910) remained unconfirmed and were most likely caused by misidentification of collection data or providing the location of the port of shipment (Shea 2000a).



**Fig. 2.** Photography of the living specimen of *Tiliqua gigas gigas* found near Airmadidi in Northern Sulawesi, Indonesia.

Apart from those early and doubtful locality data, all reliable and confirmed records of *Tiliqua* are located east of the Weber line (Shea 2000a). Here we report the first record of *T. g. gigas* from Sulawesi, Indonesia (Fig. 2).

## MATERIAL AND METHODS

A large scincid lizard was discovered on 6 August 2019 near Airmadidi, Minahasa Utara, North Sulawesi, Indonesia (Fig. 1), where it was kept alive by locals. Airmadidi is a village located southeast and in about 15 kilometers distance to Manado, as well as in proximity to the highest volcano of Sulawesi, Mount Klabat, raising 1,995 meters a.s.l.. This specimen of *T. gigas* had been caught in some distance to the village located nearby in the undergrowth of secondary rainforest at around 215 meters a.s.l.. The habitat was characterized by a dense and flourishing ground vegetation, mainly consisting of creepers (Fig. 3). No streams or pools of water can be found directly near to the collection site. Since bluetongue skinks are partially under a high collection pressure for purposes of pet trade and cases of intense suchlike collection or extirpation had been reported from type or first record localities, for instance in the eublepharid gecko *Goniurosaurus luii* Grismer, Viets & Boyle, 1999 (Lindenmayer & Scheele 2017), we refrain from providing detailed location data, like geographical coordinates. Identification and record are based on the live specimen that was returned to be kept alive in the village after examination.





Fig. 3. Habitat in which *Tiliqua gigas* was found in Northern Sulawesi.

## RESULTS AND DISCUSSION

The specimen found can be easily identified as a member of the bluetongue skinks *Tiliqua* due to its characteristic tongue and body colouration, a large body size and compact body shape (Fig. 4). Identification as *T. gigas gigas* could be confirmed by the presence of black, unspotted or slightly spotted limbs, an extensive black-striped and deep orange spotted pattern on the ventral side and blackish edged head scales based on the diagnostic characters presented in Hauschild & Hitz (2000) and Shea (2000c). Moreover, the basic dorsal colouration of the specimen found is dark-reddish brown with ten narrow black transverse bands on the trunk and 14 broad black bands on the tail. It shows an unpatterned and bright orange-coloured throat. In addition, the snout-vent length is about 290 mm, the tail length is 228 mm (measured in the field by one of the authors).

Habitus and size of the specimen resembles specimens from the northern Maluku Islands (Ternate, Halmahera, Misool). Even though this subspecies shows a high degree of variability within in its geographical range (Shea 1992), individuals from the northern Maluku Islands normally have a snout-vent length of more than 270 mm and more darkish colouration (Shea 2000c). In addition,

a dark-striped belly pattern was recorded for most specimens from Halmahera (Shea 2000c).

Bluetongue skinks of the genus *Tiliqua* have never been recorded from Sulawesi before (Iskandar & Tjan 1996; Gillespie et al. 2005; Wanger et al. 2011; Koch 2012). This new record is situated about 250 km distance west of the distribution known so far and expands the distribution range of *T. gigas* from eastern New Guinea to Sulawesi within the Wallacea to about 3.000 km in total. Bluetongue skinks are normally well-known to local people as they are hunted for consumption (Wolter 1980; Shea 2000c). In New Guinea specimens of *Tiliqua* are also known under the local name 'ular panana' ('ular' = snake; see Kopstein 1926), indicating that they are often mistaken for a snake and thought to be venomous, due to their cylindrical, short-legged appearance and their conspicuous defensive display. However, bluetongue skinks were unknown to the local people at the location where our specimen was found. Therefore, an unintentional introduction by humans has to be taken into account and cannot be ruled out.

The geographically nearest distance to places, where *T. gigas* is recorded from, are in the northern Maluku Islands (Ternate and Halmahera). Nevertheless, these islands are still more than 250 km away from our northern





**Fig. 4.** Defensive posture of *Tiliqua gigas* from Northern Sulawesi, Indonesia. Note the blueish tongue stretched out towards potential predators.

Sulawesi site. This gap implies a crossing of the biogeographically important Weber Line running east of Sulawesi and separating the Oriental and Oceanian faunas (Weber 1902; Lohman et al. 2011; Holt et al. 2013; Vilhena & Antonelli 2015).

An unintentional introduction by humans via transport in freight and cargo is common in different small-sized skink species (Köhler et al. 1997; Chapple et al. 2015). That is, however, unlikely at least for adult individuals of such a large and conspicuous skink species like *Tiliqua gigas*. Of course this cannot be ruled out completely, since also lizards of larger size have been introduced to islands out of their distribution range, for example, *Agama agama* (Linnaeus, 1758) on islands of Macaronesia, in the Mediterranean Sea or in the Indian Ocean (Wagner et al., 2012). Finally, pet trade for herpetoculture is not widespread especially in rural areas of Sulawesi, since larger reptiles like monitor lizards are caught and kept for consumption. Consequently, escaped specimens from the pet trade are improbable in this case.

An undetected population of *T. gigas* in northern Sulawesi cannot be excluded, since also during intensive herpetological field surveys bluetongue skinks were not observed, even from islands they had been recorded from previously (Setiadi & Hamidy 2006; Karin et al. 2018). Especially skinks are known for their dispersal potential even to islands located away from the coast line of the main land (Adler et al. 1995). Not only small and

inconspicuous lizard species can remain undiscovered for a long time, as shown by recent discoveries of several species of monitor lizards from Indonesian and New Guinean Islands (Ziegler et al. 2007; Weijola et al. 2016; Böhme et al. 2019). Therefore, even such relatively large lizards, like *Tiliqua*, seem to show some potential for new discoveries and unanswered questions like the blue-tongue skinks from Irian Jaya (Hitz & Hauschild 2000; Noël 2009) or the subspecies of *T. gigas* described by Shea (2000b, c).

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