The Insects of Virginia No. 9

SQUASH, BROAD-HEADED, AND SCENTLESS PLANT BUGS OF VIRGINIA (HEMIPTERA: COREOIDEA: COREIDAE, ALYDIDAE, RHOPALIDAE)

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COMPOSITION AND PRESSWORK BY
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A CALL FOR HELP TO OUR READERS REQUESTING INSECT MATERIAL ON LOAN OR AS A DONATION

Our next issues in this series, now in preparation, will include the following insect groups from Virginia:

1. The Haliplidae (Coleoptera: Adephaga), by James F. Matta;
2. A revision and updating of our No. 3 (44) bulletin on the genus *Culicoides* (Diptera: Ceratopogonidae), by E. Craig Turner, Jr.;
3. The Longhorned Beetles (Coleoptera: Cerambycidae), by Robert H. Perry;
4. The Blow Flies (Diptera: Calliphoridae), by Robert D. Hall, Lee H. Townsend, and E. Craig Turner, Jr.;
5. The Dragonflies (Odonata: Anisoptera), by Frank Carl and E. Craig Turner, Jr.;
6. The Lygaeid Bugs (Hemiptera: Lygaeoidea), by Richard L. Hoffman;
7. The Armored Scale Insects (Homoptera: Diaspididae), by Michael Kosztarab;
8. The Flower Flies (Diptera: Syrphidae), by F. Christian Thompson.

Each of the authors listed above could fully utilize more material from Virginia for their studies. There are definite gaps in the geographical distribution of most insect species, usually because of lack of collecting in certain areas of the state. The Board of Review and the authors encourage our readers to intensify their collecting efforts for these groups and lend or donate available insects (in their personal possession, or in the public collection under their supervision) to the Department of Entomology at Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, (Dr. Michael Kosztarab, Curator). If donated, the commercial value of the collections will be appraised and acknowledged by letter to the donors for use in claiming possible tax deductions. In each bulletin we also acknowledge the loans and/or donations for that project. The donated or loaned material will be forwarded to authors of future bulletins for processing and for inclusion of new distribution records in manuscripts they are preparing. Only with such joint effort in the inventorying of our insect fauna can we achieve our goal of a better understanding of the living environment in Virginia.

PUBLICATIONS in this series are intended to serve as scientific contributions for a better understanding of the **living environment** in Virginia.

Recognizing the basic economic importance of faunistic studies, our goal is to survey methodically the local insect fauna through preparation of inventories designed to show the geographic and seasonal occurrence of insects in the Commonwealth, and to provide keys, descriptions, and illustrations to facilitate their recognition.

Insofar as possible, these studies will include data on biology and life cycles to aid in the formulation of control recommendations and information on ecological interactions—including host relationships, parasites, and predators—and the potential of various species as possible biological control agents. Knowledge gained from such studies will be used to evaluate the impact of future changes in our environment.

CONTENTS

ABSTRACT

The 27 species of coreoid bugs known so far to occur in Virginia are treated from the standpoint of geographic distribution in the state, their seasonal occurrence, and host plant preferences, where known. Keys are provided for all taxonomic groups, and illustrations of various structural features are given. Spot maps illustrate the local distributional patterns of several representative species. Six additional species whose known ranges make it likely that they will eventually be found in Virginia are also included in the keys. The name *aequoris* McAtee is revived to designate the eastern subspecies of *Chelinidea vittiger*. *Catorhintha mendica* Stal is recorded for Virginia for the first time; this record is apparently also the easternmost for this rapidly spreading species. Localities for *Stictopleurus punctiventris* in western Virginia appear to represent the southernmost known stations for this generally northern form. In general, the coreoid fauna of Virginia compares favorably in size and diversity with that of other states in which the Hemiptera have been surveyed.

INTRODUCTION

This paper constitutes the second part of the proposed serial treatment of the terrestrial Hemiptera of Virginia; the first part (Hoffman, 1971) dealt with the four families of the superfamily Scutelleroidea.

In general, the introductory remarks given in the first paper apply here, with the following exceptional and/or supplementary information: The volume of material examined is appreciably smaller, because species of the coreoid families are generally far less abundant in the Virginia fauna than are those of the scutelleroids and are taken in considerably smaller numbers by the general collector. Instead of 79 species in 44 genera (the number of scutelleroids listed in the first part), only 27 species and 18 genera are here accounted for in the Coreoidea. I personally collected 45 species of scutelleroids (57% of the Virginia total), as opposed to 18 of the known local coreoids (66%). The same sources of material have been utilized plus the reference collection of the Extension Entomologist for Insect Survey at Virginia Polytechnic Institute and State University (VPI&SU), made available to me by William A. Allen. The material housed at the Virginia Truck Crops Experiment Station in Norfolk has been borrowed from Douglas E. Greenwood. The main collection at Blacksburg (VPI&SU) has been considerably augmented in recent years through acquisition of extensive material donated by M. L. Bobb, A. M. Woodside, and J. F. Matta.

As with the scutelleroid taxa, our best local representations of coreoids are from the vicinity of Blacksburg and Clifton Forge in the Ridge and Valley Province; Augusta and Rockingham counties in the Shenandoah Valley; Fairfax County in the northern Piedmont; and the extreme southeastern Coastal Plain.

It should be noted that the erstwhile county of Nansemond has lately become an incorporated municipality and is now cited as the independent city of Suffolk. As such, it forms part of a continuous complex of municipalities south of the Chesapeake Bay region.

A new base map has been prepared for the representation of Virginia localities of selected species. This map is provided with a small insert map of eastern United States upon which is shown, in a very generalized way, the overall range of a selected species in this section of the country. These small maps are compiled chiefly from

the literature and imply no high degree of accuracy. The numbers preceding species are continued from those appearing in Bulletin No. 4 of this series (Research Division Bulletin 67. See inside back cover.)

Appreciation is hereby expressed to Drs. R. I. Sailer and J. L. Herring for making available collections at the U. S. National Museum of Natural History (USNM), and to Mr. Rodney O'Shea, University of Connecticut, and Dr. Thomas R. Yonke, University of Missouri, for kindly reviewing the manuscript.

TAXONOMIC ARRANGEMENT

A considerable number of changes have been made in coreoid classification since the appearance of Blatchley's (1926) celebrated manual on the Heteroptera of eastern United States. Although the superfamily still contains the same three families admitted by Blatchley, the internal arrangement of most of them and many group names have been appreciably modified, largely through the work of hemipterologists at the University of Connecticut (notably C. W. Schaefer in two papers published in 1964 and 1965). Changes are mentioned in the appropriate places under the family headings. Schaefer's work is readily available to the student wishing detailed documentation.

As in the earlier synopsis of Virginia scutelleroids, I have provided references to current taxonomic papers and occasionally alluded to existing situations that appear controversial or unsettled. Unquestionably, a few more changes involving the name or status of some Virginia species may be anticipated. It is even possible that a few highly localized undescribed species remain to be discovered.

RELATIVE DIVERSITY OF VIRGINIA COREOIDS

In the previous part of this series, I provided a comparison of the known scutelleroid faunas of several eastern states thought to be fairly well sampled. A similar tabulation is here presented for the three coreoid groups. Obviously, some of the figures are by now obsolete, especially those for Florida and Indiana; but in general, I think the following tabulation reasonably reflects the relative concentration and diversity among the various regions shown.

	NUMBER OF SPECIES			
State	*Coreidae*	*Alydidae*	*Rhopalidae*	*Total*
Florida (Blatchley, 1926)	34	7	9	50
North Carolina (Brimley, 1938, 1942)	19	4	8	31
Virginia (this paper)	15	4	8	27
New York (Leonard, 1926)	12	8	5	25
Connecticut (Parshley, 1923)	7	4	3	14
Missouri (Froeschner, 1942)	18	3	9	30
Indiana (Blatchley, 1926)	11	6	6	23

The numerical superiority achieved by Florida in the table reflects the tropical proclivities especially of the Coreidae, many species of which occur only in the southern half of that state. In this family the Floridian fauna outnumbers that of Virginia by more than two to one.

In addition to the 27 species actually verified for the Virginia fauna, it is possible that at least 6 others may be found here with future exploration. In the following accounts, any taxa known to occur within about 100 miles of the boundaries of Virginia are included (without number, but marked by an asterisk) on the assumption that they may be encountered.

DISTRIBUTION IN VIRGINIA

In the broadest generalities, our local species of coreids reflect austral distributional patterns. Alydids are, if anything, slightly more boreal, and rhopalids show both patterns.

In the "boreal" category, species occurring in northeastern United States and extending southward through the Appalachians, may include *Stictopleurus punctiventris, Protenor belfragei* (if it is found in Virginia), and presumably *Arhyssus nigristernum.*

A few species are generally distributed over Virginia, but apparently are more abundant in the western part, and their area is chiefly northern. *Leptoglossus oppositus* represents this pattern, as does also *Alydus eurinus.*

The majority of our coreids appear to be austral, and occur chiefly in the Coastal Plain and outer Piedmont regions. Many are not yet known from west of the Blue Ridge: *Stachyocnemus apicalis, Leptoglossus phyllopus, Chelinidea vittiger, Anasa armigera, A. repetita,* and *Niesthrea louisianica,* for example.

Several other species which are basically eastern and lowland in range, have extended their range into the Alleghenies along the valleys of larger rivers like the James and Shenandoah. *Chariesterus antennator* and *Harmostes fraterculus* fall into this category.

Many species appear to be essentially statewide, but so far, have not been found anywhere much exceeding 2000 feet in elevation. To be mentioned here should be *Acanthocephala terminalis, Archimerus alternatus, Euthochtha galeator, Anasa tristis, Alydus pilosulus,* and *Arhyssus lateralis.*

The only species that has been found over the entire state from sea level to above 5500 feet on Mount Rogers is *Harmostes reflexulus.*

Leptocoris trivittatus and, presumably, also *Catorhintha mendica* are coreoids that have invaded Virginia within historic time; the former, at least, is now extremely well established here. *L. trivittatus* is now statewide at lower elevations.

SUPERFAMILY COREOIDEA

Hemiptera of moderate to large size, dominantly phytophagous in habit, strictly terrestrial. Head generally porrect, eyes large, ocelli present, both antennae and beak (rostrum) with 4 segments, antennae set high on head, on or above a line connecting eye with apex of tylus, metathorax generally with scent gland opening in front of coxa, the metapleuron with enlarged osteolar peritreme and/or evaporatorium; coxae separated ventrally, the beak extending back at least between mesocoxae; scutellum small to moderate in size, triangular, the hemelytral clavi forming a commissure behind it; veins of hemelytral membrane numerous, closely spaced, often anastomosing; tarsi 3-segmented, the ultimate with arolia; femora of legs, especially the posterior, often enlarged and with one or more rows of acute spinules on the ventral side, especially in males.

This large group of bugs belongs in the subordinal category "Pentamorpha" within which it is generally placed between the Scutelleroidea on one hand and Lygaeoidea on the other. In particular, there is an obvious affinity between the three superfamilies Coreoidea, Lygaeoidea, and Pyrrhocoroidea, as demonstrated by Schaefer (1964) on the basis of a large number of structural characters. Superfically, there is considerable similarity between members of the first two taxa, such as *Arhyssus* of the Rhopalidae and *Nysius* of the Lygaeidae; and if internal characters cannot be observed, often the only practical distinction for the beginning student is the difference in hemelytral venation, the veins being numerous, close, and often anastomosing in coreoids, but few, widely spaced, and not recurrent in lygaeids.

Although the three families of Coreoidea are generally easy to recognize after a little experience, infallible external characters for distinguishing them are not numerous. Perhaps the form of the scent gland opening and head shape (the old classical characters) will serve as well as anything to separate the families.

KEY TO FAMILIES OF COREOIDEA FOUND IN VIRGINIA

1. Opening of scent gland small, obscure, partly concealed between meso- and metathoracic coxae, or missing; 4th abdominal tergum constricted middorsally by a median indentation of both anterior and posterior margin ---------- Rhopalidae, p. 35

— Opening of scent gland large, usually through a conspicuous convex peritreme located well up on the body above the coxal bases (absent in one genus, *Stachyocnemus*, which is recognized by having an acute spine on rear margin of pronotum in front of scutellum, and in having large acute spines along the posterior tibiae, neither character present in our local forms of Rhopalidae); 4th abdominal tergum not medially constricted ---------- 2

2. Head small, narrower and shorter than pronotum; bucculae relatively long, extending back to or beyond level of insertion of antennae and thus concealing half of the 1st beak segment; body generally robust--Coreidae, p. 6

— Head relatively large, the interocular space about equal to width of apex of pronotum and/or base of scutellum; bucculae short, enclosing less than a third of the first beak segment; body slender ---------- Alydidae, p. 28

FAMILY COREIDAE

A large family of mostly tropical distribution, containing extremely large and conspicuous species as well as others of quite moderate size. All of the species are plant feeders, and a few (e.g., squash bugs) are sometimes so numerous that severe damage is inflicted upon cultivated crops. In many species there is sexual dimorphism in the form of the metathoracic legs, these being heavier and more spinose in males. The majority of coreids are good fliers, and most of the local species readily produce a strong, sometimes offensive odor when disturbed.

The classical arrangement of this family by Stal in 1870 recognized no less than 27 subfamilies. The revised classification by Schaefer (1965), however, reduces the number to only 3, with 20 tribes under the Coreinae; the 3 subfamilies (not counting the Australian Agriopocorinae) are the same as those treated in Blatchley's (1926) manual. Two of these taxa are represented in the Virginia fauna, and a third will most probably be added as the result of more intensive collection.

KEY TO SUBFAMILIES AND GENERA OF *COREIDAE* FOUND IN VIRGINIA

1. Posterior wings without hamus; transverse oblique basal vein of hemelytra separated from edge of corium; 6th pair of spiracles absent in females ---------- Subfamily Pseudophloeinae, *Ceraleptus*, p. 8

— Posterior wings with hamus; transverse oblique basal vein of hemelytra close to edge of corium or touching it (Fig. 1); 6th pair of spiracles present in females ---------- 2

2. Posterior tibiae with a short projecting apical spine on the ventral side; body length less than 9 mm. Subfamily Meropachydinae ---------- *Merocoris*, p. 9

— Posterior tibiae without an apicoventral spine; body length greater than 10 mm. Subfamily Coreinae ---------- 3

3. Tibiae of metathoracic legs dilated on one or both sides to form broad flattened plates (Figs. 4, 5, 6) ---------- 4

— Tibiae of metathoracic legs simple, not laterally expanded - 5

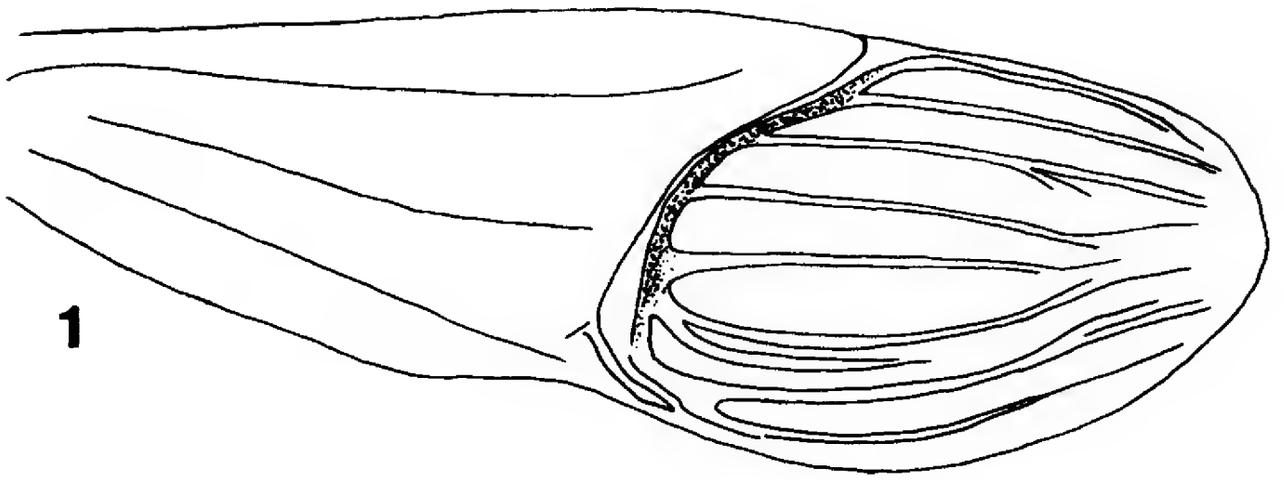


Figure 1. Diagrammatic sketch of the hemelytron of a coreid, showing the transverse basal vein of the membrane (stippled) placed close to the posterior edge of the clavus (distinctly separated from the edge in the subfamily Pseudophloeinae).

4. Head extended well beyond bases of antennae in front; tylus, compressed and deflexed in front of them; basal antennomere only slightly longer than head ---------- ---------- *Leptoglossus*, p. 12

— Head prolonged little if any beyond bases of antennae; tylus longer than jugae, projecting upward as a triangular spine between antennal bases; basal antennomere 50% longer than head ------ *Acanthocephala*, p. 11

5. Second and third antennomeres distinctly three-sided; head nearly as long as pronotum, extending forward beyond antennal bases ---------- *Chelinidea*, p. 20

— Second and third antennomeres cylindrical, or the third exceptionally flattened and broadened; head distinctly shorter than pronotum, not or but slightly projecting in front of antennal bases ---------- 6

6. Third antennomere with the form of a broad flattened plate (Fig. 8) ---------- *Chariesterus*, p. 21

— Third antennomere of normal cylindrical form ---------- 7

7. Femora of hind legs with a large number of small spines on the ventral side, and distinctly incrassate in the male; lateral margins of front lobe of pronotum finely denticulate or crenulate ---------- 8

— Femora of hind legs without ventral teeth or with only 2 or 3, not enlarged in either sex; lateral margins of pronotum smooth ---------- 9

8. Head with distinct tubercule behind each eye and with an acute spine on antennifer; antennae slender, nearly as long as body ---------- *Euthochtha*, p. 20

— Head without tubercule behind eyes and without spine near base of antennae; antennae robust, densely setose, shorter than body ---------- *Archimerus*, p. 18

9. Body less than 12 mm long; eyes projecting laterally beyond apical angle of pronotum; spiracles located closer to lateral margin of abdominal segments than to either front or rear margins ---------- *Catorhintha*, p. 22

— Body more than 13 mm long; eyes not distinctly projecting beyond anterior angle of pronotum; spiracles located equidistant from lateral front and rear margins ---------- *Anasa*, p. 24

SUBFAMILY PSEUDOPHLOEINAE

A small subfamily including six genera in the Eastern Hemisphere and two in North America, both generally northern and western in distribution. One may be found in southeastern Virginia.

Genus *CERALEPTUS* Costa

Two species are known, one from the western part of the country, the other in the central and southern states.

CERALEPTUS AMERICANUS Stal

Specimens of this species, grayish, small, about 10-13 mm long, somewhat resemble a small squash bug, but have a distinctly longer

head and the posterior femora spines are ventrally. It has been reported (Brimley, 1942) from Raleigh, North Carolina, and if that record is based on a native population, it is entirely possible that *Ceraleptus* will be discovered in central Virginia. So far, nothing is known of its preferred biotope.

SUBFAMILY MEROPACHYDINAE (= MEROCORINAE BLATCHLEY)

This small subfamily contains only a single genus in the Nearctic fauna; the internal composition however is unsettled as noted below. Although the name *Meropachys* is now regarded as a synonym of *Merocoris*, a sort of suprageneric name was based upon it several years before Merocorinae was published, and since the priority of informal group names is now sanctioned by the International Code of Zoological Nomenclature (1961) Schaefer (1965) ressurected the original name Meropachydida into its present subfamilial form.

Genus *MEROCORIS* Perty

There is some divergence of opinion regarding the relative status of the several North American taxa referred to this genus. McAtee (1919) performed the first revision in a comprehensive sense, and recognized a single species *typhaeus* Fabr., which he divided into three subspecies, two of which (*typhaeus* s.s. and *distinctus* Dallas) occur in eastern United States. Without reference to McAtee's paper, Blatchley (1926: 209), however, regarded these two forms as full species, "easy to separate when one has specimens of both in hand, but quite difficult from the literature . . . ." Torre-Bueno and Engelhardt (1910) implied some overlap in distribution in recording both taxa from Wilmington, North Carolina. At present, the two stand as subspecies in the National collection, but I am not aware of any recent study based on modern systematic principles. Perhaps, for the present, it might be best to follow Blatchley's precedent and admit both to the Virginia fauna as separate species, using his criteria for the following distinction:

KEY TO SPECIES OF *MEROCORIS* FOUND IN VIRGINIA

1. Head subquadrate, not prolonged in front between antennal bases; first antennomere stout and subcylindrical, constricted only near its base, surface thickly set with bristly hairs; beak short, just reaching between mesocoxae ---------- *distinctus*

— Head more triangular, prolonged anteriorly between antennal bases; first antennomere gradually clavate from base to apex, its surface pubescent rather than setose; beak longer, reaching behind mesocoxae _____ *typhaeus*

80. *MEROCORIS DISTINCTUS* **(Dallas)**

This species is the northern representative of the genus, ranging from New England west to Iowa and Kansas, and southward to Texas. According to Blatchley (1926) it occurs also southward in the Atlantic Coastal Plain as far as eastern North Carolina; Brimley (1938: 64) says "Statewide" for that state.

The rather limited Virginia material examined so far reflects an upland distribution, coming from Augusta, Fairfax, Montgomery, Rockingham, and Shenandoah counties, and the city of Richmond. A specimen in the National collection was taken on Elliott's Knob in western Augusta County at 4000 ft., by H. A. Allard. This implies that *distinctus* is not altitudinally limited, as many other local coreids appear to be, and will eventually be found in most of western Virginia. The VPI&SU collection has a single specimen taken at Blacksburg in April 1896, but none has been found there since. Perhaps the species occupies some very narrow ecological niche that is sampled only by accident by the general collector. Collection dates for the Virginia specimens range from April to early September, although Blatchley mentions mid-October for both Indiana and Maryland.

81. *MEROCORIS TYPHAEUS* **(Fabricius)**

As conceived by McAtee, this form is restricted to the Atlantic coastal plain from "Carolina" to Florida. Our only Virginia record appears to be that of Torre-Bueno and Engelhardt (1910: 149) for Virginia Beach. It is remarkable that decades of subsequent collecting in extreme southeastern Virginia have failed to disclose any specimens of *Merocoris* from the Norfolk region. This should stand as a challenge to local collectors. Good series of specimens from Virginia will be useful in making an eventual decision about the status of the two forms.

SUBFAMILY COREINAE

This is by far the largest subgroup of coreids and includes the largest local species. The higher classification (definition of tribes, etc.) has been treated in detail by Schaefer (1965), but many of

the genera have not been studied closely for many years; possibly some changes and refinements of generic concepts will occur in the future as the value of some traditional generic criteria is reexamined and the primary importance of genitalic characters is emphasized.

Genus *ACANTHOCEPHALA* Laporte

This genus contains the largest and most impressive of our local coreoids; they are strong fliers and, as a result, often difficult to capture. The readiness with which they diffuse their volatile defensive secretion has justly earned them the vernacular name of "stink bugs." Most of the known species are Neotropical in range, but four occur in southeastern United States; three of these are to be expected in the Virginia fauna.

KEY TO SPECIES OF *ACANTHOCEPHALA* FOUND IN VIRGINIA

1. Body length more than 28 mm; pronotal humeri projected outward and upward, causing the discal region of the posterior lobe to appear concave ---------- *declivis*

— Body length less than 28 mm; humeri projecting only slightly laterad and not elevated, posterior lobe of pronotum thus appearing nearly flat ---------- 2

2. Fourth antennomere reddish or orange, contrasting with the brownish color of the others; tibial dilation of metathoracic leg not extending beyond basal ¾ths of tibia; body 20-25 mm long ---------- *terminalis*

— Fourth antennomere brownish in color like the others; tibial dilation of hind legs extending entire length of tibia; body 25-28 mm long ---------- *femorata*

* *ACANTHOCEPHALA DECLIVIS* (Say)

The range of this large and striking species extends from Raleigh, North Carolina, south through Florida and west to Arizona and Central America. It seems entirely probable that *declivis* will be discovered in south-central Virginia. But the species appears to be generally sporadic and individuals are not numerous. There appears to be no particularly favored host plant or biotope to guide the search for local populations.

* Not yet found in Virginia.

* *ACANTHOCEPHALA FEMORATA* **(Fabricius)**

This species occurs north as far as eastern and central North Carolina, so it seems very likely it will be found eventually in southeastern Virginia. Blatchley (1926) notes that in Florida it is often found in early spring on thistle flowers. The figure which he used (Fig. 43) to illustrate *femorata* actually represents a female of *A. terminalis.*

82. *ACANTHOCEPHALA TERMINALIS* **(Dallas)**

This is the only member of the genus occurring in the northern and midwestern states. It is easily recognized by its relatively small size (less than 22 mm long) and orange or yellowish terminal antennomeres. In Virginia it apparently occurs statewide at lower elevations.

Material has been seen from Albemarle, Alleghany, Bedford, Frederick, Montgomery, Pittsylvania, Roanoke, Rockbridge, Shenandoah, York, and Wise counties, the cities of Suffolk, Norfolk and Richmond. Collecting dates in Virginia extend from late April into mid-August only, the lack of autumn dates is noteworthy.

Genus *LEPTOGLOSSUS* Guerin-Meneville

A large genus of Neotropical affinity with only one species extending as far north as north-central United States, although several follow the Atlantic Coastal Plain to Long Island or Massachusetts. Of the four species occurring in Virginia, three are most common in the eastern or lower parts of the state.

This genus includes several species commonly known as "leaf-footed bugs" because of the prominent lateral expansions of the tibiae of the metathoracic legs; at least one, *L. phyllopus,* is occasionally implicated in the damage of agricultural products, chiefly soft fruits. In Virginia, however, there seems to be little indication that these bugs can be considered as major pests.

The name *Leptoglossus* has been applied to the North American species with general consistency. However, Kiritshenko (1935) suggested that the type species of the genus (*dilaticollis* Guer.) was not congeneric with the others allocated to it, and that the name *Theognis* Stal, 1862, be resurrected for them. This view was supported by at least one American specialist (Hussey, 1953), but was rejected by the latest monographer of the genus (Allen, 1969).

Considering the degree to which other coreoid genera have been fragmented by recent studies of internal male genitalia (in the Rhopalidae, for instance), possibly the case of *Leptoglossus* vs. *Theognis* has not been finally closed.

The four species occurring in Virginia are easily distinguished by the following key, and after a little experience, merely by sight.

KEY TO SPECIES OF *LEPTOGLOSSUS* FOUND IN VIRGINIA

1. Pronotal width greater than length, the humeri projecting appreciably beyond level of elytral bases (Fig. 2); top of head uniform reddish with a few small black markings; antennae and first two pairs of legs uniformly pale yellowish; ventral side of femur of mesothoracic legs with 5 or 6 acute spinules ---------- *fulvicornis*

— Pronotum approximately as long as wide, the humeri only slightly projecting beyond level of elytral bases (Fig. 3); top of head predominantly black, sometimes with a thin median line and paramedian stripes adjacent to inner side of eyes reddish; antennae and first two pairs of legs bicolored, reddish and yellow; ventral side of femur of mesothoracic legs usually with 3 or 4 spinules ---------- 2

2. Basal antennal segment shorter than distance from its base to rear angle of head, appearing unusually robust; second antennal segment yellowish with the apical third reddish; clavus and corium of hemelytra grayish brown, lighter than pronotum and scutellum; tibial expansion of metathoracic legs relatively narrow, the outer side with numerous small spots, its edge entirely smooth (Fig. 5) ---------- *corculus*

— Basal antennal segment longer than distance from its base to rear angle of head; second antennal segment uniformly light reddish or occasionally with the apical third darker; bases of hemelytra concolorous with pronotum and scutellum; tibial expansion of metathoracic legs broad and prominent, the outer side with one spot or none, the lateral edge scalloped, with acute denticles between the emarginations ---------- 3

3. Humeral angles of pronotum acute, sometimes slightly elevated; hemelytra with a more or less prominent ivory white transverse band at level of inner angle of coria ---------- *phyllopus*

— Humeral angles of pronotum obtuse to rounded, never elevated; hemelytra without distinct transverse band, at most with small white spots at inner corial angle; posterior tibial expansion as shown in figure 6 --- *oppositus*

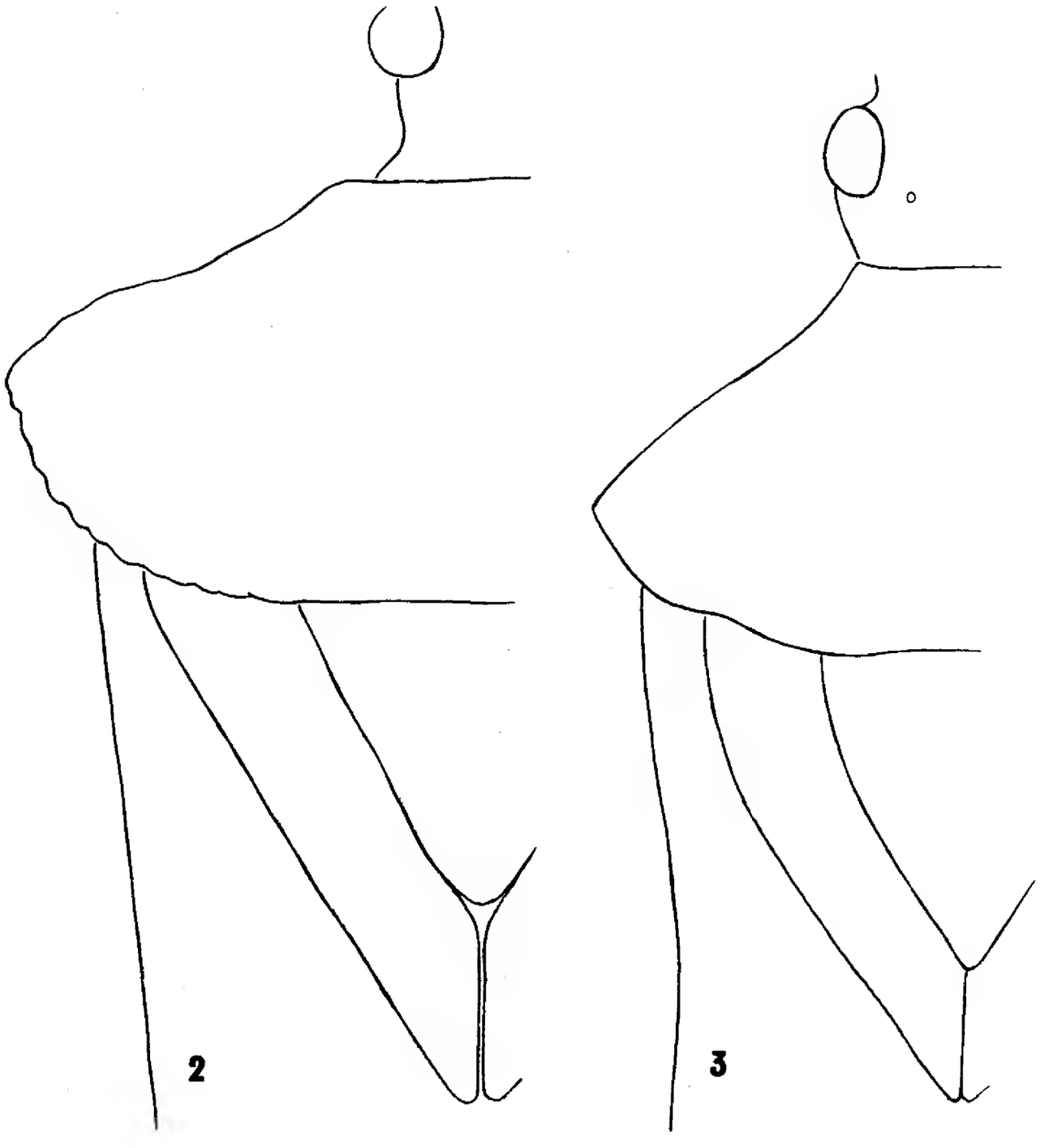
83. *LEPTOGLOSSUS FULVICORNIS* **(Westwood).**—Figs. 2, 4

This large and easily recognized form appears to be endemic to the eastern United States, ranging from coastal New England south to Florida and west as far as Alabama. It does not, as observed by Blatchley (1926), appear to be commonly taken. Brimley (1938, 1942) listed Cape Hatteras, Wilmington, and Brevard as North Carolina localities, of which the last-named is well in the southern Appalachian region. I have examined only five specimens from Virginia, having the following data: "Shenandoah National Park" (USNM); Virginia Beach, 29 March 1908, (USNM); Montgomery County (probably vicinity of Blacksburg), 1964, (VPI&SU); Wakefield, Sussex Co., 4 June 1919 (VPI&SU), and Falls Church, Fairfax Co., 13 July 1974 (VPI&SU).

84. *LEPTOGLOSSUS CORCULUS* **(Say).**—Fig. 5

Although enjoying an appreciably greater distribution than *L fulvicornis, corculus* is similarly scarce in collections. It likewise appears to be basically a lowland form, ranging from Connecticut south to Florida and west to California. Brimley (1938: 64) mentioned only localities in Moore and Pitt counties in the North Carolina Piedmont.

Virginia specimens have been seen from Herndon, Vienna, and Dunn Loring in Fairfax County, various dates, collected chiefly by H. G. Barber (USNM); Wingina, Nelson County, June-July 1925, W. Robinson (USNM); and Blacksburg, Montgomery County, 8 August 1954, R. L. Hoffman (VPI&SU). My single specimen, found during random sweeping of weeds and shrubs, lacks precise data. Probably *corculus* will be found at low to moderate elevations over most of the state.



Figures 2, 3. Outline sketches of the midbody region, left side, of two species of *Leptoglossus* to show relative lateral extension of the pronotal humerus. Fig. 2, *L. fulvicornis*; Fig. 3, *L. phyllopus*.

85. *LEPTOGLOSSUS OPPOSITUS* **(Say).**—Fig. 6

One of the most familiar of coreids and often a pest of cultivated plants, this species largely represents the genus over much of northern United States; it extends from New York and Minnesota south to Florida and Mexico, although less abundant in the southeast than the following species. In Virginia, this species is manifestly statewide in distribution, although, so far, not found above 2000 ft. Numerous specimens have been seen from Alleghany, Albemarle, Augusta, Bedford, Chesterfield, Fairfax, Fauquier, Halifax, Montgomery, Nelson, Prince George, and Rockingham counties, and the cities of Chesapeake, Norfolk, Richmond, and Virginia Beach. Collection dates extend from March to November for adults, (of which many overwinter under bark and in other sheltered places) with one collection peak in May and a second in September-October.

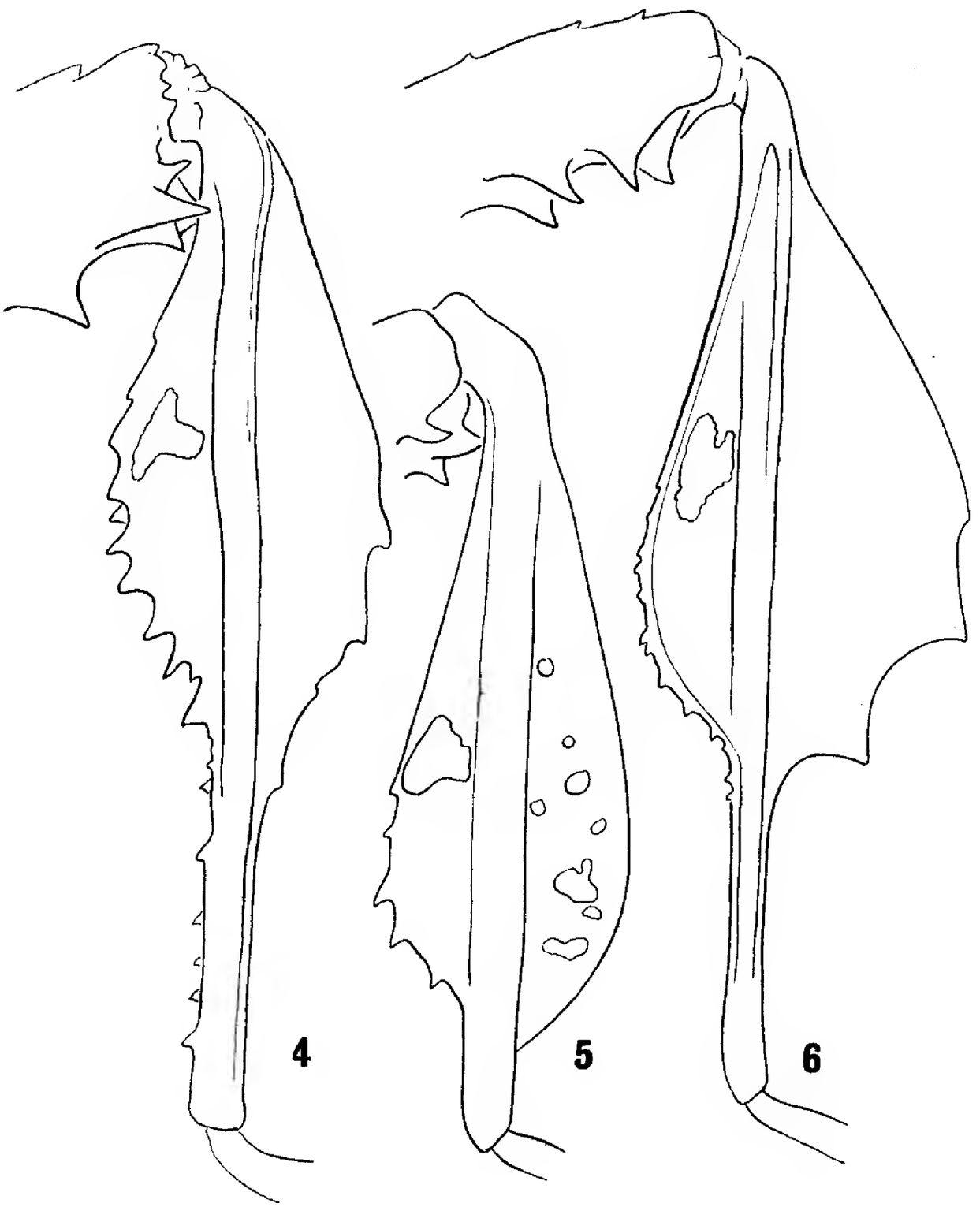
Although *L. oppositus* is often implicated in crop damage and well known to economic entomologists as the "northern leaf-footed bug," Virginia specimens have notably few pin labels indicating pest status, in contrast to the following species.

86. *LEPTOGLOSSUS PHYLLOPUS* **(Linnaeus).**—Fig. 7

The southern counterpart of the preceding species, this insect is found from New York south to Florida, west to Arizona, and thence south into Central America. In the east it is predominantly a lowland form, although Brimley (1938: 64) mentions a few localities in the mountains. I have seen Virginia specimens from the counties of Appomattox, Greensville, Isle of Wight, Fluvanna, and New Kent, and the cities of Chesapeake, Norfolk, Portsmouth, and Virginia Beach. Of these places, all are on the Coastal Plain except for Appomattox and Fluvanna counties in the central Piedmont.

L. phyllopus has been often recorded as a fairly serious pest of many cultivated food plants. Labels of several Virginia specimens stated that they had been found on potato vines, black-eyed peas, and strawberry plants.

Collecting dates extend from March to October, with a clear preponderance for the late summer and fall months.



Figures 4, 5, 6. Outline sketches of the posterior tibiae of three species of *Leptoglossus*. Fig. 4, *L. fulvicornis*; Fig. 5, *L. corculus*; Fig. 6, *L. oppositus*. All drawn to same scale.

Genus *ARCHIMERUS* Burmeister [1]

A small genus of robust hairy bugs, light brown to yellowish in color, and although somewhat similar to *Euthochtha,* easily distinguished from it by the shorter, stouter, and distinctly pubescent antennae. One species is widespread in Virginia and a second must be regarded as a possible resident of the south central part of this state.

* *ARCHIMERUS CALCARATOR* (Fabricius)

This southern species has been recorded by Brimley (1938) from Raleigh, North Carolina, and there is, therefore, every reason to think that it may occur in "southside" Virginia east of Danville. Blatchley (1926) stated that in Florida *calcarator* occurs on the flowers of the dwarf pawpaw, *Asimina parviflora,* and perhaps it might be sought in Virginia on the related *A. triloba* during its flowering season.

87. *ARCHIMERUS ALTERNATUS* (Say)

According to Blatchley (1926) *alternatus* ranges from New Jersey to Florida and west to Colorado and Indiana, and is "nowhere common." Froeschner (1942: 599) also used the term "uncommon" for this species in Missouri, but cited eleven counties where it had been collected. Yonke & Medler (1969) however regarded it as the most common coreid in Wisconsin.

In Virginia, *alternatus* has been found generally over the entire state, but never at high elevations, and the 2,000-ft. contour marks the upper known limit of is distribution. Material has been examined from the following counties: Accomac, Albemarle, Alleghany, Buckingham, Montgomery, Rockingham, Wise, and Wythe, and from the cities of Richmond, Roanoke, Suffolk, and Virginia Beach. Collecting dates extend from April into mid-September, but the majority of specimens seem to have been taken during April and May.

Yonke & Medler (1969) found adults in Wisconsin from early June to early October and recorded that the bugs occupy a succes-

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[1] R. O'Shea of the University of Connecticut has pointed out (personal communication) that the type of *Archimerus* is a species in the Meropachydinae. The oldest available generic name for the species traditionally grouped in *Archimerus* is *Piezogaster* Amyot and Serville 1843.

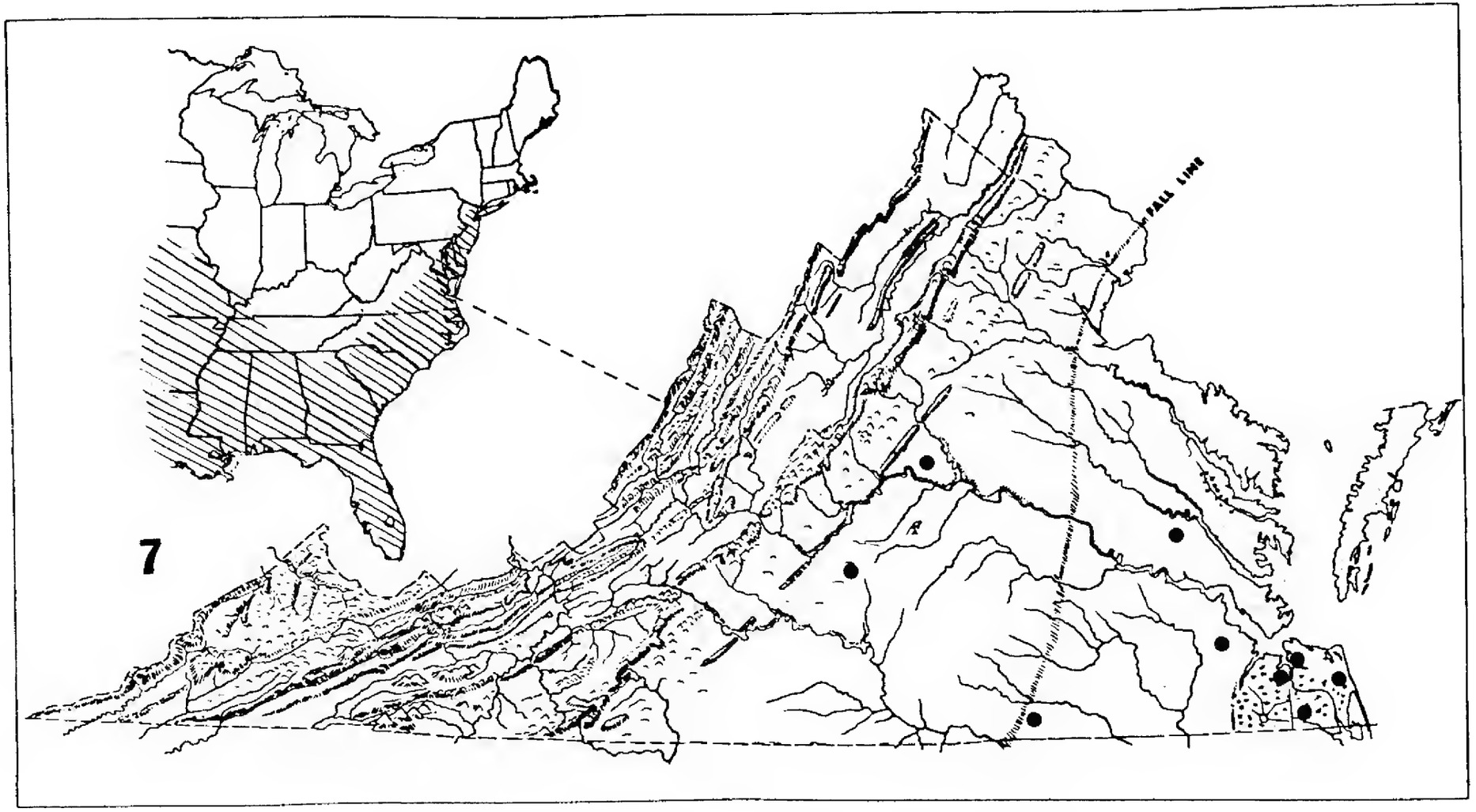

Figure 7. Distribution of *Leptoglossus phyllopus* in Virginia.

sion of food plants as the season progresses, favoring *Desmodium acuminatum* for oviposition and sometimes aggregating in large numbers on that plant.

Genus *EUTHOCHTHA* Mayr

According to Blatchley (1926) this is a monotypic genus endemic to eastern United States, where it appears to be fairly common and widely distributed. *Euthochtha* is easily distinguished from the rather similar *Archimerus* by the longer and more slender antennae with prominent spines at their base.

88. *EUTHOCHTHA GALEATOR* (Fabricius)

Widespread over eastern United States from New England and Wisconsin south through Florida and Texas. Virginia records suggest a statewide distribution, but none of the records are from above 2,000 feet elevation.

I have seen material from Accomac, Albemarle, Alleghany, Augusta, Frederick, Giles, Highland, Montgomery, Roanoke, and Rockingham counties and the cities of Nansemond, Norfolk, and Richmond. Most of the collecting dates fall into two periods: late April to mid-June and from late August through September. There is only one specimen at hand from July, and the next date is August 21. It is not yet certain whether these periods reflect a hiatus between the two adult broods or merely inadequate collecting during mid-summer.

This species feeds upon a wide variety of plants. Froeschner (1942: 600) mentioned finding both eggs and young nymphs on wild mint (*Monarda*) in Missouri in early June. Yonke & Medler (1969) found eggs and nymphs on six host plants (including *Monarda*) in five different families. They found adults from May to early October in Wisconsin, but did not mention bimodality in the seasonal occurrence of adults.

Genus *CHELINIDEA* Uhler

A small genus endemic to North America, widespread in the Rocky Mountains but in the east distinctly austral in its occurrence. The single species is confined to one host plant, the prickly-pear cactus (*Opuntia*) and must be sought within the range of that species. The stocky flattened body, median stripe on the head, and peculiar three-sided antennomeres easily distinguish this bug from all other local coreids.

89. *CHELINIDEA VITTIGER AEQUORIS* **McAtee**

Largely confined to the area of its host plant, this small-sized coreid has been found from Virginia to Georgia, west to Colorado and California.

In 1919, W. L. McAtee divided the species *vittiger* into two subspecies, with the nominate subspecies restricted to the Rocky Mountain states, Montana to Arizona and west Texas. For the second subspecies, occurring in the coastal plain from Texas to Virginia, he proposed the name *C. vittiger aequoris* (a geographic allusion implied) with the type locality at San Diego, Texas. Within this taxon, however, McAtee noted slight color variation and published a new varietal name *artuatra* for the eastern population. Since, varietal names have no validity under the International Code of Zoological Nomenclature, *artuatra* can be disregarded, but there is no reason to discriminate against the name *aequoris* as Blatchley did in omitting it from his treatment in 1926.

The occurrence of *C. vittiger* in Virginia stands upon very inadequate documentation. Apparently the first record was that of Uhler in 1863, who listed "Virginia" among the four localities known for the species when it was described. McAtee (1919: 12) cited a specimen in the USNM collection, labeled "Virginia" with Uhler given as collector. In the same collection there is now a single nymph of *vittiger*, collected at Herndon, Fairfax County, by H. G. Barber in August, 1911. Presumably this specimen was added to the collection at a much later time than when McAtee wrote his paper. I am not aware of any other Virginia material, and have had no success in personal search on prickly pear cactus (*Opuntia rafinesquei*) at various localities in the state.

Brimley (1938) cited only Southern Pines for the occurrence of this species in North Carolina. Still, there being no reason to doubt the authenticity of Barber's Herndon specimen, local collectors should be challenged to examine every occurrence of *Opuntia* at various seasons in the hope of discovering Virginia colonies of *Chelinidea*.

Genus *CHARIESTERUS* Laporte

This genus, along with two others in the Neotropical region, comprises a distinct tribe within the subfamily. Of the six named species of *Chariesterus*, one is widespread in eastern United States.

90. *CHARIESTERUS ANTENNATOR* (Fabricius).—Figs. 8, 9

Easily recognized by the small size, slender body form, and modified first and third antennomeres, this little coreid occurs over much of eastern North America; but, insofar as I can tell, it avoids the higher elevations of the Appalachians, and its range thus extends northward throughout the Mississippi Valley and along the east coast.

Virginia specimens came from the counties of Albemarle, Alleghany, Augusta, Buckingham, Chesterfield, Fairfax, Montgomery. and Nelson and the cities of Norfolk, Richmond, and Virginia Beach. It is apparently common in Fairfax County, whence known from ten separate localities. As in the case of *Euthochtha galeator*, there is a sort of bimodal seasonal occurrence, with very few collections made in midsummer.

Literature accounts suggest this bug feeds, as an adult, upon a wide variety of plants, to which I can add the following data from pin labels: *Castanea pumila, Ceanothus* sp., *Euphorbia corollata, Apocynum* sp. (dogbane), *Plantago* sp. (plantain), *Rhus* sp. (sumac). Of these, *Ceanothus* and *Euphorbia* are also mentioned by Blatchley (1926) and should be investigated as possible host plants for the nymphs. A specimen I found May 30, 1953, at Griffith, east of Clifton Forge along the Cowpasture River, was feeding upon dogbane (*Apocynum* sp.) along a railroad track. Dogbane is cited for a specimen taken at Dillwyn, Buckingham County, and one from Staunton.

The few intermontane Virginia records for this species are all at low elevations and reflect migration inland along the larger streams.

Genus *CATORHINTHA* Stal

Four species of this dominantly subtropical group occur in eastern United States. One has been found in Virginia and a second is to be expected. Superficially, they resemble small squash bugs (*Anasa*), to which they are in fact closely related.

91. *CATORHINTHA MENDICA* Stal

This insect was originally described after specimens taken in Texas and Mexico. Blatchley (1926) cited its occurrence in most of the states in the upper Mississippi Valley and also Arizona.

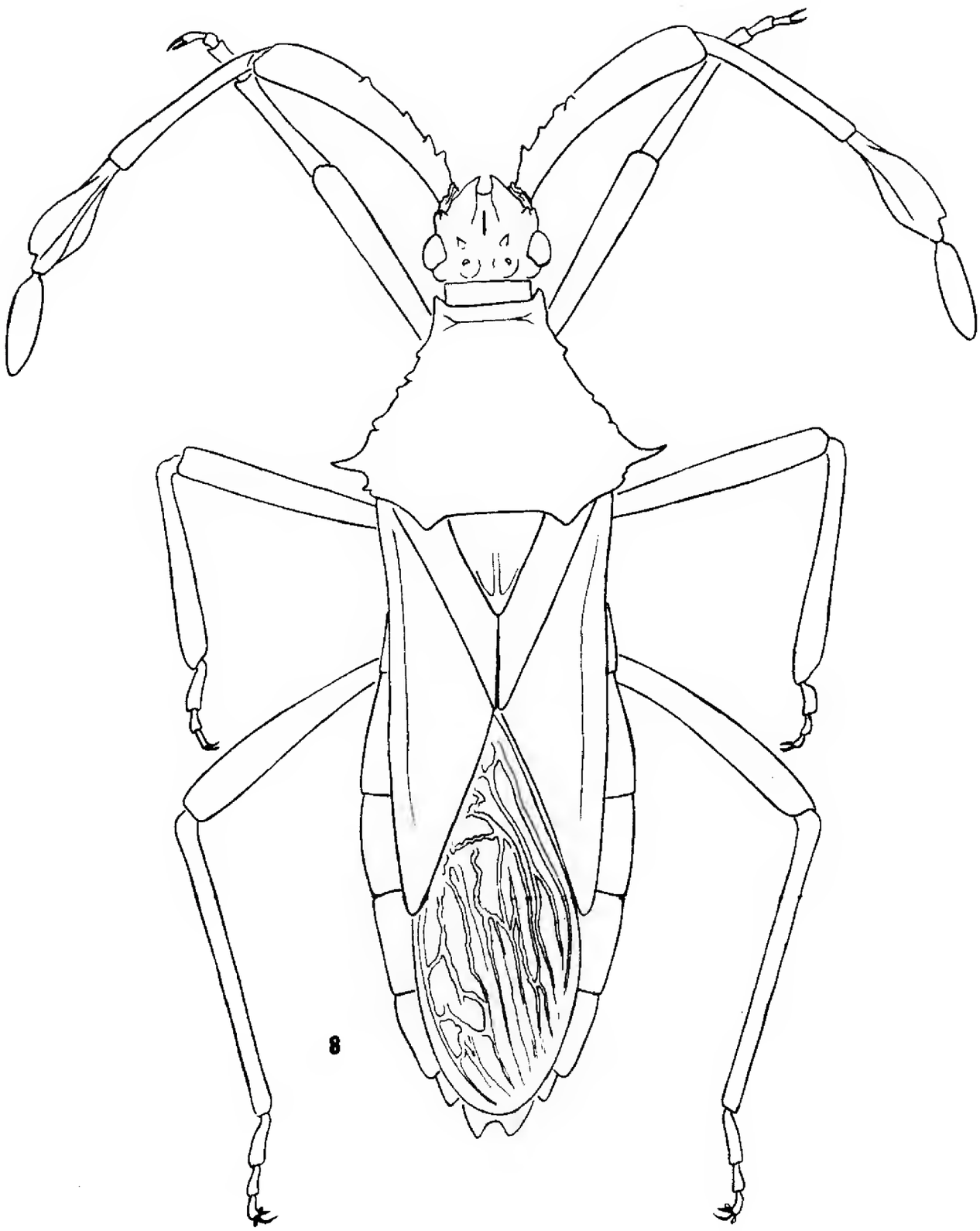

Figure 8. *Chariesterus antennator*, to show general body form and modified 1st and 3rd antennomeres; the latter seen somewhat obliquely and thus not as broad as in reality.

It was, therefore, with considerable surprise that I encountered a specimen recently taken in Virginia in the VPI&SU collection.

The bug in question was picked up on November 27, 1970, by Donald Flanagan during general collecting along the Shenandoah River southwest of Luray, about two miles south of the bridge over which U. S. Hy. 211 crosses that river.

Apparently, *mendica* is actively extending its range eastward, following the spread of its host plant *Mirabilis nyctaginea* (Michx.) along railroad rights-of-way. This plant is now becoming widespread in Virginia, and the discovery of *C. mendica* at other localities is to be expected. Details about the spread eastward of *mendica* have been published by Balduf (1957) who recorded the insect at that time as far as Lebanon County, Pennsylvania.

* *CATORHINTHA GUTTULA* **(Fabricius)**

Brimley (1942) recorded it from Maxton, North Carolina, 120 miles south of the Virginia border, thus to be considered as possible for eventual discovery within the state, doubtlessly in the southeastern region.

Genus *ANASA* Amyot & Serville

This is a large genus of chiefly Neotropical species. Blatchley (1926) recorded five species in the eastern United States, but two of them are confined to the circumcaribbean region only. The remaining three are, however, widespread, and one is a well-known crop pest. All three share a marked preference for plants in the family Cucurbitaceae.

As currently defined, this genus appears strikingly heterogeneous. Although I have not yet made comparisons of internal male genitalia, it seems improbable to me that such dissimilar species as *tristis* and *armigera* should occupy the same genus, unless tropical species manifest a spectrum of intermediacy. Perhaps a revision will result in *Anasa* being dismembered much as was true for *"Corizus"*.

KEY TO SPECIES OF *ANASA* FOUND IN VIRGINIA

1. Apical antennomere blackish; head with a yellow median stripe ---------- *tristis*

— Apical antennomere yellow or reddish; head without a median stripe ---------- 2

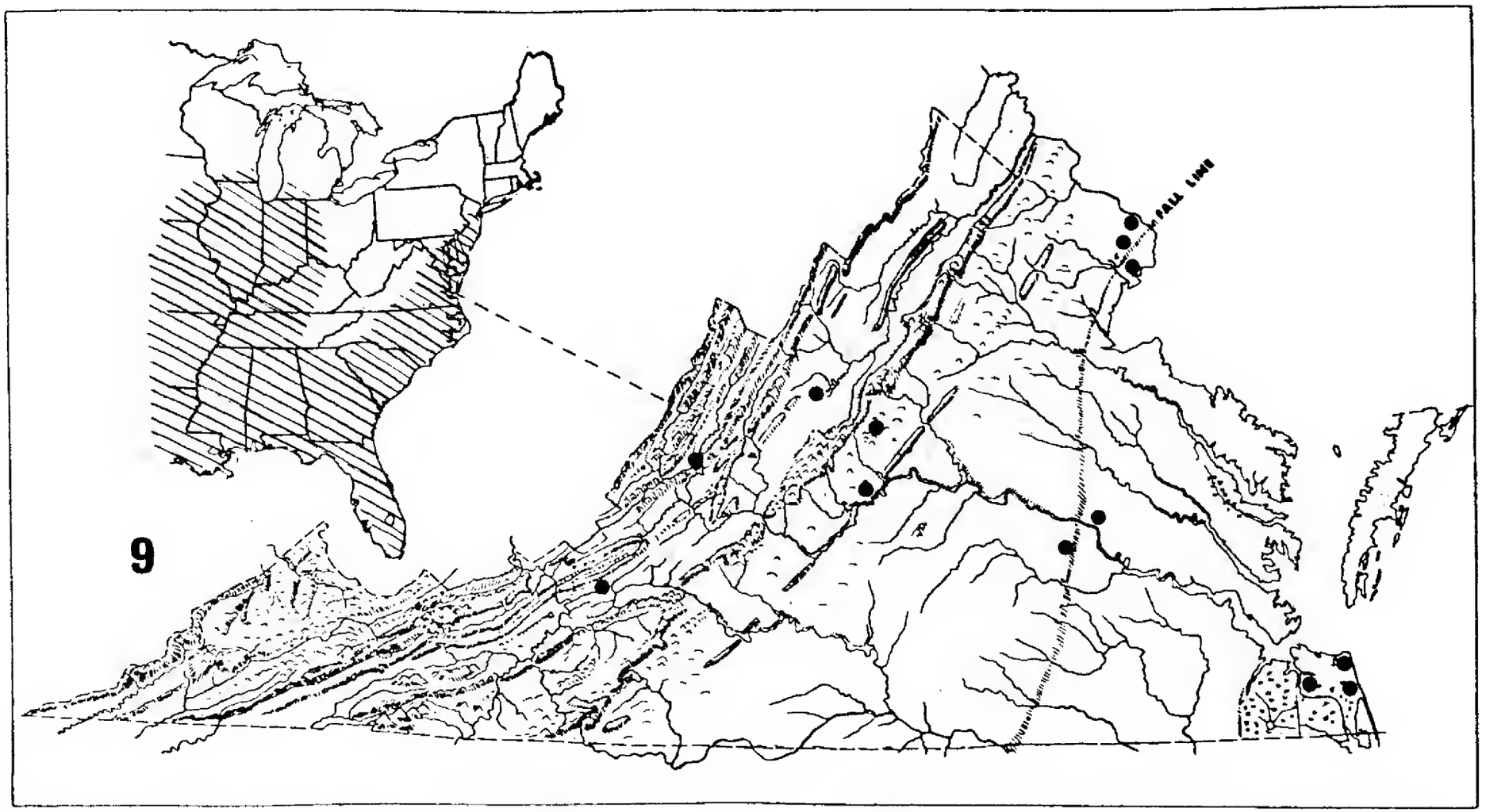

Figure 9. Distribution of *Chariesterus antennator* in Virginia.

2. Head with enormously enlarged postantennal spines (Fig. 10); basal antennomere pale yellow dotted with black ..... *armigera*

— Head without postantennal spines; basal antennomere black ventrally, yellow dorsally with a few black dots..*repetita*

92. *ANASA ARMIGERA* (Say).—Figs. 10, 11

This striking species is basically austral in range, extending north to coastal Massachusetts and to Iowa and Indiana in the Mississippi Valley. All but one of the known Virginia records are east of the Blue Ridge (Accomac, Albemarle, Fairfax, Montgomery, and Nelson counties, and the cities of Suffolk and Norfolk as are those summarized for North Carolina by Brimley (1938). The preferred native host plant appears to be *Sicyos angulata* L., but domesticated cucurbits are also attacked. Chittenden (1898) published details of its life history in the vicinity of Washington, D. C.

93. *ANASA REPETITA* **Heidemann**

Superficially similar to the foregoing species in form and coloration, but differing in structural details, this form was not described until 1905, from specimens taken in the District of Columbia. Subsequently it has been found in New York, Massachusetts, Indiana, Missouri, and doubtlessly, other states, but has not yet been reported from North Carolina.

A. repetita is apparently sporadic in Virginia; I have seen only two collections, both in the USNM: Mount Vernon, June 27, on *Sicyos*; and along the James River near Wingina, Nelson County, June-August. It is possible that neglect of specialized collecting by local entomologists is responsible for the poverty of state records, as *Sicyos* is widespread and abundant over most of the Commonwealth.

94. *ANASA TRISTIS* **(De Geer) Squash Bug**

This well-known squash bug is one of the first insects described from North America and has been recorded from most of this continent, especially in cultivated regions. It is especially injurious to squash and melons of all kinds.

In Virginia, the squash bug is statewide but not yet found above 2,000 feet. Specimens seen from Alleghany, Augusta, Bedford,

Caroline, Chesterfield, Fairfax, Frederick, Montgomery, Page, Rockingham, and Washington counties and the cities of Norfolk and Richmond, April-November.

FAMILY ALYDIDAE

(= CORISCIDAE BLATCHLEY)

A rather small family, not so dominantly tropical as the preceding. For many years the group was considered a subfamily of the Coreidae, under the name Alydinae. Following the discovery that the generic names *Alydus* and *Coriscus* were based on the same type species, with the latter name seven years older, Blatchley in 1926 proposed to elevate the group to family status and call it Coriscidae. After several decades of this usage, the name *Alydus* was ressurrected and the family name again became Alydidae. Sailer (1953) has published a short summary of the nomenclatorial legalistics involved.

There are only three common Virginia species, one in *Megalotomus* and two in *Alydus*. All are superficially similar, and are taken together by sweeping weedy fields in late summer and autumn. They emit a distinctly unpleasant odor from their scent glands. Both sexes have a stridulatory apparatus, composed of a fine 'file' along the costal margin of the hemelytra and a minutely roughened area on the inner side of the posterior femora, but I have never observed a specimen in the act of stridulating, and I have no idea what the purpose of this behavior might be.

The nymphs, particularly of *Alydus eurinus*, bear a considerable resemblance to large black ants. The adults usually have the abdomen dorsally red or orange which shows vividly when the bug takes flight, presumably an aposematic adaptation. McAtee (1919) stated that the nymphs of both *Megalotomus* and *Alydus* were found only on New Jersey tea (*Ceanothus americanus*), but I commonly have taken them by sweeping weedy fields and roadsides far from any occurrence of that plant.

KEY TO GENERA OF *ALYDIDAE* FOUND IN VIRGINIA

1. Femora of hind legs slender, without apical ventral spines; jugae longer than tylus and meeting in front of it ---------- * *Protenor*, p. 30

— Femora of hind legs stouter, with 3 to 6 acute spines on the ventral side; jugae shorter than tylus ---------- 2

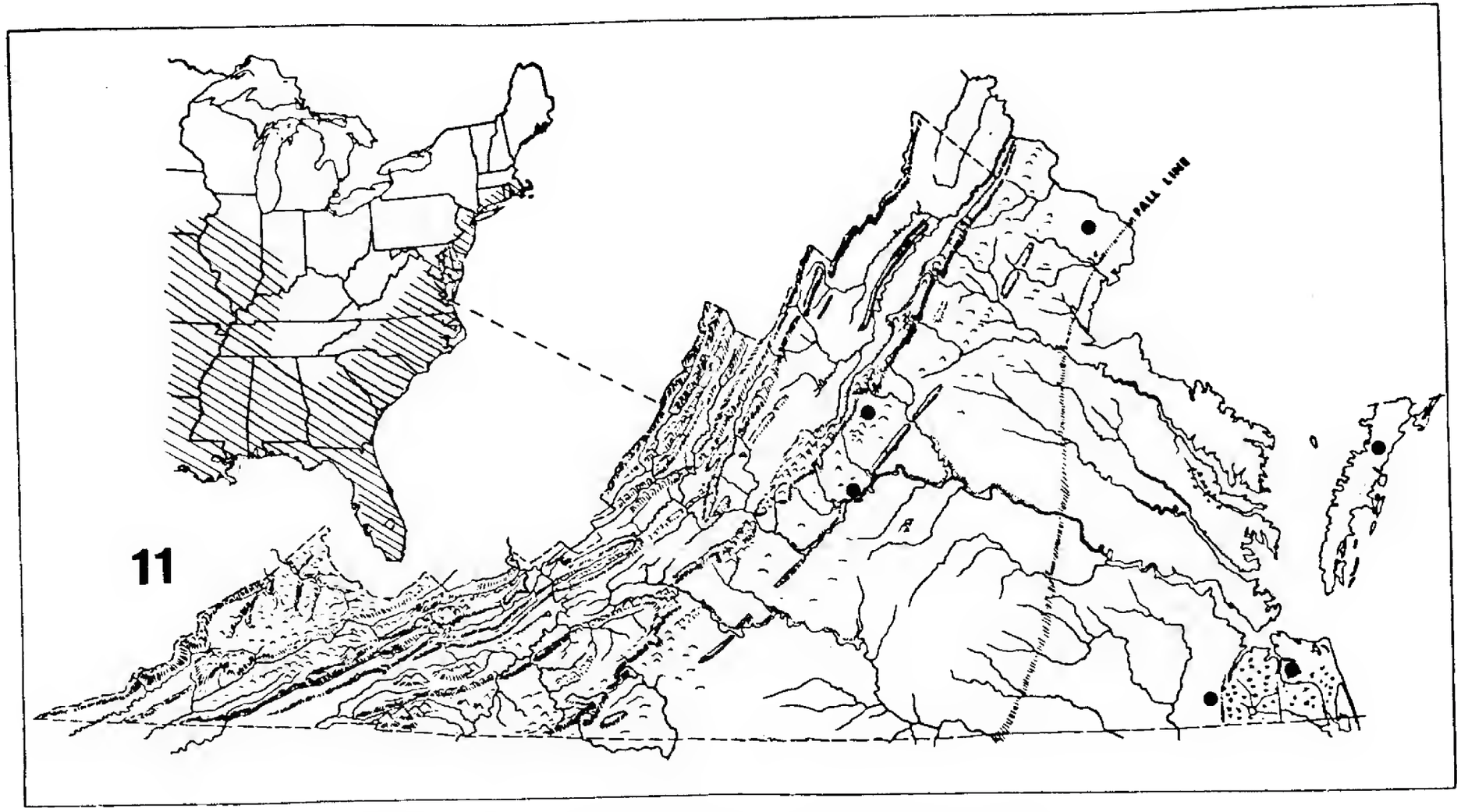

Figure 11. Distribution of *Anasa armigera* in Virginia.

2. Fourth antennomere shorter than the others; posterior tibiae with 2 rows of small spines ventrally; osteolar peritreme absent, osteole itself minute; body set with numerous short dark bristles, and with stripes and areas of short stout white setae ..... *Stachyocnemus*, p. 35

— Fourth antennomere as long as (or longer than) 2nd and 3rd united; posterior tibiae unarmed beneath; osteolar peritreme large and conspicuous between meso- and metacoxae; body with erect fine hairs, sometimes bristlelike, but never with dense white pubescence 3

3. Second antennomere shorter than the first; 6th ventral segment of females divided along the median line; osteolar peritreme dorsally bilobed (a secondary lobe anterior to the main dorsal ending); basal metatarsal segment of posterior legs more than twice as long as the other two united ..... *Megalotomus*, p. 32

— Second antennomere longer than the first; 6th ventral segment of females not divided or notched medially; osteolar peritreme elongate-oval, without an anterior dorsal lobe; basal metatarsal segment twice as long as the other two united ..... *Alydus*, p. 32

Genus *PROTENOR* Haglund

This genus contains two long, slender yellowish species, one widespread in northern United States and Canada, the other endemic to Florida. In general, they have little close resemblance to the more 'typical' alydids in our fauna.

* *PROTENOR BELFRAGEI* Haglund.—Fig. 12

Blatchley (1926) summarized the range of this species as extending from New England and Quebec west to Wisconsin and Colorado, south in the Appalachians as far as Maryland.

Two specimens in the USNM collection apparently represent the southernmost known occurrence for this species: Canaan Valley, Tucker County, West Virginia (H. A. Allard). This locality, shown by the triangle on figure 12, is about 30 miles from the angular northwest corner of Highland County and 25 miles west of the border of Rockingham County. One seems justified in anticipat-

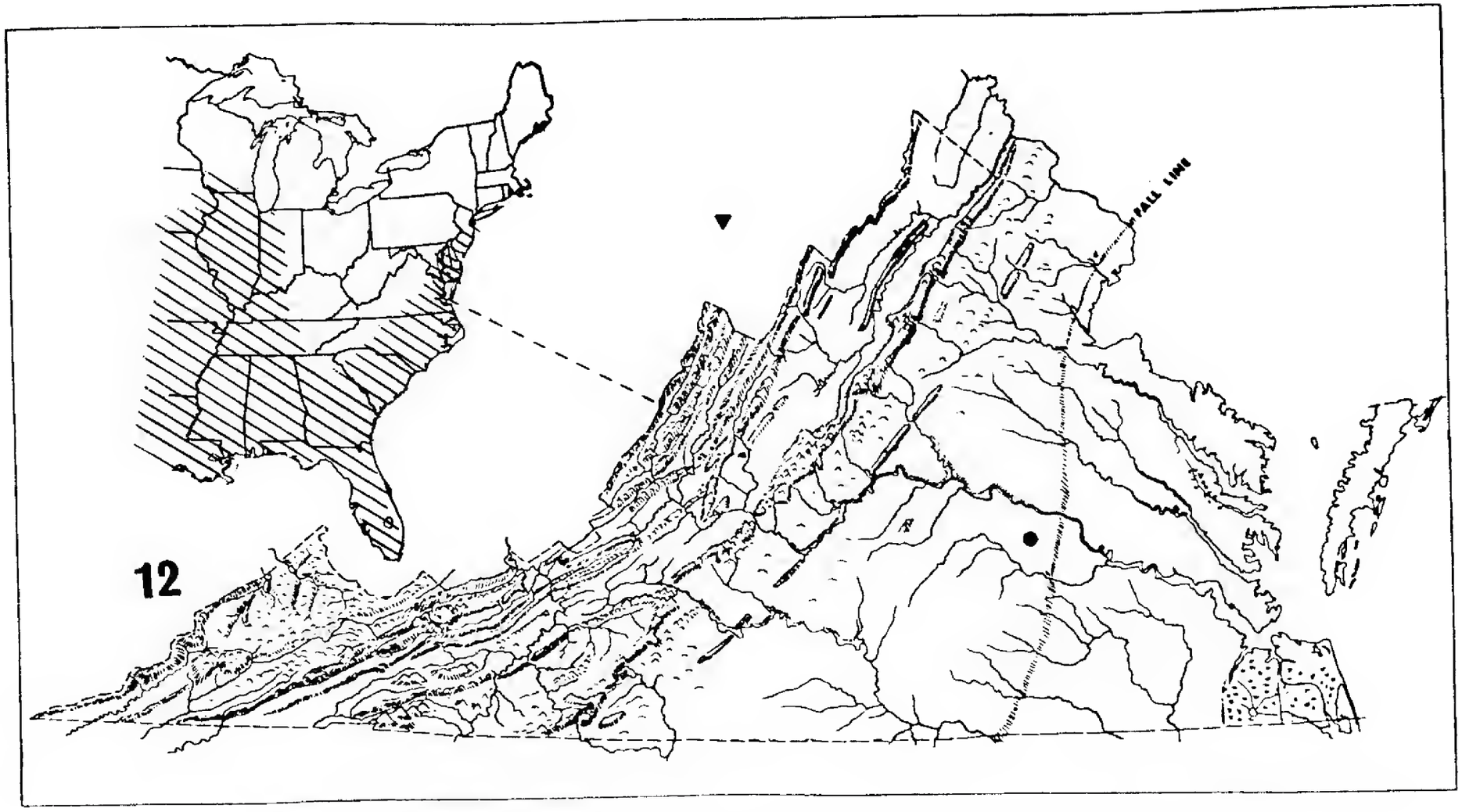

Figure 12. Distribution of *Stachyocnemus apicalis* in Virginia (black spot), and the southernmost known locality for *Protenor belfragei* (inverted triangle).

ing that the species will eventually be found in the higher Alleghenies in either or both of the counties mentioned or, quite possibly, in an isolated relict population still much further southward.

Genus *MEGALOTOMUS* Fieber

A small genus (two species) of alydids obviously most closely related to *Alydus* but distinguished by a number of small structural departures. The unique form of the osteolar peritreme makes recognition of the local species easy, even if the antennae and hind legs are missing and the specimen is a male.

95. *MEGALOTOMUS QUINQUESPINOSUS* (Say)

A subboreal species ranging across the entire continent generally north of the 36th parallel. It appears to be statewide in Virginia, but less common in the southeast and not yet found above 2,000 feet in the mountains. According to Brimley (1938), *quinquespinosus* occurs only in the Piedmont and mountainous parts of North Carolina.

Material seen from Albemarle, Alleghany, Dickenson, Montgomery, Rockbridge, and York counties, and the City of Virginia Beach; June-September. Specimens are most usually taken by sweeping in grasses and weeds in low places.

Genus *ALYDUS* Fabricius

This genus, known for many years as *Coriscus*, includes species from North America and Eurasia, three of which are represented in eastern United States. The two species occurring in Virginia, although superficially similar, differ in so many ways that one is led to wonder if they are in fact congeneric. I am not aware of any recent studies involving the internal genitalia of alydines, and perhaps a close comparative study would reveal important differences among the members of the nominal genus.

KEY TO SPECIES OF *ALYDUS* FOUND IN VIRGINIA

1. Humeral angles of pronotum obtusely rounded; pronotal lateral margins not prominent, nor light colored; pronotum and hemelytra usually uniform black in Virginia specimens ---------- *eurinus*

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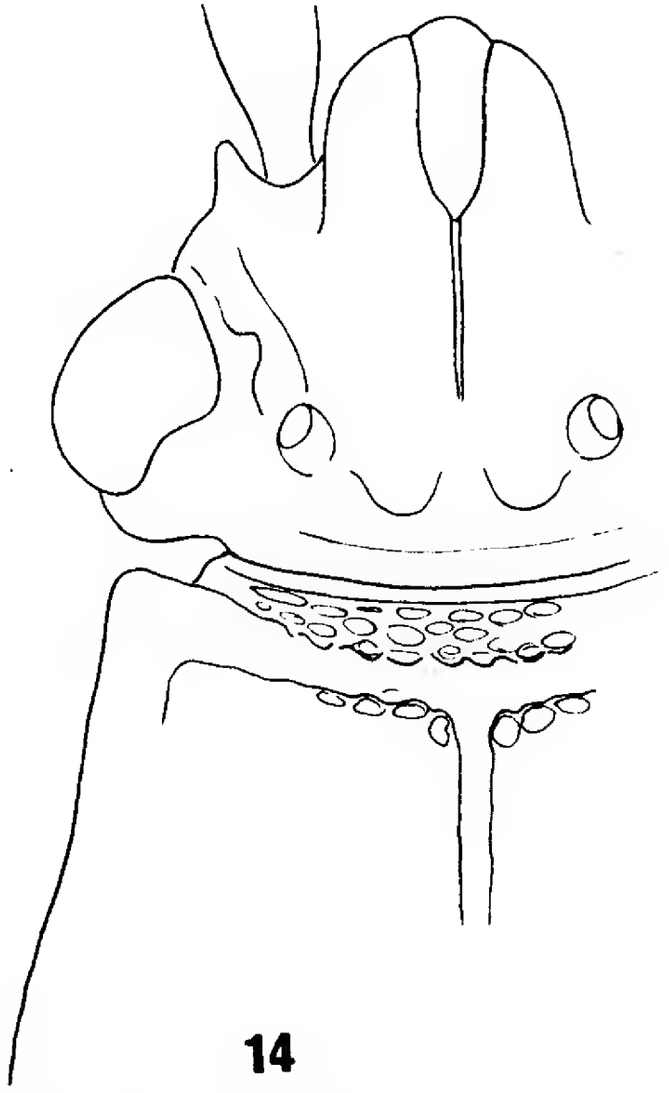

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Figures 13, 14. Structural details in the family Rhopalidae. Fig. 13, head and front of pronotum, *Leptocoris trivittatus*, showing compact insertion of head and marginal pronotal indentation; Fig. 14, head and front of pronotum, *Stictopleurus punctiventris*, to same scale as Fig. 13.

— Humeral angles of pronotum acute; pronotal lateral margins carinate and pale in color; anterior lobe of pronotum black; head, posterior lobe, and hemelytra light brown or tan in specimens from Virginia _____ *pilosulus*

96. *ALYDUS EURINUS* **(Say)**

This species, widespread across much of North America, is statewide in Virginia, except perhaps for the higher elevations (not yet found above 2,000 feet). Material has been examined from the counties of Albemarle, Alleghany, Amherst, Augusta, Bland, Charlotte, Giles, Isle of Wight, Montgomery, Pittsylvania, Roanoke, Rockbridge, and Washington and the cities of Suffolk and Norfolk; May-November.

All the Virginia material examined is uniformly blackish in color, not just the larger females, as noted by Blatchley (1926). The species is usually found by sweeping high grasses and weedy fields in the autumn months; often taken in company with *A. pilosulus*.

97. *ALYDUS PILOSULUS* **(Herrich-Schaefer)**

As noted by Blatchley (1926), the range of this insect is distinctly more southern than that of the preceding form, although it too is transcontinental. In Virginia it seems to be statewide and has been found from sea level to elevations of 3,300 feet.

Specimens have been seen from Alleghany, Augusta, Frederick, Giles, Louisa, Montgomery, Pittsylvania, Rockbridge, Southampton, Washington, and Wythe counties, and the cities of Suffolk, Norfolk, and Virginia Beach; June-November, the majority of collections made in August-October.

According to the studies of Underhill (1943) made chiefly around Blacksburg, Virginia, both this species and *A. eurinus* often occur in sufficient numbers to damage cultivated plants, particularly legumes. However, neither species is frequently taken during the field sampling work of the Insect Pest Survey in Virginia.

Genus *STACHYOCNEMUS* Stal

A monotypic genus apparently confined to southern and central United States. There is no osteolar peritreme, and the scent gland

opening is reduced to a small slit in front of the metacoxae. The occurrence of a small median tooth or spine on the rear edge of the pronotum is an interesting feature.

98. *STACHYOCNEMUS APICALIS* **(Dallas).**—Fig. 12

This little alydid is the rarest Virginia member of the superfamily, being known in this state from a single specimen only, found at Chester, Chesterfield County, May 24, 1920, by G. W. Underhill (VPI&SU). The species is austral, its range extending from New Jersey to Florida, west and north to Illinois and Indiana, and it seems to be nowhere common except in dry sandy regions where it is said to run over the ground like a cicindelid beetle. Probably, devoted collecting efforts will turn up *apicalis* at other places in eastern Virginia.

Brimley (1938) recorded it only from Raleigh and Southern Pines in North Carolina, and Blatchley (1926) found only one specimen in his extensive field work in Florida.

FAMILY RHOPALIDAE

This is the family formerly known in much of the American literature under the name Corizidae. The group was, however, first indicated as a suprageneric taxon by Amyot and Serville in 1843 under the name "Rhopalides" by provisions of the International Commission of Zoological Nomenclature (1961) which legalize the anarchy of vernacular names (Arts. 11e, 25), this name must be used instead of the first correct form, Corizidae Douglas & Scott, 1865.

The separate family status of the group has been firmly established by the studies of Schaefer (1965), and its internal classification clarified by Chopra (1967) who published a detailed system of the entire world fauna to the level of genus. The work of these two authorities, and that of some other specialists (notably H. M. Harris, 1943, 1944b) has resulted in changes in the organization and nomenclature from the familiar arrangement of Blatchley (1926). For comparison I give the corresponding names below:

Blatchley, 1926	Chopra, 1967
Family Corizidae	Family Rhopalidae
Tribe Leptocorini	Subfamily Serinethinae Subfamily Rhopalinae
Tribe Harmostini	Tribe Harmostini
Tribe Corizini	Tribe Maccevethini Tribe Rhopalini Tribe Niesthreini

It is especially to be noted that species assigned by Blatchley to the genus *Corizus* are now distributed amongst four genera in the last three tribes in Chopra's system, and that none of our local species remain in *Corizus*.

Regretably the structural character most relied upon by Blatchley for the separation of this family from other coreoids ("Osteolar openings absent . . . .") is not strictly true, as the peritremata *are* present—merely smaller and located more ventrally between the meso- and metacoxae. In some genera, such as *Arhyssus* and *Liorhyssus*, the lower sides are modified into prominent and elaborate evaporatorial surfaces (See Fig. 16), and this fact caused me considerable difficulty in my initial attempts to key out these small bugs in Blatchley's celebrated handbook. The distinctions made by Schaefer (1964, 1965) in his revision of the superfamily are more fundamental, but not all will be easily perceived by the non-specialist.

In general, the Rhopalidae group is clearly a more temperate-zone one than the Coreidae; most of its genera restricted to the Holarctic Realm. A few occur also in the Neotropical and Ethiopian regions. One is endemic to Hawaii, but none are known from the East Indies or Australia. One genus (*Liorhyssus*) appears to be almost cosmopolitan, perhaps as the result of introductions.

As noted by Blatchley (1926), rhopalids occur "in late summer and autumn, upon weeds and other plants growing in open fields and along the borders of woods and roadsides." More pronounced host specificity has been observed for several species of the tribe Niesthrini.

The following key to the higher taxa of Rhopalidae known to occur in Virginia is based entirely upon easily seen external characters which may be reliable only for the local fauna. The divisions recognized by Chopra (1967) are founded to a large extent on secondary sexual characters of the males.

KEY TO SUBFAMILIES, TRIBES, AND GENERA OF RHOPALIDAE FOUND IN VIRGINIA

1. Head inserted compactly into pronotum, the postocular area slightly overlapping anterior angle of latter (Fig. 13); lateral margin of pronotum notched (the 'notch' is the upper end of a vertical groove) just behind anterior corner; black, ornamented with red or orange, membrane of hemelytra black. Subfamily Serinethinae ---------- *Leptocoris*, p. 49

— Head not compactly set against pronotum, the postocular region thus not in contact with the latter and giving the impression of a narrow collar at base of head (Fig. 14); lateral margin of pronotum without notch; pale grayish to reddish, ornamented with black and red markings especially on the ventral surfaces and legs, membrane of hemelytra hyaline, transparent. Subfamily Rhopalinae ---------- 2

2. Posterior femora with a row of sharp spinules on the ventral surface; anterior angles of pronotum acutely produced forward (Fig. 17). Tribe Harmostini ---- ---------- *Harmostes*, p. 40

— Posterior femora without spines; anterior corner of pronotum not produced acutely forward ---------- 3

3. Dorsal half of metepimera not expanded and prolonged caudally, the posterior edge nearly in contact with surface of second abdominal segment (Fig. 15); ventral half of epimera not set off by distinct sutures; osteole minute, concealed between the 2nd and 3rd coxae; margins of body not modified into evaporatory surfaces; dorsal surface of posterior lobe of pronotum distinctly convex each side of the middorsal groove. Tribe Maccevethini ---------- *Stictopleurus*, p. 43

— Dorsal half of metepimera conspicuously prolonged caudally, the entire posterior edge of the sclerite flared away from adjoining abdominal segment (Fig. 16); ventral half of metepimera set off by distinct sutures from both the dorsal half and from the metepisternum; osteole visible in lateral aspect; adjoining surfaces of mesepimera and metepisterna modified as evaporatoria, usually in the form of elevated granular knobs and ridges; posterior edge of mesepimera with fringe of minute projections; dorsal surface of entire pronotum essentially flattened ---------- 4

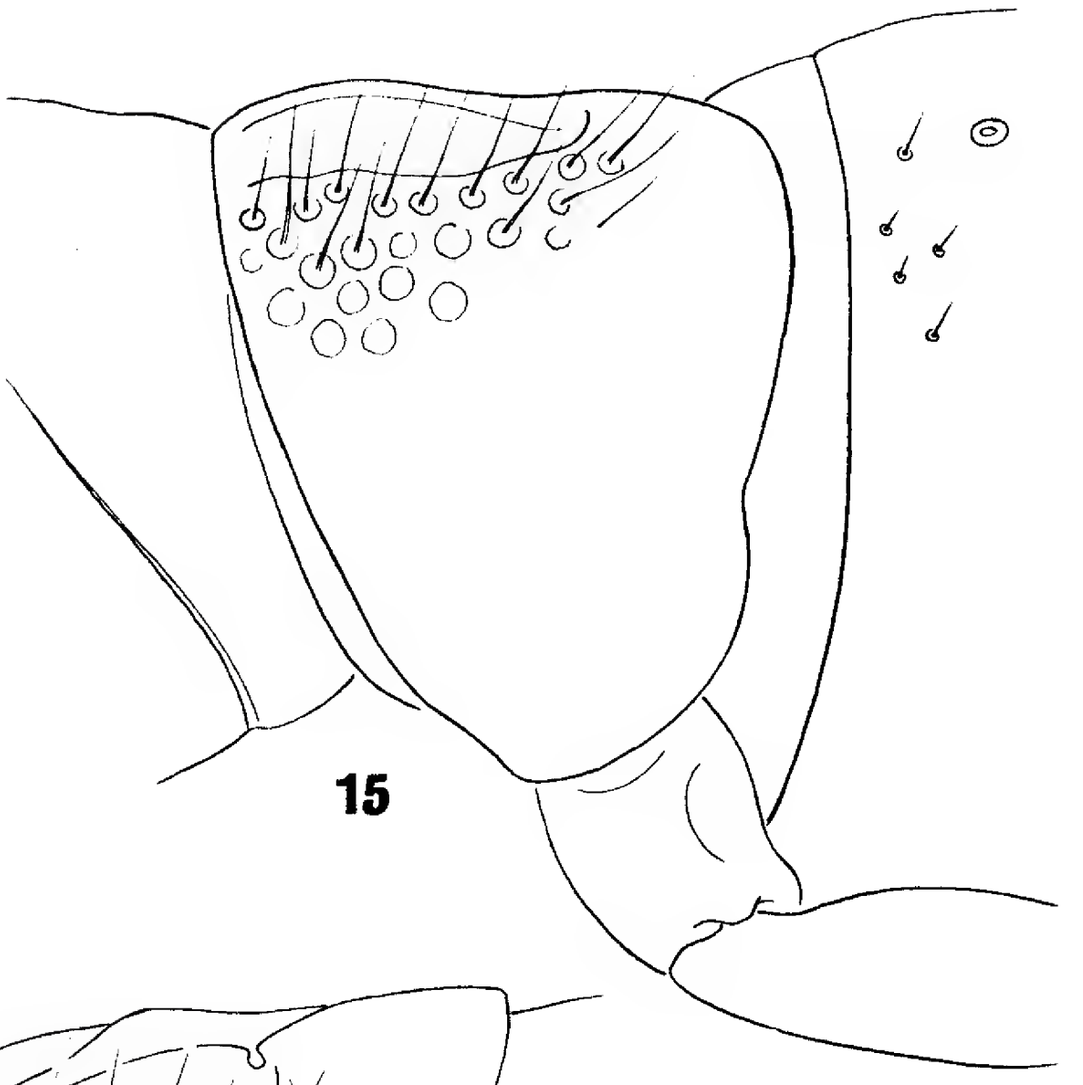
4. Anterior margin of pronotum set off as a fairly distinct 'collar' followed behind by a smooth elevated transverse rige; lateral margins of pronotum paler in color than the central surface; connexiva unspotted (the tribe to which this genus belongs is technically distinguished from the next by internal features of the male genitalia). Tribe Rhopalini ---------- *Liorhyssus*, p. 44

— Anterior margin of pronotum not sharply set off as a collar, the surface behind it obviously punctate; lateral margins of pronotum not especially paler than central area; connexiva spotted with black. Tribe Niesthrini --- 5

5. Beak long, reaching back to or beyond second abdominal segment; femora pale with narrow black rings; ventral side of body generally with red markings ------- ---------- *Niesthrea*, p. 46

— Beak shorter, not extending beyond posterior surface of hind coxae; femora pale with brown or blackish speckling ---------- *Arhyssus*, p. 46

Figures 15, 16. Structural details in the family Rhopalidae. Fig. 15, metapleural region and base of rear leg, *Stictopleurus punctiventris*, punctation shown only near upper margin of metapleuron; Fig. 16, metapleural region of *Arhyssus nigristernum*, showing evaporatorial modifications, sutures, and prolongation of the dorsal half of metapleuron.



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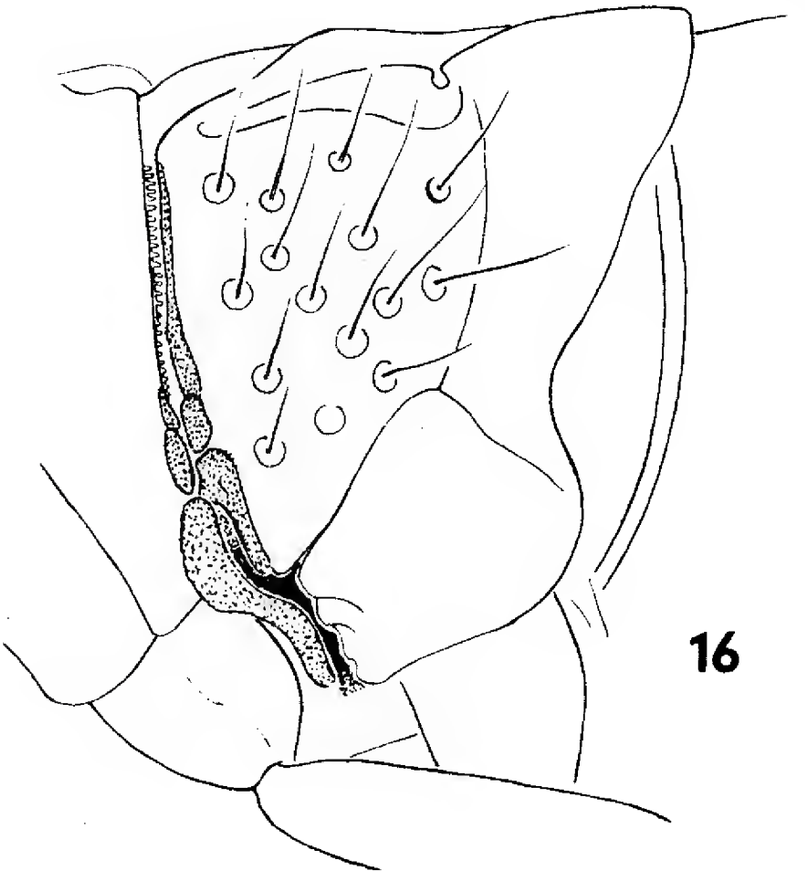

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SUBFAMILY RHOPALINAE

Genus *HARMOSTES* Burmeister

A New World genus of approximately 31 species, most of which occur south of the United States. The most recent and comprehensive review is that by H. M. Harris (1944a). Two species occur in Virginia and are most often found by sweeping vegetation in fields and roadsides during the midsummer months.

KEY TO SPECIES OF *HARMOSTES* FOUND IN VIRGINIA

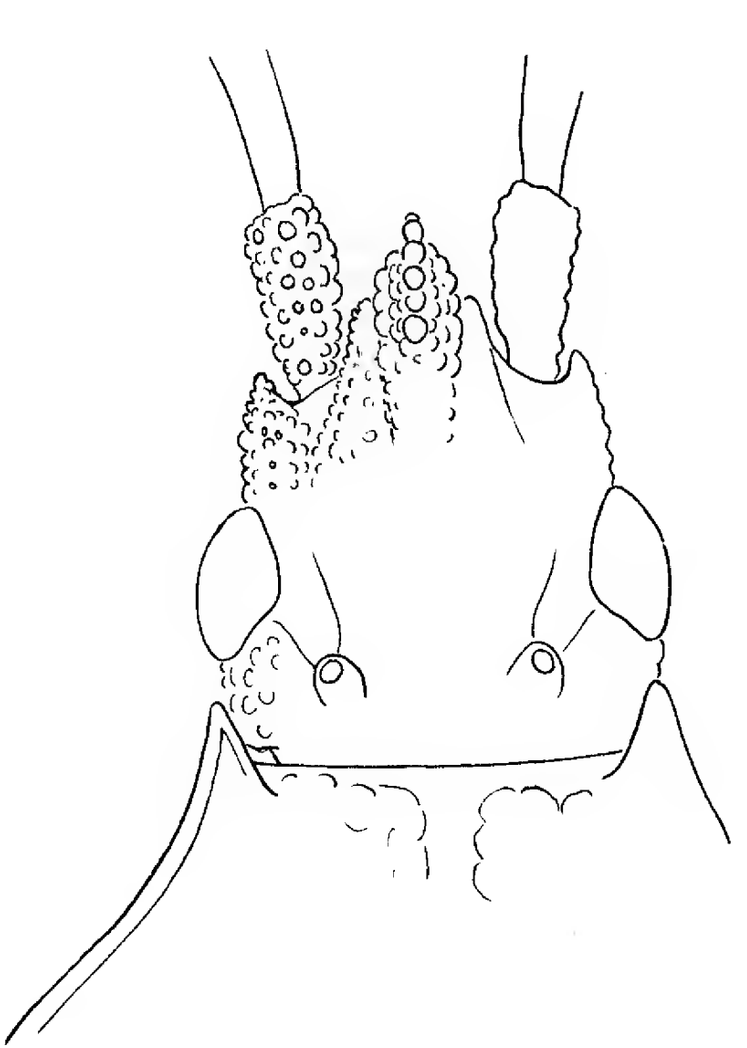
1. Basal antennal segment large, thickened, and extending far beyond the apex of the tylus; margin of corium with indistinct light brown dots; membrane entirely clear or with at most a few obscure brownish spots ---------- *reflexulus*

— Basal antennal segment relatively small, scarcely exceeding level of apex of tylus; costal margin of hemelytra with 8 to 12 prominent dark brown or blackish dots; membrane with a number of distinct brownish spots and each usually also with a straight fuscous stripe, producing the effect of two parallel dark lines when the wings are at rest ---------- *fraterculus*

99. *HARMOSTES FRATERCULUS* (Say).—Fig. 17

As stated by Blatchley (1926) this small local member of the genus is clearly of austral distribution, "extending from New Jersey west through southern Indiana to Oklahoma and south to Georgia, Arizona, California, and Central America." It is much less frequent than *reflexulus*, and the Virginia records suggest that *fraterculus* does not occur in the Appalachians, per se, and that Blatchley's statement should be rephrased.

Specimens have been examined from the following localities: Griffith, Alleghany County (VPI&SU); Dillwyn, Buckingham County (VPI&SU); Four Mile Run and Vienna, Fairfax County (USNM), and Burkeville, Prince Edward County (VPI&SU). Only one of these places (Griffith) is west of the Blue Ridge in the upper valley of the James River at about 1,100 feet. This locality is a region inhabited by numerous other austral animals which have ap-



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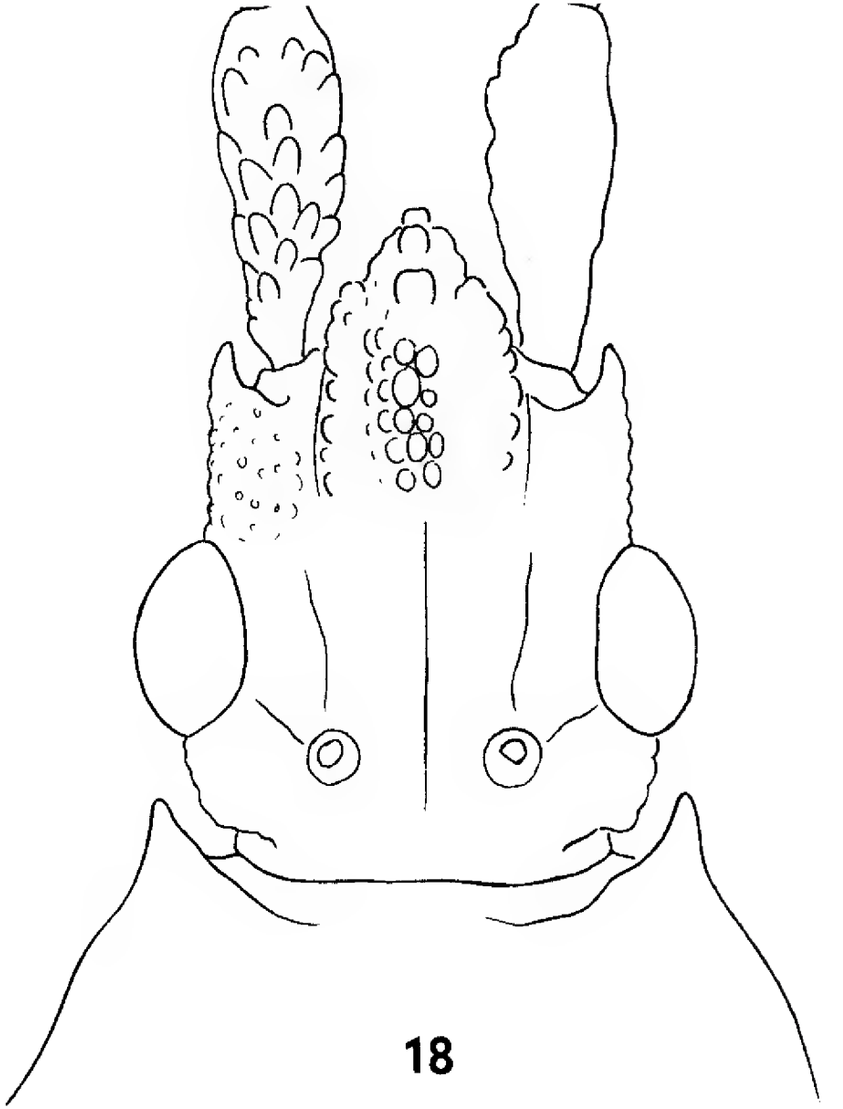

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Figures 17, 18. Dorsal views of head in two species of *Harmostes*. Fig. 17, *H. fraterculus*; Fig. 18, *H. reflexulus*.

parently likewise migrated headward along the river valley. The lack of records for the Coastal Plain is remarkable; the species must occur there as attested by coastal plain finds in New Jersey and North Carolina. Collecting dates extend from early June to late September. Pin labels carry the data "Joe Pye weed," "Boneset," "cedar," and "*Tilia*," the latter two doubtless only "sitting" finds. Both Blatchley (1926: 273) and Froeschner (1942: 602) mention boneset (*Eupatorium*) as a host plant in Indiana and Missour, respectively.

This species is a miniaturized version of the common *reflexulus*, with a generally darker coloration and more pronounced spotting of the hemelytra. It is interesting that Blatchley's description does not mention the dark lines on the membranes which are so prominent in all of the Virginia specimens seen. A point of difference from *reflexulus*, not heretofore mentioned to my knowledge, is the production of the dorsal surface of the scutellum, almost at the base, into a high, polished, medially directed knob.

100. *HARMOSTES REFLEXULUS* **(Say).**—Fig. 18

This species is considered to be generally distributed throughout the United States and southern Canada, and is without much question the most commonly encountered rhopalid in the Virginia fauna.

Specimens have been seen from the counties of Albemarle, Alleghany, Augusta, Botetourt, Buckingham, Giles, Grayson, Montgomery, Patrick, Roanoke, Rockingham, and Wise and the city of Norfolk. Altitudinally the collecting sites range from sea level at Norfolk to at least 5,500 feet at Mount Rogers, so the species can be correctly regarded as statewide in its range. Dates of collection extend from early May to early October, but the majority of specimens examined were taken during the summer months. Mating pairs have been found at Clifton Forge in late May and early June. Specimens in the VPI&SU collection carry pin labels stating they were found on yarrow, fleabane, horseweed, lettuce, chichory, and oxeye daisy, indicating an obvious prediliction for composites. This substantiates remarks of plant preferences made by Blatchley (1926: 274) for Indiana.

In addition to the relatively much longer and thickened form of the basal antennomere of this species, this segment differs from that of *fraterculus* in being studded with large, oval-elongate tubercules (Figs. 17 and 18).

Genus *STICTOPLEURUS* Stal

Originally proposed as a genus with three species in 1872, this roup was reduced to subgeneric status by Van Duzee (1917), and latchley (1926) ignored it entirely, two Nearctic species being ref-red by him to the composite genus *Corizus*. Harris (1943, 1944b) estored the original status, and in 1944, gave a synopsis of the orth American species. Finally, Chopra (1967) showed that *Stic-opleurus* is more closely related to *Maccevethus* than to the nomi-ate rhopalids and he set up the new tribe Maccevethini. He noted lso several points of similarity between *Stictopleurus* and *Harmos-is*.

The presently known species of this genus occur in the Holarctic nd Ethiopian regions. Harris recognized five Nearctic species, ne of which occurs in Virginia. In this country, *Stictopleurus* is asically boreal in distribution.

The western species *S. viridicatus* (Uhler) was recorded by Bar-er (1914) from the District of Columbia. As no further speci-nens have been taken in this area during recent decades, it seems ikely that Barber's specimen was adventitious and that *viridicatus* vill not be found naturally in Virginia.

.01. *STICTOPLEURUS PUNCTIVENTRIS* **(Dallas).**—Figs. 14, .5, 19

Under the name *Corizus crassicornis*, Blatchley (1926: 278) at-ributed to this species the following range: "Quebec and New Eng-and west to the Pacific; not recorded in the east south of New Jersey . . . ."

Material examined by me extends the known distribution south as far as Burkes Garden, Virginia, and there is no reason to doubt hat *punctiventris* occurs also in the mountains of North Carolina as well. Ten specimens have been seen from the counties of Au-gusta, Buckingham, Highland, Montgomery, Page, Rockingham, and Tazewell—all west of the Blue Ridge, except for the single Buck-ingham County specimen (Dillwyn, August 1, A. M. Woodside, VPI&SU).

Dates of collection range from late May to the end of August. Specimens in the VPI&SU collection taken by Woodside bear the pin labels "yarrow," "smartweed," and "ox-eye daisy." Elevations at which *punctiventris* has been found in Virginia extend from about

800 feet in Buckingham County to nearly 4,000 feet in Highland, Page, and Tazewell counties.

Blatchley (1926) used the name *crassicornis* for this species, in the erroneous belief that the North American population is conspecific with the Palearctic species *crassicornis* Linnaeus.

Genus *LIORHYSSUS* Stal

As with the other rhopaline genera set up by Stal, *Liorhyssus* has been reduced to subgeneric rank, or to outright synonymy under *Corizus*, and subsequently restored to its original status as modern systematic studies have vindicated Stal's clairvoyance. *Liorhyssus* is now one of the four genera placed by Chopra (1967) in the restricted tribe Rhopalini, a chiefly Palearctic assemblage. Harris (1943) noted about 28 names based on specimens of *Liorhyssus*, but considered most of them to be synonyms of *L. hyalinus;* Chopra suspected that on the basis of male genitalia a number of species might be distinguished within the cosmopolitan *hyalinus* in its present very broad sense.

102. *LIORHYSSUS HYALINUS* (Fabricius)

This small rhopalid is easily distinguished from other Virginia members of the family by the characters stated in the key, as well as by the reddish apices of the hemelytral coria, the yellow tip of scutellum, considerable extension of the membranes beyond the end of the abdomen, and by the broadly truncate terminal abdominal segment of females.

In its present somewhat composite sense, *hyalinus* is known from all the continents and from many oceanic islands. It is apparently widespread in North America but seems not to be especially common anywhere in the eastern United States. Brimley (1938) mentioned only Raleigh as a North Carolina locality. The National Museum has no material from Virginia and only a few specimens from adjoining states. I have seen five specimens from Virginia: three taken in the City of Norfolk and one at Cape Henry in the City of Virginia Beach (September 10-Oct. 1, L. D. Anderson, VPI &SU)—both localities in the extreme southeastern region. The fifth specimen is from Blacksburg, Montgomery County (Oct. 28, 1970, F. W. Morrow, VPI&SU) in the southwestern mountains at 2,000 ft.

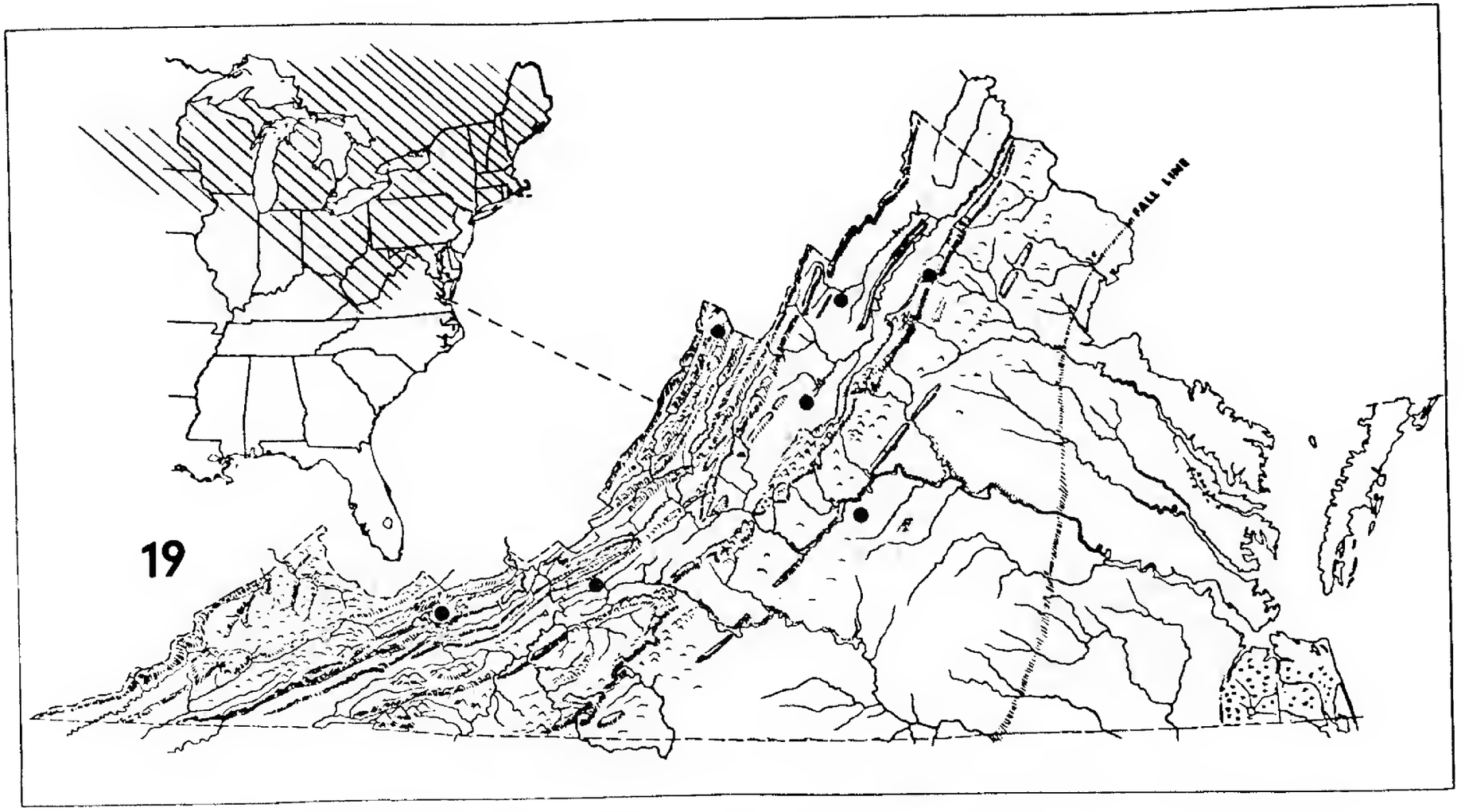

Figure 19. Distribution of *Stictopleurus punctiventris* in Virginia.

Genus *NIESTHREA* Spinola

A small American genus of colorful rhopalids closely related to *Arhyssus*. Most of the ten species recognized in the latest revision (Chopra, 1973) occur in South and Central America. Three species extend into the United States, and one is endemic to this country.

103. *NIESTHREA LOUISIANICA* Sailer.—Fig. 20

This species was for many years confused with the more southern *N. sidae* of Fabricius and was treated under the name *Corizus sidae* in Blatchley's manual (1926). In 1961, however, Sailer pointed out the heterogeneity of *sidae* and extracted the North American taxon under the name *louisianica*. This species ranges from Texas and Florida up the Atlantic coast as far as New Jersey; it chiefly inhabits lowlands but extends sporadically westward as far as the base of the Blue Ridge. Like other members of the genus, it is specific to various plants in the family Malvaceae.

Material has been seen from the following localities: Dillwyn, Buckingham County; Chase City, Halifax County; White Stone, Lancaster County; Stuart, Patrick County, and the cities of Richmond and Norfolk. Collection data mention "seed pods of *Althea*" and "on okra." Sailer (1961) lists a number of other malvaceous plants fed upon by this species. The season of activity is a late one: all but one of the series examined were taken in September and October.

Genus *ARHYSSUS* Stal

This genus has recently been revised by Chopra (1968) who recognized 17 species in the Nearctic and Neotropical regions. The group is very close to *Niesthrea*, and the most important diagnostic character occurs in the male genital capsule: in *Niesthrea* the median lobe of the posterior edge is very large and projects upward between the claspers, in *Arhyssus* the median lobe is only a low knob. For the Virginia fauna, however, the dark rings on the femora of *Niesthrea louisianica* adequately separate that species from the two local forms of *Arhyssus*.

KEY TO SPECIES OF *ARHYSSUS* FOUND IN VIRGINIA

1. Beak short, reaching about the level of the mesocoxae; apical abdominal tergum of female acutely triangular in outline (dorsal aspect) ---------- *nigristernum*

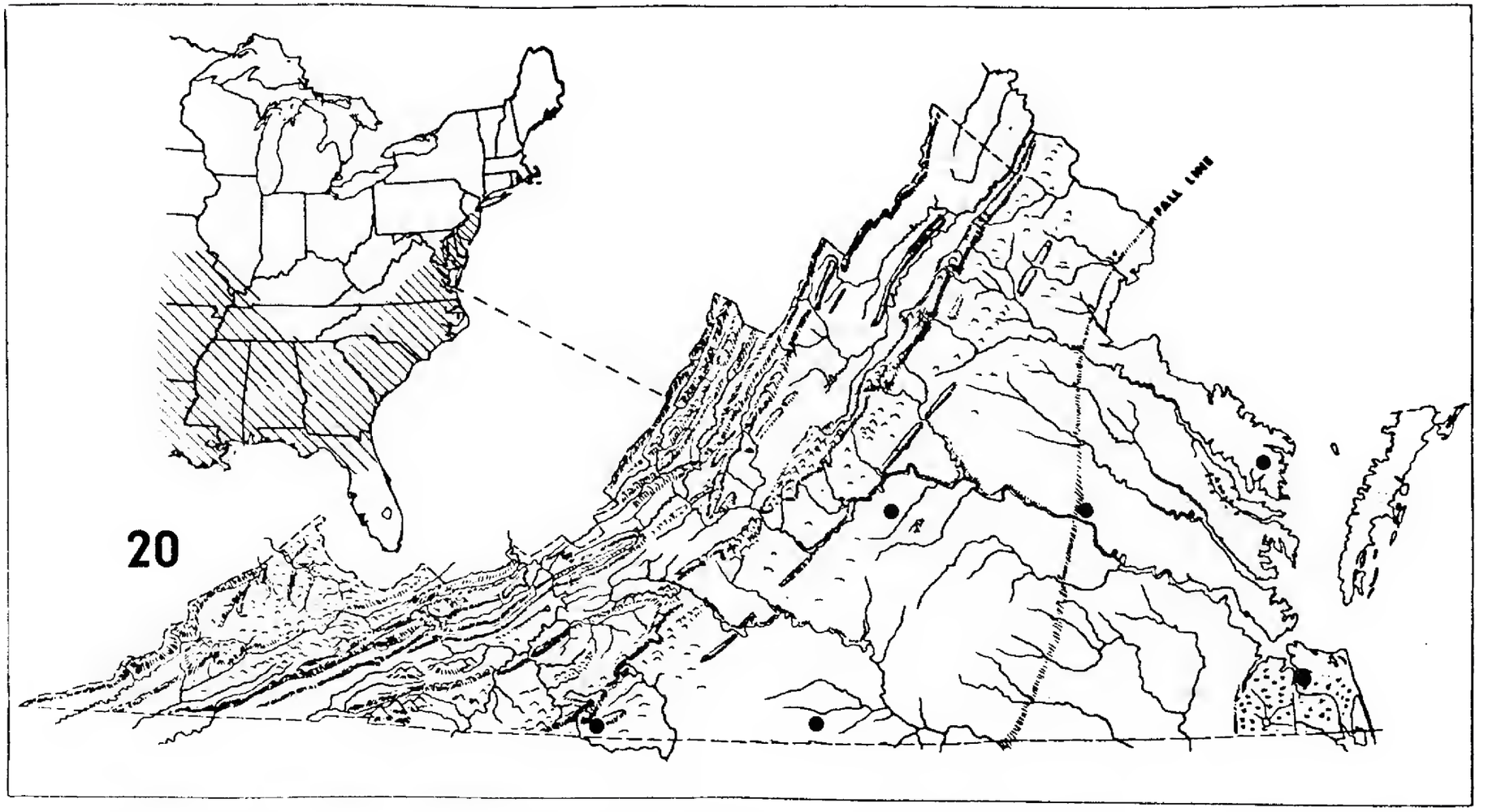

Figure 20. Distribution of *Niesthrea louisianica* in Virginia.

— Beak longer, reaching back between the metacoxae; apical abdominal tergum of female with apex broadly rounded ---------- *lateralis*

104. *ARHYSSUS LATERALIS* **(Say)**

Widespread east of the Rockies, except for southern Florida and upper New England; *lateralis* is likewise generally distributed over Virginia. Specimens have been seen from Accomac, Albemarle, Augusta, Buckingham, Fairfax, Montgomery, Nelson, Pittsylvania, and Rockingham counties and the city of Norfolk; April-August.

Some specimens are labeled as being taken on "smartweed" (presumably *Polygonum pennsylvanicum* L., the known host plant), but several are tagged "narrow dock" (perhaps *Rumex crispus?*) which is also in the family Polygonaceae. However, *lateralis* is often found by sweeping a wide variety of plants in meadows and waste places. There does not appear to be any implication of this species in damage of cultivated plants.

105. *ARHYSSUS NIGRISTERNUM* **(Signoret).**—Fig. 16

This species ranges from Quebec and Ontario south to central Florida and west as far as Oklahoma and Kansas. It does not however appear to be represented in the Atlantic Coastal Plain, as Brimley (1938) cited the species only from the Piedmont and mountains of North Carolina, and a similar pattern obtains in Virginia.

Specimens have been examined from Augusta, Buckingham, Montgomery, Roanoke, Tazewell, and Wythe counties; April-August. Only the two specimens from Dillwyn, Buckingham County (August 1, August 19, A. M. Woodside, VPI&SU) are from east of the Blue Ridge.

In earlier American literature, *nigristernum* was used for this species, but was later incorrectly replaced by *bohemanii* which persisted down to the time of Chopra's 1968 revision. Under the name *bohemanii,* this species was recorded by Torre-Bueno (1919) from the former mining town of Gossan, near Fries in Carroll County.

SUBFAMILY SERINETHINAE

This group corresponds to that treated as a tribe Leptocorini by Van Duzee (1917) and Blatchley (1926). Schaefer (1965) pointed

ut that although the generic name *Serinetha* is a junior synonym f *Leptocoris*, a subfamily name had been based upon it long before eptocorini was published, and the International Code of Zoologi- al Nomenclature (1961) does not require suppression of older names f this kind so long as the synonymy of their type genera is sub- ective. There are two recognized genera in this group; both occur n the United States, and one is a now common immigrant into Virginia.

Genus *LEPTOCORIS* Hahn

A large genus with numerous species in the Old World but only a single representative in North America.

106. *LEPTOCORIS TRIVITTATUS* (Say).—Fig. 13, **Boxelder Bug**

This is the well-known "Boxelder Bug" which is familiar to home- owners and especially to extension entomologists all over the east- ern United States. Apparently, the species was originally native to the central and western parts of this country (it was described by Say in 1825 from "Missouri") but has been making its way eastward during the present century. According to Osborn & Drake (1915) it first appeared in Ohio in 1913, and McAtee (1926) noted its arrival at Washington, D. C., during the early 1920's. Slater & Schaefer (1963) have given details on the spread of *trivittatus* into New England.

The earliest material now in the VPI&SU collection is a single specimen taken at Chester, Chesterfield County, in the eastern Pied- mont, in November 1921 by G. W. Underhill. The oldest material from the Norfolk region is dated November 3, 1936, although L. D. Anderson had been collecting Hemiptera there since 1932. The species was established in western Virginia probably in the late 1920's, for one of my vivid childhood memories is of watching processions of red and black insects (unquestionably *trivittatus*) marching up and down tree trunks in Clifton Forge, around 1932. By the time that Brimley put together his manuscript for "The Insects of North Carolina" in 1937, he could show that it then oc- curred in the Piedmont region of that state.

The VPI&SU collection has this species from about a dozen coun- ties and cities across the state, and the files of the Insect Pest Sur- vey at Blacksburg record it from no less than 60 additional cities and counties. Thus, *trivittatus* is justly to be regarded as "state-

wide," but so far, not on record from elevations above 2,000 feet. (This is to be expected, because *Acer negundo* is found chiefly along the larger streams, naturally, and along the streets of towns as an ornamental tree).

Specimens have been reported from each month of the year except January, but the time of greatest activity is in the autumn months, September-November. The species is, although widespread, spottily distributed; and in a given region, it may occur only on a few box elders out of hundreds available. On August 15, 1954, I found large numbers of nymphs, in several instars, so numerous on a boxelder at Clifton Forge as to be causing damage to foliage. Not a single adult was in evidence.

LITERATURE CITED

Allen, R. C. 1969. A revision of the genus *Leptoglossus* Guérin. Ent. Amer., 45: 35-140, figs. 1-67.

Amyot, C. J. B., and A. Serville. 1843. Histoire naturelle des insects. Hémiptères. Paris. 209, 221-231.

Balduf, W. V. 1957. The spread of *Catorhintha mendica* Stal. Proc. Ent. Soc. Washington, 59: 176-185.

Barber, H. G. 1914. New Hemiptera-Heteroptera with comments upon the distribution of certain known forms. J. New York Ent. Soc. 22: 164-171.

Blatchley, W. S. 1926. Heteroptera or true bugs of eastern North America, with especial reference to the faunas of Indiana and Florida. Nature Publishing Co., Indianapolis, 1-1116, figs. 1-215, pls. I-XII.

Brimley, C. S. 1938. The insects of North Carolina, being a list of the insects of North Carolina and their close relatives. Raleigh, N. C. Dept. Agr., 1-560.

_____. 1942. The insects of North Carolina, First Supplement. Raleigh, N. C. Dept. Agr., 1-39.

Chittenden, F. H. 1898. A new squash bug. Can. Ent. 30: 239-240.

Chopra, N. P. 1967. The higher classification of the family Rhopalidae (Hemiptera). Trans. R. Ent. Soc. London, 119: 363-399, figs. 1-75.

_____. 1968. A revision of the genus *Arhyssus* Stal (Rhopalidae: Hemiptera). Ann. Ent. Soc. Amer. 61: 629-655, figs. 1-146.

_____. 1973. A revision of the genus *Niesthrea* Spinola (Rhopalidae, Hemiptera). J. Nat. Hist. 7: 391-399, figs. 1-16.

Froeschner, R. C. 1942. Contributions to a synopsis of the Hemiptera of Missouri. Pt. II, Coreidae, Aradidae, Neididae. Amer. Midl. Nat., 27: 591-609, figs. 1-55.

Harris, H. M. 1943. Concerning the Rhopalidae (Hemiptera). Iowa State Coll. Journ. Sci. 17: 197-204.

_____. 1944a. A new *Harmostes*, with a provisional key and a checklist to the species (Hemiptera, Rhopalidae). *Ibid.*, 18: 191-197, figs. 1-14.

_____. 1944b. Concerning American Rhopalini (Hemiptera Rhopalidae). *Ibid.*, 19: 99-109, figs. 1-22.

Hoffman, R. L. 1971. Shield bugs (Hemiptera; Scutelleroidea: Scutelleridae, Corimelaenidae, Cydnidae, Pentatomidae), in "The Insects of Virginia," No. 4, Va. Polytech. Inst. & State Univ. Res. Div. Bull. 67: 1-61, figs. 1-16.

Hussey, R. F. 1953. Concerning some North American Coreidae (Hemiptera). Bull. Brooklyn Ent. Soc. 48: 29-34.

International Commission on Zoological Nomenclature. 1961. International code of zoological nomenclature. International Trust for Zoological Nomenclature, London, 1-176.

Kiritschenko, A. N. 1935. Über die Gattungen *Leptoglossus* Guer. und *Theognis* Stal (Hemiptera, Coreidae). Konowia 14: 191.

Leonard, H. D. (ed.). 1926. List of the insects and spiders of New York State. Mem. Cornell Univ. Agr. Exp. Stat. 101: 1-1121.

McAtee, W. L. 1919. Notes on Nearctic Hemiptera. Bull. Brooklyn Ent. Soc. 14: 8-16.

_____. 1926. Notes on Nearctic Hemiptera. Ent. News, 37: 13-16.

Osborn, H. and C. J. Drake. 1915. Additions and notes on the Hemiptera-Heteroptera of Ohio. Ohio Nat. 15: 501-508.

Parshley, H. M. 1923. Family Coreidae. In W. E. Britton (Ed.). The Hemiptera or sucking insects of Connecticut. (pp. 746-753). State Geol. Nat. Hist. Survey. Hartford, Conn.

Sailer, R. I. 1953. The New World distribution of *Alydus calcaratus* (L.) with comment on the disposal of the name *Coriscus* Schrank, 1796 (Hemiptera, Coreidae). Proc. Ent. Soc. Washington, 55: 315-318, figs. 1-6.

----------. 1961. The identity of *Lygaeus sidae* Fabricius, type species of the genus *Niesthrea* (Hemiptera, Coreidae). *Ibid.*, 63: 293-299, figs. 1-4.

Schaefer, C. W. 1964. The morphology and higher classification of the Coreoidea (Hemiptera, Heteroptera). Parts I & II. Ann. Ent. Soc. Amer. 57: 670-684.

----------. 1965. Same title, Part III. The families Rhopalidae, Alydidae, and Coreidae. Misc. Publ. Ent. Soc. Amer. 5(1): 1-76, figs. 1-176.

Slater, J. A., and C. W. Schaefer. 1963. *Leptocoris trivittatus* (Say) and *Coriomeris humilis* Uhl. in New England (Hemiptera: Coreidae). Bull. Brooklyn Ent. Soc. 63: 114-117.

Stal, C. 1870. Enumeratio Hemipterorum. 1 Svenska Vet. Akad. Handl. 9: 1-232.

Torre-Bueno, J. R. de la. 1919. Virginia Heteroptera. J. New York Ent. Soc. 14: 124-125.

----------, and G. P. Engelhardt. 1910. Some Heteroptera from Virginia and North Carolina. Can. Ent. 42: 147-151.

Uhler, P. R. 1863. Hemipterological Contributions, No. 2. Proc. Ent. Soc. Philadelphia, 2: 361-366.

Underhill, G. W. 1943. Two pests of legumes: *Alydus eurinus* Say, and *A. pilosulus* Herrich-Schaeffer. J. Econ. Ent. 36(2): 289-294.

Van Duzee, E. P. 1917. Catalogue of the Hemiptera of America north of Mexico, exclusive of the Aphididae, Coccidae, and Aleurodidae. Univ. California Publ. Ent. 2: i-xiv, 1-902.

Yonke, T. R., and J. T. Medler. 1969. Biology of the Coreidae in Wisconsin. Trans. Wisconsin Acad. Sci. Art. Lett. 57: 163-188.