

A THIRD SPECIES OF *TOXOPTERELLA* HILLE RIS
LAMBERS (HOMOPTERA: APHIDIDAE)
FROM NORTH AMERICA

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In 1960¹ I described as new genus and species *Toxopterella canadensis* from *Crataegus*. In 1955 G. A. Bradley had submitted alatae of an aphid that was recognized as undescribed and belonging to an unknown genus for which the reference name *Sorbobium drepanosiphoides* was suggested to Dr. Bradley. In 1961² this insect was described as *T. (Sorbobium) drepanosiphoides* by MacGillivray and Bradley. Because in 1960 only alates of the latter species were known I certainly did not realize that *canadensis* was congeneric with *drepanosiphoides*.

Professor C. F. Smith recently sent me fundatrices, larvae and alatae of a remarkable aphid for identification, and later kindly asked me to describe it.

Toxopterella smithi n. sp.

FUNDATRIX (from 8 specimens): Body very broadly oval, about 3.00-4.00 mm. long. Tergum rather thickly membranous with a very dense pattern of irregular angular warts on the middle of the body, each with some slender, blunt spinules, more laterally and also ventrally with pointed to flat-topped warts. Integumentum faintly pigmented. Very dark intersegmental sclerites present as in the fundatrix of *T. (S.) drepanosiphoides*. Hairs in two very different shapes; frontal hairs very thin and wavy, about 0.050 mm. long, but hairs on vertex only 0.009 mm. long, but not blunt; middle of dorsum (spinally and pleurally) with very few acute and stiff hairs 0.013-0.030 mm. long, but marginally on tergites I-V, pleurally and marginally on tergite VI and all over tergites VII and VIII very large number of very long and fine hairs present about 0.070-0.080 mm. long, similar to the ventral hairs; VIIth abd. tergite between the stigmata with some 50 or more hairs. Marginal tubercles absent. Head with slightly concave front, dorsally and ventrally densely covered with blunt nodules. Antennae about half as long as body, densely bluntly imbricated, rather pale with the apex of Vth segment and the whole VIth segment very dark; IIIrd segment often with two types of hairs of which the rather numerous short ones are about half as long as the diameter of the segment at its strongly constricted base, while a few fine and long ones are about equal in length to that diameter; the other segments with short hairs only; processus terminalis conspicuously tapering and pointed; primary rhinaria normal and rather small. Rostrum not reaching the middle coxae; ultimate segment blunt, about as long as the second joint of the small hind tarsi, provided with only 0-2 hairs besides the three subapical pairs of hairs. Siphunculi

¹Hille Ris Lambers, D. 1960. Some new genera and species of aphids from Canada (Homoptera: Aphididae). Can. Ent. 92: 251-265.

²MacGillivray, M. E., and G. A. Bradley. 1961. A new subgenus and species of *Toxopterella* Hille Ris Lambers (Homoptera: Aphididae), from Sorbus. Can. Ent. 93: 999-1005.

jet black, rather cylindrical on basal half, from the middle slightly and gradually tapering to the small, bulging flange, about 1/6th-1/5th the length of the body, somewhat curved inwards on distal half, very densely and rather acutely imbricated. Cauda faintly constricted at the very base and strongly tapering to a point from basal 1/3rd; blackish, less than 1/5th of the siphunculi and with a rather large number of hairs that can not be counted in the available specimens. Legs short with brownish femora and pale tibiae, all of which have dark apical portions, while the generally darker hind tibiae also have the base darkish; femora densely covered with transverse rows of spinules and with numerous very long, fine hairs; tibiae smooth except dorsally near base, the fore tibiae with rather spiny hairs resembling the short type of antennal hairs, the middle tibiae, especially on basal half, with long and fine hairs which are gradually replaced by shorter and shorter spiny hairs towards apex and dorsally; but the hind tibiae on basal half on three sides with long, fine, wavy hairs and only on distal 1/3rd with spiny hairs; on the caudal side of the hind tibiae about 12-19 very short and stout sound pegs placed over about 3/4ths of the length of the tibiae, not all in a row; sound pegs varying from blunt to bifid and becoming slightly longer (up to 0.009 mm.) more distad. First tarsal joints all with two rather short hairs.

TABLE I. FUNDATRICES*

| No. | Length body | Ant. | Siph. | Cau. | Ant. segments | | | |
|-----|----------------|------|-------|------|---------------|------|------|-------------|
| | | | | | III | IV | V | VI |
| 1 | 3.09 | 1.64 | 0.60 | ? | 0.36 | 0.31 | 0.28 | 0.18 + 0.32 |
| 2 | 3.21 | 1.71 | 0.65 | ? | 0.40 | 0.32 | 0.30 | 0.19 + 0.32 |
| 3 | 3.32 | 1.78 | 0.61 | 0.12 | 0.41 | 0.31 | 0.33 | 0.20 + 0.34 |
| 4 | 3.47 | 1.65 | 0.64 | 0.11 | 0.40 | 0.30 | 0.28 | 0.17 + 0.31 |
| 5 | 3.40 | 1.79 | 0.62 | 0.12 | 0.41 | 0.33 | 0.30 | 0.18 + 0.34 |
| 6 | 3.45 | 1.87 | 0.65 | 0.11 | 0.40 | 0.35 | 0.31 | 0.21 + 0.39 |
| 7 | 3.85 | 1.62 | 0.62 | 0.12 | 0.44 | 0.28 | 0.27 | 0.17 + 0.29 |

* Measurements in mm.

ALATE VIVIPAROUS FEMALE (from 35 specimens): Body much smaller, only about 1.75-2.05 mm. long. Head and thorax blackish sclerotic; abdomen with rather small, nodulose marginal sclerites, with rather narrow, smooth spino-pleural transverse bars of which the one on 1st abd. tergite, if well developed, is on posterior half of the tergite (with the hairs either cephalad of that bar on sclerites, or these sclerites fused with the bar), while the more caudad ones are more on the middle of the tergites; these bars often interrupted or much corrugated and perforated; all the abdominal sclerites brown, rather pale. All dorsal hairs short and acute, about 0.008-0.009 mm. long, very scarce except on the marginal sclerites which each have 8-14 hairs; even ventral hairs short, 0.008-0.016 mm. long. Head smooth; front sinuated, the antenniferous tubercles not higher than the middle of the front. Antennae about as long as body, uniformly brown; segments I and II nodulose imbricated especially on the underside, flagellum

normally imbricated; segments III-V with strongly transversely oval, much protruding, rather large rhinaria all over the segments, which consequently have a very irregular outline; IIIrd segment with strongly constricted, scabrous base and about 25-42 rhinaria; IVth segment with some 16-24 rhinaria; Vth with 9-20 secondary rhinaria, all smaller than its strongly transverse primary rhinarium; for interrelation of segmental lengths vide measurements. Antennal hairs like those on dorsum. Last rostral segment with two hairs besides the subapical pairs. Siphunculi from 1/6th to just over 1/5th of the length of the body, nearly cylindrical with suddenly widened very base, dark, especially at base, in the middle just thicker than basal 1/3rd part of the hind tibiae, markedly curved outwards and downwards at basal 1/3rd part, crenulated, and only near apex slightly imbricated, with trumpet-like, swollen, small flange. Cauda dark, only about 1/4th of the siphunculi, about semi-oval but somewhat pointed and faintly constricted at base, with some 8-11 rather short and stiff, often blunted hairs. Subanal plate more or less pointed. Subgenital plate with many hairs on its disc. Femora spinulose imbricated on distal half, especially ventrally; tibiae smooth, the hind tibiae with their caudal side conspicuously convex on basal half, concave on distal half; all hairs on the legs rather uniform, short and spiny, and no trace of sound pegs visible; first tarsal joints all with a pair of very short and inconspicuous hairs, the fore and middle legs besides with one conspicuous spiny hair of more than twice the length of the tiny lateral hairs (3, 3, 2). Wings with the media only once furcated.

NYPHS: Alatoid nymphs, until last instar agreeing closely with the fundatrix in structure of the integumentum and in chaetotaxy, i.e., marginally and ventrally on the body the numerous hairs are fine, long and wavy, spinally and partly pleurally they are short and spiny. Antennae as in the fundatrix with a few long hairs on IIIrd segment. Siphunculi with innerside convex, outerside less markedly concave (like X-legs). Hind tibiae very spinulose over nearly their whole length; with sound pegs as in fundatrix.

Nymphs inside alate migrants on the spinulose hind tibiae with four acute sound pegs that look like very short normal tibial hairs.

NOTES

This aphid can easily be distinguished from both *T. canadensis* H.R.L. and *drepanosiphoides* MacGill. and Bradley, as far as the alatae are concerned. They key as follows:

- 1 (2) Primary rhinaria on Vth ant. segment at least three times as large as the secondary rhinaria. First tarsal joints of all the legs only with two very short hairs. On *Crataegus* sp. . . *T. canadensis* H.R.L.
- 2 (1) Primary rhinaria on Vth ant. segment at most twice as large as the secondary ones. First tarsal joints of fore and middle legs with one very stout, spiny hair besides the two very small lateral hairs . . . 3
- 3 (4) Siphunculi on basal half very conspicuously swollen like a calve and on innerside markedly imbricated. Ventral hairs on VIth abd. sternite up to 0.043 mm. long. First tarsal joints of hind legs usually

TABLE II. ALATE VIVIPARIAE*

| No. | Length body | Ant. | Siph. | Cau. | Ant. III | segments | | | Rhin. on segment | | |
|-----|----------------|------|-------|------|-------------|----------|------|-------------|------------------|---------|---------|
| | | | | | | IV | V | VI | III | IV | V |
| 1 | 1.81 | 1.76 | 0.32 | 0.08 | 0.34 | 0.26 | 0.31 | 0.15 + 0.49 | 32 & 33 | 16 & 18 | 11 & 11 |
| 2 | 1.84 | 1.79 | 0.38 | 0.09 | 0.39 | 0.28 | 0.33 | 0.17 + 0.50 | 25 & 31 | 22 & 19 | 13 & 12 |
| 3 | 1.83 | 1.89 | 0.39 | 0.09 | 0.45 | 0.31 | 0.34 | 0.18 + 0.46 | 32 & 34 | 20 & 22 | 15 & 13 |
| 4 | 1.83 | 1.83 | 0.38 | 0.09 | 0.44 | 0.31 | 0.32 | 0.17 + 0.44 | 33 & 36 | 21 & 18 | 9 & 12 |
| 5 | 1.77 | 1.80 | 0.37 | 0.09 | 0.41 | 0.29 | 0.33 | 0.17 + 0.46 | 30 & 34 | 19 & 20 | 12 & 11 |
| 6 | 1.77 | 1.80 | 0.36 | 0.09 | 0.43 | 0.28 | 0.32 | 0.18 + 0.46 | 28 & 30 | 19 & 20 | 14 & 11 |
| 7 | 1.86 | 1.73 | 0.37 | 0.09 | 0.46 | 0.29 | 0.33 | 0.17 + 0.48 | 32 & 34 | 19 & 19 | 12 & 12 |
| 8 | 1.87 | 1.77 | 0.36 | 0.09 | 0.43 | 0.28 | 0.32 | 0.18 + 0.43 | 31 & 31 | 20 & 22 | 20 & 12 |
| 9 | 1.74 | 1.72 | 0.34 | 0.09 | 0.40 | 0.28 | 0.30 | 0.16 + 0.45 | 28 & 31 | 18 & 16 | 9 & 12 |
| 10 | 1.90 | 1.87 | 0.37 | 0.09 | 0.45 | 0.31 | 0.32 | 0.17 + 0.47 | 28 & 33 | 20 & 18 | 13 & 13 |
| 11 | 1.79 | 1.80 | 0.30 | 0.09 | 0.43 | 0.30 | 0.32 | 0.19 + 0.43 | 33 & 34 | 19 & 20 | 12 & 11 |
| 12 | 1.92 | 1.80 | 0.37 | 0.09 | 0.42 | 0.29 | 0.32 | 0.20 + 0.44 | 25 & 30 | 21 & 18 | 11 & 12 |
| 13 | 1.74 | 1.86 | 0.37 | 0.09 | 0.43 | 0.30 | 0.33 | 0.16 + 0.50 | 35 & 42 | 24 & 21 | 14 & 16 |

* Measurements in mm.

with three hairs. IIIrd ant. segment with 32-53 rhinaria, IVth with 19-38, Vth with 10-28 rhinaria. On *Sorbus* spp.

. *T. drepanosiphoides* MacGill. and Bradley

- 4 (3) Siphunculi not at all swollen on basal half, approximately smooth to slightly crenulated with only near apex some reticulations. Ventral hairs on VIth abd. sternite only about 0.020 mm. long. First tarsal joints of hind legs with normally two very inconspicuous hairs. IIIrd ant. segment with about 25-42 rhinaria, IVth with 16-24, Vth with 9-20 rhinaria. On *Pirus angustifolia*. . . . *T. smithi* n. sp.

It will be realized that with the discovery of this species the differences between *Toxopterella* proper and its subgenus *Sorbobium* MacGill. and Bradley have become insignificant. The only important difference was in the number of hairs on the first tarsal joints in alatae but this character is not a reliable one for generic or subgeneric distinction. The presence of sound pegs on the hind tibiae of alatae of the genotype and their absence in *Sorbobium* can hardly be considered significant; if in *T. canadensis* I had not known that the fundatrix had sound pegs I would never have recognized them in the alatae. The new species has the media in the fore wings only once branched but for the rest shows all the characters that MacGillivray and Bradley describe for *Sorbobium*. Therefore I believe that *Sorbobium* can better be dropped as a subgenus of *Toxopterella* as no good reasons are left for keeping it separate.

As additional characters for the genus *Toxopterella* I would like to add: Processus terminalis characteristically pointed. Secondary rhinaria conspicuously transversely oval. If three hairs on the first tarsal joints are present, then the middle hair very much longer than the two lateral hairs. Fundatrices with at least some dorsal hairs that are long and wavy and very different from the dorsal hairs in alatae. Media in the fore wings twice branched with the second branch rather close to the margin of the wing, or once branched.

The generic position of *Toxopterella* is rather clear. There is only a very small number of Aphidine genera with a pointed processus terminalis and these genera are all associated with mosses. They all have the same type of cauda, the same kind of secondary rhinaria and quite frequently extraordinary scabrous hind tibiae in all nymphs.

LIFE HISTORY: Professor Smith permits me to record his notes on this aphid which makes tight, deep-red leaf curls on *Pirus angustifolia* Ait. "On 2-VI-1961 there was only one large blackish aphid per leaf; no nymphs were present. The leaves were curled longitudinally and usually only one side of the leaf showed any symptoms of curling. Veins on the curled portion turned reddish-purple. Ants were attending the aphids. On 15-VI nymphs were present. On 1-VII the apterae were very dark brownish-black with a purple tinge. The nymphs were reddish and were developing wing-pads. On 8-VII alates were very abundant. They were reddish with darker bars on the abdomen. It is interesting to note that the nymphs leave the curled leaves before making the last molt. Never did I see an alate inside a curled leaf. They were always on the outside; all of the nymphs developed into alatae." Although the part of the life cycle of the *Toxopterella* species that is known points undoubtedly to host alternation, the secondary host plants as yet are unknown, but the morphology suggests that

in summer the aphids live in very moist surroundings near or below ground level.

HOLOTYPE: Alate viviparous female, Laurel Springs, North Carolina, 2-VI-1961, on *Pirus angustifolia* Ait., leg. C. F. Smith 61-134. In the U. S. Nat. Museum, Washington, D. C. **Paratypes:** 8 fundatrices, host plant and locality as in holotype, 2-VI-1961, leg. C. F. Smith 61-67; 34 alatae, host plant and locality as in holotype, 1-VII and 8-VII-1961, leg. C. F. Smith, 61-124 and 61-134, respectively. In the collection of Professor C. F. Smith, Raleigh, N. C., and in the author's collection.