G. NEWLANDS

A re-examination of some Southern African Scorpion species

(Arachnida: Scorpionidea)

Issued 15 June 1970
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A RE-EXAMINATION OF SOME SOUTHERN AFRICAN SCORPION SPECIES
(ARACHNIDA: SCORPIONIDEA)

By G. NEWLANDS

Transvaal Museum, Pretoria

(With four Text figures)

INTRODUCTION

In 1900 Dr A. Penther described six new scorpion species. Subsequently, only one of these was regarded as a valid species while three were looked upon as uncertain and two as being synonymous with an existing species. In order to re-assess the validity of these species, the type specimens were borrowed from the Naturhistorisches Museum in Vienna. The curator, Dr J. Gruber informed the author that the specimens were not included in the Museum’s type collection, but, it may be assumed that these specimens are Penther’s original types for each bottle bears a label in Penther’s handwriting. In each case the species name is followed by the letters “n. sp.”, denoting a new species. The material was compared carefully with Penther’s descriptions and measurements and accordingly, it may be assumed that the material examined is the original type series.

DISCUSSION OF SPECIES

Opisthophthalmus betschuanicus Penther.


This species was described from a single subadult female specimen found under a rock in British Bechuanaland (Botswana) in July 1893. In the inadequate description, Penther stated that this species was near to O. wahlbergi (Thorell). Hewitt (1918: 130) regarded O. betschuanicus as a synonym of O. adustus Kraepelin and later (1935: 472) concluded that it was probably a subspecific form of O. glabripennis Peters. When Lawrence’s key was published (1955: 236) the taxonomic position of betschuanicus was unresolved and it was listed as a valid species in the wahlbergi-adustus-group
of the genus. Later, the same author (1967: 16) regarded it as a subspecific form of *wahlbergi*. A re-examination of the type yields the following information:

*Carapace*: the median eyes far back, their distance from the anterior margin being 0.65 of the carapace length; median groove not bifurcated but deeply excavated anteriorly; granulation very fine and sparse, being confined to the lateral regions; well rounded anterior lobes smooth and polished.

*Tergites*: tergites I–VI smooth and polished anteriorly but finely and sparsely granulated posteriorly.

*Sternites*: sternites I–IV smooth, V granular in the posterior half.

*Cauda*: inferior median keels of segment I defined only at the lateral margins, the area in between which is coarsely granular; dorso-lateral keels of segments I–V sharply defined.

*Legs*: tarsus IV with four internal and no external spines inferiorly; superior process as long as terminal lateral lobes.

*Chela*: dorsal surface convex and finely granular; finger keel well defined but secondary crest obsolete.


*Colouration*: table I.

Penther's placing of *O. betschuanicus* near to *O. wahlbergi* was clearly erroneous, the median eyes are situated far back on the carapace and the ventral surfaces of all the caudal segments are distinctly keeled. Since the median carapace groove is not bifurcated anteriorly and the carapace is finely granular, *betschuanicus* should have been placed in the *glabrifrons-latimanus*-group of the genus.

Penther's type was compared with specimens of the same size of *glabrifrons* from Pretoria and no significant morphological differences could be traced. Rhodesian specimens differ in having one external inferior spine and tarsi III and IV. The granulation of the chela appears to be slightly coarser in Rhodesian specimens of the same size. Other diagnostic characters which distinguish *glabrifrons* from other species are all characteristic of *betschuanicus* and accordingly, the latter may be regarded as being synonymous with *glabrifrons* Peters. The most significant of these characters are the position of the median eyes on the carapace; the absence of an anterior bifurcation of the carapace median groove; Sternites I–IV smooth, V granular in the posterior half; inferior median keels of caudal segment I defined only at the lateral margins, the area in between which is coarsely granular and the pectinal teeth count being 13–13.

*Hadogenes betschuanicus* Penther.


The validity of this species was doubted by Lawrence (1955: 254). An unknown worker re-labelled the type specimen *H. taeniurus* (Thorell, 1877). Based on slender geographical evidence Hewitt (1935: 474) considered that *H. troglodytes dentatus* Hewitt could be same as *H. betschuanicus*.
The type specimen, a male nymph (probably 4th or 5th instar) from Bechuanaland (Botswana), has the following characters:

Carapace: anterior margin shallowly excavated.

Tergite VII: wider than long.

Sternite V: slightly excavated in posterior lateral regions but without distinct oval depressions characteristic of *H. taeniurus* (Thorell).

Pedipalps: chela without trace of lobe at base of movable finger.

Caudal segments: segment I deeper than wide posteriorly; segment II without superior terminal teeth; segment III, superior keels terminate posteriorly with weak tooth on each side; segment IV without superior terminal teeth posteriorly; segment V with ventral denticles pointing posteriorly. Vesicle, without lateral granulation.

With very few exceptions, scorpions of the genus *Hadogenes* are very difficult, if not impossible to identify by virtue of their external morphology unless fully grown. Penther stated that *H. betschanicus* was nearest to *H. troglodytes* (Peters) but differed from the latter in having a greater number of pectinal teeth, smooth vesicle and in the nature of the ventral spinulation of caudal segment V. Without exception, these features are characteristic of nymphal *troglodytes*. The pectinal teeth counts for *troglodytes* vary between 22 and 28 in males and 18 to 22 in females, in *betschuanicus* between 25 and 28.

The total length of Penther's type is 79 mm, while a mature male from the Soutpansberg District (T.M. 1846) measures 212 mm. Penther's specimen was compared with material from the Soutpansberg District and was found to agree very well indeed with males of *troglodytes* of the same size. Accordingly, *H. betschuanicus* Penther should be regarded as synonymous with *H. troglodytes* (Peters), a species with a wide distribution (fig. 3).

*Hadogenes austro-africanus* Penther.


This species was founded upon two very young nymphs, probably second or third instar, length of largest 39 mm. The material was collected in Matabeleland (Rhodesia), 1896. In an endeavour to identify these specimens, they were compared with identified material of similar size. Species of the genus *Hadogenes* recorded from Matabeleland are as follows: *H. troglodytes troglodytes* (Peters), *H. troglodytes matoppoanus* Hewitt, *H. granulatus* Purcell and *H. gracilis rhodestanus* Hewitt. The latter species is synonymous with *H. troglodytes troglodytes* (Peters), see p. 194.

Young specimens of *troglodytes matoppoanus* examined had dorsolateral posterior teeth only on caudal segment III, while Penther's types have these teeth on segments II, III and IV. Morphologically, *granulatus* and *troglodytes* are very similar and one of the only constant positive differences is the form of the first caudal segment. In *granulatus* the width of this segment is greater than its depth and in *troglodytes* the posterior depth is greater than the width. In Penther's types, the width is approximately equal to the height in both cases. This appears to be characteristic of both
granulatus and troglodytes nymphs of the second and possibly third instar. The pectinal teeth counts of Penther's types are also typical of both granulatus and troglodytes (♂: 22–23, ♀: 17–18).

Other characters such as the granule counts of the pedipalp keels, caudal keels, etc. proved to vary considerably from one individual to the other and no positive conclusion could be reached. We may thus conclude that either austro-africanus is a synonym of troglodytes, or granulatus is a synonym of austro-africanus.

_Uroplectes jutrzenkai_ Penther.


The validity of this species was doubted by Kraepelin (1913: 177) who considered it to be _U. vittatus_ (Thorell) and by Hewitt (1918: 122) who thought it could be synonymous with _U. chubbi_ Hirst.

Four adult specimens, two males and two females, form the type series of this species which has the following characters:

_Carapace:_ a large blackish triangular marking extends from the anterior margin backwards and terminates with its apex behind the median eyes.

_Tergites:_ without posterior lateral keels but with short posterior median keels. A light yellow band, bordered by a blackish band on each side, runs down the length of the abdomen.

_Caudal segments:_ segments are long and slender, and without ventral keels, segments I and II with weak dorso-lateral keels, III and IV with barely discernable dorso-lateral keels, and V without, but lightly punctate. Segment V is more darkly coloured than the preceding segments. The vesicle has a small tuberculiform tooth beneath the aculeus.

_Pedipalps:_ Penther claimed that _jutrzenkai_ possesses less diagonal rows of denticles on the movable finger of the chela than does _vittatus_. That this observation is of doubtful diagnostic value, is evident from a study of Table III. Penther also states that the large granules on the underside of the chela are unique to this species. All adult male specimens of _vittatus_ in the Transvaal Museum collection have these granules on the ventral side. These granules appear to be characteristic of _vittatus_.

In his checklist, Penther records _U. vittatus_ from Signal Hill, Cape Town. This is most improbable as _vittatus_ is unknown from the Cape. The Signal Hill specimen is almost certainly _U. lineatus_ Koch. Assuming this to be true, it is understandable that Penther could have described specimens typical of _vittatus_ as a new species, namely _U. jutrzenkai_.

The Transvaal Museum has two _U. vittatus_ specimens (TM. 1721/2) from the Waterberg (Transvaal) donated by R. v. Jutresencka. Further data are not entered in the catalogue and it is possible that the donor was the same person who supplied Penther's types and that his name was misspelt either by Penther or a Transvaal Museum official. However, these specimens resemble Penther's types to a very high degree.
Parabuthus obscurus Penther.


The description of P. obscurus was based on three nymphs of approximately the third instar, collected in Bechuanaland (Botswana), 1893. Penther does not appear to have been aware of the fact that these specimens were very young nymphs for he states that obscurus is nearest to P. capensis Hemprich and Ehrenburg, from which it is distinguished by virtue of its smaller size and darker colour. P. capensis is certainly one of the smaller species of the genus Parabuthus and the largest specimens in the Transvaal Museum measure 87 mm (♂, TM. 1178) and 85 mm (♀, TM. 8557), in total length. The largest P. transvaalicus Purcell (♀, TM. 2410) has a total length of 125 mm. The largest obscurus specimen measures 41.5 mm. Kraepelin (1914: 112) considered this latter species as a probable synonym of P. transvaalicus Purcell. The same view is held by Hewitt (1918: 107) and Lawrence (1955: 228).

Fig. 1. Lateral view of the vesicle of Parabuthus obscurus.

The ventral denticles of the vesicle (fig. 1) are not very pronounced in Penther's specimens and his line diagram showing a lateral view and cross section of the vesicle is very misleading and inaccurate.

P. obscurus is identical to transvaalicus in all respects. Caudal segment IV has ten granular keels, the stridulatory granules of caudal segment II extend to the posterior margin of the segment, superior crest of caudal segment V distinct throughout, the accessory crest is composed of sharply pointed tubercles, caudal segment IV wider than I.

Parabuthus pachysoba Penther.


The type specimen, a mature male, was collected in Bechuanaland (Botswana) in July, 1893. This species is clearly synonymous with P. transvaalicus Purcell, the description of which was published in 1899. It is interesting to note that Penther described the nymphs of this species under the name P. obscurus. The only significant difference other than size between the obscurus and pachysoba type specimens is the form of the
chela in the adult male of the latter. In all the nymphal stages, the chela of both male and female Parabuthus scorpions are the same, viz. very slender. During the final ecdysis, the male chela become stout and bulbous, while the chela of the female remain unchanged. Kraepelin (1914: 112), Hewitt (1918: 107) and Lawrence (1955: 228) considered that P. pachysoba is probably a synonym for P. transvaalicus Purcell.

Like P. obscurus, pachysoba falls well within the range of individual variation of transvaalicus. The granulation of the cauda appeared slightly finer than several northern Transvaal specimens examined. The colour is somewhat faded and is at present brownish (Table I), but this is in keeping with its age. Penther correctly relates this species to P. villosus (Peters).

**Hadogenes gracilis rhodesianus** Hewitt.


Dr J. Hewitt based this subspecies on two adult specimens (♂, TM. 5618; ♀, TM. 5619) from a locality given as 20 miles (32 km) north of the Limpopo River, on the road between Messina and Fort Victoria. Evidently Hewitt related these scorpions to *H. gracilis gracilis* Hewitt because of the slightly excavated carapace anterior margin and the length of the male metasoma in relation to the carapace.

Kraepelin (1899: 144) employed the degree of curvature of the carapace anterior margin as one of the characters to separate *H. trichiurus* (Gervais) from *H. troglodytes* (Peters). In *trichiurus* the anterior margin is deeply incised while in *troglodytes* it is almost straight. Hewitt (1918: 166) utilized the degree of straightness or curvature of the anterior margin to divide the species of the genus into three groups, namely (a) carapace with practically straight anterior margin, (b) anterior margin of carapace shallowly excavated and (c) anterior margin of carapace deeply excavated.

This primary division of the genus was also used by Lawrence (1955: 254). However, in the absence of accurate definition, the difference between an almost straight and shallowly excavated anterior margin is difficult to perceive, and besides, the character is prone to considerable individual variation. *H. g. rhodesianus* falls within the range of individual variation of *H. t. troglodytes* (Table IV).

Another character used to distinguish species and subspecies of *Hadogenes* from each other is the tail (metasoma) length to carapace length ratio. In males, this ratio appears to increase rapidly after the final ecdysis (fig. 4). The following average ratios were obtained: *g. gracilis* (based on seven adult males) 7.96 : 1; *t. troglodytes* (based on 36 adult males) 6.55 : 1, and *g. rhodesianus* (based on a single male) 7.0 : 1. In *t. troglodytes* the lowest ratio of the 36 specimens was 5.55 : 1 and the highest 7.40 : 1. When only large adults, viz. those with a tail length in excess of 110 mm were used, the following average ratio based on 21 specimens was obtained, 6.82 : 1. Clearly, *g. rhodesianus* falls within the range of individual variation of *t. troglodytes* in this respect.

Very slightly enlarged posterior terminal teeth of the superior keels in caudal segments II and III are characteristic of males and females of *g. rhodesianus* and *t. troglodytes*. In *g. gracilis* these terminal teeth are greatly enlarged and distinctly spiniform. Other characters in which *g. rhodesianus*
and *t. troglydytes* resemble each other are, the proportions of tergite VII in both males and females, the pectinal teeth (*troglydytes* ♂: 22–28, ♀: 18–22; *rhodesianus* ♂: 23–25, ♀: 20–20), and the granulation of the cauda. Leg colouration is subject to considerable variation but specimens of *troglydytes* from several localities in the Soutpansberg District, viz. Messina, Waterpoort and Tshipise all have yellow legs. A large series of *troglydytes* specimens from Canton in the Potgietersrus District have brown legs.

Accordingly, *H. gracilis rhodesianus* Hewitt may be regarded as a synonym of *H. troglydytes troglydytes* (Peters).

**ACKNOWLEDGEMENTS**

The author is extremely grateful to Dr Jürgen Gruber and Dr O. E. Paget of the Naturhistorisches Museum in Vienna, who very kindly made the types and only known specimens of the scorpions described by Penther available to him.

**REFERENCES**


<table>
<thead>
<tr>
<th>Species</th>
<th>Chela (dorsally)</th>
<th>Carapace anterior lobe</th>
<th>Tergites</th>
<th>Cauda (laterally)</th>
<th>Description of Colour</th>
</tr>
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<tbody>
<tr>
<td><strong>Opisthopthalmus besschuanicus</strong></td>
<td>5YR 4/8</td>
<td>7.5YR 5/6</td>
<td>7.5YR 3/3</td>
<td>5YR 3/6</td>
<td>Reddish-brown Bright brown Dark brown Dark reddish-brown</td>
</tr>
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<td><strong>Hadogenes besschuanicus</strong></td>
<td>5YR 4/6</td>
<td>5YR 3/6</td>
<td>5YR 3/4</td>
<td>5YR 3/3</td>
<td>Reddish-brown Dark reddish-brown</td>
</tr>
<tr>
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<td>5YR 2/1</td>
<td>5YR 2/1</td>
<td>5YR 2/1</td>
<td>5YR 2/1</td>
<td>Brownish-black Very dark reddish-brown</td>
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<td>5YR 3/6</td>
<td>5YR 3/3</td>
<td>5YR 3/1</td>
<td>5YR 2/4</td>
<td>Dark reddish-brown Brownish-black Very dark reddish-brown</td>
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<td>10YR 3/2</td>
<td>7.5YR 3/2</td>
<td>7.5YR 2/3</td>
<td>Black Brownish-black Very dark brown</td>
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<tr>
<td><strong>Uroplectes jutrzenkai</strong></td>
<td>10YR 5/8</td>
<td>10YR 2/2</td>
<td>10YR 1.7/1 (Segment V)</td>
<td>5YR 3/6</td>
<td>Dark reddish-brown</td>
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Table II. New measurement of Penther’s type specimens.

<table>
<thead>
<tr>
<th>Species</th>
<th>Carapace length</th>
<th>Median eye distance from Carapace anterior</th>
<th>Mesosoma length</th>
<th>Metasoma length</th>
<th>Caudal segment I max. width</th>
<th>Caudal segment I max. height</th>
<th>Sex</th>
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<tr>
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<td>11.1</td>
<td>7.2</td>
<td>41.5</td>
<td>25.5</td>
<td>4.6</td>
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<tr>
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<td>11.6</td>
<td>—</td>
<td>39.0</td>
<td>43.5</td>
<td>2.1</td>
<td>2.8</td>
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<td>5.6</td>
<td>—</td>
<td>25.8</td>
<td>16.5</td>
<td>1.35</td>
<td>1.40</td>
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<td>4.65</td>
<td>—</td>
<td>18.7</td>
<td>33.0</td>
<td>2.00</td>
<td>2.00</td>
<td>♀</td>
</tr>
<tr>
<td><strong>Parabuthus obscurus</strong></td>
<td>4.8</td>
<td>—</td>
<td>18.3</td>
<td>27.5</td>
<td>2.50</td>
<td>2.15</td>
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<tr>
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<td>—</td>
<td>28.5</td>
<td>55.0</td>
<td>7.5</td>
<td>6.2</td>
<td>♂</td>
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### Table III. Numbers of diagonal rows of denticles on the movable palpal fingers of *Uroplectes vittatus* Thorell and *U. jutrzenkai* Penther.

<table>
<thead>
<tr>
<th>Number</th>
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<th>Sex</th>
<th>No. of rows</th>
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<tr>
<td>—</td>
<td>&quot;</td>
<td>&quot;</td>
<td>♀</td>
<td>12</td>
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<tr>
<td>—</td>
<td>&quot;</td>
<td>&quot;</td>
<td>♂</td>
<td>11</td>
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<td>—</td>
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<td>♀</td>
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<td>TM. 1721</td>
<td><em>U. vittatus</em></td>
<td>Waterberg, Transvaal</td>
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<td>TM. 1741</td>
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<td>Lydenburg, Transvaal</td>
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<td>Steilwater, Transvaal</td>
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<td>Potgietersrus, Transvaal</td>
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<td>Gwelo, Rhodesia</td>
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Table IV. Carapace anterior margins degree of curvature expressed as the radius of an equivalent circle in millimetres. (See fig. 2).

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<th>Radius (mm)</th>
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<tr>
<td><em>Hadogenes gracilis rhodesianus</em> Hwtt</td>
<td>♂ (Type)</td>
<td>19.6</td>
<td>20</td>
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<tr>
<td></td>
<td>♀ (Type)</td>
<td>18.9</td>
<td>15</td>
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</tr>
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<td>18.3</td>
<td>10</td>
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<td>18.5</td>
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<tr>
<td></td>
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**FIG. 2.** Method of determining the degree of the carapace anterior margin curvature. Circles of known radius printed on plastic sheets were used to establish the values given in table IV.
FIG. 3. Map showing the distributions of *Hadogenes troglodytes troglodytes* (Peters) and *H. gracilis gracilis* Hewitt. The type locality of *H. gracilis rhodesianus* Hewitt is also shown.
Fig. 4. Graph showing the relationship between tail length and carapace length of male and female *Hadogenes troglodytes troglodytes* (Peters). The two type specimens (♂, ♀) of *H. gracilis rhodesianus* Hewitt are also included as indicated.
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