**Szeptyckianna**, a new genus of the feather mite family Pterolichidae (Acari, Astigmata, Pterolichoidea) from the Black-thighed Falconet *Microhierax fringillarius* (Falconiformes, Falconidae)

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Abstract. *Szeptyckianna*, a new genus of the feather mite family Pterolichidae (Pterolichoidea), is described based on two new species, *S. macrosetosa* sp. n. (type species), and *S. microsetosa* sp. n., collected from the wing feathers of museum specimens of the Black-thighed Falconet *Microhierax fringillarius* (Drapiez, 1824) (Falconidae). This highly pleomorphic new genus is characterized by pseudodermal membranes with net-like pattern of hexagonal cells, complete idiosomal chaetotaxy, lanceolate setae c3, free epimerites I, and dagger-like setae eG on genua I and II. Males have very short opisthosomal lobes with tongue-shaped terminal membranes, genital and anal region not sclerotized, medium-sized pedipalps and minute adanal discs, not modified legs similar in size, tarsi IV with small apico-ventral claw, and setae don tarsi IV shaped as short sticks; setae absent. Females have large horseshoe-shaped epigynum, 1.4-1.7 times longer than wide, and the ards of legs IV not reaching posterior rounded margin of the body. The occurrence of two *Szeptyckianna* species on a single individual of *M. fringillarius* is the first record of feather mite lineage duplication on falconiform birds.

Key words: Feather mites, Astigmata, Pterolichidae, falconets, new taxa.

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I. INTRODUCTION

The family Pterolichidae Trouessart et Mégnin, 1884 with about 120 named genera and nearly 400 species is the largest and most diverse taxon among the feather mites. Representatives of this family are found on diverse non-passerine birds, mostly on terrestrial ones. Among hosts of these mites are also birds-of-prey (Falconiformes). However, the main part of falconiform acarofauna are numerous members of the family Gajuciniidae GAUD et ATYEO, 1975. The family Ptero-
lichidae is poorly represented by one subfamily Pterolichinae and three genera: *Epopolichus* GAUD, 1981, *Falcolichus* GAUD et ATYEO, 1996, and *Pseudalloptimus* DUBNIN, 1956. Two later genera are restricted to Falconiformes, whereas *Epopolichus* is shared with hoopoes (Upupidae).

Feather mites remain in bird plumage also after bird’s death as dried “mummies” that gives an opportunity to examine feather mites acarofauna on preserved birds in ornithological collections (DABERT & ALBERT 2008). During systematic studies on feather mites carried out in the ornithological collections of German museums one of us (JD) found some representatives of pterolichid mites on dry skins of the two individuals of falconets, the world’s smallest falconiform birds. Sampled mites belong to a new genus (with two species), distinctly different to all genera known previously from falconiform birds. The only feather mite species reported so far from falconets belong to two genera of the family Gabuciniidae: *Hieracolichus* GAUD et ATYEO, 1975 collected from *Microhierax fringillarius* (DRAPIEZ, 1824) by MÉGIN and TROUSSART (1884) and *Coraciacarus* DUBNIN, 1956 reported from *M. caerulescens* (L., 1758) by McClaure and RATANA WORABHAN (1973). However, these reports are of very limited credibility, because *Coraciacarus* spp. and *Hieracolichus nisi* (C., 1878) are taxa not found on falcons. They represent most probably either accidental contamination or wrong species identification.

II. MATERIALS AND METHODS

The material used in the present study was collected in the ornithological collection of the Zoological Institute and Museum, Ernst-Moritz-Arndt University, Greifswald, Germany from dry bird skins and was preserved in 70% ethanol. Before mounting, mites were softened and cleared in 10% lactic acid at +60°C for 2-3 days. For light microscope study the mites were mounted on slides in Faure medium (E., 1992) and investigated under the light microscope Olympus BX51 with Nomarsky differential interference contrast (DIC). Drawings were made using a camera lucida drawing device.

All measurements are given in micrometers (µm). Length of gnathosoma was measured from the distal tips of palps to the basal margin of subcapitulum. Width of gnathosoma was measured at the widest section of subcapitulum. Idiosoma length was measured from the anterior margin of prodorsum to the posterior end of body (except terminal membranes in males). Width of idiosoma was measured at the level of setae c2. Distances between setae were measured as the shortest distance between centers of their alveoli; for setae of different rows the measure is a mean taken from both sides of the mite. Measurements separated by dash are the min-max range. Abbreviations used in measurements and taxa descriptions: L/W – length to width ratio, P/H – prodorsum to hysteronotum length ratio.

Chaetotaxy nomenclature follows that of GAUD & ATYEO (1996). Terminology of pterolichid morphology is after DABERT (2003). Scientific English and Latin names of birds as well the higher-level classification of birds are those of DICKINSON (2003). The type materials are deposited in the Department of Animal Morphology (AMU), Poznañ, Poland.

III. DESCRIPTIONS OF NEW TAXA

*Zsceptyckiana* gen. n.

**Type species.** *Zsceptyckiana macrosetosa* sp. n. from *Microhierax fringillarius* (DRAPIEZ, 1824) (Falconidae).

**Diagnosis.** Both sexes: Small-sized mites, males about 230, females about 310-330 in length. Subcapitulum of gnathosoma transversely striated, pseudorutellar membranes with hexagonal reticulation (Fig. 6). Dorsal shields entire, well developed covering almost entire pronotum and hysteronotum. Supranal concavity well developed, circular. Idiosomal chaetotaxy complete, setae
vi paired, remnants of alveoli of setae ve present. Scapular setae simple; si minute, set close to macrosetae se, medially. Setae c3 lanceolate. Epimerites I free; coxal fields I-II not sclerotized, III-IV with well developed shields along epimerites. Setae cG on genua I, II thickened, dagger-like. Solenidion σ on genu III present, σ2 on genu I absent.

Male: Body more stocky than in females, twice longer than wide. Opisthosomal lobes very short, separated by small interlobar cleft. Lobes with tongue-shaped terminal membranes. Genital organ medium-sized; genital and anal region without sclerotized shields. Adanal discs minute, highly regressive. All legs similar in size, relatively short and not modified. Tarsi IV with small apico-ventral claw; no other apophyses present. All tarsi with well developed ambulacra. Setae d on tarsi IV shaped as short sticks, e absent.

Female: Idiosoma more slender than in males, about three times longer than wide. Body terminus rounded with poorly expressed incision between setae h3. Dorsal opisthosoma with poorly developed suture lying antero-laterally to supranal concavity. All dorsal, lateral, and terminal setae of hysterosoma (except h2 and h3) piliform, short. Epigynum horseshoe-shaped, not touching anterior epimerites, longer than latigenital sclerites of oviporus, 1.4-1.7 times longer than wide. Primary spermaduct of spermatheca relatively short and wide, with distal part spring-like, stretchy; secondary spermaducts shaped as very short, strongly sclerotized cylinders; copulatory opening set dorsally in supranal concavity (Fig. 5D). Legs IV not reaching posterior margin of the body.

D i f f e r e n t i a l d i a g n o s i s. The new genus is a highly plesiomorphic taxon devoid of clear apomorphies. That makes difficult to enumerate its specific features enabling an easy single-character distinguishing from other mites of the subfamily Pterolichinae. It is possible that the net-like pattern of pseudorutellar processes is a unique character of this genus, but temporarily this observation is useless because of lacking data about shape of this structure in nearly all remaining Pterolichidae. Also the very long epigynum of female is rather unusual in pterolichins. Most genera have arched or horseshoe shaped epigynum, at most as along as wide. Females of the new genus have epigynum 1.4-1.7 times longer than wide, a situation observed also in Synapsilobus GAUD et ATYEO, 1996. But this genus in comparison to Szeptyckiana gen. n. is very different in morphology and host range (Galliformes).

Among three genera of pterolichine mites occurring on falconiform birds two are reported from representatives of the family Falconidae: Epopolichus GAUD, 1981 (known also from Upupiformes) and Falcolichus GAUD et ATYEO, 1996. The third genus, Pseudalloptinus DUBYNIN, 1956 occurs on Accipitriformes. However, the new genus is very different from all these genera as presented in the Table 1. The combination of these relatively not numerous characters enables also differentiating the new genus from all other named genera of Pterolichinae.

E t y m o l o g y. The new genus Szeptyckiana is dedicated to the memory of late Prof. Andrzej SZĘPTYCKI, an outstanding Polish zoologist, an honest man, our friend and teacher.

H o s t s. Both known species inhabits the Black-thighed Falconet Microhierax fringillarius Falconiformes, Falconidae).

R e m a r k s. Occurrence of two or more closely related feather mite species on a single bird species is an effect of a duplication of the ancestral parasite line into several new species invading different discrete microhabitats on/in the plumage of a single host species (DABERT 2005). The most spectacular examples of such multiplication are parrots (Psittaciformes), where as much as 7 different Fainalges species (Xolalgidae) may occur on Aratinga chlorochlora (PÉREZ 1995). The present finding of two different Szeptyckiana species inhabiting feathers of Microhierax fringillarius is the first report of feather mite duplication in falconiform birds.

Szeptyckiana macrosetosa sp. n.

(Figs 1, 2, 5, 6B, D)

D i a g n o s i s. Setae vi in females (and probably in males) lanceolate, at least four times longer than distance between them. Terminal membranes of males tongue-shaped, as long as wide; aedea-
Table 1

<table>
<thead>
<tr>
<th>Character</th>
<th>Szęptyckiana gen. n.</th>
<th>Epopolichus</th>
<th>Falcolichus</th>
<th>Pseudalloptimus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Genital setae g</td>
<td>present</td>
<td>absent</td>
<td>present</td>
<td>present</td>
</tr>
<tr>
<td>Setae e3</td>
<td>dagger-shaped</td>
<td>setiform</td>
<td>setiform</td>
<td>dagger-shaped or setiform</td>
</tr>
<tr>
<td>Solenidion σ on genu III</td>
<td>present</td>
<td>absent</td>
<td>present</td>
<td>present</td>
</tr>
<tr>
<td>Epimerites I</td>
<td>free</td>
<td>free</td>
<td>free</td>
<td>fused</td>
</tr>
<tr>
<td>Setae dl</td>
<td>present</td>
<td>absent</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>Setae el</td>
<td>present</td>
<td>absent</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>Setae h1</td>
<td>present</td>
<td>absent</td>
<td>absent</td>
<td>absent</td>
</tr>
<tr>
<td>Terminal membranes (male)</td>
<td>present</td>
<td>absent</td>
<td>absent</td>
<td>present or absent</td>
</tr>
<tr>
<td>Paragenital apodemes (male)</td>
<td>absent</td>
<td>absent</td>
<td>present</td>
<td>absent</td>
</tr>
<tr>
<td>Apical claw on tarsi IV (male)</td>
<td>present</td>
<td>absent</td>
<td>present</td>
<td>present</td>
</tr>
<tr>
<td>Arched apodeme between trochanters IV (male)</td>
<td>absent</td>
<td>absent</td>
<td>absent</td>
<td>present</td>
</tr>
<tr>
<td>Hysteronotal shield (female)</td>
<td>entire</td>
<td>divided into three parts or with large desclerotized medio-terminal area</td>
<td>with separate pygidal part</td>
<td>with separate pygidal part</td>
</tr>
<tr>
<td>Epigynum (female)</td>
<td>much longer than wide</td>
<td>much shorter than wide</td>
<td>shorter than wide</td>
<td>much shorter than wide</td>
</tr>
<tr>
<td>Legs IV (female)</td>
<td>not reaching body terminus</td>
<td>extending body terminus</td>
<td>extending body terminus</td>
<td>extending body terminus</td>
</tr>
</tbody>
</table>

Characters differentiating the *Szęptyckiana* gen. n. and known pterolichine genera of falconiform birds (Falconiformes).

Male, holotype (Figs 1, 5A, C, E, 6B, D): Gnathosoma with rectangular, transversely striated subcapitulum, length 40, width 38, L/W 1.1. Pseudorutellae with net-like pattern. Idiosoma moderately elongated, nearly rectangular, slightly narrowing terminally, length 227, width 107, L/W 2.1. Propodosoma and hysterosoma length 73 and 154, respectively, P/H 0.5. Opisthosoma rectangular with opisthosomal lobes very short, rounded, separated by wide triangular and shallow cleft; width at level of setae ps I 14, length 4. Terminal membranes tongue-shaped, length 17, width 17. Pronotal shield entire, covering almost the whole pronotum; shield uniformly dotted with rounded latero-terminal corners and straight posterior margin. Lateral incisions around setae se poorly sclerotized. Scapular shields shaped as small sclerites dorsally, extended ventrally as oval sclerites. Humeral shields not visible dorsally. Hysteronotal shield covers the whole hysteronotum. Entire shield uniformly dotted with two irregular lacunes posterior to setae e1. Supranal concavity circular with well sclerotized margins, lying between setae h1.

Type material. From *Microhierax fringillarius* (type host): 1 male holotype, 3 females paratypes, Java, 1949, collector unknown, AMU G19 (Greifswald 3254). 1 female paratype, same data, AMU G20 (Greifswald 3256).
Sae vi probably thickened (only big alveoli remained on the slide). Setae si set close to se, medially. Cupulae ia with well developed surrounding sclerotization. Setae cl set at anterior margin of hysteronotal shield. Gland opening gl set much closer to the level el-el than to level d2-d2. Setae h1 set at lateral margins of supranal concavity approximately in its middlength. Setae f2, ps2 and ps1 lanceolate, f2 and ps2 subequal in length, ps1 about three times longer. Setae h2 and h3 shaped as macrosetae, subequal in length. Distance between dorsal setae: se:se 52, si:si 40, cl:cl 51, d1:d1 36, c1:d1 48, c2:c2 99, d2:d2 66, c2:d2 77, e1:e1 29, e2:e2 72, d1:e1 51, d2:e2 51, h1:h1 20, e1:h1 28, h2:h2 54, h3:h3 39, ps1:ps1 29, h1:ps1 16.

Coxal fields I and II without sclerotized shields, coxal fields III and IV with well developed shields along epimerites; lateral shields of epimerites IV shaped as longitudinal rectangles, medial shields as minute triangles. Base of aedeagus located on the level of insertions of trochanters IV.
Aedeagus 46 in length directed anteriorly and bent backwards reaching its base; aedeagus gradually narrowing, several times thinner in distal part than at the base (Figs. 5A, 6D). Genital papillae set at the level of the aedeagus bend. Setae g inserted anterior to the genital organ and distinctly posterior to the level of setae 3a, 3a posterior to 3b. Adanal discs minute, 6 in diameter, surrounded by membranes with sclerotized central part.

All legs similar in length and width. Tarsi IV with an apico-ventral triangular apophysis with acute apex (Fig. 5C). Legs IV reaching posterior margin of terminal membranes by ambulacra. Setae cG on genua I and II dagger-like, about twice shorter than the width of corresponding podomere (Fig. 5E). Setae d minute, stick-like, e absent on tarsi IV.
Female, paratype (Figs. 2, 5B, D, E): Gnathosoma shaped as in males, length 48-52, width 44-49, L/W 1.1. Idiosoma length 311-324, width 118-130, L/W 2.4-2.6. Propodosoma and hysterosoma length 79-83 and 230-241, respectively, P/H 0.3-0.4. Body more elongated than in males with rounded posterior margin having poorly expressed, wide and shallow terminal cleft. Sclerotization of pronotum similar to that of males. Hysterontal shield covers the entire dorsal hysterosoma. Poorly expressed arched suture delimits pygidial part of the shield. Hysteronotum uniformly dotted. Supranal concavity shaped and situated as in males; the copulatory opening situated close to posterior margin of the concavity (Fig. 5D).

Setae vi lanceolate, about four times longer than distance between them. Cupulae ia shaped as in males. Lateral setae c2, d2, e2, f2 short, piliform. Distances e1:e1 shorter than h1:h1, e1:h1 equal to h1:h1, h1:h1 three times longer than diameter of supranal concavity. Setae h2, h3 shaped as in males; ps1 hair-like, slightly longer than distance between them. Distance between dorsal setae: se:se 58-60, si:si 45-46, c1:c1 53-64, d1:d1 43-47, c1:d1 58-60, c2:c2 111-119, d2:d2 77-85, e2:d2 89-92, e1:e1 26-31, e2:e2 96-105, d1:e1 106-107, d2:e2 87-88, h1:h1 32-37, el:h1 29-36, h2:h2 48-53, h3:h3 27-31, ps1:ps1 10-12, h1:ps1 24-27.

Sclerotization of coxal fields similar to that of males. Ventral bends of hysterontal shield form weakly sclerotized opisthoventral sclerites. Epigynum shaped as a large horseshoe-like sclerite,
width 38-46, length 65-70, L/W 1.5-1.7. Tips of the epigynum branches reach the level of setae g and extend beyond the ends of latigenital sclerites (Fig. 2). Genital acetabula set posterior to setae 3a and at the level of 3b, close to epigynum branches or on these sclerites. Distance 3b:g about twice longer than g:4a, 3a:3b approximately equal to 3b:g.

Legs IV reaching by ambulacra the level of setae ps3. Genual setae cG I, II dagger-like, about twice shorter than the width of corresponding podomere (Fig. 5E).

Juvenile stages unknown.

Etymology. The specific name (macro, L. – large + saeta, L. – hair) derives from the large lanceolate setae vi.
**Szeptyckiana microsetosa** sp. n.

(Figs 3, 4, 5, 6A, C)

**Diagnosis.** Setae *vi* in females (and probably in males) hair-like, at most twice longer than distance between them. Terminal membranes of males tongue-shaped, twice shorter than wide; aedeagus massive, only slightly wider at its base than in distal part. Distance between setae *hl:hi* in females as the diameter of supralanal concavity.
T y p e m a t e r i a l. From Microhierax fringillarius (type host): 1 male holotype, 1 female paratype, Java, 1949, collector unknown, AMU G20 (Greifswald 3256).

D e s c r i p t i o n. Male, holotype (Figs 3, 5A, C, E, 6A, C): Gnathosoma with rectangular, transversely striated subcapitulum, length 44, width 44, L/W 1.0. Pseudoratellae with net-like pattern. Idiosoma stocky, narrowing terminally, length 226, width 148, L/W 1.5. Propodosoma and hysterosoma length 67 and 159, respectively, P/H 0.4. Opisthosoma ovate with opisthosomal lobes very short, rounded and separated by triangular cleft; width at level of setae ps1 11, length 5. Terminal membranes tongue-shaped, short, length 12, width 23. Pronotal shield entire, covering almost the whole pronotum; shield uniformly dotted with rounded latero-terminal corners and straight posterior margin. Lateral incisions around setae se poorly sclerotized. Scapular shields shaped as small sclerites dorsally, extended ventrally as oval sclerites. Humeral shields developed dorsally as longitudinal sclerites. Hysteronotal shield covers the whole hysteronotum. Entire shield uniformly dotted without lacunae. Supranal concavity circular with well sclerotized margins, lying between setae h1l.

Setae vi in the male examined lost, but probably hair-like and short, since remained alveoli are small. Setae si set close to se, medially. Cupulae ia with well developed surrounding sclerotization. Setae c1 set on anterior margin of hysteronotal shield. Gland opening gl set closer to the level d2-d2 than to level e1-e1. Setae h1l set on lateral margins of supranal concavity close to its anterior margin. Setae f2, h2, h3, and ps2 absent on the slide; alveoli large as in S. macrasetosa. Distance between dorsal setae: se:se 70, si:si 56, c1:c1 60, d1:d1 49, c1:d1 42, c2:c2 124, d2:d2 73, c2:d2 74, e1:e1 42, e2:e2 64, d1:e1 52, d2:e2 54, h1:h1 15, e1:h1 33, h2:h2 63, h3:h3 47, ps1:ps1 36, h1:ps1 24.

Coxal fields I and II without sclerotized shields, coxal fields III and IV with well developed shields along epimerites; lateral shields of epimerites IV shaped as a square, medial shields as long and narrow triangles. Base of aedeagus located between levels of insertions of trochanters III and IV. Aedeagus 64 in length, massive, only slightly thinner in distal part than at the base, directed anteriorly and bent backwards reaching its base (Figs 5A, 6C). Genital papillae set laterally to the genital organ at the middlength of the ascended part of aedeagus. Setae g inserted laterally to the anterior bent of the genital organ and anterior to the level of setae 3a, 3a posterior to 3b. Adanal discs minute, 6 in diameter, surrounded by membranes with sclerotized central part.

All legs similar in length, legs IV slightly wider than remaining ones. Tarsi IV with an apicoventral triangular apophysis with blunt apex (Fig. 5C). Legs IV reaching posterior margin of terminal membranes by distal ends of tarsi. Setae cG on genua I and II dagger-like, about 1.5 times shorter than the width of corresponding podomere (Fig. 5E). Setae d minute, stick-like, e absent on tarsi IV.

Female, paratype (Figs 4, 5B, D): Gnathosoma shaped as in males, length 53, width 52, L/W 1.0. Idiosoma length 330, width 140, L/W 2.4. Propodosoma and hysterosoma length 89 and 241, respectively, P/H 0.4. Body more elongated than in males with rounded posterior margin having poorly expressed small terminal incision. Sclerotization of pronotum similar to that of males. Hysteronotal covers the entire dorsal hysterosoma. Poorly expressed arched suture delimitate pygidial part of the shield. Hysteronotum uniformly dotted. Supranal concavity shaped and situated as in males; the copulatory opening situated near the center of the concavity.

Setae vi hair-like, short, not more than twice longer than distance between them. Cupulae ia shaped as in males. Lateral setae c2, d2, e2, f2 short, piliform. Distances e1:e1 longer than h1:h1, e1:h1 three times longer than h1:h1, h1:h1 as long as the diameter of supranal concavity. Setae h2 shaped as macrasetae, h3 absent on the slide; ps1 hair-like, slightly longer than distance between them. Distance between dorsal setae: se:se 71, si:si 58, c1:c1 50, d1:d1 32, c1:d1 70, c2:c2 132, d2:d2 92, c2:d2 96, e1:e1 20, e2:e2 98, d1:e1 90, d2:e2 90, h1:h1 16, e1:h1 36, h2:h2 47, h3:h3 28, ps1:ps1 10, h1:ps1 33.

Sclerotization of coxal fields similar to that in males, except for lateral longitudinal shields of epimerites IV devoid of medial shields. Opisthoventrall sclerites absent. Epигyнium shaped as a large horseshoe-like sclerite, width 48, length 66, L/W 1.4. Tips of the epигyнium branches almost reach the level of setae g and extend beyond the ends of latigenital sclerites (Fig. 4). Genital acetabula set
posterior to setae 3a and at the level of 3b on epigynum branches. Distance 3b:g similar to the distance g:4a, 3a:3b shorter than 3b:g.

Legs IV reaching by ambulacra the level of setae ps2. Genual setae cG I, II dagger-like, approximately as long as the width of corresponding podomere (Fig. 5E), longer than in males.

Juvenile stages unknown.
ETYMOLOGY. The specific name (micro, L. – small + saeta, L. – hair) derives from the short, hair-like setae vi.

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