

Studies of the Genus *Scaphoideus* (Homoptera-Cicadellidae)

Part I—Seventeen New North American Species

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Studies of the species of *Scaphoideus* occurring in North America have previously been made by Professor Herbert Osborn¹ ² and Dr. F. D. Ball³ both of whom have used wing venation and coloration as the principal bases for classification. Characters found in the external genitalia of both the male and female have been used to some degree in specific classification but these unfortunately are group characters for the most part and are specific only in a few cases. A detailed study of the internal male characters has shown these to be excellent specific characters and has also demonstrated that face color and in some cases rather definite color patterns or types of color patterns may represent two or more species which are quite different in genital characters. Certain color patterns seem to be quite specific.

The first North American species of this group described by Say⁴ was named *Jassus immistus* and although the type has long since been destroyed, this name has been applied to and commonly accepted as the name of one of our common species. There is no mistaking the fact, however, that several species, because of similar color patterns and external characters, have been confused and placed under this name. As a starting point, therefore, in attempting to define the characters of the species of the genus it would seem fundamental to erect a neotype to represent this species and define it as a basis of comparison for the discussion and description of other species and for future studies.

Scaphoideus immistus (Say)

Jassus immistus Say, Acad. Nat. Sci. Phila. 6: 306, 1831.

A specimen has been chosen to fit the color description as given by Say.

Genitalia: Male plates about twice as long as wide, convexly rounded and somewhat narrowed but with broadly rounded spines. Styles slightly constricted near base, then convexly rounded to apical third which is abruptly narrowed to about one third its width, the apex curved strongly outwardly. Oedagus in ventral view with two long narrow parallel processes pointed at apices. In lateral view the oedagus in long and slender slightly curving ventrally and pointed at apex. A rather short dorsal process, bifurcate at

¹ Jour. Cinc. Soc. Nat. Hist. 19: 187-209, 1900.

² Ohio Naturalist 11: 249-261, 1911.

³ Jour. Wash. Acad. Sci. 22: 9-19, 1932.

⁴ Acad. Nat. Sci. Phila. 6: 306, 1831.

apex arises at about one third its length and extends dorsally and caudally. The bifurcate processes at apex are short, truncate and widely divergent.

Neotype male, Covington, Tennessee, June 18, 1915, (DeLong). In collection of senior author.

Scaphoideus dilatus sp. nov.

Resembling *immistus* in form and general appearance but darker in color and with distinct genitalia. Length 5.5-6 mm.

Vertex bluntly, broadly angled, as long on middle as basal width between eyes.

Color: Face pale brown with one complete line below margin of vertex. Vertex pale, transverse band orange red, rather broad. Pronotum dark brown, scutellum paler. Elytra brown, veins black, apices black. Two very small areolar spots on clavus and three or four in anteapical cells white.

Genitalia: Female last ventral segment strongly, roundedly produced and broadly margined with black. Male plates short and broad, shorter than combined basal width, convexly rounded to broadly rounded apices. Styles with long, narrow apical processes curved outwardly at apex. Oedagus in lateral view long, straight, gradually enlarged on apical third to apex which is sharp pointed and formed by the dorsal margin curving to straight ventral margin. Dorsal process arising at about one-third its length, extending caudally, apical end with two short divergent processes.

Described from a series of fourteen female and two male specimens from Hartstown Bog, Penna., collected Sept. 12, 13, 14, 1919, (DeLong); a female from Somerville, N. J., July 31, 1920 and two males, July 23, 1920, (Sanders); three males, North East Penna., August 2, and 19, 1919, (DeLong).

Holotype male (Hartstown Bog, Penna.), allotype female and male and female paratypes in senior author's collection. Male and female paratypes in Illinois State Natural History Survey Collection.

Scaphoideus crassus sp. nov.

Resembling *dilatus* in form but with different coloration and genitalia. Length 5-5.5 mm.

Vertex strongly produced, bluntly angled, almost as long at middle as basal width between eyes.

Color: Pale brownish with dark arcs on upper portion of face. Vertex white with slender marginal line, median transverse band almost straight, scarcely produced at middle and bright orange red in color. Pronotum brown with a broken, pale anterior band. Scutellum pale orange. Elytra brown marked with black and with very few pale areas. Inner clavus almost black with two small pale spots on apical half. Veins dark, apex broadly black.

Genitalia: Female last ventral segment strongly produced, black marked on apical portion and slightly notched at apex.

Male plates one third longer than combined basal width, narrowed to apices which are blunt and rounded. Styles narrowed so that apical third is

narrow and curved outwardly. Oedagus in lateral view long, rather broad, apex blunt, with a ventral pointed tip. At about one third its length it is decidedly enlarged and slightly narrowed beyond this point. The dorsal process arises at the point of enlargement, is rather slender, broadened and bifurcate at apex.

Described from a male and female specimen collected at Somerville, N. J., July 23, 1920 by J. G. Sanders, which are unique in color pattern and male genitalia. Holotype male and allotype female in collection of the senior author.

Scaphoideus curvatus sp. nov.

Resembling *dilatatus* in general form but with distinct genitalia. Length 5 mm.

Vertex blunt at apex, almost as long at middle as basal width between eyes.

Face dark brown with pale arcs above. Vertex yellow, with conspicuous marginal line, median transverse band between eyes dark reddish brown rather broad and produced at middle. Pronotum dark brown with a pale transverse band. Scutellum, apical half pale yellow. Elytra brown, veins dark brown with very pale areas. Two very small ones near center of clavus along commissural line.

Genitalia: Female last ventral segment produced, rounded at apex and black margined.

Male plates slightly longer than combined width at base, apices broadly rounded. Styles with slender, outwardly curved apical third. Oedagus in lateral view narrowed at about half its length, produced, ventrally curved at apex with tip pointed. Dorsal process arising from enlarged portion broadened apically and bifurcate.

Described from two male and one female specimens collected at New Haven, Illinois, June 23, 1936 by Ross and DeLong.

Holotype male, allotype female and paratype male in Illinois State Natural History Survey collection, Urbana, Illinois.

Scaphoideus camurus sp. nov.

Resembling *immistus* in form, color, and general appearance but with distinct genitalia. Length 5.5-6 mm.

Vertex strongly produced, bluntly angled, as long at middle as basal width between eyes.

Color: Face yellow, at least two complete dark lines below margin of vertex. Vertex white, a rather narrow tawny band between eyes, slightly produced at middle. Pronotum dark with a pale transverse band behind eyes. Elytra pale brown, veins darker, intensity of dark markings variable, usually with dark markings at least on apical portion.

Genitalia: Female last ventral segment slightly roundedly produced and black margined. Male plates comparatively narrow at base, a little longer

than combined basal width, convexly roundly narrowed to rather narrow, rounded apices. Styles gradually narrowed from base to form long, pointed apices which are tapered and curve outwardly at apex. Oedagus in lateral view long, almost straight, tapered toward apex where it is bent sharply ventrally and pointed. Dorsal process long and slender enlarged at apex, anterior process at apex very small, almost wanting.

Described from a series of three female and one male specimens collected at Port Royal, Pa., July 24, 1918 by J. G. Sanders, and one male, Katnak, Illinois, June 14, 1934, Ross and DeLong. Holotype male, allotype female and female paratypes in collection of the senior author. Male paratype in collection of Illinois State Natural History Survey.

Scaphoideus flexus sp. nov.

Resembling *immistus* in form and general appearance but with distinct male genitalia. Length 5.5 mm.

Vertex broad, bluntly angled, about one-fourth wider between eyes than length at middle.

Color: Face tawny with dark arcs on upper portion. A narrow dark line just beneath margin of vertex below which is a white band. Vertex with a slender dark line above margin not reaching eyes. Vertex white with a rather broad tawny band between the eyes scarcely produced anteriorly. Pronotum tawny with paler band on disc. Elytra brownish marked with darker brown and with veins darker.

Genitalia: Female last ventral segment slightly convexly narrowed to rather prominent angles between which the posterior margin is concavely, roundedly produced either side of a central produced lobe which is black margined. Male plates about one-fourth wider than combined basal width, straight on inner margin, convexly roundedly narrowed on outer margins to form blunt, rounded apices which are about half the basal width. Styles broad at base and constricted on outer margin, then gradually tapering to narrow rounded apices which bear a pointed tooth on outer margin. Oedagus in lateral view long, directed caudally, apical half gradually bending ventrally, apex enlarged, truncate with a ventrally pointed tooth on ventral margin. Dorsal process arising at about half its length, bifurcate at apex and concavely rounded between bifurcate tips.

Described from a series of five female and one male specimens, Hummelstown, Penna., June 28, July 6, 1919 and Sept. 8, 1920, (Knull); one male, Enterline, Penna., July 15, 1921, Guyton; 2 males, Tullahoma, Tenn., August 2, 1915, (DeLong); one male, Clarksville, Tenn., July 30, 1917, (DeLong); one male, Ashley, Illinois, August 7, 1917; one male, Jonesboro, Ill., July 31, 1930, (Mohr & DeLong); one female, Marshall, Ill., Sept. 27, 1934, (Frison & Ross); two females, Elizabethtown, Ill., June 27, 1927, (at light); one female, Shawneetown, Ill., June 21, 1927, (at light); one male and one female, Du Bois, Ill., August 9, 1917; one male, White Heath, Ill., June 29, 1917; one male, Dolson, Ill., July 24, 1936, (Mohr & DeLong).

Holotype male, allotype female (Hummelstown, Pa.) and male and female paratypes in senior author's collection. Male and female paratypes in Illinois State Natural History Survey Collection.

Scaphoideus radix sp. nov.

Resembling *immistus* in form and general appearance but darker in color and with distinct genitalia. Length 4.5-5 mm.

Vertex broadly bluntly rounded, one-fifth wider between eyes than median length.

Color: Face pale, dusky either side next eyes and with dusky arcs above. A fine sinuate dark line on margin of vertex, a conspicuous pale band beneath. Another fine dark line just above ocelli almost touching marginal line at center. Vertex pale with a narrow, conspicuous brown band between anterior margins of eyes, which is slightly produced at middle and is bordered with reddish brown on its posterior margin. Pronotum dark brown, black behind either eye, a white cross band on anterior portion of disc. Scutellum dusky anteriorly, posterior half pale, a black dash either side of apical angle. Elytra pale, mottled with brown, veins brown. A large brown spot at apex of first claval vein and a large one on the disc.

Genitalia: Female last ventral segment with posterior margin slightly concave either side of a central broad produced lobe which is blunt at apex and slightly bifid. Male plates about as long as combined basal width, only slightly narrowed to apices which are broadly rounded. Styles abruptly narrowed at about two-thirds their length to form long slender processes on the inner margin which curve outwardly. Oedagus in lateral view long, slender on apical half to near apex which is enlarged into a foot-shaped structure with the heel on the dorsal margin and the long pointed toe extending ventrally. A long slender bifurcate dorsal process arises about one-third the distance from base and extends dorsally and caudally.

Described from a male and two female specimens collected in an open woodland at Wilmington, Illinois, August 20, 1935 by H. H. Ross and the senior author. Male holotype and female allotype in Illinois Natural History Survey collection. Female paratype in collection of the senior author.

Scaphoideus pullus sp. nov.

Resembling *melanotus* and previously confused with it but differing by having face paler, clavus darker with smaller pale spots and with different genitalia. Length 4.5-5.5 mm.

Vertex bluntly angled, one fourth wider between eyes than median length.

Color: Face pale brown with arcs always conspicuous above. Cheeks and lorae much darker brown or black. Vertex pale yellow, with a narrow black marginal line and a narrow median reddish band, usually straight, between eyes. Pronotum paler at middle, darker either side, scutellum yellow, basal angles dark brown. Elytra pale brown heavily infuscated, inner clavus appearing to have a much darker stripe along inner margin with two paler spots on posterior half. Very few pale whitish areas.

Genitalia: Female last ventral segment produced and rounded, posterior two thirds black. Male plates shorter than combined width slightly narrowed to apex which is broadly rounded. Styles with apices narrowed, curved out-

wardly and sharply pointed. Oedagus in lateral view enlarged on apical fourth curved ventrally near apex and with ventral bluntly pointed apex.

Described from four male and three female specimens. Hummelstown, Penna., June 28, and July 6, 1919, (Knull); one female each at Waynesburg, Penna., July 17, 1919, (DeLong); Hartstown Bog, Penna., Sept. 4, 1919, (DeLong); Cameron, Wis., August 7, 1916, (DeLong); Madison, Wis., July 9, 1916, (DeLong); one male Landisburg, Pa., June 30, 1919, (Sanders); one male, Washington, D. C., July 3, 1919, (Sanders); one female each from St. Joseph, Illinois, June 27, 1915; Karnak, Illinois, June 14, 1934, (Ross and DeLong); Metropolis, Illinois, August 20, 1916; Dubois, Illinois, August 9, 1917; Hicks Branch, Eirhorn, Illinois, June 24, 1932, (Ross, Dozier, and Park).

Holotype male (Washington, D.C.), allotype female (Hummelstown, Penna.) and male and female paratypes in author's collection. Female paratypes in Illinois State Natural History Survey Collection, Urbana, Illinois.

Scaphoideus auctus sp. nov.

Resembling *obtusius* in genital structures but with a darker distinct color pattern. Length 5 mm.

Vertex bluntly angled, one-fourth wider between eyes than length at middle.

Color: Face yellowish, one complete dark line below margin of vertex, and several arcs. Vertex pale with transverse band orange in color, marginal band on anterior portion of pronotum and scutellum pale. Elytra gray, heavily marked with dark brown or black, veins very dark.

Genitalia: Female last ventral segment rather strongly, roundedly produced, apex faintly notched. Male plates a little longer than combined basal width, broadly rounded at apex. Apical third of styles long, slender, tapering to attenuated, outwardly curved apices. Oedagus in lateral view long, rather broad, enlarged at apex and obliquely sloping to form a caudally, ventrally directed bluntly pointed apex. Dorsal process rather short and broad, concave at apex forming two short thick divergent processes.

Described from a series of four female and two male specimens collected at Waynesburg, Pa., July 17, 1919, (DeLong); two males, Hummelstown, Penna., June 22, 1919, (Knull); one male, Madison, Wis., July 9, 1916, (DeLong); seven males, Urbana, Illinois, two on July 5, 1915, one on July 4, 1916, two on July 27-30, 1917, one on June 20, 1915, one on June 30, 1916, one on July 4, 1916; and two females on July 18, and August 28, 1917; one male and two females, Kankakee, Illinois, July 20, 1934, (Ross and DeLong); one male and one female, Grafton, Illinois, June 26, 1934, (Ross and DeLong); one male each from Vienna, Illinois, June 14, 1934, (Ross and DeLong); Herod, Illinois, June 20, 1935, (Ross and DeLong); Apple River Canyon, Illinois, July 11, 1934, (Ross and DeLong); Kampsville, Ill., June 27, 1934, (Ross and DeLong); Volo, Illinois, July 27, 1934, (Ross and DeLong); one female, Rock Island, Illinois, July 7, 1934, (Ross and DeLong).

Holotype male (Waynesburg, Penna.) allotype female (same) and male and female paratypes in author's collection. Male and female paratypes in Illinois Natural History Survey Collection, Urbana, Illinois.

Scaphoideus baculus sp. nov.

Resembling *luteolus* in general appearance and coloration, but paler, more tawny, and with distinct genitalia. Length 4.5-5 mm.

Vertex convexly rounded, broadly bluntly angled, a little wider between eyes than length at middle.

Color: Face tawny, margin of vertex white with two conspicuous black lines below, and a marginal line above extending between ocelli. Almost entire vertex covered with a broad, tawny band, leaving only a pale anterior narrow portion anterior to ocelli and a broad v-shaped median portion behind. Pronotum usually darker with traces of a white cross band just back of eyes. Scutellum tawny, apical third white or paler than basal portion. Elytra tawny veins brown, almost devoid of areolar spots. Brown spots at apex of first claval vein, at apex of clavus and apex of elytra.

Genitalia: Female last ventral segment slightly narrow caudally to form rather prominent angles between which the posterior margin is concavely roundedly produced to form a pair of prominent black teeth separated by a V-shaped notch. Central apical portion of segment black. Male plates about as long as combined basal width convexly rounded to bluntly angled apices. Oedagus in lateral view extending caudally, straight and slender, three-fourths its length where it is abruptly bent so the apical portion extends ventrally. The apical fourth is sometimes about uniform in width and rounded at the apex and sometimes tapered to a pointed apex and with a small dorsal spur at the point where it bends.

Described from a series of 16 male and 14 female specimens. Two males are from Harrisburg, Pa. collected July 7, 1918 by J. G. Sanders. One male was collected at Columbus, Ohio, July 28, 1928. One male was collected at each of the following: Alton, Ill., July 19, 1932, (Ross and Dozier); Dolson, Ill., July 24, 1936, (Mohr & DeLong); Urbana, Ill., July 17, 1934, (DeLong); Urbana, Ill., Aug. 2, 1916 and Sept. 28, 1915. Seven males and six females were taken at Urbana, Ill. Aug. 28, 1917, and one male and female on July 23, 1917. One female was collected on each of the following dates: Dubois, Ill., July 9, 1909; Urbana, Ill., Aug. 9, 1910, (Malloch); Aug. 30, 1914, Aug. 4, 6, 8, 1916 and Sept. 3 and 6, 1916.

Holotype male, Harrisburg, Pa. and male and female paratypes in senior author's collection. Allotype female, Urbana, Ill., Aug. 30, 1914, and male and female paratypes in Illinois Natural History Survey collection, Urbana.

Scaphoideus brevidens sp. nov.

Resembling *immistus* in form and general appearance but with genitalia resembling *opalinus*. Length 5.5 mm.

Vertex convexly rounded, broadly, bluntly angled, about one-fifth wider between eyes at base than length at middle.

Color: Face pale with a series of dark arcs above. Margin of vertex white with a narrow line just above and one just below. The transverse band between eyes on vertex narrow, produced at middle and pale brownish. Pronotum brownish, scutellum paler on apical half. Elytra pale, veins darker, often almost black especially at apex.

Genitalia: Female last ventral segment with posterior margin convexly rounded and slightly notched at apex. Male plates one-third longer than combined basal width, convexly rounded to rather broad, rounded apices. Styles long, basal two-thirds rather broad then convexly roundedly narrowed

to form long, slender outwardly curved processes on inner margin. Oedagus in lateral view with a long slender ventral process which is bifid on apical third which processes are not as long as the dorsal portion of oedagus. Dorsal process arising at about two-thirds its length and extending dorsally, narrow at base, broadened to apex which is concavely rounded between a small anterior tooth-like projection and a posterior finger-shaped process which curves dorsally and anteriorly.

Described from four female and three male specimens collected at Clarksville, Tennessee during July and August 1915, DeLong; a male and two females from Paris, Tenn., June 16, 1915; a male and female from Moscow, Tenn. June 25, 1915, (DeLong); one female from each of the following: Medina, Wisconsin, Aug. 23, 1916, (DeLong); Bells, Tenn., June 16, 1915, (DeLong); Amery, Wis., Aug. 13, 1916, (DeLong); Marshfield, Wis., Aug. 20, 1916, (DeLong); Castalia, Ohio, Aug. 8, 1914, (DeLong); Columbus, Ohio, Oct. 16, 1921, (DeLong); Bellaire, Ohio, Aug. 24, 1914; Brookings, S. D., Aug. 20, 1921, (Severin); two females, Louisiana, 1910; two males, Camp Douglas, Wis., Aug. 1, 1916, (DeLong); one male each Knoxville, Tenn., Sept. 14, 1915, (DeLong); Merrilan, Wis., Aug. 5, 1916, (DeLong); Bridgeport, Ohio, Aug. 30, 1915; seven females and six males, Hartstown, Penna., Aug. 12 and 13, 1919, (DeLong); four males and three females, Waynesburg, Penna., July 16, 1919, (DeLong); five females, State College, Penna., July 25, 1917, (Sanders); five males, Port Trevoiton, Penna., July 26, 1919, (Sanders); four males and 18 females North East, Penna., July and Aug., 1919, (DeLong); twenty four females and three males, Alton, Illinois, June 27, 1934, (Ross and DeLong); one male and five females, Dolson, Illinois, July 18, 1934, (Ross & DeLong); two males from Zion, Illinois, July 25, 1934, (Frison & DeLong); two males, Palos Park, Illinois, Aug. 21, 1934, (DeLong and Ross); one male and five females, Volo, Illinois, July 27, 1934, (Ross & DeLong).

Holotype male (Clarksville, Tenn.) allotype female (same) and male and female paratypes in senior author's collection. Male and female paratypes in Illinois State Natural History Survey Collection, Urbana, Illinois.

Scaphoideus diutius sp. nov.

Resembling *immistus* in form and general appearance but with blunt vertex and distinct genitalia. Length 5 mm.

Vertex bluntly and rather broadly angled, basal width between eyes a little greater than median length.

Color: Face yellow, at least one complete dark line below margin of vertex. Vertex pale, a rather broad tawny band between eyes scarcely produced at middle. Pronotum with a rather faint transverse band back of eyes. Elytra pale tinged with brown, veins dark brown.

Genitalia: Female last ventral segment with posterior margin roundedly produced and broadly black margined. Male plates longer than combined basal width, scarcely narrowed to apices which are broadly rounded. Styles abruptly narrowed and produced on apical third as narrow processes which curve slightly outwardly. Oedagus in lateral view similar to *brevicens* but with the apical ventral processes longer than dorsal process, and the dorsal process with a more slender curved finger process on posterior margin than in *brevicens*.

Described from four male specimens collected at Tobyhanna, Pa., Aug. 14.

1920 by J. G. Sanders, and two males and one female collected at Starved Rock, Illinois, July 14, 1932 by Dozier and Park. Holotype male, Tobyhanna, Pa., and male paratypes in collection of senior author. Allotype female, Starved Rock, Ill., and paratype males same place and date in State Natural History Survey Collection, Urbana, Illinois.

Scaphoideus nigrellus sp. nov.

Resembling *sensibilis* in coloration but smaller and with genitalia more closely related to *opalinus*. Length 4.5-5 mm.

Vertex strongly produced and bluntly angled, a little longer on middle than basal width between eyes.

Color: Beneath black, face black with three pale arcs below vertex. Black of face extending up over margin of vertex. Vertex white with a broad black band between eyes strongly produced anteriorly at middle and shading to brown posteriorly. Pronotum black with an interrupted white transverse band behind eyes. Elytra brownish, heavily marked with black, varying in intensity but with a few white *areolar* spots. The two on clavus along commissural line usually conspicuous.

Genitalia: Female last ventral segment roundedly produced and with a large black area on median apical portion. Male plates broad and slightly narrowed to broadly rounded apices. Oedagus in lateral view with a long slender basal portion extending almost caudally with a bulb-like portion arising at about half its length extending dorsally and caudally. The apical end is broad and concavely excavated, the outer margins with projecting points. The apical portion of lower oedagus bifid.

Described from a series of seven females and five male specimens collected at Dolson (Rocky Branch) Illinois, July 18, 1934 by Ross and DeLong, and 59 female and 16 male specimens from the same locality on July 24, 1936 by Mohr and DeLong. Three females and one male, Urbana, Illinois, September 10, 1934, (H. H. Ross); one male, Wilmington, Ill., Aug. 20, 1934, (Ross and DeLong); and three females, Danville, Ill., Aug. 17, 1934, (Ross and DeLong). These occur on the *Solidago* herbaceous habitat of the flood plain woods.

Holotype male and allotype female, Dolson, Illinois, July 18, 1934 and male and female paratypes in the collection of Illinois Natural History Survey, Urbana, Illinois. Male and female paratypes in collection of senior author.

Scaphoideus amplus sp. nov.

Form and general appearance of *dilatatus* but with distinct genitalia. Length 5.5 mm.

Vertex broadly, bluntly angled, a little wider between eyes than length at middle.

Color: Face pale brown, dark line above sometimes faint in color. Vertex yellowish, transverse band on disc of vertex narrow and sometimes faintly marked with fuscous. Elytra dull or pale brownish with few white areolar spots, veins dark brown.

Genitalia: Female last ventral segment slightly roundedly produced. Male

plates longer than combined basal width, sides convexly rounded to broadly rounded apices. Styles with apical third long, slender, extending caudally, apex slightly turned outwardly. Oedagus in lateral view resembling *brevidens* but with dorsal process triangular with the caudal finger-like structure produced, but the projection on the anterior margin lacking.

Described from a series of five females and three males collected at Hartstown Bog, Pa., August 12, 13 and 14, 1919, D. M. DeLong; one male Port Trevoyton, Pa., July 26, 1918, J. G. Sanders; and one female Presque, Id., Pa., Aug. 29, 1919, D. M. DeLong. Holotype male and allotype female Hartstown Bog, August 13, 1919 and male and female paratypes in collection of senior author.

Scaphoideus scelestus sp. nov.

Resembling *melanotus* in color pattern but with genitalia resembling *opalinus*. Length 5.6 mm.

Vertex bluntly and broadly angled, a little wider between eyes at base than median length.

Color: Superficially resembling *melanotus* in color. Face pale, with two complete dark lines and broken arcs on upper portion. Vertex, pronotum and scutellum usually pale in color, transverse band between eyes narrow and paler than normally. Elytra heavily infuscated with dark brown or black, anterior half appearing solid black without areoles. Two areoles on middle of clavus, and a few in antepical cells milky white.

Genitalia: Female last ventral segment roundedly produced and black margined. Male plates short and broad, only slightly longer than combined basal width, scarcely narrowed toward apices which are broadly rounded. Styles abruptly narrowed at a little more than half their length, apices long, slender, directed caudally and curved outwardly at apex. Oedagus in lateral view similar to *brevidens*, basal portion slender, straight, dorsal process arising near apex, pointed at base broadened toward apex which bears a long curved finger-like process on caudal apical extremity which is curved dorsally.

Described from a series of one female and six male specimens collected at Waynesburg, Pa., July 16 and 17, 1919, D. M. DeLong; one male Port Royal, Pa., July 24, 1918, J. G. Sanders; one male Harrisburg, Pa., July 7, 1918, J. G. Sanders; and one male Marietta, Pa., July 12, 1919, T. L. Guyton. Holotype male, allotype female (Waynesburg, Pa.) and male paratypes in senior author's collection. Male paratype in State Natural History Survey Collection, Urbana, Illinois.

Scaphoideus bifurcatus sp. nov.

Resembling *angustus* in size and general appearance but with distinct and unique genital structures. Length 5.5-6 mm.

Vertex strongly produced and rather sharply angled, a little wider between eyes than length at middle.

Color: Face pale with two heavy lines above. Vertex pale in color, transverse band pale tawny, rather indistinct. Pronotum and scutellum pale tawny.

Elytra white tinged with brown, veins dark brown especially on posterior half. Apex dark brown.

Genitalia: Female last ventral segment with posterior margin roundedly produced, a small black spot on middle of posterior margin. Male plates a little longer than combined basal width concavely narrowed on apical half to form pointed apices. Apical third of styles long, narrow, and curved. Oedagus with a pair of processes arising near base, which are divergent to near apices where they are abruptly bent inwardly and cross just before their apices. A long slender median process arises at the base of the dorsal process and lies ventrally between the two arms of the oedagus extending almost to the point of their intersection where it bears a pair of laterally divergent processes.

Described from two male and one female specimens taken at Ohio Pyle, Pa. One male collected July 20, and a male and female on July 19, 1919, D. M. DeLong; a male from Port Royal, Pa., July 24, 1918, J. G. Sanders; and two males from Drumgold, Pa., one July 16, 1920, T. L. Guyton, and one July 12, 1918, J. G. Sanders. Holotype male, Ohio Pyle, July 20, 1919; allotype female and male and female paratypes in collection of senior author.

Although this species cannot easily be distinguished from others by external characters it is unique in regard to internal structures.

Scaphoideus frisoni sp. nov.

Resembling *carinatus* in general appearance but smaller and with distinct genitalia. Length 6 mm.

Vertex strongly produced, apex blunt, length at middle equalling basal width between eyes.

Color: Face brownish, darker next eyes with a series of broken arcs and two broad black bands beneath margin of vertex. Vertex white, marginal line above interrupted at middle and widened either side at apex. Transverse band with central portion produced and ends sloping anteriorly. Scutellum pale, basal angles darker. Elytra white, mottled with brown. Veins and apex dark brown.

Genitalia: Female last ventral segment broadly roundedly produced and slightly keeled at middle. A black spot on apex of margin. Male plates about as long as combined basal width, convexly rounded on basal portion, concavely rounded to form blunt, pointed apices. Apical half of styles are long, narrow attenuated processes curved at base and directed caudally. Oedagus in ventral view with a pair of long processes arising near base which are separated near base, almost contiguous near middle then are again separated and cross each other so that the apical fourth is directed laterally and is slender and tapered at apex. Dorsal process with a longer, more slender apical portion than in *veterator*. A broad but prominent tooth on apex of pygofer. This will easily and readily distinguish it from closely allied species.

We take pleasure in naming this species for Dr. T. H. Frison who has collected many interesting species of Cicadellidae in Illinois.

Described from a series of 13 female and one male specimens collected at Trout Lake, Wisconsin, Sept. 7, 1916, (DeLong); 2 females, Amery, Wis., Aug. 1916, (Sanders & DeLong); 2 females, Pembine, Wis., Sept. 4, 1916, (DeLong); one female, Marshfield, Wis., Aug. 20, 1916, (DeLong); one female, Oconto Co., Wis., Sept. 20, 1912, (Sanders); eight female specimens, Trout Lake, Wisconsin, Aug. 12, 1936, (DeLong); one female, Cranberry Lake, N. Y., July 8, 1920, (Sims); five male and one female, Manada Gap, Penna., July 3, 1918, (Knull & Kirk); four females and one male, N. Bloomfield, Penna., July 16, 1920, (Sanders); one female, Port Matilda, Penna., Aug. 24, 1918, (Sanders); a male and female, Ocean City, Md., June 18, 1918, (Sanders); five female specimens, Penfield, Penna., Aug. 24, 1918, (Sanders); and a male and female, Orono, Maine, July 31, 1913 and Aug. 15, 1913, (Osborn).

Holotype male and allotype female (Manada Gap, Penna.) and male and female paratypes in senior author's collection. Male and female paratype in Osborn collection. Female paratypes in Illinois State Natural History Survey collection.

***Osbornellus borealis* sp. nov.**

Resembling *scalaris* in coloration and general appearance but smaller and with distinct genitalia. Length 5 mm.

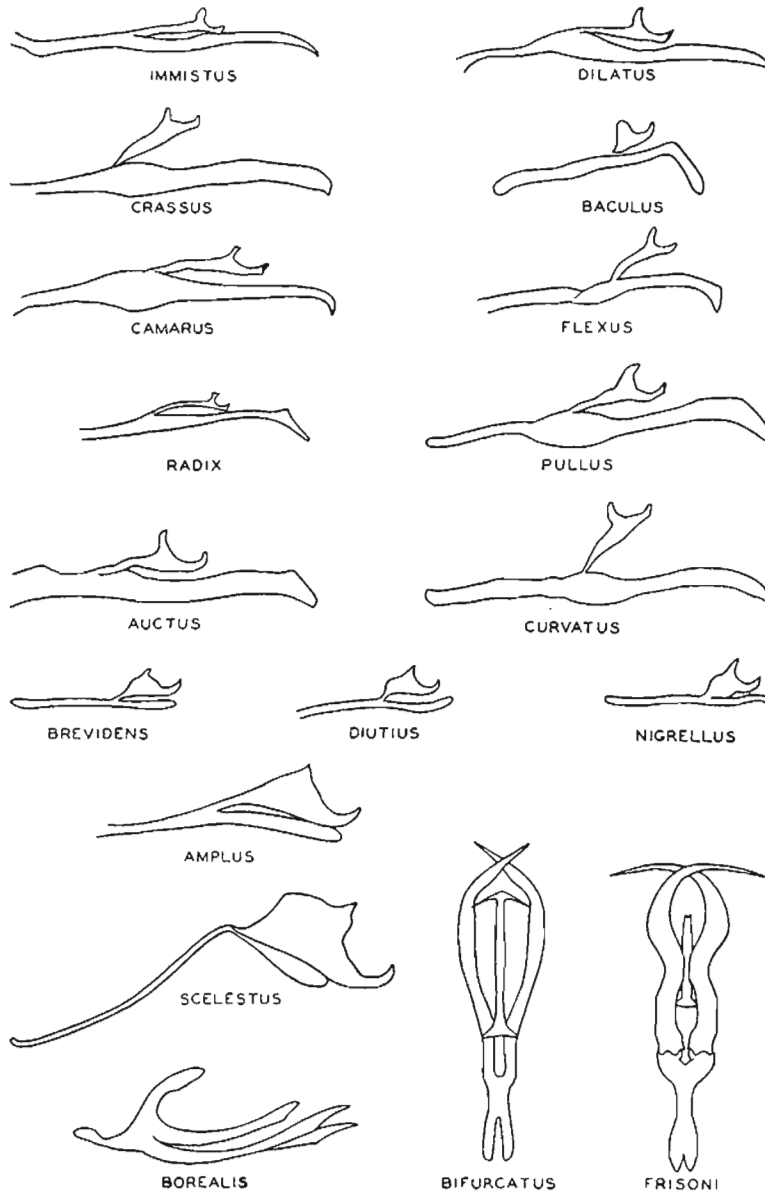
Vertex rather sharply angled, as long at middle as basal width between eyes.

Color: Similar to *scalaris* but without reddish spot above apex. Vertex pale, the waved brown line just back of apex and a rather distinct band curving forward at center, extending between ocelli, brown. Pronotum and scutellum brown, finely mottled with yellowish. Elytra white, veins brown. Inner ends of claval veins, apex of clavus, costal anteapical veinlets, broadly brown. Central area of cells on disc and of second and third anteapical cells brown.

Genitalia: Male plates long, tapering to attenuated apices. Styles broad at base gradually narrowed to apical half which is very slender and directed caudally. Oedagus in ventral view with paired ventral arms overlapping just before apices. In lateral view it is broad and curved near base with a dorsal spur extending dorsally and three processes, a dorsal and two ventral, arising from ventral arm of curvature, which are long and extend caudally.

Described from a single male specimen from Cranbrook, B. C., Sept. 4, 1919. Holotype male in author's collection.

ILLINOIS STATE NATURAL HISTORY SURVEY,
URBANA, ILLINOIS.



Lateral views of oedagi of male genitalia of species of *Scaphoideus* as named except in cases of *bifurcatus* and *frisoni* where the ventral view is illustrated.