

ENTOMOLOGY.—*Four new species of mosquitoes from Okinawa (Diptera: Culicidae).*¹ RICHARD M. BOHART, Lieutenant, H(S), U.S.N.R., and ROBERT L. INGRAM, CPhM, U.S.N., U. S. Naval Medical Research Unit No. 2. (Communicated by ALAN STONE.)

During a survey of the northwest coast of Okinawa, Ryukyu Islands, in August and September 1945, four new species of mosquitoes were collected. Type material will be deposited in the U. S. National Museum. All the type localities are in the Hentona District except Shana Wan, which is situated on a bay 4 miles south of the southern limits of the district.

Anopheles (Anopheles) saperoi, n. sp.

Female.—Length 4.5 mm; wing 4.0 mm. Vertex clothed with dark erect scales, some white erect scales medially in front, pale hair-like scales between eyes, remainder of head and its appendages dark, palpus with semi-erect scales, longest toward base where they are almost as long as clypeus. Scutum with sparse brownish hairlike scales, more numerous and whitish anteriorly; scutal integument mostly pale with a distinct unbroken lateral dark margin (Fig. 2); pleuron dark, devoid of scales, with two pale longitudinal stripes visible in some lights. Femora and tibiae dark, latter with an apical ring involving base of tarsi; tarsi with very narrow pale bands covering the joints, indistinct on last two joints of fore- and midlegs. Wing: first humeral spot absent, second humeral spot present but very small, subcostal spot very small, apical spot present, no other costal spots; vein 1 with spots at basal one-fourth, basal one-third and middle (middle spot sometimes absent), as well as apical spot; vein 2 primarily dark, 2.1 with a continuation of apical spot, 2.2 with spot at basal one-third; vein 3 mostly pale except at base and apex; vein 4 primarily dark before fork, 4.1 and 4.2 mostly pale with some dark scales; stem of vein 5 pale with a dark spot before middle, 5.1 mostly pale but dark at base, basal one-third and apex, 5.2 mostly pale on basal three-fourths; vein 6 mostly pale with dark spots at apical two-fifths and at apex; fringe spots absent except one at apex, covering tips of veins 2.1, 2.2 and 3 (Fig. 1). Seventh abdominal

sternite with an inconspicuous apical scale tuft.

Male.—Unknown.

Egg.—Length 0.5 mm. Float large, no frill noted. (Figs. 3 and 4 are taken from field sketches made with a dissecting binocular. The eggs were subsequently lost.)

Larva.—Head (Fig. 6): Preclypeal hair 1 slender, curved; inner clypeal hairs long, simple and with bases touching; outer clypeal hair slightly shorter and 4- to 7-branched; posterior clypeal hair nearly as long as outer clypeal hair, simple; frontal and occipital hairs as shown in figure 6; terminal antennal hair 4-branched and extending slightly beyond dorsal saber; antennal hair inserted at basal one-third of shaft, 3- to 4-branched, usually not extending beyond middle of shaft. Antenna spiculate, particularly along inner surface. Thorax (Fig. 5): Prothoracic hair 1 with 3-6 branches; hair 2 with about 8 branches, relatively slender; hair 3 short and simple; metathoracic palmate hair with many well developed branches. Abdomen: Palmate hairs weak on tergite I, well developed with about 20 leaflets on II to VII, the leaflets somewhat slender on II, leaflets sparsely notched and shaped as in Fig. 7; lateral hair of segments I and II stout and many-branched, that of III similar but weaker, that of IV and V slender and bifid near base, that of VI simple; anterior tergal plates small, with concave posterior border, pecten with 8-9 long and 10-11 short teeth (Fig. 8).

Type.—Female, Chizuka, Okinawa, August 24, 1945, collected biting (R. Bohart and R. Ingram collectors).

Paratypes.—Five females, same data as type but collected between August 25 and 31. One female paratype, Euka, August 27, 1945, collected biting (R. Ingram collector). An additional specimen from Chizuka was collected on September 8 and laid eggs in the laboratory. Three larval paratypes were reared to the fourth instar.

Remarks.—This species is related to *barbistrostris* van der Wulp, *gateri* Baisas, and

¹ Received November 29, 1945.

umbrosus Theobald. In common with these species it has only two definite spots on the costa, narrow tarsal bands, unbanded hind femur and entirely dark palpus. The adult differs from the other three species in having more prominent hind tarsal bands which cover the joints. Also, it differs from *gateri* in having pale interruptions on the basal one-third of vein 1; from *barbirostris* in having a slightly different wing pattern including an all dark posterior fringe, a continuous dark lateral scutal margin and no conspicuous scale tuft on the seventh sternite; and from *umbrosus* in the larger apical fringe spot and the entirely dark scaled stems of veins 2 and 4. The larva is distinctive in having a very short antennal tuft, a sparsely branched outer clypeal hair and a long single hair 4. It further differs from *gateri* and *umbrosus* by its well developed palmar hairs on the abdomen.

This species is named for Capt. J. J. Sapero (MC), U.S.N., in recognition of his contributions to malariology and his personal encouragement.

Uranotaenia stonei, n. sp.

Male.—Length of body 3 mm; length of wing 3 mm. Vertex clothed with light brown broad appressed scales, lighter around eye margins, a sprinkling of upright brown scales; torus bare, light brown; antenna thickly plumose; palpus twice as long as clypeus, light brown; proboscis dark brown, somewhat swollen apically, shorter than fore femur. Integument of thorax light brown; anterior pronotal lobe with a few light gray broad appressed scales; proepimeron with inconspicuous translucent broad appressed scales; scutum with light brown narrow curved scales and many dark stout bristles, a few pale scales around anterior margin; a patch of small translucent scales on upper sternopleuron just below a small dark integumental spot, lower and upper sternopleural bristles well developed, postspiracular area darkened; scutellum with brownish broad appressed scales. Wings entirely dark scaled. Legs dark brown, somewhat paler on femora beneath, front and mid tarsal claws slightly unequal. Dorsum of abdomen clothed with dark brown scales, tergites with inconspicuous pale basal bands on II–VII, venter pale. Genitalia (Fig. 10): Lateral plate of mesosome with five prongs in the position

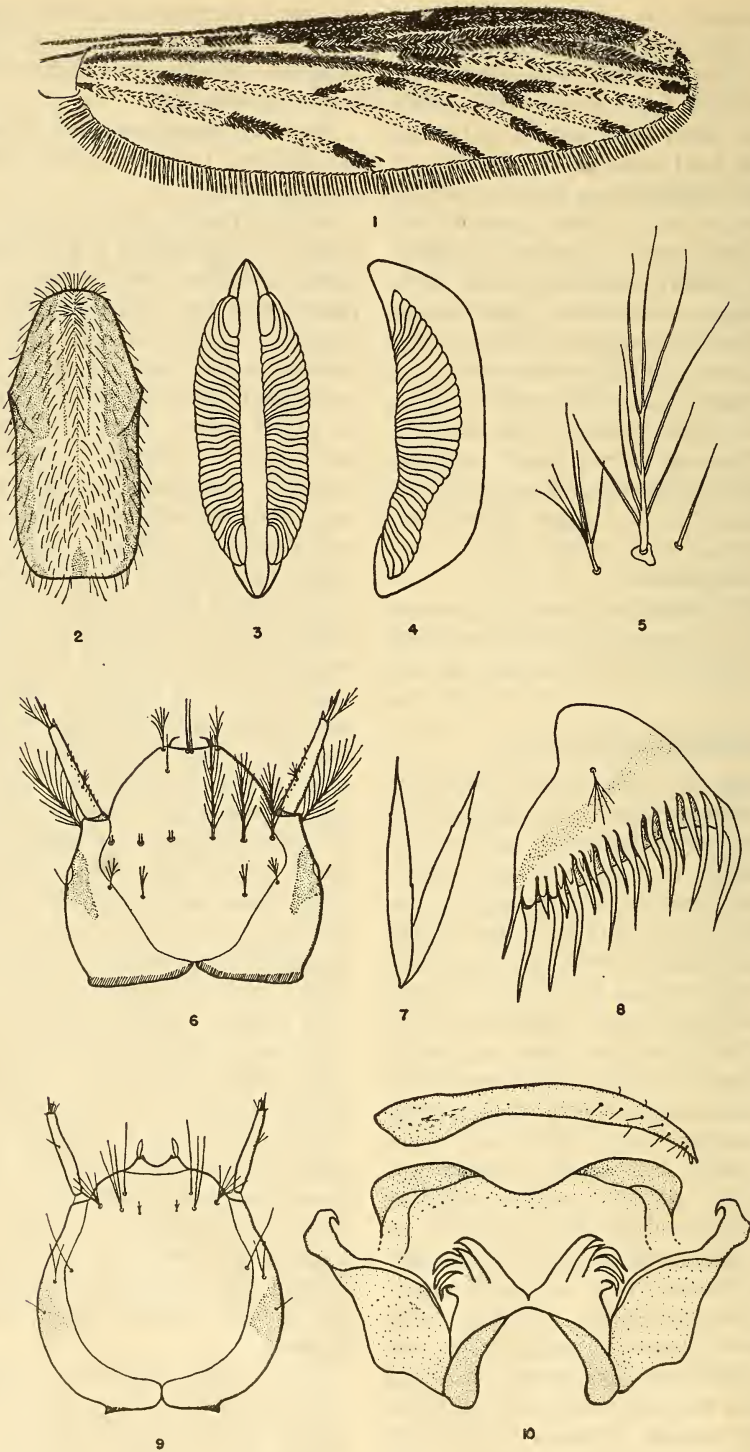
of a partly clenched fist; ninth tergite without bristles along apical margin which is concave; basal lobe of basistyle with 2 stout bristles and several smaller ones.

Female.—About as in male, abdominal bands less distinct. Length of body 3.25 mm; length of wing 3.5 mm.

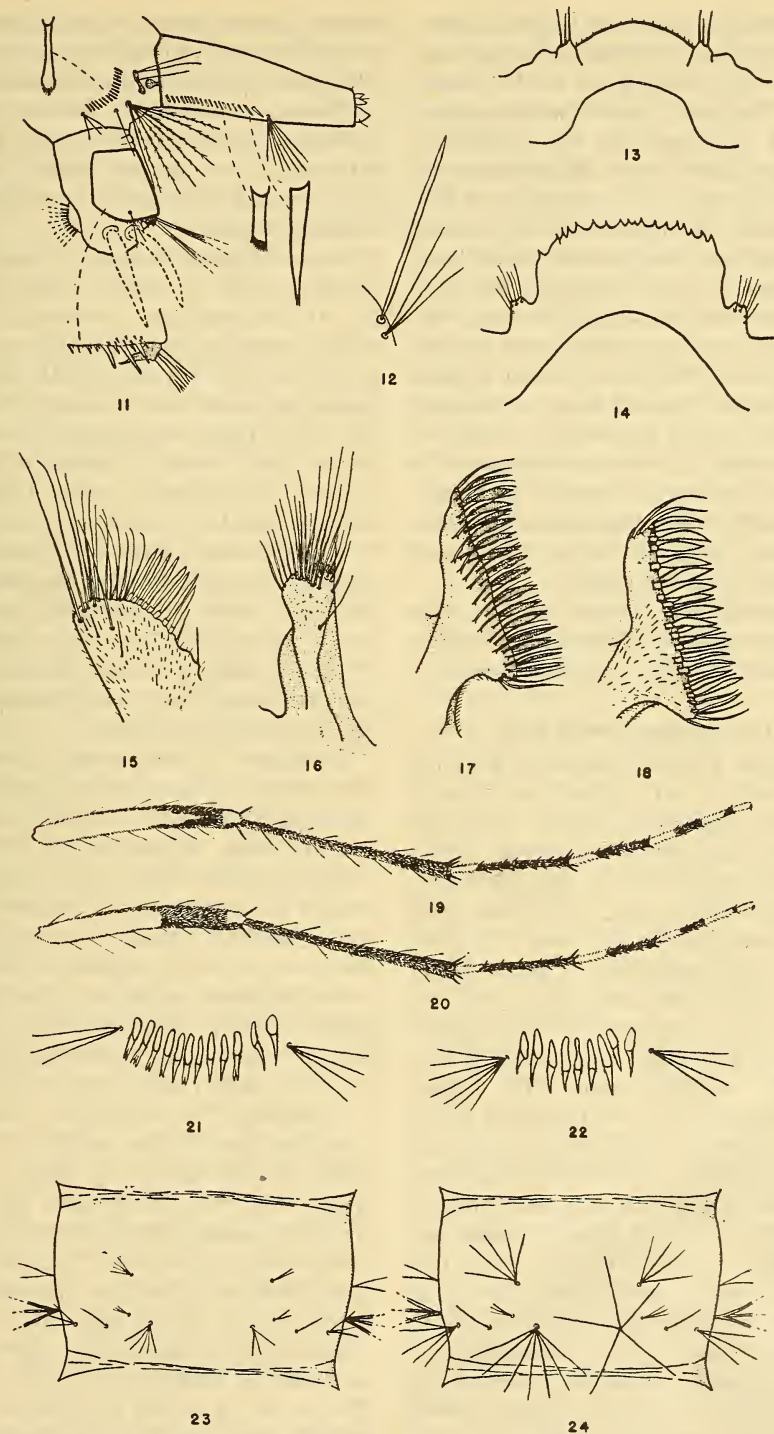
Larva.—Length of body 9.0 mm. Head (Fig. 9): Integument pale; preclypeal spines short, spatulate; head hairs A, B, C, and d placed between antennal bases; lower head hair (B) simple, slender, about as long as antenna; upper head hair (C) 2- to 4-branched and slightly shorter than B; hair d inside and on a level with C, small and 2- to 4-branched; hair A with 5–7 branches; antenna slender with simple or bifid hair at apical two-fifths; mentum triangular with about 17 large teeth. Thorax: Prothoracic hairs 1–3 on a sclerotized tubercle, hair 1 with 2 or 3 branches, hair 2 with 5–7 branches, hair 3 with 2–3 branches; hair 0 small and 4- to 5-branched; hair 4 about 8-branched; hairs 5 and 6 simple, 5 very long; hair 7 with 3–4 branches; mesothoracic and metathoracic submedian hairs with 4 setiform branches; prothoracic pleural submedian hair with 11–14 stout branches. Abdomen: Lateral hairs of segments I and II long and stout, of III–VI long, slender and simple or double; segments III–VI with stout setiform sublateral hairs, these also present on dorsum of I–II and IV–V (Fig. 12). Comb of 15–20 apically fringed slender teeth not inserted on a plate. Siphon with large acus just below a sclerotized plate bearing 2 simple hairs (more dorsal hair sometimes double); siphon pale brown, about 4 times diameter at base; pecten of about 20 apically fringed teeth, last 2 or 3 larger, more widely spaced, last 1 or 2 not apically fringed; pecten extending two-thirds of tube length, ending at insertion of tuft which is 6–7 branched. Hairs of anal segment as shown in Fig. 11; anal segment not ringed by plate which has conspicuous apical spines; fan plate with 10 hairs; gills sharply pointed, equal, longer than anal segment.

Type.—Male, Chizuka, Okinawa, September 1945, collected on damp rocks above a stream (R. Bohart and R. Ingram).

Paratypes.—Twenty males and 19 females (same data as type) and 15 larvae on slides (same locality and date as type) siphoned from a deep hole of narrow diameter in the rocky



FIGS. 1-8.—*Anopheles saperoi*: 1, wing; 2, scutum; 3, dorsal view of egg; 4, lateral view of egg; 5, right prothoracic submedian hairs; 6, dorsal view of larval head; 7, enlargement of leaflets from palmate hair on fifth abdominal segment; 8, pecten. FIGS. 9-10.—*Uranotaenia stonei*: 9, dorsal view of larval head; 10, male genitalia: mesosome and associated structures, margin of ninth tergite, and dististyle.



FIGS. 11, 12.—*Uranotaenia stonei*: 11, larval siphon and anal segment, including enlargements of a comb tooth, pecten teeth, and apical margin of saddle; 12, lateral spine and hair of third abdominal segment. FIG. 13.—*Aedes riversi*, ninth male tergite. FIG. 14.—*Aedes downsi*, ninth male tergite. FIGS. 15, 16.—*Aedes riversi*: 15, lateral view of apex of basal lobe of basistyle; 16, ventral view of basal lobe of basistyle. FIGS. 17, 18.—*Aedes downsi*: 17, ventral view of basal lobe of basistyle; 18, dorsal view of basal lobe of basistyle. FIG. 19.—*Aedes riversi*, outer lateral view of hind leg. FIG. 20.—*Aedes downsi*, outer lateral view of hind leg. FIG. 21.—*Aedes riversi*, larval comb. FIG. 22.—*Aedes downsi*, larval comb. FIG. 23.—*Aedes riversi*, second abdominal tergite of larva. FIG. 24.—*Aedes downsi*, second abdominal tergite of larva.

clay bank above a stream (R. Bohart). Other adult specimens were collected on damp rocks near Heddo at the northern tip of the island.

Remarks.—The only species which appear to be related to *stonei* are the Philippine *tubanguii* Baisas and the two Malayan species *ascidiicola* de Meijere and *xanthomelaena* Edwards. All these are inconspicuously marked brownish mosquitoes, the larvae of which have fine head hairs. *U. stonei*, however, has only a few pale scutal scales behind the head, distinctive pleural integumental spots and has the vertex light brown. The larva has the clypeal hairs placed farther forward than in *tubanguii* and the siphon is much longer than in *ascidiicola* or *xanthomelaena*, both of which breed in pitcher plants. The larva of *stonei* is distinctive also in the spatulate preclypeal spines, slender antenna, stout setae on the abdomen and toothed margin of the anal saddle.

We are naming this species for Dr. Alan Stone, to whom we are indebted for countless favors in connection with our studies on mosquitoes.

***Aedes (Stegomyia) riversi*, n. sp.**

Male.—Length 3.3 mm; length of wing 3.0 mm. Head and thorax marked as in most others of the "*scutellaris* group." Proboscis with a ventral longitudinal line of pale scales. Scutum with a median silvery line, weak posterior sublateral lines and a line over wing base. Pleural markings largely linear. Abdominal tergite I with a lateral silvery patch; II–VI with lateral, oblique subbasal spots which are continued across dorsum on IV–VI as subbasal bands; III with a median basal spot; VII with a dorsolateral subbasal spot; VIII largely white. Dorsal bands on IV–VI reduced or absent in some paratypes. Underside of fore- and midfemora with a line of white scales, narrower on former; hind femur with basal half broadly white beneath, knee spot present, outer surface marked as in figure 19; tibiae dark; fore and mid tarsi with a small basal outer white patch on first two segments; hind tarsus with complete basal white bands occupying one-fifth of first segment, one-fourth of second segment, three-eighths of third segment, three-fourths of fourth segment and all of fifth segment. Genitalia (Figs. 13, 15, 16) with slender dististyle, ninth tergite strongly convex apically; and basal lobe of basistyle bearing

about 8 slender setae along its dorsal edge and assorted lengths of bristles (structure best seen when lobe is dissected and mounted laterally).

Female.—Markings as in male except that abdominal tergites I–VII usually have lateral subbasal silvery patches, usually those on VI narrowly and those on VII broadly joined at middle of tergites.

Larva.—Similar to that of *Aedes albopictus*, differing chiefly in details of comb teeth (Fig. 21). Of 26 paratypes examined, all have the fringe extending at least half the length of apical barb of most comb teeth; 24 have some compound comb teeth (usually these are double, rarely triple or quadruple), average number of comb teeth 11 (range 8–14), average number of compound teeth 4 (range 0–9); average number of pecten teeth 11 (range 7–16). Submedian hairs of abdominal tergites with 3 to 5 relatively short branches (Fig. 23). Anal gills subequal and often very long, 14 paratypes having gills much longer than siphon.

Type.—Male, Chizuka, Okinawa, September 1945, reared from a rockhole along a stream (R. Bohart and R. Ingram).

Paratypes.—Twelve males, 20 females, Chizuka, Okinawa, August and September (R. Bohart and R. Ingram); 4 males, 8 females, Hentona, Okinawa, September (C. L. Harnage); 1 male, 6 females, Shana Wan, Okinawa, September (R. Bohart and R. Ingram). Paratypes were reared from rockholes, treeholes, and cut bamboos, as well as taken while biting or while resting on damp vegetation. Also, 24 paratype larvae on slides from Shana Wan, Chizuka, and Hentona, were taken from rockholes, treeholes, bamboos, and a bucket in the woods.

Remarks.—This mosquito is a frequent and annoying biter in the woods. In the key to adults of this group by Stone and Farner (Proc. Biol. Soc. Washington 58: 159. 1945) it runs to *quasiscutellaris* Farner and R. Bohart and *horrescens* Edwards. The basal lobe of the male genitalia in the three species is similar in type, but the strong setae in *riversi* are arranged along the dorsoapical edge and they are surpassed in length by many of the bristles. The larvae of *riversi* are unusual in having multiple comb teeth as a general rule, a character previously known only in *marshallensis* Stone and R. Bohart from the Marshall Islands and the Gilbert Islands. The latter species

differs decidedly from *riversi*, however, in the reduced white markings of the legs. *Aedes riversi* represents the most northerly extension of the range of the "scutellaris" group which heretofore has been known only as far north as Saipan, Marianas Islands.

The species is named for Commodore T. M. Rivers, MC(S), U.S.N.R., whose interest has greatly furthered research on mosquitoes in the Pacific area.

Aedes (Stegomyia) downsi, n. sp.

Male.—Length 3.0 mm; length of wing 2.5 mm. Very similar to *Aedes albopictus*, with white banded palpus, white scaled torus, a silvery median stripe on vertex and scutum, silvery scutellum, silvery pleural patches, and basal spots on first 2 tarsal segments of fore and mid legs. Differing from *albopictus* in details of markings of scutum, hind legs and abdomen. Scutum without a spot of silvery broad scales above wing base but with a few yellowish curved scales at this point, posterior scutal lines duller and less sharply defined. Hind femur with basal half mostly white on inner surface, outer surface mostly white on basal three-fifths, the white area not drawn out into a line apically (Fig. 20); a small knee spot present; hind tarsus with basal bands occupying one-fifth of first segment, one fourth of second segment, one-half of third segment, five-sixths of fourth segment (about three-fifths in *albopictus*), and fifth segment all white (a few dark apical scales in some specimens) (Fig. 20). Abdominal tergites I–VII with basal lateral (ventral) silvery spots, tergite I with a few dorsal apical pale scales (sometimes absent), II dark dorsally, III–VI with weak basal silvery bands which do not widen laterally into spots (some paratypes with several or all tergites dark as seen from above), VIII with a broad basal band. Genitalia with dististyle slender as in *albopictus*; apical margin of ninth tergite sharply serrate (Fig. 14), basal lobe of basistyle with bristles and leaflets all of about the same lengths (Figs. 17, 18).

Female.—About as in male. Palpus broadly white-tipped, abdominal tergites with basal bands on II–V, a broad basal spot at middle of VI and a small basal spot on VII. Some speci-

mens all dark dorsally or with incomplete bands.

Larva.—Similar to that of *albopictus*, differing in certain details. Description based on 18 paratypes taken from taro, bamboo and tree-holes: Antennal tuft usually at or slightly beyond middle of shaft (usually at apical two-fifths in *albopictus*); bristles of thorax and abdomen usually stouter and with more branches (Fig. 24); comb teeth very strong, average number 9 (range 6–12), fringe rarely extending beyond basal one-fourth of barb; hair just ventral to comb averaging 6 branches (range 4–7) (usually 3 or 4 in *albopictus*); pecten teeth; usually more slender with fewer basal teeth, averaging 9 teeth (range 6–12) (about 13 in *albopictus*); siphon tuft nearly always 4-branched (2 or 3 branches in *albopictus*); saddle hair reaching to or beyond apex of longer anal gill (not reaching beyond three-fourths in *albopictus*); gills unequal and broadly rounded at apex, longer pair shorter than siphon, shorter pair usually about half as long as siphon.

Type.—Male, Chizuka, Okinawa, September 1945, reared from taro leaf axil (R. Bohart and R. Ingram).

Paratypes.—Ten males, 8 females, Chizuka, Okinawa; 7 males, 14 females, Shana Wan, Okinawa; 1 male, Hentona, Okinawa; 2 males, Hedo, Okinawa; all paratypes collected by R. Bohart and R. Ingram and taken biting or reared from taro, treeholes and cut bamboos (one paratype from Hedo reared from banana axil). Also, 16 paratype larvae on slides collected at Shana Wan and Hedo from taro, treeholes, and bamboo.

Remarks.—*Aedes downsi* differs from *albopictus* by the markings of the scutum, hind femur; fourth hind tarsal segment and abdomen. It is probably most closely related to *flavopictus* Yamada from northern Japan and Korea which according to Yamada's figure of the male genitalia (Annotationes Zoologicae Japanenses 10: 53. 1921) has an irregular margin of the ninth tergite and stout setae on the basal lobe of the basistyle. This species differs from *flavopictus*, however, in having no spot at the end of the scutal suture, in the more angular and sharply serrate male ninth tergite and the stouter setae of the basal lobe of the male dististyle. Yamada's original description does not mention the markings of the legs and abdomen of *flavopictus* except to indicate that

they resemble those of *albopictus*. It should be noted that Barraud's figures of *flavopictus* (Fauna of British India 5 (Culicidae): 236. 1934) do not coincide with those of Yamada.

The species is named for Maj. W. G. Downs, MC, AUS, acting island epidemiologist on Okinawa, in appreciation of his contribution of specimens and other services.

ENTOMOLOGY.—*The genera of beetles of the family Bruchidae in America north of Mexico.*¹ J. C. BRIDWELL. (Communicated by W. L. SCHMITT.)

The first species of Bruchidae from our area was described in the printed inaugural dissertation, or graduation thesis, of Michael A. Baeckner presented to the faculty of Upsala under the presidency of Linnaeus and defended on December 18, 1752. In this dissertation, *Noxa insectorum*, the pea Bruchus and the oriental species now known as *Callosobruchus chinensis* were described in the new genus *Bruchus*, there used for the first time as a generic name in zoology. They are the first species of Bruchidae described.

Names prior to 1758 are not available, and it is our great misfortune that, in his tenth edition, Linnaeus did not adopt the name *Bruchus* as he later did but treated the pea weevil in his genus *Dermestes*, and that his citation of the name *Bruchus americanae septentrionalis* as published by Peter Kalm, 1756, has been ruled as offering no availability of the name *Bruchus*. In Opinion 5 of the International Commission of Zoological Nomenclature names prior to 1758 which are cited in synonymy in 1758 or later are not thereby made available for use. The writer hopes that an arbitrary ruling by the Commission may make an exception in this particular case so as to avoid the great confusion resulting from long use of the homonym *Mylabris* Fabricius, 1775, for the very large group of blister beetles and the relatively recent re-adoption of *Mylabris* Geoffroy, 1762, for the seed weevils. Such a ruling offers the only solution to the problems arising from the same generic name having been extensively used for more than a thousand species nearly equally applied to small weevils and to large blister beetles, but the problems are even more involved. Unless *Bruchus* can be validated as of 1758, this same name as applied by Geoffroy, 1762, is to be adopted

for the genus we have known under the subsequent name *Ptinus*. This would increase the number of specific names involved by more than 300. The substitution of *Mylabris* for *Bruchus* and of *Bruchus* for *Ptinus*, as proposed about 75 years ago to conform with the law of priority, has not become effective. The above suggestion to invoke the plenary power to suspend the rules and arbitrarily validate *Bruchus* Linnaeus as of 1758 appears to be the only solution. Its effect would be to maintain *Bruchus* and *Ptinus* as they have long been commonly used and to eliminate *Mylabris* from use even for the meloid genus. The older entomologists knew and disregarded the basis of this confusion.

To the pea Bruchus, which we now know to have been introduced into America, other members of the family have since been added so that now nearly 90 species of described bruchids are known to be native to our area or have become established in it by the operations of commerce. Besides these named species about half as many unnamed species have been recognized in collections by L. J. Bottimer or myself. Before undertaking to describe the novelties it has seemed desirable for the writer to distinguish the groups which he has come to recognize during more than 25 years' study of Bruchidae. The present paper is intended to make known the groups of Bruchidae in America, north of Mexico, whether native or introduced, which he believes should be considered genera.

The most recent revision of the Bruchidae of the entire world was published by Schoenherr in 1839, and there has been but little advance in the broader classification of these insects since that time. The arrangement of the species found in the United States and Canada as listed in the Leng Catalogue is based upon the revision of our species by Horn 1873 but *Mylabris*

¹ Received December 11, 1945.