Bibio slossonae Cockerell.—Plummers Island, Md., Nov. 18, 1906, Nov. 17, 1907 (McAtee); there is good reason for believing that this form is a northern subspecies of the preceding, and that the specimens here recorded are merely the intergrades that would be expected in a locality where the fauna derives numerous species from the mountain (equivalent faunistically to a northern) region.

Genus **Dilophus** Meigen.

Dilophus obesulus Loew.—All specimens are from the vicinity of Plummers Island or from farther up the Potomac River; they were collected from May 4 to 26; and on one occasion each at light, and on flowers of *Opulaster opulifolius*.

Dilophus serotinus Loew.—Sometimes abundant; the known season extends from Sept. 28 to Nov. 18; in copula Oct. 19, and 30.

A CONTRIBUTION TO THE BIOLOGY OF N. A. DIPTERA.

By Charles T. Greene, *Bureau of Entomology*.

The immature stages of the Diptera discussed in this paper were reared by the writer at the Eastern Field Station, Falls Church, Va. The material was collected by the writer, except where noted. These descriptions of the immature stages are new to science. *Xylota pigra* was described briefly but no figures given. There were so many good characters on the pupa I thought it worth while describing in detail. All the species treated in this paper pupate in the last larval skin.

The writer has made a distinction between the two pairs of anterior spiracles of the pupa. The small ones located close to the apex are called "*anterior spiracles.*" They are present in the full grown larva and the pupa. A short distance in back of this pair, on the dorsum, is a larger pair which appears only in the pupa and this pair I have called "*antero-dorsal spiracles.*"

Microdon coarctatus Loew.
(Plate 6, figs. 1a-b)

Larva small, dull, smooth, opaque, milky-white; about one and one-half times longer than wide; height is about three-fourths the width; on the ventral surface, near the lateral edge, but not visible from above, is a row of fine, soft, delicate hairs which entirely encircle the ventral surface. Around the edge near the base are located thirty small cone-like projections arranged in pairs; on the dorsum are numerous others of these same cone-like projections; these cone-like projections are located on a small, short stem with a diameter about equal to the length; the cone portion has the diameter at the base about or nearly equal to the height and the color is yellowish-brown. These cones are very easily knocked off but there is always a definite scar at the point of attachment. Posterior

spiracles are located at the apex of a large cone which is located well above where the side and ventral surface meet; this cone is of a medium dark, brownish-yellow, somewhat chitinized and pointing slightly oblique from the ventral surface. Where this cone attaches to the larva is a circular base, chitinous, brownish-yellow, tapering towards the apex and at the apex is a narrow constricted space and then the cone; the diameter at the base is about equal to the height.

The spiracles (fig. b. right half) cover the entire apex of the cone; spiracles may be divided into half, each half has a round button with eight straight slips radiating from this button. For details see drawing.

Length 5 mm., width 3 mm., height 2.5 mm.

Pupa the same as the larva with the following differences: pale luteous yellow. A pair of anterior spiracles (fig. 1a) developed just above the lateral edge; spiracles are widely separated, the space equal to twice the length of one spiracle; they are reddish in color; the surface at the base has a microscopical checkered appearance; apical half has numerous, small, round tubercles scattered over the surface. For details see drawing.

Larva and *Pupa* with small black ants (*Monomorium minutum* Buckley) under bark and in decayed sapwood of a log of chestnut-oak.

Collected at Difficult Run, (Arlington County), Virginia, July 4, 1916, T. E. Snyder, collector.

Hopkins U. S. No. 12994a.

Twelve adults emerged from July 10–12, 1916.

Note. The drawing is that of the *larva*. The *pupa* is the same in appearance with the addition of anterior spiracles which are located in their natural position on the *pupa* with dotted lines.

The details are shown in fig. 1.

Collected at Palm Grove, Texas. One adult emerged June 4, 1917, Hopkins No. 15120a.

Xylota pigra Fabricius.
(Plate 6, figs. 2c-f)

Pupa.—Large, nearly cylindrical, dull, light brownish yellow; larger towards the anterior end; entire surface covered with a fine, short pubescence; surface with numerous, narrow, transverse wrinkles; there are numerous hair-like appendages along the lateral edges and on the dorsum; each appendage is composed of three hair-like filaments; at the extreme apex, on the under, lateral edge is a group of short, reddish spines; on each side of the apex, widely separated, is a dark reddish chitinous plate, which is somewhat rounded in outline; each plate has two large dark red, horn-like prongs (fig. 2c); the inner one is turned slightly upward; the other one is much larger and points outward. Anterior spiracles (fig. 2d) are cylindrical, tuberculate with their height about equal to the diameter; they are deep yellowish in color; the outside is cut off obliquely; this oblique surface is flat, shining and with the inner edges dark brownish; the central area is elliptical, pale yellow, which color reaches the outer edge; the upper or inner edge of this yellow area radiates into nine long

points or rays; about the apical fourth or fifth, on the dorsum, are located a pair of spiracles of deep luteous yellow (fig. 2e); they are separated by a distance equal to twice the length of one spiracle; each spiracle is nearly cylindrical; basal half is coarsely granular; upper half has numerous prominent tubercles which are somewhat arranged in pairs. On each side of the caudal end are three cylindrical, pointed appendages with numerous hair-like filaments; each appendage is about three times as long as its basal diameter. At the center of caudal end is an elliptical semi-transparent, reddish-brown, chitinous, shining, tail-like projection; variable in length because it is partly retractile; nearly the basal half is smooth; apical end is roughly granular; apical surface is flat, resembling the figure 8; dark brown to blackish along the edges; inner surface more reddish brown; each half (fig. f) has four sinuous slits which have numerous small branches on each side; also a button which has two, small, dark areas or faint depressions.

Length 7 mm.; diameter 3 mm. at apical fourth; tail 1 mm. long, 5 mm. wide.

Hopkins U. S. No. 11907 a.

Collected at Larkspur, Colorado by A. B. Champlain. Under bark of Pinus ponderosa.

Adults emerged from the Pupa February 9 to March 5, 1914.

Under Hopkins U. S. No. 12932 there were 12 larvae of this species from the same locality collected August 21, 1914. On September 22, 1914, 12 adults emerged.

Chrysotoxum pubescens Loew.

(Plate 6, figs. 3k–l. Pupa only drawn.)

Larva opaque white, segmentation irregular, with numerous transverse wrinkles; cephalic end tapers very slightly; mouth parts retractile; posterior spiracles in the center of the caudal end which projects .5 mm.; this projection is heavily chitinized, very dark reddish, nearly black; with a longitundinal groove in the middle of the dorsal and ventral surfaces. Venter has seven pairs of ampullae which are evenly spaced.

Larva at rest is 11 mm. long and 5 mm. wide, nearly cylindrical.

Found under a stone in a moist place.

A. B. Champlain, collector.

Larva pupated May 3, 1917. Later on the same date the puparium was a pale, dull yellowish white.

May 28, 1917, an adult male emerged.

Hopkins U. S. No. 14803.

Pupa pale, dull, luteous yelow with the surface microscopically transversely rugose; the puparium is cylindrical, rather blunt on cephalic end, gradually tapering down to the caudal end which is transversely rugose (remains of the larval segmentation and partly caused by shrinkage fig. k); venter faintly transversely, concave in the center. No anterior spiracles. Posterior spiracles project slightly, the width is equal to the length and the height about half the width; color is dark brown, sub-shining; above and below is a faint groove

dividing this projection longitudinally in half; on the apex are located the spiracular slits; each half has the following: (right half drawn fig. l) at the upper inner corner is an elevation with a circular depression in the center which appears like a tube: radiating from this depression are three rounded, sinuous, shining black ridges with a yellowish slit on the dorsum; the lower inner slit is perpendicular; between the ridges is a raised, finely granular surface with the inner end pointed. Anal opening small, transverse with a narrow area reddish brown.

Length 8 mm.; diameter 4 mm.; tail .75 mm. long.

Brachypalpus rileyi Williston.
(Plate 6, figs. 4g–j)

Larva medium size, robust, nearly cylindrical, with the sides about parallel, dull, light brownish yellow; broad transverse wrinkles; entire surface of larva closely beset with short, fine pubescence; first segment nearly as long as broad; on apical edge are numerous short, robust spines; on each lateral edge are two faintly rounded elevations; each of the transverse segmental wrinkles are somewhat rounded on the lateral edge; there are numerous, small, tufts of hairs or hair-like projections arranged in longitudinal rows on the dorsum and the lateral edges; last three segments terminate laterally into a long conical projection, each with numerous dark brown spines; these projections increase in size towards the caudal end; the posterior projection is about two and one half times longer than the anterior one.

Length 9 mm.; diameter 3.5 mm.; posterior spiracles project 1 mm.

For other details see description of pupa.

Two larvae collected at Glen Echo, Maryland, October 23, 1921, J. C. Bridwell, collector.
Larvae under bark of hickory.

Pupa not so rugose as the larva; dull, dark reddish-brown with entire surface covered with a short microscopic pubescence and very narrow transverse rugosities; at the apex, on the lateral edge, are two small, nearly circular, reddish, chitinous plates (fig. h) each bearing two prongs; the inner one pointing up and back towards the dorsum and the other pointing out and backward; these plates are widely separated; just above these are the anterior spiracles (fig. g) which are elliptical, deep reddish, about as long as greatest diameter; at the apex they are cut off obliquely towards the outside; this surface is smooth, dark along the edge, with a lighter, yellowish area in the center reaching to the outer edge; this light area has seven finger-like areas radiating toward the inner edge; back of the anterior spiracles is another pair of spiracles (fig. i) which are widely separated, the space is about two and one-half times the diameter of one spiracle at the base; these spiracles are reddish-black, cone-shaped, leaning slightly outward and backward; their height is only slightly more than the diameter at the base; there are numerous tubercles on the surface; each tubercle is nearly round with a faint depression in the center; around the base of the spiracles the surface is faintly raised and forms like a blackish ring. Posterior spiracles are heavily chitinized, deep reddish-yellow; the base is slightly larger in diameter for a

distance equal to about half the diameter; the remainder is slightly smaller in diameter and about one and one-half times longer than broad; along the center is a vertical groove reaching to the apex; apex shining, brownish-black; in outline crudely shaped like the figure 8; on each half near the inner edge is a large circular depression which has a depression in the middle; on the outer edge are two small tubercles, the lower one is about on the horizontal center line; each half (fig. j) has four reddish-yellow sinuous slits.

Length 9 mm., diameter 4.25 mm. Posterior spiracles project 1 mm.

Hopkins No. 12980.

Two *pupae* collected at Dead Run, Arlington County, Virginia, March 24, 1916, C. T. Greene collector. March 26, 1916, two adults emerged.

Pupae were found in a crevice of a cedar stump.

Xylota bicolor Loew.

(Plate 7, figs. 1a–d)

Puparium cylindrical, dull, deep luteous yellow with a brownish tinge; surface covered with a microscopical, yellow pubescence; cephalic end has a broad rounded point; the greatest diameter at the apical fourth and from here the body tapers gradually to the caudal end; which is somewhat extended and slightly longer than its diameter; on each side is a short rounded tubercle and above each, at the apical edge is a longer, slender, cylindrical tubercle. Protruding from this extension or tail is a heavily chitinized elliptical, shining rod (which is retractile and therefore varies in length) semi-transparent, pale yellow and broadly reddish-brown at the apex. Posterior spiracles are located on the apex of this rod; the right half is drawn, (fig. 1d) each half contains a round depression and three sinuous slits of a pale yellow color. At the cephalic end are numerous short spines along the edge; back of these spines and slightly above the lateral edge, on each side, is a pair of reddish chitinous hooks fused at their base (fig. a) the larger or inner one curves backward, the outer one curves out and backward. A short distance in back of these hooks, on the dorsum, are located the anterior spiracles (fig. b); these are yellowish-brown, shining, heavily chitinized, elliptical and about as long as the greatest diameter; the upper, outer surface is cut off obliquely; on this oblique surface is a pale yellow area which has six finger-like radiating areas; this yellow area reaches to the outer edge and down along the outside surface of the spiracle. Quite some distance in back of the anterior pair, at about the apical fourth of the puparium and widely separated is another pair of spiracles which are widely separated at the base; each spiracle (fig. c) is heavily chitinized, three times longer than wide, with a granular surface, shining, reddish-yellow in color; each directed obliquely outward and curved backward; there are numerous, distinct, round tubercles on the upper three-fourths and a long, narrow bare area on the inner front surface.

Length 12 mm.; diameter 4 mm.

Hopkins No. 12988a.

Collected at Falls Church, Va., May 5, 1916, by C. T. Greene. Adult emerged May 17, 1916.

Pupae were found in frass in a pocket of an old tree of Liriodendron tulipifera.

Criorhina pictipes Bigot.
(Plate 7, figs. 2e–g)

Pupa, small, dull, luteous yellow; nearly cylindrical, slightly flattened on ventral surface which is covered with short, fine yellow hairs; on the ventral surface are evenly paired clusters of bristly hairs which are the remains of the larval ampullae; diameter of puparium nearly one-third the length of the body; puparium tapers slightly towards the cephalic end and is somewhat wedge-shaped transversely with the anterior edge faintly indented; along this edge is a row of short hairs; the tail is about two-thirds the length of the body, cylindrical, tapering towards the apex which is about one-fourth the diameter of the base. Anterior spiracles short, cylindrical, pale yellowish, microscopically rugose; apex cut off obliquely towards the outside and nearly semi-circular in shape; this upper surface is smooth, shining, with the central area lighter in color and indented along the edge (fig. e). At about the apical fourth, on the dorsum, is located a pair of spiracles (fig. f) widely separated, the distance between them is about two and one-half times the length of one spiracle; these spiracles are of a more golden yellow than the puparium, directed slightly backward and outward and have numerous small, rounded tubercles distributed on the entire surface.

The tip of the tail is somewhat rectangular in shape with the spiracular tube slightly protruding and rectangular in form (fig. g); this inner tube is yellowish-white in color, semi-transparent with a thin wall, perpendicular in the center.

Length 7 mm., diameter 2.75 mm.; tail 3.5 mm. long; 5 mm. diameter at base.

One adult female emerged April 22, 1919.
Pupa collected in frass in a dead tulip stump at Falls Church, Va., April 19, 1919, C. T. Greene, collector.

Myiolepta nigra Loew.
(Plate 7, figs. 3, k).

Puparium.—Medium size, dull, brownish-yellow; covered with short pale yellow hairs; puparium nearly cylindrical, slightly flattened on the ventral surface; greatest diameter at about the apical fourth, tapering gradually towards the caudal end, terminating into a small tail-like projection which is only slightly longer than wide; from this projection is extended a very slender, heavily chitinized, dark reddish, semi-transparent, elliptical rod. This rod is variable in length because it is retractile. At the apex are located the posterior spiracles (fig. k); the central area is light yellowish and very faintly depressed with two elliptical areas which are slightly oblique to each other; these areas are outlined with microscopical bead-like markings; the outer edge is a dark reddish-brown with a black winding line on the surface which has the appearance of a narrow edge.

Length 7 mm.; diameter 3.5 mm.; tail 1 mm. long; width 1 mm.

Hopkins Nos. 12977*i* and 12988.

Puparium found in a hole in a tulip tree *Liriodendron tulipifera*. Two adults emerged May 11–22, 1916. C. T. Greene, collector,

Blera (Criorhina) umbratilis Williston.

(Plate 7—figs. 4h-j).

Puparium.—Medium sized, cylindrical, dull, luteous yellow, microscopically pubescent and with a tail about half the length the body. Cephalic end tapers to a broad rounded point with a short row of short hairs on the edge; greatest diameter at apical third; the diameter gradually diminishing towards the caudal end; tail is four or five times longer than basal diameter; apical diameter is about half that of the base. Posterior spiracles are located on the apex of a heavily chitinized, dark brown to black, hollow rod which contains the trachae; this rod is retractile; the left half of the apex of this is drawn (fig. j), the dark edge is nearly black and shining; the light portion is pale luteous yellow with two large, pointed lobes and two rounded lobes, the larger one at the top. Anterior spiracles (fig. h) close to the apex, widely separated by a broad, low ridge tapering towards the apex; each spiracle is nearly cylindrical, dark reddish, chitinized and cut off obliquely towards the outside; this oblique surface is elliptical in form, smooth, sub-shining with a pale yellowish area in the middle; this yellow area has one broad projection below to the left, and eight, narrow, finger-like projections above; around the base of these spiracles is an area with a granular surface. Further back, near the greatest diameter is another pair of spiracles (fig. i) separated by a space equal to the length of one spiracle; they are directed outward and curved backward; each has a slightly darkened area around the base; each spiracle is pale, luteous yellow, with four transverse rows of paired tubercles widely separated on the inner front surface; apex with numerous rounded tubercles; at the base of these spiracles are numerous short hairs which are easily broken off.

Length 7 mm.; diameter 3.75 mm.; tail 2.25 mm. long, .5 mm. diameter at base.

Two pupae collected at Great Falls, Va., April 21, 1916, in moist frass in a hole in an old Sycamore tree. C. T. Greene, collector.

Hopkins No. 12984.

Adults emerged May 3, 1916.

Explanation of Plates.

Plate 6.

Fig. 1—*Microdon coarctatus* Loew.
Larva, dorsal view.
Pupa, same with the addition of fig. a.
a—Anterior spiracle of pupa. Lateral view.
b—Posterior spiracle. Right half drawn.

Fig. 2—*Xylota pigra* Fabricius.
Pupa dorsal view.

c—Cephalic horns.
d—Anterior spiracle of larva and pupa.
e—Antero-dorsal spiracles of pupa. Lateral view.
f—Posterior spiracle. Right half drawn.
Fig. 3—*Chrysotoxum pubescens* Loew.
Pupa, lateral view.
k—Posterior end. Dorsal view.
l—Posterior spiracle. Right half drawn.
Fig. 4—*Brachypalpus rileyi* Williston.
Pupa dorsal view.
g—Anterior spiracle of larva and pupa.
h—Cephalic horns.
i—Antero-dorsal spiracles of pupa. Lateral view.
j—Posterior spiracle. Right half drawn.

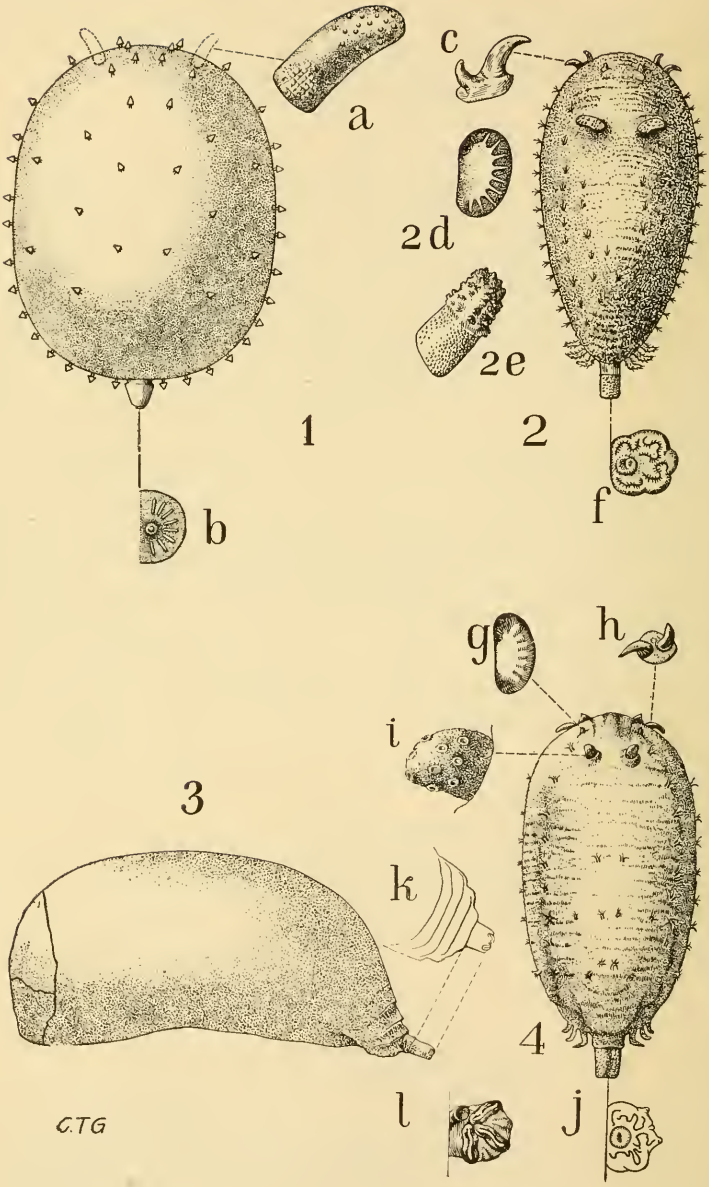
Plate 7.

Fig. 1—*Xylota bicolor* Loew.
Pupa, dorsal view.
a—Cephalic horns.
b—Anterior spiracle of larva and pupa.
c—Antero-dorsal spiracle of pupa. Lateral view.
d—Posterior spiracle. Right half drawn.
Fig. 2—*Criorhina pictipes* Bigot.
Pupa, dorsal view.
e—Anterior spiracles of larva and pupa.
f—Antero-dorsal spiracles of pupa. Lateral view.
g—Posterior spiracles.
Fig. 3—*Myiolepta nigra* Loew.
Pupa, dorsal view.
k—Posterior spiracles.
Fig. 4—*Blera* (*Criorhina*) *umbratilis* Williston.
Pupa, dorsal view.
h—Anterior-spiracles of larva and pupa.
i—Antero-dorsal spiracles of pupa.
j—Posterior spiracles. Left half drawn.

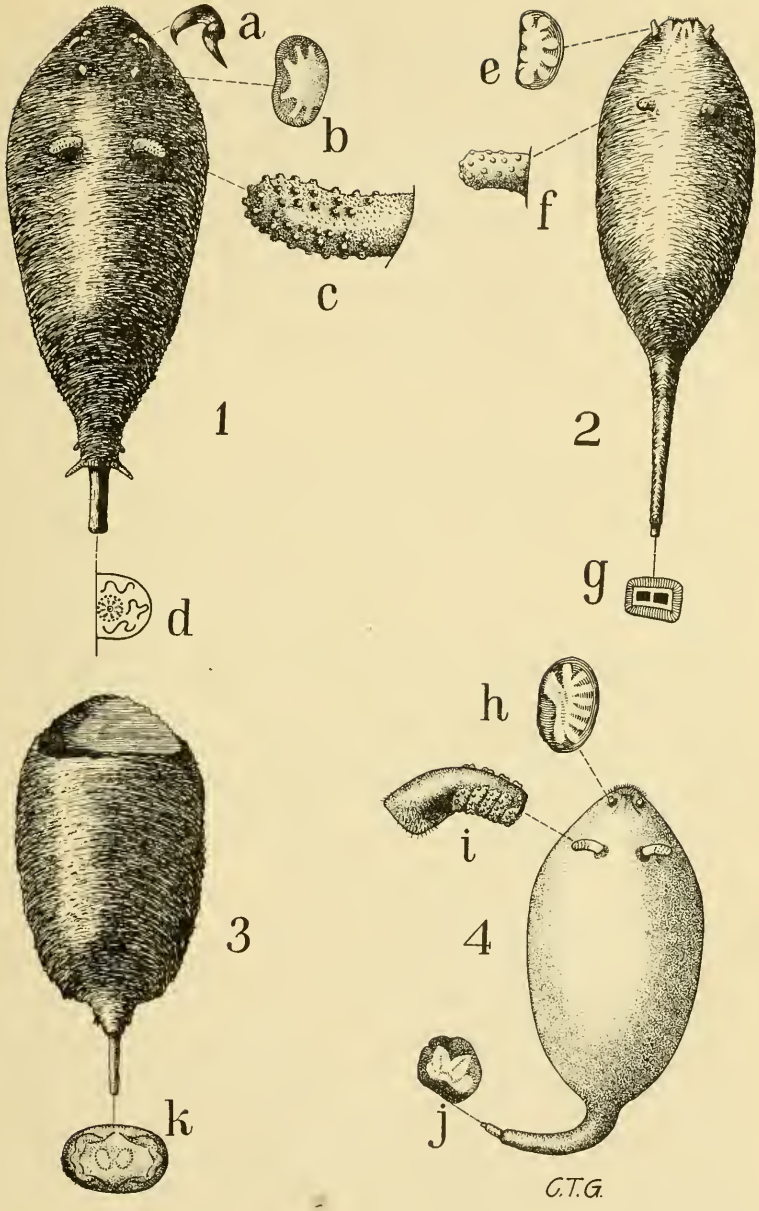
A NEW GLYPTOTERMES FROM PORTO RICO.

By Thos. E. Snyder, *U. S. Bureau of Entomology.*

Only eight species of the genus *Glyptotermes* are known from America, although its contained species are widely distributed throughout the world. Two species are known from the Antilles, namely, *G. pubescens* Snyder and this new species *G. corniceps* Snyder—both from Porto Rico.



GREENE—BIOLOGY OF N. A. DIPTERA.



GREENE—BIOLOGY OF N. A. DIPTERA.