SPIXIANA	13	3	237–252	München, 1. November 1990	ISSN 0341–8391

Diplopoda from the Nepal Himalayas Several additional Polydesmidae and Fuhrmannodesmidae (Polydesmida)[1])

By Sergei I. Golovatch

Golovatch, S. I. (1990): Diplopoda from the Nepal Himalayas. Several additional Polydesmidae and Fuhrmannodesmidae (Polydesmida). – **Spixiana 13**: 237–252

A recent collection of the millipede superfamily Polydesmoidea from eastern Nepal comprises, among other forms, *Himalodesmus prosperus*, spec. nov., *Usbekodesmus theocraticus*, spec. nov. (Polydesmidae), *Hingstonia beatae*, spec. nov., *H. fittkaui*, spec. nov., *H. pahakholana*, spec. nov., *H. sympatrica*, spec. nov., *Sholaphilus gompa*, spec. nov. and *S. monachus*, spec. nov. (Fuhrmannodesmidae). Some zoogeographical comments are given on *Usbekodesmus* and *Hingstonia*.

Sergei I. Golovatch, Institute of Evolutionary Morphology and Ecology of Animals, USSR Academy of Scienes, 117071 Moscow V-71, Leninsky prospekt 33, UdSSR

In general, the millipede families Polydesmidae and Fuhrmannodesmidae may be by now considered as being among the best known groups of Diplopoda in the fauna of the Himalayas (s. Golovatch 1986, 1987, 1988 a, b). Despite the fact that so far no less than 18 and 17 species, respectively, have been described/revised from there, the real diversity of the Himalayan fauna of these two families concerned is still impossible to appreciate. All the more interesting for me was the opportunity to recently examine another fine collection of Polydesmoidea taken in 1988 in eastern Nepal by Prof. Dr. J. Martens (Mainz) and Dr. W. Schawaller (Stuttgart) (s. Maps 1 & 2). Although quite a considerable part of their route coincided with that of Prof. Martens' 1983 expedition to Nepal (s. Martens 1987), with the results of a study of both Polydesmidae and Fuhrmannodesmidae already published (s. Golovatch 1987), as little as two species crossed both collections, whereas numerous others were new for science. The present paper puts on record part of that fresh material, with no fewer than eight new forms involved. Besides, zoogeography of two genera abundantly represented in the Nepal Himalayas is discussed at a reasonable length.

Type material has been housed at the Senckenberg-Museum, Frankfurt/M. (SMF), several paratypes and non-types have been shared between the collections of the Zoologische Staatssammlung in München (ZSM), Zoological Museum of the Moscow State University (ZMUM), and Zoologisk Museum of the Copenhagen University (ZMUC). The scales of the figures are always given in mm.

[1]) Results of the Himalaya Expeditions of J. Martens, No. xy. For No. xy see: J. Orn. 124, 1989. – J. M. sponsored by Deutscher Akademischer Austauschdienst and Deutsche Forschungsgemeinschaft.

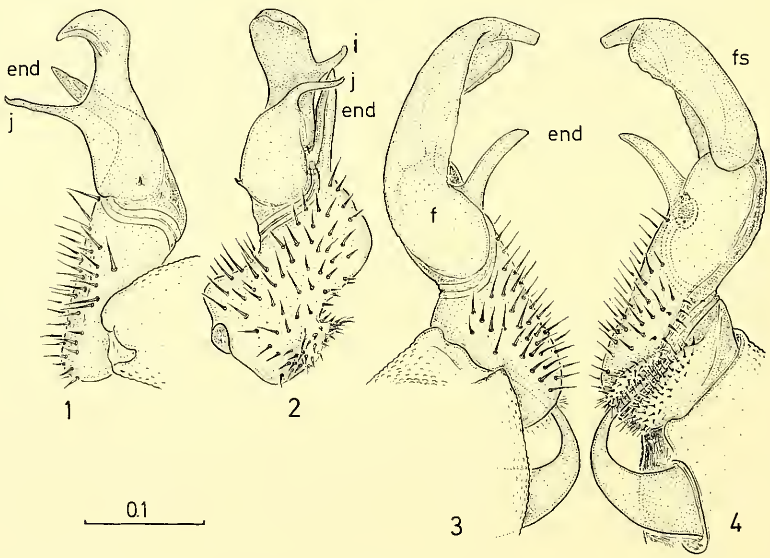
Family Polydesmidae

Himalodesmus benefactor Golovatch, 1987
Figs 1–2

Himalodesmus benefactor Golovatch, 1987, p. 209.

Material. 1 ♂ (ZSM), Napal, Taplejung Distr., descent from Pass Deorali to Hellok, 2800–2600 m, mature mixed forest, 17. V. 1988; leg. J. Martens & W. Schawaller.

Remarks. This species very recently described from practically the same locality (s. Golovatch 1987 and Map 1) seems to be somewhat variable as regards the gonopod structure. Thus, the tip can be curved a little better, exposing a smaller inner process *(i),* whereas both endomerite *(end)* and process *j* are very typical (s. Figs 1–2). Habitually, the new material agrees perfectly with the original description.



Figs 1–4. Gonopods of *Himalodesmus benefactor* Golovatch, 1987 (1–2) and *H. prosperus,* spec. nov. (3–4), ♂ from Deorali-Hellok & ♂ holotype. – 1) left gonopod (lateral view); 2–4. right gonopods (caudal, lateral and mesal views, respectively).

Himalodesmus prosperus, spec. nov.
Figs 3–4

Holotype: ♂ (SMF), Nepal, Sankhua Sabha Distr., above Pahakhola, 2600–2800 m, *Quercus semecarpifolia-Rhododendron* forest, 31. V.–3. VI. 1988; leg. J. Martens & W. Schawaller. – Paratypes: 6 ♀ (SMF), 2 ♀ (ZSM), 2 ♀ (ZMUM), same locality, together with holotype, 31. V.–3. VI. 1988; leg. J. Martens & W. Schawaller.

Diagnosis. Differs from all congeners in having the metatergal tuberculation oblong (like in, e. g., *H. benefactor)* combined with the head a bit broader than (♂) or subequal to (♀) midbody rings. Besides that the gonopod structure is highly conspicuous due to the somewhat underdeveloped endomerite and shape of the femoral lateral process.

Description

Length ca. 6–8 mm, 6.5 mm in holotype, width of midbody rings 0.7–0.8 and 0.8–1.0 mm on pro- and metazona, respectively, in ♀♀ and 0.65 and 0.75 mm, respectively, in holotype. Colour whitish to pale brownish, sometimes mottled pinkish.

Head broader than elliptical collum, broader than (♂) or subequal in width to (♀♀) midbody soma. Postcollar constriction best developed on subequal segments 3–4, whereas both somites 2 and 5 also subequal and a little broader that 3rd or 4th. Body parallel-sided on rings 5–6 till 17th whereupon starting very gently and gradually tapering. Antennae in situ reaching to end of segment 3, well clavate, not too long, joints 5 and 6 each with a disto-dorsal group of tiny sensillae, joint 7 with a middorsal knob. Body rather moniliform, polydesmoid, paraterga very modestly developed, well rounded in dorsal view, set rather high (at about a quarter of metasomital height on midbody segments), rimmed and incised, with caudal corner never surpassing hind tergal contour, rather well rounded until soma 11–12, onward increasingly pointed till segments 16–17, onward again better rounded and poorer projecting as a small triangle. Surface dull, finely shagreened, metatergal tuberculation very distinct as usual three rows, tubercles increasingly oblong and rounded toward telson (like in, e. g., *H. audax* – s. Golovatch 1986); tergal setae very small, clavate, a bit longer and subbacilliform only on collum and subsequent soma 2–3, as well as in hind row on ring 18. Pores usual, vague. Pleural keels practically wanting, rather resembling swellings. Epiproct short, stout, in dorsal view subtriangular with sides very feebly concave and tip broadly truncate, in lateral view slightly curved downward. Subanal scale, anal valves, legs and sterna typical, ♂ legs a little more encrassate, ridge behind ♀ coxae 2 very small, blade-shaped, inconspicuous.

Gonopods (Figs 3–4) with coxite not very voluminous, covered with scale-like structure and carrying a few strong setae frontally. Telopodite suberect, prefemoral portion densely setose, about half as high as entire telopodite; endomerite *(end)* relatively small, knife-shaped, simple, with accessory seminal chamber at base terminating usual loop-like course of seminal groove; femoral lateral process *(fs)* with a small truncate tip and two folds, one lateral and the other mesal, along its extension.

Usbekodesmus theocraticus, spec. nov.

Figs 5–6

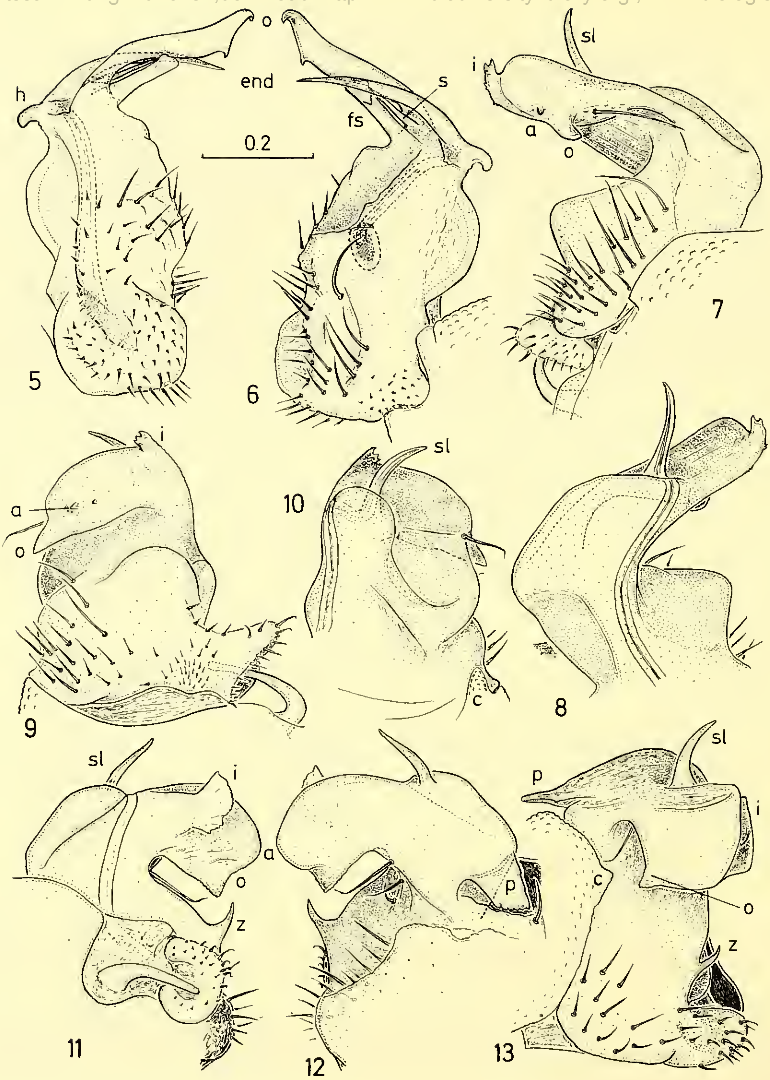
Holotype: ♂ (SMF), Nepal, Taplejung Distr., descent from Pass Deorali to Hellok, 2800–2600 m, mature mixed forest, 17. V. 1988; leg. J. Martens & W. Schawaller.

Diagnosis. Differs from other congeners by the particularly well developed paraterga (like in *U. occultus* Gol.) combined with especially complex gonopods supplied with a frontal hook *(h)* and an additional femoral outgrowth *(s* on *o)*.

Description

Length ca. 20 mm, width 1.2 and 2.7 mm on midbody pro- and metazona, respectively (ratio 1:2.25). Colour marble-greyish, markings being scattered throughout body rings; paler yellowish only legs and ventrum; darker brownish vertex, antennomere 6 and basal half of antennomere 7.

Head normal, distinctly narrower than spindle-shaped collum (1.7:2.0). Antennae in situ reaching to midlength of somite 3. Body polydesmoid, broadens gradually until ring 5, parallel-sided from ring 6 until 16th, onward gently tapering. Paraterga very well developed, thinly rimmed, subhorizontal, set high, a bit raised upward to reach level of poorly convex dorsum, laterally incised (3 or 4 small incisions on poreless and pore-bearing segments, respectively), in dorsal view almost straight, not rounded; caudal corner subrectangular on somite 3 only, onward increasingly acute, beak-shaped. Pores lie at about 1/4th of paratergite length dorso-laterally off caudal corner. Surface very finely shagreened, poorly shining, on metaterga macrosculpture scarcely traceable as usual three transverse rows of



Figs 5–13. Gonopods of *Usbekodesmus theocraticus,* spec. nov. (5–6), *Hingstonia pahakholana,* spec. nov. (7–10) and *H. fittkaui* spec. nov. (11–13), ♂ holotype & ♂♂ paratypes. – 5–8, 11–12 left gonopods (mesal, lateral, lateral, mesal, mesal and lateral views, respectively); 9–10, 13. right gonopods (caudal, frontal and caudal views, respectively).

highly flat polygonal tubercles. Tergal setae preserved only in hind row of ring 19, minute, clavate. Epiproct rather long, subconical, in dorsal view quite narrowly truncate, with a pair of minute apical setiferous papillae and a pair of midlength lateral incisions. Anal valves margined. Subanal scale typical, with a paramedian pair of setiferous knobs at hind margin.

Sterna without peculiarities, sparsely setose, Legs not enlarged, normal, very long and slender.

Gonopods (Figs 5–6) relatively complex, somewhat falcate. Coxite finely papillate on outer surface, not very massive, with a few frontal setae. Telopodite rather broad, stout, endomerite *(end)* as a long spine supplied with a small frontal hook *(h)* at base. Femoral lateral process *(fs)* finger-shaped, with two small distal outgrowths. Oral process *(o)* quite big, with an additional smaller spine *(s)* at base, preapically divided into two small and unequal unci.

Usbekodesmus spp. indet.

Material. 1 ♀ (SMF), Nepal, Sankhua Sabha Distr., Kongla Khola E of Thudam, 4100–4200 m, dwarf *Rhododendron*, rock debris, 24.–25.V.1988; 1 ♀ (SMF), Thudam, 3550–3650 m, mixed forest mainly of *Betula-Rhododendron*, 25.–27.V.1988; 1 ♀ (SMF), from Thudam to Gabri Khola, 4000–4250 m, dwarf *Rhododendron*, 27.V.1988; 2 ♀ (SMF), between Pass Pomri La and Pahakhola, 3600–3450 m, *Abies-Rhododendron* forest with *Bambusa*, 30.V.1988; all leg. J. Martens & W. Schawaller.

Remarks. Unfortunately, this material is represented solely by ♀♀ which seem to belong to two different species. However, in the absence of ♂♂ and reliable geographic records it is premature to describe them as new taxa. Anyhow, the above finds are interesting enough for zoogeographical purposes discussed in further detail under *Hingstonia* spp. (see below).

Family Fuhrmannodesmidae

Hingstonia pahakholana, spec. nov.

Figs 7–10

Holotype: ♂ (SMF), Nepal, Sankhua Sabha Distr., above Pahakhola, 2600–2800 m, *Quercus semecarpifolia-Rhododendron* forest, 31.V.–3.VI.1988; leg. J. Martens & W. Schawaller. – Paratypes: 12 ♂, 10 ♀, 2 juv. (SMF), 2 ♂, 2 ♀ (ZSM), 2 ♂, 2 ♀ (ZMUM), 1 ♂, 1 ♀ (ZMUC), same locality, together with holotype, 31.V.–3.VI.1988; leg. J. Martens & W. Schawaller.

Diagnosis. Keys out as *H. eremita* Carl or *H. perarmata* Gol. (s. Golovatch 1988a), but differs in the head subequal in width to both soma 2–3 combined with the conspicuous gonopods being very falcate and carrying characteristic branches and outgrowths.

Description

Length 12–15 mm in ♂♂ and 13–15.5 mm in ♀♀, width of midbody pro- and metazona 1.2–1.3 and 1.6–2.0 mm (♂♂), 1.3–1.4 and 1.8–2.0 mm (♀♀), respectively. Holotype ca. 13 mm long, 1.3 and 1.9 mm wide on midbody pro- and metazona, respectively. Juveniles (19 segm.) ca. 10 mm long, 1.3 (♂) or 1.4 mm (♀) wide on midbody metazona. Colour (pale) marble-brown, darker only vertex and antennae, paler legs and ventrum.

Head considerably broader than collum; latter convex, discoidal, carries rudimentary paranota, a row of longer, bacilliform setae along anterior margin and 2 + 2 very small, claviform setae in two rows centrally and posteriorly. Somite 2a little narrower than head, sometimes subequal in width to it (♀♀). Segment 3 already a little broader than head, sometimes subequal to it (♂♂), always narrower than 4th. Postcollar constriction somewhat better developed in ♂♂ as compared to ♀♀. Ring 5 broader than 4th, but narrower than 6th. Body polydesmoid, parallel-sided on somites 7–16, onward gently and gradually tapering. Paraterga well-developed, normally set quite high (at about 1/4th of midbody metasomital height), laterally rimmed, carry 2–3 bigger and often at anterior curvature several additional tiny incisions; caudal corner subrectangular on somite 2, obtuse and rounded narrowly on soma 3–8, again subrectangular on rings 9–14, increasingly acute and pointed as a beak, projecting beyond caudal tergal contour on rings 15–17, a little less so on 18th and very poorly so on 19th, (almost) reaching to hind contour on segment 14, well reaching to or even slightly surpassing contour on 15th, definitely surpassing contour on ring 16. Dorsum generally rather poorly convex, better so only on segment 2 (where paraterga set at about midheight), increasingly worse so on subsequent 2–3 soma. Surface finely shagreened, poorly shining. Macrosculpture displayed already from collum, as usual three transverse rows of flat and polygonal tubercles, with lateral ones being very large and scarcely subdivided; transverse sulcus between rows 1 and 2 better expressed than that between rows 2 and 3. Tergal setae minute, clavate, only in anterior row on collum and last row on segment 19a little longer, bacilliform. Fine rugosity below paraterga. Hind tergal limbus slightly bisinuate. Pleural keels wanting. Epiproct long, in dorsal view triangular with sides straight and incised, tip moderately narrowly truncate, in lateral view slightly curved downward. Subanal scale and anal valves normal.

Legs long and slender (particularly due to tarsi), gradually and not too much elongated toward telson, well enlarged in ♂♂ as compared to ♀♀. Tarsal sphaerotrichs and telopodital ventral microdenticulation as usual present on ♂ legs. Sterna without particulars, only behind ♀ coxae 2 a good, high (a bit higher than coxae 3), blade-shaped ridge with medial portion semi-circular and lateral parts elevated obliquely forward in the form of rounded triangles. Coxae 2 of ♀ each with a big, caudal, subhorizontal rounded disk.

Gonopods (Figs 7–10) subfalcate, coxite with an inconspicuous outer finger *(c)*. Telopodite at about midlength abruptly curved, basally with a big, rounded, caudal lobe lacking any outgrowths. Distal portion with a normal solenomerite *(sl)* terminating entirely mesal seminal groove, an inner, serrate *(i)*, an outer, subtriangular *(o)* and a more or less developed frontal tooth *(a)*. Sometimes *a* is bigger than depicted, sometimes even two smaller teeth stand for *a* (s. Fig. 9).

Remarks. It seems noteworthy that the type series comprises a copulating pair.

Hingstonia fittkaui, spec. nov.

Figs 11–14

Holotype: ♂ (SMF), Nepal, Sankhua Sabha Distr., Thudam, 3550–3650 m, mixed forest mainly of *Betula-Rhododendron*, 25.–27.V.1988; leg. J. Martens & W. Schawaller. – Paratypes: 7♂, 4♀ (SMF), 2♂, 1♀ (ZSM), 2♂, 1♀ (ZMUM), 1♂, 1♀ (ZMUC), same locality, together with holotype, 25.–27.V.1988; leg. J. Martens & W. Schawaller.

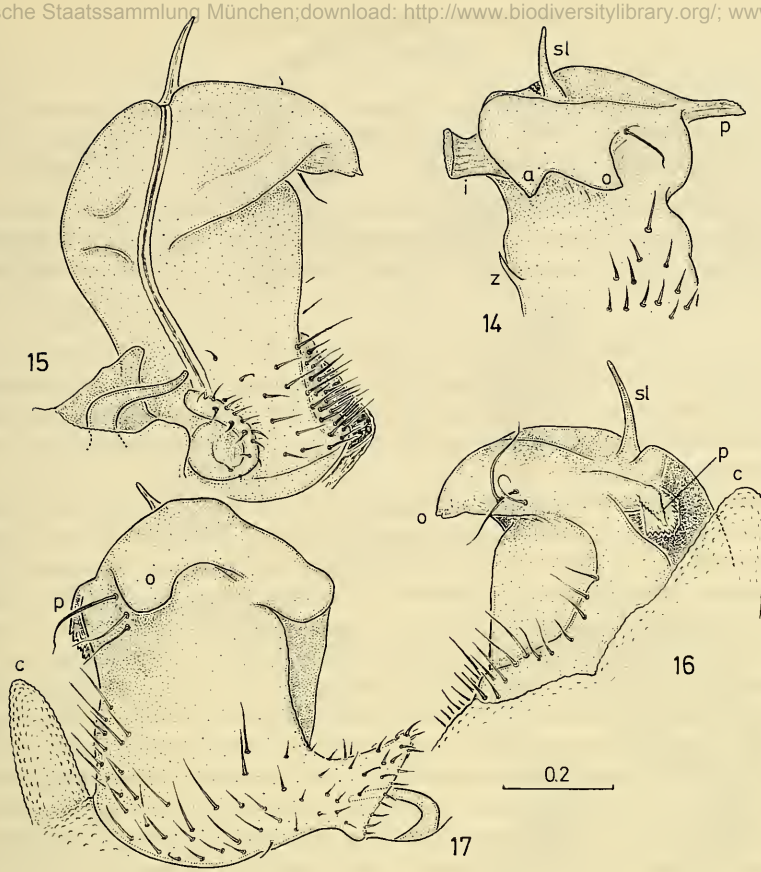
Derivatio nominis. It is my pleasure to name this highly interesting species after Prof. Dr. E. J. Fittkau, the prominent entomologist and Director of the ZSM, whose support and encouragement I experienced during my short stays in Munich.

Diagnosis. Keys out as both *H. perarmata* Gol. and *H. gogonana* Gol. (s. Golovatch 1988a), but differs well from either by the conspicuous gonopods possessing a small parabasal tooth *(z)* and a number of other outgrowths of various shapes.

Description

Length 13–15 mm in both ♂♂ and ♀♀, width of midbody pro- and metazona 1.3–1.4 and 1.9–2.1 mm (♂♂), 1.4 and 2.0–2.1 mm (♀♀), respectively. Holotype ca. 14 mm long, 1.4 and 2.1 mm wide on midbody pro- and metazona, respectively. Colour (pale) marble-brown, darker only vertex and antennomeres 5, 6 and 7 (at least basal half), paler (yellowish) legs and ventrum.

Head considerably broader than normal collum, a little broader than somite 2, subequal in width to segment 3, but a bit narrower than ring 4. Body gradually grows in width until segments 6–7 to become parallel-sided till ring 16, onward gently and gradually tapering. Postcollar constriction better developed in ♂♂ as compared to ♀♀. Collum well convex, with traces of paraterga, incised laterally. Paraterga, micro- and macrosculpture, telson, legs, sterna, etc., like in *H. pahakholana*, spec. nov., but tergal setae, though very small, are definitely bacilliform, tending to shorten and grow more claviform only in hind rows toward telson. Caudal angle of paraterga obtuse until segment 11, subrectangular



Figs 14—17. Gonopods of *Hingstonia fittkaui*, spec. nov. (14) and *H. sympatrica*, spec. nov. (15—17), ♂♂ paratypes. — 14—16. left gonopods (caudal, mesal and lateral views, respectively); 17. right gonopod (caudal view).

on rings 12—13, again obtuse on 14th, subrectangular on 15th, increasingly acute and pointed until somite 18, onward less prominent, reaching to hind tergal contour on ring 15, a little surpassing it on 16th, particularly well so on 17th. Sternal ridge behind ♀ coxae very similar to that of *H. pahakholana*, spec. nov., but medial portion is equal in height to coxae 3.

Gonopods (Figs 11—14) heavily falcate, coxite with outer finger *(c)* almost wanting. Telopodite massive, at midlength abruptly curved caudad, parabasally with caudal lobe supplied with a conspicuous, rather small tooth *(z)*, distally with a normal solenomerite *(sl)* terminating normal seminal groove, a flat, uneven, almost square frontal process *(p)*, an inner, subscapulate, uneven outgrowth *(i)*, an uneven, small, subtriangular outer projection *(o)*, and usually a similar caudal projection *(a)*. More seldom practically no concavity between apical projections *a* and *o* (cp. Figs 13 & 14).

Remarks. Like in the previous case, the type series contains a copulating pair, thus providing not only the ground for matching the sexes, a task rather serious in the presence of a sympatric congener (see below under *H. sympatrica*, spec. nov.), but also some idea of the phenology of *Hingstonia*.

Hingstonia sympatrica, spec. nov.

Figs 15–17

Holotype: ♂ (SMF), Nepal, Sankhua Sabha Distr., Thudam, 3550–3650 m, mixed forest mainly of *Betula-Rhododendron,* 25.–27.V.1988; leg. J. Martens & W. Schawaller. – Paratypes: 1♂, 2♀ (SMF), 1♀ (ZSM), 1♀ (ZMUM), same locality, together with holotype, 25.–27.V.1988; leg. J. Martens & W. Schawaller.

Diagnosis. Keys out as *H. variata* Gol. (s. Golovatch 1988a and below), but differs in a number of conspicuous features of the gonopod structure, in particular by the presence of a disto-lateral frontal outgrowth *(p),* absence of any longer and slender processes except for the solenomerite, etc.

Description

Length 19–23 mm in both ♂♂ and ♀♀, width on midbody pro- and metazona 1.5–1.9 and 2.8–3.0 mm (♂♂), 1.8–2.0 and 2.9–3.1 mm (♀♀), respectively. Holotype ca. 19 mm long, 1.9 and 3.0 mm wide on midbody pro- and metazona, respectively. Colour (pale) marble-brown; usually darker, almost blackish are antennae, vertex (or entire dorsal part of head) and subsequent 2–3 terga; paler legs and ventrum.

Head considerably broader than normal collum, a bit broader than (♂) or subequal to (♀) segment 2, but narrower than somite 3. Body broadens toward rings 6–7, onward parallel-sided until 15th to become gently and gradually tapering further on. Postcollar constriction best expressed in ♂♂ rather than ♀♀. Paraterga, micro- and macrosculpture, tergal setae, telson, etc., like in *H. pahakholana,* spec. nov. Caudal corner of paraterga well obtuse on soma 2–4, less so on rings 6 and 8, subrectangular on rings 5, 7 and 11, increasingly acute on somites 9, 10, 12 and all the subsequent ones until 19th, on ring 14 almost (♂) to well (♀) reaching to hind tergal contour, rather well surpassing it on rings 15–17, somewhat less so on segments 18–19. Epiproct moderately narrowly truncate at apex.

Ridge behind ♀ coxae 2 almost straight, lower than coxae 3, both lateral triangles well-developed as usual. Coxa 2 of ♀ with a prominent, subhorizontal, rounded, caudal disk expanding toward ridge.

Gonopods (Figs 15–17) massive, stout, more simple, coxite with a prominent outer finger *(c).* Telopodite curved only distally, with a plume-shaped fronto-lateral *(p)* process, a good solenomerite *(sl)* terminating normal seminal groove, and a bigger, inconspicuous caudal apex *(o)* probably corresponding to both *a* and *o* of the previous species.

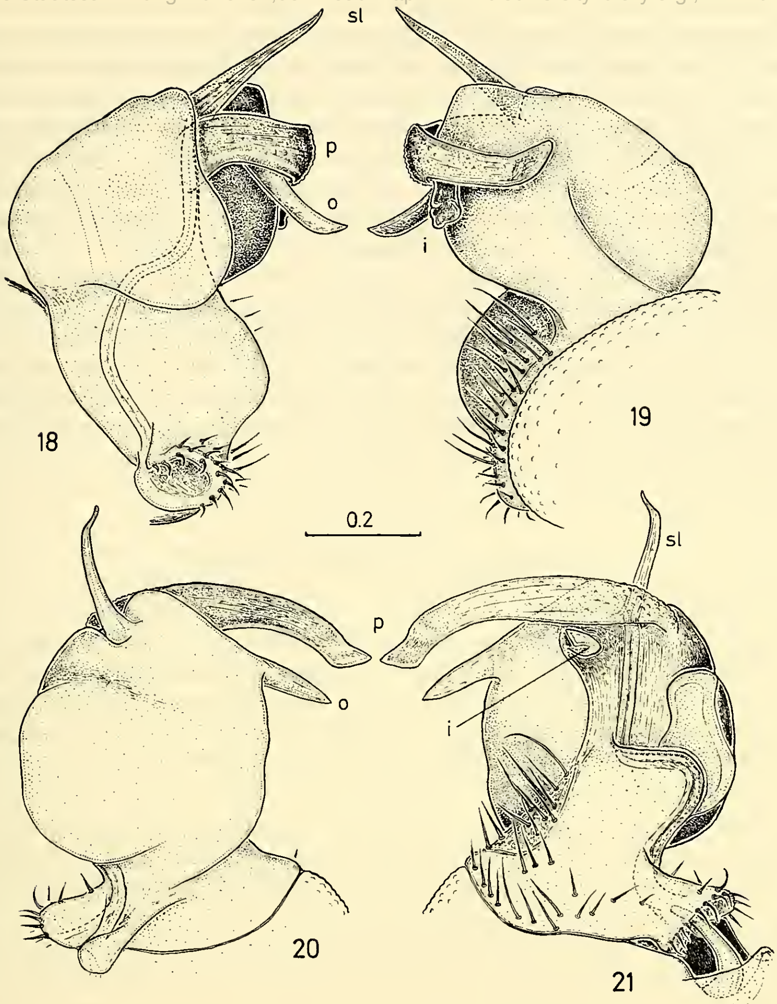
Remarks. This is the first case as yet of two *Hingstonia* occurring most probably not only sympatrically (as is the case, e. g., with *H. variata* Gol. and *H. beatae,* spec. nov., see below), but also syntopically. As in numerous other examples of millipede congeners sharing one and the same habitat, marked differences in body size are evident.

Hingstonia beatae, spec. nov.

Figs 18–21

Holotype: ♂ (SMF), Nepal, Taplejung Distr., Yamputhin, ascent to Pass Deorali, 2700–3420 m, mixed mature forest, *Bambusa* thicket, 16.V.1988; leg. J. Martens & W. Schawaller. – Paratypes: 1♂ (ZSM), Taplejung Distr., pasture Lassetham NW of Yamputhin, 3300–3500 m, mature *Abies-Rhododendron* forest, 6.–9.V.1988; 1♂, 1♀ (SMF), 1♀ (ZMUM), upper Tamur Valley, below Walungchung Gola, 2400–2700 m, mixed forest, open river bank, 20.V.1988; 2♀ (SMF), 1♀ (ZSM), Walungchung Gola, 3000–3200 m, *Tsuga* forest, mainly open terraces at river bank, 20.V.1988; all leg. J. Martens & W. Schawaller.

Derivatio nominis. Honours Mrs. Beate Martens, formerly B. Daams, who contributed heavily to Prof. Martens' 1983 expedition to Nepal both as collector and laboratory assistant and who now shares with her husband the hardships of family life.



Figs 18–21. Gonopods of *Hingstonia beatae,* spec. nov., ♂ paratype from Lassetham. – 18–19. left gonopod (mesal and lateral views, respectively); 20–21. right gonopod (frontal and caudal views, respectively).

Diagnosis. Keys out as *H. eremita* Carl (s. Golovatch 1988 a), but differs in the armament of the gonopods and the development of the paratergal caudal corners.

Description

Length 15–17 mm in both ♂♂ and ♀♀, width on midbody pro- and metazona 1.3–1.7 and 2.0–2.7 mm (♂♂), 1.3–1.5 and 2.0–2.2 mm (♀♀), respectively. Holotype ca. 17 mm long, 1.7 and 2.6 mm wide on midbody pro- and metazona, respectively. Colour marble-brown, darker antennae, vertex (sometimes entire dorsal side of head), a few anteriormost body segments and sometimes also a few posteriormost ones, paler are legs and ventrum.

Head considerably broader than discoid collum, but a bit narrower than somite 2, onward body gradually broadening to become parallel-sided on terga 6–7 to 16th, further on gently and gradually tapering. Paraterga, microsculpture, telson, etc., like in, e. g., *H. pahakholana,* spec. nov., but macrosculpture somewhat poorer developed more like in sympatric *H. variata* Gol. (see below). Tergal setae hardly traceable, minute, clavate, only a bit longer in anteriormost row of collum and hindermost row of ring 19. Caudal corner mainly obtuse until rings 11–12, subrectangular at least on segment 13, rather rounded and not beak-shaped on 14th, poorly beak-shaped and reaching to or hardly surpassing hind tergal contour on 15th, well beak-shaped and projecting beyond hind contour on rings 16–17, somewhat less so on 18th and particularly poor on ring 19.

Ridge behind ♀ coxae 2 high, medial portion equal in height to both lateral triangles continuing the straight outline, equal in height to or even a bit higher than coxae 3. Coxa 2 of ♀ with caudal disk somewhat underdeveloped as compared to *H. variata* Gol.

Gonopods (Figs 18–21) massive, rather rounded, coxite with inconspicuous outer finger. Telopodite with several swellings, mostly parabasally; solenomerite *(sl)* normal, terminating the somewhat curved course of seminal groove; distal part with a lamelliform, at base a little rugose, long process *(p)* beginning cephalad of seminal groove and, despite its outward direction, probably corresponding to frontal process of several other *Hingstonia,* e. g., *H. fittkaui,* spec. nov.; a short, somewhat irregularly shaped, inner process *(i)* is almost hidden by *p,* whereas disto-caudal swelling carries a good, knife-shaped, simple outgrowth *(o)* directed laterad.

Hingstonia variata Golovatch, 1987

Hingstonia variata Golovatch, 1987, p. 215.

Material: 1 ♂ (ZSM), Nepal, Taplejung Distr., descent from Pass Deorali to Hellok, 3400–3000 m, mature mixed forest, 17. V. 1988; 1 ♀ (SMF), same locality, 2800–2600 m, mature mixed forest, 17. V. 1988; 3 ♀ (ZSM), upper Simbua Khola Valley, near Tseram, 3250–3350 m, mature *Abies-Rhododendron* forest, 10.–15. V. 1988; 1 ♀ (SMF), same Valley, near Yalung, 3450–3700 m, *Abies-Rhododendron* forest, 13. V. 1988; 3 juv. (ZSM), same valley, ascent to pasture Lassetham, 3000 m, mature mixed *Tsuga-Rhododendron*-broadleaved forest, 15. V. 1988; all leg. J. Martens & W. Schawaller.

Remarks. The materials at hand agree very well with the original description (s. Golovatch 1987), which is hardly surprising as they derive from actually the locus typicus and a few neighbouring localities. As pointed out earlier, *H. variata* obviously represents another case of strict co-existence, with its counterpart being at least *H. beatae,* spec. nov. (and still another congener?! – see below). And again, both species concerned are readily distinguished by body size, whereas in other respects at least ♀♀ are habitually difficult to allocate. As possible hints may serve perhaps, regardless of the size gap, also normally more acute caudal corners of the 13th ring in *H. variata* as compared to *H. beatae,* spec. nov., and a well to rather well concave ridge behind the ♀ leg-pair 2 in the former species. Besides, the ♀ coxa 2 in *H. variata* is supplied with a particularly well developed caudal disk.

Hingstonia spp. indet.

Material: 1 ♀ (SMF), Nepal, Taplejung Distr., upper Simbua Khola Valley, near Tseram, 3250–3350 m, mature *Abies-Rhododendron* forest, 10.–15. V. 1988; 1 ♀ (SMF), Sankhua Sabha Distr., between Pass Pomri La and Pahakhola, 3900–3600 m, open *Abies-Rhododendron* forest, 30. V. 1988; both leg. J. Martens & W. Schawaller; 1 ♀ juv. (19 segm.) (SMF), Panchthar Distr., ridge between Sheldoti & Paniporua, 2200 m, broadleaved forest, 29. VIII. 1983; leg. J. Martens & B. Daams.

Remarks. Unfortunately, in the absence of ♂♂ and/or reliable geographic record, these samples could not be identified closer to species. As regards the ♀ from near Tseram, it was encountered in the same vial comprising 3 ♀♀ of *H. variata,* but differs by its even greater body size (22 mm long, 2.0 and 3.2 mm wide on midbody pro- and metazona) and, what is particularly important, the ridge behind the coxae 2 is drastically concave and low in its medial portion, with a good frontal triangle in the very middle. Concerning the ♀ from between Pomri La and Pahakhola, its size is distinctly larger than that of the geographically nearest *H. pahakholana*, spec. nov. – it is 14.5 mm long, 1.4 and 2.3 mm wide on midbody pro- and metazona, and some other somatic differences are expressed as well. In other words, *Hingstonia* may be postulated as certainly being one of the species-richest polydesmoid genera in the Himalayas. But even a rough idea of how many species are involved is impossible to assess at the moment: dozens and dozens at least.

Zoogeographically, *Hingstonia* is quite interesting. This purely Himalayan genus is known to comprise now 13 described forms from Nepal and Bhutan (see review by Golovatch, 1988a). Of them, the only record below an altitude of 2000 m belongs to *H. yeti* Gol. (1600–2600 m), the highest discoveries involve *H. gogonana* Gol. (3650–4000 m), *H. serrata* Gol. (3600 m), *H. fittkaui* spec. nov. (3550–3650 m), *H. sympatrica* spec. nov. (3550–3650 m), etc. Moreover, *H. variata* is known now to range from 2600 to 4500 m in elevation! But this must surely bean exception rather than a rule, as the majority of *Hingstonia* spp. are confined to altitudes ranging between 2500 and 3600 m.

Practically the same pattern is observed in *Usbekodesmus*, a genus now comprising 7 described forms restricted to Soviet Middle Asia (*U. redikorzevi* Lohm., 1500–4000 m in elevation) and Nepal (*U. theocraticus* spec. nov., altitudes 2600–2800 m, on the one hand, and *U. sacer* Gol., altitudes 3300–4000 m, on the other). The majority of the known *Usbekodesmus* normally occur between 2700 and 3400 m in elevation, i. e. exactly like *Hingstonia*.

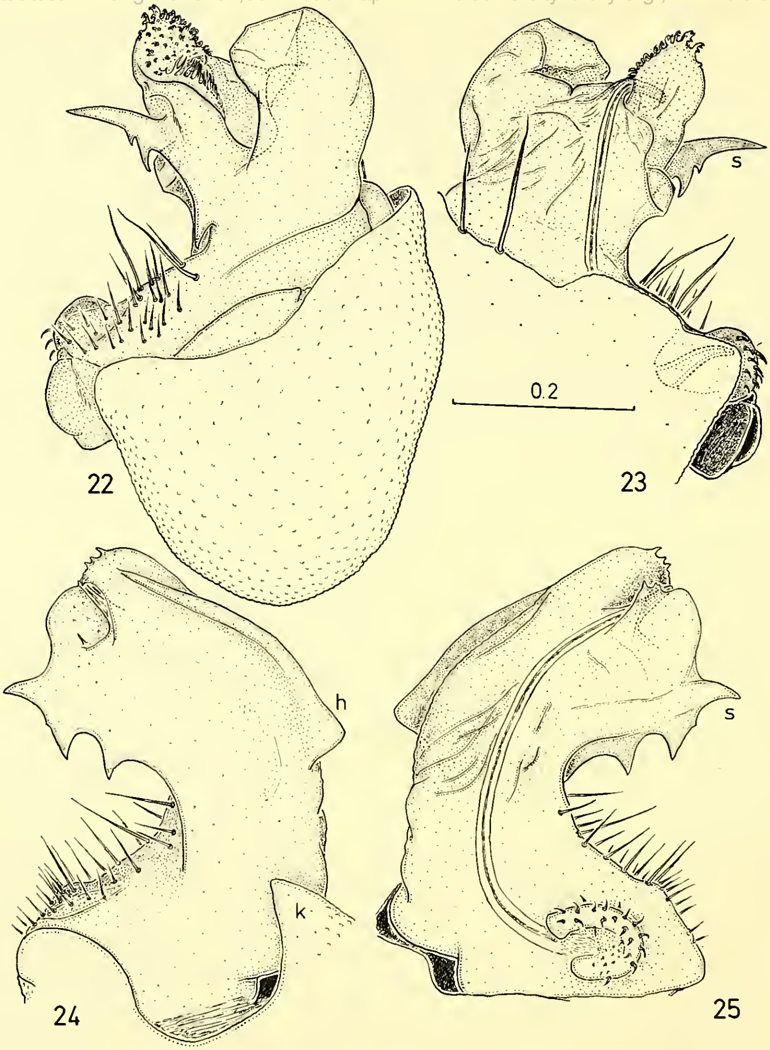
However, this similarity is highly superficial, since both genera in question belong to very different lineages: *Hingstonia* is a Fuhrmannodesmidae, which do not have representatives in the entire Palaearctic, whereas *Usbekodesmus* is a Polydesmidae, almost exclusively a Holarctic family. Even within *Usbekodesmus* proper, definite relationships with Central Asia are evident, let alone the fact that its closest affinities lie with the Manchurio-Japanese genus *Epanerchodus*. As regards *Hingstonia*, its closest relatives seem to be *Assamodesmus*, restricted to Assam, India, *Sholaphilus* and some immediate allies, confined to southern India and/or the Himalayas. In any case, if *Usbekodesmus* may be postulated to represent in the Himalayan fauna a Palaearctic element, *Hingstonia* can definitely be referred to as an Oriental (sub)tropical component. Their vertical distribution in the Himalayas seems to be misleading, if only this kind of chorology is taken into consideration. It is well-known that the Himalayan biota is a bon mélange of elements of various origins, and the Himalayas are quite unique in having absorbed so many of them and produced a wealthy lot of their endemics. Most of such endemics are quite restricted in area, many of them represent local species swarms, examples of proliferated secondary speciation are numerous (s. Martens 1984). This holds especially true for soil/litter fauna, with Diplopoda among them, more or less strictly confined to the forest belt(s). Just in such groups violations from the principle "tropical elements for tropical habitats only" are rather a rule than an exception. Unfortunately, too scant is our knowledge of the diplopod fauna of the Himalayas to warrant any further biogeographical speculations.

Sholaphilus monachus, spec. nov.

Figs 22–23

Holotype: ♂ (SMF), Nepal, Sankhua Sabha Distr., Arun Valley between Mure & Hurure, 2050–2150 m, mixed broadleaved forest, 17. VI. 1988; leg. J. Martens & W. Schawaller. – Paratypes: 1 ♂ (SMF), same locality, together with holotype, 17. VI. 1988; leg. J. Martens & W. Schawaller.

Diagnosis. Differs from all congeners but *S. gompa*, spec. nov. (see below) by the complete absence of gonofemoral latero-basal processes, from *S. gompa*, spec. nov. by the shorter tergal setae, somewhat differently shaped and armed gonopods, etc.



Figs 22–25. Gonopods of *Sholaphilus monachus*, spec. nov. (22–23) and *S. gompa*, spec. nov. (24–25), ♂ paratype & ♂ holotype left gonopods (lateral, mesal, lateral and mesal views, respectively).

Description

Length 11 (paratype) or 12 mm (holotype), width on midbody pro- and metazona 0.8 (paratype) to 0.85 (holotype) and 1.2 (paratype) to 1.3 mm (holotype), respecitvely. Colour brownish, paler legs and ventrum.

Head considerably broader than discoid collum and subequal in width to somite 5, a little broader than segment 2 which in its turn a bit broader than subequal soma 3–4. Antennae broken off, obviously quite long as usual. Body polydesmoid, parallel-sided on rings 5 to 15th, thereafter very gradually and gently tapering caudad. Collum with traces of paranota and three rows of setae on tubercles: 5 + 5 antero-laterally, 2 + 2 medially and 3 + 3 caudally. Paraterga moderately developed, although set quite high (at about 1/4th of metasomital height), subhorizontal, thinly rimmed, with normal, relatively big lateral incisions (3 in front of caudal corner). Dorsum rather slightly convex, surface dull, finely punctured. Macrosculpture on metaterga very distinct, tubercles relatively high, arranged into three usual rows caudal of which is particularly sinuate at limbus. Tergal setae medium-sized, normally clavate, only those in fore row on collum and hind row on somite 19 somewhat longer, though still subclaviform. Caudal angle of paraterga obtuse or subrectangular only until ring 7, from 8th increasingly acute to become a relatively good beak on segments 14–15, reaching to lateral limbal tooth (= hind tergal contour) on ring 16, surpassing it in length on 17th, a little less so on 18th, again almost within contour and this time very poorly expressed on 19th. Lateral tooth of limbus obtuse to subrectangular, gradually coming to almost naught until ring 18. In dorsal view paraterga of anterior body half better rounded, tending to grow straighter toward telson. Epiproct finger-shaped, rather broadly rounded at tip, in dorsal view sides very feebly concave, incised, in lateral view slightly curved downward. Anal valves margined. Subanal scale semi-circular, with a paramedian pair of setiferous knobs at caudal margin. In other respects typical for the genus.

Legs distinctly encrassate, relatively long (especially due to tarsi lacking sphaerotrichs), tending to grow gradually in length toward telson. Sterna moderately setose, starting from 11th with a pair of small spiniform outgrowths.

Gonopods (Figs 22–23) very complicated, coxite voluminous, papillate, without distinct outgrowths from lateral side. Telopodite well curved caudad, parabasally lacking any distinct outgrowths from lateral side, distally branching into two bigger lobes caudal of which is densely plumose and frontal characteristically folded. A usual, small solenomerite terminating mesal seminal groove runs between both distal branches. Caudal branch caudo-laterally with a harpoon-shaped process *(s)* carrying three strong teeth on its dorsal side.

Sholaphilus gompa, spec. nov.

Figs. 24–25

Holotype: ♂ (SMF), Nepal, Taplejung Distr., Yamputhin, cultivated land, open forest, 2000–2100 m, 25.IV.1988; leg. J. Martens & W. Schawaller.

Derivatio nominis. From Nepali "gompa", in Tibetan lamaism meaning a monastery.

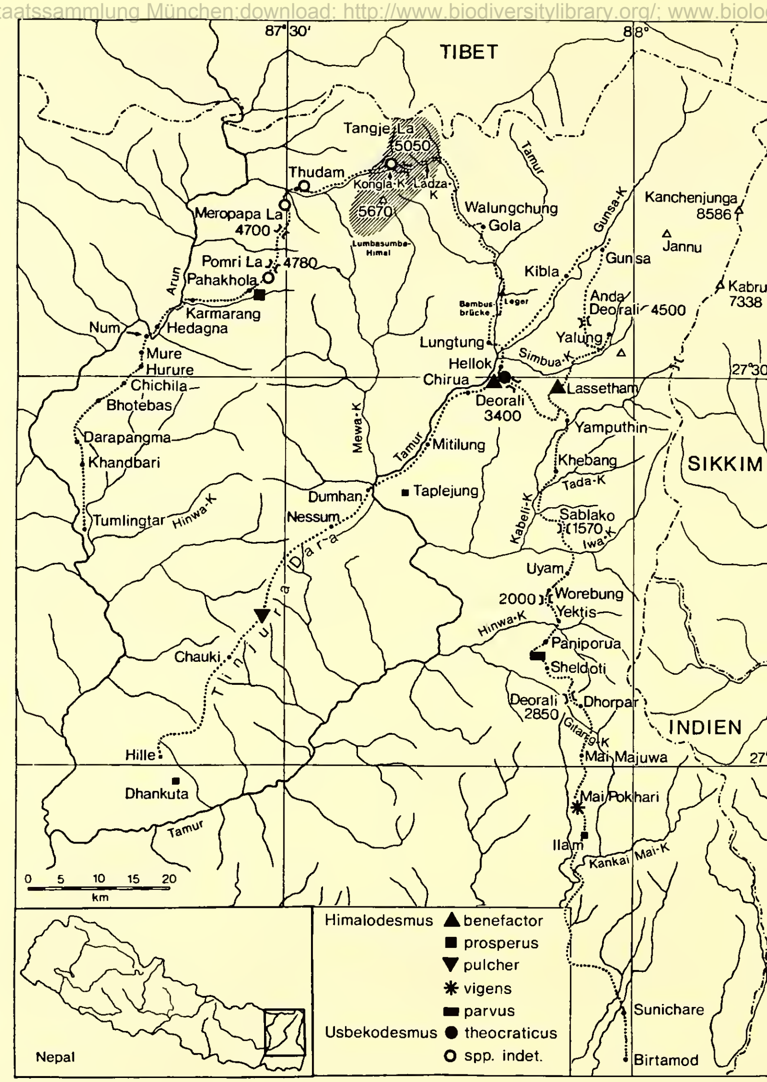
Diagnosis. Particularly closely related to *S. monachus*, spec. nov. (see above), but differs in the longer tergal setae, somewhat broader somite 2, certain details of the gonopod structure, etc.

Description

Length ca. 11 mm, width on midbody pro- and metazona 0.8 and 1.1 mm, respectively. Colour brownish, paler legs and ventrum, darker antennae.

Head subequal in width to segment 2 which is just a tiny bit broader than subequal somites 3–4. Ring 5 already broader than head, starting from it body parallel-sided till segments 15–16, onward very gently and gradually tapering toward telson. Paraterga, micro- and macrosculpture, pores (normal), legs, etc., like in *S. monachus* spec. nov., but antennae in situ almost reaching to end of segment 3, tergal setae normally bacilliform, longer, particularly long and slender also in fore row on collum and hind row of segment 19, and sterna provided with paramedian knobs already from leg-pairs 10–11, but fully developed only on the subsequent sterna. Paratergal caudal corner reaching to hind tergal limbus (= limbal lateral tooth) on ring 16, a little projecting beyond it on both 17th and 18th, again reaching to contour and very poorly developed on 19th, both paratergal and lateral limbal teeth invariably acute and quite pointed.

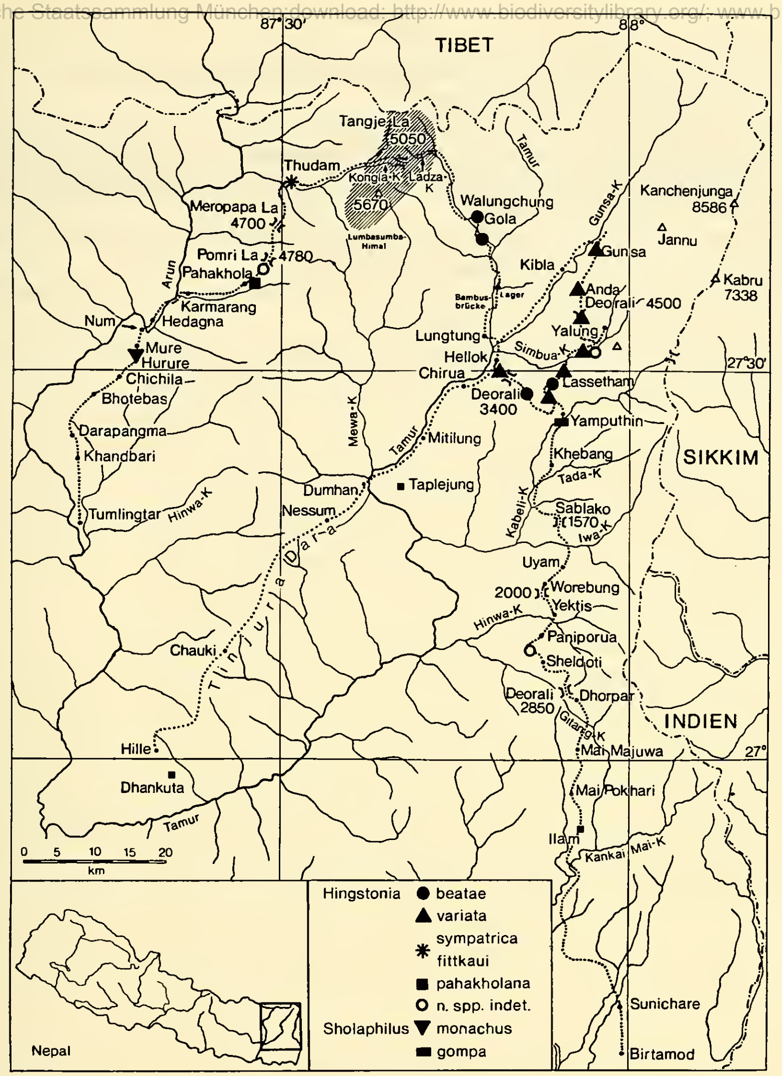
Gonopods (Figs 24–25) somewhat simpler, coxite massive, papillate on outer surface, also with a couple of strong setae from frontal side, fronto-laterally with a poorly developed outgrowth *(k)*. Telopodite well curved, (para)basally lacking any particulars, distally also divided into two smaller lobes,



Map 1. Distribution of Polydesmidae in eastern Nepal, resulting from the Martens' collections 1983 and 1988. Stippled line: Martens' route 1983 and 1988.

both with poor traces of plumosity. Solenomerite normal, small, terminating seminal groove running entirely mesally. Harpoon-shaped caudal process *(s)* somewhat underdeveloped. Frontal branch from lateral side with a long, simple ridge *(h)* forming basally an abrupt subrectangle.

Remarks. The genus *Sholaphilus* is known to represent another Oriental element in the Himalayan fauna, comprising a single species (with a good number of very close allies) from southern India and several forms from the Nepal Himalayas (see review by Golovatch 1986). However, their altitudinal zonation is a better support to the zoogeographical pattern than in *Hingstonia* (see above), as most *Sholaphilus* spp. are restricted to elevations ranging from 1300 to 2000 m, with the lowest record being 1100 m for *S. martensi* Gol. and the highest 2150 m for *S. monachus*, spec. nov., 2100 m for



Map 2. Distribution of Fuhrmannodesmidae in eastern Nepal, resulting from the Martens collections 1983 and 1988. Stippled line: Martens' route 1983 and 1988.

both *S. gompa*, spec. nov. and *S. martensi*, and as much as 2400 m for *S. dalai* Gol. In other words, in this case the normal rule "(sub)tropical elements for (sub)tropical habitats only" works quite well (cp. Martens 1984).

Acknowledgements

I feel particularly indebted to all my colleague friends in both West-Germany and Denmark whose help, support and hospitality I enjoyed during my stay with them in January–March 1989: Prof. Dr. J. Martens and Mrs. B. Martens (Mainz), Prof. Dr. E. J. Fittkau and Dr. H. Fechter (both ZSM), Dr. M. Graßhoff (SMF), Dr. H. Enghoff (ZMUC), Dr. W. Schawaller (Stuttgart). Without their kind assistance this paper never would have appeared.

References

Golovatch, S. I. 1986. Diplopoda from the Nepal Himalayas: Polydesmidae, Fuhrmannodesmidae. – Senckenberg. biol. **66** (4/6): 345–369; Frankfurt/M. [for 1985]

–– 1987. Diplopoda from the Nepal Himalayas: Opisotretidae, additional Polydesmidae and Fuhrmannodesmidae. – Cour. Forsch.-Inst. Senckenberg **93:** 203–217; Frankfurt/M.

–– 1988 a. On the first Polydesmidae, Opisotretidae and Fuhrmannodesmidae from Bhutan (Diplopoda, Polydesmida). – Ent. basil. **12:** 15–48; Basel

–– 1988 b. On three remarkable genera of Polydesmoidea (Diplopoda: Polydesmida) from the Himalayas of India. – Folia ent. hung. **49:** 41–47; Budapest

Martens, J. 1984. Vertical distribution of Palaearctic and Oriental faunal components in the Nepal Himalayas. – Erdwissenschaftl. Forsch. **18:** 321–336; Stuttgart

–– 1987. Remarks on my Himalayan expeditions. – Cour. Forsch.-Inst. Senckenberg **93:** 7–31; Frankfurt/M.