

## TYROPHAGUS CURVIPENIS N.SP. FROM AN ORCHID CULTIVATION IN A GREENHOUSE IN PORTUGAL (ACARI: ACARIDAE)

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**ABSTRACT** - *Tyrophagus curvipenis* n.sp. (Acari, Acaridae) is described from orchids cultivated in a greenhouse in Portugal. The mites were feeding on algae covering the wooden structures of the greenhouse and occasionally entered the flowers where they could feed on pollen.

### INTRODUCTION

More than 50 species have been described in the genus *Tyrophagus* Oudemans (1924). Most of these are now considered as synonyms. The number of valid species recognized at present is probably less than 20 (Griffiths, 1979).

The identification of the species is based on the following characters: relative lengths of setae *d1*, *d2* and *l2*, shape of the supracoxal setae (*s cx*), shape and length of the solenidia *omega 1* (tarsi I and II), presence or absence of pigmented eye spots on the dorsal shield. Most important characters in the male are the shape and the size of the penis (to be examined in lateral view), the direction of the lateral arms supporting the penis (turned inwards or outwards) and the situation of the copulatory suckers on tarsus IV (relative distances of *a + b* and *c*). The mites described herein were found by Mr M.T. Malé in Lagos, Portugal, on the wooden parts and benches of a greenhouse used to rear orchids and sometimes in the flowers themselves. The green particles which could be seen in the digestive tract through the transparent skin of the mites suggest that these mites fed on algae which developed enormously owing to the high ambient RH but they could also consume pollen inside the flowers.

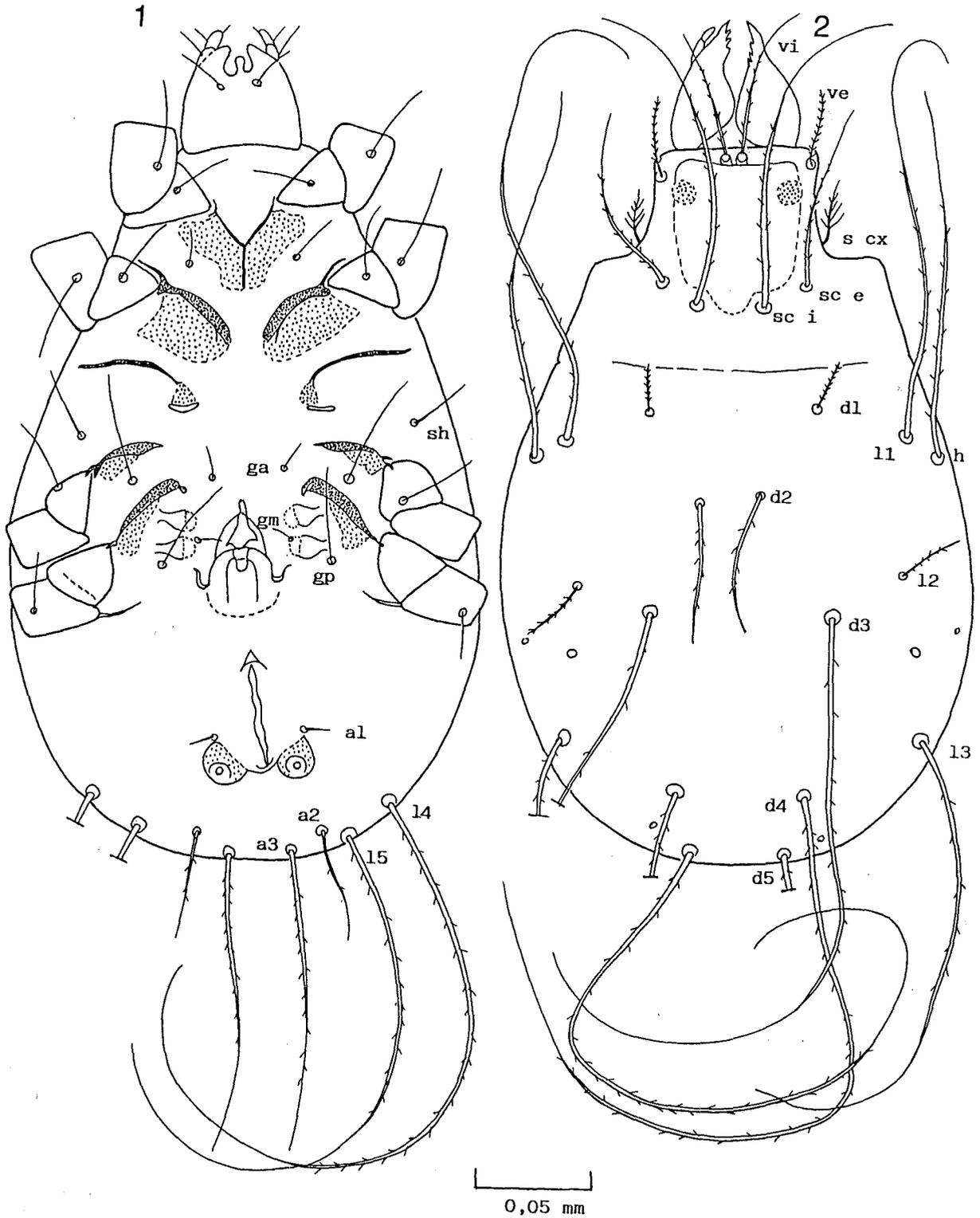
All the measurements used herein are in micrometers. The nomenclature of the idiosomal setae is that of Fain (1963).

### *Tyrophagus curvipenis* n.sp.

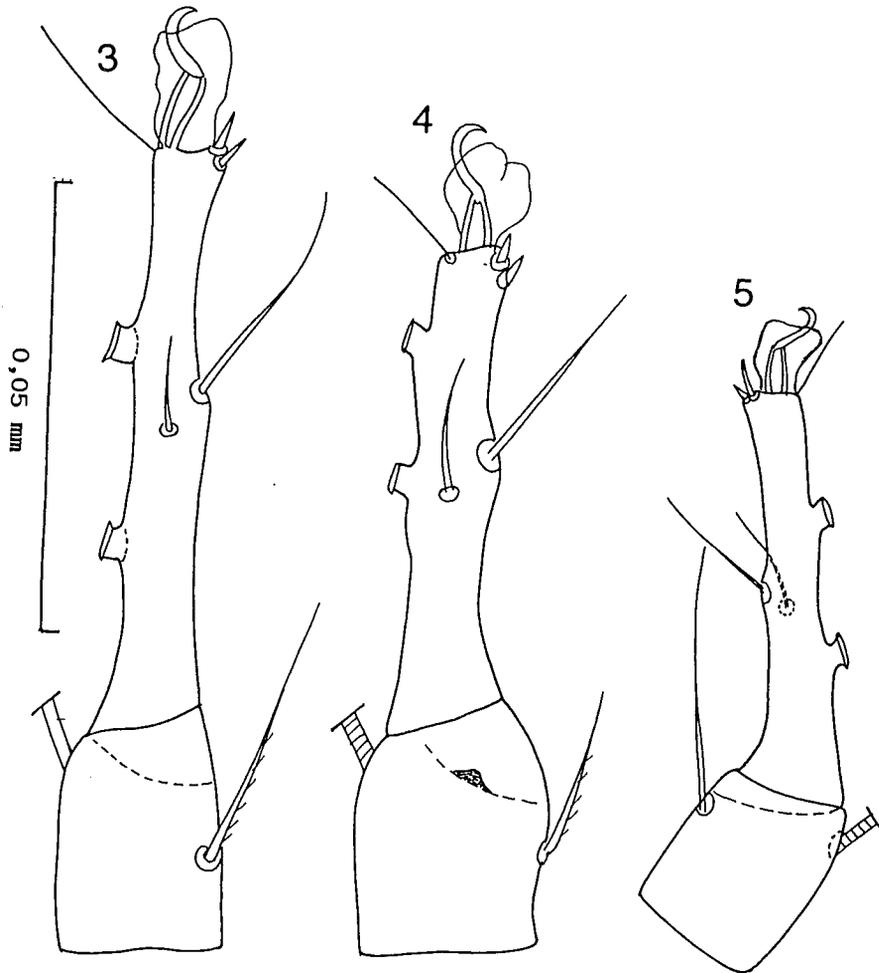
(Figs. 1,2,4,9-13)

**Diagnosis:** Small species (male 310-330 long) with conspicuous pigmented eyespots. Tarsi short (in male 48-48-57-59, ambulacra excluded). Lateral sclerites supporting the penis turned outwards. Ratio  $d2/d1 = 2.7$  to 3, ratio  $l2/d1 = 1.22$  to 1.28. Supracoxal seta thin and short with 3 or 4 pairs of short pectinations. Penis as in *T. putrescentiae* but thicker and with apical third more strongly curved forming an angle of 28 to 30° with its median part (in *T. putrescentiae* this angle is 75 to 80°). Ratio  $a + b/c$  (see Robertson, 1959) = 4.1 to 5.4. Tibia and genu IV in both sexes with a small preapical posterior triangular spur. Omega 1 distinctly widened at apex.

**Male, holotype** (Figs 1, 2, 4, 9 to 13): Idiosoma 310 long and 198 wide. In one paratype the length and width are 330 x 185. Sejugal furrow incomplete. Propodonal shield with a pair of conspicuous pigmented eyespots. Lengths of dorsal setae : *vi* 70, *ve* 35, *sc i* 160, *sc e* 80, *d1* 22 and 23, *d2* 60 and 66, *d3* 330, *d4* 390, *d5* 350, *l1* 210, *l2* 26, *l3* 200, *h* 180. All these setae with short pectinations. Setae *d1*, *d2* and *l2* are more or less rod-like. Setae *s cx* short (20 long), narrow, with 4 pairs of short pectinations. **Venter:** setae *a1*, *a2* and *a3* are 12, 40 and 165 long respectively. Setae *l4*, *l5* and *sh* are 310, 250 and 36 long. All these ventral setae have short pectinations except the *sh* and *a1* which are smooth. Penis S-shaped as in *T. putrescentiae* but thicker and with apical third more strongly bent, the latter forming with



Figs 1-2 :*Tyrophagus curvipenis* n.sp. Holotype male in ventral (1) and dorsal (2) view.



Figs 3-5 :Tarsus and tibia IV in males of *Tyrophagus putrescentiae* (3), *T. curvipenis* (4) and *T. javensis* (neotype) (5).

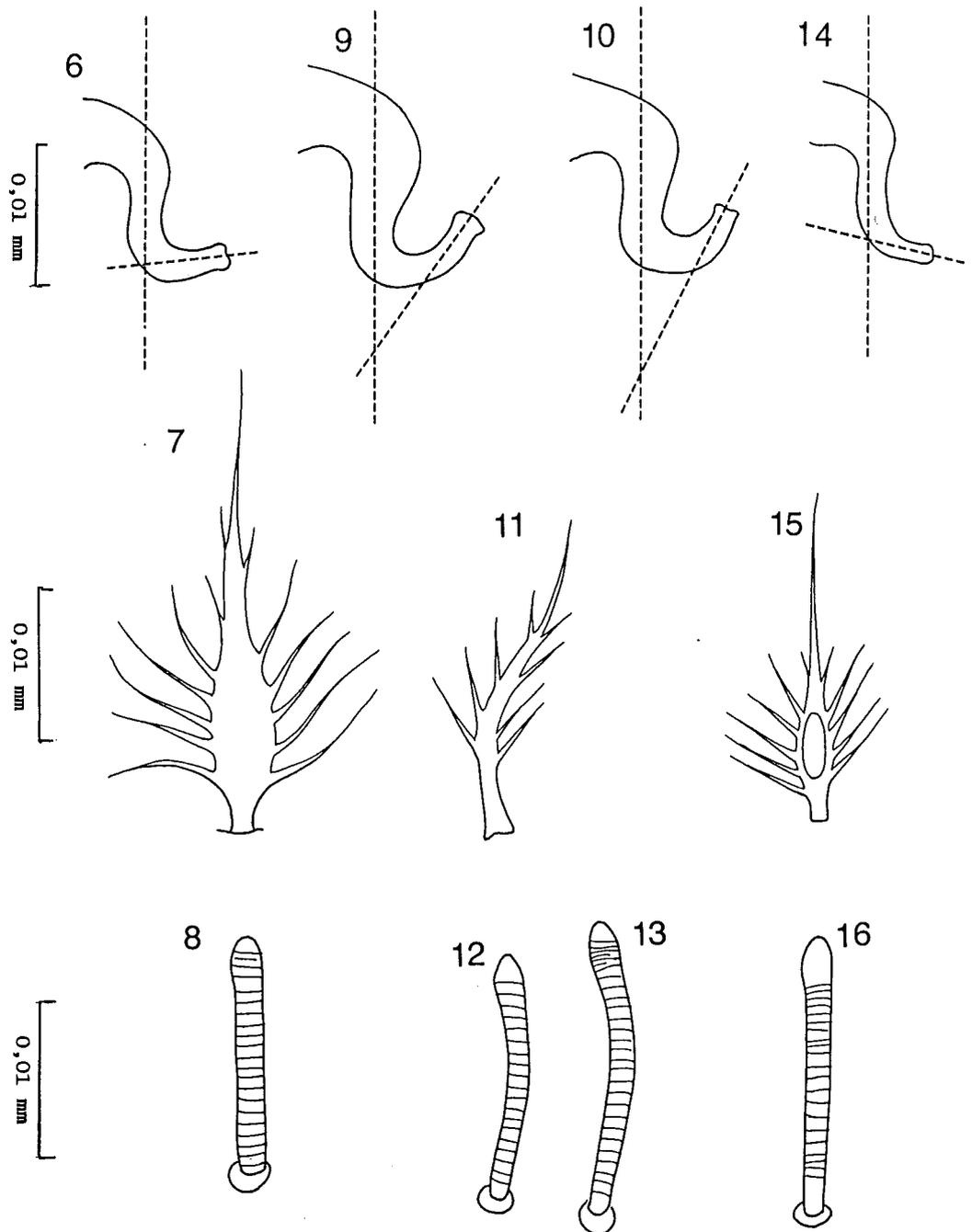
the median part an angle of 28 to 30° (instead of 75 to 80° in *T. putrescentiae*). The lateral arms supporting the penis are turned outwards. *Legs*: Tarsi 48-48-57-59 long (ambulacra not included), tibiae 24-24-22-26 long. Ratio  $a + b/c = 4.1$  (holotype), 4.2 (male n°1) and 5.4 (male n°2). The apical sucker of tarsus IV is completely situated in the apical third of the tarsus. The tibia and genu IV bear a small preapical posterior triangular spur. *Solenidia*: *omega1* of tarsi II and I 20 and 16 long respectively, ratio 1.25. *Solenidia phi* of legs I-IV 100-110-130-140 long.

*Female*: Length and width of idiosoma in 2 paratypes: 360 x 201 and 340 x 220. Dorsum as in the male but the setae are generally longer: *vi* 105, *ve* 54, *scj* 180, *sc e* 99, *d1* 30, *d2* 85, *d3* 240, *d4* 390, *d5* 225, *l1* 180, *l2* 33, *h* 180, *sh* 45. There are 6 pairs of anal setae,

the *a1* to *a4* are short (10 to 20), *a5* 80, *a6* 200. Setae *scx* short and narrow, with 3 pairs of short pectinations. Length of tarsi (without ambulacra): 61-63-60-78, of tibiae 27-27-24-30. Tibia and genu IV with a spur as in the male. *Solenidia omega1* of tarsi II-I 21 and 16 long respectively (ratio 1.3). Bursa about 40 long, opening at posterior margin of body. Basal sclerite of spermatheca narrow (18 to 20 wide). Genital papillae funnel-shaped, rather large.

*Tritonymph*: Length and width of idiosoma in 3 paratypes: 315 x 225, 305 x 230 and 285 x 180. Setae *d1*, *d2* and *l2* 21, 60 and 24 long. Setae *a1*, *a2* and *a3* 12, 21 and 120 long. Pigmented eyespots very conspicuous.

*Habitat*: Holotype male from orchids cultivated in a greenhouse in Portugal (December, 1991) (Coll. M.T. Malé). Paratypes (2 males, 2 females and 4 trito-



Figs 6-16 :*Tyrophagus putrescentiae*, Male: penis (6), seta *s cx* (7) and *omega 1* of tarsus II (8). *T. curvipenis*, Male: penis in 2 paratypes (9, 10), seta *s cx* (11), *omega 1* of tarsus I (12) and II (13). *T. javensis*, Male (neotype): penis (14), seta *s cx* (15) and *omega 1* of tarsus II (16).

nymphs) with the same data as the holotype. Holotype and 1 paratype male, 1 paratype female and 3 paratypes nymphs in the collection of Institut royal des sciences naturelles de Belgique. Three paratypes (female, male and tritonymph) in the collection of the ENSA-Montpellier.

**Remarks:** *T. curvipenis* belongs to a group of *Tyrophagus* species characterized by the presence on the scutum of a pair of pigmented eyespots. This group includes now 7 species (see the key).

By the shape of the penis this species is the closest to *T. putrescentiae* and *T. javensis*, but in these species the setae *s cx* are widened basally and carry numerous and long pectinations, while in *T. curvipenis* these setae are thin and bear only 3 to 4 pairs of short pectinations (Figs 7, 11 and 15). Moreover in this new species the penis is thicker, a little longer and more strongly curved in its apical third than in these species. The angulation of the apical third to the median third is 28 to 30°, instead of 75 to 115° in the two other species. (Figs 6, 9 and 10 and 14). Another character is the more apical situation of the apical sucker of leg IV. In *T. curvipenis* the distance *a+b* is 4.1 to 5.4 times as long as the distance *c*. In the two other species *a+b* is only 1.5 to 2 times (*putrescentiae*) or 2.15 to 2.4 times (*javensis*) longer than the distance *c*. (Figs 3, 4 and 5). Finally, *T. curvipenis* bears a small triangular preapical spur on the posterior surface of genu and tibia IV (in both sexes). This spur is lacking in the two other species. (Fig 4).

#### Remarks on *Tyrophagus javensis* (Oudemans, 1916)

In 1916, Oudemans described two new species of *Tyrophagus* (= *Tyroglyphus*) from the Oriental region, i.e. *T. javensis* collected from an ant, *Plagiolepis longipes*, from Salatiga, Java and *T. australasiae* taken from a pigeon (*Goura* sp.) from Jamur, New-Guinea and also found associated with *T. javensis* from ants in Salatiga.

According to Robertson (1959) who examined the typical material of both species, the specimens of *T. australasiae* collected in Salatiga belong in fact to *T. javensis*. As the typical slide of *T. javensis* was not available and probably lost this author selected the slide n° 6 containing males of *T. australasiae* (specimens from Salatiga) as "lectotype" of *T. javensis*. In 1962, Samsinak, reexamining this material, noted that this specimen is merely a "neotype" rather than a lectotype, probably owing to the fact it had not been selected in the typical series of *T. javensis*. He also considered that the true *T. australasiae*, from New Guinea, is a synonym of *T. putrescentiae*.

Through the courtesy of Dr P.J. van Helsingen, of the Museum of Natural History of Leiden, we were able to examine the slide n° 6 (2073) of the Oudemans Collection and containing the "neotype" of *T. javensis*.

This slide contains in fact 3 males. We designate as neotype the specimen which has been depicted by Samsinak (1962).

#### Key to the males of the *Tyrophagus* group with pigmented eyespots

1. Setae *s cx* short (less than 20) without pectinations. Lateral arms supporting the penis turned outwards. Penis very small, slightly sinuous in apical half. Setae *l3* about one third the length of posterior setae. Setae *d1, d2, l2* subequal in length (ca 40) .....*T. brevicrinatus* Robertson, 1959  
Setae *s cx* longer and always distinctly pectinate. Setae *l3* approximately as long as remaining posterior setae. Setae *d2* distinctly longer than *d1* and *l2*. Shape of penis variable. ....2
2. Lateral arms supporting the penis turned inwards. Penis very small, only very slightly curved in apical third. Setae *s cx* narrow with 2 to 4 pairs of quite long pectinations. Setae *d2* about twice as long as *d1* and *l2*. Pigmented eyespots very faint.....  
.....*T. robertsonae* Lynch, 1989  
Lateral arms supporting the penis turned outwards (this character is not known for *T. javensis*). Penis not specially short. Pigmented eyespots conspicuous. Setae *d1, d2* and *l2* variable. ....3
3. Penis S-shaped with two deep curves, one at base, the other in apical third. Setae *s cx* either thin or swollen basally .....4  
Penis not distinctly S-shaped, with a short and strong curve at base and a much longer apical part only slightly curved. Setae *s cx* distinctly widened in basal half. *Omega 1* not swollen at apex. ....6
4. Setae *s cx* strongly widened in basal half, with 5 to 8 pairs of long pectinations. Apical third of penis angulated at 75-115° to its median third. Penis 15 to 16 long (measured in straight line).....5  
Setae *s cx* narrow with 3 to 4 pairs of short pectinations. Apical third of penis angulated at 28-30° to the median part. Total length of penis 17-18 (measured in straight line). Setae *d2* 2.7 to 3 times longer than *d1*; *l2* 1.22 to 1.28 times longer than *d1*; *a3* 2.5 to 3 times longer than *a2*. *Omega 1* distinctly widened at apex. Distance *a+b* is 4.1 to 5.4 times longer than distance *c*. .....*T. curvipenis* n.sp.
5. Apical third of penis angulated at 75-80° to its median third. *Omega 1* cylindrical, with apex very slightly widened. Setae *d2* 2.5 to 3 times longer than *d1* and *l2*. Distance *a+b* 1.5 to 2 times longer than distance *c*. .....*T. putrescentiae* (Schrank, 1781)  
Apical third of penis angulated at 110-155° to its median third. *Omega 1* distinctly swollen at apex. Setae *d2* 1.5 to 1.7 times longer than *d1*; *a3* 1.8 to 2.5 times longer than *a2*. Distance *a+b* 2.5 to 2.4 times longer than distance *c*.....  
.....*T. javensis* (Oudemans 1916)

6. Setae *d2* a little less than 3 times as long as *d1* or *l2*.  
*Omega 1* cylindrical, shorter and wider. Setae *s cx*  
 moderately widened in basal part and bearing 6  
 pairs of thin and long pectinations.....  
 .....*T. savasi* Lynch, 1989
- Setae *d2* almost 2 times as long as *d1* or *l2*. *Omega 1*  
 30% longer and slightly narrowing towards the  
 apex. Setae *s cx* strongly widened in basal two-  
 thirds and bearing 7 to 8 pairs of thick relatively  
 short and blunt pectinations.....  
 .....*T. neiswanderi* Johnston & Bruce, 1965

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#### REFERENCES

- Fain, A. 1963. Les acariens producteurs de gale chez les Lémuriens et les Singes, avec une étude sur les Psoroptidae (Sarcoptiformes). Bull. Inst. r. Sci. nat. Belg., 32: 1-125.
- Griffiths, D.A. 1979. The morpho-species and its relationship to the biological species in the genus *Tyrophagus* (Acaridae, Acarina). In "Recent advances in Acarology, 1: 199-212, Rodriguez, J.G. (Ed.) New York, San Francisco and London, Academic Press".
- Johnston, D.E. and W.A. Bruce. 1965. *Tyrophagus neiswanderi*, a new acarid mite of Agricultural importance. Res. Bull. Ohio agri. Exp. Stn., 977: 1-17.
- Lynch, C.A. 1989. Two new species of the genus *Tyrophagus* (Acari, Acaridae). J. Zool. Lond., 219: 545-567.
- Oudemans, A.C. 1916. Myrmecophile Acari uit Salatiga. Ent. Ber. Amst., 4: 267.
- Roberstson, Ph. L. 1959. A revision of the genus *Tyrophagus* with a discussion on its taxonomic position in the Acarina. Aust. J. Zool., 7: 146-181.
- Samsinak, K., 1962. Beiträge zur kenntnis der Gattung *Tyrophagus* Oud. Acta Soc. ent. Cechoslov., 59: 266-280.

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