NEW TABANIDAE (HORSEFLIES) WITH NOTES ON CERTAIN SPECIES OF THE LONGUS GROUP OF TABANUS[1]

CORNELIUS B. PHILIP

While examining representative material of western species of horseflies in the collection of the late Professor J. S. Hine, it soon became evident that the status of some species could be clarified only by a revision of certain species related to the difficult *longus* group of *Tabanus*. From time to time, various students of the family have contributed data on the group, including Hine himself, and the latest contribution is that of Fairchild (1934). The present notes are submitted in the hopes of providing additional diagnostic information without any pretense to a complete treatment of all the related slender-bodies species in North America.

The author is indebted to the authorities of the Ohio State Museum, particularly Mr. Edward S. Thomas, for permission and facilities to study Professor Hine's extensive collection and to make comparisons with his own; also to Dr. Alan Stone of the U. S. National Museum for generous comments and data as cited below.

T. longus O. S. Specimens are before me from Pennsylvania, Ohio (1 ♀, Lancaster, by Bequaert), Kentucky and Arkansas (Yell Co., by Schwardt). There seems to be considerable variation in robustness of the palpi and of the body in general. The Arkansas specimens are largest (15 mm. in one instance) with elongate palpi attenuated for nearly half their length, a distinct dorsal prominence on the antennae and the abdomen not narrowed posteriorly, the 6th tergite reduced in depth and not as elongated as in typical *longus;* these are probably distinct and more closely related to "*T. sp.*" to be described by Stone. The Kentucky specimens, on the other hand, show the usual body form, but the palpi are relatively short and somewhat incrassate to the bluntly rounded apices. It appears to be a late summer species, like *sackeni*, seldom appearing before August.

T. sackeni Fairchild. This author, in 1934, correctly separated this species from *T. longus*, recording it from as far west as Missouri and Ohio. The writer had also discovered its presence among Hine's material and noted but one specimen of true *T. longus* from within Ohio in a considerable series of this species (identifications confirmed

[1]Contribution from Rocky Mountain Laboratory, United States Public Health Service, Hamilton, Montana.

by Dr. J. Bequaert). Additional records include Arkansas (specimens received from H. H. Schwardt) and Kansas; while Stone adds Va., Ind., and Okla. It has been taken in Ohio between July 23 (Thomas) and as late as September 7 and is apparently not uncommon. The eyes of the female (relaxed) show traces of two greenish bands on a purple ground.

The male (which Fairchild apparently lacked) is easily associated.

Allotype—Length, 14 mm. Head subhemispherical, area of enlarged facets well marked, occupying almost three-fourths of the total area. Antennae very slender, about half the width of those of the ♀, but the elongate shape characteristic; red, the annuli sharply black. Palpi very slender, second joints about two and one-half times as long as broad, covered with long, white hairs and a few scattering black ones. Thoracic lines not as distinct, abdomen more slender, rather pointed, otherwise the abdominal pattern, leg colors, vestiture and completely hyaline wings compare typically with the ♀. "Neotoma," Hocking Co., Ohio, July 24, 1932. Edw. and John Thomas. In the collection of the Ohio State Museum.

Additional males, one each from Onaga, Kansas, July 21, 1901, in the same collection, and from Hinckley, Medina Co., Ohio, August 24, 1904, in the collection of the author. These are probably the males mentioned by Hine (1914) under his form 1 of *longus*.

T. fulvulus Wied. Typically, the annuli of the antennae, femora, fore tibiae distally and tarsi are blackish. Stone considers as true *fulvulus* only the variant with yellow face, palpi and pleurae described by Osten Sacken in his "observation" (1876, p. 452). The degree of infuscation of the appendages varies so markedly as to suggest a composite species, and certain specimens from the South are markedly pallid in this respect, as pointed out by Hine (1914).

Insufficient material and some intergradation among the females, especially in color intensity, makes it unwise to treat this form in more than a varietal sense at present.

Var. *pallidescens* n. var. Female—Length, 13.5 mm. Differs from typical *fulvulus* in having front more distinctly convergent below, the callosity "faded brown," more elongate and not separated from the eye margins by narrow pollinose lines; face below the insertion of the antennae whitish pollinose and pilose with hardly a suggestion of buff, palpi pale creamy; thorax light yellowish instead of golden, pleurae sharply white pollinose and pilose, legs practically concolorous, pale reddish, darkening slightly on the apices of the fore tibiae and on the fore-tarsi, and some blackish hairs on the tips of the hind tibiae; the wings more hyaline, the dilute yellowish along the costal margin hardly discernible; the abdominal pattern is essentially the same but less dark caudally.

Male—12 mm. Eyes bare, dark brownish, area of enlarged facets large, very pronounced. Antennae entirely red, slender, with a distinct tooth, the annuli about two-thirds length of the third joint proper. Palpi pallid, pointed apically with long white hairs. Thorax yellowish on the disc, pale grayish laterally and ventrally, unstriped. Legs concolorous reddish, a little darker distally on the front pair. Costal

cell of wings dilute yellowish. Abdomen orange-yellow, pattern indistinct.

Holotype, female. Blue Mts., Miss., June 10, 1914, H. H. Carter. In the collection of the author.

Allotype, male, Starkville, Miss. "T. C.," May 31, 1921. In the collection of the Ohio State Museum.

Paratype females. Tenn., 1; Ark., 1; Ga., 5; Miss., 1, and La., 5. In the above collections also.

A specimen compared by Hine with the type of *T. fulvofrater* Walk. has red antennae, but he says (MS notes), "The (type) specimen is much soiled and antennae broken," and his other comments indicate the name is hardly available for this pallid variety. The male with all red antennae studied by Osten Sacken may be this form and also perhaps the females he describes with pale face, palpi and pleurae and "brownish yellow" femora; Fairchild does not include a statement regarding Osten Sacken's original three specimens in his redescription of the Mus. Comp. Zool. material.

T. sagax O. S. The type of *T. baal* Twns. (examined through the kindness of Professor Beamer of the University of Kansas) was greased and when cleared is a well preserved specimen of *sagax* with gray front, cheeks, pleurae and broad, abdominal stripe. *T. dawsoni* Phil. is also a synonym.

Two rather definite forms have been regarded as *sagax* by Hine and others, the typical one being rather robust, 13–15 mm., the front of the female about three times as tall as broad, the 3rd antennal segment elongate (length is to breadth about as 3.5 : 1), the annuli less than half the total length of the segment (1 : 2.5), the palpi yellowish, the abdomen chiefly reddish yellow with a wide grayish pollinose, mid-dorsal stripe. The other form is darker with a narrower front and will be described later by Stone and is the one, comparison with which was responsible for the establishment of *dawsoni*.

The male of the typical form has not heretofore been described.

Allotype—Length, 13.5 mm. Area of enlarged facets of the eyes not pronounced but definitely delimited, about two-thirds of the total area. Antennae of the same elongate shape as in the ♀, but a little more slender, red, the annuli sharply black. A few scattering, long black hairs among the white pile along the facial margin of the eyes and on the underside and apex of the second palpal joints. Latter rather swollen, about twice as long as wide, pale yellow. Compared to the ♀, the whole body is covered with longer pile, that on the pleurae more yellowish, and the abdominal pattern rather indistinct with a fulvous suffusion, the mid-dorsal black crescents hardly evident except by dark hairs, the characteristic mid-dorsal stripe evident although creamy instead of gray pollinose, and the elongate, black, integumental spot in the middle of the second segment (usually obscure in the female) pronounced. Carlisle Junction, Pennsylvania, June 27, 1917, J. N. Knull. In the collection of the author.

T. longiusculus Hine. Although the describer compared this with *longus* as "smaller and darker" (he undoubtedly had then unknown

T. sackeni confused with the latter) it nevertheless bears a striking general resemblance to true *T. longus* O. S. in size and color. The front in this is somewhat narrower, however, and the callosity perceptibly taller than wide; the antennae are a brighter red and the third segment chunkier, while there are darker shades on the femora accentuated by blackish hair at least dorsally on the last two pairs, best emphasized by end-on view. These hairs in the *longus* examined have been almost entirely pale. Infuscation of the femora, especially of the bases of the two hind pairs described by Hine as "almost black," varies somewhat and in two of the eight co-types seen by the writer, is almost evanescent. In one of the co-types otherwise comparable, the third antennal segment is drawn out resembling that of *sagax* in shape.

A male taken by the original donor, A. H. Manee, in the type locality a year after the description appeared, is here described.

Allotype—Length, 12 mm. Easily associated with the ♀, but the body, legs and wing veins not so dark, nearer a pure brown. Eyes with area of enlarged facets distinct, but not as pronounced as seen in some glabrous-eyed species, occupying slightly more than half the total area. Antennae bright red, annuli sharply black, narrower than in the ♀. Second palpal joints pale creamy, about twice as long as thick, distinctly downward pointed apically, with white and black hairs intermixed, white only on the basal segment. Proboscis very short. Thorax with faint brownish lines and appressed yellowish hairs among the dense, upright, smoky ones on the disc. Entire venter with less of the pronounced frosty pollen of the ♀. Legs brownish, darker distally and on the femora because of rather dense black hairs over the whole fore femora and dorsally on the last two pairs. Abdominal pattern typical, but the stripe and spots yellow rather than gray.

Southern Pines, North Carolina, May 22, 1908. In the collection of the Ohio State Museum.

Two females (one with nearly concolorous legs) apparently from the original Georgia series, were also studied in the University of Kansas collection bearing the photographic labels of "*T. longulus* det. by Hine." The species has been reported from Louisiana (Jones and Bradley).

T. zythicolor n. sp. (Latin, beer-color). Heretofore placed with *T. longus* O. S., but the entirely pale red, relatively shorter antennae, average smaller size (9.5 to 13 mm.) and lighter brownish-red color, especially of the thorax, with a complete yellowish suffusion of the wings, and the narrower front with lack of connection between the yellowish frontal callosity and the dark brown, ovate median callosity above in the females are distinctive.

Female—Length, 13 mm. Eyes glabrous, indications of two stripes (relaxed). Front parallel sided, about four times as high as wide, yellowish pollinose, the callosity fulvous, quadrate, occupying the full width of the front, a little taller than broad and widely separated from the small, dark brown ovoid median callus. Subcallus fulvous pollinose, face and cheeks creamy, with pale hairs; palpi about three-fourths of the length of the stylets, pale yellowish with sparse black and white hairs intermixed, moderately swollen basally. Antennae, including annuli, entirely light reddish, rather broad, little excised. *Thorax*

pale brownish-red, with appressed, pale golden hairs and practically immaculate. Legs pale reddish. Wings with costal cell yellowish and a paler suffusion over the entire surface. Halteres brown. *Abdomen* elongate, of a light reddish-brown ground color, with narrow, pale incisures and three rows of triangles, the median triangles narrow, but not acuminate anteriorly, widening abruptly on the posterior margin; the appearance is thus a narrow median pale stripe with widened portions barely connecting across the posterior segmental margins with the rounded pale lateral spots. In certain lights, the latter hardly touch either margin. Venter pale reddish.

Male—Length, 12.5 mm. Essentially similar to the female but a trifle darker brown over the whole body including the appendages, except the palpi which are pale yellow and rather slender, bluntly rounded apically, about twice as long as thick. Fore-tarsal claws subequal, black. Not much difference in the size of the eye facets.

Holotype—Female, Oakdale, North Carolina, August 22, 1902, F. C. Sherman.

Allotype—Male, Cape Charles, Virginia, July 1–20, 1933. Dwight Buchanan. Both in collection of the author.

Paratypes—Two females, Raleigh, North Carolina, July 18 and September 2; 1 female, Brinkleyville, North Carolina, August 6; 1 female, Princeton, North Carolina, July 28; 1 female, Lagrange, North Carolina, mid-July; 10 females, Mimsville, Georgia, July 7 to September 6. In the collections of Ohio State Museum, Museum of Comparative Zoology, Cambridge, Mass., U. S. National Museum, and Rocky Mountain Laboratory at Hamilton, Montana.

Little variation is to be seen except in size and in distinctness of the abdominal pattern according to the preservation of the various specimens. Stone adds the states of Va., S. C., Tenn., Ala., Fla., Ark., La., and Okla.

T. gracilis Wied. Most of the specimens studied from North Carolina, Florida and Louisiana have antennae entirely bright reddish, but occasionally there is a dark-brownish suffusion distally which involves the whole third joint as in a specimen kindly compared for me with the type by Dr. H. Zerny, of the Vienna Natural History Museum. The species seems otherwise quite uniform.

T. abactor n. sp. (Latin, cattle-thief). Has been confused heretofore with *T. erythraeus* Big. (*T. rubescens* Bell., syn.[2]) of Arizona and Mexico. The abdomens of both have somewhat the same light chocolate-brown ground color with three rows of prominent pale-brown triangles reaching almost or quite across the segments, but this color occupies the thorax of the females as well in the present species, and

[2]The synonymy is in manuscript of the late Professor Hine who studied Bigot's type at the British Museum; but the specimen compared by him is actually *T. abactor*. Bellardi specifically mentions the enlarged first antennal segment in his type, and Austen writes of this segment in Bigot's type, "unusually incrassate, as described in your letter, and projects like a hood above the small second segment." Hine's synonymy is, therefore, correct, although his homotype is *abactor*. *T. rubescens* Bell. is preoccupied by *rubescens* Macq. while *T. erythraeus* Big. (type in poor condition) has page priority over *Atylotus erythraeus* Big. from the Argentine.

the glabrous eyes, normal rather than swollen first antennal joints, presence of a faint cloud at the bifurcation of vein R5 of the wing, and the larger frontal callosity of the female will differentiate it.

Female—Length, 14 mm. Eyes naked, with two green stripes on a purple ground (relaxed). Front grayish pollinose, rather narrow, very slightly convergent below, the dark brown callosity occupying its full width and tapering abruptly into a narrow line above; on either side of the latter a patch of dark brown pollen with blackish pile, which is obsolescent when viewed from above. Subcallus and palpi pale-creamy pollinose, the latter tapering gradually and not quite as long as the stylets, covered sparsely with appressed black and white hairs; face and cheeks whitish pilose and pollinose. Antennae dark reddish, the annuli black, and the third joint broad, chunky, with little excision. *Thorax* and scutellum brown, covered with appressed gray hairs and indications of four brown lines almost the full length of the disc. Antealar tubercles with fine black and white hairs intermixed. Pleurae and fore coxae creamy-brown pollinose and whitish pilose. Fore legs with femora, distal half of tibiae and tarsi blackish-brown; front tibiae basally and two hind pairs of legs reddish-brown. Halteres brown, yellowish on the disc. Radial sector of wings not appendiculate, the stigma pale brown, and the costal cell and cross-veins are very faintly tinged with yellow, in addition to the faint cloud at the bifurcation of R5. The abdominal triangles completely divided by the dark brown intervals, i. e., not connected across the incisures, the median triangles equilateral and paler than the lateral, semi-rhomboidal spots. Venter reddish-brown, darker toward the tip, with a wide median stripe of minute black hairs its full length.

Male—15 mm. A little darker than the ♀, especially on the thorax, area of enlarged facets not as marked as in some glabrous-eyed species, a single green band across the purple area of small facets. Palpi fulvous, rather short, about twice as long as thick. All femora blackish. Otherwise as in the female except for the usual sexual differences.

Holotype, female, Eastland Co., Texas, May 27, 1921, Grace O. Wiley. In the collection of the author.

Allotype, male, Kerryville, Texas, June 19, 1908; F. C. Pratt (Bishopp No. 5410). In the collection of the Ohio State Museum, Columbus, Ohio.

Paratypes—One male, same data as holotype, and one female, same data as allotype (August 5), in the collection of the author; 18 females from Eastland County, and from Austin, Brownwood, Kerryville, Dallas, Doss, Uvalde, Batesville, Sonora, Bardsdale, Lackey, Bunt, San Marcos, Hacienda, Mason, Regan Wells and Con Con, Texas. Dates are fairly distributed between May 27 and September 20; one female from Sonora is labeled October, 1921. In the collections of the Ohio State Museum, U. S. and Canadian National Museums, Museum of Comparative Zoology, University of Kansas, California Academy of Sciences, and the Rocky Mountain Laboratory, U. S. Public Health Service, Hamilton, Montana. One male, Pearsall, Oct. 9, and 3 females, Johnson Co., July 1, Texas Coll. Reinhard, in Univ. of Texas Collection. Length, 12 to 15 mm.

Some variation is seen in abdominal coloration of the paratypes where a smoky suffusion may spread forward from the tip involving especially the venter.

The species is some like *T. sackeni* Fchld., but the abdominal triangles are more pronounced and angulate, the third antennal segment is wider and shorter, the front of the female is less convergent, the callosity merging broadly with the median callus above, and the fore femora of the female and all femora of the male are dark brown; the wings of *T. sackeni* have no traces of clouds on any of the crossveins.

The specimens from Texas referred to by Osten Sacken (1876, p. 448) in the last paragraph under *T. longus*, and by Fairchild (1934, p. 143) under *T. fulvicallis* probably represent this species. Stone lists this species from Kansas and Oklahoma in addition to Texas and comments that the "abdomen of *erythraeus* is distinctly more orange-brown than in *abactor* and the colors more contrasted" in his considerable series.

Professor Sanborn, of the University of Oklahoma, informs me this species is very amenable to confinement and most useful in their transmission studies of anaplasmosis in cattle. Specimens from him are *T. abactor*, and it seems likely the "*T. gracilis*" reported by Sanborn et al. (1930) were actually *T. abactor*, since the former occurs only rarely as far west as Louisiana. He has taken it from mid-May to mid-September and observes it to be their most troublesome species, as many as three dozen being seen on an animal at one time in mid-season. Their experiments (unpublished) indicate this species as a potential vector of the disease.

Since Fairchild (1934) overlooked including his intended key to the *longus* group, an analytical dichotomy is here appended to include also related species with elongate, brownish bodies and three rows of abdominal spots treated above.

1. Legs practically concolorous, brownish-red (fore tibiae and tarsi sometimes darkened distally) 5
   Legs with at least the fore femora almost black or decidedly darker than the fore tibiae basally; legs therefore really bicolored 2
2. Wings with faint clouds on outer cross-veins and costal cell hyaline; lateral abdominal spots angular, semi-rhomboidal; median callus linear, not widened above its connection with the frontal callosity; fore legs only (♀) bicolored ..... **abactor** n. sp.
   Wings hyaline with yellowish costal cell; lateral abdominal spots rounded (except *texanus*); median callus usually widened above or disconnected from callosity; all femora darkened at least basally 3
3. Lateral abdominal spots angular and continuous, the dark intervals not curved behind; front of female broad, the callosity quadrate .. **texanus** Hine
   Lateral abdominal spots rounded, isolated at least inwardly and below by paired crescentic dashes; front of female moderately broad or narrow, the callosity usually plainly taller than broad 4
4. Front of female narrow, somewhat convergent below, the callosity small; thorax essentially unstriped; body, including face and palpi, chiefly yellow ..... **fulvulus** Wied.
   Front of medium breadth, parallel-sided, the callosity relatively large; thorax distinctly lined; body chiefly light brownish, the face and palpi whitish ..... **longiusculus** Hine
5. Wings, including costal cells, hyaline 6
   Wings, with at least costal cells dilute yellowish 7

6. Third antennal joint elongate, red, the annuli sharply black; front of female convergent below, frontal callosity separated from the median, **sackeni** Fchld.
   Third joint short, compact, predominately black; front of female narrow parallel, frontal callosity continuous with a narrow, median line above, **fulvicallus** Philip
7. Antennae entirely red, occasionally brownish..... 8
   Antennae black distally, at least the annuli..... 10
8. Thorax unstriped, dusty golden pollinose; front of female narrow, convergent below, the callosity small and elongate, **fulvulus** var. **pallidescens** n. var.
   Thorax brown, more or less gray striped; front parallel-sided, the callosity relatively larger..... 9
9. Abdominal triangles angular, the central row large, acuminate just before the margin of each segment; the front of female broad, the calli usually connected.....**gracilis** Wied.
   Abdominal spots rounded laterally, the central row or triangles attenuated anteriorly on each segment forming a narrow, continuous gray stripe; front moderate, the calli not normally connected....**zythicolor,** n. sp.
10. Abdominal pattern chiefly brown, rather dark, the mid-dorsal row of connected gray triangles forming a narrow stripe; thorax usually distinctly gray striped.....**longus** O. S.
    Abdomen chiefly yellow, or light reddish, the median gray stripe or yellow triangles frequently broad; thorax not or imperceptibly lined... 11
11. Abdomen usually reddish yellow with a broad, pale pollinose, middorsal stripe its full length, the lateral spots indefinite; 3rd antennal segment elongate, the basal prominence hardly perceptible; front of female about three times as high as inferior width.....**sagax** O. S.
    Abdomen usually yellowish, with paired, brownish dashes enclosing a rather narrow yellow stripe; 3rd antennal segment with basal angle more distinct; frontal height of female usually four times its width, **"T. sp."** (to be described by Stone)

REFERENCES

Fairchild, G. B. 1934. Notes on Tabanidae. Occas. Papers, Boston Soc. Nat. Hist., 8: 139–144.

Hine, J. S. 1914. *Tabanus longus, fulvulus* and *sagax*. Ohio Nat., 14: 224–228.

Osten Sacken, C. R. 1876. Prodrome of a monograph of the Tabanidae of the United States. Part II. Mem. Boston Soc. Nat. Hist., 4: 421–479.

Sanborn, C. E., Stiles, G. W., Moe, L. H., and **Orr, H. W.** 1930. Transmission of Anaplasmosis by flies. Okla. Agric. Exp. Sta. Rept.

Stone, Alan. Correspondence.