material. Figures of the female lectotype and immature female paralectotype have been made (figs. 1–4) by the author.

The author would like to express his appreciation to Dr's. E. W. Baker and K. V. Krombein for the loan of the Ewing syntype series.

NEW SPECIES AND RECORDS OF CULICOIDES FROM WESTERN NORTH AMERICA

(DIPTERA: CERATOPOGONIDAE)[1]

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ABSTRACT—Five new species of *Culicoides* are described from western North America: **saundersi** n. sp., **atchleyi** n. sp., **posoensis** n. sp., **nanellus** n. sp., and **inyoensis** n. sp. *Culicoides kibunensis* Tokunaga, a Japanese species, is reported from Oregon and Washington, and *C. cubitalis* Edwards from Europe is synonymized with it.

In this paper we describe five new species of North American *Culicoides* Latreille to make the names available for workers reporting on their biology and disease transmission potential. We also offer a redescription and synonymic notes on a Palaearctic species not heretofore recorded from North America.

Antennal ratio is the combined length of the five elongated distal antennomeres (for convenience hereafter in this paper referred to as segments) divided by the combined length of the eight shorter preceding segments. Palpal ratio is the length of the third palpal segment divided by its greatest breadth. Proboscis/Head ratio (P/H ratio) is the length of the proboscis measured from the distal end of the labrum-epipharynx to the anterior margin of the tormae, divided by the length measured from the anterior margin of the tormae to the median hair socket beween the eyes. Wing length is measured from the basal arculus to the wing tip; the costal ratio is the length of the costa measured from the basal arculus to the tip of the second radial cell divided by the wing length.

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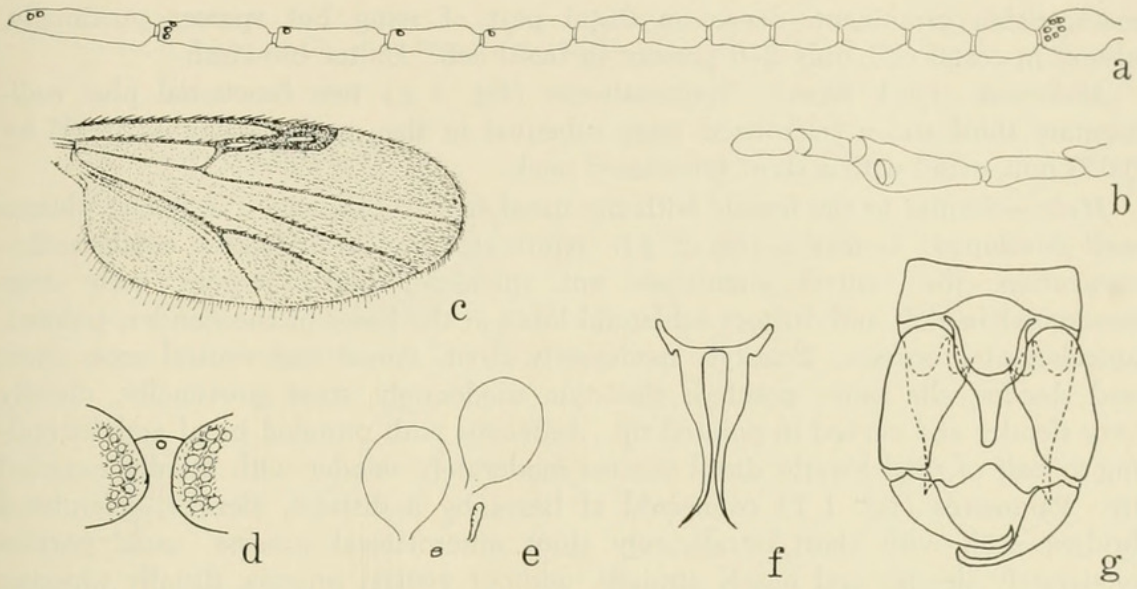

Fig. 1. *Culicoides saundersi*, n. sp. Female holotype: a, antenna; b, palpus; c, wing; d, eye separation; e, spermathecae. Male allotype: f, parameres; g, genitalia, parameres removed.

Measurements were made on specimens cleared in phenol and mounted on slides in phenol-balsam; when possible they were made on series and are given as mean (minimum-maximum value, n = number of measurements), otherwise they were made on the holotype. The holotypes are deposited in the U. S. National Museum in Washington, D. C.; when available, paratypes will be deposited in the California Academy of Sciences in San Francisco, the Canadian National Collection in Ottawa, the University of Florida at Gainesville, and the Washington State University at Pullman.

Culicoides saundersi Wirth and Blanton, n. sp.
(Fig. 1, a–g)

Female.—Wing length 2.30 (1.96–2.60, n = 12) mm.

Head: Brown. Eyes (fig. 1 d) broadly separated, with distinct interfacetal hairs. Antenna (fig. 1 a) brown, lengths of flagellar segments in proportion of 61-46-47-48-48-48-48-50-70-73-82-85-110, antennal ratio 1.06 (0.98–1.21, n = 12); distal sensory tufts present on segments 3, 11–15. Palpus (fig. 1 b) brown, segments with lengths in proportion of 30-70-95-35-40; third segment slightly swollen, with a moderately small and shallow sensory pit; palpal ratio 2.9 (2.5–3.2, n = 12). Proboscis long, P/H ratio 0.93; mandible with 17 (14–20, n = 11) teeth.

Thorax: Subshining brownish black, scutum with slight pollinosity, without color pattern. Legs uniformly dark brown, without pale bands; hind tibial comb with six spines, the second from the spur longest.

Wing (fig. 1 c): Uniformly grayish brown without pattern of pale spots; the veins bordering radial cells considerably thickened and darkened causing appearance of a moderately dark stigma. Costal ratio 0.66 (0.65–0.68, n = 12);

macrotrichia prominent, dense on distal part of wing but sparser proximally, absent in costal cell, only 2–6 present in basal cell. Halter brownish.

Abdomen: Dark Brown. Spermathecae (fig. 1 e) two functional plus rudimentary third and a sclerotized ring; subequal in size, each measuring 0.065 by 0.053 mm, ovoid with a short sclerotized neck.

Male.—Similar to the female with the usual sexual differences; antennal plumes well developed. Genitalia (fig. 1 g): Ninth sternum with shallow caudomedian excavation, the ventral membrane not spiculate; ninth tergum with deep caudomedian cleft and distinct sublateral lobes at the bases of the slender, pointed, apicolateral processes. Basistyle moderately stout, dorsal and ventral roots short and slender, the latter pointed; dististyle moderately stout proximally, distally very slender and curved to pointed tip. Aedeagus with rounded basal arch extending to half of total length; distal process moderately slender with bluntly rounded tip. Parameres (fig. 1 f) connected at bases by a distinct, slender, sclerotized bridge; each with short, moderately stout anterolateral process, main portion moderately slender and nearly straight, without ventral process, distally tapering to sharp slender point slightly curving ventrad.

Distribution.—Alaska to Oregon and Montana.

Types.—Holotype female, allotype male, Sullivan Lake, Pend Oreille Co., Washington, 26 July 1966, N. M. Jorgensen (Type no. 70333, USNM). Paratypes, 10 males, 56 females, as follows: ALASKA: Anchorage, 25 August, 1 September 1964, 2 females; Kenai Peninsula, Johnson Lake to Kasilof, 19 July 1965, 1 female; all collected by K. M. Sommerman in jeep trap. BRITISH COLUMBIA: Hope, Silver Lake, 2 July 1968, W. W. Wirth, 1 female. Ocean Falls, 11 July 1960, E. I. Schlinger, 2 females. Revelstoke, 1 July 1968, W. W. Wirth, biting man, 1 female. West Kootenays, 6 mi s Nakusp, 18 July 1959, H. B. Leech, 1 female. MONTANA: Beaverhead Co., 1936, W. L. Jellison, from magpie nest, 1 female. Flathead River, West Fork, 1 July 1951, L. E. Rozeboom, biting man, 2 females. OREGON: Mary's Peak Campground, Benton Co., 3 July 1965, J. D. Spooner, 1 female. Saddleback Mountain, Lincoln Co., 20 May 1961, J. C. Dirks-Edmunds, 5 females. WASHINGTON: Brown's Lake, Pend Oreille Co., 4 June 1905, W. A. Rowley, biting man, 5 females. Elwha Ranger Station, Olympic Nat. Park, 17 June 1955, J. F. G. Clarke, at light, 9 males; 6 July 1968, W. W. Wirth, light trap, 1 male, 6 females. Glacier, 4 June 1917, H. G. Dyar, 14 females. Sullivan Lake, same data as type, 14 females.

Discussion.—This species is named in honor of the late Dr. Leslie G. Saunders, who taught for many years at the University of Saskatchewan, in appreciation of his fine contributions to our knowledge of Canadian biting midges and his pioneering studies on the genus *Forcipomyia* Meigen throughout the world.

Culicoides saundersi is a troublesome bloodsucking pest of man in the Pacific Northwest. Its very close North American relative, *C.*

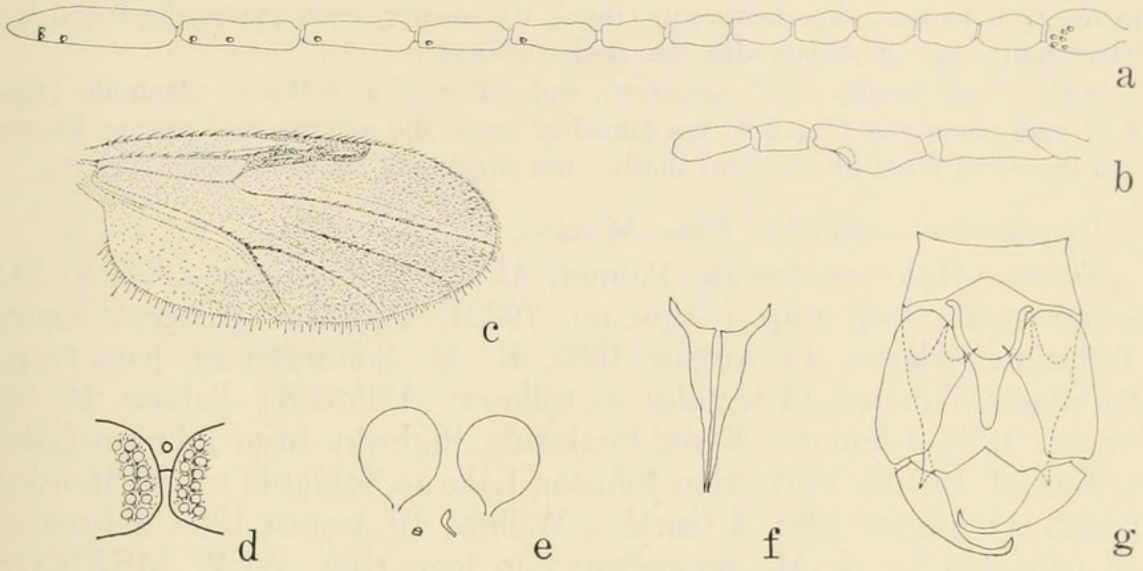

Fig. 2. *Culicoides atchleyi*, n. sp. Female holotype: a, antenna; b, palpus; c, wing; d, eye separation; e, spermathecae. Male allotype: f, parameres; g, genitalia, parameres removed.

atchleyi, n. sp., differs in many small details but especially in the loss of mandibular teeth. *C. saundersi* and *C. atchleyi* are not closely related to any other known North American species but have Palaearctic counterparts in *C. tokunagai* Arnaud from Japan, *C. chaetophthalmus* Amosova from eastern Siberia, and *C. setosus* Gutsevich from Europe. The latter two species also attack man and are very similar to *C. saundersi*, but *C. chaetophthalmus* differs in its slightly narrower eye separation with sutures present both above and below the interocular seta, the pits near the sensory pit on the third palpal segment; the two distal palpal segments much shorter, the five distal antennal segments somewhat shorter, and the spermathecae unequal in size. A female *C. setosus* in the USNM kindly sent to us by Dr. Gutsevich has the eye separation narrower than in *C. saundersi*, the third palpal segment is much more swollen with a broader pit, the antenna has sensoria present on segments 3, 7–9, 11–15, and the halteres are pale. *Culicoides tokunagai* is discussed in this paper under the discussion of *C. atchleyi*.

Culicoides atchleyi Wirth and Blanton, n. sp.
(Fig. 2, a–g)

Female.—Wing length 1.95 (1.80–2.10, n = 7) mm.

Very similar to *C. saundersi*, n. sp. but slightly smaller. Eyes (fig. 2 d) narrowly separated, hairy. Antennal ratio 1.14 (1.09–1.18, n = 7), distal sensory tufts present on segments 3, 11–15 (fig. 2 a). Palpus (fig. 2 b) with third segment shorter, palpal ratio 2.2 (1.8–2.4, n = 7). Proboscis much shorter, P/H ratio 0.65; mandibular teeth not developed. Wing (fig. 2 c) as in *C. saundersi*, costal ratio 0.66 (0.63–0.67, n = 7). Hind tibial comb with five spines, the one next

to the spur longest. Spermathecae (fig. 2 e) smaller, each measuring 0.055 by 0.046 mm, more globular with the neck slenderer.

Male.—Very similar to *C. saundersi*, but differing as follows: Genitalia (fig. 2 g) with parameres (fig. 2 f) not joined at bases, the anterolateral process longer and the distal point blunter and shorter, not surpassing tip of aedeagus.

Distribution.—Alaska, New Mexico.

Types.—Holotype female, Palmer, Alaska, July–August 1963, K. M. Sommerman, jeep trap (Type no. 70334, USNM). Allotype male, Talkeetna, Alaska, 18 August 1965, K. M. Sommerman, jeep trap. Paratypes, 7 males, 15 females, as follows: ALASKA: Palmer, 10, 31 August 1964, 4 females; Kenai Peninsula, highway from Johnson Lake to Kasilof, 19 July 1965, from Johnson Lake to Soldatna via Kalifonsky Beach, 11 August 1965, 2 females; Willow, 19 August 1965, 1 female; all collected by K. M. Sommerman in jeep trap. NEW MEXICO: Questa Ranger Station, Taos Co., 6 July 1953, W. W. Wirth, light trap, 7 males, 9 females.

Discussion.—We are dedicating this species to Mr. William R. Atchley of the University of Kansas in recognition of his very fine studies on the biting midges of New Mexico and other western states.

Culicoides atchleyi is closely related to *C. saundersi*, n. sp., but can readily be distinguished by its narrower eye separation, vestigial mandibular teeth, shorter third palpal segment, and different shapes of the female spermathecae and male parameres. *Culicoides tokunagai* Arnaud from Japan is very close to *C. atchleyi*, also having hairy eyes, unmarked wings, vestigial mandibular teeth, and similar sensorial pattern, but the third palpal segment is longer than four and five combined, the eyes are contiguous, and there are faint basal pale bands on the tibiae.

Culicoides kibunensis Tokunaga
(Fig. 3, a–g)

Culicoides kibunensis Tokunaga, 1937, Tenthredo 1: 298 (Japan; male, female; fig. wing, antenna, male genitalia).—Arnaud, 1956, Microent. 21: 107 (redescribed; many figures).

Culicoides cubitalis Edwards, 1939, British Bloodsucking Flies, p. 40, 139 (Britain; male; fig. genitalia).—Campbell and Pelham-Clinton, 1960, Proc. Royal Soc. Edinburgh 67: 244 (Britain; redescribed; fig. male parameres, aedeagus, female wing, eye separation, palpus, antenna).—Kremer, 1966, Encycl. Ent. 39: 169 (France; redescribed; fig. wing, antenna, palpus, eye separation, spermathecae, male genitalia). **New synonymy.**

Female.—Wing length 1.50 (1.40–1.60, n = 10) mm.

Head: Brown. Eyes (fig. 3 d) separated by a distance equal to diameter of one eye facet, bare. Antenna (fig. 3 a) with lengths of flagellar segments in proportion of 43-25-25-25-26-27-29-29-55-58-62-62-90, antennal ratio 1.40 (1.34–

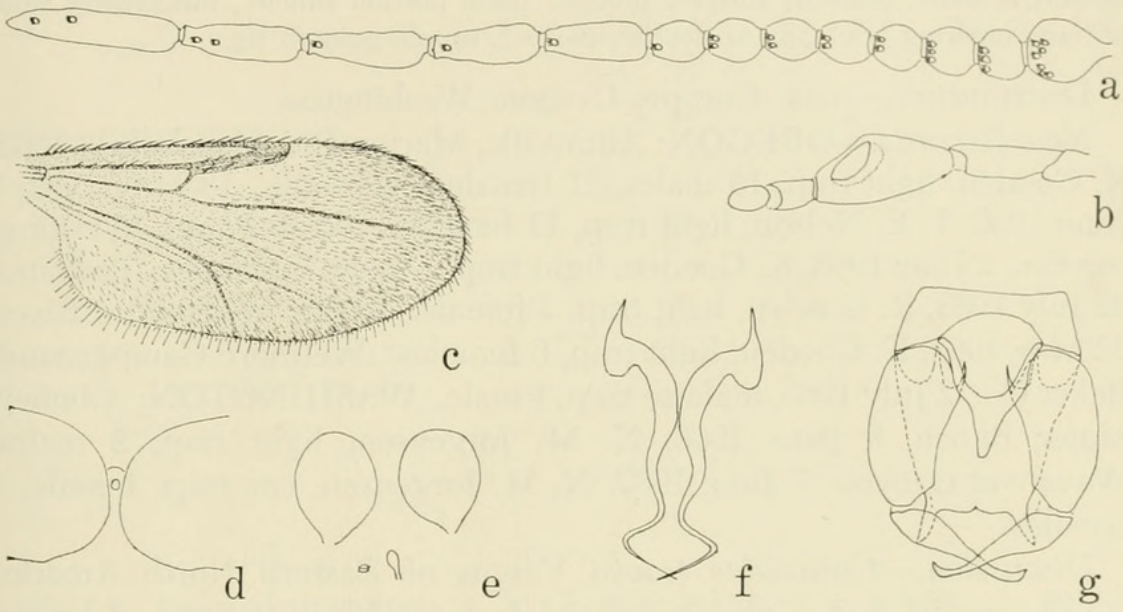

Fig. 3. *Culicoides kibunensis* Tokunaga. Female: a, antenna; b, palpus; c, wing; d, eye separation; e, spermathecae. Male: f, parameres; g, genitalia, parameres removed.

1.50, n = 9); distal sensory tufts present on segments 3–15. Palpus (fig. 3 b) with lengths of segments in proportion of 22-55-75-22-20; third segment broadly swollen, with a very broad, shallow, round sensory pit; palpal ratio 2.3 (1.9–2.5, n = 10). Proboscis moderately long, P/H ratio 0.89; mandible with 13 (11–14, n = 10) teeth.

Thorax: Brown; scutum without prominent pattern in slide preparations. Legs pale brown, knee spots darker, tibiae with narrow basal pale rings; hind tibial comb with four spines, the one nearest the spur longest.

Wing (fig. 3 c): Pattern as figured, without prominent pattern, a small pale spot lying over r-m crossvein, a small spot at end of costa appearing pale due to paucity of macrotrichia; rarely diffuse pale areas also present in apices of cells R5, M1, M2, M4, anal cell, and in front of mediocubital fork. Costal ratio 0.59 (0.57–0.62, n = 10), both radial cells narrow; macrotrichia long and abundant, covering most of wing and extending to bases of medial and anal cells. Halter slightly infuscated.

Abdomen: Brown. Spermathecae (fig. 3 e) two functional plus a rudimentary third and sclerotized ring; subequal in size measuring 0.055 by 0.040 mm, oval without sclerotized neck.

Male.—Similar to the female with the usual sexual differences; antennal plumes well developed. Genitalia (fig. 3 g): Ninth sternum with moderately deep caudomedian excavation, the ventral membrane bare; ninth tergum with long, slender apicolateral processes, the caudal margin between them slightly bilobate. Basistyle moderately slender, dorsal root long and slender, ventral root slightly shorter and sharp-pointed; dististyle slightly sinuate, slender distally with bent, pointed tip. Aedeagus with rounded basal arch extending to about half of total length, the basal arms rather stout; distal process stout at base, tapering to moderately slender, rounded tip. Parameres (fig. 3 f) each with base knobbed, turned laterad and

bearing a short, pointed, anterior process; main portion sinuate, moderately stout at base, tapering gradually to slender, twisted, simple-pointed tip.

Distribution.—Asia, Europe, Oregon, Washington.

New Records.—OREGON: Aumsville, Marion Co., March–July 1963, K. Goeden, light trap, 19 males, 31 females. Corvallis, 18 May 1962, 9 June 1966, T. E. Nelson, light trap, 11 females. North Plains, Washington Co., 2 June 1963, K. Goeden, light trap, 1 male, 3 females. Portland, 22 July 1963, K. Goeden, light trap, 1 female. Salem, Willamette River, 22 May 1963, K. Goeden, light trap, 6 females. Wetmore Campground, Baker Co., 2 July 1965, malaise trap, 1 male. WASHINGTON: Cheney, Majer Ranch, 9 June 1966, N. M. Jorgensen, light trap, 2 males. Wawawai Canyon, 7 June 1967, N. M. Jorgensen, car trap, 1 male, 3 females.

Discussion.—*Culicoides travisi* Vargas of Eastern North America is very similar and is closely related, but can be distinguished by the usual presence of marginal wing spots and in the male by the much shorter basal arch and long slender distal process with parallel sides in the aedeagus.

Campbell and Pelham-Clinton (op. cit.) in their excellent redescription and figures of *cubitalis* Edwards, indicated the probable synonymy with *C. kibunensis* Tokunaga. A careful comparison of the Japanese *C. kibunensis* slides in the USNM redescribed by Arnaud (op. cit.) and French *C. cubitalis* determined by Kremer with our American material convinces us that they are conspecific. Our redescription and figures are from specimens from Aumsville, Oregon.

Culicoides posoensis Wirth and Blanton, n. sp.
(Fig. 4, a–g)

Female.—Wing length 0.99 (0.81–1.13, n = 12) mm.

Head: Pale Brown. Eyes (fig. 4 d) broadly separated, bare. Antenna (fig. 4 a) with lengths of flagellar segments in proportion of 35-22-23-25-27-28-30-30-35-40-45-50-68, antennal ratio 1.10 (1.04–1.16, n = 12); distal sensory tufts present on segments 3, 11–15. Palpus (fig. 4 b) with lengths of segments in proportion of 20-45-55-25-25; third segment short and slender, with a shallow, irregular sensory pit; palpal ratio 2.6 (2.2–2.9, n = 12). Proboscis moderately long, P/H ratio 0.78; mandible with 12 (11–13, n = 12) teeth.

Thorax: Brownish, in slide preparations without prominent pattern. Legs pale brown, knee spots blackish, tibiae with very faint basal pale rings; hind tibial comb with four spines, the second from the spur longest.

Wing (fig. 4 c): Uniformly grayish, without pattern except very faint indication of small pale spots over r-m crossvein and just past end of costa. Wing relatively narrow; costa short, costal ratio 0.57 (0.55–0.60, n = 12); radial cells narrow; macrotrichia long and abundant, covering wing except in costal and basal cells. Halter infuscated.

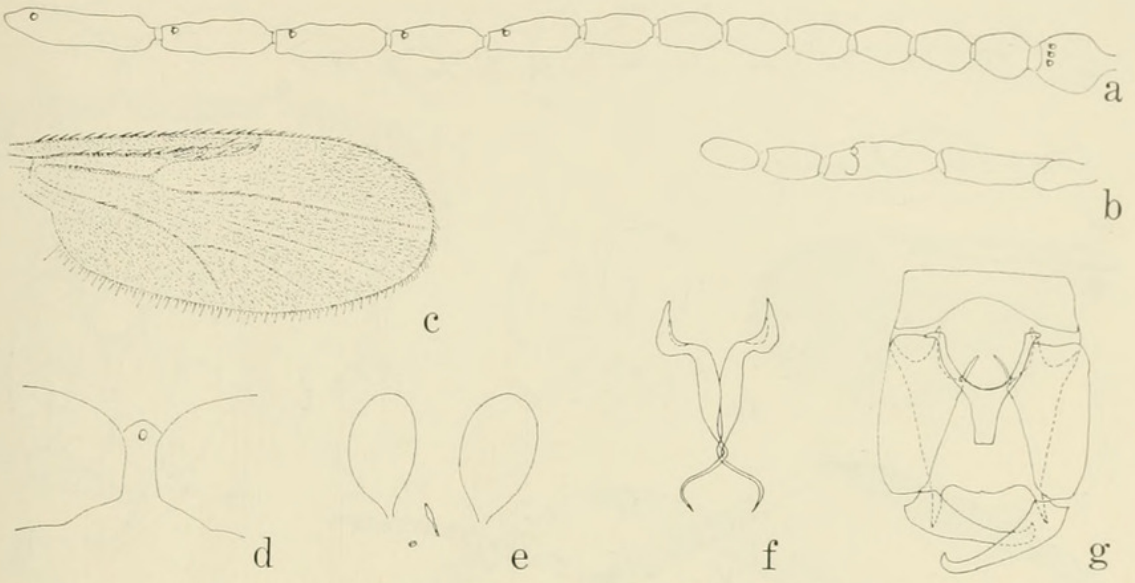

Fig. 4. *Culicoides posoensis*, n. sp. Female holotype: a, antenna; b, palpus; c, wing; d, eye separation; e, spermathecae. Male allotype: f, parameres; g, genitalia, parameres removed.

Abdomen: Brownish. Spermathecae (fig. 4 d) two functional plus rudimentary third and sclerotized ring; subequal in size, each measuring 0.062 by 0.036 mm, elongate oval, tapering to short sclerotized neck.

Male.—Similar to the female with the usual sexual differences; antennal plumes well developed. Genitalia (fig. 4 g): Ninth sternum with shallow caudomedian excavation, the ventral membrane bare; ninth tergum with long slender apicolateral processes, the caudal margin between them nearly transverse. Basistyle moderately slender, ventral and dorsal roots long and slender, the ventral root especially so; dististyle moderately long and slender, with sharp, bent tip. Aedeagus with rounded basal arch extending to half of total length, distal process quite stout with blunt apex. Parameres (fig. 4 f) each with basal process bent laterad, then cephalad, main portion straight and only slightly swollen proximally, distally very slender, twisted laterally, then ventromesally, with simple filamentous tip.

Distribution.—California.

Types.—Holotype female, allotype male, Poso Creek, Kern Co., California, 28 August 1967, R. L. Nelson, truck trap (Type no. 70335, USNM). Paratypes, 15 males, 52 females, same data as type, except some collected June 1966 and April 1967.

Discussion.—The group relations of this poorly marked species are not clear. The presence of two faint wing spots, the irregular palpal pit, the antennal sensorial pattern 3, 11–15, and the presence of two spermathecae in the female indicate possible affinity with the *biguttatus* and *spinosus* groups. The male genitalia, however, indicate that *C. posoensis* is more closely allied with the Palaearctic *heliophilus* group. The repeated collection of males and females at the same time in truck trap catches reinforces the morphological evidence that we have correctly associated the sexes.

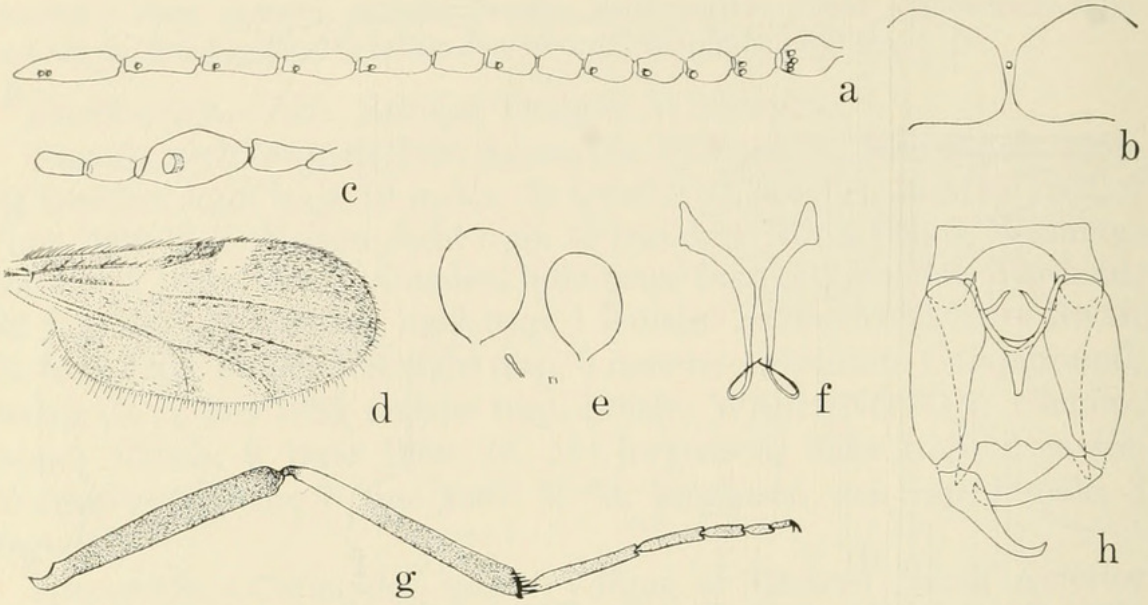

Fig. 5. *Culicoides nanellus*, n. sp. Female holotype; a, antenna; b, eye separation; c, palpus; d, wing; e, spermathecae; g, hind leg. Male allotype: f, parameres; h, genitalia, parameres removed.

Culicoides nanellus Wirth and Blanton, n. sp.
(Fig. 5, a–h)

Female.—Wing length 1.10 mm.

Head: Pale brownish. Eyes (fig. 5 b) narrowly separated, bare. Antenna (fig. 5 a) with lengths of flagellar segments in proportion of 42-30-32-32-34-34-35-35-53-53-55-55-70, antennal ratio 1.02; distal sensory tufts present on segments 3–7, 9, 11–15. Palpus (fig. 5 c) with length of segments in proportion of 20-45-65-25-30; third segment much swollen, fusiform, with a small, deep, sensory pit; palpal ratio 2.0. Proboscis short, P/H ratio 0.68; mandible with 11 teeth.

Thorax: Brownish, in slide preparations without prominent pattern. Legs (fig. 5 g) pale brown, knee spots darker; tibiae with narrow basal pale rings; hind tibial comb with five spines, the second from the spur longest.

Wing (fig. 5 d): Pattern as figured; large prominent pale spot over r-m cross-vein and another poststigmatic pale spot just past end of costa on anterior wing margin; large but fainter pale spots in cell M4 and at apex of anal cell. Costal ratio 0.63; radial cells with distinct lumens; macrotrichia long and abundant over wing and extending to bases of medial and anal cells. Halter infuscated.

Abdomen: Brownish. Spermathecae (fig. 5 e) two functional plus rudimentary third and sclerotized ring; slightly unequal in size, measuring 0.060 by 0.045 mm and 0.058 by 0.041 mm; ovoid without neck.

Male.—Similar to the female with the usual sexual differences; antennal plumes well developed. Genitalia (fig. 5 h): Ninth sternum with a shallow caudomedian excavation, the ventral membrane bare; ninth tergum with long, slender, slightly flaring apicolateral processes, the caudal margin between them slightly bilobed. Basistyle moderately slender, ventral and dorsal roots long and slender; dististyle slender, slightly curved with bent, pointed tip. Aeadeagus with rounded basal arch extending to slightly more than half of total length, distal process moderately slender and slightly tapered to bluntly pointed tip. Parameres (fig. 5 f) each

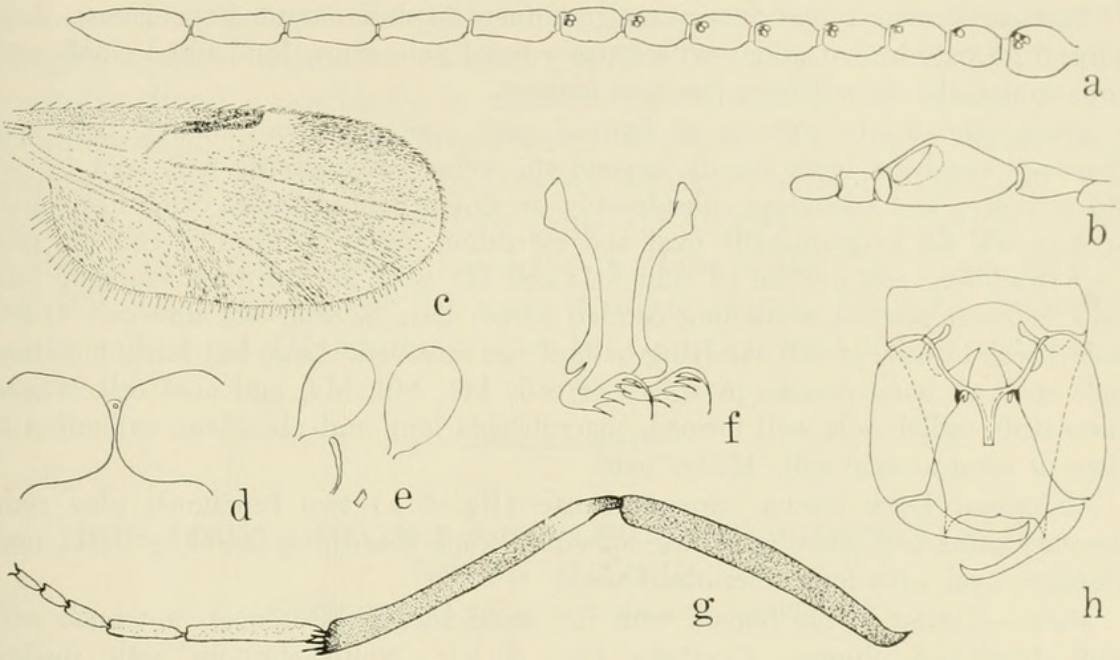

Fig. 6. *Culicoides inyoensis*, n. sp. Female holotype: a, antenna; b, palpus; c, wing; d, eye separation; e, spermathecae; g, hind leg. Male allotype: f, parameres; g, genitalia, parameres removed.

with strong basal knob, basal third directed slightly laterad, midportion slender and nearly straight, distally curved ventromesad to simple slender tip.

Distribution.—California.

Types.—Holotype female, allotype male, Hopland, Mendocino Co., California, 1 July 1965, F. K. Murphy, in treehole trap (Type no. 70336, USNM). Paratypes, 11 males, 2 females, same data as type.

Discussion.—*Culidoides nanus* Root and Hoffman, a treehole-breeding species of the Eastern United States, is very closely related, with nearly identical male genitalia, similar wing pattern, leg and halter color, palpi, and spermathecae. In *C. nanus*, however, the antennal sensorial pattern is 3–14, definite pale wing spots are found at the apices of cells M1 and M2, and the spermathecae are definitely unequal in size.

Culicoides inyoensis Wirth and Blanton, n. sp.
(Fig. 6, a–h)

Female.—Wing length 1.24 mm.

Head: Brown. Eyes (fig. 6 d) bare, contiguous with a very narrow wedge-shaped space below interorbital seta-base. Antenna (fig. 6 a) with lengths of flagellar segments in proportion of 40-28-30-32-32-33-33-34-45-48-50-53-65, antennal ratio 0.99; distal sensory tufts present on segments 3–10. Palpus (fig. 6 b) with lengths of segments in proportion of 18-42-76-20-25; third segment greatly swollen with a broad, shallow, round sensory pit; palpal ratio 2.0. Proboscis short, P/H ratio 0.65; mandible with 10 teeth.

Thorax: Brown; scutal pattern not prominent in slide-mounted specimens. Legs (fig. 6 g) pale brown, tibiae with narrow basal pale rings; hind tibial comb with four spines, the second from the spur longest.

Wing (fig. 6 c): Pattern as figured; pale spots not conspicuous, pale spot over r-m crossvein lying mostly beyond the vein; poststigmatic pale spot in cell R5 extensive and extending considerably proximad behind radial cells; distal pale spot in cell R5 longitudinally oval and extending nearly to apex of cell; no pale spot straddling any portion of vein M1; cell M1 with an indistinct elongate pale area in basal portion, extending caudad across base of vein M2 into cell M2; a pale streak in base of cell M2 lying behind r-m crossvein; large but fairly indistinct pale spots at wing margin in apices of cells M1, M2, M4, and anal cell. Costal ratio 0.56, radial cells well formed; macrotrichia long and abundant, extending to base of wing in anal cell. Halter pale.

Abdomen: Dark brown. Spermathecae (fig. 6 e) two functional plus rudimentary third and sclerotized ring; subequal, each measuring 0.066 by 0.041 mm; elongate oval with long sclerotized neck.

Male.—Similar to the female with the usual sexual differences; antennae with well developed plumes. Genitalia (fig. 6 h): Ninth sternum with shallow caudomedian excavation, the ventral membrane bare; ninth tergum with short, pointed, apicolateral processes, the caudal margin between them straight. Basistyle moderately slender, ventral root "foot-shaped," dorsal root slender; dististyle slender, nearly straight with slightly bent, sharp tip. Aedeagus with basal arch broader than long, extending to half of total length of aedeagus, basal arms slender, a pair of strongly sclerotized, pointed spurs projecting caudolaterad from shoulders near base of distal process, the latter slightly tapering proximally, distally with subparallel sides and ending in moderately slender, truncate tip. Parameres (fig. 6 f) each with stout basal knob; stem curved near base, straight in midportion; distally with a distinct ventral lobe; portion beyond lobe slenderer, abruptly bent ventrad and slightly expanded in a subapical fringe of four sharp spines before the sharp distal point.

Distribution.—California.

Types.—Holotype female, allotype male, Resting Springs, Inyo Co., California, 29–30 May 1955, Belkin and McDonald (Type no. 70337, USNM). Paratypes, 6 males, 2 females, same data as type.

Discussion.—The female of *Culicoides mohave* Wirth is similar to *C. inyoensis* but lacks the marginal wing spots, the wing macrotrichia are much shorter and sparser, the eyes are narrowly separated, the third palpal segment is not so strongly swollen, and sensoria are usually present only on antennal segments 3, 7–10. The male genitalia of *C. haematopotus* Malloch are very similar to those of *C. inyoensis*, but the distal process of the aedeagus is longer and not so tapered, and the fringed portion of the parameres is much more broadly expanded.

Vargas (1960, Rev. Biol. Trop. 8: 40) erected the subgenus *Diphaomyia* for *C. baueri* Hoffman and included *C. haematopotus* and several other American species whose male genitalia have the spur-like sclerotized processes on the posterolateral margins of the basal arms

of the aedeagus, and the parameres have knobbed bases and apical fringing spines. Females of some of the species with similar male genitalia diverge markedly in characters ordinarily considered to be of subgeneric or group importance, leaving the group somewhat heterogeneous on such characters as antennal sensorial pattern, the presence of pale spots straddling veins M1 and M2, the position of the pale spot over r-m crossvein, and the position of the distal pale spot in cell R5. The structure of the male genitalia would place *C. inyoensis* in the subgenus *Diphaomyia*, but the females are not so definitely placed.

THE SECOND RECORD OF PICROMERUS BIDENS (L.) IN NORTH AMERICA

(HETEROPTERA: PENTATOMIDAE: ASOPINAE)

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ABSTRACT—*Picromerus bidens* (L.) is recorded from Durham, New Hampshire where it was feeding on a larva of *Pyrrharctia isabella* (J. E. Smith) (Lepidoptera: Arctiidae). Other specimens were collected in the same area feeding on larvae of *Diprion simile* (Hartig) (Hymenoptera: Diprionidae), an introduced species of sawfly. *P. bidens* is a well known predator of larval Coleoptera and Lepidoptera in Europe. There is no record of a deliberate introduction of this potential biological control agent into North America.

A single female of *Picromerus bidens* (L.) was collected by one of us (J.P.D.) one and one-half miles northeast of Durham, New Hampshire on 31 August 1967. It has been deposited in the collection of Oregon State University. The specimen was feeding on a larva of *Pyrrharctia isabella* (J. E. Smith) (Lepidoptera: Arctiidae). The site was a moist, old-field situation immediately surrounded by hay fields and a stand of pine and mixed second-growth hardwoods in the rolling hills of a semi-rural countryside. This location is eight air miles from the international port of Portsmouth, New Hampshire. Portsmouth was an early (1623) New England seaport and today supports a major naval shipyard. Emery (1968) records the presence of ship ballast from several localities in the vicinity of this port. Lindroth (1957) has discussed extensively the potential ballast material offers as a vehicle for insect dispersal.