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Collembola Symphypleona (Insecta) from the Republic of Yemen. Part 2: Samples from the Isle of Socotra

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Abstract

Out of five samples of Collembola Symphypleona from the Isle of Socotra, Republic of Yemen, two new genera (families Sminthuridae and Bourletiellidae), 14 new species and two already known species are described; two sets of specimens are described but not named. Keys to the genera *Anarmatus* Bretfeld, 2000, *Sphyrotheca* Börner, 1906, and *Stenognathriopes* Betsch & Lasebikan, 1979, are included.

Zusammenfassung

Collembola Symphypleona (Insecta) aus der Republik Jemen. Teil 2: Proben von der Insel Socotra – Aus fünf Proben von Collembola Symphypleona von der Insel Socotra, Republik Jemen, werden zwei neue Gattungen (Familien Sminthuridae und Bourletiellidae), 14 neue Arten und zwei bereits bekannte Arten beschrieben; zwei Gruppen von Exemplaren werden beschrieben aber nicht benannt. Bestimmungsschlüssel für die Gattungen *Anarmatus* Bretfeld, 2000, *Sphyrotheca* Börner, 1906, und *Stenognathriopes* Betsch & Lasebikan, 1979, sind beigefügt.

Introduction

I have again had the opportunity to study Collembola Symphypleona from the Republic of Yemen, on this occasion exclusively from the Isle of Socotra. The five samples were collected during the Global Environment Facility (GEF) project »Conservation and Sustainable Use of the Biodiversity of Socotra Archipelago« in which were involved: the Senckenberg Museum, Frankfurt/Main (F. Krupp), the Hessisches Landesmuseum Darmstadt (H. Pohl) (both from Germany) and the General Department of Plant Protection, Sana'a, Republic of Yemen (A. van Harten). The two latter colleagues both collected the Collembola and sent them to me. The five samples studied here contained two new genera, 14 new species and only two already described species. Two sets of specimens (family Bourletiellidae) have been described but not named because their generic position is not certain. This is only the second paper about Collembola Symphypleona from the Republic of Yemen (see Bretfeld 2000b), but there are also two papers about Collembola Arthropleona, namely concerning the genus *Seira* (Barra 2004a, 2004b). The samples were collected directly from leaf-litter, by pitfall traps and also by beating the vegetation

into a dish. The preparation method and the presentation of the results follow my previous papers (BRETFELD 2000a, 2000b, 2002). For more information about taxonomy and characteristics see BRETFELD (1999). The types and all other specimens are held in the collection of the Hessisches Landesmuseum Darmstadt (HLMD), Germany. The account of the taxa is given in alphabetical order.

List of the samples

1. SOQ 2000/01: Yemen, Isle of Socotra, town of Hadibo and in its immediate vicinity, 12°36'57"N – 54°01'01"E, pitfall traps in dry plain with scarce, low vegetation at 10 m altitude, 20 X – 1 XI 2000 leg. Pohl (Bretfeld's number: Yemen IV 1).
2. SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2 and 7).
3. SOQ 2000/03: Yemen, Isle of Socotra, Goeeh, 12°32'25"N – 54°10'22"E, from leaf-litter under dense *Ficus* bushes near permanent stream at 240 m altitude, 23 X 2000 leg. Pohl (Bretfeld's number: Yemen IV 6).
4. SOQ 2000/06: Yemen, Isle of Socotra, Nogeed, Farmihin, Steroh, Wadi on mountain slope, 12°24'26"N – 54°08'40"E, beaten from scarce, low vegetation and abundant boulders at 40 m altitude, 24 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 5).
5. SOQ 2000/11: Yemen, Isle of Socotra, Diksam Camp on the bottom of a valley with grass and dwarf shrubs, 12°31.401'N – 53°57.204'E, from leaf-litter surrounding big boulders at 800 m altitude, 26 – 27 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 3+4).

***Anarmatus* Bretfeld, 2000**

This genus, described from the mainland of Yemen, was found on the Isle of Socotra with four new species. Two of them are known from females and males, the other two are described with only one female each. All species differ in colour and in a few chaetotactic characteristics. The study of these new species allows me to add a few observations to the description of the type species, *Anarmatus taizzus* Bretfeld, 2000: Antennal segment III with 25 setae. Length of outer setae of tibiotarsi I – III ≥ diameter of tibiotarsus. Empodial filaments relatively thin. Inner side of dens with 6 setae in groups of 3 x 2.

***Anarmatus diksamanus* n. sp.**

Holotype: Female (no. 2, on 4 slides, at HLMD) from sample SOQ 2000/11: Yemen, Isle of Socotra, Diksam Camp on the bottom of a valley with grass and dwarf shrubs, 12°31.401'N – 53°57.204'E, from leaf-litter surrounding big boulders at 800 m altitude, 26 – 27 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 3+4b).

Paratypes: 8 specimens (on slides and in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its type locality.

Diagnosis: A large spotted species of the genus *Anarmatus* Bretfeld, 2000, with 6 diagnostic characteristics:

- Dorsal part of large abdomen with large dark pigmented spot,
- antennal segment III with 30 setae,
- tibiotarsus III with 2 – 3 long outer setae,
- claws each with distinct inner tooth,
- empodial filaments relatively thick,
- formula of anterior setae of dens 3+1,2,1,1 ... 1.

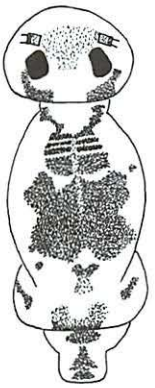

Fig. 1

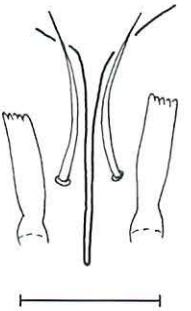

Fig. 2

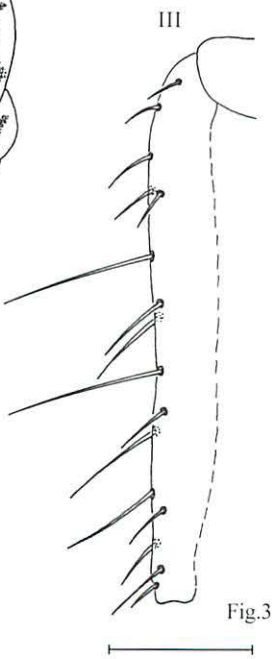

Fig.3

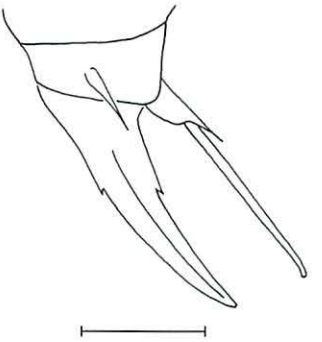

Fig. 4

Anarmatus diksamanus n. sp.

Fig. 1 Colour pattern of female. Total length 0.8 mm
Fig. 2 Appendices anales and setae sa3 (bar = 25 µm)
Fig. 3 Outer setae of tibiotarsus III of female (bar = 50 µm)
Fig. 4 Claw and empodium II seen from anterior (bar = 100 µm)

Description (only the main differences from the type species, *Anarmatus taizzus* Bretfeld, 2000, are mentioned):

Measurements and proportions (mainly from 2 females and 1 male slide specimens): Total female 0.7 mm, male 0.5 mm. Head diagonal in female 0.25 mm, in male 0.2 mm. Mucro in female 60 µm, in male 50 µm. Claw III inner edge in female 20 µm, in male 17 µm. Appendices anales 22 µm. Length of whole antenna : head diagonal = 1.7 (1.8) in female (and male). Antennal segments I : II : III : IV = 1 : 2.2 (1.7) : 2.8 (2.2) : 5.9 (5.1) in female (and male). Dens : mucro = 3 (2.6) : 1 in female (and male). Mucro : claw III inner edge = 3.0 (3.1) in female (and male). Appendices anales : mucro = 0.4. Appendices anales : claw III inner edge = 1.2.

Colour (Fig. 1): Eye-patches black. Background colour yellowish, head and body with violet-brown pigment. Head with pale spots between antennae and 1+1 more intense ones behind eye-patches. Dorsal part of large abdomen with a large main spot and several smaller ones forming a dorsal band of pigment, posterior part with small symmetrical spots. Small abdomen also with dorsal spots. Antennae pale violet, legs and furca unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated):

Head: Clypeus region M with 14 – 18 setae. Ventral head-back with 1+1 oval organs.

Antennae: Segment III with 30 setae. Segment IV with 4 – 5 dorso-posterior sensilla.

Small abdomen: In both sexes dorsal side of segment VI with 2 pairs of DL setae and 5 dorsal circumanal setae (a0, a1, a2). Appendices anales (Fig. 2) short band-like, tip cut and with few round teeth.

Legs: Tibiotarsi I – III rows p with 5, 3(4), 3 setae respectively. Ratio of length of outer setae of tibiotarsus to diameter of tibiotarsus I = 1, of tibiotarsus II up to 2 in female and > 1 in male, of tibiotarsus III (2 – 3 outer setae) up to 3 in female (Fig. 3) and about 2 in male. Claws with distinct inner tooth. Empodial filaments relatively thick (Fig. 4).

Furca: Dens outer row E with 7 – 8 setae, posterior row P with 7, formula of anterior setae 3+1,2,1,1 ... 1, middle ones longer than spaces between their bases.

***Anarmatus goeehensis* n. sp.**

Holotype: Female (on 4 slides, at HLMD) from sample SOQ 2000/03: Yemen, Isle of Socotra, Goeeh, 12°32'25"N – 54°10'22"E, from leaf-litter under dense *Ficus* bushes near permanent stream at 240 m altitude, 23 X 2000 leg. Pohl (Bretfeld's number: Yemen IV 6). No further specimens known.

Derivatio nominis: The name of this new species is derived from its type locality.

Diagnosis: A spotted species of the genus *Anarmatus* Bretfeld, 2000, with 6 diagnostic characteristics:

– Head and body with symmetrical pattern of small dark spots,

– antennal segment III with 30 setae,

– tibiotarsus III with 2 – 3 long outer setae,
– claws each with distinct inner tooth,
– empodial filaments relatively thick,
– formula of anterior setae of dens 3+1,2,1,1 ... 1.

Fig. 5

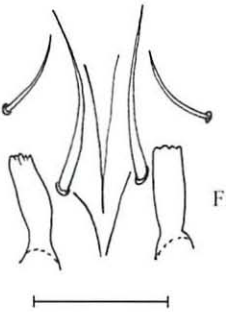

Fig. 6

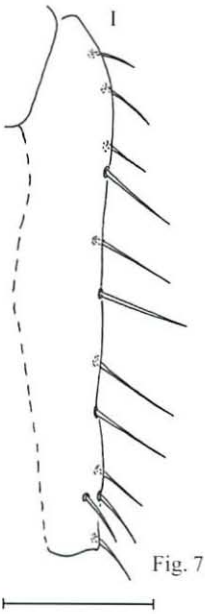

Fig. 7

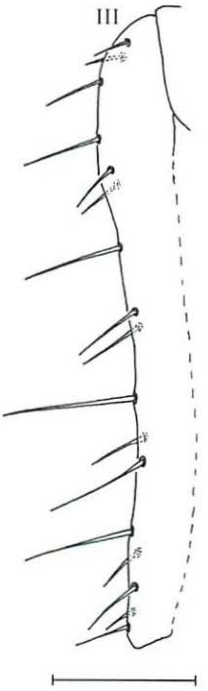

Fig. 8

Anarmatus goeehensis n. sp.

Fig. 5 Colour pattern. Total length 0.5 mm
Fig. 6 Appendices anales and setae sa2, sa3 (bar = 25 µm)
Fig. 7 Outer setae of tibiotarsus I (bar = 50 µm)
Fig. 8 Outer setae of tibiotarsus III (bar = 50 µm)

Description (only the main differences from the type species, *Anarmatus taizzus* Bretfeld, 2000, are mentioned):

Measurements and proportions: Total length 0.65 mm. Head diagonal 0.3 mm. Mucro 70 µm. Claw III inner edge 22 µm. Appendices anales 20 µm. Length of whole antenna : head diagonal = 1.6. Antennal segments I : II : III : IV = 1 : 2 : 2.5 : 5.6. Manubrium : dens : mucro = 3.4 : 2.5 : 1. Mucro : claw III inner edge = 3.3. Appendices anales : mucro = 0.3. Appendices anales : claw III inner edge = 0.9.

Colour: Eye-patches black. Background colour whitish, head and body (Fig. 5) with small dark symmetrical spots. Small abdomen with mainly dorsal spots.

Chaetotaxy and special structures:

Head: Clypeus region M with 17 setae. Oval organs of ventral head-back uncertain.

Antennae: Segment III with 30 setae. Segment IV with 5 dorso-posterior sensilla.

Small abdomen: Appendices anales (Fig. 6) like a short but relatively broad band, tip cut and with few round teeth.

Legs: Tibiotarsi I – III rows p with 5, 4, 3 setae respectively. Ratio of length of outer setae of tibiotarsus to diameter of tibiotarsus I = 1 (Fig. 7), of tibiotarsus II ≥ 1, of tibiotarsus III (2 – 3 outer setae) > 2 (Fig. 8). Claws with distinct inner tooth. Empodial filaments relatively thick (see Fig. 4).

Furca: Dens outer row E with 8 setae, posterior row P with 7, formula of anterior setae 3+1,2,1,1 … 1, middle ones longer than spaces between their bases.

***Anarmatus irregularius* n. sp.**

Holotype: Female (on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2j).

Paratypes: 1 male and 1 juvenile (on 3 slides and in alc., respectively, at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its asymmetrical pigmental pattern.

Diagnosis: A spotted species of the genus *Anarmatus* Bretfeld, 2000, with 6 diagnostic characteristics:

– Body with asymmetrical pattern of pigmented spots,

– antennal segment III with 28 setae,

– tibiotarsus III with 2 – 3 long outer setae,

– claws each with distinct inner tooth,

– empodial filaments relatively thick,

– formula of anterior setae of dens 3+1,2,1,1 … 1.

Description (only the main differences from the type species, *Anarmatus taizzus* Bretfeld, 2000, are mentioned):

Measurements and proportions (mainly from 1 female and 1 male slide specimen): Total female 0.65 mm, male 0.5 mm. Head diagonal in female 0.27 mm, in male 0.2 mm. Mucro in female 70 µm, in male 50 µm. Claw III inner edge in female 20 µm, in male 18 µm. Appendices anales 20 µm. Length of whole antenna : head diagonal = 1.6 (1.8) in female (and male). Antennal segments I : II : III : IV = 1 : 2.2 (1.9) : 2.8 (2.5) : 6.3 (5.5) in female (and male). Manubrium : dens : mucro = 2.9 (3.1) : 2.2 (2.7) : 1 in female (and male). Mucro : claw III inner edge = 3.3 (2.9) in female (and male). Appendices anales : mucro = 0.3. Appendices anales : claw III inner edge = 1.

Colour (Fig. 9): Eye-patches black. Background colour white, head and body with bluish-black spots, on posterior part of large abdomen more intense than on anterior part. Head with symmetrical pattern and dark spots on inner sides of antennal bases. Large abdomen with asymmetrical pattern. Segment V with 3 and segment VI with anchor-like spot. Antennae pale violet, legs and furca unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated):

Head: Clypeus region M with 14 setae in female, 13 in male. Ventral head-back with 1+1 oval organs.

Fig. 9

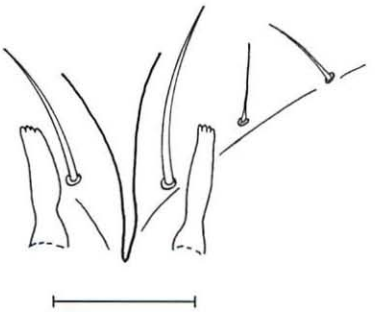

Fig. 10

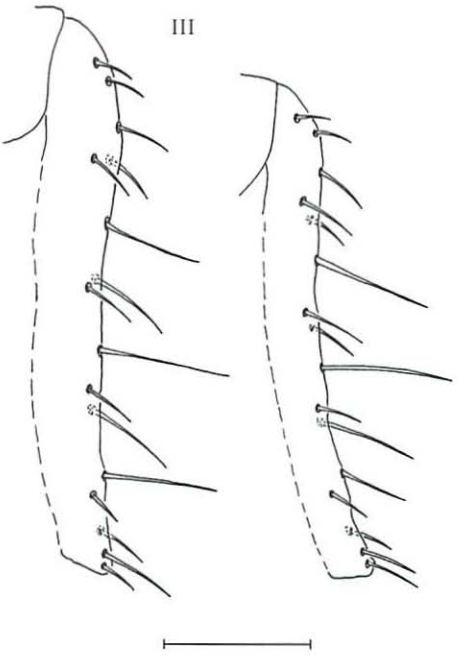

Fig. 11

Anarmatus irregularius n. sp.

Fig. 9 Colour pattern of female. Total length 0.65 mm

Fig. 10 Appendices anales and setae sa1 – 3 (bar = 25 µm)

Fig. 11 Outer setae of tibiotarsus III of female (left) and male (bar = 50 µm)

Antennae: Segment III with 28 setae. Segment IV with 5 dorso-posterior sensilla.

Small abdomen: In both sexes dorsal side of segment VI with 2 pairs of DL setae and 5 dorsal circumanal setae (a0, a1, a2). Appendices anales (Fig. 10) short band-like, tip cut and with few round teeth.

Legs: Tibiotarsi I – III rows p with 5, 4, 3 setae respectively. Ratio of length of outer setae of tibiotarsus to diameter of tibiotarsus I = 1, of tibiotarsus II > 1, of tibiotarsus III (2 – 3 outer setae) up to 3 (Fig. 11). Claws with distinct inner tooth. Empodial filaments relatively thick (see Fig. 4).

Furca: Dens outer row E with 7 – 8 setae, posterior row P with 7 – 8, formula of anterior setae 3+1,2,1,1 ... 1, middle ones longer than spaces between their bases.

***Anarmatus longisetus* n. sp.**

Holotype: Female (on 4 slides, at HLMD) from sample SOQ 2000/06: Yemen, Isle of Socotra, Nogeed, Farmihin, Steroh, Wadi on mountain slope, 12°24'26"N – 54°08'40"E, beaten from scarce, low vegetation and abundant boulders at 40 m altitude, 24 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 5). No further specimens known.

Derivatio nominis: The name of this new species is derived from its long tibiotarsal setae.

Diagnosis: A pale blue species of the genus *Anarmatus* Bretfeld, 2000, with 6 diagnostic characteristics:

- Head and body with little pale blue pigment,
- antennal segment III with 30 setae,
- tibiotarsus III with 5 – 6 long outer setae,
- claws each with distinct inner tooth,
- empodial filaments relatively thick,
- formula of anterior setae of dens 3+1,2,1,1 ... 1.

Description (only the main differences from the type species, *Anarmatus taizzus* Bretfeld, 2000, are mentioned):

Measurements and proportions: Total length 0.6 mm. Head diagonal 0.25 mm. Mucro 50 µm. Claw III inner edge 20 µm. Appendices anales 20 µm. Length of whole antenna : head diagonal = 1.6. Antennal segments I : II : III : IV = 1 : 1.9 : 2.7 : 5.8. Manubrium : dens : mucro = 4 : 3.3 : 1. Mucro : claw III inner edge = 2.3. Appendices anales : mucro = 0.4. Appendices anales : claw III inner edge = 1.

Colour: Eye-patches black. Background colour yellowish white, head and body with pale blue pigment without distinct pattern. Antennae pale blue, legs and furca unpigmented.

Chaetotaxy and special structures:

Head: Clypeus region M with 13 setae. Ventral head-back with 1+(1?) oval organs.

Antennae: Segment III with 30 setae. Segment IV with 5 dorso-posterior sensilla.

Small abdomen: Appendices anales (Fig. 12) short band-like, tip cut and with few small teeth.

Legs (Figs 13, 14): Tibiotarsi I – III rows p with 5, 4, 3 setae respectively. Ratio of length of outer setae of tibiotarsus to diameter of tibiotarsus I (about 7 long outer setae) > 1, tibiotarsi II and III (5 – 6 long outer setae each) > 2. Claws with distinct inner tooth. Empodial filaments relatively thick (see Fig. 4).

Furca: Dens outer row E with 8 setae, posterior row P with 6, formula of anterior setae 3+1,2,1,1 ... 1, middle ones longer than spaces between their bases.

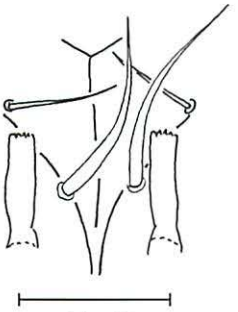

Fig. 12

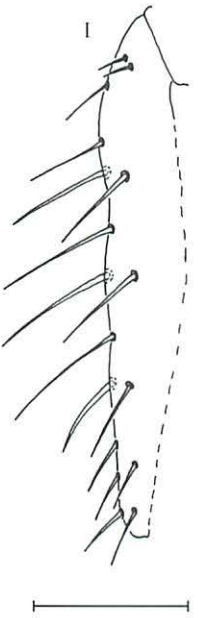

Fig. 13

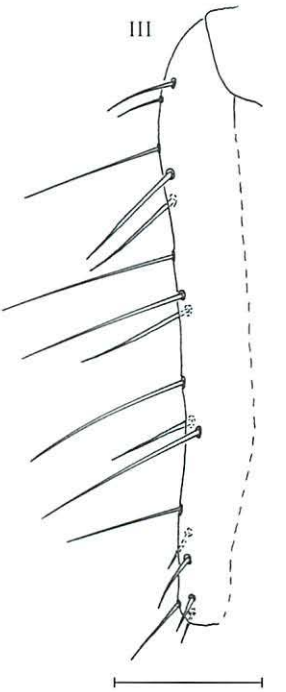

Fig. 14

Anarmatus longisetus n. sp.

Fig. 12 Appendices anales and setae sa2, sa3 (bar = 25 µm)

Fig. 13 Outer setae of tibiotarsus I seen from anterior (bar = 50 µm)

Fig. 14 Outer setae of tibiotarsus III seen from posterior (bar = 50 µm)

Key to the species of the genus *Anarmatus* Bretfeld, 2000

1 Formula of anterior setae of dens 3+1,2,1 ... 1. Antennal segment III with 25 setae. Claws with minute inner tooth. Empodial filaments relatively thin *taizzus* Bretfeld, 2000

– Formula of anterior setae of dens 3+1,2,1,1 ... 1. Antennal segment III with 28 or 30 setae. Claws with distinct inner tooth. Empodial filaments relatively thick **2**

2 Antennal segment III with 28 setae. Body with asymmetrical dark spots *irregularius* n. sp.

– Antennal segment III with 30 setae. Body without or with symmetrical spots **3**

3 Tibiotarsus I with about 7, tibiotarsus III with 5 – 6 long outer setae. Body with only little faint pigment *longisetus* n. sp.

– Tibiotarsus I without, tibiotarsus III with 2 – 3 long outer setae. Body with small or large black spots **4**

4 Anterior and dorsal parts of large abdomen with large black spots. Tibiotarsus II row p with 3 (seldom 4) setae *diksamanus* n. sp.

– Anterior and dorsal parts of large abdomen with small black spots. Tibiotarsus II row p with 4 setae *goeehensis* n. sp.

***Calvatomina strigata* n. sp.**

Holotype: Female (no. 3, on 3 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2f).

Paratype: 16 specimens (on slides and in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its pigmental pattern.

Diagnosis: A striped species of the genus *Calvatomina* Yosii, 1966 (*C. rufescens*-group) with 4 diagnostic characteristics:

– Body with longitudinal violet bands,

– small abdomen segment VI with seta P2 (= G) present,

– same segment with setae P1 and VL2 (= H and L) thick and spine-like,

– same segment seta DL1 (= N') varying from seta-like to spine-like.

Calvatomina strigata n. sp.

Fig. 15 Colour pattern of head. Total length 0.4 mm
Fig. 16 Colour pattern of abdomen. Total length 0.6 mm
Fig. 17 Abdominal segment VI of female (bar = 50 µm)
Fig. 18 Distal part of tibiotarsus III seen from posterior (bar = 25 µm)
Fig. 19 Claw and empodia seen from anterior (bar = 20 µm)
Fig. 20 Dens seen from posterior (bar = 50 µm)
Fig. 21 Mucro. J marks inner edge (bar = 25 µm)

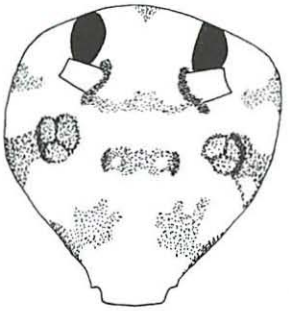

Fig. 15

Fig. 16

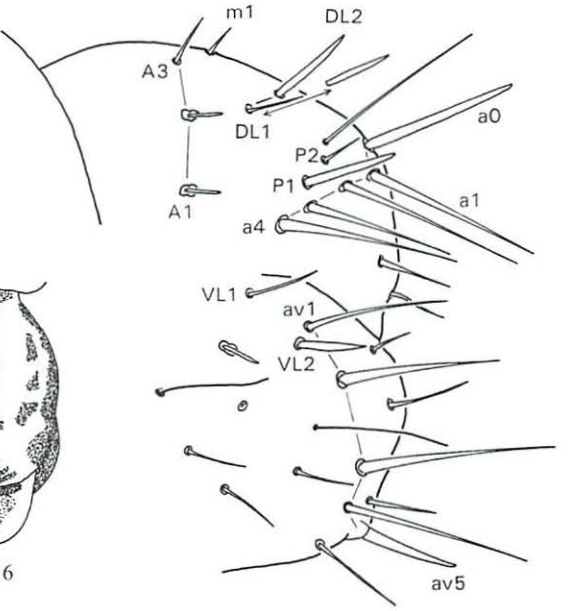

Fig. 17

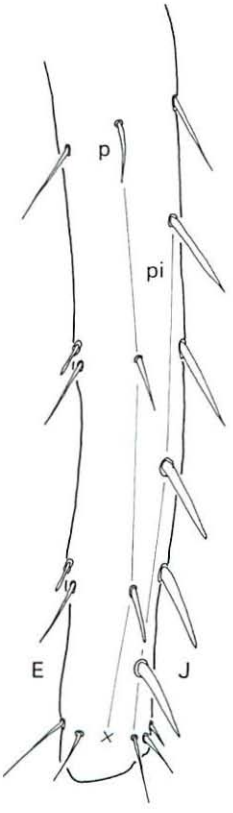

Fig. 18

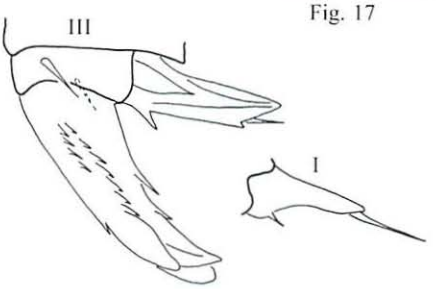

Fig. 19

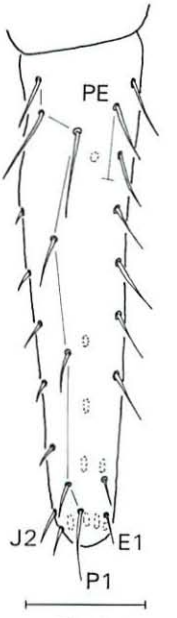

Fig. 20

Fig. 21

Description (the chaetotaxy resembles that of *C. guyanensis* Nayrolles & Betsch, 1996 and therefore is not completely repeated here):

Measurements and proportions (mainly from 3 female slide specimens): Total length up to 0.7 mm. Head diagonal 0.37 mm. Mucro 67 µm. Claw III inner edge 27 µm. Appendices anales 32 µm. Length of whole antenna : head diagonal = 1.7. Antennal segments I : II : III : IV = 1 : 4.5 : 5.1 : 1.4. Manubrium : dens : mucro = 3.4 : 3.3 : 1. Mucro : claw III inner edge = 2.5. Appendices anales : mucro= 0.5. Appendices anales : claw III inner edge = 1.2.

Colour (Figs 15, 16): Eye-patches black. Head and body striped by violet pigment. Head with 3 interrupted cross stripes. Large abdomen with 3+3 or 4+4 longitudinal stripes. Lateral and dorsal parts of small abdomen with pigmented spots. Antennae and bases of legs violet, other parts of legs and furca unpigmented.

Chaetotaxy and special structures: Head, antennae and abdomen without long spine-like setae.

Head: Eye-patches with 2+2 short normal setae. Dorsal head-back (i.e. dorso-posterior setae) with inner pair 1 as short normal setae, pair 2 and outer pair 3 as short spine-like setae.

Antennae: Not analysed.

Large abdomen: Furca base with 3+3 neosminthuroid setae.

Small abdomen: Segment VI (Fig. 17) with spine-like setae DL2 (= N) and a0 as in whole *C. rufescens*-group, also P1 and VL2 (= H and L) as spines, seta P2 (= G) present, setae DL1 (= N') varies from normal to spiny, i.e. formula of special setae of segment VI, namely of m1, A3, DL1, VL1, P1, P2, VL2 [= M, M', N', T'*, H, G, L, see Snider (1990), Nayrolles & Betsch (1996)], reads: - - +/- - + 1 + (- = seta-like, + = thick and spiny, 1 = present, 0 = missing). Appendices anales (Fig. 17) straight rod-like.

Legs: Tibiotarsi I – III (Fig. 18) with distal inner setae (including 2 setae of row pi) thicker than others, mostly pointed, seldom blunt. Tibiotarsi I – III rows p with 4, 4, 3 setae respectively, seta p1 always missing and thickness of these setae varies (tibiotarsus I with all setae p thin, tibiotarsus II with 2 thin, 2 thick, tibiotarsus III with 2 thin, 1 thick, Fig. 18). Claws (Fig. 19) with large pseudonychium and 2 inner teeth. Empodia (Fig. 19) with outer tooth, empodium I slender with long filament slightly exceeding claw, empodium III broad with short filament not exceeding claw.

Furca: Manubrium with 9+9 setae. Dens (Fig. 20) outer row E with 8 setae, inner row J with 7 (basal ones spiny), postero-outer row PE with 1, posterior row P with 7, formula of anterior setae 3(+1 outer),2,1,1 ... 1 (as in whole *C. rufescens*-group). Mucro (Fig. 21) with both posterior edges toothed.

Remarks: The chaetotaxy of abdominal segment VI of *Calvatomina strigata* n. sp. resembles *C. cruciata* Yosii, 1966. But the latter species has DL1 (= N') very short and thin, not as long or thick as in the new species, also the pigmentation differs. A varying seta DL1 (= N') was also described in *C. rufescens* by Mari Mutt (1987). The same seta is only slightly thickened in the same species described by Soto-Adames (1988). In *C. rufescens*, however, the pigmentation is more or less homogeneous, thus the striped pattern of *C. strigata* n. sp. also differs from that species.

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* This seta is called T in the tables of Snider (1990) and Nayrolles & Betsch (1996), but must be called T' according to Yosii (1969), who then differentiated these two setae: Seta T belongs to the dorsal anal valve and in *Calvatomina* becomes a4, seta T' belongs to the ventral anal valves and in my nomenclature is called VL1. In *C. rufescens* Mari Mutt, 1987 seta T in reality is seta H (= P1), and in *C. rufescens* Soto-Adames, 1988 seta T must also be called T' (= VL1).

***Diksamella* n. g.**

Type species: *Diksamella pohli* n. sp.

A genus of the monophylum Bourletiellida Bretfeld, 1986 (syn. Bourletiellidae Börner, 1913) with the following diagnostic characteristics of females (males unknown):

Mouthparts normal. Antennae shorter than body. Antennal segment II and especially segment III with reduced number of setae and with dorsal spines. Antennal segment IV with normal distal sensilla, with dorso-posterior sensillum P on 1st whorl behind tip, ventral sensilla V on 1st and 2nd whorl behind tip, tip with 11 distal sensilla. Some circumanal setae of female thicker than others, straight or waved and partially fringed, without forked setae. Tibiotarsi with smooth setae and without flattened or obliquely truncated inner setae. Tibiotarsi I – III with 3, 3, 2 spatulate setae respectively and 1 oval organ each. Tibiotarsus I seta Ja appressed. Empodia broad and smooth with blunt tip, filaments thin, short and not exceeding claws. Dens with middle anterior setae longer than spaces between their bases. Mucro with wavy posterior edges and protruding point.

Derivatio nominis: This new genus is named after the locality where its type species was collected, Diksam in the Isle of Socotra. The gender of this genus is feminine.

Justification: *Diksamella* n. g. appears in the key in Bretfeld (1999) near the genus *Bourletiella* Banks, 1899, the empodia of which also have short filaments. The new one differs from that genus since its empodia are broader and the filaments longer, the antennal segments II and III have a reduced number of setae and dorsal spines, and the distal anterior setae of dens are more numerous.

I suppose that the unknown males have antennae which function to meet the setae-free spaces in the antennae of the females, i.e. I predict clasping antennae in this genus.

In the Bourletiellida, there are 2 genera known with clasping antennae in males, *Bovicornia* Delamare Deboutteville, 1947, with several species mainly in the tropics, and *Bourletides* Betsch & Massoud, 1972, from Australia. But in both genera the females show a complete set of antennal setae besides several other differences. Therefore this new genus *Diksamella* differs from all others known and especially from those suspected to be related.

***Diksamella pohli* n. sp.**

Holotype: Female (no. 1, on 4 slides, at HLMD) from sample SOQ 2000/11: Yemen, Isle of Socotra, Diksam Camp on the bottom of a valley with grass and dwarf shrubs, 12°31.401'N – 53°57.204'E, from leaf-litter surrounding big boulders at 800 m altitude, 26 – 27 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 3+4e).

Paratype: 1 female (no. 2, on 4 slides, at HLMD) together with the holotype.

Derivatio nominis: This new species is gratefully dedicated to one of its collectors, Dr Hans Pohl, University of Rostock, Germany.

Diagnosis: A dark blue pigmented species of the genus *Diksamella* Bretfeld, see above, with 5 diagnostic characteristics:

– Head and body with dark blue pigmented pattern,

– antennal segments II and III with 2 and 1 dorsal spine respectively,

– appendices anales slender, partially fringed, tip with incision,

– tibiotarsi without long outer setae,

– formula of anterior setae of dens 3+1,2,1,1 ... 1.

Other diagnostic characteristics as mentioned for the genus.

Description (of the 2 females known, males unknown):

Measurements and proportions: Total length 0.6 mm. Head diagonal 0.25 mm. Mucro 50 µm. Claw III inner edge 27 µm. Appendices anales 23 µm. Length of whole antenna : head diagonal = 1.65. Antennal segments I : II : III : IV = 1 : 1.8 : 3 : 6.4. Manubrium : dens : mucro = 3.7 : 3 : 1. Mucro : claw III inner edge = 1.8. Appendices anales : mucro = 0.5. Appendices anales : claw III inner edge = 0.8.

Colour (Fig. 22): Eye-patches black. Background colour yellowish white with dark blue pigment. Head with irregular blue spots. Dorsal and lateral parts of large abdomen with irregular stripes, anterior part with cross stripes, posterior part with longitudinal stripes. Small abdomen with dorsal spots and stripes. Ventral side of abdomen unpigmented. Antennae red-violet, legs and furca unpigmented.

Chaetotaxy and special structures: Head with short and thin setae, anterior part of large abdomen with very short, posterior and lateral parts with longer setae.

Head: Eye-patches normal, with 2+2 setae. Head apex with 2+2, frons rows a with 5+5 and its middle part with 10 and 13 setae. Clypeus region M with 10 setae in asymmetrical position. Ventral head-back with 2+2 oval organs. Mouthparts normal.

Antennae: Total length shorter than body. Segment I with 7 setae as usual. Segment II whorls 1 – 4 (Fig. 23) with 2, 2, 1, 8 setae respectively of which 2 dorso-distal setae spine-like. Segment III (Fig. 23) with only 2 whorls with 6 ... 6 setae of which 1 dorso-basal seta spine-like. Segment IV with 5 intermediate subsegments and long tip, region T without setae, distal subsegments with 5 dorso-anterior, 6 dorso-posterior (large sensillum P in 1st whorl behind tip) and 2 ventral additional sensilla in 1st and 2nd whorl behind tip, tip with 11 distal sensilla.

Large abdomen: Chaetotaxy not analysed. Ventral tube with 1+1, retinaculum with 3 setae.

Small abdomen: Genital papilla with 7 – 8 setae. Segment VI (Fig. 24) with circumanal setae a0, a1 – a3, av1', av1 – av5, of which 6 pairs thicker than others, partially fringed and waved (in Fig. 24 these setae are perspectively shortened, the extra seta figured shows the full length). Appendices anales (= av5) slender, partially fringed, tip with incision.

Legs: Setae of tibiotarsi normal, inner ones stronger than others, without flattened or obliquely truncated setae. Tibiotarsi I – III rows p with 5, 3, 2 setae and with 3, 3, 2 spatulate ones respectively. Tibiotarsus I seta Ja appressed. Claws (Figs 25, 26) broad with outer and inner tooth, without lateral teeth. Empodia (Figs 25, 26) broad and smooth with blunt tip, filaments thin, short and not exceeding claws.

Furca: All setae normal. Manubrium with 8+8 setae. Dens outer row E with 8 setae, inner row J with 7, postero-outer row PE with 1, posterior row P with 7, formula of anterior setae 3+1,2,1,1 ... 1, middle ones longer than spaces between their bases. Mucro (Fig. 27) with thin and wavy posterior edges, narrow anterior furrow and protruding tip, seta missing.

Fig. 22

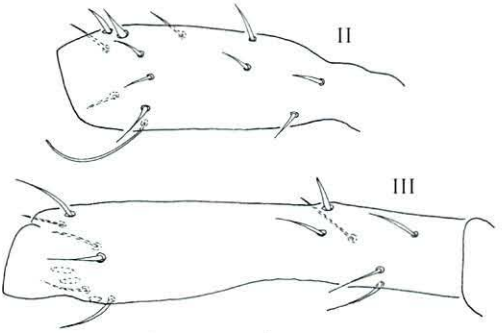

Fig. 23

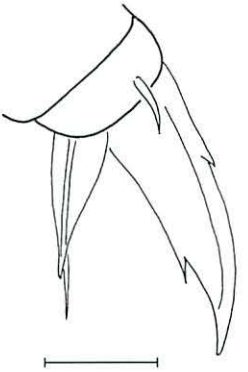

Fig. 25

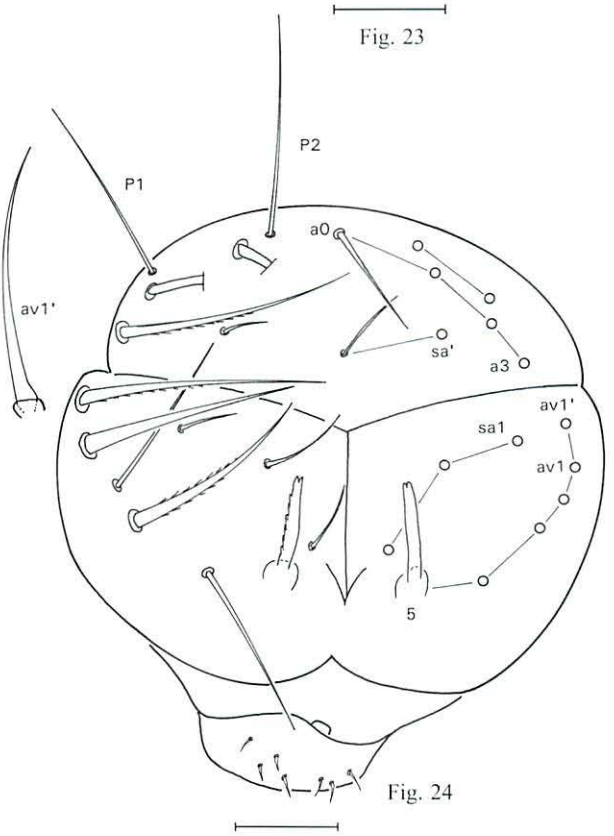

Fig. 24

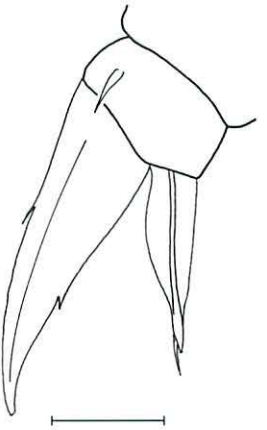

Fig. 26

Fig. 27

Diksamella pohli n. g. n. sp.

Fig. 22 Colour pattern of abdomen. Total length 0.5 mm

Fig. 23 Antennal segments II and III (bar = 25 µm)

Fig. 24 Small abdomen of female and full length of seta av1' from another female (bar = 25 µm)

Fig. 25 Claw and empodium I (bar = 10 µm)

Fig. 26 Claw and empodium III (bar = 10 µm)

Fig. 27 Mucro. E marks outer edge (bar = 25 µm)

***Orenius* Bretfeld, 2001, in Bretfeld et al. 2001**

This genus, described with one species from Israel, was represented on the Isle of Socotra by a second, new species (see below). The study of this new species showed that some characteristics of the type species, *Orenius parvus* Bretfeld, 2001, were not mentioned in the original description and they are added here: Antennal segment III with 23 setae. Segment IV region T with 4 – 6 setae. Small abdomen segment VI with outer circumanal setae a0, a1, a2 and P2 not thicker than others, length of inner circumanal seta sa > sa'. Relation of appendices anales : circumanal seta P2 about 0.75. Setae of tibiotarsi I – III relatively short. Inner sides of dentes with basal points (Fig. 28), seta E4 of dens missing.

For a comparison of some characteristics with that of the new species, see below under Remarks on the new species.

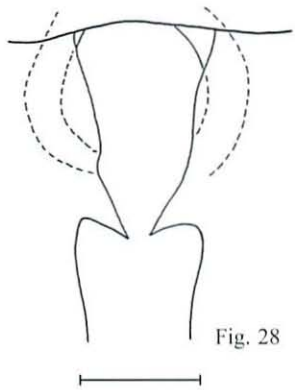

Fig. 28

Orenius parvus Bretfeld, 2001
Fig. 28 Basal inner points of dentes (bar = 10 µm)

***Orenius maculatus* n. sp.**

Holotype: Female (on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2i).

Paratypes: 4 specimens (1 female and 2 males in alc., 1 male on 3 slides, all at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its spotted pigmental pattern.

Diagnosis: A small, black-spotted species of the genus *Orenius* Bretfeld, 2001, in Bretfeld et al. 2001, with 5 diagnostic characteristics:

– Black spots on head and abdomen,

– length of basal sensilla of antennal segment IV as 1 : 2,

– circumanal setae sa and sa' of same length,

– anterior side of dens with 9 setae,

– dentes with basal inner pair of round tubercles.

Description (of mainly 1 female and 1 male slide specimens):

Measurements and proportions: Total female 0.7 – 0.8 mm, male 0.4 – 0.5 mm. Head diagonal in female 0.3 mm, in male 0.2 mm. Mucro in female 85 µm, in male 58 µm. Claw III inner edge in female 13 µm, in male 8 µm. Appendices anales 34 µm. Length of whole antenna : head diagonal = 2.3 (2.5) in female (and male). Antennal segments I : II : III : IV = 1 : 2.6 (2.1) : 4.1 (3.3) : 9.3 (8.3) in female (and male). Manubrium : dens : mucro = 3.3 (3) : 2.3 : 1 in female (and male). Mucro : claw III inner edge = 6.5 (7.3) in female (and male). Appendices anales : mucro = 0.4. Appendices anales : claw III inner edge = 2.6. Appendices anales : circumanal seta P2 = 0.5.

Colour (Fig. 29): Eye-patches black. Background colour whitish with black spots, head pigment weaker than that of body. Lateral parts of head with spots, below antennae with 2 cross stripes. Large abdomen with symmetrical spots. Small abdomen with 1+1 lateral spots. Antennae violet, legs, furca and ventral side of body unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated): Head and body with normal setae.

Head: Eye-patches with apparently 8+8 ommatidia, but partially obscured by pigment, 1+1 setae. Head apex with 1+1, frons rows a with 5(6)+6 and its middle part with 11 setae. Ventral head-back with 2+2 oval organs in male, in female not certain. Labrum with setae a1 spiny.

Antennae: Segment II rows 1 – 4 with 2, 4, 3, 9 setae respectively. Segment III with 23 setae. Segment IV with 5 elongate intermediate subsegments, basal sensilla P1/2 about half as long as sensilla P1/3 (Fig. 30), basal whorl p1 with 5, p2 with 5, region T with 6 – 7 setae, distal subsegments with 5 dorso-anterior, 6 dorso-posterior and 2 ventral additional sensilla.

Large abdomen: Chaetotaxy obscured by gut content and pigment.

Small abdomen: Genital papilla in female with 8 setae, in male not certain. Segment VI in male with only normal, thin setae, dorsal part with row A:3, m:1 (anterior), DL:2, P:2 setae, dorsal anal valve with setae a0, a1, a2 and P2; in female same pattern but setae a0, a1, a2 and P2 longer than others, a0 the strongest, ventral anal valves with setae av1-5 (av1' missing). Appendices anales (= av5, Fig. 31) as straight and blunt rods.

Legs: Tibiotarsi with some obliquely truncated setae, other setae of normal length. Tibiotarsi I – III rows p with 7, 5, 4 setae and with 3, 2, 2 spatulate ones respectively. Pretarsal seta apparently missing. Claws (Fig. 32) with inner tooth. Empodia (Fig. 32) more slender than claws, with slender point and thick filament with hatchet-like tip exceeding claws.

Furca: All setae normal. Manubrium with 8+8 setae. Dentes with 1 basal inner pair of round tubercles (Fig. 33). Dens outer row E with 6 setae (seta E4 missing), inner row J with 5 (3 distal, 2 proximal), postero-outer row PE with 1, posterior row P with 7, formula of anterior setae 3(+1 outer),2,1,1 ... 1, middle ones longer than spaces between their bases. Mucro smooth with broad anterior furrow and broad tip, seta missing.

Remarks: The type species, *Orenius parvus* Bretfeld, 2001, and the new species, *O. maculatus*, share the general chaetotaxy and especially the shapes of claws and empodia, and thus show that they belong to the same genus. They differ in colour and in some other differences (characteristics of the type species in brackets): Head, body, appendices anales, claws and mucro larger. Relation of appendices anales : circumanal seta P2 = 0.5 (about 0.75). Apparently all 8+8 ommatidia present (only 7+7). Antennal segment II with 18 setae (17). Antennal segment IV with basal sensillum P1/2 longer, i.e. length 0.5 of P1/3 (0.2), region T with 6 – 7 setae (4 – 6). Dorsal circumanal setae in female longer and stouter than others (of same shape as others), setae sa and sa' of dorsal anal valve of same length (sa longer than sa'). Setae of tibiotarsi long (short). Tibiotarsus II with 2 distal spatulate setae (3). Empodia of same dimensions as claws (empodia larger than claws). Anterior side of dens with 9 setae (8), and basal inner tubercles of dentes round (pointed).

Fig. 29

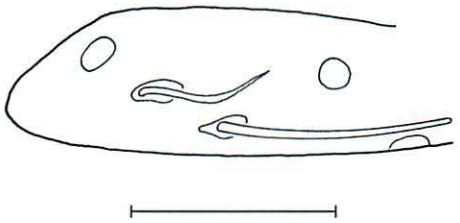

Fig. 30

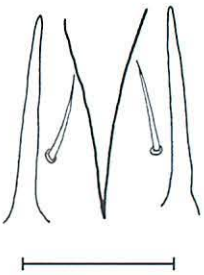

Fig. 31

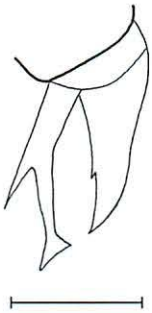

Fig. 32

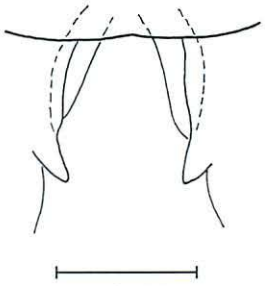

Fig. 33

Orenius maculatus n. sp.

Fig. 29 Colour pattern. Total length 0.8 mm
Fig. 30 Basal sensilla of antennal segment IV (bar = 20 µm)
Fig. 31 Appendices anales and setae sa3 (bar = 25 µm)
Fig. 32 Claw and empodium (bar = 10 µm)
Fig. 33 Basal inner tubercles of dentes (bar = 25 µm)

***Sanaaiella septemlineata* n. sp.**

Holotype: Female (no. 1, on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2e).

Paratypes: 12 specimens (on slides and in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its striped pigmental pattern.

Diagnosis: A strongly contrasted species of the genus *Sanaaiella* Bretfeld, 2000, with 6 diagnostic characteristics:

- Large abdomen with 6 – 7 black longitudinal stripes,
- antennal segment IV with 3 sensilliform setae PB,
- antennal segment IV region T short,
- appendices anales short band-like with toothed tip,
- tibiotarsi I – III rows p with 5, 5, 3 setae respectively,
- formula of anterior setae of dens 3+1,2,1,1 ... 1.

Description (refers to that of the type species, *Sanaaiella quadripunctata* Bretfeld, 2000, and mainly mentions the differences from that species):

Measurements and proportions (mainly from 2 female and 1 male slide specimens): Total female up to 0.9 mm, male 0.5 mm. Head diagonal in female 0.11 mm, in male 0.09 mm. Mucro in female 70 µm, in male 60 µm. Claw III inner edge 16 µm in both sexes. Appendices anales 22 µm. Length of whole antenna : head diagonal = 1.9 (2) in female (and male). Antennal segments I : II : III : IV = 1 : 1.9 (2.2) : 3 (3.1) : 6.6 (6.9) in female (and male). Manubrium : dens : mucro = 3.3 : 2.8 : 1 in both sexes. Mucro : claw III inner edge = 4 in both sexes. Appendices anales : mucro = 0.3. Appendices anales : claw III inner edge = 1.3.

Colour (Fig. 34): Eye-patches black. Background colour yellowish white, head and body with stripes and spots of black pigment. Head with 1+1 spotted longitudinal bands including eye-patches and also lateral parts with black stripes. Large abdomen with 6 – 7 longitudinal stripes. Small abdomen segment V with 3 spots, segment VI with anchor-like dorsal spot. Antennae violet, legs and furca unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated):

Head: Apex with 5 (2-m-2), frons rows a with 6+6 and its middle part with 14 – 15 setae. Clypeus region M not observed because of pigment. Ventral head-back with 2+2 oval organs.

Antennae: Segment II whorls 1 – 4 with 2, 4, 3, 9 setae respectively. Segment III whorl 8 with 3 setae. Segment IV with 3 postero-basal sensilliform setae PB, intermediate region T with 4 – 6 setae, distal part with 6 dorso-anterior and 4 dorso-posterior sensilla.

Large abdomen: Chaetotaxy obscured by pigment and gut content.

Small abdomen: Genital papilla in female with 13 setae, in male not certain. Segment VI with circumanal setae a1, a2, av1 thicker than others, smooth and bowed, av3 also thicker and smooth but shorter than others and straight; dorsal and ventral anal valves in females with 1 pair of oval organs each, in males missing. Appendices anales (= av5, Fig. 35) band-like, tip with small teeth.

Legs: Tibiotarsi I – III rows p with 5, 5, 3 setae respectively. Claws and empodia as in the type species.

Furca: Manubrium with 8+8 setae. Dens outer row E with 8 setae, inner row J with 5 – 7 in rather equal distances apart, postero-outer row PE with 1, posterior row P with 7, formula of anterior setae 3+1,2,1,1 ... 1. Mucro (Fig. 36) with smooth edges, anterior furrow of moderate width.

Remarks: From the 5 *Sanaaiella* species known (Bretfeld 2000b), there are 4 described from the mainland of Yemen only. One, however, *S. intermaculata* Bretfeld, 2000, was found in both the mainland and the Isle of Socotra, and there also in the Wadi Daneghan, as was the new species, but then at 300 m altitude.

The new species, *Sanaaiella septemlineata*, mainly differs from the known species by its striking pigmentation and its setae of tibiotarsi I – III rows p (5, 5, 3 setae respectively). Table 1 in Bretfeld 2000b, p. 171, can be supplemented with the data of the new species as follows: Colour: 6 – 7 dark longitudinal bands. Setae of Ant III whorl 8: 3. Postero-basal sensilla of Ant IV: 3. Setae of Ant IV region T: 4 – 6. Antero-distal sensilla of Ant IV: 5 – 6. Postero-distal sensilla of Ant IV: 3 – 4. Setae of tibiotarsi I – III rows p: 5, 5, 3. Inner setae J of dens: 5 – 7. Anterior setae of dens: 4,2,1,1 ... 1. Appendices anales: short band-like.

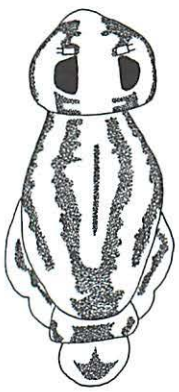

Fig. 34

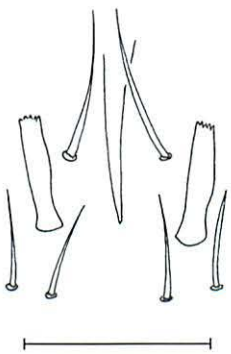

Fig. 35

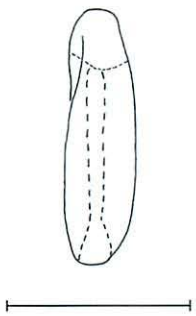

Fig. 36

Sanaaiella septemlineata n. sp.

Fig. 34 Colour pattern. Total length 0.9 mm

Fig. 35 Appendices anales and adjacent setae (bar = 50 µm)

Fig. 36 Mucro (bar = 50 µm)

***Songhaica nigeriana* Lasebikan et al., 1980**

Material: Sample SOQ 2000/02a (Bretfeld's number: Yemen IV 2l): 2 specimens (1 female and 1 male, on 4 and 3 slides respectively).

In addition to the original description, the characteristics of the new specimens from Socotra Island are given here in detail to demonstrate both the similarity and the few differences.

Measurements and proportions (from female and male): Total female 0.5 mm, male 0.35 mm. Head diagonal in female 0.2 mm, in male 0.16 mm. Mucro in female 48 µm, in male 33 µm. Claw III inner edge in female 15 µm, in male 13 µm. Appendices anales 39 µm. Length of whole antenna : head diagonal = 2.2 (2.4) in female (and male). Antennal segments I : II : III : IV = 1 : 1.7 : 2.3 (2.5) : 7.1 (8.2) in female (and male). Manubrium : dens : mucro = 2.4 (2.9) : 2.9 (3.6) : 1 in female (and male). Mucro : claw III inner edge = 3.2 (2.5) in female (and male). Appendices anales : mucro = 0.8. Appendices anales : claw III inner edge = 2.6.

Colour (Fig. 37): Eye-patches black. Background colour white, head and body with a broad, blue, horizontal band. Head with additional small patch between antennae. Large abdomen with additional pigment in a cross stripe on thorax, 2 blue spots in the middle, and a broad patch on the posterior. Small abdomen segment VI also with blue dorsal side. Antennae violet, legs and furca unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated):

Head: Eye-patches with 6+6 large ommatidia, small ones obscured by pigment, 1+1 setae (lower pair missing). Head apex with 1+1 setae (i.e. median seta missing), frons rows a with 5+5, rows b with 3+3, and with 2 median frontal setae. Clypeus without median setae (i.e. middle region with pairs of setae), anterior row g with only 2+2 setae. Labrum uncertain.

Antennae: Segment I with 7 setae as usual. Segment II whorls 1 – 4 with 2, 3, 3, 8 setae respectively. Segment III with 19 setae. Segment IV with 10 – 11 subsegments, basal one with 2 short setae-like oval organs (1 anterior, 1 posterior), subsegments with 9 dorso-anterior, 9 dorso-posterior additional sensilla and 2 sensilla-like ventral setae (in 2 distal whorls separated by a whorl with normal setae).

Large abdomen: Furca base with 3+3 neosminthuroid setae. Retinaculum with 2 setae and 3+3 teeth. Ventral region of large abdomen with 5+5 setae.

Small abdomen: Genital papilla in female with 3+3 setae, in male not certain. Segment VI in female with long and thin dorsal setae as A:3, DL:2, P:2, m:1 (posterior one); circumanal setae a0, a1, a2 longer and thicker than av1 – av4, dorsal anal valve with setae sa and sa'. Appendices anales (av5, Fig. 38) long, strong, slightly waved, and tip cut. Segment VI in male with a0 long and thick (thicker than in the new species described below), a1 and a2 of normal shape, setae sa and sa' of same length (other setae uncertain because of the smallness of this body part).

Legs: Trochanter III in female with slender and blunt posterior spine and 4 normal setae (in male uncertain). Tibiotarsi I – III with inner setae thicker than others, rows p with 7, 5, 4 setae respectively in both sexes. Claws and empodia small and difficult to analyse (Fig. 39). Claws with distal inner tooth and cavity, outer tooth missing. Empodia with rough outer edge and short filament.

Furca: Manubrium with 6+6 setae. Dens outer row E with 4 setae (3 distal, 1 proximal), inner row J with 3 (1 distal, 2 proximal), postero-outer row PE with 1, posterior row P with 5, formula of anterior setae 3+1,1 ... 1 (middle one longer than others, see Fig. 48). Mucro (Fig. 40) slender, all edges smooth.

Remarks: The colour and the chaetotaxy of these two *Songhaica* specimens described above differ from the new species (see below) as indicated in its diagnosis but resemble *Songhaica nigeriana*. There are only few differences from the original description: The pigment is lighter, the lower setae of the eye-patches are missing and the appendices anales are not straight but waved. The number of setae of antennal segment III cannot be compared as they are not completely described in the original description and the claws are too small to allow the observation of differences.

Thus I think it best to assign these two specimens from Socotra to *S. nigeriana*, a conclusion which is supported by the geographical vicinity of this island to Africa.

Fig. 37

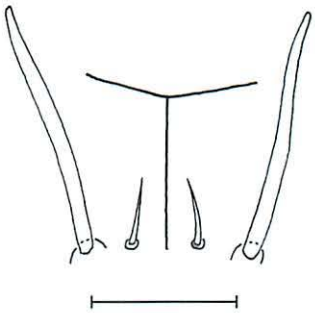

Fig. 38

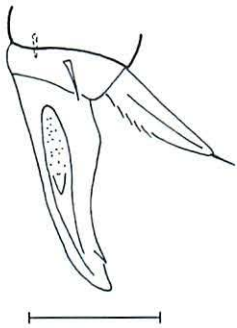

Fig. 39

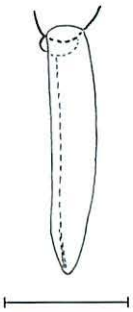

Fig. 40

Songhaica nigeriana

Fig. 37 Colour pattern. Total length 0.35 mm

Fig. 38 Appendices anales and setae sa3 (bar = 25 µm)

Fig. 39 Claw and empodium seen from anterior (bar = 10 µm)

Fig. 40 Mucro (bar = 25 µm)

***Songhaica soqotrana* n. sp.**

Holotype: Female (no. 3, on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2h).

Paratypes: 9 specimens (females and males, on slides and in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from the Isle of Socotra, where it was collected.

Diagnosis: A striped species of the genus *Songhaica* Lasebikan et al., 1980 with 5 diagnostic characteristics:

- Head and large abdomen with 3+3 dark, longitudinal stripes,
- rows b of head frons with 4+4 setae,
- antennal segment III with 17 setae,
- segment VI of small abdomen without setae sa',
- appendices anales long and acuminate.

Description (refers to that of the type species, *Songhaica nigeriana* Lasebikan et al., 1980, and mainly mentions the differences from that species):

Measurements and proportions (mainly from 3 female and 2 male slide specimens): Total female up to 0.45 mm, male 0.3 mm. Head diagonal in female 0.2 mm, in male 0.15 mm. Mucro in female 40 µm, in male 30 µm. Claw III inner edge 15 µm in both sexes. Appendices anales 40 µm. Length of whole antenna : head diagonal = 2 (2.3) in female (and male). Antennal segments I : II : III : IV = 1 : 1.6 (1.7) : 2.5 (2.6) : 7.5 (7.9) in female (and male). Manubrium : dens : mucro = 3 : 3 : 1 in both sexes. Mucro : claw III inner edge = 2.7 (2.5) in female (and male). Appendices anales : mucro = 1. Appendices anales : claw III inner edge = 2.7.

Colour (Figs 41, 42): Eye-patches black. Background colour white with dark longitudinal stripes. Head with 2 – 3 stripes. Large abdomen with 3+3 longitudinal stripes with 2 – 3 cross connections. Dorsal parts of small abdomen surrounded by dark pigment. Antennae violet, legs and furca unpigmented.

Chaetotaxy and special structures (applies to both sexes if not otherwise stated):

Head: Eye-patches with 6+6 large ommatidia (especially A and B large), C and D small, 2+2 setae. Head apex with 1-m-1, frons rows a with 5+5, rows b with 4+4, and 1 median frontal seta. Clypeus without median setae (i.e. middle region with pairs of setae), anterior row g with only 2+2 setae. Labrum rows a, m, p with 4, 5, 5 setae respectively.

Antennae: Segment I with 7 setae as usual. Segment II whorls 1 – 4 with 2, 3, 3, 8 setae respectively. Segment III with 17 setae. Segment IV with 11 subsegments, basal one with 2 short setae-like oval organs (1 anterior, 1 posterior), subsegments with 10 dorso-anterior, 10 dorso-posterior additional sensilla and 2 sensilla-like ventral setae (in 2 distal whorls separated by a whorl with normal setae).

Fig. 41

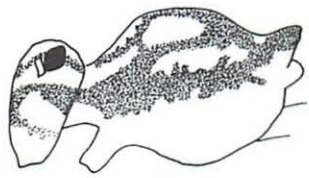

Fig. 42

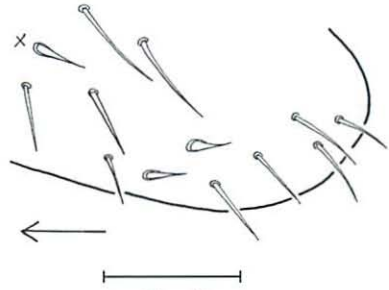

Fig. 43

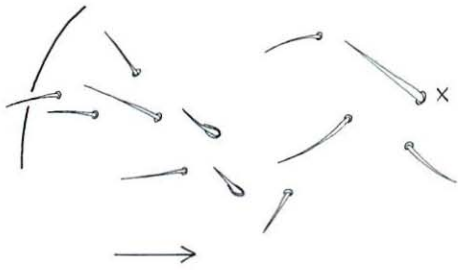

Fig. 44

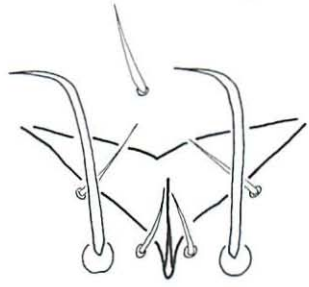

Fig. 45

Fig. 46

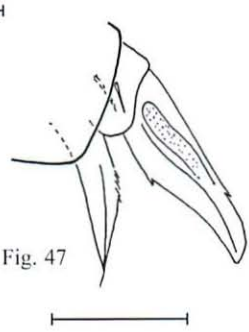

Fig. 47

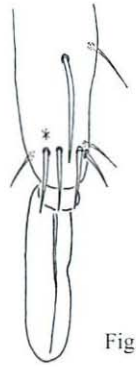

Fig. 48

Songhaica soqotrana n. sp.

Fig. 41 Colour pattern seen from dorsal. Total length 0.45 mm

Fig. 42 Colour pattern seen from lateral. Total length 0.45 mm

Fig. 43 Furcal base with 3 neosminthuroid setae, marked seta varies. Arrow marks the anterior (bar = 25 µm)

Fig. 44 Furcal base with 2 neosminthuroid setae, marked seta varies. Arrow marks the anterior (bar = 25 µm)

Fig. 45 Appendices anales and some inner circumanal setae (bar = 25 µm)

Fig. 46 Spine of trochanter III (bar = 10 µm)

Fig. 47 Claw and empodium seen from anterior (bar = 10 µm)

Fig. 48 Tip of dens and mucro seen from anterior. Asterisk represents a posterior seta (bar = 25 µm)

Large abdomen: Furca base (Figs 43, 44) with 2+2 or 3+3 neosminthuroid setae, the anterior one (marked by x) varies between individuals and body sides: Strong and normal seta - larger basis but seta shorter than normal - long basis and seta short. Retinaculum with 2 setae and 3+3 teeth. Ventral region of large abdomen with 5+5 setae.

Small abdomen: Genital papilla in female with 5 – 6 setae, in male not certain. Segment VI in female (in male not all setae certain) with dorsal setae as A:3, DL:2, P:2, m:1 (posterior one); circumanal setae a0 (in male thicker than others), a1, a2, av1 - av5, dorsal anal valve with seta sa strong, setae sa' missing. Appendices anales (= av5, Fig. 45) long, distal part curved and acuminate.

Legs: Trochanter III with posterior spine (Fig. 46) and 4 normal setae. Tibiotarsi I – III with inner setae thicker than others, rows p not certain. Claws and empodia small and difficult to analyse (Fig. 47). Claws with outer and inner tooth and cavity. Empodia with rough outer edge and short filament.

Furca: Manubrium with about 6+6 setae. Dens outer row E with 3 setae (only distal ones), inner row J with 2 (1 distal, 1 proximal), postero-outer row PE with 1, posterior row P with 5, formula of anterior setae 3+1,1 ... 1 (middle one longer than others, Fig. 48). Mucro (Fig. 48) with smooth edges, inner may be slightly waved, anterior ridge almost undivided.

Remarks: This new species, *Songhaica soqotrana*, clearly differs from *S. nigeriana*. Besides the characteristics mentioned in the diagnosis, the number of setae of the outer and inner rows of the dentes differ.

***Soqotrasminthurus* n. g.**

Type species: *Soqotrasminthurus vanharteni* n. sp.

Diagnosis: A genus of the group Sminthurida Bretfeld, 1986 (syn. Sminthuridae Börner, 1913, sensu Betsch 1980) and the subgroup (= subfamily) Sminthurinae sensu Betsch 1980, with the following diagnostic characteristics:

Head and abdomen with normal setae. Postantennal setae missing. Antennae as long as or longer than body. Antennal segment III with only short normal setae. Antennal segment IV with many (about 20) intermediate subsegments. Posterior of large abdomen without large cuticular glands. Abdominal segment V with 1+1 protuberances, each apex of which with short and spiny bothriotrix D. Trochanter III with posterior spine. Tibiotarsi I – III distally with only pointed setae, setae Ia, Ip and IIi missing. Claws with cavity. Anterior side of dens with 12 setae, inner ones normal. Mucro with smooth posterior edges, seta missing.

Derivatio nominis: The name of this new genus is derived from the Isle of Socotra (also spelled Soqotra), where it was collected. The gender is masculine.

Justification: *Soqotrasminthurus* n. g. appears in the key in Bretfeld (1999) near *Gisinurus* Dallai, 1970, because of the claws having a cavity. Although the chaetotaxy is also similar to that genus, the new one differs by the reduced number of distal tibiotarsal setae and especially by the protuberances of the abdominal segment V and the short and spiny bothriotrichia D.

***Soqotrasminthurus vanharteni* n. sp.**

Holotype: Female (no. 2, on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X. 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2c).

Paratypes: 13 specimens (female no. 1, male no. 1 and 2 on slides, others in alc., at HLMD) together with the holotype.

Derivatio nominis: This new species is gratefully dedicated to one of its collectors, Dr Antonius van Harten, whose collections are the basis of our knowledge of the Collembola of the Republic of Yemen.

Diagnosis: A blue-violet spotted species of the genus *Soqotrasminthurus* Bretfeld, see above, with 5 diagnostic characteristics:

- Large abdomen with blue-violet spots,
- length of antenna > total length of specimen,
- abdominal segment V with short protuberances,
- these protuberances with many setae and short and thin bothriotrichia D+D,
- claws each with 2 short inner teeth.

Other diagnostic characteristics as mentioned for the genus.

Description (mainly of the slide specimens):

Measurements and proportions (applies to both sexes if not otherwise stated): Total female up to 1.2 mm, male 0.8 mm. Total antenna up to 1.5 mm in female, 1.1 mm in male. Head diagonal in female up to 0.6 mm, in male 0.4 mm. Mucro in female up to 140 µm, in male 100 µm. Claw III inner edge in female up to 50 µm, in male 30 µm. Appendices anales 34 and 42 µm. Length of whole antenna : head diagonal = 2.7 (3.1) in female (and male). Antennal segments I : II : III : IV = 1 : 1.8 (2.1) : 3.5 (3.9) : 10 (13) in female (and male). Manubrium : dens : mucro = ?? (2.9) : 3.3 (3.2) : 1 in female (and male). Mucro : claw III inner edge = 2.9 (3.1) in female (and male). Appendices anales : mucro = 0.3. Appendices anales : claw III inner edge = 0.9.

Colour: Eye-patches black. Background colour yellow with blue-violet spots. Head with dark frontal eye and little faint pigment. Large abdomen (see Fig. 58) with irregular faint and dark blue-violet spots mainly on lateral and posterior parts. Small abdomen unpigmented. Antennae violet, legs and furca unpigmented.

Chaetotaxy and special structures: Head and body with normal setae.

Head: Anterior side with 3+3 pores below antennae, without postantennal organs. Ventral head-back with 2+2 or 3+3 oval organs. Labrum with normal setae.

Antennae: All setae relatively short. Segment I with 7 setae as usual. Segment II whorls 1 – 4 with 1, 4, 5, 8 setae respectively, with 4 long and thin ventral setae-like sensilla. Segment III with about 38 setae, 2 main sensilla of antennal organ in separate grooves with common opening. Segment IV with about 24 intermediate subsegments and many dorso-anterior and dorso-posterior sensilla.

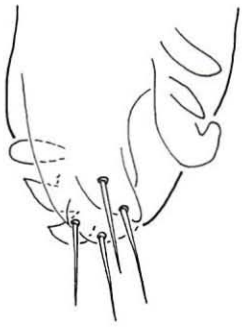

Fig. 49

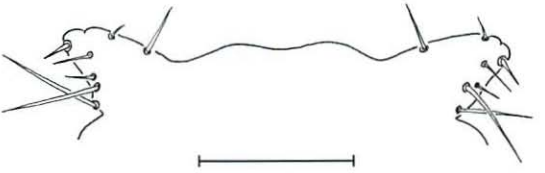

Fig. 50

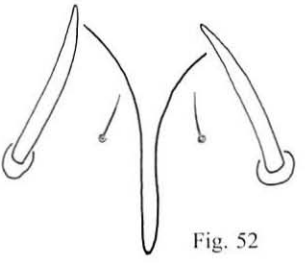

Fig. 52

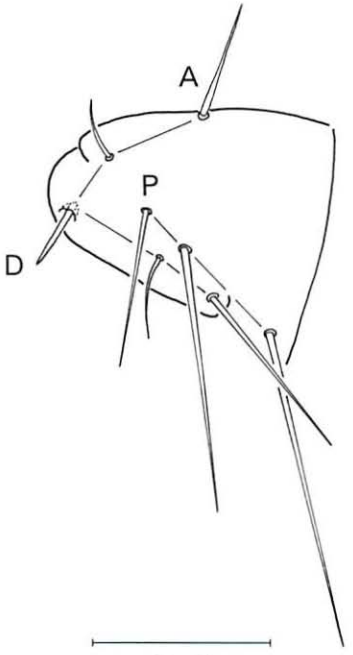

Fig. 51

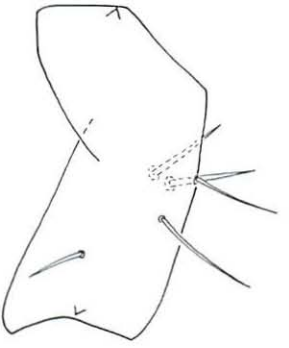

Fig. 53

Fig. 54

Soqotrasminthurus vanharteni n. g. n. sp.

Fig. 49 Retinaculum (bar = 25 μm)

Fig. 50 Dorsal side of abdominal segment V (bar = 100 μm)

Fig. 51 Protuberance of abdominal segment V. Bothriothrix D and setal rows A and P marked (bar = 50 μm)

Fig. 52 Appendices anales and setae sa3 (bar = 25 μm)

Fig. 53 Trochanter I seen from anterior (bar = 50 μm)

Fig. 54 Spine of trochanter III (bar = 25 μm)

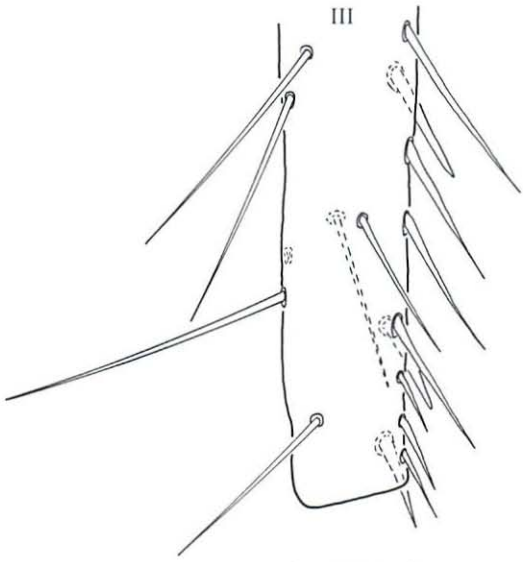

Fig. 55

Fig. 56

Fig. 57

Soqotrasminthurus vanharteni n. g. n. sp.

Fig. 55 Distal part of tibiotarsus III seen from anterior (bar = 25 µm)

Fig. 56 Claw and empodium I seen from anterior (bar = 20 µm)

Fig. 57 Mucro (bar = 50 µm)

Large abdomen: All setae normal, neosminthuroid setae missing, bothriotrichia ABC obscured by gut content. Ventral tube with 1+1 distal setae. Retinaculum (Fig. 49) with 3+3 teeth and 2+2 setae on separated lobes. Ventral region of large abdomen with 5 - 6 + 5 - 8 setae.

Small abdomen: Segment V (Figs 50, 51) with a pair of short lateral protuberances, each with 8 normal, long and short setae arranged in 2 usual rows (anterior A, posterior P), bothriothrix D at tip short, thin and pointed. Female genital papilla with 12 setae, male about 18+18. Segment VI with normal setae arranged as usual, with 7 dorsal and 5+5 ventral circumanal setae. Appendices anales (= av5, Fig. 52) relatively short, smooth, pointed and slightly bowed to the anterior.

Legs: Most setae normal. Coxae I – III with 1, 2, 4 setae respectively, coax III with 2 oval organs. Trochanter I (Fig. 53) with a pair of posterior setae. Trochanter III with a long spine (Fig. 54). Tibiotarsi I – III with most outer setae slightly longer than diameter of

tibiotarsus, with 4 oval organs in row pe, rows p with 7, 7, 6 – 7 setae respectively, without setae Ia, Ip and IIi. Tibiotarsus I (see Fig. 63) with 1 inner seta thicker than others and 1 seta with a long flagellum (seta IIIi?). Tibiotarsus II with a few thick inner setae, without flagellated one. Tibiotarsus III (Fig. 55) with a few distal inner setae spiny, without flagellated seta. Claws (Fig. 56) with 2 small inner teeth, tunica and large cavity with uncertain opening. Empodia (Fig. 56) slender without outer tooth, filaments short and not exceeding claws.

Furca: Most setae normal. Manubrium with 8+8 setae. Dens outer row E with 7, inner row J with 7, postero-outer row PE with 1, posterior row P with 8 setae (basal one duplicated), formula of anterior setae 3(+1 outer),2,2,2,1,1 ... 1 with all setae except basal one strong and waved. Mucro (Fig. 57) simple with smooth edges, seta missing.

Remarks: The colour pattern of this new species, *Soqotrasminthurus vanharteni*, resembles that of the second species described here; I was not able to separate them by their pattern. *S. vanharteni* distinctly differs, however, from the second species in the protuberances of abdominal segment V. They are plesiomorphic compared with the second species, since they are short, have the usual number of setae and the bothriotrichia D are thin.

***Soqotrasminthurus hadiboensis* n. sp.**

Holotype: Female (no. 1, on 4 slides, at HLMD) from sample SOQ 2000/01: Yemen, Isle of Socotra, town of Hadibo and in its immediate vicinity, 12°36'57"N – 54°01'01"E, pitfall traps in dry plain with scarce, low vegetation at 10 m altitude, 20 X – 1 XI 2000 leg. Pohl (Bretfeld's number: Yemen IV 1).

Paratypes: 2 specimens (1 female on 3 slides, 1 specimen in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its type locality.

Diagnosis: A blue spotted species of the genus *Soqotrasminthurus* Bretfeld, see above, with 5 diagnostic characteristics:

– Large abdomen with blue spots,

– length of antenna ≤ total length of specimen,

– abdominal segment V with long protuberances,

– these protuberances with few distal setae and short and thick bothriotrichia D+D,

– claws each with 2 large inner teeth.

Other diagnostic characteristics as mentioned for the genus.

Description (the 2 females prepared are ready to moult, thus the chaetotaxy cannot be completely observed):

Measurements and proportions: Total length 0.8 and 1.0 mm. Total antenna 1 mm. Head diagonal 0.40 and 0.48 mm. Mucro 77 and 94 µm. Claw III inner edge 30 µm. Appendices anales 33 µm. Length of whole antenna : head diagonal = 2.4. Antennal segments I : II : III : IV = 1 : 1.7 : 3.1 : 9. Manubrium : dens : mucro = 3.4 : 3.5 : 1. Mucro : claw III inner edge = 2.9. Appendices anales : mucro = 0.4. Appendices anales : claw III inner edge = 1.2.

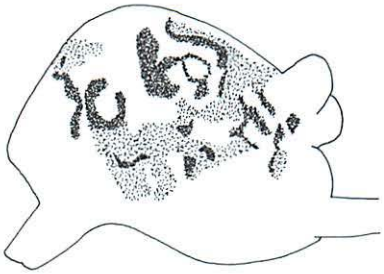

Fig. 58

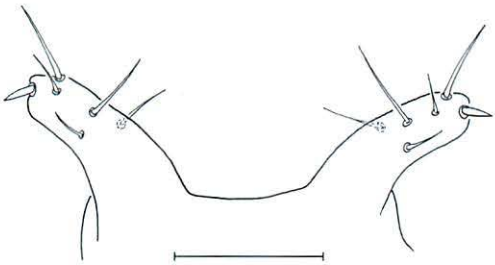

Fig. 59

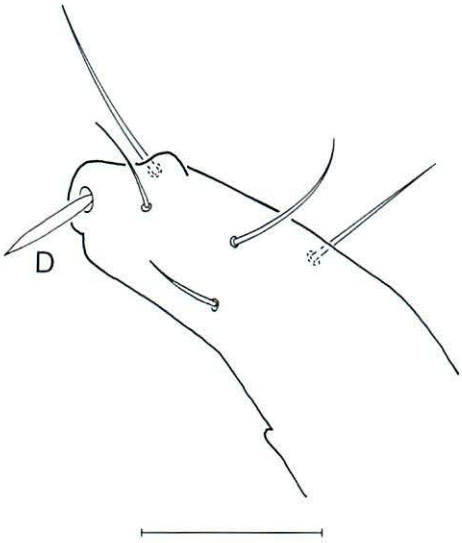

Fig. 60

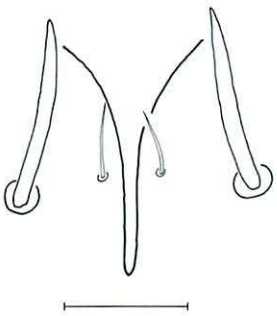

Fig. 61

Fig. 62

Soqotrasminthurus hadiboensis n. g. n. sp.

Fig. 58 Colour pattern of abdomen. Total length 0.8 mm
Fig. 59 Dorsal side of abdominal segment V (bar = 100 µm)
Fig. 60 Protuberance of abdominal segment V. Bothriothrix D marked (bar = 50 µm)
Fig. 61 Appendices anales and setae sa3 (bar = 25 µm)
Fig. 62 Spine of trochanter III (bar = 25 µm)

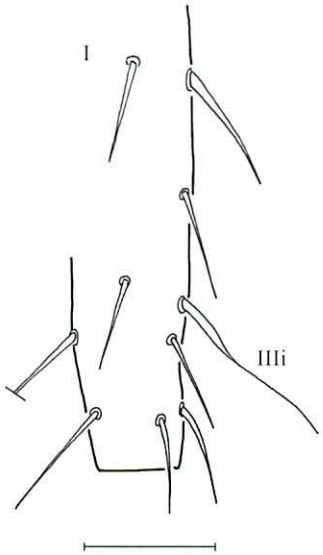

Fig. 63

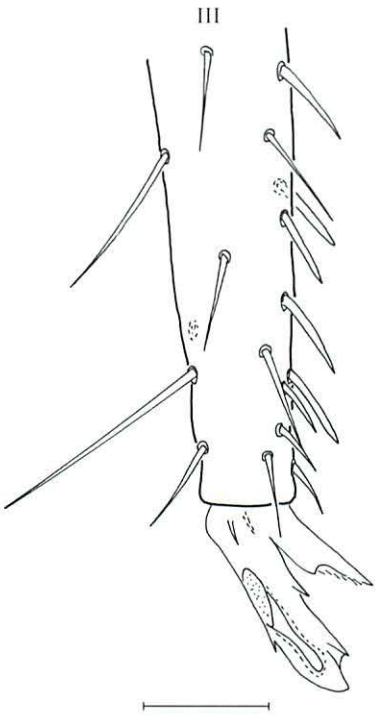

Fig. 64

Soqotrasminthurus hadiboensis n. g. n. sp.

Fig. 63 Distal part of tibiotarsus I seen from anterior (bar = 25 μm)

Fig. 64 Distal part of leg III seen from anterior (bar = 25 μm)

Colour: Eye-patches black. Background colour white with blue spots. Head with dark frontal eye and blue spots below antennal bases. Large abdomen (Fig. 58) with irregular faint and dark blue spots mainly on lateral and posterior parts. Small abdomen unpigmented. Antennae brown-violet, legs and furca unpigmented.

Chaetotaxy and special structures: Head and body with normal setae.

Head: Anterior side with 3+3 pores below antennae, without postantennal organs. Ventral head-back with 2+2 or 3+3 oval organs. Labrum with normal setae.

Antennae: All setae relatively short. Segment I with 7 setae as usual. Segment IV with about 18 intermediate subsegments and many dorso-anterior and dorso-posterior sensilla.

Large abdomen: All setae normal, neosminthuroid setae missing, bothriotrichia ABC in a straight line or in an angle slightly opening to the posterior. Ventral tube with 1+1 setae. Retinaculum (see Fig. 49) with 3+3 teeth and 2+2 setae on separated lobes. Ventral region of large abdomen with 5+5 or 6+6 setae.

Small abdomen: Segment V (Figs 59, 60) with a pair of long lateral protuberances, each with 5 normal setae in distal half of protuberance, bothriothrix D at tip short, thick and pointed. Female genital papilla with 12 setae. Segment VI with normal setae arranged as usual, with 7 dorsal and 5+5 ventral circumanal setae. Appendices anales (= av5, Fig. 61) relatively short, smooth, pointed and slightly bowed to the anterior.

Legs: Most setae normal. Coxae I – III with 1, 2, 4 setae respectively, coax III with 2 oval organs. Trochanter I (see Fig. 53) with a pair of posterior setae. Trochanter III with a long spine (Fig. 62). Tibiotarsi I – III with most outer setae slightly longer than diameter of tibiotarsus, with 4 oval organs in row pe, rows p with 6, 6, 7 setae respectively, without setae Ia, Ip and IIi. Tibiotarsus I (Fig. 63) with 1 inner seta thicker than others and 1 seta with a long flagellum (seta IIIi?). Tibiotarsus II with several thick inner setae, without flagellated one. Tibiotarsus III (Fig. 64) with distal inner setae spiny, without flagellated seta. Claws (Fig. 64) with 2 strong inner teeth, 1 outer tooth and a cavity which opens on both lateral sides, tunica uncertain. Empodia (Fig. 64) strong with round outer tooth and short outer fringes, not exceeding claws (filaments not observed).

Furca: Most setae normal. Dens outer row E with 7, inner row J with 6, postero-outer row PE with 1, posterior row P with 8 setae (basal one duplicated), formula of anterior setae 3(+1 outer),2,2,2,1,1 ... 1 with all setae except basal one strong and waved. Mucro (see Fig. 57) simple with smooth edges, seta missing.

Remarks: The colour pattern of this new species, *Soqotrasminthurus hadiboensis*, resembles that of the type species (see above); I was not able to separate them by their pattern. *S. hadiboensis* distinctly differs, however, from the type species in its protuberances of abdominal segment V. They are apomorphic compared with the type species, since they are long, the number of setae is reduced and the bothriotrichia D are thick.

***Sphyrotheca coerulea* n. sp.**

Holotype: Female (on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2k).

Paratype: 1 juvenile (in alc., at HLMD) together with the holotype.

Derivatio nominis: The name of this new species is derived from its colour.

Diagnosis: A small species of the genus *Sphyrotheca* Börner, 1906 with 6 diagnostic characteristics:

- Head and body blue with white spots,
- dorsal part of head with 3 median setae,
- empodia each without outer tooth,
- empodium III and its filament of same length,
- anterior side of dens with 3(+1),2 apical setae,
- apex of mucro with symmetrical incision and 2 round tips.

Description:

Measurements and proportions: Total length 0.6 mm. Head diagonal 0.1 mm. Mucro 60 µm. Claw III inner edge 25 µm. Appendices anales 65 µm. Length of whole antenna : head diagonal = 1.6. Antennal segments I : II : III : IV = 1 : 1.5 : 2.3 : 4.8. Manubrium : dens : mucro = 3.6 : 2.5 : 1. Mucro : claw III inner edge = 2.3. Appendices anales : mucro = 1.1. Appendices anales : claw III inner edge = 2.6.

Colour: Eye-patches black. Head and body almost completely blue with pale spots.

Chaetotaxy and special structures: Dorsal part of head with smooth, thickened setae. Large abdomen with slightly rough, blunt setae and thin, knobbed ones. Neosminthuroid setae present.

Head (Fig. 65): Eye-patches with ommatidia obscured by pigment, 2+2 setae short, thin and pointed. Dorsal head-back with 3+3 setae, head apex with 3 setae (ap1-apm-ap1), frons rows a with 5+5, rows b with 2+2 and 2 median frontal setae. Dorsal parts of head thus with 3 median and 3 pairs of smooth and thickened setae (a4, a5, ap1). Clypeus region M with 13 setae in symmetrical position. Lateral parts without hook-like setae. Oval organs not observed.

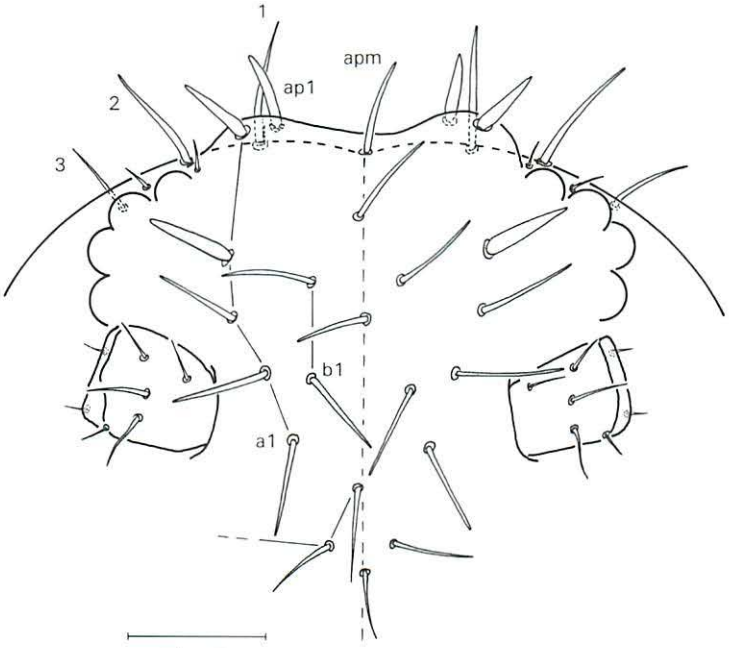

Fig. 65

Sphyrotheca coerulea n. sp.

Fig. 65 Dorsal part of head and antennal segment I (bar = 50 µm)

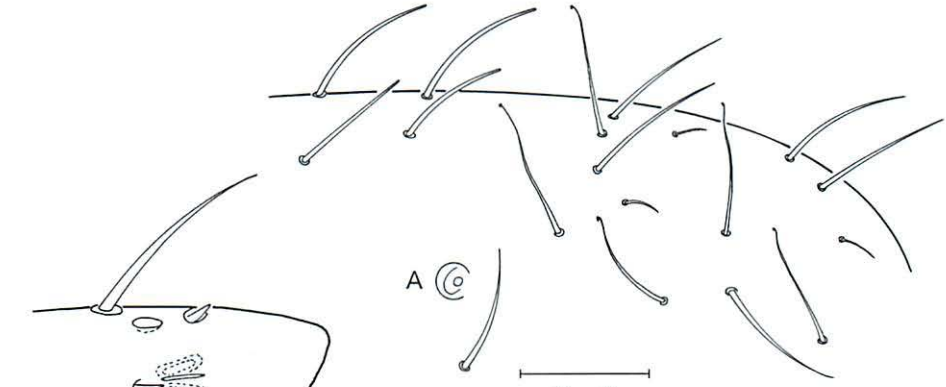

Fig. 67

Fig. 66

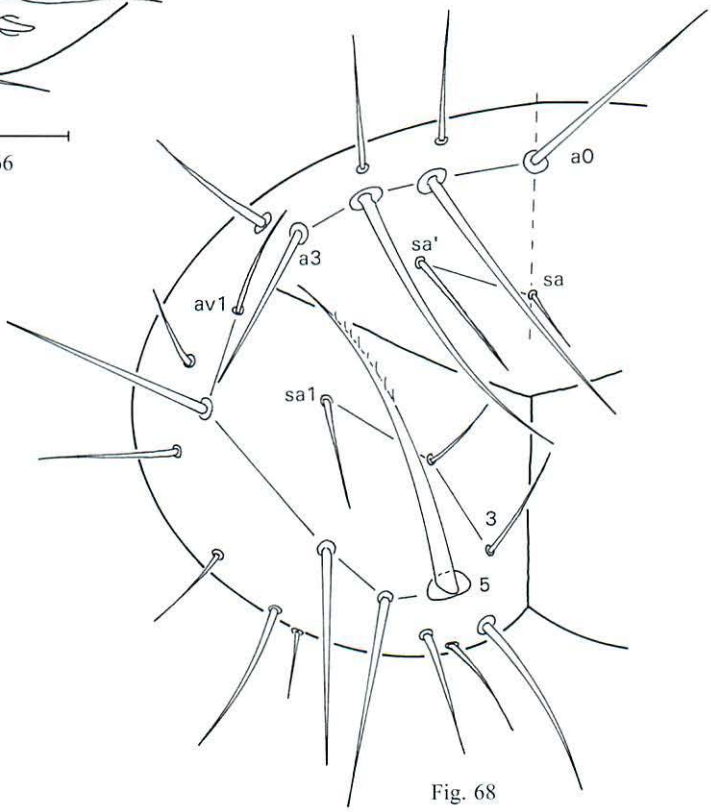

Fig. 68

Sphyrotheca coerulea n. sp.

Fig. 66 Distal sensilla of antennal segment III (bar = 20 µm)

Fig. 67 Posterior part of large abdomen. Trichobothrium A marked (bar = 50 µm)

Fig. 68 Abdominal segment VI of female (bar = 50 µm)

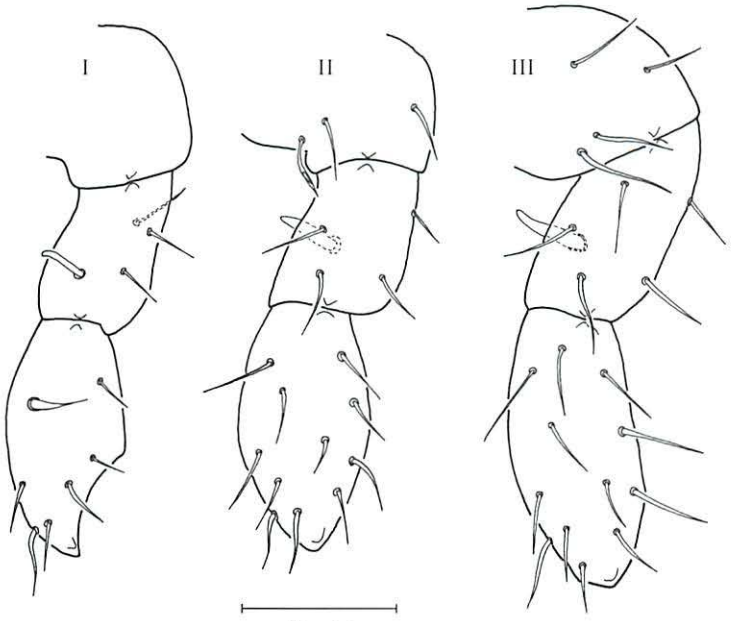

Fig. 69

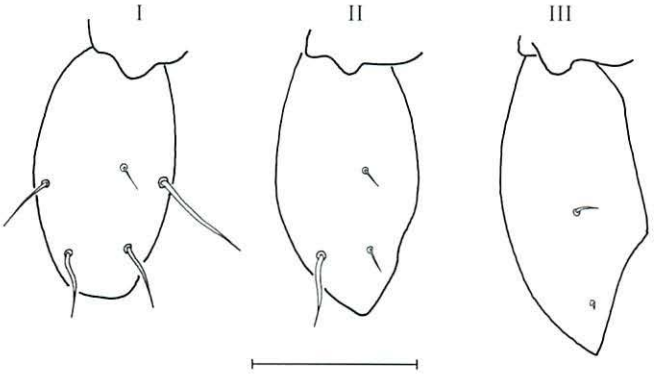

Fig. 70

Sphyrotheca coerulea n. sp.

Fig. 69 Basal segments of legs seen from anterior (bar = 50 μm)

Fig. 70 Posterior sides of femora (bar = 50 μm)

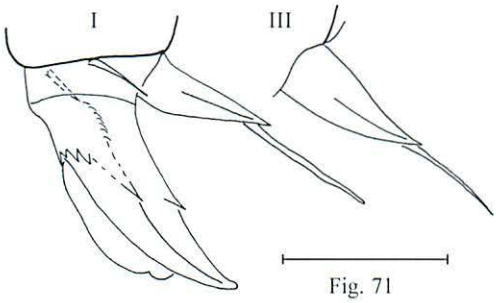

Fig. 71

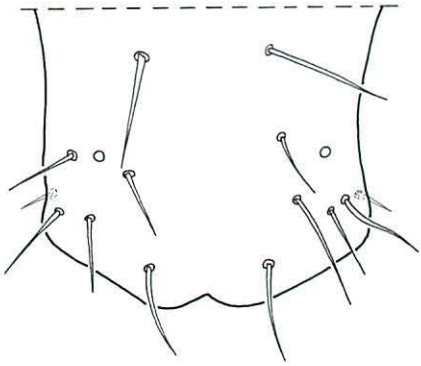

Fig. 72

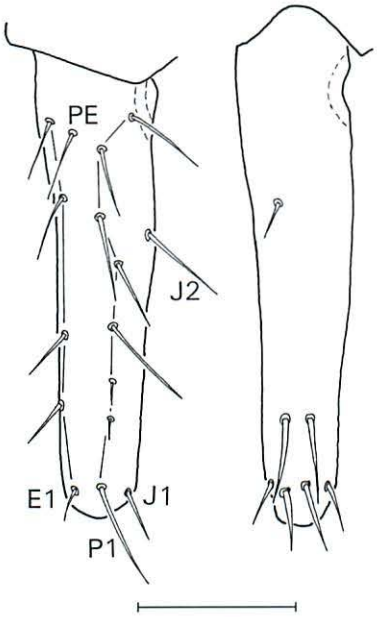

Fig. 73

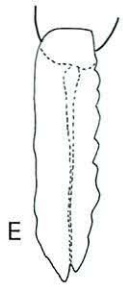

Fig. 74

Sphyrotheca coerulea n. sp.

Fig. 71 Claw and empodia seen from anterior (bar = 20 µm)
Fig. 72 Manubrium seen from posterior (bar = 50 µm)
Fig. 73 Dens, posterior (left) and anterior sides (bar = 50 µm)
Fig. 74 Mucro. E marks outer edge (bar = 25 µm)

Antennae: Segment I (Fig. 65) with 7 setae as usual. Segment II whorls 1 – 4 with 1, 3(4), 3, 8 setae respectively, one ventro-apical seta thin and sensillum-like (resembling the sensillum in the Bourletiellida). Segment III with normal, smooth setae, tip (Fig. 66) with 6 short sensilla, the main pair of which in separated grooves with a common opening. Segment IV with 9 – 10 intermediate subsegments, setae normal, with 6 dorso-anterior and 7 dorso-posterior additional sensilla, distal subsegments with 2 sensilla-like ventral setae (in 2 different whorls separated by a whorl with normal setae).

Large abdomen (Fig. 67): Normal, blunt setae directed towards the posterior, thin, knobbed ones directed towards the anterior, also a few short and thin setae present, short, sensilla-like setae missing. 1+1 neosminthuroid setae with a long basis. Ventral tube with 1+1 setae. Retinaculum with 2 setae. Ventral region of large abdomen with 1+1 setae.

Small abdomen: Chaetotaxy of segment V not analysed. Genital papilla with 7 setae. Segment VI (Fig. 68) with long, smooth and straight circumanal setae, except normal setae av1, large gap without remnants of setae between setae av2 and av3. Appendices anales (= av5, Fig. 68) long with distal half ciliate, tip pointed.

Legs: Basal segments (Figs 69, 70): Coxa I – III with 0, 3, 4 setae respectively, coxa II with a flattened seta. Trochanter I with anterior spine and 3 normal setae. Trochanters II and III each with a blunt posterior spine and 5 normal setae. Anterior side of femur I with a thick seta directed towards the posterior. Posterior sides of femora I – III with 5, 3, 1-2 setae respectively. Tibiotarsi I – III with normal setae, rows p with 5, 4, 4 setae respectively, seta Vi always very short, no oval organs. Tibiotarsus I row p with an additional short basal seta. Further chaetotaxy not analysed. Claws (Fig. 71) with tunica, broad pseudonychium, outer and inner tooth. Empodia (Fig. 71) broad without outer tooth, filaments I – II straight and band-like, longer than empodia and exceeding claws, filament III thin and straight, as long as empodium and not exceeding claw.

Furca: Most setae normal, 2 setae of dens short. Manubrium (Fig. 72) with 7+7 setae and 1+1 pore (1+1 anterior setae short and thin). Dens (Fig. 73) outer row E with 5, inner row J with 2, postero-outer row PE with 1, posterior row P with 8 setae of which 2 (P2, P3) very short, formula of anterior setae 3+1,2 ... 1. Inner edge of mucro (Fig. 74) with round teeth, outer edge slightly waved, apex with slight incision and 2 round tips.

Remarks: This new species, *Sphyrotheca coerulea*, differs from the other known species in several characteristics which are mentioned in the diagnosis and in the key below.

Key to the world species of the genus *Sphyrotheca* Börner, 1906

1	Anterior side of dens without apical setae (formula 0 ... 1)	*coeruleocapitata* Bretfeld, 2002
–	Anterior side of dens with 1 or more apical setae	**2**
2	Anterior side of dens with 1 apical seta (formula 1 ... 1)	*caputalba* Bretfeld, 2002
–	Anterior side of dens with more than 1 apical seta	**3**
3	Anterior side of dens with 1 crossrow of apical setae	**4**
–	Anterior side of dens with more than 1 crossrow of apical setae	**12**
4	Dorsal part of head with 1 median seta (apm). Frons rows b with 3+3 setae	*ozeiana* Bretfeld, 2000
–	Dorsal part of head with 2 or 3 median setae (m1, m2, apm). Frons rows b with 2+2 setae	**5**
5	Dorsal part of head with 2 median setae (m2, apm)	*sinensis* Bretfeld, 2000
–	Dorsal parts of head with 3 median setae (m1, m2, apm)	**6**
6	All empodia or at least empodium III with outer tooth	**7**
–	All empodia without tooth	**9**
7	Dorsal part of head with spines of equal length and width	**8**
–	These spines of different length and width	*minnesotensis* (Guthrie, 1903) sensu Bretfeld 2002
8	Filaments of all empodia thickened and exceeding claws	*nani* Christiansen & Bellinger, 1992
–	Filament of empodium III short and thin, not exceeding claw	*gangetica* Yosii, 1966
9 (6)	Dorsal parts of head with all modified setae as short cones	*dawydoffi* (Denis, 1948)
–	Some of these setae long, some short	**10**
10	2+2 setae between antennae (a1, b1) short and thin	*madagascariensis* Betsch, 1974
–	These setae of normal setal shape or slightly thickened	**11**
11	Head apex with 3+3 short setae, all slender	*multifasciata* (Reuter, 1881), sensu Bretfeld 2000
–	Head apex with 3+3 short setae, some thick (i.e. expanded), some slender	*nanjingensis* Chen & Wu in Bretfeld, 1999
12 (3)	Anterior side of dens with 2 crossrows of apical setae (i.e. 1 apical and 1 subapical crossrow)	**13**
–	Anterior side of dens with 3 crossrows of apical setae (formula 3(+1?),2,2...1)	*boneti* (Denis, 1948) specimen A
13	Subapical crossrow of anterior side of dens with 1 seta (formula 3(+1?),1...1)	**14**
–	Subapical crossrow of anterior side of dens with 2 setae (formula 3(+1?),2...1)	**15**

14	Dorsal part of head with 2 median setae (m2, apm)	*santiagoi* Yosii, 1959 sensu Lawrence 1968
–	Dorsal part of head with 3 median setae (m1, m2, apm)	*formosana* Yosii, 1965
15	Dorsal part of head with 2 median setae (m2, apm)	**16**
–	Dorsal part of head with 3 median setae (m1, m2, apm)	**21**
16	Filaments of all empodia thickened and exceeding claws. Head frons with setae b2 much shorter than the other spines (about 1/4 or 1/3)	*bellingeri* Betsch, 1965
–	Filament of empodium III thin. Head frons with setae b2 ≤ other spines	**17**
17	Spines of large abdomen smooth	*aleta* Wray, 1953 sensu Soto-Adames 2002
–	Spines of large abdomen rough	**18**
18	Claws without lateral pseudonychia	*mucroserrata* Snider, 1978
–	Claws with lateral pseudonychia	**19**
19	Spines of head smooth. Trochanter III with 4 normal setae	*vanderdrifti* Delamare Deboutteville & Massoud, 1964
–	Spines of head rough. Trochanter III with 5 normal setae	**20**
20	Frons of head with setal pair a1	*karlarum* Palacios-Vargas et al., 2003
–	Frons of head without setal pair a1	*peteri* Palacios-Vargas et al., 2003
21(15)	Tip of mucro without incision or a long spine	**22**
–	Tip of mucro with incision or a long spine	**23**
22	Filaments of all empodia thin, filament III short and not exceeding claw	*implicata* Hüther, 1967
–	Filaments of empodia I and II thickened, filament III strong and exceeding claw	*machadoi* (Delamare Deboutteville & Massoud, 1964)
23	Filament and empodium III of same length, all empodia without outer tooth	*coerulea* n. sp.
–	Filament of empodium III shorter than empodium III, at least empodium III with outer tooth	**24**
24	Mucro with symmetrical incision	*boneti* (Denis, 1948) specimen B
–	Mucro with asymmetrical incision, i.e. tip with 1 long outer spin	**25**
25	Outer posterior edge of mucro smooth. Posterior side of dens with about 17 setae	*spinimucronata* Itoh & Zhao, 1993
–	Outer posterior edge of mucro undulated. Posterior side of dens with about 13 setae	*nepalica* Yosii, 1966

Not included in this key are the following species as they are not completely described: *Sminthurus maculatus* Schött, 1883 (= *Rhopalothrix maculata* Schött, 1927) (from former Deutsch-Kamerun), *Sminthurus pseudofuscus* Schött, 1901 (from former Deutsch-Neuguinea), and the descriptions of *Sphyrotheca multifasciata* by Börner, 1909 (formae s. str., ornata and pallidinota, from Japan), Ionesco, 1915 (from Romania; Stach 1956, p.

206, doubts in this generic decision), Womersley, 1932 (from Australia; these specimens have never been restudied; GISIN 1944, p. 117, mentioned this occurrence without commentary, in GISIN 1960 it is not mentioned, contrary to the note by GREENSLADE 1994, p. 135), and Uchida, 1957 (from Japan).

***Stenognathellus* cf. *cassagnaui* Yosii, 1966**

Material: Sample SOQ 2000/02a (Bretfeld's number: Yemen IV 2g and IV 7b, at HLMD): 7 specimens (2 females on 4 and 3 slides respectively, others in alc.).

Colour a shade of light violet. Circumanal seta a0 simple, setae av1' apparently missing. Appendices anales with many or few branches.

These specimens resemble those from the mainland of Yemen (BRETFELD 2000b) and are also temporarily assigned to this species.

***Stenognathriopes vilhenai* Delamare Deboutteville & Massoud, 1964**

Material: Sample SOQ 2000/02a (Bretfeld's number: Yemen IV 2d): 4 females (no. 2 and 3 on 5 slides each, 2 in alc.).

Since this species from Angola has been described from only a single female, which has been lost (BETSCH & LASEBIKAN 1979), some characteristics of these new specimens will be added here (with the characteristics of the holotype in brackets).

S. vilhenai was found here, on the Isle of Socotra, on the soil surface of a wadi.

Measurements and proportions (mainly of 2 female slide specimens): Total length 0.8 – 1.1 mm. Heads not measured before preparation. Mucro 100 µm. Claw III inner edge 20 µm. Appendices anales about 15 and 20 µm. Antennal segments I : II : III : IV = 1 : 2.3 : 2 : 5.2 (holotype: 1 : 2.6 : 2 : 4.6). Manubrium : dens : mucro = 3.9 : 2.4 : 1. Mucro : claw III inner edge = 5.5. Appendices anales : mucro = about 0.2. Appendices anales : claw III inner edge = about 1.

Colour: Head and body dark violet (female no. 2 and 1 specimen in alc.) or violet with pale dorsal side of large abdomen (female no. 3 and 1 specimen in alc.), all specimens with dark violet extremities (holotype: spot between eye-patches, anterior part of large abdomen, antennae and legs violet).

Chaetotaxy and special structures (only some main characteristics mentioned, see key below):

Head frons with 2 median setae and rows b with 3+3 setae (holotype: same). Clypeus row g with 2+2 short and thin setae (see Fig. 79, not mentioned in holotype). Labrum rows a, m, p, with 4, 5, 5, setae respectively as usual, but outer setal pair a1 short and thick (see Fig. 79, not mentioned in holotype). Antennal segment IV with 13 subsegments (holotype: 12). Dorsal anal valve (Fig. 75) with 7 outer circumanal setae, including P1 and P2 (holotype: same), inner circumanal setae sa', sa1, sa3 missing (same pattern observed in the specimens in alcohol, holotype: same). Appendices anales split into many short branches (Fig. 76, holotype: split into long branches). Dens (Fig. 77) with formula of anterior setae 3+0(small outer seta missing, in holotype not mentioned),3,1,1 … 1 (= 9 setae) (holotype: 3,3,1,1,1 … 1 = 10 seteae). Tip of mucro with 2 points (Fig. 78, holotype: same).

Remarks: These specimens of *Stenognathriopes vilhenai* slightly differ from the original description in their pigmentation and the length of the fringes of the appendices anales. The chaetotaxy resembles the original description with one small difference, there are 9 setae on the anterior side of the dens instead of 10 in the specimen from Angola. The differences in the pigmentation and in the appendices anales seem not to be species specific, as they are not accompanied by relevant chaetotactic ones. For further discussion, see Remarks to the new *Stenognathriopes* species below.

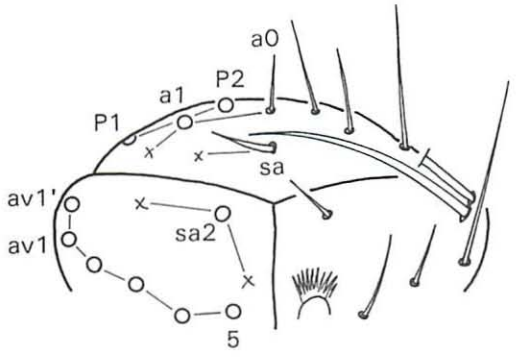

Fig. 75

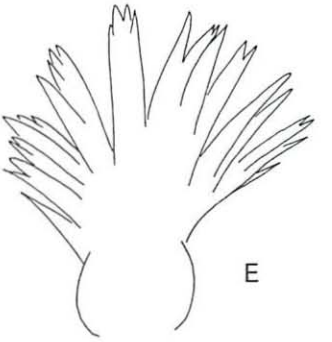

Fig. 76

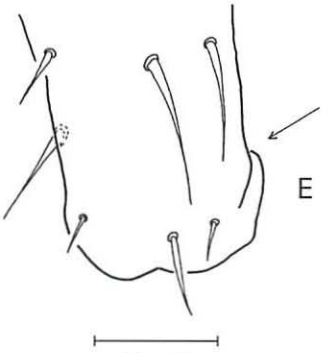

Fig. 77

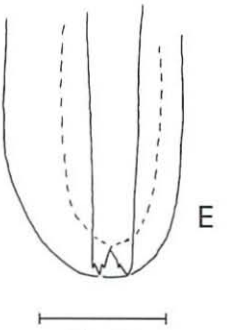

Fig. 78

Stenognathriopes vilhenai Delamare Deboutteville & Massoud, 1964

Fig. 75 Abdominal segment VI of female (bar = 50 µm)

Fig. 76 Appendix analis. E marks outer side (bar = 10 µm)

Fig. 77 Tip of dens seen from anterior. E marks outer side, arrow marks position of missing seta, see Fig. 85 (bar = 25 µm)

Fig. 78 Tip of mucro seen from anterior. E marks outer edge (bar = 25 µm)

***Stenognathriopes yemenensis* n. sp.**

Holotype: Female (no. 2, on 5 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2b).

Paratypes: 15 specimens (in alc. and on slides, at HLMD) together with the holotype (Bretfeld's number: Yemen IV 2b, IV 2d, IV 7a). – 1 female (on 4 slides, at HLMD) from sample SOQ 2000/11: Yemen, Isle of Socotra, Diksam camp on the bottom of a valley with grass and dwarf shrubs, 12°31.401'N - 53°57.204'E, from leaf-litter surrounding big boulders at 800 m altitude, 26 - 27 X 2000 leg. van Harten (Bretfeld's number: Yemen IV 3+4a).

Derivatio nominis: This new species is named after the Republic of Yemen.

Diagnosis: A species of the genus *Stenognathriopes* Betsch & Lasebikan, 1979, with 6 diagnostic characteristics:

– Head frons with 2 median setae,

– rows b of head frons with 3+3 setae,

– antennal segment IV with 13 subsegments,

– dorsal anal valve with 11 outer circumanal setae (i.e. 7 setae a and 4 setae P),

– inner circumanal setae sa', sa1 and sa3 present but very short,

– claws each with outer tooth.

Description (refers to that of the type species, *Stenognathriopes huetheri* Betsch & Lasebikan, 1979, and is based on females, males not recognised):

Measurements and proportions (of up to 5 females): Total length 0.8 – 1.6 mm. Head of 2 paratypes 0.67 mm. Mucro 130 – 160 µm. Claw III inner edge 25 – 29 µm. Appendices anales about 20 – 40 µm. Length of whole antenna : head diagonal of 2 paratypes = 1.3. Antennal segments I : II : III : IV = 1 : 2.3 : 1.9 : 4.2 (4.0 – 4.5). Manubrium : dens : mucro = 3.6 : 2.4 : 1. Mucro : claw III inner edge = 5.3 (4.9 – 5.8). Appendices anales : mucro = about 0.2. Appendices anales : claw III inner edge = about 0.8.

Colour: Although there are common chaetotactic characteristics, the colour of the specimens varies. Sample SOQ 2000/02a: (Bretfeld's number IV 2b): Background colour whitish yellow, few violet spots on lateral parts of head and of large abdomen, small black median spots on the posterior of large abdomen and on small abdomen (these posterior spots also in small juveniles), antennae violet, legs and furca unpigmented. (Bretfeld's number IV 2d): Many dark spots, extremities spotted. (Bretfeld's number IV 7a): Background colour yellowish brown, black pigment as a middle band on the posterior of large abdomen, dorsal part of small abdomen also black, antennae violet-brown, legs and furca unpigmented. Sample SOQ 2000/11: (Bretfeld's number IV 3+4a): Violet pigment on head and body but dorsal parts of head and of large abdomen pale, extremities violet-blue to violet-brown, femora with longitudinal spots, tibiotarsi each with broad basal ring of pigment.

Chaetotaxy and special structures: Head and body with strong and straight setae with golden appearance.

Head: Dorsal parts with setae blunt or, especially anterior ones, pointed. Frons rows b with 3+3 setae and with 2 median frontal setae. Clypeus row g with 2+2 small setae (Fig. 79). Labrum (Fig. 79) rows a, m, p with 4, 5, 5 setae respectively as usual, but outer setal pair a1 short and thick (not mentioned in the descriptions of other *Stenognathriopes* species but also observed in undescribed specimens from Brazil).

Antennae: Segment II and basal part of segment III with strong and blunt setae. Segment IV with 13 subsegments. Chaetotaxy not analysed.

Large abdomen: Large setae strong and blunt with golden appearance.

Small abdomen (Fig. 80): Segment VI with 11 dorsal circumanal setae; setae a0, a1, a2 and P2 thin and of normal shape, setae a3 and P1 long, strong and acuminate. Ventral circumanal setae av1' and av1 strong and flattened, av2 long, av3 short, av4 normal. Inner circumanal setae (Figs 80, 81) of different shapes, sa and sa2 normal, sa', sa1 and sa3 present but very short with large basis (same circumanal setae observed in specimens in alcohol). Appendices anales (av5, Figs 82, 83) split into many short or long branches.

Legs: Tibiotarsi I – III with strong inner setae, rows p with 5, 4, 2 setae respectively, clavate tenant setae thick, pretarsi (Fig. 84) not distinct, with small anterior protuberance but no seta. Chaetotaxy not analysed. Claws (Fig. 84) short with outer tooth. Empodia and filaments (Fig. 84) strong and acuminate, tip of empodia marked by short inner tooth, filaments exceeding claws.

Furca: Most setae strong and acuminate, a few distal ones short and thin. Manubrium with 8+8 setae. Dens outer row E with 8, inner row J with 7 setae (most distal seta J1 shorter than others, Fig. 85), postero-outer row PE with 1, posterior row P with 7 setae, formula of anterior setae 3(+1 outer seta),3,1,1 ... 1 (4 distal setae thinner and shorter than others, Fig. 85). Mucro (Fig. 86) broad with round tip.

Remarks: This new species, *Stenognathriopes yemenensis*, differs in several chaetotactic characteristics from the other species known, which are shown in the diagnosis and the following key to the world species.

Between the populations of this new species, however, the pigmentation and the number and length of the fringes of the appendices anales differ. These differences apparently are not species specific, as they are not accompanied by relevant chaetotactic ones. Unpublished observations in specimens from Brazil also show a great variety of pigmentation without relevant chaetotactic differences. These discrepancies may be caused by local parthenogenesis.

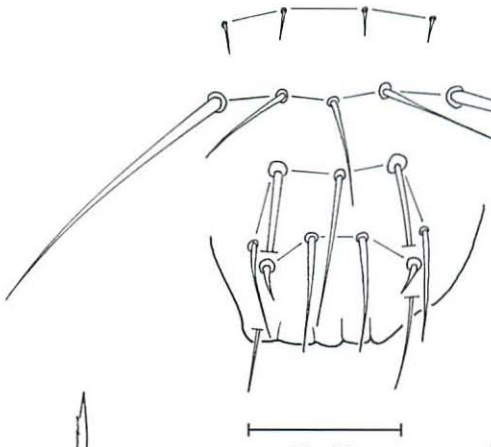

Fig. 79

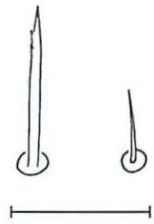

Fig. 81

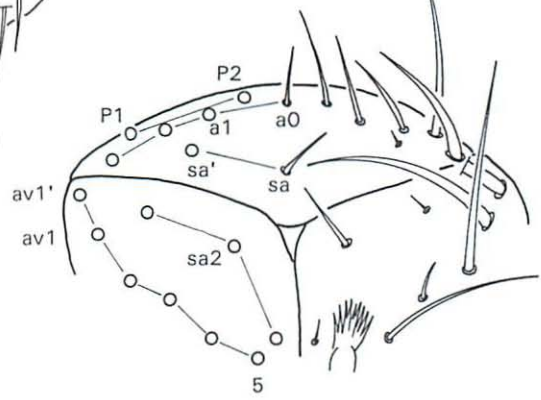

Fig. 80

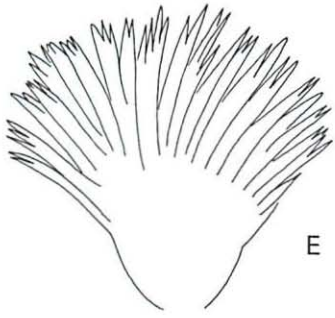

Fig. 82

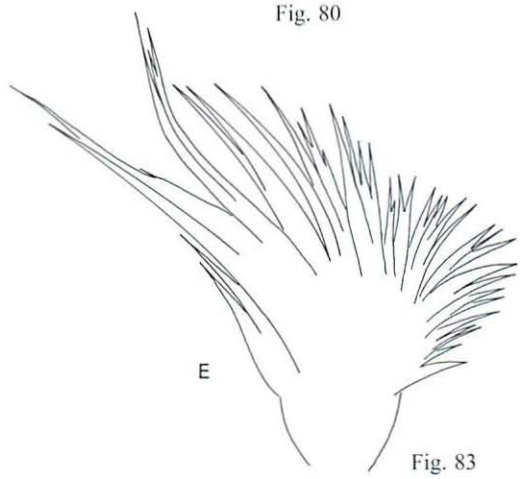

Fig. 83

Stenognathriopes yemenensis n. sp.

Fig. 79 Labrum and row g of clypeus (bar = 50 µm)

Fig. 80 Abdominal segment VI of female (bar = 50 µm)

Fig. 81 Small inner circumanal setae. Setae sa, sa2 (see left seta), sa', sa1, sa3 (see right seta) (bar = 25 µm)

Fig. 82 Appendix analis. E marks outer side (bar = 10 µm)

Fig. 83 Appendix analis of another female. E marks outer side (bar = 10 µm)

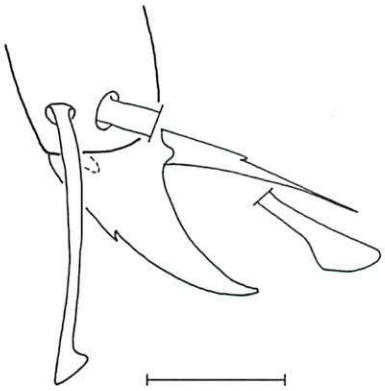

Fig. 84

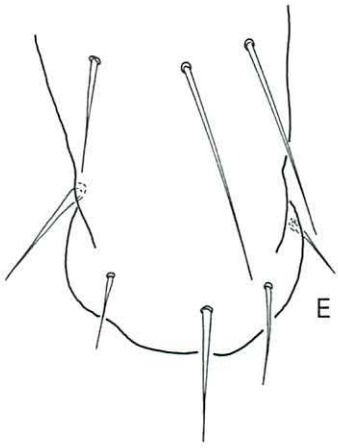

Fig. 85

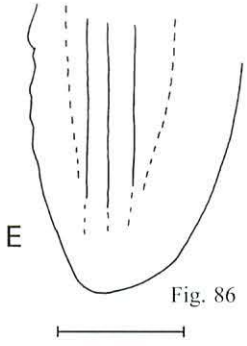

Fig. 86

Stenognathriopes yemenensis n. sp.

Fig. 84 Spatulate setae of tibiotarsus, claw and empodium seen from posterior (bar = 25 μm)

Fig. 85 Tip of dens seen from anterior. E marks outer side, small outer seta present, see Fig. 77 (bar = 25 μm)

Fig. 86 Tip of mucro seen from anterior. E marks outer edge (bar = 25 μm)

Key to the world species of the genus *Stenognathriopes* Betsch & Lasebikan, 1979.

1 Head frons with 1 median seta *rastrifer* (Denis, 1948), Indochina

– Head frons with 2 median setae **2**

2 Head frons rows b with 2+2 setae. Antennal segment IV with 8 – 9 subsegments. Dorsal anal valve with 11 outer circumanal setae n. sp. unpublished, Brazil

– Head frons rows b with 3+3 setae. Antennal segment IV with 12 – 14 subsegments. Dorsal anal valve with 7 or 11 outer circumanal setae **3**

3 Dorsal anal valve with 7 outer circumanal setae (a0, a1, P1, P2). Claws without outer tooth **4**

– Dorsal anal valve with 11 outer circumanal setae (a0, a1-3, P1, P2). Claws with outer tooth *yemenensis* n. sp., Yemen

4 Tip of mucro round *interpositus* (Hüther, 1967), Sudan

– Tip of mucro with 2 points **5**

5 Inner circumanal setae sa', sa1 and sa3 present but short
huetheri Betsch & Lasebikan, 1979, Nigeria

– Inner circumanal setae sa', sa1 and sa3 missing
vilhenai (Delamare Deboutteville & Massoud, 1964), Angola, Yemen

***Temeritas daneghanensis* n. sp.**

Holotype: Female (no. 4, on 4 slides, at HLMD) from sample SOQ 2000/02a: Yemen, Isle of Socotra, Wadi Daneghan at foot of mountains, 12°36'59"N – 54°03'48"E, pitfall traps between scattered shrubs and grasses near permanent stream at 90 m altitude, 28 – 30 X 2000 leg. van Harten & Pohl (Bretfeld's number: Yemen IV 2a).

Paratypes: 80 specimens (on slides and in alc., at HLMD) together with the holotype (Bretfeld's numbers: Yemen IV 2a and IV 7c).

Derivatio nominis: The name of this new species is derived from its type locality.

Diagnosis: A red-violet species of the genus *Temeritas* Delamare Deboutteville & Massoud, 1963, with 4 diagnostic characteristics:

– Head and body with more or less homogeneous red-violet pigment,

– heart region of large abdomen unpigmented,

– antennal segment III and tibiotarsus III with very long setae,

– mucro without seta.

Description (mainly of 4 female and 3 male slide specimens):

Measurements and proportions (applies to both sexes if not otherwise stated): Total female up to 1.2 mm, male 0.9 mm. Head diagonal in female 0.5 – 0.6 mm, in male 0.40 – 0.45 mm. Mucro in female 130 µm, in male 100 – 120 µm. Claw III inner edge in female 70 µm, in male 60 µm. Appendices anales 48 (42 – 53) µm. Length of whole antenna : head diagonal = 3 (4.2) in female (and male). Antennal segments I : II : III : IV = 1 : 2 (2.2) : 3.5 (4.4) : 11 (15.4) in female (and male). Manubrium : dens : mucro = 3 (2.8) : 3 (3) : 1 in female (and male). Mucro : claw III inner edge = 1.9. Appendices anales : mucro = 0.4. Appendices anales : claw III inner edge = 0.7.

Colour: Eye-patches black. Head and body with much red-violet pigment with pale spots and unpigmented dorsal stripe (heart region) (Fig. 87). Head and legs homogeneously pigmented, pattern on large and small abdomen composed of pigmented rings (Fig. 88).

Chaetotaxy and special structures:

Head (Fig. 89): Eye-patches with 2+2 setae, ventral pair thicker than dorsal pair. Head apex with 5 setae (ap2-ap1-m-ap1-ap2), frons rows a with 5+5, rows b with 2+2 and 3 median frontal setae. Dorsal parts of head thus with 4 median, 2 pairs of long and thick (ap1, a4)

and 1 pair of short and slightly spiny setae (a5), other setae long and thin. Below antennal bases with 1+1 oval organs and 3+3 cuticular pores. Clypeus not analysed but anterior side with 1+1 oval organs. Ventral head-back with 3+3 oval organs. Labrum (Fig. 90) with 3 minute setae in row p.

Antennae: All setae normal. Segments II and III (Fig. 91) with long and thin setae. Ratio of setal length to diameter of segment in segment II: 2 – 2.5 (1.5 – 2) in female (and male), in segment III: 5 – 6 (3 – 4) in female (and male). Segment IV with about 30 subsegments.

Large abdomen (Figs 92 – 94): Dorsal parts with both long and short setae. Posterior part in female with more numerous long setae than in male, male also with a lateral sensillum-like seta (see arrow in Fig. 94). Furca basis without specialised setae.

Small abdomen: All setae normal. Segment VI in female with circumanal setae a0, a1 – 3, av1 – 5 (in male number of dorsal circumanal setae reduced to a0 and a1). Length of seta sa' > sa and of sa3 >> sa1 and sa2 (i.e. longer than appendices anales). Appendices anales bowed and band-like with tip cut and toothed (Fig. 95).

Legs: Trochanter III with posterior spine (Fig. 96). All tibiotarsi with long outer setae (Fig. 97), in male longer than in female. Ratio of setal length to diameter of tibiotarsus in tibiotarsus I: 3 – 4, in tibiotarsus II: 3.5 – 5, in tibiotarsus III: 4 – 5 (5 – 7.5) in female (and male). Claws (Fig. 98) slender with slender pseudonychia and distal inner tooth. Empodia (Fig. 98) slender, filament I longer than III, never exceeding claws.

Furca: Most setae normal. Dens (Fig. 99) outer row E with 6 – 7 setae (subbasal seta E6 may be missing, its basis then transformed into oval organ, see Betsch 2000), inner row J with 6, postero-outer row PE with 3 (2 additional distal setae), posterior row P with 9 or 10 setae (a basal seta may be duplicated), formula of anterior setae 3+2(1 inner and 1 outer), 2+1(short), 2+1(short), 2,2,1 ... 1. Mucro (Fig. 100) slender, outer edge with 7 – 11, inner with 17 – 20 teeth, seta missing.

Remarks: The more or less homogeneous pigmentation of *Temeritas daneghanensis* n. sp. is also found in the majority of the *Temeritas* species described. The new species lacks a mucronal seta, which only lacks in *T. macroceros* (Denis, 1933) from Costa Rica [Murphy (1960) mentioned this species from Gambia but did not describe it and thus its occurrence in Africa is doubted]. Besides their geographic distance, these species differ in the length of setae of both the antennal segment III and the tibiotarsi: *T. daneghanensis* n. sp. has some very long setae, *T. macroceros* only has short setae.

I tried to construct a key to the homogeneously pigmented *Temeritas* species, but failed as in these species there are too many chaetotactic details not known.

A second group appear to be the species with strong contrasting pigmentation, they can be distinguished by their colour pattern.

A third, geographically closed group contains the species described from Madagascar, they can be recognised by the two longitudinal rows of pigmented spots in the heart region of the large abdomen (Betsch 2000).

Thus both the pigmentation and the chaetotaxy allow us to recognise this new species.

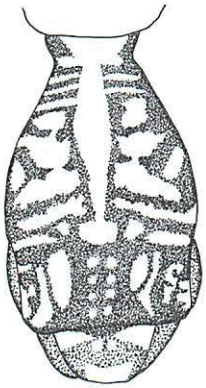

Fig. 87

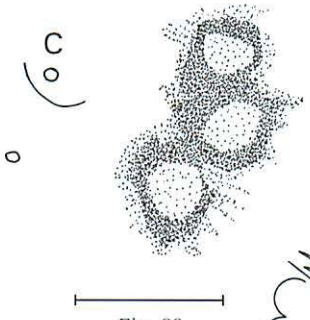

Fig. 88

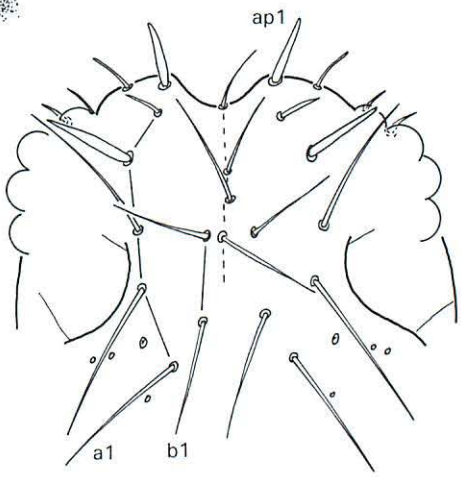

Fig. 89

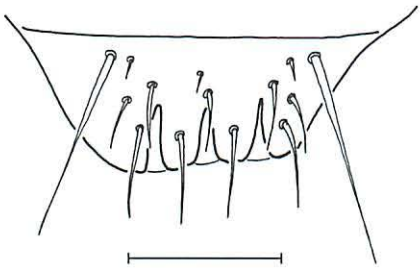

Fig. 90

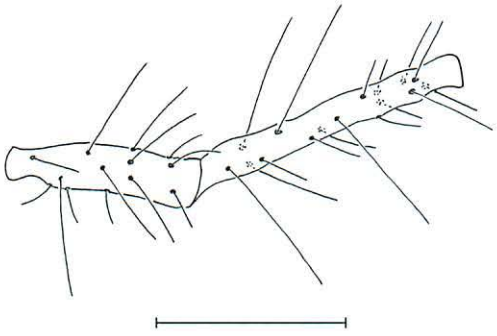

Fig. 91

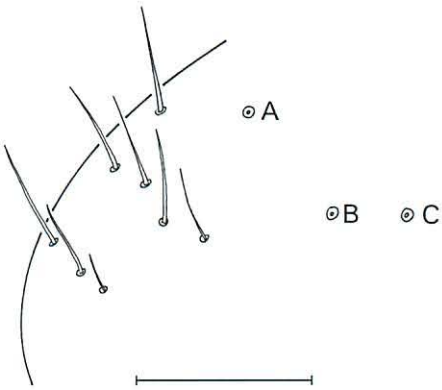

Fig. 92

Temeritas daneghanensis n. sp.

Fig. 87 Colour pattern of abdomen. Total length 0.9 mm
Fig. 88 Pigmented rings of large abdomen. Trichobothrium C marked (bar = 50 µm)
Fig. 89 Dorsal part of head (bar = 100 µm)
Fig. 90 Labrum (bar = 50 µm)
Fig. 91 Habitus of antennal segments II and III (bar = 100 µm)
Fig. 92 Anterior part of large abdomen of female (bar = 100 µm)

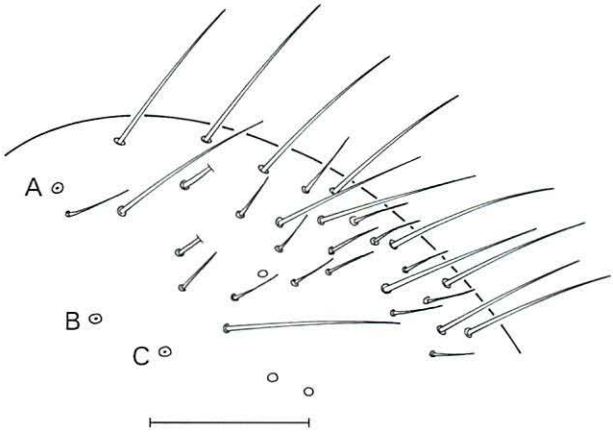

Fig. 93

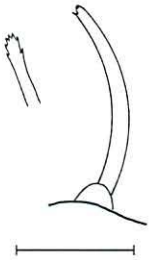

Fig. 95

Fig. 96

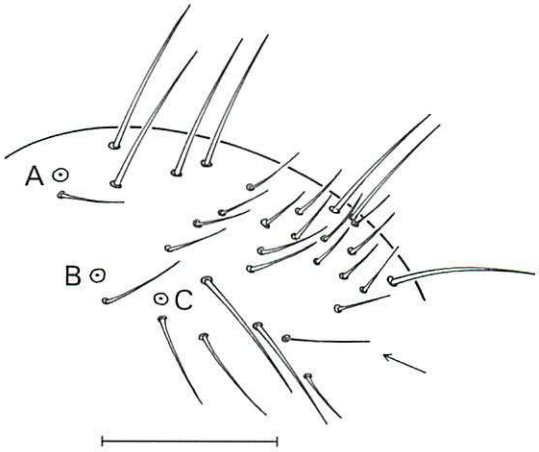

Fig. 94

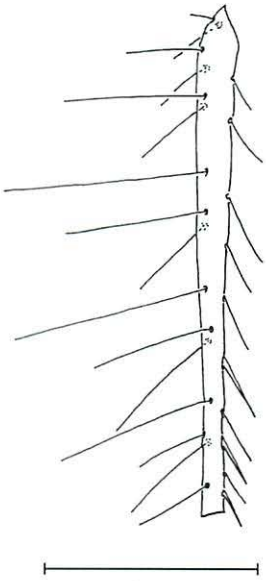

Fig. 97

Temeritas daneghanensis n. sp.

Fig. 93 Posterior part of large abdomen of female (bar = 200 µm)
Fig. 94 Posterior part of large abdomen of male. Arrow marks sensillum-like seta (bar = 200 µm)
Fig. 95 Appendices anales seen from lateral and posterior (detail) (bar = 25 µm)
Fig. 96 Spine of trochanter III (bar = 50 µm)
Fig. 97 Habitus of tibiotarsus III (bar = 100 µm)

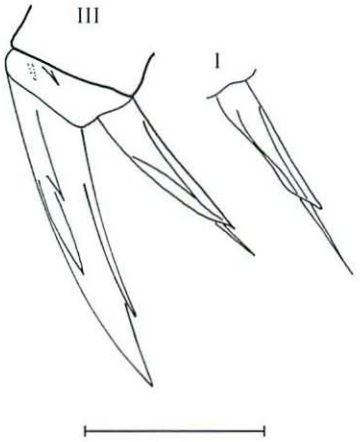

Fig. 98

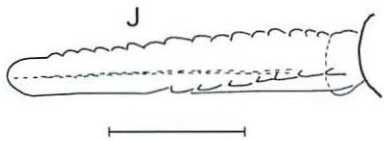

Fig. 100

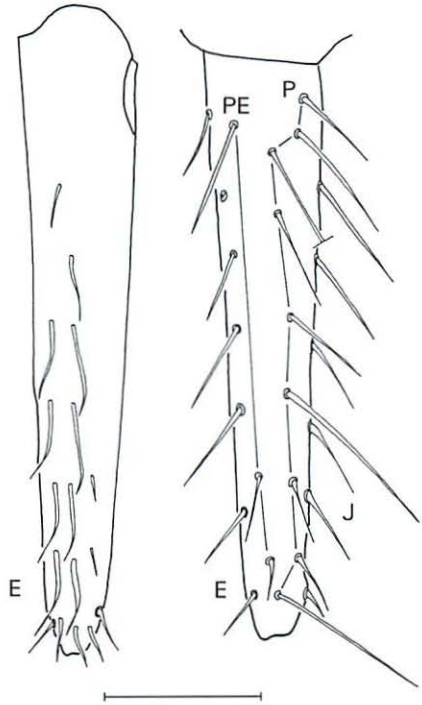

Fig. 99

Temeritas daneghanensis n. sp.

Fig. 98 Claw and empodia seen from anterior (bar = 50 µm)

Fig. 99 Dens, anterior (left) and posterior sides (bar = 100 µm)

Fig. 100 Mucro. J marks inner edge (bar = 50 µm)

gen. spec. A

Material: Sample SOQ 2000/11: 1 female (on 4 slides, at HLMD) (Bretfeld's number: Yemen IV 3+4c). No further specimens known.

Description:

Measurements and proportions: Total length 0.7 mm. Head diagonal 0.2 mm. Mucro 40 µm. Claw III inner edge 15 µm. Appendices anales 20 µm. Length of whole antenna : head diagonal = 1.6. Antennal segments I : II : III : IV = 1 : 1.8 : 2.5 : 5.5. Manubrium : dens : mucro = 3.9 : 3.1 : 1. Mucro : claw III inner edge = 2.7. Appendices anales : mucro = 0.5. Appendices anales : claw III inner edge = 1.4.

Colour (Fig. 101): Eye-patches black. Background colour yellowish, dorsal side of head and dorso-anterior part of large abdomen with dark violet pigment. All extremities unpigmented.

Chaetotaxy and special structures: Head and body with normal setae.

Head: Dorsal parts with strong setae, frons rows a with 5+5, middle region of frons with 15 setae. Clypeus destroyed. Ventral head-back without oval organs. Mouthparts normal.

Antennae: Total length shorter than body. All setae normal. Segment II rows 1 – 4 with 2, 3, 2, 8 setae respectively (including 1 long ventro-distal sensillum). Segment III with 24 setae. Segment IV basal whorl p1 with 5 setae (including 2 sensilla), whorl p2 with 5 setae, intermediate region T with 3 and 5, whorl p3 with 7 setae, without postero-basal sensilla PB, distal part with 5 intermediate subsegments d1 – d5, 5 dorso-anterior sensilla, 4 – 5 dorso-posterior sensilla (large sensillum P in whorl d5) and 2 ventral sensilla (in whorls d3 and d4), tip with 12 sensilla.

Large abdomen: All setae thin and normal, setae of anterior part shorter than of posterior and lateral parts. Region of flank-setae destroyed. Retinaculum with 3 setae.

Small abdomen: Genital papilla with 11 setae. Segment VI (Fig. 102) without special setae, outer circumanal seta a0 thin, setae a1, a2 and av1 thicker than others and av1 fringed (av1' missing, P1, P2 and av2 fallen out), setae sa and sa2 shorter than other inner circumanal setae. Appendices anales smooth and spatulate with distal incision.

Legs: Tibiotarsi I – III with most setae normal, some inner setae stronger than others, few flattened or obliquely truncated (difficult to observe) and some outer setae long. Tibiotarsi I – III rows p with 5, 3, 3 setae and with 3, 3, 2 distal spatulate setae respectively, with 1 oval organ each. Tibiotarsus I seta Ja appressed. Tibiotarsi II and III (Figs 103, 104) with 5 long outer setae (length about 2x and 2 – 3x diameter of tibiotarsus respectively). Claws and empodia of same shapes (Fig. 104) but only claw III with small inner tooth. Empodia with minute inner point and long, thin filament slightly curved to inner side and with small apical knob, all filaments exceeding claws.

Furca: All setae normal. Manubrium with 8+8 setae. Dens outer row E with 7 and 8, inner row J with 5, postero-outer row PE with 1, posterior row P with 7 setae, formula of anterior setae 3+1,2,1,1 ... 1, middle setae longer than spaces between their bases. Mucro (Fig. 105) with posterior edges smooth, anterior furrow narrow, tip protruding and seta missing.

Remarks: This female belongs to the monophylum Bourletiellida (syn. Bourletiellidae) and some of its characteristics resemble *Cyprania* Bretfeld, 1992. But the position of the large dorso-posterior sensillum P differs (in 1st whorl behind tip, but in *Cyprania* in 3rd). The circumanal setae are damaged and the appendices anales could only be observed laterally. I do not think that the males of gen. spec. B, see below, belong to this female, since they differ in the pigmentation, the claws, the empodia and the chaetotaxy. Thus one has to wait for new specimens and for males, which should be easily recognised by the characteristic dorsal pigment and the long outer setae of tibiotarsi II and III.

Fig. 101

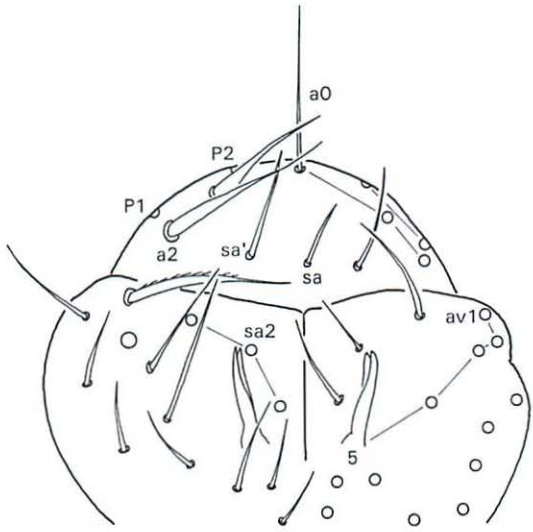

Fig. 102

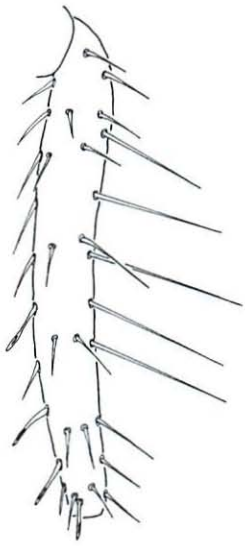

Fig. 103

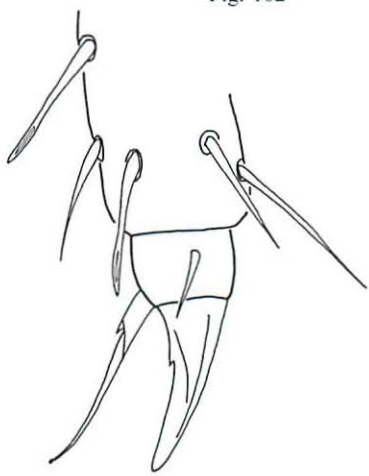

Fig. 104

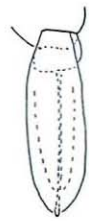

Fig. 105

gen spec. A

Fig. 101 Colour pattern. Total length 0.7 mm

Fig. 102 Abdominal segment VI of female (bar = 25 µm)

Fig. 103 Tibiotarsus III seen from anterior (bar = 50 µm)

Fig. 104 Distal part of leg III seen from anterior (bar = 10 µm)

Fig. 105 Mucro (bar = 25 µm)

gen. spec. B

Material: Sample SOQ 2000/11: 2 males (each on 3 slides, at HLMD) (Bretfeld's number: Yemen IV 3+4d). No further specimens known.

Description:

Measurements and proportions: Total length 0.55 mm. Head diagonal 0.22 mm. Mucro 50 µm. Claw III inner edge 20 µm. Length of whole antenna : head diagonal = 1.8. Antennal segments I : II : III : IV = 1 : 2 : 2.5 : 5.5. Manubrium : dens : mucro = 4 : 3.3 : 1. Mucro : claw III inner edge = 2.4.

Colour: Eye-patches black. Background colour yellowish, little faint blue pigment on head, thorax, posterior part of large abdomen and small abdomen. Antennae faint blue, legs and furca unpigmented.

Chaetotaxy and special structures: Head and body with normal thin setae.

Head: Frons rows a with 6+6 setae, middle region with 17 (19) setae. Clypeus region M with 12 (13) setae. Ventral head-back with 1+1 (0+0) oval organs. Mouthparts normal.

Antennae: Total length shorter than body. All setae normal. Segment II rows 1 – 4 with 2, 4, 3, 9 setae respectively (including 1 long ventro-distal sensillum). Segment III with 30 setae. Segment IV basal whorl p1 with 5 setae (including 2 sensilla), whorl p2 with 6 (4) setae, intermediate region T with 0 – 2, whorl p3 with 6 – 8 setae, without postero-basal sensilla PB, distal part with 6 intermediate subsegments d1 – d6, 6 dorso-anterior sensilla, 4 – 5 dorso-posterior sensilla (large sensillum P in whorl d4 or d5) and 2 ventral sensilla (in whorls d4 and d5), tip with 12 sensilla.

Large abdomen: All setae thin and normal, setae of anterior part shorter than of posterior and lateral parts, formula of flank-setae 5/++, i.e. 2 intermediate setae in front of flank-sensillum S.

Small abdomen: Genital papilla smaller than ventral anal valves. Segment VI without special setae, with dorsal circumanal setae a0, a1, a2.

Legs: Tibiotarsi I – III with most setae normal, some inner setae stronger than others, some flattened or obliquely truncated and a few outer setae long. Tibiotarsi I – III rows p with 5, 4(3), 3 setae and with 3, 3, 2 distal spatulate setae respectively, with 2 oval organs each. Tibiotarsus I seta Ja not distinctly appressed, seta IIi missing. Tibiotarsi II (Fig. 106) and III with 1 – 2 long outer setae (length ≤ 2x and > 2x diameter of tibiotarsus respectively). Claws (Fig. 107) with minute inner and outer tooth (teeth not always certain). Empodia (Fig. 107) with large inner point and long filament slightly curved to inner side, all filaments exceeding claws.

Furca: All setae normal. Manubrium with about 6+6 setae. Dens outer row E with 8, inner row J with 6, postero-outer row PE with 1, posterior row P with 7 setae, formula of anterior setae 3+1,2,1,(1) ... 1, middle setae longer than spaces between their bases. Mucro (see Fig. 105) with posterior edges smooth, anterior furrow narrow, tip protruding and seta missing.

Remarks: These 2 males belong to the monophylum Bourletiellida (syn. Bourletiellidae) and have a special characteristic in the flank-setae as they have 2 intermediate setae in front of flank-sensillum S. This characteristic is only known from the genus *Navarella* Bretfeld & Arbea, 2000. But other features of that genus are not found in these males (3 ventral sensilla of antennal segment IV, large genital

papilla, tibiotarsi without truncated setae, empodia directly forming a long needle, middle setae of anterior side of dens shorter than the spaces between them). Thus they seem to belong to a new genus which I hesitate to create as the corresponding females are not known and the females found in the same sample differ in pigmentation or in other characteristics (*Diksamella pohli* n. g. n. sp. and gen. spec. A, see above).

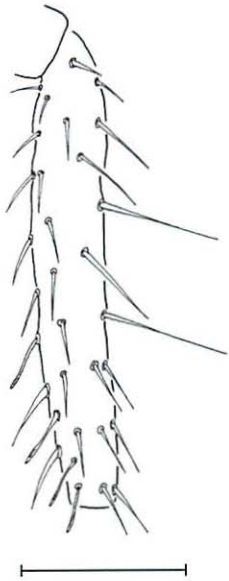

Fig. 106

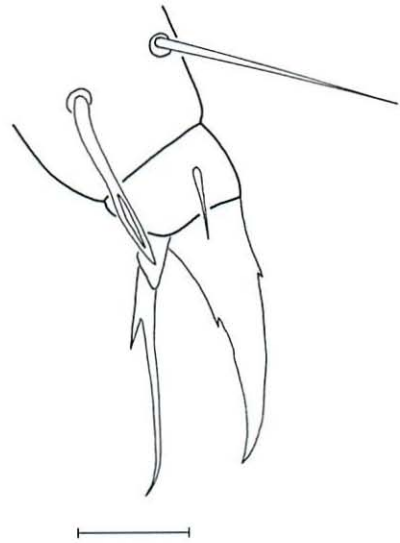

Fig. 107

gen. spec. B

Fig. 106 Tibiotarsus II seen from anterior (bar = 50 µm)

Fig. 107 Distal part of leg III seen from anterior (bar = 10 µm)

Localities and their species

1. Isle of Socotra, town of Hadibo and in its immediate vicinity at 10 m altitude, 1 sample with 3 specimens: *Soqotrasminthurus hadiboensis*.
2. Isle of Socotra, Wadi Daneghan at foot of mountains at 90 m altitude, 2 samples with 176 specimens in 12 species: *Anarmatus irregularius*, *Calvatomina strigata*, *Orenius maculatus*, *Sanaaiella septemlineata*, *Songhaica nigeriana*, *Songhaica soqotrana*, *Sphyrotheca coerulea*, *Stenognathellus* cf. *cassagnaui*, *Stenognathriopes vilhenai*, *Stenognathriopes yemenensis*, *Soqotrasminthurus vanharteni*, *Temeritas daneghanensis*.
3. Isle of Socotra, Goeeh, near permanent stream at 240 m altitude, 1 sample with 1 specimen: *Anarmatus goeehensis*.

4. Isle of Socotra, Nogeed, Farmihin, Steroh, Wadi on mountain slope, 1 sample with 1 specimen: *Anarmatus longisetus*.
5. Isle of Socotra, Diksam camp on the bottom of a valley, 2 samples with 15 specimens and 5 taxa: *Stenognathriopes yemenensis*, *Anarmatus diksamanus*, *Diksamella pohli*, gen. spec. A, gen. spec. B.

The most striking site of this collection is no. 2, the Wadi Daneghan, which 2 samples from pitfall traps contain 176 specimens in 12 species. Almost half of these specimens, 81, belong to one species, *Temeritas daneghanensis* n. sp. It is difficult to imagine that all these species occur in the same habitat. I think that in this site there are many small habitats to which the different species are adapted.

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