Status and current composition of the soft scale insect genus *Toumeyella* (Hemiptera: Coccidae)

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Abstract: The genus *Toumeyella* is in the subfamily Myzolecaniinae of the Coccidae, and is part of the Toumeyella-group, which is composed of about 50 species and includes the genera *Akermes, Cyclolecanium, Megasaissetia, Neolecanium, Octolecanium, Pseudophilippia,* and *Toumeyella.* The genus *Toumeyella* is only known from the New World, from North America southwards to Central and South America. It is well represented in North America north of Mexico, with 11 described species. Two species are known from Brazil, two from Mexico, and one species from Cuba. Studies of various life stages of the *Toumeyella*-group by the authors have indicated several needed changes in the composition of this complex of species and have identified additional undescribed species of *Toumeyella* from North and Central America.

Key words: soft scale, taxonomy, biodiversity, Myzolecaniinae, *Toumeyella.*

Introduction

The soft scale insect genus *Toumeyella* was first proposed as a subgenus of *Lecanium* by Cockerell in 1895, with *Lecanium (Toumeyella) mirabile* as its type species. In 1901 Cockerell elevated it to generic rank (Cockerell & Parrott, 1901). The genus *Toumeyella* is in the subfamily Myzolecaniinae of the Coccidae, and is part of the Toumeyella-group, which is composed of about 50 species and includes the genera *Akermes, Cyclolecanium, Megasaissetia, Neolecanium, Octolecanium, Pseudophilippia,* and *Toumeyella* (Kondo & Williams, 2001).

As currently recognized, the genus *Toumeyella* is only known from the New World, from North America southwards to Central and South America. It is well represented in North America north of Mexico, with 11 described species. Two species are known from Brazil, two from Mexico, and one species from Cuba. Studies of various life stages of *Toumeyella* by the senior author and his students (Sheffer & Williams, 1990; Williams, 1993; Miller & Williams, 1995; Kondo & Williams, 2003) have indicated several needed changes in the composition of this complex of species and have identified additional undescribed species of *Toumeyella* from North and Central America.

Material and methods

Scalenet lists the following 18 species as belonging in the genus *Toumeyella*: *T. cerifera* Ferris; *T. cubensis* Heidel and Kohler; *T. erythrinae* Kondo & Williams; *T. lignumvitae* Williams; *T. liriodendri* (Gmelin); *T. lomagundiae* Hall; *T. mirabilis* (Cockerell); *T. nectandrae* Hemple; *T. obunca* De Lotto; *T. parvicornis* (Cockerell); *T. paulista* Hemple; *T. pini* (King); *T. pinicola* Ferris; *T. quadrifasciata* (Cockerell); *T. sallei* (Signoret); *T. sonorensis* Cockerell & Parrott; *T. turgida* (Cockerell); and *T. virginiana* Williams & Kosztarab (Ben-Dov *et al.*, 2007).

The two species of *Toumeyella* described from Africa (*T. obunca* and *T. lomagundi*) have little in common with the genus, and Kondo (2007) erected a new genus, *Hallicoccus*, to accommodate them.

The genus *Toumeyella* can be characterized by the following combination of characters: body of adult female convex to globular, often heavily sclerotized at maturity; submarginal tubercles absent; preopercular pores present and generally large; sclerotized crescent around anal plates present or absent; eyes absent; perivulvar and spiracular pores mostly with

5 loculi; ventral tubular ducts of one type, restricted to perivulvar region and posterior abdominal segments; anal plate setae 3-25 in number, usually less than 10 on each plate; antennae and legs greatly reduced; and spiracular setae 0-3 per group.

Following is an annotated listing of the 16 described species currently recognized in the genus *Toumeyella*, along with comments on the status of each.

***Toumeyella cerifera* Ferris – buttonbush scale**

Originally described from Agua Caliente, Mexico, on *Albizia occidentalis* (Fabaceae). The species subsequently collected from *Cephalanthus occidentalis* in several states in the United States and treated as *T. cerifera* by Williams and Kosztarab (1972), and Hamon and Williams (1984), is actually an undescribed species that is very close to *T. cerifera*.

***Toumeyella cubensis* Heidel and Kohler**

Originally described from Ceballos, Cuba, on *Citrus sinensis* (Rutaceae). Known only from Cuba on various species of *Citrus* (see comments under *T. lignumvitae*).

***Toumeyella erythrinae* Kondo and Williams – the erythrina scale**

Originally described from Mexico City, Mexico, on *Erythrina* sp. (Fabaceae). The erythrina scale is unusual in having antennae with up to 7 segments and an anal ring with 12-14 setae. A closely related, undescribed species, also collected on Erythrina, is known from Guatemala (Kondo & Williams, 2003).

***Toumeyella lignumvitae* Williams – lignumvitae scale**

Originally described from Lignumvitae Key, Florida, U.S.A., on *Guaiacum sanctum* (Zygophyllaceae). Slide mounted specimens of this species cannot readily be separated from *T. cubensis*. Lignumvitae scale is only known from Florida on the lignumvitae tree, it has never been collected on citrus, the common host of *T. cubensis*, even though citrus is a common host plant in Florida. Likewise, *T. cubensis* has not been collected on lignumvitae. I feel that they are likely different species, but more study is needed, particularly with the immatures and adult male.

***Toumeyella liriodendri* (Gmelin) – tuliptree scale**

Originally described from Europe on *Liriodendron tulipifera* (Magnoliaceae) imported from the United States. The tuliptree scale is probably the best known species of *Toumeyella*. It occurs in the eastern United States and California. The tuliptree scale is quite variable in form depending on the host plant. There is a yellow form that is frequently collected on some members of the Magnoliaceae (see comments under *T. turgida*).

***Toumeyella mirabilis* (Cockerell)**

Originally described from Tucson, Arizona, U.S.A., on *Prosopis juliflora* var. *glandulosa* (Leguminosae). *T. mirabilis* is the type species of the genus *Toumeyella.* It is known from Mexico and several western states in the U.S.A. This species is unusual in that it generally lacks differentiated spiracular setae, although some specimens will occasionally have a single thicker seta in the stigmatic area.

***Toumeyella nectandrae* Hempel**

Originally described from Parana, Jaguariahyva, Brazil, on *Nectandra grandiflora* (Lauraceae). Only known from Brazil.

***Toumeyella parvicornis* (Cockerell) – pine tortoise scale**

Originally described from Florida, U.S.A., on *Pinus taeda* and *P. australis* (Pinaceae). The pine tortoise scale is known from Canada, Mexico and the United States. It has both a bark and a leaf or needle form. The pine tortoise scale can be easily separated from all other species of *Toumeyella* by the dorsal bilocular pore aggregations.

***Toumeyella paulista* Hempel**

Originally described from Sao Paulo, Brazil, on *Nectandra* sp. (Lauraceae). Only known from the original collection.

***Toumeyella pini* (King) – striped pine scale**

Originally described from Ontario, Canada, on *Pinus austriaca* (Pinaceae). Known from Canada and the United States. The large conical preopercular pores in *T. pini* will readily separate it from all other species of *Toumeyella* on pine.

***Toumeyella pinicola* Ferris – irregular pine scale**

Originally described from San Mateo County, California, U.S.A., on *Pinus radiata* (Pinaceae). Only known from California in the United States.

***Toumeyella quadrifasciata* (Cockerell)**

Originally described from New Mexico, U.S.A., on *Robinia neomexicana* (Fabaceae). Known only from Arizona and New Mexico in U.S.A. and only on *Robinia neomexicana*.

***Toumeyella sallei* (Signoret)**

Originally described from Mexico on an undetermined tree. Only known from Mexico. This species was recently redescribed by Kondo & Williams (2003) who transferred this species from *Neolecanium*.

***Toumeyella sonorensis* (Cockerell & Parrott)**

Originally described from Hermosillo, Mexico, on *Beloperone californica* (Acanthaceae). Only known from Mexico. This is the only species in *Toumeyella* which has first instar nymphs with 6-segmented antennae. All other first instar *Toumeyella* have 5-segmented antennae. This may suggest that *T. sonorensis* may be sister to all other species in the genus, since 6-segmented antennae is the common number of antennal segments of most first-instar Coccidae, and 5-segmented antennae may be a derived character state.

***Toumeyella turgida* (Cockerell)**

Originally described from Lake City, Florida, U.S.A., on *Magnolia glauca* (Magnoliaceae). This species appears to be identical to tuliptree scale, *Toumeyella liriodendri*.

***Toumeyella virginiana* Williams & Kosztarab – Virginia pine scale**

Originally described from Clark County, Georgia, U.S.A., on *Pinus taeda* (Pinaceae). Known from the states of Alabama, Florida, Georgia, Louisiana, Maryland, and Virginia in the U.S.A., from several species of *Pinus*. The Virginia pine scale is unusual among the *Toumeyella* in having many dorsal setae (15-25) on each anal plate.

Results and discussion

As currently recognized, the soft scale insect genus *Toumeyella* contains 16 species. However, the authors are currently working on a revision of the genus *Toumeyella* and are aware of several undescribed species that belong in *Toumeyella*, including: one species commonly collected on *Cephalanthus occidentalis* (Naucleaceae) in the southeastern United States; two species found on various species of *Pinus* (Pinaceae), one from California and one from Colorado, in the U.S.; one species commonly collected on *Hypericum* spp. (Guttiferae) in the southeastern U.S.; one species from Guatemala on *Erythrina* spp. (Fabaceae); and two species from Mexico, one on *Byrsonima crasifolia* (Malphigiaceae), and the other on *Stenocereus dumortieri* (Cactaceae).

Additionally, several species currently placed in other genera actually should be transferred to *Toumeyella*. The genus *Neolecanium* is considered a junior synonym of *Toumeyella* because the type species *N. imbricatum* (Cockerell) is a *Toumeyella* (Kondo &

Williams, 2004). Currently there are 16 species included in *Neolecanium*, and most of these species are not congeneric with the type species *N. imbricatum* (=*Toumeyella sensu lato*). Only about seven of these species should be transferred to *Toumeyella,* and two belong in *Cryptostigma*. There are also two species that are currently placed in the genus *Mesolecanium* that belong in *Toumeyella*. When the revision of *Toumeyella* is completed and the undescribed species, and species that need to be transferred into the genus are included, the genus *Toumeyella* should number 20 plus species, and our understanding of the Toumeyella-group should be significantly improved.

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