

Description of a new species of *Toumeyella* Cockerell (Hemiptera, Coccidae) from Mexico, with a taxonomic key to Mexican species

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ABSTRACT. Description of a new species of *Toumeyella* Cockerell (Hemiptera, Coccidae) from Mexico, with a taxonomic key to Mexican species. A new species of soft scale insect from Mexico, *Toumeyella fontanai* Kondo & Pellizzari **sp. nov.** is described and illustrated. A taxonomic key to the species of scale insects of the genus *Toumeyella* Cockerell known in Mexico is provided.

KEYWORDS. *Acacia*; coccid; soft scales; *Toumeyella fontanai*.

RESUMO. Descrição de uma nova espécie de *Toumeyella* Cockerell (Hemiptera, Coccidae) do México e chave do gênero para as espécies mexicanas. Uma nova espécie de coccídeo do México, *Toumeyella fontanai* Kondo & Pellizzari **sp. nov.**, é descrita e ilustrada. Uma chave taxonômica para separar as espécies de cochonilhas do gênero *Toumeyella* Cockerell que ocorrem no México é fornecida.

PALAVRAS-CHAVE. *Acacia*; coccídeo; cochonilha; *Toumeyella fontanai*.

According to the scale insects database ScaleNet (Ben-Dov *et al.* 2010), currently there are 14 species of soft scale insects included in the genus *Toumeyella* Cockerell, which are distributed in Brazil (2 spp.), Cuba (1 sp.), Mexico (4 spp.) and the United States (9 spp.).

The four species of *Toumeyella* hitherto recorded from Mexico are: *T. erythrinae* Kondo & Williams, 2003 (Fig. 1A), *T. mirabilis* (Cockerell, 1895) (Fig. 1B), *T. parvicornis* (Cockerell, 1897) (Figs 1E & F) and *T. sallei* (Signoret, 1873) (no available photos).

Signoret (1873) described *T. sallei* based on a specimen sent to him from Mexico. The original description in French by Signoret was translated (Kondo & Williams 2004) as follows: "A species of monstrous size, which was collected in Mexico on an undetermined plant, and donated by M. Sallé. Its size is 2 cm long by 1.5 cm wide and 0.5 cm high. The insect is brownish with some pale shading, a bit yellow. It is rugose on the sides". These authors slide-mounted the large, pinned holotype specimen of *Neolecanium sallei* Signoret, redescribed and illustrated it based on cuticular morphology and transferred it from the genus *Neolecanium* Parrott to *Toumeyella* which they considered to be a senior synonym (Kondo & Williams 2004). The host of *T. sallei* is unknown.

The erythrina scale, *Toumeyella erythrinae*, is also a large species, which can grow up to 2.1 cm long and 2.0 cm wide, is a pest of *Erythrina coralloides* (Fabaceae), a common street tree in Mexico City, and was described by Kondo and Williams (2003) based on the adult female and first-instar nymph. The biology and damage caused by *T. erythrinae* was summarized by Kondo and Williams (2003).

Cockerell (1895) briefly described the Mesquite scale, *Toumeyella mirabilis* from specimens collected in Tucson (Arizona, USA), off *Prosopis juliflora* var. *glandulosa* (Fabaceae). Several years later, Ferris (1921) and Ferris & Kelly (1923) listed this species as present in some Mexican localities (Aguascalientes, Baja California Norte, Baja California Sur). *Toumeyella mirabilis* was redescribed by Hodgson (1994) based on non type-material collected in Arizona and Texas off *Prosopis* sp. and *Xanthocephalum* (Asteraceae).

The pine tortoise scale, *Toumeyella parvicornis* is a well known species, redescribed on a modern basis by Williams & Kosztarab (1972). It is associated with Pinaceae and is widely distributed, from Canada to Mexico (Williams & Kondo 2008). *Toumeyella parvicornis* has both a bark (Fig. 1E) and leaf form (Fig. 1F) (Hamon & Williams 1984; Williams & Kondo 2008) and occasionally it is damaging to pine seedlings and saplings (Hamon & Williams 1984).

On December 8, 2006, near Tlacotepec city (state of Puebla, Mexico), a single soft scale insect specimen was collected on a wild *Acacia* sp. (Fabaceae) growing in the maquis ("matorral" in Spanish) by the entomologist Paolo Fontana. The host plant was also infested by *Coccus longulus* (Douglas) (Fig. 1C & D). The insect was sent to the second author who slide-mounted the insect and recognized it as an undescribed species belonging to the genus *Toumeyella*. The specimen was later sent to the first author who confirmed its novelty, and prepared a description of the species. Here we describe the new species based on the adult female. Although we were reluctant to describe a new species based on a single specimen, the combination of morphological features of the

discovered insect justified the description of a new species, however, there is a risk that the specimen described here may not be representative of the species.

MATERIAL AND METHODS

The specimen was slide-mounted following the procedure described by Ben-Dov & Hodgson (1997). The terminology of morphological features follows mostly that of Hodgson (1994) and the illustration of the adult female (Fig. 2) shows the dorsum on the left and the venter on the right with enlargements of important features around the margin.

Specimen depository. CNIN: Instituto de Biología, Departamento de Zoología, Universidad Autónoma de México, Apartado Postal 70–153, Mexico city, D.F. 04510, Mexico.

RESULTS AND DISCUSSION

Genus *Toumeyella* Cockerell

Type-species: *Lecanium (Toumeyella) mirabile* Cockerell, 1895: 2.

Diagnosis (Adapted from Williams & Kosztarab 1972). Body of adult female convex to globular, often irregular in outline, naked or with thin glassy test. Dorsum. Derm heavily sclerotized at maturity. Dorsal tubercles absent. Unilocular or bilocular microducts present; aggregations of pores rarely present. Preopercular pores present, large. Anal plates with varying number of apical, subapical and fringe setae. Hypopygial setae present. Anal ring usually with 10 (rarely 12–14) setae. Margin. Marginal setae slender or stout, pointed or blunt but never frayed. Stigmatic setae present, 3 per stigmatic area, or completely absent. Venter. Antenna and legs greatly reduced. Legs without tibio-tarsal sclerotization. Quinquelocular pores usually present in spiracular furrows and also in vulvar and abdominal region. Tubular ducts confined to perivulvar area.

Taxonomic key to the *Toumeyella* species of Mexico based on the adult female (characters taken from Williams & Kosztarab 1972; Kondo & Williams 2003, 2004; Hodgson 1994)

1. With aggregations of 2–15 fused bilocular pores scattered over dorsum *Toumeyella parvicornis* (Cockerell)
- 1'. Without such aggregations of bilocular pores scattered over dorsum 2
2. Width of posterior spiracular peritreme about same length or longer than length of anal plates, anal ring with 12–14 setae *Toumeyella erythrinae* Kondo & Williams
- 2'. Width of posterior spiracular peritreme shorter than length of anal plates, anal ring with 10 setae 3
3. Antennae 7 segmented. Spiracular pore bands narrowing from each spiracle to spiracular cleft, less than 5 pores wide near body margin *Toumeyella fontanai* Kondo & Pellizzari, **sp. nov.**

- 3'. Antennae usually 6 segmented. Spiracular pore bands widening broadly from each spiracle to spiracular cleft, about 30–50 pores wide near body margin 4
4. Spiracular clefts present, well developed; spiracular setae well differentiated from marginal setae, numbering 3 per spiracular cleft *Toumeyella sallei* (Signoret)
- 4'. Spiracular clefts absent; spiracular setae absent or not differentiated from marginal setae *Toumeyella mirabilis* (Cockerell)

Toumeyella fontanai Kondo & Pellizzari, **sp. nov.**

Proposed common name: English: Fontana's soft scale. Spanish: Escama blanda de Fontana.

Material studied. Holotype: adult female (CNIN). Type-locality: Mexico, state of Puebla, Cacaloapan, 11km SW Tlacotepec city, 1890m asl, 18°36'23.1"N, 097°35'55.3"W, 8.xii.2006, coll. P. Fontana, ex *Acacia* sp.

Description. Adult female (Figs. 1C, D & 2).

Unmounted material (Fig. 1C & D). Body round in shape, posterior end elevated, 2.8 mm at highest point. Derm grayish brown in color, with a pinkish cream narrow submarginal band; dorsum with a pinkish cream colored V-shaped elevation, with outer sides of elevation deeply depressed. Insect in life 5.2 mm long and 5.2 mm wide.

Mounted material. (Fig. 2) Body outline oval, body 5.7 mm long, 5.8 mm wide.

Dorsum. Derm membranous. Dorsal setae bluntly to sharply spinose, straight or slightly curved, each 20–33 µm long, scattered evenly. Dorsal microducts each about 5 µm wide, with a long terminal filament, evenly scattered. Simple pores each 5–6 µm wide, evenly scattered. Preopercular pores numerous, present in a rather dense mid-dorsal line extending from area anterior to anal plates to head near margin, and also scattered throughout most of dorsum, but absent from margin and submargins, each pore 7.5–13.0 µm wide. Dorsal tubular ducts, dorsal tubercles and pocket-like sclerotizations absent. Anal plates together quadrate, with rounded angles, plates located about 1/4 of body length from posterior margin, each plate 250–255 µm long, 130–135 µm wide, anterolateral margin 150–155 µm long, posterolateral margin 220–225 µm long, with 3 apical setae on posterior inner margin, plus 1 pair of long fringe setae, about 5 ventral subapical setae and numerous hypopygial setae. Anal ring with 10 setae (not illustrated). A sclerotic area present around anal plates.

Margin. Marginal setae bluntly to sharply spinose, straight to slightly bent, each 25–43 µm long, arranged in a single irregular row, with 8–10 on each side between anterior and posterior stigmatic areas. Stigmatic clefts shallow, with 3 stigmatic setae per stigmatic area, median seta longest, 47–55 µm long, lateral setae each 14–28 µm long. Eyes not detected.

Venter. Derm entirely membranous. Pregenital disc-pores each 7–9 µm wide, mostly with 5 loculi (range 3–6), present around vulvar area and in a submedial line between vulva and posterior spiracle on each side. Spiracular disc-pores mostly

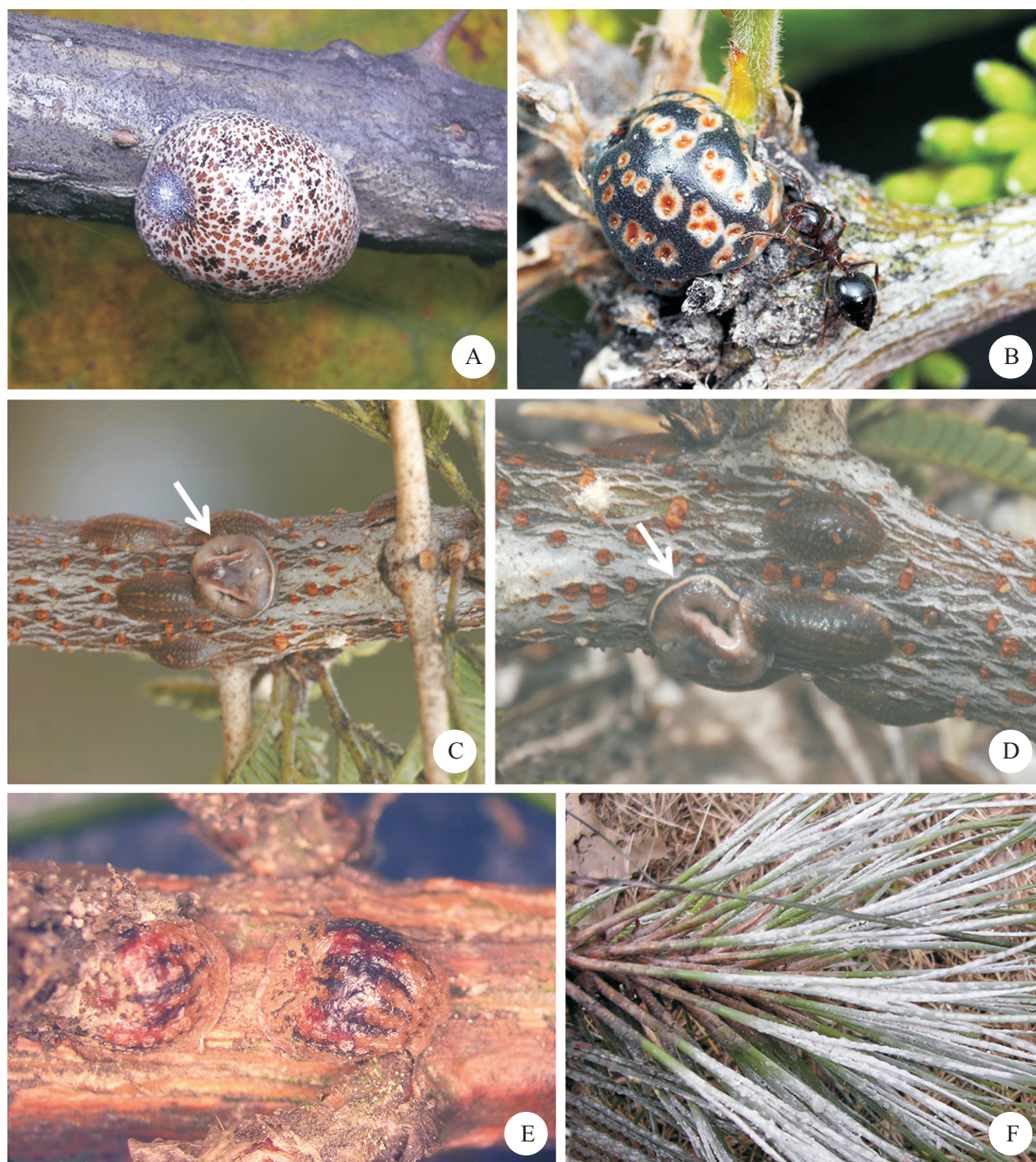


Fig. 1. (A) *Toumeyella erythrinae* Kondo & Williams on *Erythrina collaroides* (Mexico City, Mexico). (B) *Toumeyella mirabilis* (Cockerell) on *Prosopis juliflora* (Arizona, USA). (C) *Toumeyella fontanai* Kondo & Pellizzari (see arrow) surrounded by *Coccus longulus* (Douglas) on twig of Acacia tree. (D) Side view of *T. fontanai* (see arrow) showing a large side depression. Notice grayish-pink submarginal band. (E-F) *Toumeyella parvicornis* (Cockerell) (Alabama, USA): (E) bark form, (F) leaf form. Photos 1A, E, F by T. Kondo, 1B by Alex Wild, and 1C & D by P. Fontana.

with 5 loculi (range 3–8), each pore 6.3–9.5 μm wide, present in a broad band as wide as peritremes, extending laterally from each spiracle to body margin, pore band narrowing near margins. Ventral microducts scattered evenly throughout, each about 5 μm wide. Ventral tubular ducts present around vulvar region, each tubular duct with an inner filament ending in a

small gland. Ventral setae slender, straight or slightly bent, each 15–28 μm long; with 3 pairs of long median setae, each 47–65 μm long on pregenital segments and 2 pairs of interantennal setae. Spiracles well developed, large, anterior spiracular peritremes each 175 μm wide, posterior peritremes each 195 μm wide. Legs greatly reduced, but most segments

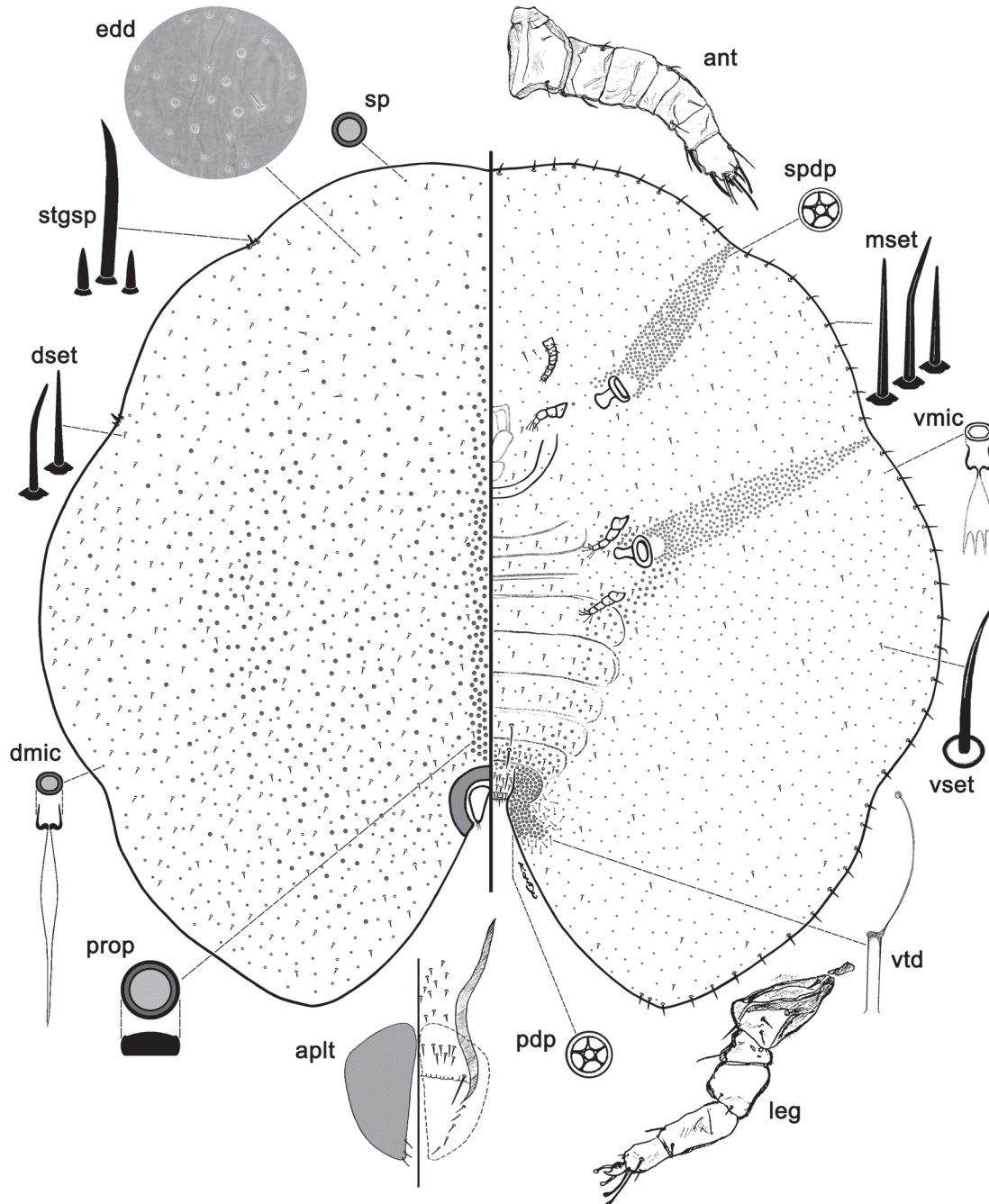


Fig. 2. *Toumeyella fontanai* Kondo & Pellizzari, adult female. Abbreviations as follows: aplt = anal plate; ant = antenna; dmic = dorsal microduct; dset = dorsal setae; edd = enlargement of dorsal derm; mset = marginal setae; pdp = pregenital disc-pore; prop = prepercular pores; sp = simple pore; spd = spiracular disc-pore; stgsp = stigmatic spine; vmic = ventral microduct; vset = ventral setae; vtd = ventral tubular duct.

usually discernible, with trochanter and femur, and tibia and tarsus fused, all segments with few setae; metathoracic legs shortest; total length of all legs: each 150–335 μm long; coxa 78–128 μm long, trochanter + femur 88–110 μm long, tibia + tarsus 118–133 μm long, claw 17.5–22.5 μm long; claws with a small denticle, claw digitules, slender, knobbed; tarsal digitules knobbed or spiniform. Antennae short, each 260–265 μm long, 7 segmented, with fleshy setae present on last two antennal segments. Mouthparts missing on specimen.

Etymology. The species is named in homage to Paolo Fontana, entomologist, who collected the insect.

DISCUSSION

The status of the genus *Toumeyella* was summarized by Williams & Kondo (2008), who listed 16 species. Two of them (namely *T. cerifera* Ferris and *T. sonorensis* Cockerell & Parrott) were later transferred to the genus *Neotoumeyella*

(Kondo & Williams 2009). With the description of *T. fontanai* **sp. nov.**, the number of species in the genus *Toumeyella* increases to 15 species worldwide and to 5 in Mexico.

The genus *Toumeyella* has a wide distribution in the New World, with most species being described from the USA, suggesting that many more new species should be found in Mexico and other countries in the Nearctic and Neotropical Regions.

With regard to the host plants, *Toumeyella* species are mostly oligophagous, usually being recorded off members of one or very few families. The Mexican *Toumeyella* species have been collected off Fabaceae (*T. erythrinae*, *T. mirabilis* and *T. fontanai*), and Pinaceae (*T. parvicornis*); the host plant of *T. sallei* is unknown.

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REFERENCES

- Ben-Dov, Y.; D. R. Miller & G. A. P. Gibson. 2010. ScaleNet: a database of the scale insects of the world. Available from: <http://www.sel.barc.usda.gov/scalenet/scalenet.htm> (accessed July 2010).
- Ben-Dov, Y. & C. J. Hodgson. 1997. Collecting and mounting, p. 389–395. *In*: Y. Ben-Dov & C. J. Hodgson (eds.), **World Crop Pests. Soft Scale Insects, Their Biology, Natural Enemies and Control**. Amsterdam, Elsevier, vol. 7A, 452 p.
- Cockerell, T. D. A. 1895. New scale-insects from Arizona. **Bulletin Arizona Agricultural Experiment Station** 14: 56.
- Ferris, G. F. 1921. Report upon a collection of Coccidae from Lower California. **Stanford University Publications, Biological Sciences. Palo Alto** 1: 61–132.
- Ferris, G. F. & J. B. Kelly. 1923. XIV Expedition of the California Academy of Sciences to the Gulf of California in 1921. Some Coccidae from about the Gulf of California. **Proceedings of the California Academy of Sciences** 12: 315–318.
- Hamon, A. B. & M. L. Williams. 1984. **The soft scale insects of Florida (Homoptera: Coccoidea: Coccidae)**. Arthropods of Florida and Neighboring Land Areas. Gainesville, Fla. Dept. of Agric. & Consumer Serv. Div. Plant Ind., 194 p.
- Hodgson, C. J. 1994. **The scale insect family Coccidae: an identification manual to genera**. Wallingford, CAB International, 639 p.
- Kondo, T. & M. L. Williams. 2003. A new species of *Toumeyella* (Hemiptera: Coccoidea: Coccidae) on *Erythrina* in Mexico. **TIP Revista Especializada en Ciencias Químico-Biológicas** 6: 11–15.
- Kondo, T. & M. L. Williams. 2004. Redescription of the soft scale insect *Toumeyella sallei* (Signoret), new combination (Hemiptera: Coccidae: Myzolecaniinae). **Annalen Naturhistorischen Museums in Wien** 105 B: 211–215.
- Kondo, T. & M. L. Williams. 2009. Redescriptions of *Neolecanium leucaenae* Ckll., *Toumeyella cerifera* Ferris and *T. sonorensis* Ckll. & Parrott and their transfer to *Neotoumeyella* gen. nov. (Hemiptera: Coccidae), with descriptions of two new species from the Southwestern U.S.A. and Colombia, South America. **International Journal of Insect Science** 2: 11–27.
- Signoret, V. 1873. Essai sur les cochenilles ou gallinsectes (Homoptères – Coccides), 11e partie. **Annales de la Société Entomologique de France (série 5)** 3: 395–448.
- Williams, M. L. & T. Kondo. 2008. Status and current composition of the soft scale insect genus *Toumeyella* (Hemiptera: Coccidae), p. 29–32. *In*: Branco, M.; Franco, J. C. & Hodgson, C. J. (Editors), **Proceedings of the XI International Symposium on Scale Insect Studies, Oeiras, Portugal, 24–27 September 2007**. Lisbon, ISA Press, 322 p.
- Williams, M. L. & M. Kosztarab. 1972. Morphology and systematics of the Coccidae of Virginia with notes on their biology (Homoptera: Coccoidea). **Research Division Bulletin, Virginia Polytechnic Institute and State University** 74, 215 p.