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Can a Bothriurid scorpion be present in the Himalayas of India ?

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(With 8 figures)

Abstract

A Bothriurid scorpion is reported for the first time from Himalayas of India. It represents a new species which belongs to the genus *Cercophonius* previously known only from Australia and Tasmania. Attempts are made to explain the disrupted pattern of distribution of the genus.

Introduction

Scorpions of the family Bothriuridae are, as far as is known up till now, distributed only in South America, Southern Australia and Tasmania. Of the three sub-families: Brachistosterninae, Vachoninae and Bothriurinae, the first two are represented only in South America, whereas the last has eight genera in South America and one genus endemic to Australia and Tasmania. This is *Cercophonius* Peters, 1861 (Maury 1973, Sissom 1990; Fig. 1). One genus of scorpions, *Lisposoma* Lawrence (Fig. 2), originally described as an element of the family Scorpionidae, was later regarded by Francke (1982) as an African representative of the family Bothriuridae. This taxonomic position, however, cannot be accepted as definitive, since *Lisposoma* presents characteristics of both Scorpionidae and of Bothriuridae. Some authors hesitate to allocate it to one family or the other (Sissom, 1990). In fact, this genus should probably be assigned to a family, of its own. This has already been decided at the sub-familial by Lawrence in 1928 who erected the Lisposominae to accomodate it. The presence of the Bothriuridae in South America, Australia and Tasmania has induced some authors to consider this group as having a Palaeantarctic origin (Maury 1975, Acosta 1990).

During a field mission in the Himalayas of India in the late 1950s, Dr. F. Schmid of the Entomology Research Institute of Ottawa, Canada, collected some scorpions. These were forwarded to Prof. M. Vachon by European colleagues only in the 1970s. After this, Vachon corresponded with Schmid in order to clarify the conditions under which the collection has been made, since Schmid remained in India for a period of 4 years during which he undertook six field expeditions (Vachon, *in litt.*). This correspondence supports the conclusion that the scorpion material could only have come from the Himalayas of India. After initial investigations Vachon decided that the speci-

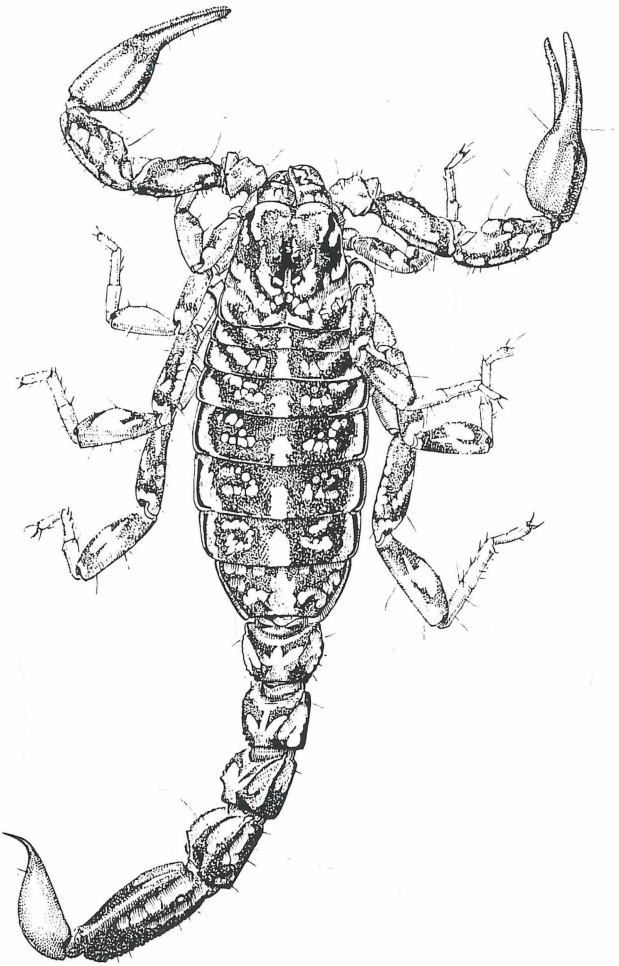


Fig. 1. *Cercophonius squama* (Gervais, 1844), type species of the genus (female from South Australia, dorsal view).

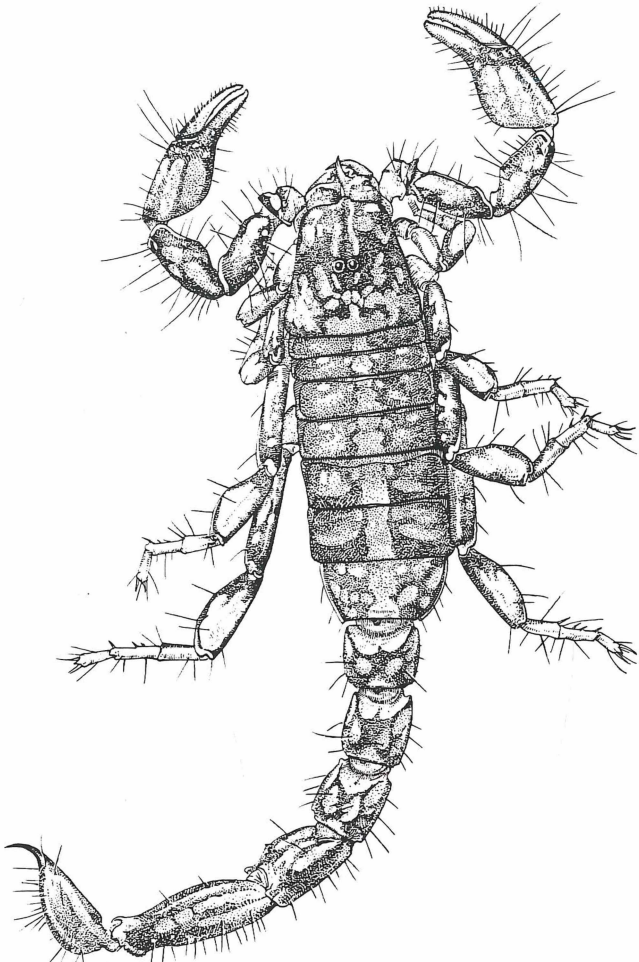
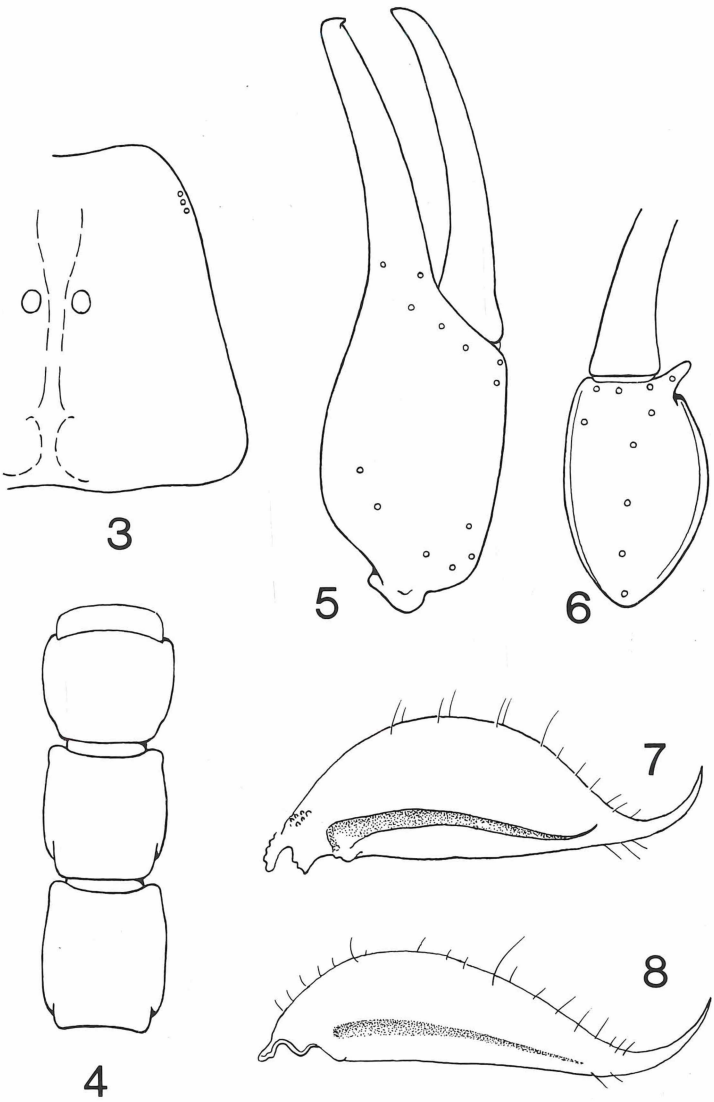


Fig. 2. *Lisposoma elegans* Lawrence, 1928, a possible African element of the family Bothriuridae (male from Namibia, dorsal view).



Figs. 3-8. *Cercophonius himalayensis* sp. n., male holotype (Figs 3-7): 3 - carapace; 4 - segments I to III of the metasoma, ventral surface; 5 and 6 - chelae, external and ventral aspect; 7 - telson. Fig. 8 - telson of *Cercophonius squama* (Gervais, 1844), male.

men belonged to the Family Bothriuridae (Vachon, *in litt.*), but he turned to other matters shortly after the correspondence with Schmid and nothing else was done about it.

I was recently able to locate the specimen studied by Vachon and was surprised to confirm not only that it belonged to the Bothriurid, but also that it corresponded with the genus *Cercophonius,* previously only known from Australia and Tasmania as already mentioned. Moreover, detailed study of the specimen revealed that it was an undescribed species. This conclusion was based mainly on the characters proposed in the revison of the genus by Acosta (1990). I therefore decided to describe this new species here. It is, however, by no means difficult to explain its occurrence in the Himalayas of India.

Description

Cercophonius himalayensis sp. n.
(Figs 3-7)

HOLOTYPE (male): India, Himalaya, Ukal, Pauri Garhwal, U.P., 30° N - 79° 5' E, about 45 km from the town of Pauri (2250 m alt.), 16-V-1958. Coll. F. Schmid. Deposited in the Zoologisches Museum of the University of Hamburg; Reg. No. ZMH A40/96.

ETYMOLOGY: The specific name reflects the type locality, in the Himalayas.

DESCRIPTION (based on the holotype):

C o l o r a t i o n reddish brown. Prosoma: carapace reddish with several brown spots; eyes surrounded by black pigment. Mesosoma: tergites brownish with confluent yellowish spots and one median longitudinal yellow strip. Metasoma: segments I to IV reddish; segment V and vesicle yellowish; light brown spots present; aculeous reddish. Venter and sternites yellowish with diffuse brown spots; pectines and genital operculum yellowish. Chelicerae yellowish with some variegated brown spots; fingers moderately reddish. Pedipalps reddish with several diffuse spots. Legs yellowish with diffuse fuscous spots.

M o r p h o l o g y. Carapace (Fig. 3) not granular, smooth; anterior margin with feeble median concavity. Absence of keels. All furrows very feeble. Median ocular tubercle distinctly anterior to the center of the carapace. Three pairs of very small lateral eyes. Sternum slitlike. Mesosoma: tergites smooth. Tergite VII with four keels, very feeble. Venter: genital operculum divided longitudinally with subpentagonal shape. Pectines: pectinal tooth count 11-11. Sternites smooth, with moderate elongated stigmata; VII with two very feeble keels. Metasoma (Fig. 4): segments I to IV with dorsolateral and lateral supramedian keels feebly marked. Ventral keels absent in segments I to IV, and with a Y shape in segment five. Intercarinal spaces smooth. Telson (Fig. 7) almost smooth with only a few small granules on the ventral surface; aculeous short and not much curved. Cheliceral dentition characteristic of the family Bothriuridae (Vachon 1963). Pedipalps smooth; femur pentacarinate with very feeble keels; tibia and chelae smooth; movable fingers with a linear series of granules, only slightly divided into rows. A strong tubercle present on the inner face of the chelae, at the base of the movable finger. This character is a secondary sexual character and is present only in males. Trichobothriotaxy of type C. Neobothriotaxy. Chelae (Figs 5, 6)

with 27 trichobothries, tibia with 19 and femur with 3 (Vachon 1973). Legs: tarsus of leg IV with two rows of 4 spines on the ventral surface; legs III and IV without spurs.

Measurements (in mm): Carapace: length 2.8, anterior width 2.1, posterior width 3.3. Metasomal segment I: length 1.2, width 1.9. Metasomal segment V: length 3.9, width 1.7, depth 1.4. Vesicle: width 1.9, depth 1.4. Pedipalp: femur length 2.5, width 0.8; tibia length 3.2, width 1.0; chelae length 5.3, width 1.7, depth 1.7; movable finger: length 3.1.

Remarks: This species can be readly distinguished from the six others distributed in Australia and Tasmania by the presence of a smaller number (two) of pectinial teeth. This number is matched by *Cercophonius queenslandae* Acosta, but only females are known of this species, and it is well known that males always possess more pectinal teeth, than females do.

Notes on the habitat and microhabitat in which *Cercophonius himalayensis sp.n.* was collected

Most the information concerning the type locality of the new species was obtained from Dr. Uppeandra Dhar of the G. B. Pant Institute of Himalayan Environment & Development at Kosi-Katarmal, Almora, India, who send me a considerable amount of information about the area.

The exact location is Ukal (and not Ukhal as on the original label), District Pauri Garhwal (U.P.). Located approximately at 30° N - 79° 5' E., Ukal is 45 km from Pauri town. Its elevation ranges (Nayar west catchment) from 1000-2250 m. According to the collector, the specimen was obtained below 2000 m. Lower elevations (below 1500 m) are mainly occupied by the agricultural land, while *Pinus roxburghii* forests are the climax dominant of the region. *Sapium sabiferum* and *Toona ciliata* are common tree associates. At higher elevations (above 1500 m), forests of *Quercus leucotrichophora* in association with *Myrica esculenta*, and *Carpinus viminea*, and of *Pinus roxburghii* in association with *Quercus leucotrichophora* and *Myrica esculenta,* are common. Snow falls during January and February in the higher reaches. During the rains (July and August), high humidity prevails.

According to people living in the area, the preferred habitat of « scorpions » is *Pinus roxburghii* forest (under boulders) and they rarely occur in *Quercus* forests. Also according to the local inhabitants, the scorpions observed are blackish brown and their sting remains painful for 3-4 days. It therefore seems that the scorpion species observed by local people must be a different species to that described here.

The pattern of distribution of the genus *Cercophonius*

The first reaction of a taxonomist to the presence of a Bothriurid scorpion in the Himalayas, would be to explain it as the result of mislabelling. In his correspondence with Vachon, Schmid was precise about the details of his expeditions in India during the four years, beginning in 1958. Moreover, he affirmed that scorpions were collected only during the first expedition. Moreover, he did not collect in Australia or Tasmania.

The possibility of an accidental introduction appears too remote to be acceptable: first, because the site at which the scorpion was collected is located in a region of high mountains of difficult access, and second because most scorpions species (Bothriuridae in particular), are equilibrium species which cannot live outside their specific habitat (Lourenço 1992).

The presence of a Bothriurid scorpion in the Himalayas is therefore contrary to the Palaeantarctic pattern accepted until present by most authors (see Maury 1975). However, this may be yet another example of « apparent anomalies in the distribution of some groups of families and genera », as they were called by Pocock (1894) and subsequently explained in detail by Lourenço (1996).

A possible explanation of this disruption in the distribution of the genus *Cercophonius* could be ecological. Almost all Bothriurid scorpions are known to shelter in dry or arid environments, in most cases in temperate or sub-tropical climates *. Moreover they are well adapted to high mountain habitats (see Lourenço, in press; Maury 1969, 1982). It is possible to suggest that immediately prior to the tropical and equatorial climatic conditions observed today in Southern India and throughout the Indo-Malayan region, these lands experienced marked climatical changes. Such events took place during the Cenozoic over a period of 60 M.Y., and have influenced the present biogeographical patterns of scorpions. Climatic-vegetational fluctuations since the late Cenozoic have had a major impact during Pleistocene times. Therefore, when periods of less humid and more arid conditions occurred in the Indo-Malayan region, Bothriurid scorpions would probably have had a much wider range of distribution than they have today. This range was reduced by the regression of populations that were not capable of adapting subsequentely to moist environmental conditions. Other more « plastic » groups of scorpions such as those belonging to the genus *Lychas* Koch, are still present in the Himalayas, throughout the Indo-Malayan region, and in Australia (Sissom 1990).

It is not yet possible, with any certainty, to explain the precise causes of the observed pattern of distribution of the genus *Cercophonius*. However, it must be remembered that the information now available is probably only a fragment of what may well be found in the future. Our knowledge of many faunas is still incomplete and many other surprises are to be expected.

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Zusammenfassung

Eine neue Skorpion-Art, *Cercophonius himalayensis* sp. n. (Bothriuridae) wird aus dem Himalaja (Indien: Disctrict Pauri Garhwal, 2250 m a.s.l.) beschrieben. Die Gattung *Cercophonius* war bis jetzt nur aus Australien und Tasmanien bekannt und die Familie Bothriuridae nur aus der südlichen Hemisphäre. Das Verbreitungsmuster und der Fund werden diskutiert.

* One exception is the species of the genus *Thestylus* Simon which is endemic to the tropical rainforests of the Southern Brazilian coast.

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