Tityus trinitatis (Trinidad Thick-tailed Scorpion)

Order: Scorpiones (Scorpions)
Class: Arachnida (Spiders, Scorpions and Mites)
Phylum: Arthropoda (Arthropods)

Fig. 1. Trinidad thick-tailed scorpion, *Tityus trinitatis.*

[https://www.researchgate.net/publication/250305225, downloaded 28 February 2016]

TRAITS. This species has approximately 18-19 pectinal teeth (the two sets of teeth on the underside of the scorpion resembling a comb) in both males and females. White spots are present on the mesosoma (segment of the body that forms the abdomen) and legs, with the legs appearing lighter in colour (yellow). The metasoma (the post-abdomen or posterior tail segment of the body) is longer and the chela (claw that functions as a sensory organ and is used for holding prey) more elongated in males. For both sexes moulting occurs in a vertical position (St John, 2015). This species illustrates sexual dimorphism with respect to their colour: males are bright brown with the distal end of their tail black (Fig 1); females are very dark brown, almost black, with the extremities of the tail black. These observable colour differences between sexes develop after maturation. The adult males are approximately 100 mm in length and adult females 65mm (Borges, 2013).

DISTRIBUTION. It is endemic to Trinidad and Tobago (mostly in the south and north-eastern area) and islands off the north-western peninsula (Prendini, 2001). It is reported to have been found in some areas of Venezuela, and recently, it has been confirmed that a population of this species has been established in Europe (St John, 2015). Of the nine species of scorpions identified in Trinidad, 90% of the individual scorpions found were members of this species (Auerbach, 2011).

HABITAT AND ACTIVITY. They can be described as semi-arboreal (inhabits trees for some but not all of its life) but are usually found near the ground. They inhabit forested areas among forest debris, coconut husks and logs, on sugar cane fields, banana, coconut and cocoa plantations (Borges, 2013). Most specimens were found on the bare ground, on leaf litter, the faces of rocks and on logs and branches close to the ground. They can be found living in sympatry with the other scorpions *Microtityus rickyi, A. cussinii* and *B. nitidus* at Mount St. Benedict, Trinidad, and with *B. laui, M. rickyi* and *A. cussinii* at Speyside, Tobago (Prendini, 2001). They can also exist in the human home environment.

FOOD AND FEEDING. Scorpions are predators of other arthropods. Not much has been documented with respect to the diet of *T. trinitatis*, but they have been observed preying on *Microtityus rickyii* and other members of their own species (cannibalism) (Prendini, 2001).

REPRODUCTION. Mating between males and females involves a dance referred to as the "promenade a deux" which readily takes place once mates meet. They can mate uninterrupted for 20-30 minutes. They are viviparous; litters of 5-15 scorpling (newborn young of scorpions) are produced (Fig. 2) and cared for by the mother. The gestation period in captivity is 4-5 months. 10-11 months are required to reach adulthood and both sexes become adult in the 6^{th} instar stage. Males usually require one less moult to reach sexual maturity (St John, 2015).

BEHAVIOUR. They are docile; when molested they remain still and have very little reaction, but they rely on their complex coloration to remain concealed in an attempt to avoid predation (St John, 2015).

APPLIED ECOLOGY. This species is recorded as being responsible for human deaths because of its lethal neurotoxic (affecting the nervous system) and cardiotoxic (affecting the cardiac or heart muscles) venom, and hence is of medical importance. It is documented as the first known scorpion species that is able to produce a pancreatotoxic venom (causing damage to the pancreas). Envenomation by this species is associated with the onset of intractable vomiting (repeated vomiting), difficulties in respiring, cardiac distress (of the heart) and epigastric distress (of the upper central region of the abdomen). There is also development of oedematous pancreatitis, haemorrhagic pancreatitis and pancreatic pseudocysts. The median lethal dose (LD50) of toxicity for the venom is 2mg venom per kg of body weight. Non-fatal envenomation can also result in clinical consequences for example the development of pancreatitis (Borges, 2013). The mortality rate generated by this species is high compared to other scorpions (Table 1). Approximately 175 stings are reported annually, of which 80% develop acute pancreatitis (Lans et al., 2001).

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Fig. 2. Female *Tityus trinitatis* with young.

[http://venomlist.com/forums/index.php?/topic/28907-michiels-rhopalurus-and-tityus-species/ downloaded 3 March 2016]

Table 1. Retrospective studies of scorpion envenomation by species (WRBU, 2016). Note the high mortality rate from *Tityus trinitatis* stings compared to other species of scorpion.

Period	Cases	Deaths	Mortality Rate	Species	Location
1929	**136**	**7**	**5.14%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1930	**135**	**6**	**4.44%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1931	**126**	**4**	**3.17%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1932	**112**	**3**	**2.68%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1933	**189**	**13**	**6.88%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1940-1949	**429**	**4**	**0.93%**	***Tityus trinitatis***	**Port-of-Spain, Trinidad**
1942-1958	20,164	386	1.91%	*Androctonus australis*	Algeria
1955-1959	27	1	3.70%	*Centruroides vittatus*	Texas, USA
1970	100	4	4.00%	*Centruroides limpidus*, *C. elegans*	Costa Sur, Jalisco, Mexico
1977-1982	100	1	1.00%	*Centruroides exilicauda*	Hermosillo, Sonora, Mexico
1983-1987	205	0	0.00%	*Androctonus crassicauda*, *Apisthobuthus pterygocercus*, *Leiurus quinquestriatus*	Riyadh, Saudi Arabia
1980-1981	438	0	0.00%	*Centruroides exilicauda*	Arizona, USA
1984	1039	0	0.00%	*Androctonus crassicauda*	Khuzestan, Iran
1984	1140	0	0.00%	*Mesobuthus eupeus*	Khuzestan, Iran
1984	329	5	1.52%	*Hemiscorpius lepturus*	Khuzestan, Iran