

SMITHSONIAN INSTITUTION
U. S. NATIONAL MUSEUM

Vol. 103

Washington : 1953

No. 3316

BITING MIDGES OF THE HELEID GENUS *STILOBEZZIA* IN
NORTH AMERICA

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Stilobezzia Kieffer, 1911, is a rather large, widespread genus of predaceous midges which has reached its greatest development in the warmer parts of the New World. For North America 11 species are listed in Johannsen's recent list (1943b); this total is now raised to 18 by the present new records and species, and no doubt many more await discovery. The species of *Stilobezzia* are rather easily characterized, and all the Nearctic species known to Johannsen were correctly placed by him, with the exception of *S. uncinata* Johannsen, 1943, which I believe to represent the female of *Parabezzia petiolata* Malloch, 1915.

The types of the species described here are in the U. S. National Museum, the collections of which furnished the bulk of the material studied. I am indebted to Dr. Henry K. Townes, of North Carolina State College, for the loan of specimens from his collection, and to Mrs. Elisabeth C. Beck and J. A. Mulrennan, of the Florida State Department of Health, for their kindness in sending a large series of light trap collections from which I sorted most of the Florida specimens.

Family HELEIDAE

Genus *Stilobezzia* Kieffer, 1911

Diagnosis.—Body rather slender and nearly bare. Eyes bare. Female antenna with segments 3–10 oval, 11–15 long and cylindrical;

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male antenna with well-developed plumes. Mesonotum usually with few or no long bristles; humeral pits present but usually inconspicuous. All legs slender; femora without spines or (in *Eukraiohelea*) with a few on forelegs; basitarsus and fifth segment with or without ventral spines; fourth segment cordiform, fifth not enlarged; female claws large and very unequal or a single long claw with basal barb on each leg, male claws small and equal; empodium absent. Wing rather long; microtrichiae present; macrotrichiae present toward tip (in *Neostilobezzia*) or absent; costa extending to two-thirds wing length or more; usually two radial cells, second much larger than first, which may be entirely absent (in *Eukraiohelea*) or greatly reduced; intercalary fork distinct; crossvein r-m more or less oblique; median fork with long petiole, M_2 not interrupted at base; anal vein straight, not interrupted in middle. Male genitalia with basistyles simple or with lobe on inner margins; dististyles long; ninth sternite very short; ninth tergite usually rounded caudad with setigerous apicolateral lobes; aedeagus reduced to a pair of oblique lateral sclerites; parameres a pair of large, highly sclerotized, greatly modified, submedian processes with flaring basal apodemes.

Keys to the Nearctic species of *Stilobezzia*

Females

- | | | |
|--------|--|------------------------------------|
| 1. | Only one long radial cell present; fore femur with 2 or 3 ventral spines (subgenus <i>Eukraiohelea</i>)..... | 1. elegantula (Johannsen) |
| | Two radial cells present; fore femur unarmed..... | 2 |
| 2 (1). | Wing with macrotrichiae at tip (subgenus <i>Neostilobezzia</i>)..... | 3 |
| | Wing entirely bare (subgenus <i>Stilobezzia</i>)..... | 5 |
| 3 (2). | Body hairs very strong and erect; wings hyaline; legs, scutellum, and halteres yellow..... | 3. lutea (Malloch) |
| | Body hairs soft and decumbent; midlegs and hind legs brown..... | 4 |
| 4 (3). | Wing infuscated brown; scutellum and halteres yellowish. | |
| | Wing hyaline; scutellum and halteres brownish.... | 2. fuscula Wirth |
| 5 (2). | Wing with 2 or 3 dark spots on anterior margin..... | 6 |
| | Wing hyaline, unmarked..... | 9 |
| 6 (5). | Shining yellow; mesonotum polished yellow, with pair of longitudinal brown bands, anterior spine absent; legs yellow, narrow apices of hind femur and tibia brown; wing hyaline, with brown spots at crossvein and apex of second radial cell..... | 9. coquilletti Kieffer |
| | Mesonotum brown with silvery, pruinose areas and prominent anterior spine; legs extensively brown banded or punctate; wing brownish, anterior margin with 2 or 3 dark spots..... | 7 |
| 7 (6). | Femora and tibiae extensively yellow, with small brown spots at bases of hairs; wing hyaline, with two brown spots; abdomen mostly yellowish above..... | 14. punctipes , new species |
| | Femora and tibiae brown with yellowish rings; wing infuscated, with 2 or 3 brown spots and a subapical pale area; abdomen black above with narrow, distal, silvery pruinose, segmental bands..... | 8 |

- 8 (7). Three dark wing spots including one at apex of first radial cell; fifth tarsal segment with ventral batonnets..... 15. **rabelloi** Lane
Two dark wing spots, none at apex of first radial cell; fifth tarsal segment without ventral batonnets..... 6. **beckae**, new species
- 9 (5). Mesonotum entirely polished black..... 10
Mesonotum yellow, green, or brown, not entirely black..... 13
- 10 (9). Abdomen polished black..... 11
Abdomen green..... 12
- 11 (10). Midfemora and hind femora black except at extreme bases.
5. **antennalis** (Coquillett)
Legs uniformly yellow..... 7. **bicolor** Lane
- 12 (10). Fifth tarsal segment with ventral batonnets...10. **diversa** (Coquillett)
Fifth tarsal segment without ventral batonnets.
12. **pallidiventris** (Malloch)
- 13 (9). Shining green; third or fourth abdominal tergites extensively black.. 14
Yellow or brown, not green; abdomen without black bands or spots.. 15
- 14 (13). Mesonotum uniformly pale green; distal fourth of hind femur black.
18. **viridis** (Coquillett)
Mesonotum largely dark brown; hind femur with only spot at apex black..... 11. **glauca** Macfie
- 15 (13). Mesonotum shining brown; wing with a beadlike swelling near apex of second radial cell..... 16. **sybleae**, new species
Mesonotum pruinose brown; wing venation normal..... 16
- 16 (15). Mesonotum dark brown, with pattern of large pruinose gray spots; scutellum dark; tibiae with sub-basal pale rings...13. **pruinosa** Wirth
Mesonotum uniform light grayish brown; tibiae unbanded..... 17
- 17 (16). Scutellum and femora yellow..... 8. **bulia** Thomsen
Scutellum and femora brown..... 17. **thomsenae**, new species

Male genitalia

1. Lateral sclerites of aedeagus greatly reduced or absent, instead a transverse sclerite between inner margins of basistyles beyond base..... 2
Lateral sclerites of aedeagus well developed and oblique, with bases at inner ventral margins of basistyles..... 3
- 2 (1). A large rounded lobe at distal third of inner margins of basistyles; transverse sclerite with pointed, curved ends; apicolateral lobes of ninth tergite widely spaced and triangular..... 8. **bulia** Thomsen
Basistyles simple; transverse sclerite with blunt ends; apicolateral lobes fingerlike and close together..... 17. **thomsenae**, new species
- 3 (1). Lateral sclerites of aedeagus sinuate, irregularly bent, or apex forked; basistyle without lobe, or if one present it bears a strong spine; apicolateral lobes of ninth tergite usually slender and close together..... 4
Lateral sclerites of aedeagus straight, at least on distal half; basistyle with mesal lobe; apicolateral lobes usually low and rounded..... 10
- 4 (3). Basistyle with a strong spine midway on inner margin, arising from a low lobe also bearing a fine hair; aedeagus with strong subapical tooth on outer side, appearing forked at end; parameres long and slender with long pointed tips..... 2. **fuscula** Wirth
Basistyle simple; aedeagal sclerites without strong tooth..... 5

- 5 (4). Parameres greatly expanded from bases, with obliquely truncated apices bearing a short lateral tooth and a long, curved, distal tooth.
4. **stonei**, new species
Parameres broadest at bases or without truncated apices----- 6
- 6 (5). Stems of parameres very slender and rodlike----- 7
Stems of parameres bladelike----- 9
- 7 (6). Apices of parameres slightly expanded, palplike; aedeagal sclerites sinuate, stouter toward apices; ninth sternite with deep, quadrate, mesal notch; dististyles very broad, with truncate apices.
1. **elegantula** (Johannsen)
Apices of parameres sharp-pointed and bent ventrad; aedeagal sclerites bent more than twice----- 8
- 8 (7). Membrane of ninth sternite bare; tips of aedeagal sclerites recurved hooklike; dististyles very slender----- 6. **beckae** new species
Membrane spiculate; tips of aedeagal sclerites snoutlike and crossing each other; dististyles stout----- 14. **punctipes**, new species
- 9 (6). Parameres with an extra lateral pair of straight, bladelike arms half as long as inner arms; membrane of ninth sternite bare.
15. **rabelloi** Lane
Parameres simple, without lateral arms, expanded subapically, with tips abruptly narrowed; membrane spiculate----- 3. **lutea** (Malloch)
- 10 (3). Parameres with knobbed apices over twice as broad as the very slender, stalklike stems; basistyles very large and globular; dististyle very slender to base----- 18. **viridis** (Coquillett)
Parameres otherwise, without knobbed apices----- 11
- 11 (10). Parameres with greatly swollen, conical bases and very slender, tapered apices----- 12
Parameres with stems of subequal diameter or swollen towards apices----- 13
- 12 (11). Parameres with basal 0.6 swollen, the pointed apices abruptly bent towards base on outer side----- 10. **diversa** (Coquillett)
Parameres with only basal 0.2 swollen, distal portions consisting of very slender, curved, saber-shaped blades crossing each other in middle.
16. **sybleae**, new species
- 13 (11). Parameres nearly straight, with apices abruptly narrowed and bent over----- 14
Parameres sinuate or with broad, toothlike, lateral, subapical expansions----- 15
- 14 (13). Parameres with apices bent outward----- 7. **bicolor** Lane
Parameres with apices bent inward----- 11. **glauca** Macfie
- 15 (13). Lobe of basistyle quadrate, as long as broad; parameres slender and markedly sinuate; dististyles greatly curved.
5. **antennalis** (Coquillett)
Lobe of basistyle consisting of only a hump on inner margin; parameres very broad and stout; dististyle nearly straight----- 16
- 16 (15). Each paramere with broad, toothlike, lateral, subapical expansion about half as broad as length of dististyle, with a slender, ventrally curved spine from apex on inner margin; dististyle tapered.
9. **coquilletti** Kieffer
Each paramere swollen slightly midway to apex without subapical lateral expansion; dististyle with broad, blunt apex--- 13. **pruinosa** Wirth

TABLE 1.—Proportions of segments of hind legs of female *Stilobezzia* species.

Species	Cx	Tr	F	Ti	T ₁	T ₂	T ₃	T ₄	T ₅
1. <i>elegantula</i>	20	10	60	60	30	10	5	4	12
2. <i>fuscula</i>	25	10	60	65	32	15	6	4	8
3. <i>lutea</i>	40	15	90	90	40	20	9	6	15
4. <i>stonei</i>	25	10	70	70	30	18	7	5	10
5. <i>antennalis</i>	20	12	55	55	28	12	3	3	8
6. <i>beckae</i>	30	15	75	75	40	18	6	5	8
7. <i>bicolor</i>	15	7	40	35	17	10	4	3	10
8. <i>bulla</i>	15	7	35	35	15	8	3	2	5
9. <i>coquilletti</i>	30	15	80	85	40	18	5	5	13
10. <i>diversa</i>	13	6	35	32	16	6	3	3	5
11. <i>glauca</i>	20	10	65	70	33	15	4	4	10
12. <i>pallidiventris</i>									
13. <i>pruinosa</i>	20	10	50	50	28	10	4	4	8
14. <i>punctipes</i>	30	15	80	80	40	20	6	4	10
15. <i>rabelloi</i>	40	15	85	95	45	25	10	5	15
16. <i>sybleae</i>	15	7	45	50	25	12	3	2	5
17. <i>viridis</i>	20	10	55	55	28	12	3	3	8

Subgenus *Eukraiohelea* Ingram and Macfie, 1921

Eukraiohelea Ingram and Macfie, Ann. Trop. Med. Parasit., vol. 15, p. 347, 1921.—Johannsen, Arch. Hydrobiol., Suppl., vol. 9, p. 430, 1931; Journ. New York Ent. Soc., vol. 42, p. 344, 1934.—Macfie, Ann. Trop. Med. Parasit., vol. 34, p. 22, 1940.—Tokunaga, Tenthredo, vol. 3, p. 344, 1940.—Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943; Bull. Bishop Mus. No. 189, p. 190, 1946. (Genotype, *Eukraiohelea africana* Ingram and Macfie, 1921; designated by Macfie, 1940.)

Diagnosis.—First radial cell absent, the r-m crossvein nearly forming a straight line with R₁, the latter arising just a little more toward base of wing; fore femora with 2 or 3 ventral spines but not swollen; male aedeagus with hyaline posterior membrane, parameres long and very slender.

Discussion.—Johannsen (1934) placed *Eukraiohelea* as a subgenus of *Parabezzia* Malloch, 1915. However, as shown by a comparison of the male genitalia of *P. petiolata* Malloch, 1915, with those of the four species of *Eukraiohelea* whose males have been described, the latter are much more closely related to *Stilobezzia*. The following species have been correctly placed in *Eukraiohelea*: *E. africana* Ingram and Macfie, 1921, *E. versicolor* Ingram and Macfie, 1921, and *E. foyi* Ingram and Macfie, 1922, all from West Africa; *Stilobezzia (Eukraiohelea) aberrans* Johannsen, 1931, from Java; *S. (E.) esakiana* Tokunaga, 1940, from the Caroline Islands; and *Eukraiohelea amnigena* Macfie, 1935, from Brazil. *Eukraiohelea inusitata* Johannsen, 1946, from

Guam is apparently a synonym of *esakiana* Tokunaga. *Palpomyia dorsofasciata* Lutz, 1914, from Brazil was correctly referred to *Eukraiohelea* by Macfie (1935). *Parabezzia poikiloptera* Ingram and Macfie, 1922, from West Africa should be referred to *Eukraiohelea* as tentatively suggested by Johannsen (1946), but the position of *S. ugandae* Ingram and Macfie, 1923, from East Africa, which Johannsen also believed to belong here, is more doubtful. De Meillon (1938), moreover, states that *versicolor* and *poikiloptera* should be placed in the subgenus *Stilobezzia*, since material he determined as these two species from Lourenço Marques, Mozambique, possessed a small but distinct first radial cell.

1. *Stilobezzia (Eukraiohelea) elegantula* (Johannsen), 1908, new combination

FIGURE 11, *g*

Bezzia elegantulus Johannsen, Kansas Univ. Sci. Bull., vol. 4, p. 109, 1907 (♀, Kansas).

Probezzia elegantula, Malloch, Proc. Biol. Soc. Washington, vol. 27, p. 137, 1914.

Parabezzia elegantula, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 359, 1915.—Johannsen, Journ. New York Ent. Soc., vol. 42, p. 345, 1934.

Eukraiohelea elegantula, Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE: Length 2.0 mm., wing 1.5 mm. by 0.7 mm. A yellowish species, some specimens with a greenish tinge; antennae brown, pedicel and narrow bases of flagellar segments yellow; palpi dark brown. Mesonotum deep yellow, with broad sublateral brown bands; scutellum yellow in center, ends brown; postscutellum brown; pleura grayish, a large black spot on mesopleuron. Legs yellow; coxae dark below; trochanters brown; apex of hind femur, base of hind tibia, apices of all tibiae and narrow apices of all tarsal segments brown. Wings, including veins, grayish hyaline; halteres yellow, sides of knobs black, flat end of knobs pale green. Abdomen dark grayish brown, apices of tergites with narrow white bands.

Antennae very long and slender. Mesonotum with long black hairs in rows; scutellum with four long black marginal bristles and a few short hairs. Legs with hairs fine except on hind tibia where they are long and black; proportions of segments of hind leg as in table 1; fore femur with two or three small black spines midway on inner margin; basitarsus with a long black basal and a smaller distal spine on midlegs and hind legs; fifth tarsal segment with two pairs of long black ventral batonnets; claws slender and unequal, the outer claw as long as fifth segment, the other about a third as long. Wing without macrotrichiae; first radial cell absent, r-m crossvein and R_1 nearly forming an oblique line, lengths of the two sections of costa in ratio of 0:6; petiole of media as long as r-m crossvein.

MALE: Ninth sternite nearly four times as broad as long, with deep quadrate emargination three-fourths way to base on mesal third, with spiculate margins, the posterior membrane bare; ninth tergite rounded, with a pair of very small fingerlike setigerous apicolateral lobes. Basistyles simple, about twice as long as broad; dististyles about two-thirds as long as basistyles, very broad with truncate tips. Aedeagus with an oblique pair of rather stout, slightly sinuate, sclerotized bars with pointed apices; an irregular hyaline membranous lobe from posterior margins. Parameres very long, slender and rodlike, with slender lateral apodemes; stems about a fourth again as long as basistyles, subparallel, the apices slightly swollen, palplike, and bent ventro-laterad.

Type.—In Snow collection, University of Kansas, ♀, Kansas, Douglas County, Lawrence.

Material examined.—Florida: Crystal River, Citrus County, July 7, 1949, Sept. 18, 1950, Hudson, 2 ♀♀, Miami, Dade County, Oct. 15, 1947, Buren, 1 ♀; Panama City Beach, Bay County, July 2, 1950, McElvey, 1 ♂

Louisiana: Baton Rouge, Apr. 30, 1947, Wirth, 1 ♀.

Jamaica: Newport, Feb. 22, 1937, Chapin and Blackwelder, 1 ♀.

Remarks.—*S. (E.) africana* Ingram and Macfie, from West Africa, the genotype of *Eukraiohelea*, is almost identical with *elegantula*, but is smaller and the male genitalia differ markedly; the ninth sternite does not have the mesal excavation, the dististyles have the apices slenderer and rounded, the apices of the parameres are straight and pointed, and the membrane of the aedeagus is prolonged mesad in a sharp cone.

Subgenus *Neostilobezzia* Goetghebuer

Neostilobezzia Goetghebuer, in Lindner, Die Fliegen der Palaearktischen Region, Lief. 78, p. 53, 1934. (Genotype, *Ceratopogon ochraceus* Winnertz, 1852, by present designation.)

Discussion.—Goetghebuer (1934) distinguished this subgenus from *Stilobezzia* by the presence of macrotrichiae at the end of the wing, the wing of *Stilobezzia* being entirely bare. In addition, all the species known to me are yellowish or brown in ground color, varying from almost whitish to almost black, and the male genitalia have the aedeagal sclerites decidedly bent or humped in the middle and the basistyle lacks the inner lobe. Species with these characters are widely distributed around the world. It is especially significant that most of the species described from the temperate regions belong to this subgenus, while the tropical species are predominantly the subgenus *Stilobezzia*.

2. *Stilobezzia* (*Neostilobezzia*) *fuscula* Wirth, 1952

FIGURE 11, e

Stilobezzia fuscula Wirth, Univ. California Publ. Ent., vol. 9, p. 204, 1952 (♀, California).

Diagnostic characters.—This species resembles *S. (N). lutea* (Malloch), 1918, in its uniformly yellowish color, unmarked wings with macrotrichiae, and mesonotum with indistinctly darker vittae; but differs in being somewhat duller and darker, with dark antennal pedicel and halteres, and in having the body hairs much softer.

Description.—FEMALE: Length 1.4 mm., wing 1.5 mm. by 0.5 mm. Head grayish brown pruinose, pedicel of antennae and palpi brown, antennal flagellum yellowish brown; segments in proportion of 20:12:12:12:12:12:12:12:20:20:20:20:30. Palpal segments in proportion of 4:8:15:10:10, third segment with three long, stalked sensillae.

Mesonotum dull yellowish brown, with coarse pruinosity, a narrow median longitudinal vitta and a broad patch on each side from humeral pits to wing base darker brown; most of bristles removed, but those few remaining long and dark brown. Scutellum bright yellow in middle, brownish on sides, apparently with four marginal bristles. Postscutellum and pleura yellowish brown pruinose. Legs dull dark yellowish; hairs short, except row of long bristles on outer edge of hind tibia; inner claw as long as fifth tarsal segment.

Wings grayish hyaline, anterior veins brownish; second anterior radial cell about five times as long as first; macrotrichiae thick at apex of cell R_5 and along and beyond intercalary fork, a few also along tip of veins M_1 and M_2 and at apex of cell M_1 . Halteres brown, flat end of knob dull yellowish.

Abdomen dull dark brown, a patch of long brown hairs on sides of first segment. Spermathecae two, oval, with ducts sclerotized a short distance; a rudimentary third spermatheca present.

MALE: Similar to the female but with the usual sexual differences; antennal plumes light brown; thorax and abdomen infuscated light brown; scutellum yellow.

Ninth sternite about three times as broad as long, with mesal posterior excavation halfway to base, posterior membrane bare; ninth tergite rather long and rounded, with a pair of long, rounded, setigerous, apicolateral lobes. Basistyle nearly three times as long as broad, with a black spine borne on a small lobe with a long fine hair about midway of mesal margin; dististyle as long as basistyle, slender and slightly curved to apex. Aedeagus with a pair of oblique, lateral, sclerotized bars with median apices forked, the inner arm in line with base and longer than the other arm. Parameres with slender

basal apodemes, stems long and slender, with bases slightly swollen, each with apex gradually narrowed to a fine apical filament abruptly bent and recurved on distal fourth.

Type.—USNM 59946, ♀, California, Tulare County, 6 miles east of Orosi. (In the original publication the sex was erroneously given as ♂.)

Material examined.—California: 6 miles east of Orosi, Tulare County, July 8, 1947, Wirth, 2 ♀♀ (type and paratype).

Utah: Moab, June 8, 1948, Knowlton, Harmston, and Wood, at light, 1 ♂.

Remarks.—The male genitalia of *S. fuscula* are practically identical with those of *S. macfieii* Lane, 1947, from Brazil. However, the latter species has the mesonotum polished black, with lighter areas, and under certain light a spot on each side before wing base has purplish reflections. Moreover, the absence of macrotrichiae on the wings would place *S. macfieii* in the subgenus *Stilobezzia*.

3. *Stilobezzia* (*Neostilobezzia*) *lutea* (Malloch), 1918

FIGURE 11, b

Hartomyia gilva Malloch, not Coquillett (misidentification), Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 343, 1915.

Hartomyia lutea Malloch, Bull. Brooklyn Ent. Soc., vol. 13, p. 18, 1918, (♀, Illinois).

Stilobezzia lutea, Johannsen, Ann. Ent. Soc. Amer. vol. 36, p. 781, 1943.

Stilobezzia mallochi Hoffman, Ent. News, vol. 35, p. 283, 1924, (♂, ♀; New York, Pennsylvania).—Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943 (eastern United States). (New synonymy.)

Description.—FEMALE: Length 2.5 mm., wing 1.9 mm. by 0.7 mm. Yellow, including anterior wing veins, antennae, and legs; mesonotum, except humeri, and apex of abdomen rufous brown. Vestiture of very long coarse brown bristles, those on scutellum as long as breadth of scutellum.

MALE: Ninth sternite nearly three times as broad as long, with a very broad, shallow, posterior emargination, the membrane spiculate; ninth tergite conical, with a prominent, submedian pair of long, fleshy, setose lobes. Basistyles simple, twice as long as broad; dististyles slightly longer than basistyles, curved, and gradually attenuated, with pointed apices. Aedeagus with a pair of oblique sinuate sclerites, bases of which are articulated with ventral root of basistyle, apices close together, pointed, and bent ventrad. Parameres with stout basal apodemes, the stems close together and slightly sinuate, flattened and slightly expanded past middle, with apices pointed and somewhat curved ventrad.

Type.—In collection Illinois Natural History Survey, ♀, Illinois, Elizabeth.

Material examined.—New Hampshire: Center Harbor, July 9, Dyar, 1 ♀; Franconia, Slosson, 1 ♂.

Connecticut: Green Falls, June 31, 1935, Chapman, 1 ♂, 1 ♀.

Rhode Island: Westerly, June 10, 1936, Chapman, 1 ♂.

New York: Armonk, Bemus Point, Canadarago Lake, Kast Bridge, Millwood, Poughkeepsie, Rome, June, July 1934-36, H. K. Townes, 12 ♂♂, 7 ♀♀.

New Jersey: Moorestown, June 6, 1936, H. and M. Townes, 1 ♀; Riverside, June 18, 1939, H. K. Townes, 1 ♂.

Delaware: Smyrna, June 8, 1937, Bradley, 1 ♂.

Maryland: Cabin John, June 18, 1920, Aldrich, 1 ♀; Glen Echo, July 1, 1923, Malloch, 1 ♀; Plummer's Island, June 18, 1914, Shannon, 1 ♀.

District of Columbia: Rock Creek Park, June 17, 1920, Aldrich, 1 ♂.

Virginia: Dead Run, June 6, 1914, Shannon, 1 ♀; Falls Church, June 7, 1914, Shannon, 2 ♀♀, and July 4, 8, 1950, Wirth, 4 ♂♂, 7 ♀♀; Glencarlyn, June 7, 1935, Malloch, 1 ♂, 1 ♀.

South Carolina: Greenville, June 4, 1933, H. K. Townes, 1 ♂.

Indiana: Lafayette, June 26, 1916, Aldrich, 1 ♂, 4 ♀♀.

Illinois: Elizabeth, July 7, 1917, Malloch, 1 ♀ (type of *Hartomyia lutea* Malloch).

Michigan: Cheboygan County, July 17, 1942, Sabrosky, 1 ♀.

Iowa: Maquoka Caves State Park, Jackson County, July 3, 1949, Laffoon, 1 ♀; Pikes Peak State Park, Clayton County, July 4, 1949, Laffoon, 1 ♀; Sioux City, June, July 1949-50, Slater and Laffoon, 6 ♂♂, 11 ♀♀.

Remarks.—Malloch had misidentified the male of this species as *Hartomyia gilva* (Coquillett), which is an *Atrichopogon*, in 1915, and in 1918 described the female of the same species as *Hartomyia lutea*, new species. Hoffman discovered that Malloch's determination of *gilva* was incorrect and described the species as *Stilobezzia mallochi*, 1924, in part from Malloch's material. Since Hoffman made no mention of Malloch's description of *lutea*, he may have been unaware of it, or he may not have been able to recognize Malloch's species. The present synonymy has been made after an examination of the type of *lutea* and specimens determined as *gilva* by Malloch in the Illinois Natural History Survey through the kindness of Dr. H. H. Ross, and of specimens in the U. S. National Museum determined by Hoffman as *mallochi*. Hoffman's detailed description of this species needs no elaboration except for the characters of the male genitalia.

4. *Stilobezzia* (*Neostilobezzia*) *stonei*, new species

FIGURE 11, c

Diagnostic characters.—A large brownish species; mesonotum and scutellum dull yellowish; legs yellowish; midfemora, hind femora, and tibiae dark brown; wings grayish brown; halteres dull yellow.

Description.—FEMALE: Length 1.8 mm., wing 1.8 mm. by 0.7 mm. Head dull brownish, including antennae and palpi, with a few long black hairs. Antenna as long as head and thorax combined; flagellar segments in proportion of 20:15:15:15:15:16:17:18:25:25:25:25:30. Palpal segments slender, in proportion of 5:10:12:6:10, third segment slightly swollen on basal two-thirds, with a small pit at distal fourth.

Thorax dull brown, mesonotum and scutellum dull yellowish, postscutellum and pleura dark brown. Mesonotum with moderate to long brown hairs in rows; scutellum with about ten long brown marginal hairs. Legs dull brown, usually all of forelegs, midtarsus and hind tarsus yellowish. Proportions of segments of hind leg as in table 1; legs moderately slender, hairs fine, not very long except those on hind tibia about twice the diameter of segment; basitarsi with ventral spines, three or four on basal half on forelegs and midlegs, one at base on hind leg; claws unequal, rather strong and curved, the longer nearly as long as fifth segment, the other about half as long.

Wings evenly infuscated, the veins slightly darker, a few macrotrichiae at apices of cells R_5 and M_1 . First radial cell large, about a third the length of second; costa extending to 0.8 wing length; crossvein r-m faint in middle, oblique; petiole of media as long as crossvein. Halteres yellow. Abdomen dark brown with short fine hairs; two large, slightly unequal ovoid spermathecae and a vestigial third present, ducts not sclerotized.

MALE: Similar to the female but with the usual sexual differences; antennal plumes brownish, knees quite dark. Ninth sternite about three times as broad as long, with broad posterior excavation more than halfway to base, the membrane bare; ninth tergite rounded, with small, submedian, setose, apicolateral lobes. Basistyles simple, twice as long as broad; dististyles 0.9 times as long as basistyles, slender and nearly straight, their apices slightly knobbed. Aedeagus with an oblique pair of slightly curved sclerites with distal ends close together, sharp-pointed, and bent ventrad; apparently bearing a pair of hyaline membranous lobes on posterior margins and attached to membrane connecting dorsal roots of basistyles on ventral side of parameres. Parameres with broad, platelike, basal apodemes; stems very broad and flattened, gradually expanded distad with a short lateral point and a longer, slenderer, ventrally bent, distal point, their distal margins obliquely truncated.

Types.—USNM 60964, holotype, ♂, and allotype, Falls Church, Va., July 8, 1950, Wirth. Paratypes: Virginia: 16 ♂♂, 24 ♀♀, same data as type. Georgia: 2 ♂♂, 17 ♀♀, Thomasville, May 1949, Palmer. Florida: 2 ♀♀, Innerarity Point, May 4, 1950, Rathert; 1 ♀, Panama City Beach, May 6, 1949, McElvey.

Remarks.—Related to *S. lutea* (Malloch) in general features, but readily distinguished by the more extensive brown coloration, finer vestiture and the characteristic broad, obliquely truncated, two-pointed, platelike, male parameres. This species is named in honor of Dr. Alan Stone.

Subgenus *Stilobezzia* Kieffer, 1911

Stilobezzia Kieffer, Rec. Indian Mus., vol. 6, p. 118, 1911, and vol. 9, p. 184, 1913; Bull. Ent. Soc. France, p. 192, 1919.—Goetghebuer, Mem. Mus. Hist. Nat. Belgique, vol. 8, p. 59, 1920.—Carter, Ingram, and Macfie, Ann. Trop. Med. Parasit., vol. 15, p. 324, 1921.—Edwards, Trans. Ent. Soc. London, vol. 74, p. 411, 1926; Notulae Ent., vol. 9, p. 9, 1929.—Johannsen, Arch. Hydrobiol., Suppl., vol. 9, p. 430, 1931; Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.—Ingram and Macfie, The Diptera of Patagonia and southern Chile . . ., pt. 2, fasc. 4, p. 191, 1931.—de Meillon, Proc. Ent. Soc. London, ser. B, vol. 7, p. 266.—Tokunaga, Philippine Journ. Sci., vol. 72, p. 155, 1940.—Lane, Rev. Ent., vol. 18, p. 197, 1947.—Lee, Proc. Linn. Soc. New South Wales, vol. 72, p. 345, 1948.—Wirth, Univ. California Publ. Ent., vol. 9, p. 202, 1952. (Genotype, *Ceratopogon notatus* de Meijere, as *Stilobezzia festiva* Kieffer; original designation.)

Hartomyia Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 339, 1915. (Genotype, *Ceratopogon pictus* Coquillett; original designation.)

Diagnosis.—Two radial cells present; wing without macrotrichiae at apex.

5. *Stilobezzia* (*Stilobezzia*) *antennalis* (Coquillett), 1901

FIGURE 12, e

Ceratopogon antennalis Coquillett, Proc. U. S. Nat. Mus., vol. 23, p. 606, 1901 (♀, District of Columbia).

Ceratolophus antennalis, Kieffer, Genera insectorum, fasc. 42, p. 60, 1906.

Johannseniella antennalis, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 227, 1914.

Hartomyia antennalis, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 343, 1915 (♂; Illinois, Indiana).

Stilobezzia antennalis, Johannsen, Ann. Ent. Soc. Amer., 36: 781, 1943.

Description.—FEMALE: Length 1.5 mm., wing 1.6 mm. by 0.6 mm. Head, thorax, and abdomen polished black; antennae and legs yellow, midfemur and hind femur black except at extreme bases. Wings bare and hyaline, anterior veins yellowish, knob of halteres black. Palpi and last five flagellar segments slightly infuscated, flagellar segments in proportion of 18:11:11:11:11:11:11:15:25:25:25:25:30. Palpal segments in proportion of 4:8:14:8:15, third segment not swollen, pit absent. Proportions of segments of hind leg as in table 1; basitarsi without spines, fifth segment with a pair of long ventral batonnets; claws long, simple, and very unequal, the short claw fused with base of and about a third as long as the other. First radial cell about a fourth as long as second; r-m crossvein vertical, petiole of media to a

third the length of M_1 . Spermathecae two, the larger oval, the smaller subspherical and a third the diameter of other, a minute vestigial third present.

MALE: Similar to the female but with the usual sexual differences; plumes of antennae brown. Ninth sternite a narrow transverse anterior band, the membrane spiculate; ninth tergite evenly rounded caudad, the apicolateral lobes not prominent. Basistyle with large irregular lobe on inner side to distal third; dististyle rather strongly bent past middle and tapered to pointed tip. Aedeagus with a pair of oblique, straight, sclerotized bars with distal apices scarcely meeting. Parameres a pair of strongly sclerotized, large, strongly sinuate rods with pointed apices and large basal knobs.

Type.—USNM 5481, ♀, District of Columbia.

Material examined.—New York: Ithaca, June 11, 1935, H. K. Townes, 1 ♀; Rome, June 24, 1934, H. K. Townes, 1 ♂.

New Jersey: Moorestown, June 6, 1939, H. and M. Townes, 1 ♂.

Maryland: Dorchester, July 10, 1907, Barber, 1 ♀; Mayo, July 22, 1950, Wirth, 2 ♂♂, 1 ♀; Plummer's Island, June 30, 1914, Shannon, 1 ♀, and Aug. 18, 1913, Viereck, 1 ♀.

District of Columbia: June, 1 ♀ (type); Benning's, July 21, Aldrich, 2 ♀♀.

Virginia: June 16, 1903, Pergande, 2 ♂♂, 3 ♀♀; Dead Run, June 22, 1915, Shannon, 1 ♀, Falls Church, July 4, 8, 1950, Wirth, 3 ♂♂, 4 ♀♀.

Michigan: Midland County, July 17, 1944, Dreisbach, 1 ♀; Traverse City, June 17, 1943, Sabrosky, 1 ♂.

Illinois: Freeport, July 4, 1917, Malloch, 3 ♂♂; Galena Junction, July 8, 1917, Malloch, 1 ♀; White Heath, June 4, 1939, Dirks, 1 ♀.

Tennessee: Knoxville, May 25, Aldrich, 1 ♀.

Mississippi: West Point, Aug. 11, 1904, Barber, 1 ♂.

Louisiana: Baton Rouge, May 4, 16, 1947, Wirth, 4 ♂♂, 8 ♀♀.

6. *Stilobezzia (Stilobezzia) beckae*, new species

FIGURE 11, *f*

Diagnostic characters.—A large, dark brown species with silvery pruinose pattern on mesonotum and abdomen; wing with two darker and one lighter spots on anterior margin; knobs of halteres black; mesonotum with strong anterior tubercle; fifth tarsal segment unspined.

Description.—**FEMALE:** Length 2.5 mm., wing 1.8 mm. by 0.7 mm. Head black with dense whitish pruinosity, antennae brown, bases of flagellar segments 3 to 10 yellowish; palpi dark brown. Flagellar segments of antenna in proportion of 16:12:15:20:20:20:20:22:28:

30:32:32:42. Palpal segments in proportion of 5:12:15:8:12, third segment slightly swollen, with large, shallow sensory pit near apex.

Thorax dark reddish brown, with dense silvery pruinescence in irregular patches; mesonotum long, with prominent, conical, anterior spine, the anterior portion markedly sloping, posterior portion flattened between wing bases; covered with sparse, long, brown hairs; scutellum with four long, fine, brown hairs. Legs dark brown, all femora and fore tibiae with obscure broad median light bands, mid-tibia and hind tibia with narrow sub-basal light rings, tarsi yellow except fifth segment of each brown. Proportions of segments of hind leg as in table 1; legs with moderately long, black hairs, which are stronger on hind tibia; basitarsi with three ventral spines on foreleg, four on midleg, and one at base on hind leg; fifth segment without ventral batonnets; claws very slender and slightly unequal, the longer as long as fifth segment, the other about 0.6 to 0.8 as long.

Wing hyaline, without macrotrichiae, veins infuscated, a large brownish spot over first radial cell from vein R_1 to crossvein r-m; apex of second radial cell with brown spot, then a short white area with apex of wing weakly infuscated. First radial cell well developed, one-fourth as long as second; r-m crossvein faint in middle, forming an oblique line with R_1 , petiole of media as long as crossvein. Knobs of halteres black.

Abdomen black, distal half of tergites 1 to 3 and narrow distal margins of remaining tergites with silvery, pruinose bands. Spermathecae two, subequal, pyriform.

MALE: Similar to the female but with the usual sexual differences; antennal plumes golden. Ninth sternite over twice as broad as long, with caudal excavation to half its length, the membrane bare; ninth tergite rounded with a pair of membranous, setigerous, apicolateral lobes. Basistyles simple, about 2.5 times as long as broad; dististyles slender, nearly as long as basistyles, gently curved, with pointed incurved apices. Aedeagus with a pair of heavy, oblique, crooked, lateral sclerites meeting mesad subapically, with apices pointed and abruptly bent ventrolaterad. Parameres with heavy, platelike, V-shaped, basal apodemes; stems straight and contiguous mesad, slightly expanded midway, with lateral wall folded ventrad and mesad and apparently fusing on midline on distal third; extreme apices slender, flattened dorsoventrally and abruptly bent ventrad.

Types.—USNM 60695, holotype, ♂, and allotype, Crystal River, Citrus County, Fla., June 7, 1950, Hudson, light trap. Paratypes: Florida: 10 ♂♂, 17 ♀♀, same data as type except dates, June 5–July 17, 1949–50; 6 ♀♀, Grayton Beach, Walton County, May 10, 1949, Butler; 15 ♀♀, Santa Rosa, Walton County, June 7, 1949, Peterson. Mississippi: 4 ♀♀, Horn Island, June, July, 1944, Richmond.

Additional material examined.—Perú: Iquitos, March, April 1931, Shannon, 1 ♀.

Remarks.—Closely allied to *S. paulistensis* Lane, 1947, from Brazil which differs, however, in having the legs yellowish rather than blackened, in lacking the dark spot at apex of second radial cell, and in having the lateral sclerites of the male aedeagus shorter, with apices capitate and bent mesad rather than slender and bent laterad. *S. rabelloi* Lane, 1947, is also closely related, but is a larger, hairier species with three dark wing spots, including one at apex of first radial cell, and has several pairs of batonnets on fifth tarsal segment. I am happy to name this species for Mrs. Elisabeth C. Beck of Arlington, Fla., who has kindly sent me so many interesting Florida heleids.

7. *Stilobezzia* (*Stilobezzia*) *bicolor* Lane, 1947

FIGURE 11, *i*

Stilobezzia bicolor Lane, Rev. Ent., vol. 18, p. 208, 1947 (♂, Brazil).

Description.—FEMALE: (Here described for the first time.) Length 1.5 mm., wing 1.5 mm. by 0.6 mm. Head dark brown, antennal pedicel, clypeus, and palpi yellowish. Thorax and abdomen polished black, with metallic bluish violet reflections. Mesonotum rather broad and flat, with sparse, long, brown hairs, scutellum with four marginal bristles. Midcoxa and hind coxa black, rest of legs yellow, except knees and fifth tarsal segments dark. Legs with fine hairs; proportions of segments as in table 1; basitarsi unspined; fifth segment with a pair of long black batonnets at base; claws slender and unequal, the outer claw as long as fifth segment, the inner about a third as long. Wing hyaline, with violet reflections, anterior veins yellow; macrotrichiae absent. First radial cell distinct, a sixth as long as second; petiole of media about twice as long as crossvein r-m. Halteres black. Abdomen convex above, somewhat petiolate, with a row of long, brown hairs across each tergite.

MALE: As in the female but with the usual sexual differences; plumes of antennae brown. Ninth sternite a narrow anterior band, the posterior membrane spiculate; ninth tergite rounded, with inconspicuous, rounded, setigerous, apicolateral lobes. Basistyle with a small lobe at half the length of inner margin; dististyle about as long as basistyle, tapered to slender tip. Aedeagus with an only slightly oblique pair of sclerotized bars, stout in the Texas specimen figured, but slenderer in the tropical specimens. Parameres with lateral apodemes bent caudad; stems straight, stout and rodlike, with beak-like apices abruptly bent laterad.

Type.—In collection University of São Paulo, Brazil, ♂, Brazil, São Paulo, Osasco.

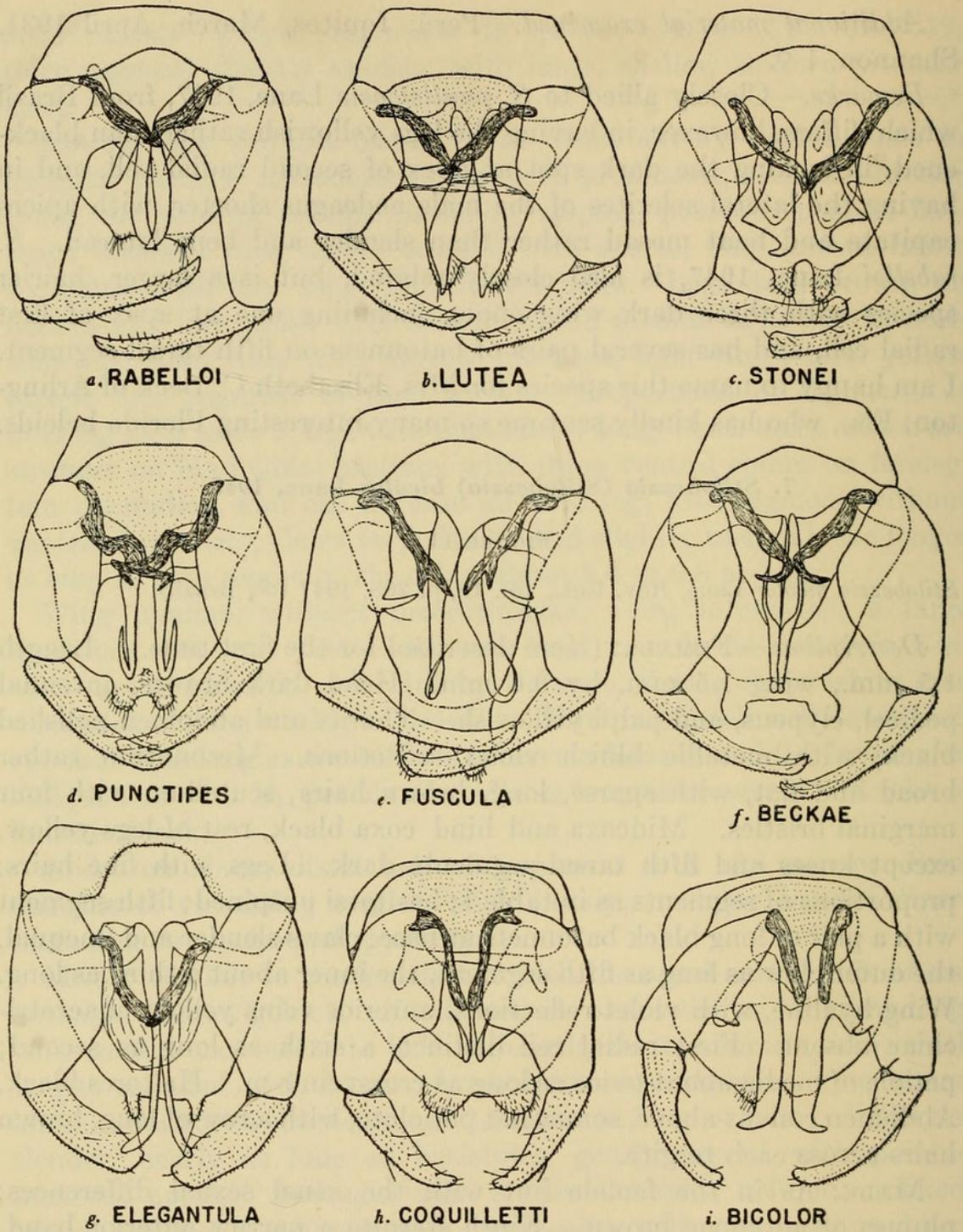
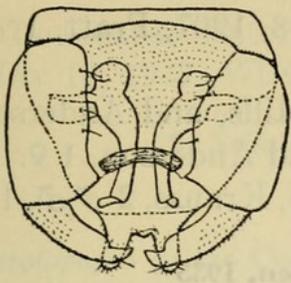
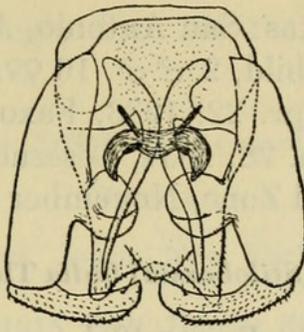


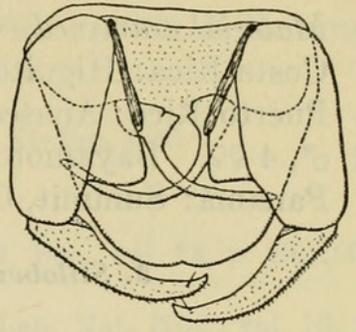
FIGURE 11.—Male genitalia of *Stilobezzia* species: a, *S. (S.) rabelloi* Lane; b, *S. (N.) lutea* (Malloch); c, *S. (N.) stonei*, new species; d, *S. (S.) punctipes*, new species; e, *S. (N.) fuscula* Wirth; f, *S. (S.) beckae*, new species; g, *S. (E.) elegantula* (Johannsen); h, *S. (S.) coquilletti* Kieffer; i, *S. (S.) bicolor* Lane.



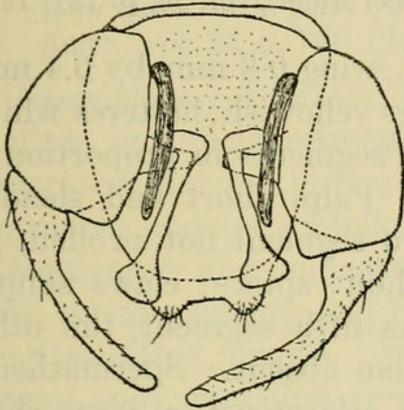
a. THOMSENÆ



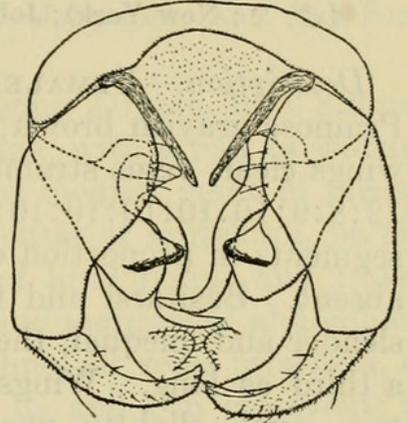
b. BULLA



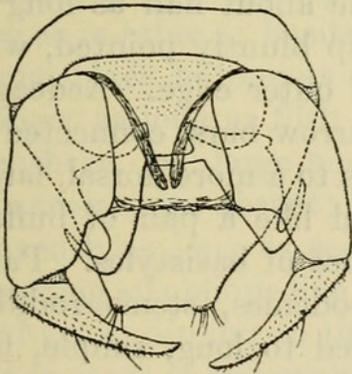
c. SYBLEAE



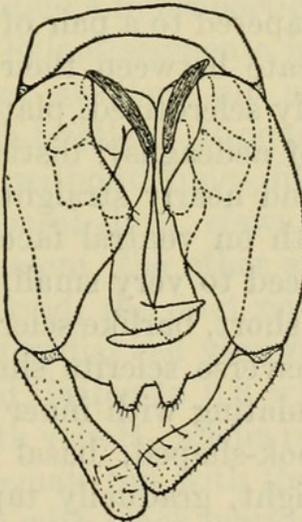
d. VIRIDIS



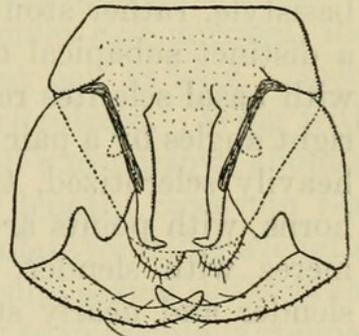
e. ANTENNALIS



f. DIVERSA



g. PRUINOSA



h. GLAUCA

FIGURE 12.—Male genitalia of *Stilobezzia* species: a, *S. (S.) thomsenae*, new species; b, *S. (S.) bulla* Thomsen; c, *S. (S.) sybleae*, new species; d, *S. (S.) viridis* (Coquillett); e, *S. (S.) antennalis* (Coquillett); f, *S. (S.) diversa* (Coquillett); g, *S. (S.) pruinosa* Wirth; h, *S. (S.) glauca* Macfie.

Material examined.—Texas: San Antonio, Apr. 8, 1907, Pratt, 1 ♂.
 Costa Rica: Higuito, Schild, 2 ♂♂, 10 ♀♀.
 Puerto Rico: Anasco, Apr. 22, 1933, Faxon, Mills, and Anderson,
 1 ♂, 4 ♀♀. Bayamon, Jan. 28, 1934, Lesesner and Anderson, 1 ♀.
 Panamá: Summit, Canal Zone, November 1946, Krauss, 2 ♂♂, 1 ♀.

8. *Stilobezzia (Stilobezzia) bulla* Thomsen, 1935

FIGURE 12, b

Stilobezzia bulla Thomsen, Journ. New York Ent. Soc., vol. 43, p. 289, 1935
 (♂, ♀; New York); Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE. Length 1.0 mm., wing 0.8 mm. by 0.4 mm. Pruinose grayish brown; scutellum and legs yellowish; halteres white; wings clear, veins stramineous. Antennal segments in proportion of 12:8:9:10:10:10:10:10:13:15:15:15:20. Palpi short and slender, segments in proportion of 5:7:7:5:7, third segment not swollen, pit absent. Basitarsi and fifth segment without spines; claws simple, slender and unequal, the longer as long as fifth segment, the other a third as long. Wings clear, macrotrichiae absent. Spermathecae two, oval, slightly unequal, with ducts sclerotized a very short distance.

MALE: Ninth sternite a narrow anterior ribbon, the membrane spiculate; ninth tergite tapered to a pair of prominent, slender, setose, apicolateral lobes, truncate between their bases. Basistyle slender, with a prominent, heavily sclerotized, platelike lobe articulating with the median sclerite (? of aedeagus); dististyle about half as long as basistyle, rather stout and nearly straight, tip bluntly pointed, with a distinct subapical tooth on ventral face of outer edge. Aedeagus with basal sclerites reduced to very small, narrow bars, connected at right angles by a pair of short, barlike sclerites to a more dorsal, large, heavily sclerotized, transverse sclerite shaped like a pair of buffalo horns, with points articulating with inner lobes of basistyles. Parameres with slender, hook-shaped, basal apodemes, stems rodlike, slender and nearly straight, gradually tapered to long, simple, fine tips reaching nearly to apices of lobes of ninth tergite.

Types.—In collection Cornell University, holotype, ♂, and allotype, New York, Ithaca, McLean Bogs.

Material examined.—Maryland: Dorchester, July 10, 1907, Barber, 1 ♂.

District of Columbia: Bennings, July 21, Aldrich, 1 ♀.

Virginia: Falls Church, July 4, 8, Aug. 6, 1950, Wirth, 18 ♂♂, 24 ♀♀.

Georgia: Thomasville, May 15–30, 1949, Palmer, 1 ♀.

Florida: Crystal River, Sept. 18, 1950, Hudson, 1 ♀.

Louisiana: Baton Rouge, Apr. 19, 1947, Wirth, 1 ♂; Kilbourne, May 10, 1947, Wirth, 1 ♀.

9. *Stilobezzia (Stilobezzia) coquilletti* Kieffer, 1905

FIGURE 11, *h*

Ceratopogon pictus Coquillett, Journ. New York Ent. Soc., vol. 13, p. 60, 1905 (♀, Virginia).

Hartomyia picta, Malloch, 1915, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 341, 1915 (♂, Illinois).

Stilobezzia coquilletti Kieffer, Ann. Mus. Nat. Hungarici, vol. 15, p. 308, 1917 (new name for *C. picta* Coquillett not Meigen).—Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE: Length 2.0 mm., wing 2.0 mm. by 0.8 mm. Yellow, in some specimens with greenish tinge; with a pair of widely separated, narrow brown lines from anterior median point of mesonotum to ends of scutellum; also, narrow center of scutellum, palpi, mesopleuron and midcoxa, narrow apices of hind femur and tibia, fifth tarsal segment, and fore, lateral, and hind margins of abdominal tergites 3 to 7, brown. Wing bare and hyaline, all veins brownish, a brown spot over first radial cell including R_1 and r-m crossvein; a second spot over apex of second radial cell and below halfway across cell R_5 ; knobs of halteres brown.

Flagellar segments of antenna in proportion of 25:15:15:15:15:15:17:18:28:28:30:30:60. Palpal segments in proportion of 4:15:20:10:22, third segment not swollen, pit absent. Mesonotum and abdomen with coarse, dark bristles. Proportions of segments of hind leg as in table 1; basitarsi without spines, fifth segment with a pair of long, black batonnets at basal third; claws slender and unequal, the longer as long as fifth segment, the other about half as long. Spermatheca one, large and ovoid, the duct not sclerotized. Wing with macrotrichiae absent; first radial cell very small and narrow, about a seventh as long as second, latter to 0.8 wing length; crossvein r-m forming an oblique line with vein R_1 ; media petiolate for 0.23 its length.

MALE: Similar to the female but with the usual sexual differences; body more or less greenish with black markings as in female, antennal plumes yellow at bases, black on distal halves. Ninth sternite a narrow, transverse, anterior band, posterior membrane spiculate; ninth tergite full and rounded, with a pair of low, rounded, setigerous, apicolateral lobes. Basistyle about twice as long as broad at base, abruptly narrowed about midway on inner side, forming a low, mesal lobe connected by an irregular membrane to ventrolateral margins of ninth tergite; dististyle about 0.7 as long as basistyle, stout, slightly incurved, with bluntly pointed tip. Aedeagus with an oblique pair of spatulate sclerites with bases abruptly bent laterad around bases of basistyles. Parameres a pair of broad, flattened, sclerotized plates, bases connected across midline by a highly sclerotized band from outer anterolateral

margins of basistyles; base of each paramere with a prominent lateral spur projecting caudad along inner margin of basistyle; distal half greatly expanded, with a large, sharp, lateral tooth; inner margins contiguous at apices, each with a very slender, pointed spine abruptly bent ventrad and cephalad.

Type.—USNM 8356, ♀, Virginia.

Material examined.—Maryland: Shadyside, July 6, 1925, Aldrich, 1 ♀.

Virginia: June 16, Pergande, 1 ♀ (type).

Illinois: Urbana, May 20, 1914, Aldrich, 1 ♂, 1 ♀.

Louisiana: Baton Rouge, Apr. 13, 25, 1947, Wirth, 3 ♂♂, 3 ♀♀.

México: Ciudad Monte, Tamaulipas, Nov. 23–Dec. 1, 1943, Brookman, 29 ♂♂, 35 ♀♀; Tamazanchale, San Luis Potosí, March 11, 1944, Brookman, 1 ♀; Tapachula, Chiapas, Sept. 20, 1944, Brookman, 1 ♀.

Puerto Rico: Arecibo, Apr. 5, 1932, Faxon and Anderson, 1 ♂, 1 ♀; San Juan, June 14, 1933, Harlan, 1 ♀.

Jamaica: Bath, St. Thomas, Chapin and Blackwelder, 4 ♀♀; Spanish Town, Feb. 2, 1937, Chapin and Blackwelder, 3 ♀♀.

Panamá: Sabanas, Apr. 20, 1923, Shannon, 1 ♀.

Remarks.—*S. fiebrigi* Kieffer, 1917, from Paraguay and Brazil, resembles *S. coquillettii* very closely except for the abdominal markings, with a pair of large lateral brown spots on the first tergite and a large median brown spot on the second, and tergites 3 to 7 with dark markings on the disc rather than on the margins. In the male genitalia of *fiebrigi* the basistyles bear a prominent mesal lobe, the dististyles are slenderer at the apices, the lateral bars of the aedeagus are slender without capitate tips, and the parameres are not so broad and the lateral tooth is not so prominent.

10. *Stilobezzia* (*Stilobezzia*) *diversa* (Coquillett), 1901

FIGURE 12, f

Ceratopogon diversus Coquillett, Proc. U. S. Nat. Mus., vol. 23, p. 607, 1907 (♀, New Jersey).

Ceratolophus diversus, Kieffer, Genera insectorum, fasc. 42, p. 60, 1906.

Johannseniella diversus, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 227, 1914.

Hartomyia diversus, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 344, 1915.

Stilobezzia diversus, Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE: Length 1.5 mm., wing 1.4 mm. by 0.6 mm. Head brown, antennae and palpi yellow; thorax shining black; abdomen and coxae light green; legs yellow, fifth tarsal segment brownish; wings hyaline, anterior veins yellow, halteres yellowish. Antennae as long as entire body; palpi slender, third segment not swollen. Wing

with first radial cell a fifth as long as second; petiole of media a fourth as long as distal portion. Legs slender, nearly bare, proportions of segments of hind leg as in table 1; basitarsi unspined, fifth segment with a pair of ventral batonnets.

MALE: Similar to the female but with the usual sexual differences; plumes of antennae yellow. Ninth sternite about four times as broad as long, with a very shallow, broad, posterior excavation, the posterior membrane spiculate; ninth tergite tapered, much longer than basistyles, with very short, setigerous, apicolateral lobes. Basistyles broad at bases, attenuated distad, simple, with an irregular, hyaline membrane connecting the inner margins about two-thirds way to apices; dististyles about as long as basistyles, slightly curved and tapered to a slender, pointed tip. Aedeagus with a pair of slender, sclerotized, oblique rods with straight apices, the curved bases continuous with anterior margins of basistyles. Parameres with bases very stout and conical, and with greatly narrowed apices recurved ventrolaterad, the bases connected by a narrow, sclerotized band.

Type.—USNM 5482, ♀, New Jersey, Riverton.

Material examined.—New Jersey: Riverton, July 3, Johnson, 1 ♀ (type).

Virginia: Falls Church, July 4, Aug. 6, 1950, Wirth, 4 ♂♂, 3 ♀♀.

Georgia: Thomasville, May 15–30, 1949, Palmer, 1 ♂, 2 ♀♀.

11. *Stilobezzia (Stilobezzia) glauca* Macfie, 1939

FIGURE 12, *h*

Stilobezzia glauca Macfie, Rev. Ent., vol. 10, p. 204, 1939 (♂, Brazil).—Lane, Rev. Ent., vol. 18, p. 207, 1947 (♀).

Diagnostic characters.—A rather small, bright, pale green species with whitish antennae, legs, wings, and halteres; mesonotum extensively dark, shining brown; abdomen with black band across third tergite and lateral spots on fifth.

Description.—**FEMALE:** Length 1.8 mm., wing 1.7 mm. by 0.6 mm. Head yellowish brown, antennae whitish at bases, last five segments and palpi pale brownish. Flagellar segments in proportion of 25:15:15:15:16:17:18:20:40:40:35:35:45. Palpi long, segments in proportion of 4:7:15:8:12; third segment not swollen, pit absent.

Thorax pale green; mesonotum with median third of anterior margin shining brownish black, forming a broad, V-shaped mark caudad, the sides of mesonotum broadly dark to ends of scutellum, and the median area between the dark bands yellowish. Vestiture consisting of a few long, brown bristles; scutellum with four weak, marginal bristles. Postscutellum and a faint pleural spot brown. Legs whitish, hind femur and tibia with very faint dark, apical spot. Proportions of segments of hind leg as in table 1; basitarsus without spines, fifth seg-

ment with a pair of long, dark batonnets at basal fourth; claws very slender and unequal, the longer claw as long as fifth segment, the other a third as long.

Wings hyaline, anterior veins yellowish; first radial cell small, a seventh as long as second; petiole of media a fifth way to apex of wing. Halteres yellowish white.

Abdomen pale green; two dark spots present on sides of first and second tergites; third tergite with broad, black band; fifth tergite with a pair of small, lateral, black spots. Spermatheca one, slightly oval, the duct not sclerotized.

MALE: Similar to the female but with the usual sexual differences; antennal plumes bright yellow. Ninth sternite broad and not strongly sclerotized, with spiculate membrane; ninth tergite rounded with membranous, setigerous, apicolateral lobes. Basistyle with distal portion slender, base stout, a large unsclerotized lobe about halfway along inner margin, connected on dorsal side to margin of ninth tergite; dististyle about as long as basistyle, tapered and curved to a slender, bluntly pointed tip. Aedeagus with an oblique pair of long, straight, slender, sclerotized bars. Parameres with stout basal knobs, a pair of inner apodemes joined mesad by a membrane from their anterior margins; stems stout, slightly curved, with apex abruptly narrowed, pointed, and bent mesad in the form of a short claw.

Type.—In collection British Museum (Natural History), ♂, Brazil, Nova Teutonia.

Material examined.—Virginia: Falls Church, July 4–29, 1950, Wirth, 9 ♂♂, 16 ♀♀.

South Carolina: Greenville, June 20, 1940, H. and M. Townes, 1 ♂.

Louisiana: Baton Rouge, May 1947, Wirth, 2 ♂♂.

Remarks.—Very similar to *S. viridis* (Coquillett), 1901, in the general green color with black-banded abdomen, but readily distinguished from that species by the dark-banded mesonotum, unbanded legs, pale wings, and in the male by the yellowish antennal plumes. One female from Falls Church is atypical, with the abdomen entirely dark.

12. *Stilobezzia (Stilobezzia) pallidiventris* (Malloch), 1915

Hartomyia pallidiventris Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 344, 1915 (♀; Illinois, Indiana).

Stilobezzia pallidiventris, Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE (from original description): Length 1.0 mm. Shining black; head, antennae, palpi, legs, and abdomen yellow; abdomen may be darkened; wings hyaline; halteres white. Antennae as long as entire body; legs slender; basitarsi longer than segments 2 to 5 combined; fifth segment without ventral batonnets; claws slender, inner half as long as outer. First radial cell a fifth as long as second.

Type.—In collection Illinois Natural History Survey, ♀, Illinois, Urbana.

Remarks.—Very near *S. (S.) diversa* (Coquillett), but much smaller, the abdomen yellowish rather than green, and fifth tarsal segment of female without ventral batonnets.

13. *Stilobezzia (Stilobezzia) pruinosa* Wirth, 1952

FIGURE 12, *g*

Stilobezzia pruinosa Wirth, Univ. California Publ. Ent., vol. 9, p. 203, 1952 (♂, ♀; California).

Description.—FEMALE: Length 1.0 mm. Pruinose brown, with broad, short, unmarked wings and a marked, pruinose gray pattern on the mesonotum; legs with narrow sub-basal pale rings on tibiae; halteres white. Proportions of segments of hind leg as in table 1; basitarsi and fifth segment without ventral spines. Spermathecae two, slightly unequal, slightly ovoid, with a few minute perforations; the ducts sclerotized a very short distance.

MALE: Ninth sternite transverse; ninth tergite long and rounded caudad with a subapical pair of low, rounded, setigerous lobes. Basistyles tapered, the inner margins with low hump bearing a few setose tubercles; dististyles very stout, with blunt apices. Aedeagus with a pair of small, oblique, sclerotized bars. Parameres a pair of highly sclerotized, heavy plates; basal apodemes winglike and bilobed; inner margins of stems nearly straight, slightly expanded on outer sides about halfway to apices; apices abruptly narrowed and bent ventromesad on about distal fourth. The apices of the parameres are somewhat longer in the Florida specimens figured than in the type from California.

Types.—USNM 59945, holotype, ♂, allotype, California, San Luis Obispo County, Arroyo Seco Ranger Station.

Material examined.—California: Arroyo Seco Ranger Station, San Luis Obispo County, July 1, 1948, Wirth, 3 ♂♂ (type, 2 paratypes), 1 ♀ (allotype); Pollack Pines, Eldorado County, July 7, 1948, Wirth, 1 ♂; Snowline Camp, Eldorado County, July 8, 1948, Wirth, 1 ♂.

Florida: Gainesville, Alachua County, June 2, 1950, Bidlingmayer 1 ♂, 1 ♀; Grayton Beach, Walton County, May 10, 1949, Butler, 1 ♀

14. *Stilobezzia (Stilobezzia) punctipes*, new species

FIGURE 11, *d*

Diagnostic characters.—A large, yellowish species with brown thorax and brown-punctate legs; abdomen with narrow segmental dark bands; wings with two small black spots.

Description.—FEMALE: Length 2.4 mm., wing 1.9 mm. by 0.9 mm. Head pruinose brown; antennae yellow, apices of segments 3 to 10 and all of last five segments brown; palpi black. Flagellar segments in proportion of 28:18:18:18:18:20:20:38:38:40:40:55, last segment with very slender pointed tip. Papal segments in proportion of 5:10:16:8:20, third segment slightly swollen with a small, round, subapical pit.

Thorax pruinose brown, margins of mesonotum, broad center of scutellum, and upper half of pleura yellow. Mesonotum with irregular, silvery pruinose patches, a few long, brown bristles; scutellum with four long, marginal bristles. Coxae and trochanters dark brown, rest of legs yellow; fore femur with broad sub-basal, midfemur with narrow basal, and hind femur with narrow apical brown bands; all tibiae narrowly brown at apices; rows of small, round, brown punctations at bases of hairs on all femora and tibiae, these hairs long and dark on hind tibia. Proportions of segments of hind leg as in table 1; basitarsus with three black ventral spines on forelegs, two on midlegs and one at base on hind legs; fifth tarsal segment without batonnets; claws slender and unequal, the longer claw as long as fifth segment, the other two-thirds as long.

Wing hyaline, anterior veins yellowish; a brown spot over r-m crossvein and a very small one over vein R_{2+3} ; macrotrichiae absent. First radial cell large, one-fourth as long as second, latter to 0.8 wing length; petiole of media as long as r-m crossvein. Halteres brown.

Abdomen dull, pruinose yellowish, tergites with irregular brown bands in middle of segments, pleura dark. Spermathecae three, the two larger subequal and oval with short, sclerotized ducts, the third about two-thirds as large and subspherical, without sclerotized duct.

MALE: Similar to the female but with the usual sexual differences; plumes of antennae golden brown. Ninth sternite a very narrow band, the posterior membrane spiculate; ninth tergite rounded, with small, submedian, setigerous lobes at apex. Basistyle simple, twice as long as broad; dististyle as long as basistyle and rather stout to apex, slightly bent on distal third. Aedeagus with an oblique pair of heavy twice-sinuate sclerites with apices snoutlike and crossing each other mesad. Parameres very slender, the lateral apodemes evenly curved and slender, stems nearly straight with bases slightly enlarged, gradually tapered to sharp, hooked tips abruptly bent ventrocephalad at two-thirds total length.

Types.—USNM 60966, holotype, ♀, Crystal River, Citrus County, Fla., June 7, 1949, Hudson, light trap; allotype, same data except date, Oct. 6, 1949. Paratypes: Florida: 11 ♂♂, 23 ♀♀, same data as type except dates, May-October 1949-50; 1 ♂, 3 ♀♀, Leesburg, Lake County, Aug. 7, 1949, Braddock; México: 4 ♀♀, Ciudad Monte, Tamaulipas, Nov. 22, 1943, Brookman.

Most closely related to the Neotropical species *S. (S.) punctulata* Lane, 1947, and *S. (S.) kiefferi* Lane, 1947, which it resembles in its spotted wings and punctate legs. Both related species, however, have the abdomen reddish, the former species differing in having three dark wing spots, the third over tip of second radial cell, while the second species has the first radial cell half as long as the second, yellowish coxae, whitish halteres, and the fore femur and midfemur lack the basal dark bands.

15. *Stilobezzia (Stilobezzia) rabelloi* Lane, 1947

FIGURE 11, a

Stilobezzia rabelloi Lane, Rev. Ent., vol. 18, p. 203, 1947 (♂, ♀; Brazil).

Diagnostic characters.—A large, brown species with irregular, silvery, pruinose markings; wing brownish, infuscated with three darker and one lighter spots on anterior margin; body hairs dense and strong; fifth tarsal segment with 3 or 4 pairs of ventral batonnets.

Description.—FEMALE. Length 3.0 mm., wing 2.2 mm. by 0.8 mm. Head pruinose brown, narrow bases of flagellar segments yellow, palpi black. Antenna with flagellar segments in proportion of 22:15:15:15:18:20:24:24:40:42:50:?:? (last two segments broken, not measured). Palpal segments in proportion of 8:15:25:15:20, third segment slightly swollen, densely set with strong hairs, a small, round pit near apex.

Mesonotum with strong, conical, anterior spine, the sides sloping, flattened only in prescutellar area; color dark brown with irregular silvery pruinose markings, usually three sublateral pairs of small, rounded, polished spots on disc; humeral corners yellowish; a few long, brown hairs in row. Scutellum brown, yellowish in middle, with 4 or 5 long, brown, marginal bristles. Postscutellum and pleura dark, pollinose brown. Legs including coxae dark brown; fore femur and midfemur with narrow sub-basal and subapical and broad median yellowish bands; hind femur with narrow, light band at apex; fore tibia and midtibia with narrow sub-basal and broad median yellowish bands; first four tarsal segments yellowish. Proportions of segments of hind leg as in table 1; leg hairs strong and spinose, especially long on hind tibia; basitarsus with strong black basal and apical spines, a third spine in middle on forelegs; fifth segment with 3 or 4 pairs of ventral batonnets; claws very slender and unequal, the longer claw as long as fifth segment, the other a third as long.

Wing brownish hyaline, extensively infuscated along the veins; three dark brown spots, first over r-m crossvein, second over vein R_{2+3} , and the third over distal third of second radial cell and extending halfway through cell R_5 at same level; a light area just beyond tip

of costa as large as third brown spot, the apex of the wing beyond lightly infuscated. First radial cell nearly half as long as second, the latter ending at about 0.7 wing length; petiole of media about as long as first radial cell. Halteres brown except at extreme bases of stems.

Abdomen dark brown, tergites with narrow, apical, segmental, silvery pruinose bands; vestiture very dense, consisting of long, stout, brown hairs. Spermathecae two, ovoid, subequal, with ducts sclerotized a short distance, and a rudimentary third present.

MALE: Similar to the female but with the usual sexual differences; plumes of antennae brown. Ninth sternite about three times as broad as long, with shallow, mesal, posterior excavation, and the membrane bare; ninth tergite short and rounded with very short, setigerous, apicolateral lobes. Basistyles simple, very long, slender and tapered to tips, about three times as long as broad; dististyles about 0.8 as long as basistyles, slightly incurved, slender, with pointed apices. Aedeagus with an oblique pair of double-sinuate sclerites with mesal tips snoutlike. Parameres strongly sclerotized with broad, winglike, lateral apodemes at bases, a lateral pair of L-shaped or boomerang-shaped lateral plates with blunt apices directed latero-caudad, and a submedian pair of nearly straight processes of same thickness, but about twice as long, with pointed apices.

Type.—In collection University of São Paulo, Brazil, ♂, Brazil, Rio de Janeiro, Estrada Rio-São Paulo, km. 47.

Material examined.—Georgia: Thomasville, May 15–30, 1949, Palmer, 1 ♀.

Florida: Leesburg, Lake County, Aug. 7, 1949, Braddock, 2 ♀♀; Panama City Beach, May 6, 1949, McElvey, 3 ♂♂, 1 ♀; Santa Rosa Island, Escambia County, June 7, 1949, Butler, 1 ♂, 1 ♀.

Louisiana: New Orleans, May 27, 1947, Van Beeck, 6 ♂♂.

Honduras: La Ceiba, Aug. 6, 1916, Dyer, 1 ♂.

Surinam: Moengo, Nov. 10, 1947, Stage, 1 ♀.

Remarks.—Closely related to *S. (S.) beckae*, new species, which it resembles closely in the brown mesonotum with silvery pruinosity and strong anterior spinose tubercle and brownish infuscated and spotted wings, but *beckae* differs in lacking the third dark spot at apex of first radial cell and the ventral batonnets on fifth tarsal segment, and the body hairs are not nearly so well developed.

16. *Stilobezzia (Stilobezzia) sybleae*, new species

FIGURE 12, c

Diagnostic characters.—A small, shining, brown species with dusky, yellow legs; wing hyaline with a prominent beadlike swelling of vein R_{4+5} near apex of second radial cell; hind tarsi with fifth segment and claws greatly reduced.

Description.—FEMALE: Length 1.5 mm., wing 1.3 mm. by 0.5 mm. Head shining brown, clypeus and antennal pedicel yellowish, antennal flagellum and palpi dusky. Thorax polished brown, mesonotum with sparse black hairs in rows; scutellum with four marginal hairs. Pleura, coxae, midfemur, hind femur, and tibiae dusky, yellowish brown; all of forelegs, midtarsus, and hind tarsus lighter yellowish. Proportions of segments of hind leg as in table 1; basitarsi unspined; fifth segment with a pair of black ventral batonnets near base; claws slender and unequal, normal on forelegs and midlegs with outer claw as long as fifth segment, the inner a third as long, on hind legs with fifth segment half as long and claws only a fourth as long as on forelegs and midlegs.

Wings grayish hyaline, without macrotrichiae, anterior veins brownish yellow. First radial cell a fourth as long as second, latter to five-eighths wing length; vein R_{4+5} on distal half of second radial cell with an oval beadlike swelling; crossvein r-m short, petiole of media about three times as long as crossvein. Halteres brown. Abdomen shining brown, very convex dorsally and somewhat petiolate at base.

MALE: Ninth sternite a slender anterior band, the posterior membrane spiculate; ninth tergite rounded, the apicolateral lobes reduced. Basistyle broad, with a large triangular, flattened, sclerotized lobe about midway of mesal margin; dististyle nearly as long as basistyle, incurved, gradually tapered to slender apex. Aedeagus with a pair of slightly oblique, long, very slender, sclerotized bars. Parameres with basal knoblike apodemes fused with anteromesal margins of inner lobes of basistyles, with slender, long, curved, sicklelike posterior blades.

Types.—USNM 60967, holotype, ♀, and allotype, Falls Church, Virginia, July 4, 1950, Wirth.

Remarks.—This species is very similar to *S. (S.) antennalis* (Coquillett), but the highly modified posterior branch of the radius and hind fifth tarsal segment and claws are quite distinctive. The West African species *S. limnophila* Ingram and Macfie, 1922, is very similar in coloration and in the structure of the male genitalia, but since the female is unknown, the wing and tarsal features cannot be compared with those of *sybleae*. *Parabezzia poikiloptera* Ingram and Macfie, 1922, from West Africa, which is a *Stilobezzia* of the subgenus *Eukraiohelea*, has a remarkable thickening of the radius almost exactly like that of *sybleae*, indicating that this character is not just an aberration. This species is named for my wife, Syble Austin Wirth.

17. *Stilobezzia (Stilobezzia) thomsenae*, new species

FIGURE 12, a

Diagnostic characters.—Very closely related to, and almost indistinguishable from, *bulla* Thomsen, except for the very characteristic male genitalia.

Description.—FEMALE: Length 1.0 mm.; wing 0.8 mm. by 0.4 mm. Apparently somewhat darker brown than *bulla*, the mesonotum and scutellum concolorous; femora brownish. Otherwise as in *bulla*.

MALE: Genitalia broader than long, parts very broad and stout. Ninth sternite a narrow, anterior band, posterior membrane spiculate; ninth tergite rounded, with a submedian pair of fingerlike setose lobes about twice as long as broad. Basistyles simple, about twice as long as broad, set far apart, no inner lobes; dististyles short and stout, two-thirds as long as basistyle, with abruptly narrowed, pointed, clawlike apices. Aedeagus with anterior arms vestigial, the dorsal median sclerite a crescent-shaped, transverse bar connecting distoventral angles of basistyles. Parameres stout, with broad, lateral, winglike, basal apodemes, stems slightly knobbed at bases, stout and slightly out-curved toward apices, which are slightly flattened, expanded, rounded, and bent ventrad.

Type.—USNM 60968, holotype, ♂, Everglades City, Collier County, Fla., Feb. 7, 1950, Davidson, light trap.

Remarks.—One female from Crystal River, Citrus County, Fla., Sept. 18, 1950, Hudson, is provisionally referred to *S. (S.) thomsenae*, since it resembles the male in coloration, although it may prove to be a dark specimen of *S. (S.) bulla*. This species is named in honor of Dr. Lillian Thomsen, who has contributed much to the study of North American Heleidae.

18. *Stilobezzia (Stilobezzia) viridis* (Coquillett), 1901

FIGURE 12, *d*

Ceratopogon viridis Coquillett, Proc. U. S. Nat. Mus., vol. 23, p. 607, 1901 (♀, New Jersey).

Ceratolophus viridis, Kieffer, Genera insectorum, fasc. 42, p. 61, 1906.

Johannseniella viridis, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 227, 1914.

Hartomyia viridis, Malloch, Bull. Illinois State Lab. Nat. Hist., vol. 10, p. 342, 1915.

Stilobezzia viridis, Johannsen, Ann. Ent. Soc. Amer., vol. 36, p. 781, 1943.

Description.—FEMALE: Length 2.0 mm., wing 1.9 mm. by 0.6 mm. A bright, pale-green species; antennae and legs yellow, apex of antenna dark; distal fourth of hind femur and narrow apex of hind tibia black; abdomen with a black band across distal half of third tergite and a pair of large black spots on fifth tergite. Wings brownish hyaline, anterior veins infuscated. Proportions of segments of hind leg as in table 1; basitarsi without spines; fifth segment with a pair of long, black batonnets at basal fourth; claws slender and very unequal, the longer as long as fifth segment, the other about half as long.

MALE: As in the female but with the usual sexual differences,

plumes of antennae dark. Genitalia very large and bulbous. Ninth sternite reduced, the posterior membrane spiculate; ninth tergite large, convex, apex rounded with low, rounded, setigerous, apicolateral lobes. Basistyle short and very broad, nearly as broad as long; dististyle about 1.2 times as long as basistyle, extreme base bulbous, distal portion very slender, irregularly bent inward, with blunt apex slightly bent outward. Aedeagus with a pair of slender, nearly straight, barlike sclerites. Parameres with reduced basal sclerotization, stems slender and slightly crooked, apices greatly expanded in a rounded lobe.

Type.—USNM 5483, ♀, New Jersey, Riverton.

Material examined.—New Jersey: Riverton, June 16, Johnson (type).

Maryland: Cabin John, May 26, 1943, Cortes and Townes, 2 ♂♂; Glen Echo, June 30, 1929, Bridwell, 1 ♂.

Florida: Leesburg, Lake County, Aug. 7, 1949, Braddock, 1 ♀.

Texas: Kirbyville, May 20, 1908, Tucker, 1 ♂.

Remarks.—*S. glauca* Macfie from Brazil and the southeastern United States is closely related to *viridis*, but has the antennae and wings infuscated, the mesonotum dark, and lacks the apical black markings on the hind femur.

References

GOETGHEBUER, M.

1934. Heleidae (Ceratopogonidae). *In* Lindner, Die Fliegen der Paläarktischen Region, Lief. 78, pp. 49–94.

JOHANNSEN, O. A.

1934. New species of North American Ceratopogonidae and Chironomidae. *Journ. New York Ent. Soc.*, vol. 42, pp. 343–353.

1943a. Two new species of American Ceratopogonidae (Diptera). *Ann. Ent. Soc. Amer.*, vol. 36, pp. 761–762.

1943b. A generic synopsis of the Ceratopogonidae (Heleidae) of the Americas, a bibliography, and a list of the North American species. *Ann. Ent. Soc. Amer.*, vol. 36, pp. 763–791.

1946. Some new species of Nematocera Diptera from Guam. *Bull. Bishop Mus.*, No. 189, pp. 189–193.

LANE, J.

1947. Espécies Brasileiras de *Stilobezzia* (Dipt., Ceratopogonidae) e *Zygoneura stonei* nov. nom. (Dipt., Mycetophilidae). *Rev. Ent.*, vol. 18, pp. 197–214, 9 figs.

MACFIE, J. W. S.

1935. Ceratopogonidae (Dipt.) from the river Amazon. *Stylops*, vol. 4, pp. 49–56, 2 figs.

MEILLON, B. DE

1938. Notes on African Ceratopogonidae (Diptera). *Proc. Ent. Soc. London*, ser. B, vol 7, pp. 266–270.



Wirth, Willis Wagner. 1953. "Biting midges of the heleid genus *Stilobezzia* in North America." *Proceedings of the United States National Museum* 103(3316), 57–85. <https://doi.org/10.5479/si.00963801.103-3316.57>.

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