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DESCRIPTION OF A NEW SPECIES
IN THE GENUS CRIOKERON VOLGIN, 1966
AND OF THE MALE OF CRIOKERON QUINTUS
(DOMROW & BAKER, 1963) (ACARI, CHEYLETIDAE)

BY A. FAIN and F. S. LUKOSCHUS

ABSTRACT: A new species, Criokeron thailandicus, is described from Tupaia glis from Thailand. The male and the immatures of Criokeron quintus (Domrow & Baker, 1963) (Acari, Cheyletidae) are described for the first time. The males are either homeomorphic or heteromorphic; they develop within protonymphs whilst the females develop within tritonymphs.

RESUME: Criokeron thailandicus sp. n. est décrit de Tupaia glis de la Thailande. Le mâle et les immatures sont décrits pour la première fois chez Criokeron quintus (Domrow & Baker, 1963) (Acari, Cheyletidae). Les deux types de mâles, homeomorphe et hétéromorphe ont été rencontrés. Le mâle se développe dans une protonyme alors que la femelle prend naissance dans une tritonympe.

INTRODUCTION

Criokeron quintus (Domrow & Baker, 1963) has been described from a female specimen collected from Tupaia glis in Malaysia. We describe herein for the first time the male and the immatures of this species. They were collected, mixed with females, from the nest box of a Tupaia glis originating from Thailand and reared in the laboratory of a German Primate Center. In addition we describe here a new species of Criokeron, C. thailandicus, collected from Tupaia glis in Thailand.

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REMARKS ON THE SUBFAMILIES CRIOKERONTINAE AND NIHELIINAE

LAWRENCE (1954) created the genus *Hemicheyletus* for two species, *Cheletiella lemuricola* (from a Primate) and *Ch. curvidens* (from a Mongoose), that he had described in 1948. This genus was not valid because the author omitted to designate a type species.

In 1960, DOMROW and BAKER created the genus *Nihelia* for *Nihelia calcarata* sp. n. from a Carnivore. As this species appeared to be congeneric with *H. curvidens*, this new genus replaced the genus of LAWRENCE for this group of species. In 1963, DOMROW and BAKER described two new species in this genus: *N. squamosa* from a squirrel and *N. quinta* from *Tupaia glis*.

VOLGIN (1966) rejected the name *Nihelia* and erected for *N. quinta* a new genus *Criokeron*. In 1969, he created for *N. squamosa* a new subgenus *Sciurocheyla* in the genus *Hemicheyletus*, the latter being revalidated by this author. Both genera were included in the subfamily Cheyletiellinae Volgin, 1961.

SMILEY (1970) elevated the Cheyletiellinae to the family rank. In 1977 he created several new subfamilies in this new taxon including the Criokerontinae (type genus *Criokeron*) and the Niheliinae (type genus *Nihelia*).

FAIN (1979 a) proposed to restrict the family Cheyletiellidae to the two most evolved genera of the group (*Cheletiella* and *Eucheyletiella*) and to maintain the other genera in the Cheyletidae. He created two new genera: *galagocheles* (type species *Hemicheyletus lemuricola*) and *Smileycheles* (type species *Smileycheles camerounensis* sp. n.) and described a new species *Nihelia cynictis* from a Carnivore.

In the present paper we follow SMILEY (1977) who includes the genus *Criokeron* into the subfamily Criokerontinae and the other genera in the Niheliinae. These two subfamilies present clear affinities with the subfamily Chelonotinae which contains several genera specialized for primitive rodents (see FAIN, 1979 b).

DIVISION OF THE CRIOKERONTINAE AND THE NIHELIINAE

The subfamily Criokerontinae contains only the type genus *Criokeron*. The female in this genus is clearly characterized by the shape of the gnathosoma which is strongly modified. Its base is prolonged laterally by a pair of enormous hooks, the palps are reduced, straight, situated not far from the midline and with most of the segments (tarsus, tibia genu and femur) fused and ending apically by a comb. The palptibial spine is absent. The coxa I bears a large flat attaching organ. There are no hooks or spurs on palps, legs, and on dorsal and ventral surfaces of the gnathosoma. In the male that we describe below the palps are strongly developed, all the segments are free and normal in shape and the palptarsus bears a large comb, two sickle-setae, a barbed seta and a solenidion. There are no spurs or hooks on the palp (except for two strongly pedunculate setae on the palp femora, on the legs and on the gnathosoma. The copulatory orifice is terminal.

The subfamily Niheliinae contains four genera characterized as follows: In the female the palps have at least the tibia and the genu fused and these two segments, including the apical spine of tibia, are strongly recurved ventrally acting as a hook. Palptarsus always reduced and lacking a comb, or completely absent. Spurs or hooks always present on the palps, inconstant on legs and on base of gnathosoma. The idiosoma bears variable retrorse or spurlike processes. The males are known in the genera *Galagocheles* and *Nihelia*. In *Galagocheles* the palps resemble those of genus *Criokeron* except for the following characters: palptarsus smaller and without comb, palpfemur with a strong retrorse ventral hook, coxa I with a strong ventral hook, genua I and II with small ventral spurs, gnathosomal base with one pair of ventral hooks and one pair of transverse crests, the copulatory orifice is dorsal. In *Nihelia* the palp resembles that of *Galagocheles* but the palptarsus is fused with the tibia and vestigial, the
palpfemur bears more hooks or spurs, the gnathosomal base bears hooks dorsally, the peritremes are more posterior, the genua I and II are devoid of spurs and the setae ve are situated on prominent sclerotized processes. The genital aperture is dorsal as in *Galagocheles*.

The Niheliinae contain four genera forming two distinct groups: In the group *Galagocheles-Nihelia* the peritremes are strongly developed and have large cells and the gnathosomal base bears ventral or dorsal spurs or hooks. In the group *Sciurocheyla-Smileycheles* the peritreme are less developed and narrow with small regular cells and the gnathosomal base is devoid of sclerotized processes.

KEY TO THE GENERA OF THE CRIOKERONTINAE AND NIHELIINAE

(FEMALES)

1. Base of gnathosoma prolonged laterally by a pair of enormous hooks directed postero-ventrally. Palps relatively very small, straight, close to the midline, with tarsus, tibia, genu and femur fused and bearing an apical comb; apical tibial spine absent. Absence of spurs or hooks on the palps, the dorsal and ventral surface of gnathosoma, and the legs, except the coxae I which bear a flat hooklike process. **Criokerontinae.** One genus: *Criokeron*, Volgin, 1966

Base of gnathosoma without strong lateral hooks. Palps well developed, more lateral, with their apical part strongly curved in ventral direction (hook-like) and with at least the tibia and the genu fused. Palptarsus either small and devoid of a comb or absent. Palps, specially the palpfemur, with hooks; ventral or dorsal surface of gnathosoma, or both, with spurs or hooks. **Niheliinae (2)**

2. Peritremes strongly developed with large cells. Gnathosomal base with spurs or hooks ventrally or dorsally

Peritremes narrow, linear with small subequal cells. Absence of spurs or hooks on the dorsal or ventral surface of gnathosoma

**Niheliinae (2)**

3. Hooks or spurs present on legs I and II (ventral surface of tarsus, genu and femur and laterally on coxae I and II); a pair of rounded retrorse processes on ventral surface of gnathosoma; dorsal surface of gnathosoma without retrorse processes; absence of processes on dorsal surface of idiosoma. Palptarsus relatively large. Peritreme situated in the anterior half of the gnathosomal base. Palpfemur, legfemora and legtrochanters with setae either bare or with a very few barbs

**genus Galagocheles**, Fain, 1979

Labs I and II without hooks or spurs. Ventral surface of gnathosoma with a pair of rounded processes along its posterior margin; dorsal surface with a pair of large hooks and one or two pairs of lateral spurs. Dorsal surface of idiosoma with a pair of triangular processes bearing setae ve and a pair of rounded and flat processes behind setae h. Palptarsus very small. Peritreme situated in the posterior half of the gnathosoma. Palpfemur legfemora and legtrochanters with densely barbed setae

**genus Nihelia** (Domrow & Baker, 1960)

4. All dorsal setae piliform. Palptarsus completely lacking

**genus Smileycheles**, Fain, 1979

Some dorsal setae are squamose. Palptarsus completely lacking

**genus Smileycheles**, Fain, 1979

Some dorsal setae are squamose. Palptarsus present

**genus Sciurocheyla**, Volgin, 1969, stat. nov.

(MALES)

(N. B. The males of *Sciurocheyla* and *Smileycheles* are unknown)

1. Palptarsus with a comb, genital opening terminal, absence of retrorse spur on palpfemur

**Criokerontinae**

Palptarsus without a comb, genital opening dorsal, presence of a retrorse spur on palpfemur

**Niheliinae (2)**

2. Setae ve and dorsal setae of palpfemur and genu setiform

**Galagocheles**, Fain, 1979

Setae ve and palpal setae barbed

**Nihelia** (Domrow & Baker, 1960)

LIST OF THE SPECIES IN THE CRIOKERONTINAE AND THE NIHELIINAE

These interesting mites live on Afrotopical and Oriental mammals. They have been found so far on African Lorisidae (Primates), on Oriental Tupaiidae (Scandentia), on Oriental Sciuridae and African Anomaluridae (Rodentia) and on Mongooses (Viverridae, Carnivora) from both regions. Here is a list of the known species:
Genus *Criokeron* Volgin, 1966


Genus *Nihelia* Domrow and Baker, 1960


2. *N. curvidens* (Lawrence, 1948) : from *Herpestes sanguineus punctulatus* in South Africa and *H. sanguineus bocagei* in Angola.


Genus *Galagocheles* Fain, 1979


Genus *Sciurochelea* Volgin, 1969 stat. nov.

1. *S. squamosus* (Domrow & Baker, 1963) stat. nov. (type species) : from *Menetes* sp. (Sciuridae) in Thailand.

Genus *Smileycheles* Fain, 1979


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**Homeomorphic male** (figs 1-2) : Idiosoma devoid of spurs or hooks. Idiosoma 300 µm long and 240 µm wide. Total length including gnathosoma 380 µm (in midline). Propodonotal shield bearing 5 pairs of barbed setae of which one pair (d) very short. Hysteronotal shield with 4 pairs of barbed setae (30-50 µm) and 7 pairs of very small setae. Penis very long, curved. Gnathosoma : base partly covered by the idiosoma, its total length in midline is 120 µm (ventrally). The part visible dorsally is 80 µm long. The base is devoid of spurs or hooks. Peritreme strongly developed, D-shaped. Palp femur 60 µm long with an internal rounded process bearing a thin seta, but without hooks ; it bears in addition a ventral bare seta and a dorsal barbed seta. Palpi with 2 setae. Palp femur with an apical slightly curved spine and 3 setae. Palp tarsus normally shaped bearing a comb with 6 thick teeth, 2 sickle-setae, 1 barbed seta and a solenidion. Leg I 190 µm long (the 4 apical segments), the tibia alone is 50 µm, the femur 60 µm long. Legs II-IV much shorter (135-120-125 µm respectively). Chaetotaxy (number of setae) as in the female : Tarsi 9-7-7-7. Tibiae 5-4-4-4. Genua 2-2-2-2. Femora 2-2-2-1. Trochanters 1-1-2-1. Coxae 2-1-2-2. All tarsi with 2 claws and an empodium with 3 pairs of tenents hairs.

**Heteromorphic male** (figs. 3-6) : In a strongly heteromorphic specimen the total length of the body is 460 µm. The gnathosoma is 155 µm long in the midline, the palp femur 93 µm, the leg I 270 µm (the four apical segments), leg II 150 µm, leg III 148 µm and leg IV 160 µm. The peritreme is much less sinuous. In other less heteromorphic specimens these measurements are intermediate between this strongly heteromorphic and the homeomorphic males.

**Tritonymph** : Total length 350 µm, width 210 µm. It resembles the female except for the following characters : absence of lateral hooks on the gnathosoma, palps as in female but relatively larger and with a comb bearing 12-13 thinner teeth ; the peritreme is narrower and very sinuous ; hysteronotum with two small parame-
FIGS. 1-6: *Crikeron quintus* (Domrow & Baker).

1-2. — Homeomorphic male; dorsum (1); leg I in dorsal view (2).

3-6. — Heteromorphic male; leg I in dorsal view (3); gnathosoma in dorsal view (4); tibia and tarsus of palp in ventral view (5); the same in dorsal view (6).
dian shields; propodonotal shield smaller bearing only 4 pairs of setae, the fifth pair being on the soft cuticle; genitoanal area with 7 pairs of simple setae.

**Protonymph** : Total length 400 μm, width 240 μm. Another contracted specimen is only 250 μm long and 140 μm wide. It differs from the tritonymph by the shape of the palps whose segments are rather well separated, the smaller size of the propodonotal and of the two hysteronotal shields and the less developed chaetotaxy. Coxae with 2-1-2-0 setae, the trochanteral I, II and IV and genital setae are lacking; trochanter III with 1 seta. Genito-anal area with 4 pairs of setae.

**Larva** : Total length 210 μm, width 135 μm. Palps very short without apical comb; peritremes shorter than in protonymph; propodonotal shield smaller than in protonymph bearing only the vi and ve setae, the three other pairs being on the soft cuticle; hysteronotum without shield; coxae I-III with 1-0-0 setae; there are only two pairs of ic setae (ic 1 and ic 3). Other setae present: d 1, d 2, l 1 to l 5. The anus is surrounded by 3 pairs of anal setae.

**Development** : Seven protonymphs in the molting stage contained a male. Five females were developing within a tritonymph. This type of development has already been observed in the genus *Ornithocheyletia* Volgin, 1964 (see FAIN, 1981).

**Origin of our specimen** : All these specimens were collected in a nest box of a *Tupaia glis* originating from Thailand and reared in the laboratory of a German Primate Center (Justus-Liebig University at Giessen).

2. **Criokeron thailandicus** spec. nov.

This species is represented only by the female.

**Female** (figs 7-11) : Idiosoma in holotype 480 μm long and 380 μm wide. Length including the gnathosoma 630 μm (in midline). Total length and width in 3 paratypes: 650 × 360 μm; 665 × 300 μm and 678 μm × 400 μm. Average lengths of 10 specimens: idiosoma 524 μm, total length 710 μm (in *C. quintus* these measurements are, in 10 females: 444 μm and 609 μm respectively.) Dorsum bearing two large shields. Anterior shield with 6 pairs of thick barbed setae. Posterior shield with 5 pairs of barbed more unequal setae. **Venter** : Coxae with 2-1-2-2 thin and not barbed setae. Setae ic 1, ic 3, ic 4, the 5 pairs of genitals and the 3 pairs of anal are bare. Gnathosoma very large with a pair of very strong lateral hooks directed ventrally and posteriorly. Palps close to the midline, they are small and straight and their 4 apical segments are fused. Peritremes with many elongate cells. Chaetotaxy: The vi, ve, and sc i are 65-75 μm long; sc e 100 μm; d 1 and d 2 70 μm; D 3 90 μm; d 4 50 μm; d 5 105 μm; l 1 and l 2 100 μm; l 3 120 μm; h 105 μm. All these setae are dorsal, they are thick and shortly barbed. The l 4 and l 5 are ventral and 80 and 60 μm long respectively. Legs I-IV (number of setae): Tarsi 9-7-7-7. Tibiae 5-4-4-4. Genua 2-2-2-1. Femora 2-2-2-1. Trochanters 1-1-2-1. Solenidiotaxy: Tarsi 1-1-0-0. Tibiae 1-0-0-0. The genu I bears a very short specialized seta. Palps: The fused segments bear 8 setae (5 thick and 1 small, all barbed, 1 thin not barbed and 1 short and thick not barbed). 1 solenidion and 1 comb bearing 7-8 teeth. Empodium as in *C. quintus*.


**Remarks** : This species differs from *C. quintus* by the following characters: peritremes much smaller, far apart in the midline and differently shaped, absence of a large spoonlike seta on the ventral surface of tibia I, propodonotal shield with 6 pairs of setae (5 pairs in *C. quintus*).
FIG. 7-11: *Criokeron thailandicus* sp. n. Female.
Dorsum (7); peritreme (8); palp in dorsal view (9); palp in ventral view (10); leg I in dorsal view (three apical segments) (11).
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