

**Case 3501*****Acarus putrescentiae* Schrank, 1781 (currently *Tyrophagus putrescentiae*; Acariformes, ACARIDAE): proposed conservation of usage by designation of a replacement neotype**

Pavel B. Klimov

*University of Michigan, Museum of Zoology, Ann Arbor, MI, U.S.A.*  
(e-mail: pklimov@umich.edu)

Barry M. OConnor

*University of Michigan, Museum of Zoology, Ann Arbor, MI, U.S.A.*  
(e-mail: bmoc@umich.edu)

**Abstract.** The purpose of this application, under Article 75.6 of the Code, is to conserve the current usage of the name *Tyrophagus putrescentiae* (Schrank, 1781) for a ubiquitous, medically and economically important species of acariform mite (family ACARIDAE) by setting aside the existing name-bearing type and designating a replacement neotype. Cultures of this mite species are maintained in many research institutions or companies and are commercially traded as a source of mite allergens, food for phytoseiid mites used in biological control, and for various molecular biology applications. A recent taxonomic treatment indicated that the taxonomic concept of *T. putrescentiae* involved two closely related species, one common and one rare, and the neotype designated by Robertson (1959) for *T. putrescentiae* corresponds to the rare species; the common species was renamed as *Tyrophagus communis* Fan & Zhang, 2007. We demonstrated that the prevailing usage of the name *T. putrescentiae* comprises almost exclusively the common species, the name *T. communis* is a junior synonym of eight previously named taxa with extant types, and we proposed a new name for the rare species: *Tyrophagus fanetzhangorum* Klimov & OConnor, 2009. The stability of zoological nomenclature is therefore threatened by the following: (1) the prevailing usage of the name *T. putrescentiae* was not maintained by Fan & Zhang (2007); (2) the name *T. communis* proposed for the common species is a junior synonym and, therefore, not valid; and (3) besides the eight taxa for which synonymy with the common species was verified by us, types of older taxa may also be discovered in the future thus posing another nomenclatural challenge. We propose to conserve the prevailing usage of the name *T. putrescentiae* by designation of a new neotype from a culture currently maintained in a research institution, which was cited in many published works and started from specimens collected close to the type locality of *T. putrescentiae*.

**Keywords.** Nomenclature; taxonomy; Chelicerata; Acariformes; ACARIDAE; *Tyrophagus*; *Tyrophagus putrescentiae*; *Tyrophagus fanetzhangorum*; *Tyrophagus communis*; allergy; agricultural pest; stored product pest; Czech Republic; cosmopolitan.

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1. Schrank (1781, p. 521) proposed the name *Acarus putrescentiae* for specimens originally described by him from the 'Austrian Empire' in garden soil, flower pots, and rotting leaves (Schrank, 1776, p. 34, pl. I, figs. 28, 29). The taxon as described and

illustrated involves two arthropod species, a mite and a springtail, and the mite cannot be confidently placed into a family based on the original description and figures.

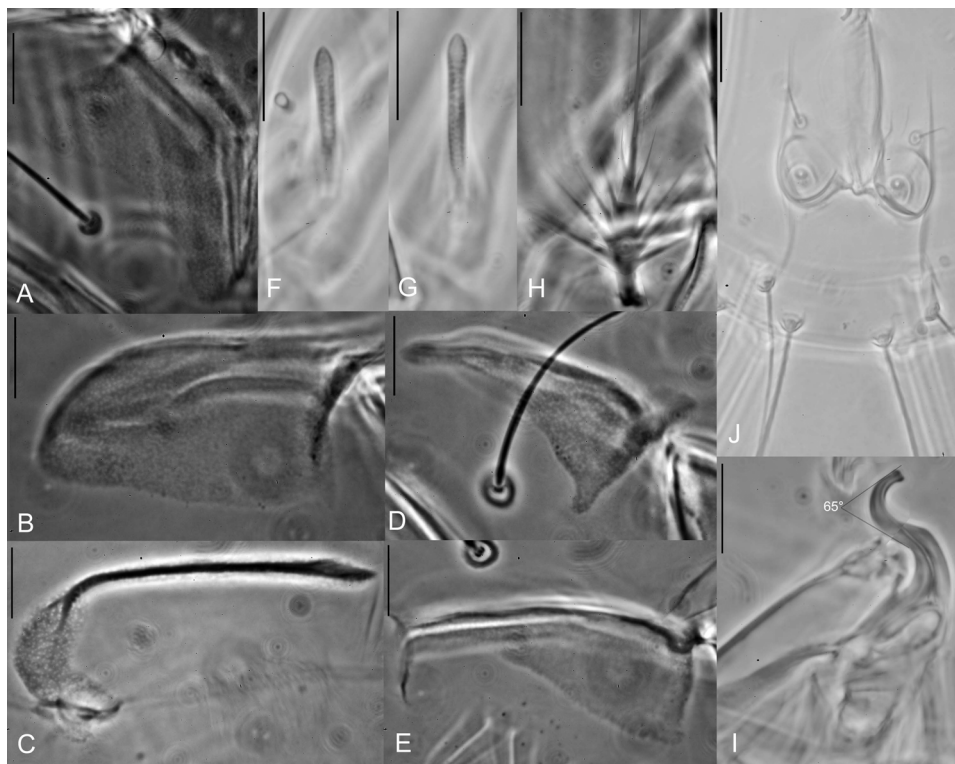
2. Oudemans (1906, p. 138) treated *Acarus putrescentiae* as a species 'indeterminabilia' and, based on the habitat similarity only, as potentially identical to *Tyroglyphus longior* Gervais, 1844 (where Oudemans placed many currently recognised *Tyrophagus* species). He later designated *Acarus putrescentiae* Schrank, 1781 as the type species of the subgenus, *Tyrophagus* Oudemans, 1924, in the genus *Tyroglyphus* Latreille, 1796 (Oudemans, 1924a, p. 250) (currently a junior synonym of *Acarus* Linnaeus, 1758). Subsequently, he clarified his concept of *Acarus putrescentiae*, again giving no evidence, except for the habitat preference, for its identity with Schrank's species (Oudemans, 1924b, p. XXIII). The identity of *Tyrophagus putrescentiae* sensu Oudemans was uncertain (Hughes, 1948, pp. 20–21; Robertson, 1946, p. 198; Vitzthum, 1929, p. 75; Zachvatkin, 1941, p. 99).

3. Robertson (1959, p. 157), in her revision of *Tyrophagus*, designated a neotype for *A. putrescentiae* from Oudemans's collection, choosing a male collected in humus by Oudemans in 1902 in the Netherlands. However, she figured and partially described *T. putrescentiae* based on specimens from England (Robertson, 1959, pp. 157–160, figs. 3, 6, 9, 12, 15, 18, 21, 35). In designating the neotype, Robertson gave no evidence that it was consistent with the original description. An application (Case Z.N.(S.)1450) to the Commission to place *putrescentiae* Schrank, 1781 as defined by her neotype on the Official List was published in April 1981 (BZN 38: 125–129). In her reply to criticism from some members of the Commission, she stated that 'there are no such [conflicting] characters debarring *putrescentiae* from such acceptance [as a species of *Tyrophagus*]' (BZN 42: 124–126 (June 1985)), although the numerous leg setae and the free palps protruding from the gnathosoma clearly indicate that Schrank's mite specimen (Schrank, 1776, Fig. 28) does not even belong to Astigmata. The Commission, however, approved the proposal in Opinion 1298 (BZN 42: 124–126 (June 1985)). Robertson's taxonomic concept of *T. putrescentiae* was universally followed thereafter.

4. Fan & Zhang (2007, p. 21) discovered that Robertson's concept of *T. putrescentiae* included two closely related species, one common and one rare, and that the neotype represented the rare species. For the common species, Fan & Zhang (2007, p. 18) proposed a new name, *Tyrophagus communis* Fan & Zhang, 2007, without considering previously described taxa.

5. The authors (Klimov & OConnor, 2009, pp. 101–107) showed that *Tyrophagus communis* was identical with eight previously described taxa with extant types: *Tyrophagus americanus* (Banks, 1906); *T. breviceps* (Banks, 1906); *T. cocciphilus* (Banks, 1906); *T. castellanii* (Hirst, 1912); *T. australasiae* (Oudemans, 1916) (tentative synonymy); *T. neotropicus* (Oudemans, 1917); *T. amboinensis* Oudemans, 1925; *T. nadinus* (Lombardini, 1944). Ten additional taxa possibly identical to this species, including *Coelognathus morsitans* Hessling, 1852, *Tyroglyphus lintneri* Osborn, 1893, and *Tyroglyphus ananas* Tryon, 1898, were treated as species inquirendae, because their types could not be located (Klimov & OConnor, 2009, pp. 108–109).

6. An extensive survey showed that the common species, under the name *T. putrescentiae*, was involved in the majority of studies published during the past 20 years. The rare species was involved in only one of 31 published studies (14 authors) (Klimov & OConnor, 2009, Table 3, p. 99). Commercially available cultures and DNA sequence data from GenBank (Klimov & OConnor, 2009, Table 2, p. 98) were also



**Fig. 1.** *Tyrophagus putrescentiae* (Schrank, 1781) – proposed neotype (UMMZ BMOC 08–1010–002–1). A–B, D–E – anterior coxal sclerotisation I–IV, respectively; C – posterior coxal sclerotisation II; F–G – solenidion  $\omega_1$ , I–II, respectively; H – supracoxal seta (*sex*), I – aedeagus; J – anus and anal suckers; D – total view of the slide with labels. Scale bar = 10  $\mu\text{m}$  (A–I), 20  $\mu\text{m}$  (J). Figures 1B, H, I are reproduced from *International Journal of Acarology*, with permission.

studied. There are hundreds of studies on *T. putrescentiae* and thousands of DNA sequences in GenBank (Klimov & OConnor, 2009, Table 1, p. 97); unfortunately, not all authors involved preserved vouchers for their studies or responded to our inquiries.

7. Changes resulting from the work of Fan & Zhang (2007) not only impose maximal disruption on the stability of nomenclature of *Tyrophagus*, one of the most common and intensively studied group of mites, but they are also in a position to jeopardise numerous applied studies in the fields of allergology, molecular biology, agriculture, and stored product research, employing *T. putrescentiae* as a model species. Under Article 75.6 of the Code, the authors investigated the possibility for a new neotype to conserve the prevailing usage of the name *T. putrescentiae*, including specimens from both Oudemans's and Robertson's collections (Klimov & OConnor, 2009, p. 100). Because no single specimen displaying all diagnostic characters of the common species could be found in these collections, a potential neotype with the following data was suggested: 'male – Czech Republic, Buštěhrad, grain store, April 1996 (UMMZ BMOC 08–1010–002)' in the University of Michigan, Museum of Zoology. The rationale for this is that the collection locality is close to the original type locality, specimens from the culture are available for gene sequencing and breeding experiments (a live culture from which this

specimen was obtained is maintained in the Crop Research Institute, Czech Republic), and eight published papers have been based on specimens from this culture. This specimen was described and illustrated along with other specimens from the same culture (Klimov & OConnor 2009, p. 109, figs. 1a–h, 2a–h, 3a–h, 4a, b, f, g). For the rare species, the authors proposed a new name, *Tyrophagus fanetzhangorum* Klimov and OConnor, 2009 (Klimov & OConnor, 2009, p. 109, figs. 1i–l, 2a–j, 3i–l, 4c–e, h).

8. The International Commission on Zoological Nomenclature is accordingly asked:

- (1) to use its plenary power to set aside all previous type fixations for the nominal species *putrescentiae* Schrank, 1781, as published in the binomen *Acarus putrescentiae*, and to designate specimen BMOC 08–1010–002–1 at the University of Michigan, Museum of Zoology as the neotype;
- (2) to amend the entry on the Official List of Specific Names in Zoology for the name *putrescentiae* Schrank, 1781, as published in the binomen *Acarus putrescentiae*, to record that it is re-defined by the neotype designated in (1) above.

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