NEW LAEVICEPHALUS FROM THE UNITED STATES

DOROTHY J. KNULL

Department of Zoology and Entomology, The Ohio State University, Columbus 10, Ohio

In re-examination of members of *Laevicephalus* as limited by Oman in The Nearctic Leafhoppers, 1949, the following species were found to be new.

Parts figured inner ♂ gentalia, are not further described. All types are to be deposited in the Collection of The Ohio State University unless other deposition is mentioned.

I wish to thank E. S. Ross and H. B. Leech of the California Academy of Sciences for locating and lending a specimen of *L. pupa* (Van Duzee).

Laevicephalus inconditus n. sp.

Figures 16–18

Related to *L. minimus* (O. & B.) and *L tritus* Beamer, but with distinctly different aedeaga characters.

Yellowish green. Vertex with pair of oblique fuscous dashes just below apex. Elytra subhyaline, veins yellow, margined with fuscous toward apices. Face fuscous with 7 short pale arcs either side; sutures dark. Venter and dorsum dark medially to genital segments which are light.

Vertex in ♂ blunt and about equal in length to pronotum. Head wider than pronotum, side margins very short, rounded to straight hind margin. Elytra exceeding abdomen. Vertex in ♀ rectangular, longer than pronotum.

Genitalia. Value in ♂ longer than preceding segment, bluntly triangular, Plates wider than valve at base, two and one-half times as long as valve, broad, narrowing gradually to blunt appressed apices, uniseriate spine-like setae on margins. Elongate setose pygofer exceeds apices of plates by less than half their length. Last ventral segment in ♀ a little less than twice as long as preceding; posterior margin only slightly produced on median third, sides faintly sinuate, a short slit, about one-fourth length of segment at center, with a small rounded notch either side; central notched area and ovipositor except tip black or dark brown.

Length: ♂ 3 mm; ♀ 3.5 mm.

Close relationship to *minimus* and *tritus* is shown in genitalia of both sexes. The principal difference is in the form of aedeagus. In *minimus* both branches are long and separate from the shaft; in *tritus* they are mere stubs but retain the asymmetrical placement, and in *inconditus* the upper branch is united with the shaft but for its tip.

Collected in Texas by D. J. and J. N. Knull; ♂ holotype, allotype, 7 ♂ and 16 ♀ paratypes, Chisos Mts., July 17, 1946; 1 ♂ Culberson Co., Aug. 18, 1950; and Davis Mts., 1 ♂ June 8, 1939, 1 ♂ June 21, 1949, 5 ♂ and 4 ♀ July 2, 1940, 1 ♀ July 23, 1946, 3 ♀ paratypes and 10 specimens Sept. 20, 1938.

Laevicephalus curvus n. sp.

Figures 7–9

Resembling *L. tritus* Beamer and Tuthill, but smaller and with the aedeagus twisted.

Dark tan, eyes dark, face tan with pale arcs, apex of vertex with dark arc either side almost reaching black ocelli; dorsum but for tip, median part of abdomen, ovipositor and median part of segment above it black. Elytra semihyaline, veins yellow, bordered by dark smoky cell margins.

In ♂ length of head equal to that of pronotum and to width between eyes, bluntly rectangular. In ♀ head acutely angular, less than a right angle, one-fourth longer than pronotum and than width between eyes.

Genitalia. ♂, valve a small triangle, plates broad and long with sides almost straight narrowed to broad tips sharp on median side, exceeded by pygofer by half their length. Segment of ♀ as in *tritus*, half longer than preceding, sides rounded to median third which is produced,

with short slit at middle, and angular notch either side forming four teeth which are not as deep as in *tritus*.

Length. ♂ 2.5 mm; ♀ 3 mm.

Taken in Texas by D. J. & J. N. Knull: ♂ holotype, allotype and ♀ paratype, Gillespie Co., May 7, 1946; 2 ♂ Uvalde, June 26, 1949 and May 11, 1946; 1 ♂ Val Verde Co., May 24, 1948; 2 ♂ Benchley, April 30, 1941.

Laevicephalus longus n. sp.

Figures 1–3

Near *L. obvius* Knull, but longer. The largest species of the genus.

Greenish yellow, brighter yellow in ♂, front brown with pale arcs either side, vertex with curved brown arcs either side of apex fading toward ocelli, upper dark dash of face visible from above as straight mark between apex and dark ocellus; dorsum, median part of venter to last segment and ovipositor dark. Elytra semihyaline with yellow veins, apices faintly smoky.

In both sexes vertex bluntly rectangular, as long as pronotum at middle, elytra extending well beyond tip of abdomen.

♂ valve triangular, plates long, broad, narrowed very gradually to broad, blunt appressed tips, exceeded by spiny pygofer by half their length. ♀ segment produced on median third to rounded apex, no notch, sides sinuately excavated; produced part translucent so dark ovipositor shows through it.

Length; ♀ 5.5 mm; ♂ 4.2 mm.

♀ holotype, allotype and 4 ♀ paratypes, Huachuca Mts., Arizona, August 13, 1950; 4 ♀ paratypes, 1 ♀ and 1 ♂ specimen, August 19, 1950, D. J. & J. N. Knull.

Laevicephalus vannus n. sp.

Figures 4–6

Near *L. siclus* DeL. & Dav. but larger. There is variation within a species in Laevicephalus especially in the group in which the last ventral segment in the ♀ is produced convexly rounded, chiefly in constriction at sides and indentation or creasing at apex. Because of its larger size, although the segment is similar to that figured for *L. siclus*, and since no specimens have been seen which correspond exactly to *L. austrinus* DeL. & Dav., although it agrees fairly well with the rest of the description of that species, this is considered distinct.

Yellowish white with green tinge on pronotum and scutellum. Front with pale stripe down center, and alternating pale and brown arcs. Curved fuscous arcs extend from below apex of vertex to ocelli. In ♂ a pair of dashes either side just above base midway between median line and eyes. Dorsum dark, venter dark in middle of segments, darker in ♂. Ovipositor a little darker than pygofer, especially on sides. Elytra semihyaline with yellow veins. In ♂ head as long as pronotum and as long as width between eyes; in ♀ longer than pronotum; apex of head bluntly rectangular.

♂ valve small, triangular with apex a small rounded lobe. Plates as broad at base as last ventral segment, wider than valve, extending beyond tip of valve twice its length, narrowing gradually to blunt tips separated slightly at apex, exceeded by spiny pygofer less than half their length. ♀ last ventral segment as long at sides as preceding segment, then excavated and median third roundly produced with faint indentation at apex. Top of this and preceding segment appear creased at middle.

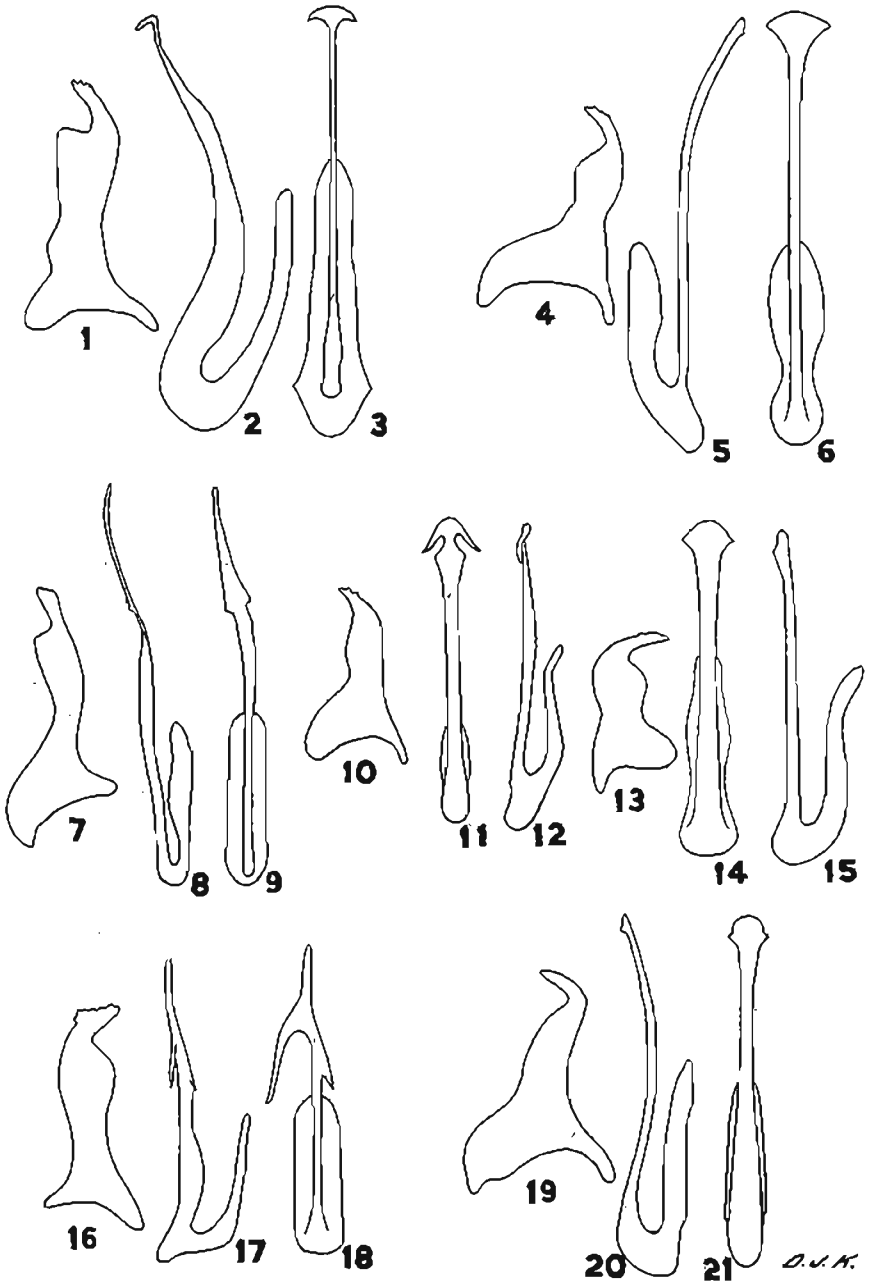
Length: ♂ 3.8 mm; ♀ 4 mm.

♂ holotype, Davis Mts., Tex., May 9, 1941; allotype and 2 ♀ paratypes, Davis Mts., Tex., June 2, 1951; 1 ♂ Val Verde Col., Tex., June 14, 1949; collected by D. J. & J. N. Knull. 6 ♂, 7 ♀ paratypes, Buffalo, S.D., June 28, 1947; 1 ♂ Martin, S.D., Sept. 11, 1948; 2 ♀ and 2 ♀ Logan, N.M., Aug. 28, 1950, collected by H. C. Severin. Paratypes in Dr. Severin's collection.

Laevicephalus exiguus n. sp.

Figures 19–21

Greenish yellow, darker on disc of pronotum; brown arcs from either side of apex of vertex not reaching black ocelli, double dash dark brown near base either side midway between black median line and gray eyes, area between arcs and dashes brown tinged; two narrow brown lines



(Inner ♂ genitalia all drawn to the same scale)

1– 3. Style, lateral and ventral view of aedeagus, *L. longus*.
4– 6. Style, lateral and ventral view of aedeagus, *L. vannus*.
7– 9. Style, lateral and ventral view of aedeagus, *L. curvus*.
10–12. Style, ventral and lateral view of aedeagus, *L. salarius*.
13–15. Style, ventral and lateral view of aedeagus, *L. tantalus*.
16–18. Style, lateral and ventral view of aedeagus, *L. inconditus*.
19–21. Style, lateral and ventral view of aedeagus, *L. exiguus*.

below double dashes on anterior half of pronotum faintly indicated. Face yellow with pale median strip, either side of which are alternating pale and dark arcs, sutures and dot on outer margin of lora dark. Body dark except genital segments and lateral margins; elytra semihyaline with pale veins.

♂ head shorter than width between eyes and a little shorter than pronotum, broadly rounded, more than a right angle. ♀ head a little longer than pronotum, but shorter than width between eyes.

♂ valve small, triangular, blunt tip; plates narrowed on outer half, inner margin straight, sharp-tipped, exceeded by spiny pygofer by about one-third their length. ♀ last ventral segment as long as preceding, at sides, produced a little on middle third, entire.

Length: ♂ 2.8 mm.; ♀ 3.2 mm.

Collected in South Dakota by Dr. H. C. Severin: ♂ holotype, allotype, 1 ♂ and 2 ♀ paratypes, Badlands, Interior, June 15, 1948; 1 ♂, 1 ♀ Fox Ridge, June 28, 1947; 1 ♀ Phillip, Aug. 7, 1948; 4 ♀, Buffalo, 1 June 27, 1950, 3 Sept. 10, 1948; 4 ♀, Highmore, 1 June 14, 1948, 2 June 23, 1950, 1 Aug. 14, 1949. Paratypes in Dr. Severin's collection.

Laevicephalus tantalus n. sp.

Figures 13–15

Near *L. exiguus* n. sp. in character of inner ♂ genitalis but smaller, with very blunt head in ♂ and produced head in ♀.

Greenish yellow with two large patches either side of apex, not touching ocelli, a streak against each eye, and an elongate oval enclosing pale spot, midway between eyes and central dark line from base half way to apex, brown. Faint indication on middle of pronotum of two narrow longitudinal stripes. Face bright yellow, especially toward top, center pale, with brown and light arcs irregular. Elytra almost clear, veins yellow. Dorsum black but for edges and pygofer, venter dark medially to last two abdominal segments.

♂ head broadly rounded, only slightly longer at middle than against eye, three-fifths as long as pronotum and shorter than width between eyes. Valve broad, short and rounded, plates wider than valve, narrowed gently on outer half then produced to blunt, appressed tips, exceeded by pygofer by almost one-third their length. ♀ head produced, rectangular, longer than pronotum and longer than width between eyes. Marking as in ♂ but elongate. Last ventral segment longer than preceding, produced slightly, with margin faintly sinuate, and with no median notch or indentation.

Length: ♂ 2.5 mm; ♀ 2.7 mm.

Collected in South Dakota by Dr. H. C. Severin, types include: ♂ holotype and 2 ♂ paratypes, Phillip, Aug. 7, 1948; 1 ♂ Kimball, June 17, 1947; 1 ♀ allotype, Badlands, Interior, June 15, 1948. Paratypes in Dr. Severin's collection.

Laevicephalus salarius n. sp.

Figures 10–12

A pale species near *L. obvius* Knull but smaller.

Yellow, darker on disc of pronotum, usual brown arcs reduced to a spot either side of apex; face yellow with arcs very faint, sutures black. Dorsum black, venter and lateral margins as well as dorsum of pygofer light, sides only of ovipositor darkened.

♂ head blunt, considerably shorter than pronotum and then width between eyes; ♂ head a trifle longer at middle than pronotum, and than width between eyes, bluntly produced, more than a right angle.

♂ valve small, irregularly triangular, plates long, straight-sided, narrowing only slightly outside to blunt tips, exceeded by pygofer by less than half their length. ♀ segment twice as long at middle as preceding, produced from middle in a short rounded lobe slightly sinuate over ovipositor.

Length: ♂ 2.6 mm; ♀ 3.3 mm.

Taken in Utah in 1950 by Dr. H. C. Severin as follows: ♂ holotype, allotype, 4 ♂ and 4 ♀ paratypes, Great Salt Lake, Aug. 26; 1 ♂ Bryce Nat. Park, Aug. 30; 2 ♂ Marysville, Aug. 26; and 1 ♀ Manti, Aug. 25. Paratypes in Dr. Severin's collection.

DISCUSSION

In studying this genus it was found that the following species are readily recognized from external characters in both sexes: *acus* (S. & Del.), *longus* Knull (on basis of size), *melsheimerii* (Fitch), *monticolus* (G. & B.) *poudris* Tuthill, *sylvestris* (O. & B.) and *unicoloratus* (G. & B.)

Three groups of species show close interspecific relationship. One, the Sylvestris Group, includes *acus* (S. & Del.), *pravus* Delong, and *sylvestris* (O. & B.), all with the aedeagus S-curved in lateral view. ♀s of *sylvestris* and *pravus* cannot always be separated. Only a few specimens in large series of *pravus* examined corresponded in character of last ventral segment to DeLong's (1948) illustration for it.

In the Minimus Group are: *curvus* Knull, *minimus* (O. & B.), *incondilus* Knull, and *tritus* B. & T., all with aedeagus asymetrically branched and last ventral segment of ♀ incised at middle, and indented either side of incision, forming four teeth. Depth and form of these incisions is variable within a species and it is not always possible to separate them from ♀s alone.

The chief difficulty arises in the Parvulus Group in which it is necessary to examine internal ♂ genitalia for specific determination, and unassociated ♀s cannot be reliably placed on morphological characters, at least for this author. To this Group in which there is usually a pronounced difference between shape of heads of ♂s and ♀s, the ♀ heads being more bluntly rounded, belong the following in which ♂s are known: *aridus* Oman, *canyonensis* Knull, *exiguus* Knull *hamatus* Beamer, *longus* Knull, *obvius* Knull, *parvulus* (Gillette), *paulus* Knull, *salarius* Knull, *tantalus* Knull and *vannus* Knull. The following which were described from ♀s and in which ♂s are not known probably may be referred to this Group: *austrinus* DeL. & Dav., *bocanus* Oman, *convergens* (DeL.), *pupa* (Van Duzee and *siclus* Del. & Dav.

Vafer Knull is near the Parvulus Group, but lacks the terminal broadening of the aedeagus which is characteristic of it.

BIBLIOGRAPHY

(Papers not included in Oman, 1949)

DeLong, D. M. 1948. The Leafhoppers or Cicadellidae of Illinois. Ill. Nat. Hist. Surv Bull. 24: 255–6.

Knull, D. J. 1951. Sixteen New Leafhoppers and Notes. Ohio Jour. Sci. 51: 169–178.

1951. Eight New Leafhoppers from the United States. The Ohio Journal of Science 51(4): 179–183.

Oman, P. W. 1949. The Nearctic Leafhoppers. Mem. Ent. Soc. Wash. No. 3, 253 pp.

Fatigue of Metals. *R. Cazaud.* Translated by *A. J. Fenner.* Philosophical Library, Inc., New York. 1953. xiv+334 pp. $12.50.

This book by Dr. Cazaud is about the failure of metals under oft repeated stresses. It deals with many phases of fatigue testing including testing machines and the effects of physical variables on the results. The opening chapter is a brief history of the subject and there follows an excellent description of the physical and visual characteristics of fatigue failures with some very fine photographs. The book is a good resumé of factual knowledge and is heavily documented with references, curves, tables and the results of experiments, many of them the author's own work.

The editing and presentation are somewhat ragged. Typographical errors are noted and chapter headings do not always define clearly the content of the chapter. Theories of the mechanism of fatigue are recounted in too hasty a manner and the author seems timid about using the mathematical and thermodynamic approaches with which current literature is crowded.

However, being non-mathematical, the book can be read by mill foremen, shop operators, and draughtsmen and yet it is not without value to the more advanced student of physical testing.

The original book, published in 1948, is ably translated by Mr. Fenner. It reads easily and interestingly and except for the use of metric values one would not suspect its foreign origin.

J. O. LORD.