

## THE LARVA AND NYMPH OF ODONTACARUS AUDYI (RADFORD) (Acarina: Trombiculidae)<sup>1</sup>

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*Abstract*: The nymph of *Odontacarus audyi* (Radford) is described for the first time, and the larva is redescribed from Malayan and Thailand birds. Variations in the standard data of the scutum and the number of dorsal setae are recorded.

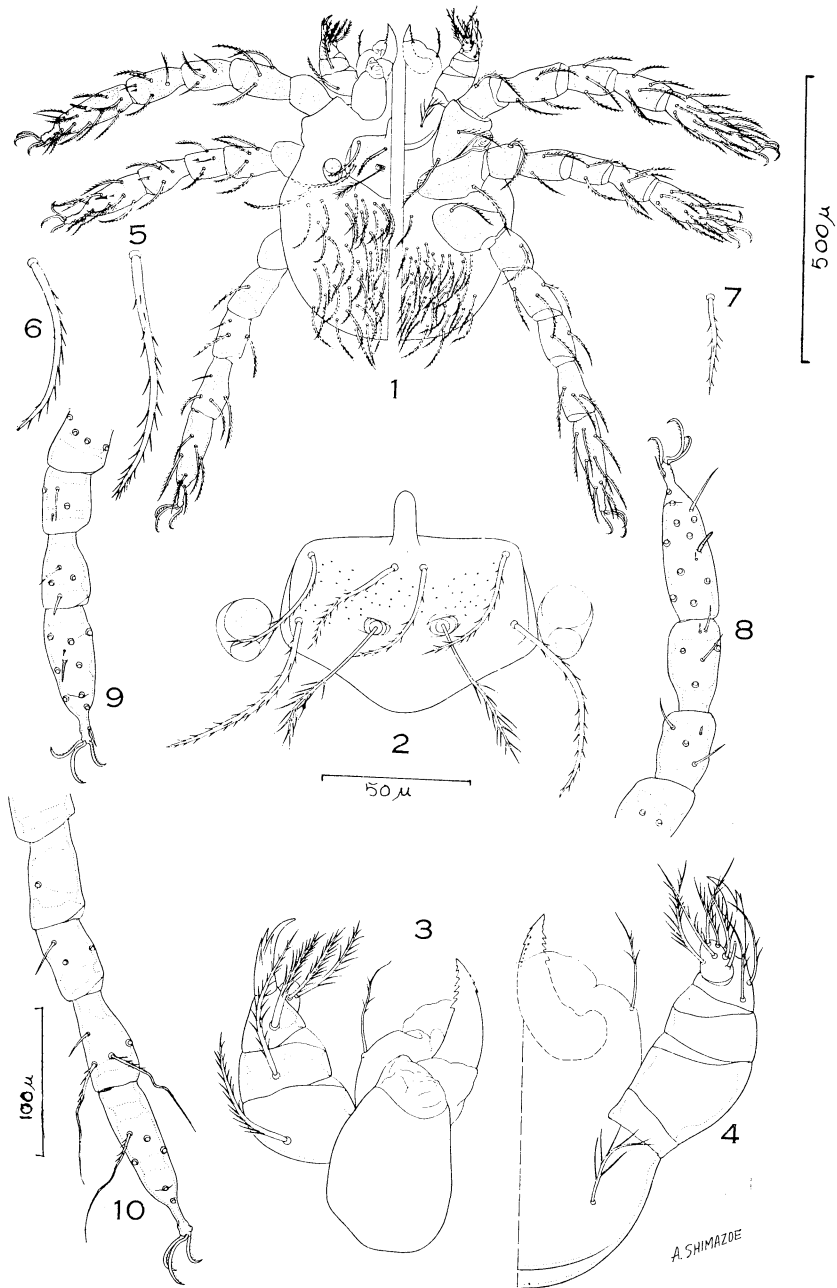
The genus *Odontacarus* is represented in Malaya and Thailand by a single species, *O. audyi* (Radford, 1946). A parasite of birds, it was first described from a babbler (?) from Imphal, Manipur State, India. The present description of the larva is based on specimens collected in Malaya and Thailand, which I have compared with one of Radford's specimens from the type series deposited in the London School of Hygiene and Tropical Medicine. Notes made by Dr. H. S. Fuller, who examined the type specimen in Radford's collection, were also used in confirming the identification. The nymph is described for the first time from a specimen reared from the larva.

### *Odontacarus audyi* (Radford), 1946

*Diagnosis of larva*: Palpal formula B/B/Bbb. 7B; claw 4-pronged. Galeal seta B. Cheliceral blades with approximately 7 pointed, subequal teeth dorsally and 6-8 blunt teeth ventrally, all teeth being confined to distal 1/2 of blade. Scutum pentagonal; AW/SD=1.4. Two tapering flagelliform setae with basal barbs set distally on tibia III; one similar seta set basally on tarsus III. Claws on all legs with row of hairlets on inner side.

*Redescription of larva*: Body shape cordiform to broad oval. Larvae from 440×320 μ when partially engorged; up to 1000×680 μ when replete. Live specimens orange in color. *Eyes* 2+2 on ocular shield, well developed, all lens-like, anterior pair 2× the diameter of posterior; situated opposite PL setae. *Gnathosome*: Gnathosome base sparsely pitted with weak punctate. Cheliceral base 62×39 μ, minutely punctate. Cheliceral blade somewhat dagger-like (51 μ long), moderately broad. Galeal setae with 3-4 fine cilia. Palpi broadly rounded laterally. Femur almost 1/2 length of palp. Dorsotibial seta of palp stout and brush-like; dorsolateral and ventral setae finely barbed, virtually nude. Claw 26 μ long, slender, with 4 (occasionally 3) prongs. *Scutum* with anteromedian process cone-shaped, 19 μ long. Posterior margin rounded, not angulate. Position of scutal setae as figured. Pitting on scutum sparse and weak, the area behind SB being less punctate than that in front. SB in line with PL setae. Sensillae flagelliform, with 10-12 barbs

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Figs. 1-10. *Odontacarus audyi* (Radford), larva. 1, dorsal/ventral aspects of larva; 2, scutum; 3-4, dorsal/ventral aspects of gnathosome; 5-7, humeral, dorsal, and ventral setae; 8-10, legs I, II, III, sensory setae.

on distal 1/3.

Standard data in micra of larval scutum of *O. audyi* (Radford) (Thailand)

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens.
Mean of 10 specimens	65	80	26	36	29	65	29	41	44	63	58
Minimum	60	74	23	33	26	59	25	40	40	60	55
Maximum	73	86	28	40	30	70	32	49	54	69	60

*Body setae*: Humeral and dorsal setae ciliated. HS 58  $\mu$  long, DS 36 to 45  $\mu$  long. Dorsal setae from 52–90 in number, arranged in irregular rows. Ventrally with one pair of sternal setae between coxae III, 20–24 ventral setae, plus 26–32 caudal setae. Ventral setae 30  $\mu$  long, unipectinate. *Legs*: All legs 6-segmented, heavily sclerotized with long and slender claws. Short inconspicuous hairs are also present on the empodium. Coxa I with 2 setae, one distal and one proximal; coxae II and III unisetose. Punctations on all coxae few, almost invisible in old mounts. Punctate on all other leg segments numerous and distinct. Ordinary setae of legs of two sizes, strongly barbed. Sensory setae as follows: *Leg I*: 2 genualae, microgenuala; 2 tibialae, microtibialae; tarsala 19  $\mu$  long, microrarsala, subterminala (parasubterminala absent)<sup>3</sup>, and pretarsala. Ordinary setae as follows: trochanter 1, femur 6, genu 4, tibia 8, tarsus 20–22. *Leg II*: genuala, microgenuala; 2 tibialae; tarsala 15  $\mu$  long, microtarsala, and pretarsala. Ordinary setae 1,5,4,6,15–17. *Leg III*: genuala; tibiala. Ordinary setae (in addition to flagelliform setae) 1,5,4,6, 16. Tarsus I 106 $\times$ 28  $\mu$ ; tarsus II 88 $\times$ 26  $\mu$ ; tarsus III 110 $\times$ 21  $\mu$ .

**MATERIAL EXAMINED**: INDIA: One slide labelled "*Acomàtaccarus audyi* Radford–Manipur, Kangla Tongbi–Bird–8 July, 1945–C. D. Radford." MALAYA: 8 larvae from 2 Lesser Blue-winged Pitta, (*Pitta brachyura cyanoptera* R45108, R45109), Selangor, Klang, Kampong Java, 8.IV.1956; 2 larvae from Red-winged Crested Cuckoo (*Clamator coromandus* R44902), Selangor, Gombak Forest Reserve, 26 km NE of Kuala Lumpur, 9.III.1956 (Zoology Laboratory, I. M. R., Kuala Lumpur). THAILAND: 2 larvae from Striped babbler (*Pellorneum ruficeps*), Nan, Ban Pa Chompoo and Ban Pha Hang, 26.XI and 1.XII.1961; 9 larvae from Scimitar–Babbler (*Pomоторhinus hypoleucos*), same loc., 4.XII.1961; 4 larvae from Sibirian Blue Robin (*Lusinia cyane*), 7 larvae from Large Crow Pheasant (*Centropus sinensis*), 2 larvae from Stone Chat (*Saxicola ferrea*), 1 larva from Babbling Trush (*Garrulax moniliger*), 2 larvae from Common Sharma (*Copsychus malabaricus*), and 2 larvae from Tree-pipit (*Anthus hodgsoni*), all from Nan, Ban Pha Hang, 4–18.XII.1961; 1 larva from a Shrike (*Lanius collurioides*), Chengmai, Ban Bo Kaeo, 29.I.1962; 3 larvae from Hill Blue Flycatcher (*Muscicapa banyumas*), Chengmai, Ban Bo Luan 1050 m, 30.I.1962. All the Thai collections were made by Mr. Kitti Thonglongya, to the north of Bangkok.

*Notes*: The following intraspecific variation was noted in the larvae examined:

1. *Scutal standard data*: The standard data given below are as follows: (i) Radford's measurements of holotype; (ii) measurements of Radford's specimen from Kangla Tongbi; (iii) a Malayan specimen (42996); (iv) mean of 10 Thailand specimens:

3. A character shared with *Neoschongastia americana* (Hirst), *N. entomyza* Womersley, and *N. struthidia* Womersley. *N. americana* and *N. entomyza* also have hairy tarsal claws; all are parasites of birds.

	AW	PW	SB	ASB	PSB	SD	AP	AM	AL	PL	Sens.
(i)	85	102	34	44	34	78	34	51	51	68	68
(ii)	70	88	26	37	33	70	30	52	49	81	—
(iii)	74	84	26	40	34	74	32	48	47	78	—
(iv)	65	80	26	36	29	65	29	41	44	63	58

2. Arrangement of dorsal setae:

(i)	2.	10.	8.	10.	12.	8.	8.	4.	2.	=64
(ii)	2.	18.	10.	16.	18.	12.	10.	4.	2.	=92
(iii)	2.	12.	16.	13.	12.	12.	8.	4.	2.	=81
(iv)	2.	10(12).	8(7).	10.	8(10).	8(6).	10.	8.	4.	=68-69

Omitting the humeral row the first, second, and the last three rows are irregularly arranged.

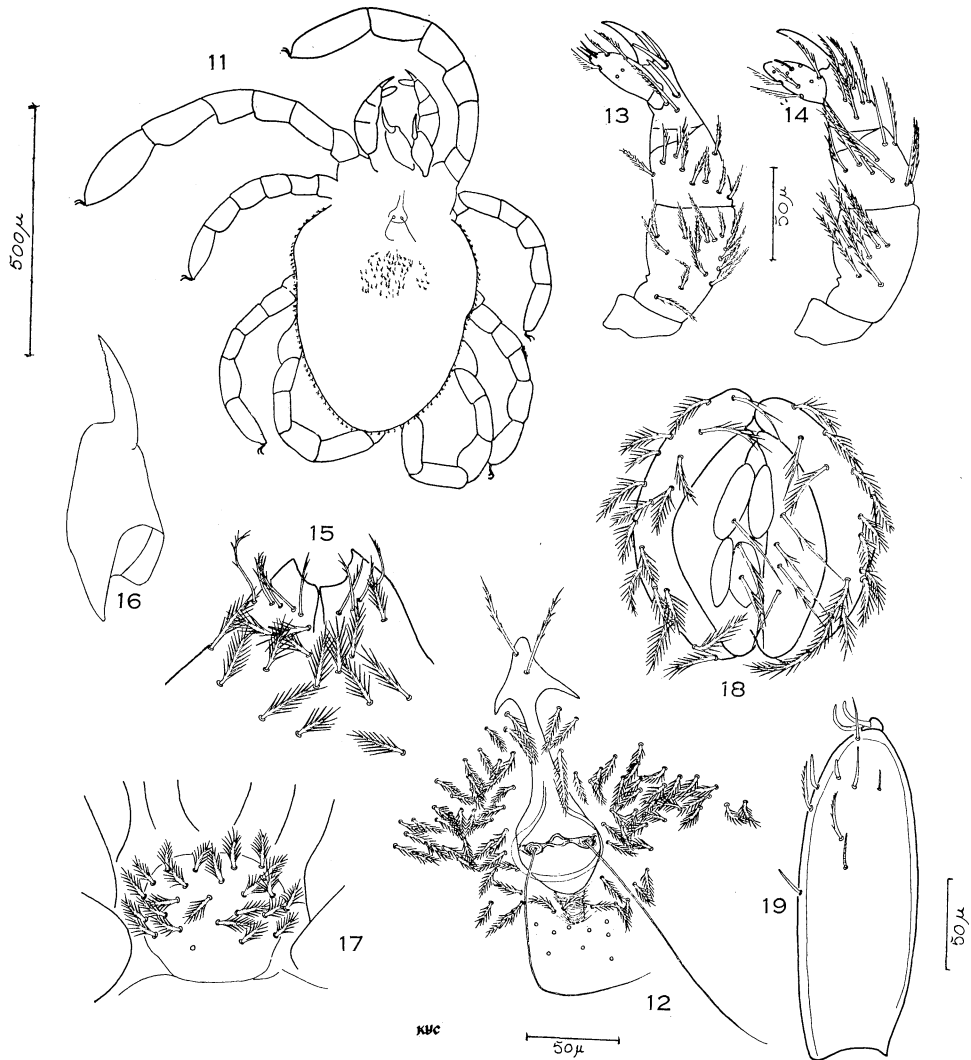
*Description of nymph:* Idiosoma oval, without medial constriction,  $560 \times 380 \mu$  in mounted specimen; orange colored in life. Eyes absent. Body setae uniformly bipectinate; hysterosomal setae 17 to  $20 \mu$  long. *Genitalia* situated between coxae IV, broadly oval,  $78 \times 55 \mu$ . External plates elongate, clearly discernable, bearing 14 pairs of bipectinate setae similar to body setae. Inner plates with 3 or 4 pairs of stiff setae each with 2 to 6 barbs, dissimilar to body setae. Two pairs of elongate genital discs present. Anal plates narrowly oval,  $50 \mu$  long; margins thickened, with 5 setae similar to body setae. *Gnathosoma:* Cheliceral bases evenly pitted with fine, close-set punctae;  $84 \mu$  long,  $54 \mu$  high, and broader basally. Blade dagger-like,  $65 \mu$  long, with at least 20 small, pointed teeth which gradually decrease in size towards the base of the blade. *Palp*  $185 \mu$  long (trochanter to tip of claw), stout. Femur with 20-22 setae of two lengths ( $40 \mu$  and  $24 \mu$ ), genu with 8 longer setae ( $48 \mu$ ) externally at least one of which is nude, and 9 shorter bipectinate internal setae ( $22 \mu$ ). Tibia with 3 accessory claws set in a close triangle, a little distance behind which are 2 long spines in tandem (basal spine absent on right palpus); also with 9 strongly ciliated setae. Palpal tarsus with 3 unde pointed subterminalae in a triangle, a sub-basal tarsala plus 10 ciliated setae. Hypostome blunt, with 5 weakly ciliated setae on one side and 4 on the other. These are dissimilar to other hypostomal setae, which are short and strongly pectinate.

*Scutum:* Sensillary area well developed, somewhat oval, and with strongly thickened margins;  $52 \mu$  wide. A thick-walled 'bar' joins sensillary bases. Crista almost  $2 \times$  as long as sensillary area; broader basally than distally. Two long ciliated, subequal tectal setae in tandem. Margins of tectum somewhat sagittate. Sensillae long, flagelliform and nude. Posterior limits of apodeme behind sensillary area faintly demarcated. Parascutal setae subequal and numerous, as figured.

Standard data in micra of nymphal scutum of *O. audyi*

CTL	ASL	SB	$\frac{ASL}{SB}$	PSL	PAD	TS	SS	Sens.
98	111	28	3.96	20	15	46	37	130

*Legs:* All legs 7-segmented; legs I  $730 \mu$ , II  $470 \mu$ , III  $500 \mu$ , and IV  $640 \mu$  long. Precoxal plates absent, but well defined sternum with 24 short, bipectinate setae present. Coxae I to IV with 32, 21, 22, and 20 pectinate setae. Length of tarsus I  $185 \mu$ , height  $68 \mu$ . Ratio LTI/HTI=2.7. Length of tibia I  $136 \mu$ . Lengths of sensory setae of legs as



Figs. 11-19. *Odontacarus audyi* (Radford), nymph. 11, outline of dorsal aspect of nymph; 12, scutum with middorsal and posterior body setae; 13-14, internal and external views of palp; 15, hypostome; 16, chelicera; 17, sternum; 18, genitalia; 19, tarsus I.

follows: slender solenidia  $24 \mu$ , thick solenidia  $15 \mu$ .

**MATERIAL EXAMINED:** One nymph (slide 43092) bred from larva recovered from Red-winged Crested Cuckoo, *Clamator coromandus*. The nymph emerged 23 days later, but 4 other larvae failed to metamorphose.

**Notes:** Crossley (1960) studied a single nymph of *Odontacarus* (*O.*) *arizonensis* (Ewing) and 16 nymphs of *O.* (*Xenacarus*) *plumosus* (Greenberg)<sup>4</sup>, diagnosing the 2 subgenera on

4. The genus *Acomatacarus* Ewing, 1942, was synonymised with *Odontacarus* Ewing, 1929, by Brennan (1959).

nymphal characters as follows :

Chelicera with blade shear-like. Palpal tarsus with 5 apical nude setae. Hypostome pointed, projecting, with 8 apical nude setae. Tectal setae not expanded...*Odontacarus*  
 Chelicera with blade straight, dagger-like. Palpal tarsus with 3 apical nude setae. Hypostome blunt, with about 6 to 8 apical, sparsely branched setae. Tectal setae somewhat expanded ..... *Xenacarus*

The nymph of *O. audyi* is very similar to that of *O. australiensis* (Hirst) (see Domrow, 1956) and both these species are, I believe, typical *Odontacarus*. In addition to the subgenera listed by Wharton and Fuller (1952), at least one other larval subgenus has since been raised, *Matacarus* Vercammen Grandjean, 1956. Whether these divisions will be evident in the nymphal stage remains to be seen. Certainly in the Trombiculinae many larval groups are not paralleled in the nymphal stage, eg. *Leptotrombidium* and *Trombiculindus*, *Doloisia* and *Traubacarus*, *Ascoschoengastia* and *Microtrombicula*, *Gahrlepiea* and *Schoutedeni chia*.

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#### REFERENCES

- Audy, J. R. 1954. Malaysian parasites IX. Notes on the taxonomy of trombiculid mites with description of a new subgenus. *Stud. Inst. Med. Res. Malaya* **26**: 123-70.
- Brennan, J. M. 1959. Synonymy of *Odontacarus* Ewing, 1929, and *Acomatacarus* Ewing, 1942, with redescriptions of *O. dentatus* (Ewing) and *O. australis* (Ewing), also descriptions of three new species from Southern United States (Acarina: Trombiculidae). *Ann. Ent. Soc. Amer.* **52**: 1-6.
- Crossley, D. A. 1960. Comparative external morphology and taxonomy of nymphs of the Trombiculidae (Acarina). *Univ. Kansas Sci. Bull.* **40**: 135-321.
- Domrow, R. 1956. Three new Australian chigger nymphs (Acarina, Trombiculidae). *Proc. Linn. Soc. N. S. W.* **81**: 144-52.
- Radford, C. D. 1946. New species of larval mites (Acarina: Trombiculidae) from Manipur State, India. *Proc. Zool. Soc. Lond.* **116**: 247-65.
- Vercammen-Grandjean, P. H. 1956. Un Leeuwenhoekiinae African extraordinaire, d'un sous-genre nouveau: *Acomatacarus* (*Matacarus*) *buretti*, n. sg., n. sp. (Acarina). *Ann. Mag. Nat. Hist. ser. 12*, **9**: 625-30.
- Wharton, G. W. and H. S. Fuller. 1952. A manual of chiggers. *Mem. Ent. Soc. Wash.* **4**: 1-186.