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DESCRIPTION OF THE ADULT MALE OF *BAKERDANIA ELLIPTICA* (KRCZAL, 1959) WITH A REDESCRIPTION OF THE ADULT FEMALE (ACARI: PYGMEPHORIDAE)

BY M. J. COLLOFF ¹ and S. P. HOPKIN ²

### Abstract

The adult male of *Bakerdania elliptica* (Krczal, 1959) is described for the first time from specimens cultured in a laboratory. The adult female is redescribed from specimens taken from the ventral surface of specimens of the woodlouse *Oniscus asellus* L. (Isopoda: Oniscoidea) from leaf litter in deciduous woodland near Bristol, England.

### Introduction

During attempts to culture *Bakerdania elliptica* in the laboratory as part of a study on the phoretic association between females of this species and terrestrial isopods (COLLOFF & HOPKIN, 1986), the adult male was found among leaf litter in the culture vessels. Little is known of males of the genus *Bakerdania* Sasa, 1961. Until now, to the authors' knowledge, only one has been formally named and described, *B. exigua* (Mahunka, 1969), which was figured and discussed by RACK (1974). An undescribed species captioned *Neopygmephorus* (*Neopygmephorus*) sp. was figured by CROSS (1965).

Detailed observations by phase contrast and Normaski interference contrast microscopy revealed several discrepancies in KRCZAL's (1959) original description of the adult female of *B. elliptica*. In view of this fact, and to prevent any doubt as to the identity of the species that we studied, this stage is redescribed.

### Methods

Covered glass dishes (6 × 12 × 6 cm) were used as culture vessels. They were filled with a mixture of oak (*Quercus robur* L.) and hazel (*Corylus avellana* L.) leaf litter that had been boiled and dried to render it devoid of any living acarofauna. Into the litter were introduced ten *Oniscus asellus* infested with a total of 71 female *B. elliptica* (between 5 and

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¹. Department of Zoology, University of Glasgow G12 8QQ, Scotland.
². Department of Pure and Applied Zoology, University of Reading, Reading, England.

12 mites per woodlice). The culture was maintained at 100% relative humidity by regular sprayings with distilled water, and about 20°C.

After 20 days only 39 mites were present on the woodlice. Hand-sorting of the leaf litter under a stereomicroscope recovered 25 live females and 2 live male mites. These were cleared in 70% lactic acid, mounted in gum chloral and examined under a Leitz Orthoplan compound microscope.

Setal notation follows that of LINDBQUIST (1976) and KALISEWSKI & RACK (1985). The following conventions of measurement are used in this study. Ventral length: measured in ventral view, from the base of the gnathosoma to the posterior edge of the opisthosoma (females) or from the base of the gnathosoma to the distal end of the genital capsule (males). Width: measured in dorsal view, it represents the maximum width of the hysterosoma. Total leg length: measured in dorsal view, it represents a median line along the leg from the base of the trochanter to the tip of tarsus, excluding claw and pulvillus (if present).

*Bakerdania elliptica* (Krczal, 1959)

*Pygmeophorus ellipticus*: KRCZAL, 1959, p. 350. Figs. 62a-d.

Description of adult male (Figs. 1-7).

Dimensions (n = 2). Ventral length 132 µm. Width 60 µm.

Dorsal surface (Fig. 1).

Cuticle smooth, creamy white in colour. Prodorsum almost twice as broad as long (ca. 53 µm x 28 µm). All dorsal setae slightly pilose. Three pairs of setae on prodorsum; v₁ (ca. 15 µm) and s₁ (ca. 8 µm) situated close together, arranged more or less in a transverse row on anterior part of

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**Figs. 1-3**: *Bakerdania elliptica*, adult male, dorsal view of idiosoma (1), dorsal view of gnathosoma (2), ventral view of idiosoma (3).
prodorsum; longer sc2 setae (ca. 40 μm) directly behind these. Tergite CD not overlapping prodorsum. Tergite CD (ca. 45 μm long × 60 μm wide) with three pairs of setae, c2 (ca. 32 μm); d (ca. 28 μm) situated posteriomedially to c2. One pair opisthosomal cupules, ia, present. Tergite EF (ca. 15 μm long × 45 μm wide) with two pairs of closely adjacent setae, long curved f (ca. 36 μm) and short straight e (ca. 8 μm). One pair opisthosomal cupules, im, present. Triangular genital capsule behind tergite EF (ca. 25 μm long × 25 μm wide at the base) bearing two pairs of setae, h1 (ca. 8 μm) which are smooth and blunted at tip and h2 (ca. 2 μm) situated immediately posterior to these on a pair of dorsoventrally flattened extensions of genital capsule.

**Gnathosoma** (Fig. 2).

Cylindrical (ca. 8 μm long × 4 μm wide), highly reduced. Two pairs dorsal setiform setae, Gd1 and Gd2 (both ca. 2 μm), one pair dorsal solenidiform setae, Gd3. One pair ventral setae, Gv1 (ca. 2 μm) and one pair lateral solenidia; Gv2 (ca. 2 μm). One pair of opisthosomal cupules, im, present. Apex of gnathosoma extends no further than anterior coxodochantal articulation of legs 1.

**Ventral surface** (Fig. 3).

Coxal fields I trapezoidal, two pairs of setae, 1a and 1b (both ca. 10 μm) present. All setae on ventral surface smooth, non-pilose. Coxal fields II more or less pentagonal, with two pairs setae, 2a (ca. 13 μm) and 2b (ca. 11 μm) present. Sternum, apodemes I and II entire. Apodeme II rectilinear, separated from convex apodeme III by a broad area of smooth asetate cuticle (ca. 10-20 μm wide). Coxal fields III rhomboid, with setae 3a (ca. 7 μm), 3b (ca. 7 μm) and 3c (ca. 7 μm). Coxal fields IV sub-triangular, with setae 4a (ca. 4 μm) and 4c (ca. 6 μm). Ventral opisthosoma triangular, with setae 4b (ca. 9 μm) present. Ventral surface of genital capsule with tubular ejaculatory duct visible. Two pairs setae present, ps1 (ca. 2.5 μm) and ps2 (ca. 4 μm). Ventrum, apodemes III and IV entire.

**Legs** (Figs. 4-7).

Leg I (ca. 73 μm long) with single claw, pulvillus absent. Trochanter I triangular, posterior articulation at 90° to longitudinal axis of body. Tarsus I with two solenidia; ω1, slightly bulbous, curved through 90° near its base, and ω2 (ca. 10 μm) thin and straight. Also present on tarsus I are four smooth eupathidia and nine pilose setae.

**Table 1. Setal formulae of legs of male Bakerdania elliptica.**

<table>
<thead>
<tr>
<th>Trochanter</th>
<th>Femur</th>
<th>Genus</th>
<th>Tibia</th>
<th>Tarsus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg I</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>6 (+ 2)</td>
</tr>
<tr>
<td>Leg II</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4 (+1)</td>
</tr>
<tr>
<td>Leg III</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4 (+1)</td>
</tr>
<tr>
<td>Leg IV</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4 (+1)</td>
</tr>
</tbody>
</table>

Leg II (ca. 75 μm) with pair of claws and pulvillus. Single tarsal solenidion ω (ca. 20 μm), curved and thickened (ca. 5 μm). Tibial solenidion ϕ thin, straight (ca. 11 μm long).

Leg III (ca. 66 μm) with pair of claws and pulvillus. Tibial solenidion ϕ thin, straight (ca. 9 μm long).

Leg IV (ca. 54 μm) curved posteriomedially. Tibial solenidion ϕ thin, straight (ca. 5 μm long). Tibial seta r" (ca. 15 μm) strong, spiniform.

**Material examined.**

Two specimens from laboratory culture vessels containing leaf litter, and *Oniscus aselli* infested with female *B. elliptica* from Hallen Wood, Bristol, Avon (British Ordnance Survey grid reference ST 555802). Collected by M. J. C., September 1982. One specimen deposited in British Museum (Natural History), accession number 1986.2.25.6. One specimen deposited in MJC’s collection.

**Redescription of adult female** (Figs. 8-15).

Dimensions (n = 10). Ventral length 194 μm (range 182-204 μm). Width 103 μm (range 98-112 μm).

**Dorsal surface** (Fig. 8).

Cuticle smooth, creamy white to yellow-brown in colour. Opisthosoma ovoid to oblong. Prodorsum
trapezoidal, with pair of peritremes situated mediad of smooth setae $v_2$ (ca. 5 $\mu$m). All other dorsal idiosomal setae strongly pilose. Setae $sc_1$ (ca. 25 $\mu$m) located directly behind setae $v_2$ and medially to sensilli $sc$, which are clavate with two parallel rows of 6-8 spinules on dorsal surfaces. Tergite C (ca. 80 $\mu$m long) extends as far as setae $v_1$. Bases of $c_1$ and $c_2$ arranged in a transverse line. One pair of opisthosomal cupules, $ia$, present. Tergite D (ca. 35 $\mu$m long) with one pair of setae, $d$ (ca. 45 $\mu$m). Tergite EF (ca. 20 $\mu$m long) with two pairs of setae, $e$ (ca. 25 $\mu$m) and $f$ (ca. 35 $\mu$m) and one pair of opisthosomal cupules, $im$. Tergite H with two pairs of setae, $h_1$ (ca. 45 $\mu$m) and $h_2$ (ca. 22 $\mu$m) and one pair of opisthosomal cupules, $ih$.

**Gnathosoma** (Figs. 9 & 10).

Hypognathous, freely articulating with the prodorsum, not reduced. Gnathosomal capsule more or less triangular in dorsal view (ca. 24 $\mu$m wide x 20 $\mu$m long to base of cheliceral stylets), bisected by longitudinal septum extending from the base of capsule to a point level with setae $g_3$. Three pairs of setae present on the dorsal surface of capsule; $Gd_1$ (ca. 16 $\mu$m) extend to the bases of the cheliceral stylets, $Gd_2$ (ca. 17 $\mu$m) extend to the stylet tips and $Gd_3$ (ca. 4 $\mu$m) are located laterally, behind setae $s_r$. Ventral surface of gnathosomal capsule bears setae $Gv$ (ca. 11 $\mu$m), situated medially to posterior
margin of palpal foramen. Palps free, arising from foramina on anterolateral margins of gnathosomal capsule. Palp with two dorsal setae, \( P_d \) (ca. 5 \( \mu \)m) and \( P_d' \) (ca. 5 \( \mu \)m). Ventral surface with seta \( P_v \) and solenidion \( \omega \) (both ca. 2 \( \mu \)m). Apically there are two very small claw-like structures. Chelicerae minute styliform structures (ca. 2.5 \( \mu \)m), with bulbous, laterally curved bases. Oral cone below chelicerae with oesophageal opening at its apex. Pharynx visible through cuticle, surrounded by heavy musculature.

**Ventral surface** (Fig. 11).

All setae on ventral surface mildly pilose. Apodemes I and 2, sejugal and anteriomedian apodemes all connected and well developed. Coxal fields I with setae 1\( a \) (ca. 30 \( \mu \)m) and 1\( b \) (ca. 20 \( \mu \)m) present. Coxal fields II with setae 2\( a \) (ca. 32 \( \mu \)m) and 2\( b \) (ca. 38 \( \mu \)m) present. Coxal fields III with setae 3\( a \) (ca. 38 \( \mu \)m), 3\( b \) (ca. 35 \( \mu \)m) and 3\( c \) (ca. 32 \( \mu \)m) present. Apodemes 4 complete, joined to anterior part of coxal foramen III. Posteriomedian apodeme unbranched posteriorly, extending medially to bases of setae 4\( a \) (ca. 37 \( \mu \)m). Apodemes 5 extending medially to bases of setae 4\( b \) (ca. 54 \( \mu \)m). Setae 4\( c \) (ca. 35 \( \mu \)m) located adjacent to coxal foramen III. A V-shaped posterior genital opening present internally toward posterior part of the opisthosoma. Caudal margin with setae \( p_s_1 \) (ca. 20 \( \mu \)m), \( p_s_2 \) (ca. 7 \( \mu \)m) and \( p_s_3 \) (ca. 7 \( \mu \)m) present.

**Legs** (Figs. 12-15).

Leg I (ca. 76 \( \mu \)m long) lacking claw. Tibia and tarsus fused, bearing five smooth eupathidia and eleven pilose setae. Four solenidia are present \( \omega_1 \) (ca. 20 \( \mu \)m) thin and rod-shaped, \( \omega_2 \) (ca. 18 \( \mu \)m) spindle-shaped, becoming bulbous at base. \( \varphi_1 \) and \( \varphi_2 \) (both ca. 12 \( \mu \)m) are clavate. Seta \( d \) on femur
characteristically curved and flattened. All femoral setae smooth as is seta $v'$ on trochanter.

Leg II (ca. 82 $\mu$m) with pulvillus and pair of well-developed basally thickened claws. Single spindle-shaped solenidion $\omega$ (ca. 16 $\mu$m) present. Solenidion $\varphi$ (ca. 6 $\mu$m) flattened. Seta $v'$ on trochanter smooth.

Leg III (ca. 86 $\mu$m). Tarsus with short spur-shaped seta $u'$ (ca. 5 $\mu$m). Solenidion $\varphi$ (ca. 7 $\mu$m) flattened and pointed. Well-developed pair of claws.

Figs. 12-15: *Bakerdania elliptica*, adult female, dorsolateral aspect of right leg I (12), dorsal aspects of right leg II (13), III (14), IV (15).
with basal thickening, and pulvillus present. Seta v' on trochanter is pilose.

Table 2. Setal formulae of legs of female Bakerdania elliptica.

<table>
<thead>
<tr>
<th></th>
<th>Trochanter</th>
<th>Femur</th>
<th>Genus</th>
<th>Tibia</th>
<th>Tarsus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leg I</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>6 (+ 2)</td>
<td>10 (+ 2)</td>
</tr>
<tr>
<td>Leg II</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>4 (+ 1)</td>
<td>5 (+ 1)</td>
</tr>
<tr>
<td>Leg III</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>4 (+ 1)</td>
<td>8</td>
</tr>
<tr>
<td>Leg IV</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4 (+ 1)</td>
<td>4</td>
</tr>
</tbody>
</table>

Leg IV (ca. 120 μm). Solenidion ψ (ca. 5 μm) short, stumpy and located posteriolaterally to seta d (ca. 75 μm) which is almost as long as tibia and tarsus combined. Pulvillus and pair of claws present, smaller than those on legs II and III. Claws not thickened basally. Seta v' on trochanter pilose.

Material examined


Discussion

Ebermann & Rack (1982) described the male of Petalomium fimbrisetum. It is very similar in morphology and chaetotaxy to the male of B. elliptica, indeed more so than the male of B. exigua, but there appears to be no information in the literature on differential diagnosis of males of the two genera at the present time, partly because so few have been described. Further descriptions of males is hampered by the scarcity of readily available natural populations of live females, belonging to previously described species, from which in vitro cultures for males can be started.

Adult females of B. elliptica can be distinguished from other members of the genus by the following combination of features: tibiotarsus I lacking claw, setae s2 and s3 the same length and one third of the length of seta s1.

There are discrepancies between the present description and that of Krczal (1959). All four solenidia on tarsus I are not very slender: ω2 is at least twice the thickness of ω1 and distinctly bulbous at the base. The shape of the opisthosoma is not completely elliptical, nor is the prodorsum covered by tergite C up to the peritremes. These features both depend on the orientation of the specimen. They are more or less accurate only if the specimen is tilted slightly forward. Krczal did not figure the tergites or the legs other than the tarsus of leg I. Detailed descriptions of the chaetotaxy of the legs have been provided here since there are many features, such as the shape of the solenidia, which may be of use in future differential diagnoses.

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