

First report of an arboreal scorpion (Bothriuridae: *Urophonius*) from the temperate forests of southern Chile

Primer reporte de un escorpión arbóreo (Bothriuridae: *Urophonius*) en los bosques templados del sur de Chile

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RESUMEN

Presentamos las primeras observaciones de un escorpión botriurido arborícola y el primer registro de un escorpión arbóreo de los bosques templados del sur de Chile. *Urophonius tumbensis* Cekalovic 1981 fue observado y capturado mediante luz ultravioleta (UV) en troncos de árboles *Cryptocarya alba* (Molina) Looser a una altura de hasta seis metros en la Reserva Botánica de Hualpén (Región del Bío Bío, Chile).

ABSTRACT

We present the first observations of an arboreal bothriurid scorpion and the first report of an arboreal scorpion from the temperate forests of southern Chile. *Urophonius tumbensis* Cekalovic 1981 was observed and captured with ultraviolet (UV) light at a height of up to 6 meters on trunks of *Cryptocarya alba* (Molina) Looser trees in the Hualpén Botanical Reserve (Bío Bío Region, Chile).

The scorpion family Bothriuridae Simon 1880 has a Gondwana distribution pattern. Most bothriurid species occur in southern and central South America, from Ecuador to southern Patagonia, but there are also two genera in southern Africa and one in Australia (Prendini 2003). The distribution of Bothriuridae in South America is concentrated in arid areas, especially deserts, steppes and savannas (Prendini 2003, Agosto et al. 2006). In the tropical and subtropical forests north of 34°S, bothriurid scorpions are mostly replaced by scorpions of the families Buthidae C.L. Koch 1837 and Chactidae Pocock 1893. The few bothriurid species occurring in these forested habitats are obligate ground dwellers; the arboreal habitats are occupied by chactids and buthids (González-Sponga 1978). Maury (1982) suggested that the absence of bothriurid species in the seasonally flooded tropical rainforests of Amazonia is related to their dependence on the ground for excavating burrows and gestation chambers.

All species of Bothriuridae, for which data have previously

been reported, are ground-dwelling scorpions. Most bothriurid species are fossorial, constructing burrows in the substratum, varying in depth from 30 cm to more than 1 m below the surface (Maury 1968, 1969, San Martín & Gambardella 1974, Ojanguren-Affilastro 2005). Many other bothriurids are opportunistic and will shelter under rocks or fallen trees, if available (lapidicolous *sensu* Prendini 2001).

Several species of different bothriurid genera have been observed at night, climbing on shrubs, bamboo and other low vegetation, usually no more than 30 to 50 cm above the ground. Bothriurids climb on low vegetation only to forage, and when disturbed, they drop immediately to the ground as an escape response. No bothriurid species was previously reported living or foraging in trees (arboreal or corticolous *sensu* Prendini 2001). Only *Bothriurus pampa* Ojanguren-Affilastro 2002 (cited as *Bothriurus prospicuus* Mello-Leitão 1934 by Maury [1973]) and *Urophonius iheringi* Pocock 1893 were mentioned to shelter under the bark of indigenous trees and introduced *Eucalyptus* trees (Maury

1968, 1973, Ojanguren-Affilastró 2002). However, we consider this behaviour to be opportunistic, because much of the area where these species occur is a treeless steppe. In the only native forests of the area, the dry “caldén” (*Prosopis caldenia* Burk) forests, where *B. pampa* also occurs, this species was not observed on trees at night with ultraviolet (UV) light detection, nor under tree bark during the day. We presume this is because the bark of *P. caldenia* is not as loose as that of *Eucalyptus*, making it unsuitable as a shelter.

The scorpion fauna of the humid temperate forests of southern Chile differs from that of the humid forests of Amazonia, in that only family Bothriuridae is present. Bothriurids are highly diversified in this area, which contains several endemic genera, e.g. *Tehuanka* Cekalovic 1973, *Centromachetes* Lönnberg 1897 and *Phoniocercus* Pocock 1893, and endemic species of more widespread genera, e.g. *Bothriurus* Peters 1861, *Brachistosternus* Pocock 1893 and *Urophonius* Pocock 1893 (Cekalovic 1973, 1974, 1981, Lourenço 2001, Mattoni 2002, Ojanguren-Affilastró et al. 2007). Despite the abundance of endemic bothriurid genera

and species in the temperate forests of southern Chile, our knowledge of their biology remains fragmentary. Most species are known from only a few specimens and, in most cases, little or nothing is known of their distribution, ecology and phenology (Cekalovic 1966, 1968, 1976). No arboreal scorpions were previously reported from this area.

We recently conducted extensive fieldwork in southern Chile to survey its scorpion fauna. During two consecutive austral winters, August 2009 and July 2010, we visited the Hualpén Botanical Reserve (36°47'51.2"S, 73°09'29.3"W) on the Tumbes Peninsula near Concepción in the Bio Bío Region of southern Chile (Fig. 1), searching for a little known bothriurid, *Urophonius tumbensis* Cekalovic 1981. This species is closely related to the *brachycentrus* group of *Urophonius*, all species of which are active on the surface in winter (A.A. Ojanguren-Affilastró, J. Pizarro-Araya & L. Prendini, unpublished data). The Hualpén Botanical Reserve belongs to the “Bosque Caducifolio” botanical region, and its environment corresponds to a temperate to cold deciduous humid forest (Gajardo 1993).

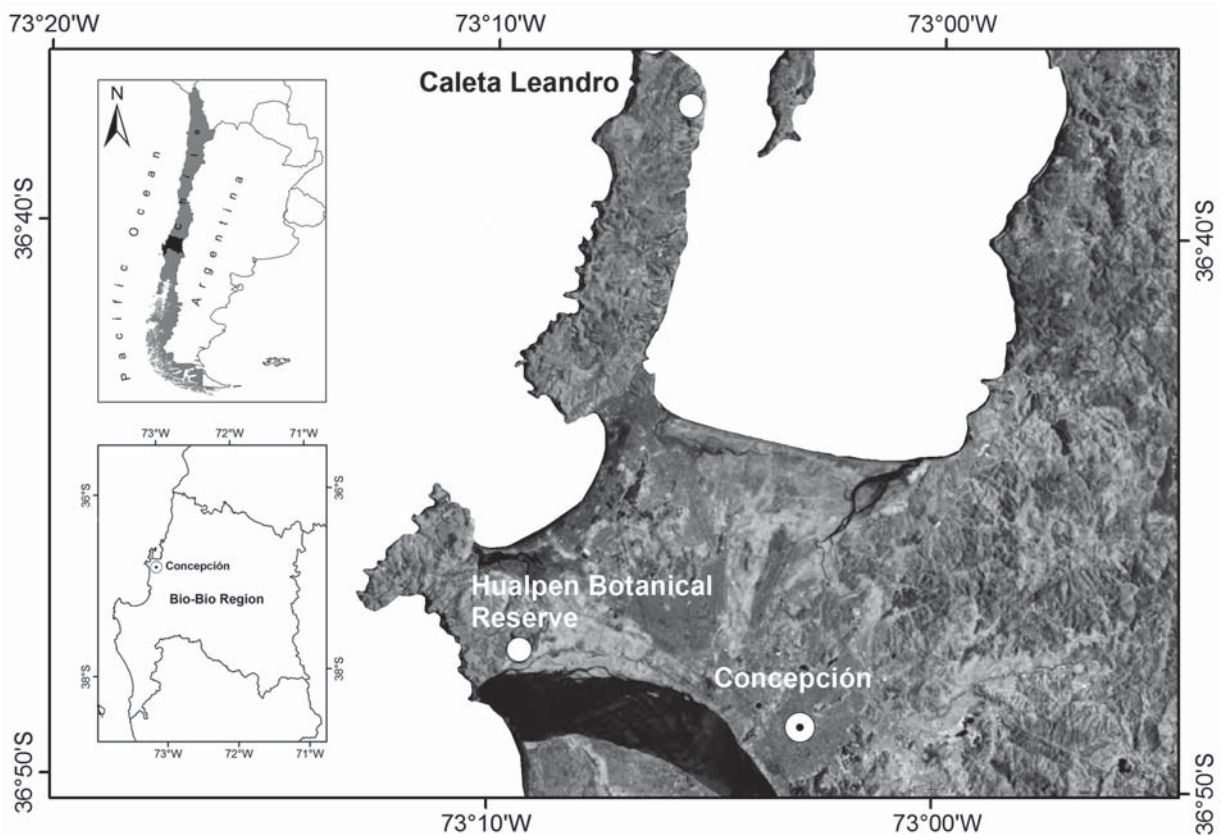


FIGURE 1. Map showing the known distribution of *Urophonius tumbensis* Cekalovic 1981 in southern Chile (white circles).

FIGURA 1. Mapa que muestra la distribución conocida de *Urophonius tumbensis* Cekalovic 1981 en el sur de Chile (círculos blancos).

During these expeditions, we confirmed that *U. tumbensis* has a winter activity period, and observed and collected several specimens active on trees at night, using UV light detection (Fig. 2a). All were collected from “peumo” trees, *Cryptocarya alba* (Molina) Looser (Fig. 2b), walking on the trunk and major branches at heights ranging from 2 to 6 m above ground. We cannot dismiss the possibility that specimens were present at even greater heights, because we could not see these scorpions (adult length ca. 3 cm) fluorescing above 5 to 6 m. Several specimens of *U. tumbensis* were observed feeding on spiders, but they were too damaged to identify the species. One specimen was attempting to capture a spider (probably a species of *Ariadna* sp.) in a small crevice covered by silk, by introducing its chelae and telson inside the spider retreat. Some of the scorpions observed with UV light, were partially hidden under loose bark or small epiphytes and the mud accumulated below them. When we attempted to capture the scorpions, they escaped by retreating into crevices in the bark or under the epiphytes, rather than dropping immediately to the ground as typically observed with ground-dwelling *Urophonius* species (Ojanguren-Affilastro et al. 2010). We collected several adult males and females of *U. tumbensis*, easily recognized by their sexual secondary characters typical of the genus (Ojanguren-Affilastro 2005); however no specimens were observed in courtship. Some juveniles were collected on the ground, but they represent only 10% of all specimens collected. It is not uncommon to

occasionally find specimens of otherwise obligate arboreal buthid, chactid and liochelid scorpion species on the ground, elsewhere in the world (L. Prendini, unpublished data).

During daytime, we searched the peumo trees from which *U. tumbensis* were collected at night, but failed to find any specimens under the bark or epiphytes, or under stones, logs, or other possible retreats at ground level, in their immediate vicinity. As we were unable to find any specimens in their diurnal retreats, we cannot assume that *U. tumbensis* is not fossorial or lapidicolous like other species of the genus. We consider that unlikely, however, as the observation of some *U. tumbensis* retreating into bark crevices at night suggests that this microhabitat forms the diurnal retreat of some individuals.

The ground in the Hualpén Botanical Reserve is densely covered by low vegetation, but the broad trunks of peumo, lightly covered with moss and epiphytes, may offer a more suitable substrate on which to forage for prey. Other species of *Urophonius* have also been collected in forests: *Urophonius transandinus* Acosta 1998 and *U. tregualemuensis* Cekalovic 1981 in central Chile (Acosta 1998, Ojanguren-Affilastro et al. 2010, Ojanguren-Affilastro, Pizarro-Araya & Prendini, unpublished data), and *U. brachycentrus* (Thorell 1876) in central Argentina (Ojanguren-Affilastro 2005). However, the ground in these forests is less densely covered with vegetation, making it more suitable for ground-dwelling scorpions.



FIGURE 2. a). *Urophonius tumbensis* Cekalovic 1981 sitting on “peumo” tree bark, taken at night under ultraviolet light. b) “Peumo” tree, *Cryptocarya alba* (Molina) Looser, in the Hualpén Botanical Reserve (Bío Bío Region, Chile).

FIGURA 2. a) Fotografía tomada con luz ultravioleta, de un ejemplar de *Urophonius tumbensis* Cekalovic 1981 sobre la corteza de un peumo. b) Árbol de peumo, *Cryptocarya alba* (Molina) Looser, en la Reserva Botánica Hualpén (Región del Bío Bío, Chile).

In the same area where we observed and collected *U. tumbensis*, we collected several specimens of two other bothriurid species in the genera *Centromachetes* and *Phoniocercus* under rocks and logs. We also collected some *Phoniocercus* specimens under the bark of a peumo and a willow (*Salix* sp.), about 2 m above the ground, one feeding on an *Ariadna araucana* Grismado 2008 spider. In addition, we collected some specimens of *Centromachetes* and *Phoniocercus* on the ground surface at night, with UV light detection. However, *Centromachetes* and *Phoniocercus* species do not appear to reach the peak of their surface activity in winter, so we prefer not to draw inferences about phenology based on these data alone.

This is the first time a bothriurid scorpion was observed using the microhabitats provided by trees. Prior to the present report, arboreal scorpion species were known only in the families Buthidae, Chactidae and Liochelidae Fet & Bechly 2001 (González-Sponga 1978, Prendini 2001, 2005). Future expeditions to the study area should identify the diurnal and summer retreats of *U. tumbensis*, and determine whether other scorpion species occupy the arboreal habitats during summer, when most *Urophonius* species are not active.

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