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A new species of the genus *Coraciacarus* (Gabuciniidae, Pterolichoidea) from the huia *Heteralocha acutirostris* (Callaeatidae, Passeriformes), an extinct bird species from New Zealand

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We describe one new feather mite species *Coraciacarus muellermotzfeldi* sp. nov. (Acari, Astigmata) found as dried corpses on the feathers of the museum skin of the huia *Heteralocha acutirostris* (Gould, 1837) (Passeriformes, Callaeatidae). This endemic New Zealand passerine bird is believed to have been extinct since the beginning of the twentieth century. Comments on the systematic position of the new species within the genus *Coraciacarus* are presented. A key to all known species and subspecies of the genus is provided. The unusually wide host range of *Coraciacarus* is discussed. The presence of a representative of this genus on a passerine bird is an enigmatic phenomenon. It might be the result of horizontal transfer from cuckoos (Cuculiformes) rather than ancient co-phylogenesis but this hypothesis is only weakly supported by currently available data.

Keywords: extinct species; new species; feather mites; *Coraciacarus*; *Heteralocha*

Introduction

Feather mites (Astigmata, Analgoidea+Pterolichoidea) are specialized ectoparasites and commensals of birds and are known from hosts belonging to almost all avian orders (with the possible exception of penguins). Their small size and very effective morphological adaptations enable these mites to penetrate and inhabit the whole body surface of the bird, especially the feather vanes and quills, downy feathers and partly also the skin. The physical connection between feather mites and bird plumage is so strong that even after a bird's death the mites do not leave its corpse but perish together with the host, remaining fixed as dried "mummies" on or in the feathers.

This phenomenon provides an excellent opportunity to examine feather acarofauna on preserved birds in ornithological collections. In fact, most of about 2500 named species, especially from exotic or rare hosts, have been described from dry museum bird skins. It also allows the discovery of the acarofauna of extinct bird species if their skins have been preserved. Six feather mite species were described from the museum exhibit of the Carolina parakeet *Conuropsis carolinensis*, the only North American parrot, 100 years after this bird became extinct through the destruction of its forest habitat (Mironov et al. 2005a). Also, the recently described new *Pterotrogus* (Analgoidea, Pteronyssidae) species was discovered on the museum skin of the ivory-billed woodpecker *Campephilus principalis*, a bird still believed by

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some ornithologists to exist despite the last reliable sightings of this species being in the 1950s in North America and probably in the early 1990s in Cuba (Mironov et al. 2005b). The well-known example of the extinct *Diplaegidia gladiator* (Analgoidea, Analgidae) from the passenger pigeon *Ectopistes migratorius* should not be included in this list of discovered “museum fossils” because it was described when the passenger pigeon was still alive (Haller 1882).

In the present paper we describe a new species of the feather mite genus *Coraciacarus* Dubinin, 1956 (Pterolichoidea, Gabuciniidae) from preserved skins of huia *Heteralocha acutirostris*. This extinct bird together with two other still living species (kokako *Callaeas cinerea* and saddleback *Philesturnus carunculatus*) belongs to the family Callaeatidae (wattlebirds), endemic to New Zealand. The huia became extinct early in the twentieth century, mainly as the result of forest destruction and intensive hunting for its decorative feathers (BirdLife International 2004). It was unique as the only known bird species with a completely different beak form and function in the male and female birds (Figure 1).



Figure 1. Investigated individuals of huia *Heteralocha acutirostris* (Gould, 1837) from the collection of the Zoological Institute and Museum, Ernst-Moritz-Arndt University, Greifswald, Germany. Left – female, right – male.

Material and methods

The mite material was collected from dry museum skins of two individuals of the huia *Heteralocha acutirostris* (Callaeatidae, Passeriformes), deposited in the ornithological collection of the Zoological Institute and Museum, Ernst-Moritz University of Greifswald, Germany. Mites were extracted from the sample according to the scratching method of Gaud and Atyeo (1996) and preserved in 70% ethanol. Before mounting, the desiccated mites were softened and cleared in 10% lactic acid at +60°C for 2–3 days. For light microscope study mites were mounted on slides in Faure medium (Evans 1992) and investigated under an Olympus BX50 light microscope with differential interference contrast illumination.

The nomenclature of idiosomal chaetotaxy follows Griffiths et al. (1990), gnathosoma and leg chaetotaxy is that of Atyeo and Gaud (1966). Measurements in the descriptions are given in μm . The taxonomic system, Latin and common names of hosts in the present study follow those of Sibley and Monroe (1990).

Systematics

Superfamily **PTEROLICHOIDEA** Gaud and Atyeo, 1977

Family **GABUCINIIDAE** Gaud and Atyeo, 1975

Genus *Coraciacarus* Dubinin, 1956

The genus *Coraciacarus* is morphologically a typical gabuciniid taxon with unusually wide host range and may be defined as a euryxenic genus (in the sense of Euzet and Combes 1980). Six morphologically uniform species, including one new species described below, are distributed worldwide among four bird orders: Cuculiformes, Coraciiformes, Musophagiformes and Passeriformes (Table 1). Also some *Coraciacarus* species may show relatively wide host ranges, e.g. *C. cuculi* is reported from 19 species of cuckoos belonging to two families and six genera. Similarly *C. meropsi* s.l. inhabits 15 species of bee-eaters of the genus *Merops*. Thus these polyxenic or oligoxenic species (excluding the monoxenic new species) are stenoxenic parasites limited to smaller or bigger groups of closely related host species.

The current generic diagnosis of the *Coraciacarus* (compiled after Gaud and Atyeo 1975, 1996; de Alzuet et al. 1988) is as follows. In both sexes, two vertical setae *vi* present; scapular setae *se* and fine setae *si* are inserted on one level; setae *c2* hair-like; setae *c3* dilated and lanceolate; anterior tarsi not longer than double the length of the palps; solenidion σI present on genua I and II, absent or inserted basally on genu III; setae *cG* on genu I setiform and elongated or short and more or less dilated. In males adanal discs well developed with polydentate corolla; genital acetabula positioned posterior to the level of the genital setae *g*. In females branches of epigynum reach or encompass setae *3a*; setae *e2* dilated and lanceolate, setae *f2* hair-like; genital acetabula posterior to level of setae *g* and anterior to the level of setae *4a*.

The generic diagnosis should be updated after including new species. In the new species setae *cG* I are thick and long, similar to those in *Aetacarus* or *Gabucinia*, and male genital acetabula are inserted laterally to setae *g*, posterior pair on the level of the setae. We think that these differences do not justify the separation of the new species into its own genus but rather widen the morphological diversity of the genus *Coraciacarus*. However, this opinion may be changed after more possible hosts of the genus have been analysed, especially of the family Callaeatidae.

Table 1. Host range of *Coraciacarus* species.

Mite species	Hosts	Locality	Data source
<i>C. americanus</i> de Alzuet, Cicchino and Abrahamovich, 1988	Cuculiformes		
	Coccyzidae		
	<i>Coccyzus americanus</i> (L.)	Argentina, USA	1
	<i>Coccyzus melacoryphus</i> Vieillot	Argentina	1
<i>C. cuculi</i> (Mégnin and Trouessart, 1884)	Cuculiformes		
	Centropidae		
	<i>Centropus anelli</i> Sharpe	Congo, S Cameroon	4, 8
	<i>Centropus burchelli</i> Swainson	No locality is given	13
	<i>Centropus cupreicaudus</i> Reichenow	Congo	4
	<i>Centropus grillii</i> Hartlaub	Congo	4
	<i>Centropus monachus</i> Rüppell	Congo	4, 9
	<i>Centropus senegalensis</i> (L.)	Cameroon, Congo	4
	Cuculidae		
	<i>Ceuthmochares aereus</i> (Vieillot)	Cameroon	4, 9
	<i>Chrysococcyx caprius</i> (Boddaert)	Cameroon, Congo	4, 8, 9
	<i>Chrysococcyx cupreus</i> (Shaw)	Angola, Cameroon, Congo	4, 8, 9
	<i>Chrysococcyx klaas</i> (Stephens)	Cameroon	4, 8, 9
	<i>Clamator glandarius</i> (L.)	Congo, Senegal	4, 9
	<i>Cuculus canorus</i> L.	Eurasia, Kenya	1, 2, 6, 10, 11, 12, 13
	<i>Cuculus clamosus</i> Latham	Congo	4
	<i>Cuculus fugax</i> Horsfield	NE Russia	2
	<i>Cuculus micropterus</i> Gould	NE Russia	2
	<i>Cuculus poliocephalus</i> Latham	NE Russia	2
	<i>Cuculus saturatus</i> Blyth	NE Russia	2
	<i>Oxylophus jacobinus</i> (Boddaert)	Congo	4
	<i>Oxylophus levaillantii</i> (Swainson)	Congo	4
Coccyzidae			
<i>Piaya cayana</i> (L.) *	S America	11	

Table 1. (Continued.)

Mite species	Hosts	Locality	Data source	
<i>C. dithyridus</i> Gaud, 1966	Musophagiformes			
	Musophagidae			
	<i>Corythaixoides concolor</i> (A. Smith)	Congo	4	
	<i>Corythaixoides personatus</i> (Rüppell)	Rwanda	4	
<i>C. m. leptus</i> Gaud, 1978	Coraciiformes			
	Meropidae			
	<i>Merops bulocki</i> Vieillot	Cameroon, Ghana, Sudan, Togo	5, 3 ‡, 7	
	<i>Merops gularis</i> Shaw	Congo, Zaire	5, 7	
	<i>Merops hirundineus</i> A. A. H. Lichtenstein	Zaire	5, 7	
	<i>Merops oreobates</i> (Sharpe)	No locality is given	7	
	<i>Merops pusillus</i> P. L. S. Müller	Central and S Africa	5, 7, 9	
	<i>Merops variegatus</i> Vieillot	Zaire	5, 7	
	<i>C. m. meropsi</i> Dubinin, 1956	<i>Merops albicollis</i> Vieillot	Cameroon, Togo, Zaire	5, 7, 9
		<i>Merops apiaster</i> L.	Europe, SE Africa, Zaire	2, 5, 7, 11, 13, 15
<i>Merops bullockoides</i> A. Smith†		Angola, Congo, Kenya, Mozambique	5, 7	
<i>Merops malimbicus</i> Shaw		No locality is given	7	
<i>Merops nubicoides</i> Des Murs et Pucheran		Angola, Rhodesia, Tanzania, Zaire	5	
<i>Merops nubicus</i> J. F. Gmelin		Cameroon, Senegal, Togo, Zaire	3 ‡, 5, 7, 9, 11	
<i>Merops persicus</i> Pallas		Uzbekistan, Cameroon, Burundi, Kenya, Uganda	2, 5, 9	
<i>Merops superciliosus</i> L.		Kenya, Mozambique, Zaire	5, 7	
<i>Merops viridis</i> L.		No locality is given	11	

Table 1. (Continued.)

Mite species	Hosts	Locality	Data source
<i>C. musophagi</i> (Trouessart, 1886)	Musophagiformes		
	Musophagidae		
	<i>Crinifer piscator</i> (Boddaert)	Congo, Senegal, S Cameroon	4, 8, 9, 13, 14
	<i>Crinifer zonurus</i> (Rüppell)	Congo	4
	<i>Musophaga violacea</i> Isert	Congo	4
<i>C. muellermotzfeldi</i> sp. nov.	<i>Tauraco persa</i> (L.)	Congo	14
	Passeriformes		
	Callaeatidae		
	<i>Heteralocha acutirostris</i> (Gould)	New Zealand	present paper

*Most probably it is *Coraciacarus americanus* or similar species because Mégnin and Trouessart (1884) did not recognize other than *C. cuculi* species at this time.

†Record needs to be verified.

‡*C. meropsi* under name *Pterolichus cuculi*.

Data sources: 1 – de Alzuet et al. 1988, 2 – Dubinin 1956, 3 – Gaud 1953, 4 – Gaud 1966, 5 – Gaud 1978, 6 – Gaud and Atyeo 1975, 7 – Gaud and Atyeo 1979, 8 – Gaud and Mouchet 1959, 9 – Gaud and Till 1961, 10 – Hull 1934, 11 – Mégnin and Trouessart 1884, 12 – Radford 1953, 13 – Radford 1958, 14 – Trouessart 1886, 15 – Vassiliev 1959.

Coraciacarus muellermotzfeldi sp. nov.
(Figures 2–4)

Type material

Male holotype (AMU G1/1), 5 male and 3 female paratypes from *Heteralocha acutirostris* (Greifswald #3677), male, New Zealand, 1879, coll. Frank. Other paratypes: 1 female from the same host species, female, same data (Greifswald #3676). Holotype and paratypes (registration numbers AMU G1/1-8, G2/1) are deposited at A. Mickiewicz University, Poznan, Poland.

Description

Male (holotype, Figures 2, 4A–D). Gnathosoma with trapeziform and transversely striated subcapitulum, length to palpal tips 82, greatest width 91 (gnathosomal sizes in five paratypes 80–83 by 86–89). Setae *d1* foliform, tridentate, located on apico-dorsal appendix of distal podomere (Figure 4A). Distal podomere with two eupathidia and solenidion ω clearly visible (Figure 4B). Idiosoma relatively stocky, slightly narrowing terminally, length 520 (490–502), width at level of setae *c2* 244 (233–245), length to width ratio 2.1 (2.0–2.1). Terminal part of the body with long opisthosomal lobes. Lobes triangular with medial near-square ledge and small tongue-like tips. Interlobar cleft rectangular from tips to the median ledge, in anterior part trapezoidal, total length 91 (90–95), width at level of setae *h1* 114 (98–116).

Pronotal shield without ornamentation, shaped as flattened hexagon, length 128 (121–125), width at terminal margin 173 (160–169), with deep lateral incisions encompassing bases of setae *se*, terminal margin straight with minute median incision. Scapular setae *se* shaped as macrosetae, *si* minute, distance *se–se* 95 (94–99), distance *si–si* 52 (47–52). Vertical setae *vi* hair-like, at least twice as long as distance between them. Scapular shields absent; well sclerotized lateral bands in scapular region present. Hysteronotal shield covers the entire hysteronotum, anterior margin straight, length from anterior margin to bases of setae *h3* 370 (360–368), surface with some transverse striae in anterior two-thirds. Lateral margin of hysteronotal shield with short oblique incisions in midlength *gl–e2*. Terminal margin of the shield with median weakly sclerotized area reaching anteriorly the level of lateral incisions (Figure 2B). All dorsal and lateral hysteronotal setae short, *e2*, *f2*, *h1* lanceolate, remaining ones hair-like. Setae *e1* set on the level or slightly anterior to the level of gland openings *gl*. Setae *e2* distinctly posterior to the level of ventral setae *ps3*. Setae *f2* posterior to the level of setae *h2*, lanceolate. Setae *h1* short, distance between their tips twice exceeds the length of the setae. Short setae *ps1* set at anterior margin of bases of setae *h3*. Terminal setae *h2* and *h3* shaped as long macrosetae, *h3* shorter than *h2*. Three pairs of dorsal cupules present: *ia* at the bases of setae *c2*, *im* posterolateral to *d2*, and *ip* in middle distance *e2–f2*. Distances between hysteronotal setae: *c1–c1* 73 (64–80), *d1–d1* 76 (63–106), *e1–e1* 78 (63–72), *e2–e2* 191 (184–195), *f2–f2* 185 (165–198), *c1–d1* 78 (68–81), *d1–d2* 57 (45–65), *d1–e1* 83 (84–92), *c2–d2* 117 (103–109), *d2–e2* 164 (168–174), *e2–f2* 52 (51–59), *e1–f2* 173 (174–188).

Epimerites I free. Ventral propodosoma without cuticular shields. Basal parts of wide lanceolate setae *c3* and hairlike setae *cp* covered dorsally by flat semicircular lateral body extension. Ventrolateral opisthosoma with narrow, well-sclerotized

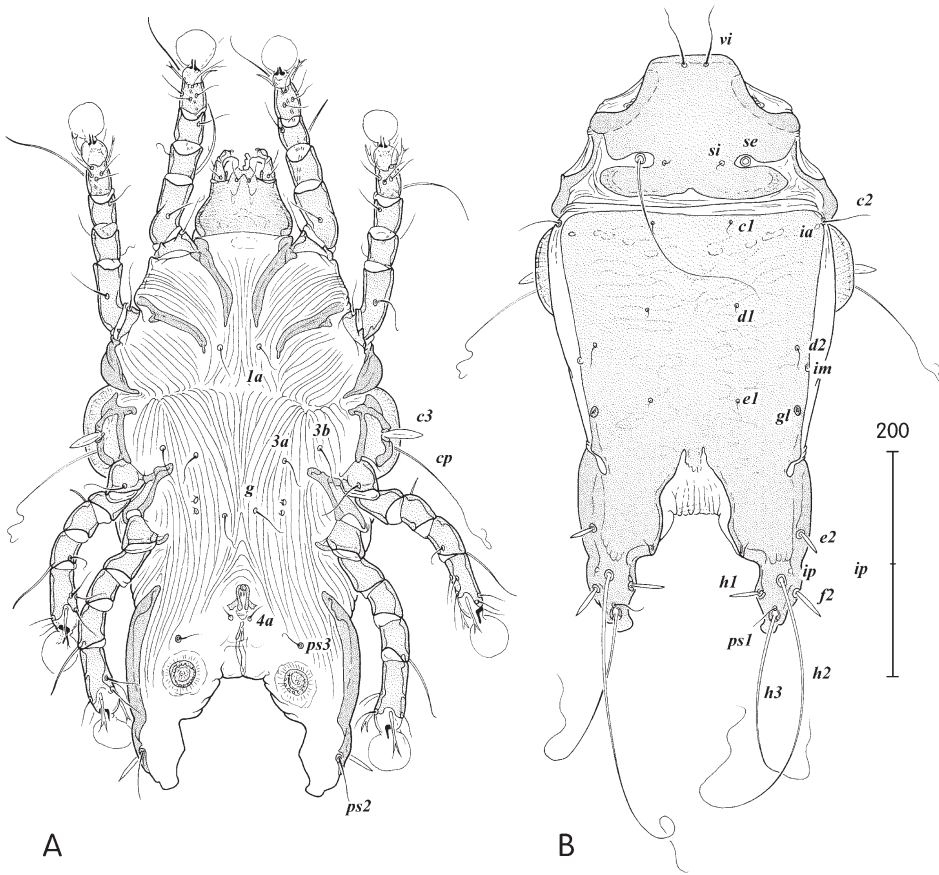


Figure 2. *Coraciacarus muellermotzfeldi* sp. nov., male. (A) Ventral view, (B) dorsal view. Setal designations of idiosoma after Griffiths et al. (1990).

opisthoventral sclerites. Genital apparatus inserted subterminally on the level of anterior ends of opisthoventral sclerites, length 35 (30–38), width 25 (20–27), without genital apodemes. Genital acetabules set far anterior to genital apparatus, posterior pair on the level or slightly anterior to the level of setae *g*, anterior pair distinctly anterior to setae *g* (Figure 2A). Setae *g* set posterior to *3a*, setae *3a* slightly posterior to *3b* and situated approximately at level of tips of epimerites IIIa. Distances between ventral setae: *3b*–*3a* 37 (27–32), *g*–*3a* 52 (48–52), *g*–*4a* 96 (95–101), *4a*–*ps3* 54 (49–54). Adanal discs 22 (23–27) in diameter, corolla with several teeth, distance between centres of discs 100 (99–109).

All legs of similar length and width, without apophyses. Setae *cG* of genu I thick, fishbone like, two to three times longer than genu (Figure 4D). Solenidion σ_1 on genu III inserted dorsobasally. Seta *kT* absent on tibia IV. Tarsus IV with six setae, seta *d* shaped as very short spine and shifted to middle length of the podomere (Figure 4C).

Female (paratype, Figures 3, 4E,F). Gnathosoma shaped as in male, length in four paratypes 89–91, width 95–100. Idiosoma elongated, parallel-sided, length 522–562,

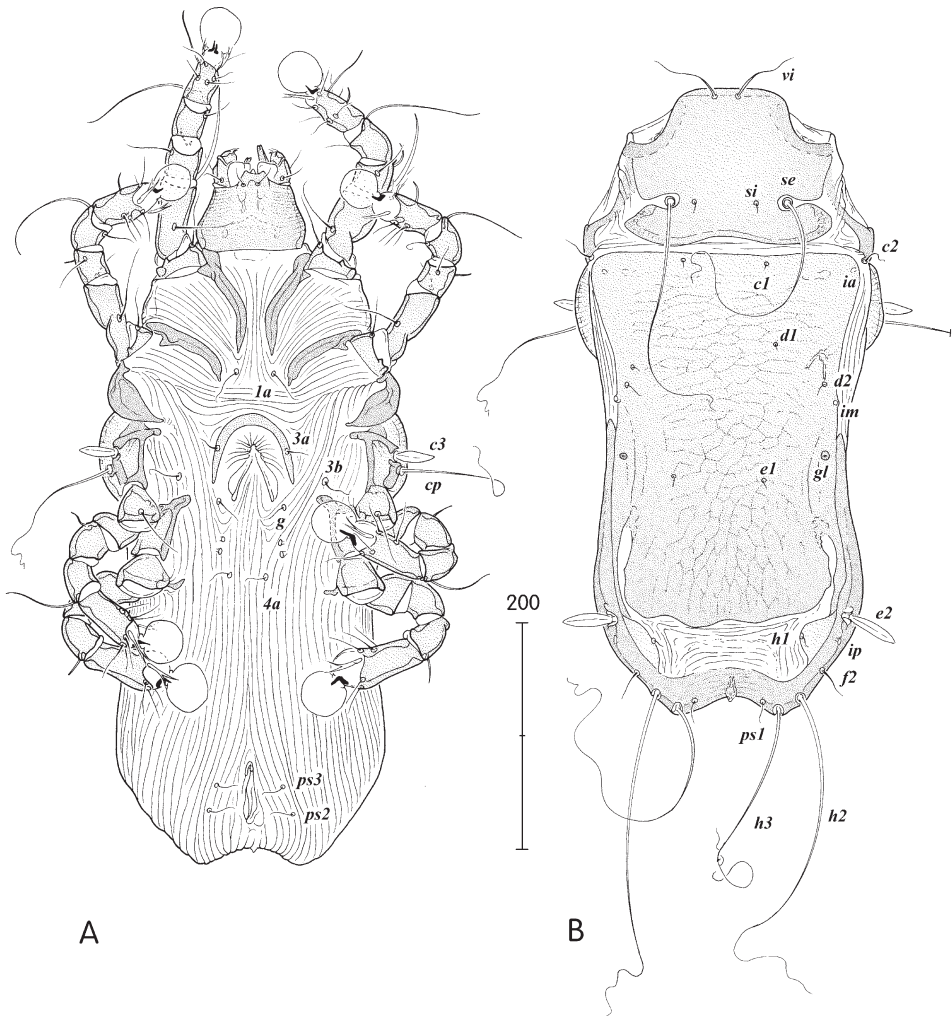


Figure 3. *Coraciacarus muellermotzfeldi* sp. nov., female. (A) Ventral view, (B) dorsal view.

width 249–260, length to width ratio 2.1–2.3. Opisthosoma with short triangular opisthosomal lobes separated by shallow arched cleft; small triangular extension inserted centrally in the cleft with terminal copulatory opening. Well-sclerotized secondary sperm ducts visible far anterior near setae *d1* and *d2* (Figures 3B, 4E). Supranal concavity absent. Lateral and terminal margins of opisthosoma strongly sclerotized.

Prodorsum shaped and sclerotized as in male, length of pronotal shield 131–138, width 170–189, distances *se*–*se* 104–107, *si*–*si* 56–58, setae *vi* as in male. Hysteronotal shield covers almost whole hysteronotum, anterior and posterior margins straight, opisthonotal region with large U-shaped weakly sclerotized area (Figure 3B). Shield with transverse (anterior) and longitudinal (posterior) network-like striation. All dorsal and lateral hysteronotal setae short, *e2* are longest one, wide and lanceolate (length 45–48), remaining setae hair-like. Setae *e1* set posterior to the level of gland openings *gl*. Setae *h1* set on margins of semicircular shields lying on lateral margins

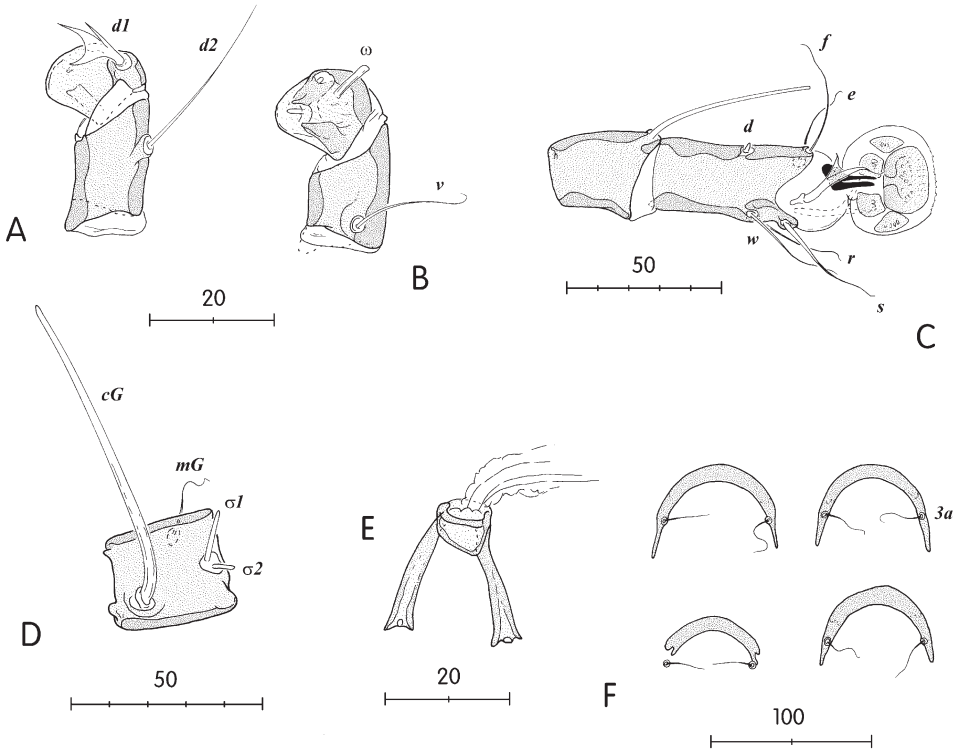


Figure 4. *Coraciacarus muellermotzfeldi* sp. nov., details. (A) Palpus, dorsal view, (B) palpus, ventral view, (C) tibia and tarsus of leg IV in males, (D) genu of leg I, (E) secondary sperm ducts in females, (F) morphological variability of epigynum shape in females. Setal designations of legs and palps after Gaud and Atyeo (1996).

of U-shaped desclerotized area. Setae *ps1* four times shorter than distance between them. Terminal setae *h2* and *h3* shaped as in male. Number and position of dorsal cupules as in male. Distances between hysteronotal setae: *c1-c1* 77–83, *d1-d1* 85–98, *e1-e1* 80–88, *e2-e2* 178–219, *f2-f2* 131–175, *c1-d1* 73–83, *d1-d2* 52–56, *d1-e1* 115–122, *c2-d2* 111–119, *d2-e2* 193–205, *e2-f2* 49–55, *e1-f2* 153–169.

Sclerotization of ventral idiosoma as in male (with exception of lacking opisthoventral sclerites). Epigynum variable in shape and size, from large horseshoe-shape with length 57 and width 77 to relatively flat and arched with length 22 and width 59; respectively tips of branches either reaching the level of setae *3b* and setae *3a* are inserted in middle length of branches or tips of branches not reaching bases of setae *3a* (Figure 4F). Distances between ventral setae: *3b-3a* 35–47, *g-3a* 46–52, *g-4a* 56–65, *4a-ps3* 168–180. Setae *ps2* set close to setae *ps3*, laterotermally, distance *ps2-ps2* only slightly longer than distance *ps3-ps3* (46–64 versus 49–78).

Differential diagnosis

Among five species previously described the new species is more similar to species inhabiting cuculiform birds: *Coraciacarus americanus* de Alzuet, Cicchino and Abrahamovich, 1988 and *C. cuculi* (Mégnin and Trouessart, 1884). All these species

are well characterized by combination of the following characters: pronotal shield incised laterally around setae *se* in both sexes, tips of lanceolate setae *h1* widely separated and setae *e2* situated posterior to the level of bases of setae *ps3* in males, anterior part of hysteronotal shield well developed and with big desclerotized area on opisthonotal part in females. The new species differs from these and all remaining species by long and thick setae *cG* on genu I in both sexes and shifting of genital acetabules slightly anterior to level of setae *g* in males; in other *Coraciacarus* species setae *cG* I are either thin and long or thick and short, male genital acetabules are situated posterior to genital setae. Moreover males of the new species differ also from *C. americanus* and *C. cuculi* in the following characters: (1) distance between tips of setae *h1* twice exceeds the length of these setae in new species; distance between tips of *h1* as long as the length of these setae in both remaining species; and (2) the main part of the hysteronotal shield is not separated from lobar parts in new species; dorsal shields of opisthosomal lobes completely separated by wide oblique gaps from the main part of hysteronotal shield in both remaining species. In addition, females of the new species differ from *C. americanus* and *C. cuculi* in the following characters: (1) setae *ps2* set posterior to *ps3*, distance *ps2–ps2* slightly longer than *ps3–ps3* in new species; setae *ps2* set laterally to *ps3*, distance *ps2–ps2* several times longer than *ps3–ps3* in both remaining species, (2) terminal margin of hysteronotal shield straight in new species; terminal margin of hysteronotal shield with median extension in both remaining species.

Etymology

This species is named in honour of Prof. Dr Gerd Müller-Motzfeld, an outstanding entomologist, former director of the institute, and head of the museum (Institute of Zoology and Museum, Ernst-Moritz-Arndt University, Greifswald, Germany).

Remarks on host–parasite relationships

Co-phylogenetic analyses of feather mites have proven that the close co-speciation with their hosts is the main evolutionary factor of their evolution in most cases (Dabert 2005). It implies that common acarofauna of particular bird taxa originated much more probably as a result of co-phylogenesis rather than colonization.

Coraciacarus inhabits birds from four orders: Cuculiformes, Coraciiformes, Musophagiformes and Passeriformes. Being aware that drawing conclusions from parasite phylogeny about the phylogenetic relationships between their hosts is a prohibited procedure in phylogeny reconstruction we can suggest only that a common *Coraciacarus* acarofauna of these four bird orders might point to close relationships between some of them. The close phyletic relationships between Musophagiformes and Cuculiformes, and to a lesser degree also to Coraciiformes, are generally accepted (Livezey and Zusi 2007; but see also Sibley and Ahlquist 1990). The fourth host group, Callaeatidae, is undoubtedly a corvid member of the Passeriformes (Barker et al. 2004; Shepherd and Lambert 2007), birds sometimes treated as relatively close to Coraciiformes (Livezey and Zusi 2007) and sometimes as very distant to the three remaining host orders of *Coraciacarus* (Sibley and Ahlquist 1990). Therefore it is very risky to conclude that the presence of *Coraciacarus* on *huia* is a result of a common ancestry of this bird with the remaining three bird orders and is a relic of an ancient co-speciation between the slowly evolving mite and

its hosts. A more realistic explanation of the presence of *Coraciacarus* on *Heteralocha acustris* is horizontal transfer. The only possible “donors” are cuckoos (Cuculiformes) because bee-eaters (Coraciiformes, Meropidae) and turacos and plantain-eaters (Musophagiformes) are not represented in the avifauna of New Zealand. However, ambiguities still exists because the only two recent species of New Zealand cuckoos (*Chrysococcyx lucidus* and *Eudynamys taitensis*) are typical brood parasites and no data about possibly extinct cuckoos are available. The transfer from foster parents to young cuckoo was frequently observed (Dubinin 1951) while the reverse direction of mite transfer is practically impossible. The presence of non-parasitic cuckoo(s) in the former avifauna of New Zealand is not confirmed. The reasons for the presence of *Coraciacarus* on huia therefore remain unresolved at this stage of our knowledge about the acarofauna of Callaeatidae and other recent and extinct New Zealand birds.

Key to species of the genus *Coraciacarus* Dubinin, 1956

1. In both sexes pronotal shield incised laterally around setae se 4.
 In both sexes pronotal shield not incised laterally. 2.
2. In both sexes setae si set much closer to respective setae se than to midline of the shield. In males setae *e2* thin, needle-like. In females rounded and closed supranal concavity well developed on dorsoterminal end of hysteronotum; setae *e2* short, at most as long as half of the distance *e2-h1*.
 *C. musophagi* (Trouessart, 1886)
 In both sexes setae si inserted equidistantly to respective setae se and midline of the shield. In males setae *e2* wide, lanceolate. In females closed supranal concavity absent; setae *e2* as long or longer than distance *e2-h1* (*C. meropsi* Dubinin, 1956) 3.
3. In males medial incision of terminal margin of hysteronotal shield very short, several times shorter than distance *e1-e1*. In females length to width ratio of idiosoma is 2.3–2.6; terminal lobes and interlobar cleft as flat triangles, the length much smaller than the width of their bases.
 *C. m. meropsi* Dubinin, 1956
 In males medial incision of terminal margin of hysteronotal shield at least as long as distance *e1-e1*. In females length to width ratio of idiosoma is 3.0–3.3; terminal lobes and interlobar cleft as sharp triangles, as long as the width of their bases. *C. m. leptus* Gaud, 1978
4. In males tips of lanceolate setae *h1* widely separated, *e2* situated posterior to the level of setae *ps3* bases. In females anterior part of hysteronotal shield well developed and with big desclerotized area on opisthonotal part. . . 5.
 In males tips of needle-like setae *h1* touching each other; setae *e2* shifted anterior to the level of setae *ps3* bases. In females anterior part of hysteronotal shield completely reduced from the level of trochanters III and well sclerotized in opisthonotal part. *C. dithyridus* Gaud, 1966

5. In both sexes setae *cG* on genu I thick, fishbone-like. In males the main part of hysteronotal shield not separated from lobar parts; posterior pair of genital acetabula set on the level or anterior to the level of genital setae *g*. In females setae *ps2* set posterior to *ps3*, distance *ps2-ps3* slightly longer than *ps3-ps3*; terminal margin of hysteronotal shield straight
 *C. muellermotzfeldi* sp.n.

In both sexes setae *cG* on genu I thin, hair-like. In males the main part of the hysteronotal shield completely separated by oblique gap from lobar parts; both pairs of genital acetabula set posterior to the level of genital setae *g*. In females setae *ps2* set laterally to *ps3*, distance *ps2-ps3* several times longer than *ps3-ps3*; terminal margin of hysteronotal shield with median extension. 6.

6. In males entire hysteronotal shield uniformly dotted. In females epigynum arched, at most reaching by branch tips the bases of setae *3a*.
 *C. cuculi* (Mégnin and Trouessart, 1884)

In males anterior half of hysteronotal shield with transverse striae. In females epigynum semicircular, branches long with bases of setae *3a* inserted in the middle of their length.
 *C. americanus* de Alzuet, Cicchino and Abrahamovich, 1988

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