

The Insects of Virginia: No. 4

SHIELD BUGS

(Hemiptera; Scutelleroidea: Scutelleridae, Corimelaenidae,
Cydnidae, Pentatomidae)

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ABSTRACT

HOFFMAN, RICHARD L. (Radford College, Radford, Va.). Shield Bugs (Hemiptera: Scutelleroidea: Scutelleridae, Corimelaenidae, Cydnidae, Pentatomidae), in *The Insects of Virginia*, No. 4, Va. Polyt. Inst. & State U., Res. Bull., No. 67, 61p., 1971—79 species of shield bugs are listed for Virginia on the basis of specimens personally examined and a few literature records, as well as a number of species considered as of probable occurrence in the state. Distribution within the state is given by county records for common forms and in detail for the scarcer species, along with notes on seasonal occurrence, feeding habits, and other biological data. Keys are given for all taxonomic groups, and illustrations of various structural features are provided. An introductory section treats the major distributional patterns within Virginia, and spot maps provided for representative species. Several species are recorded for the first time as members of the Virginia fauna, including three (*Galgupha loboprosthesis*, *Acantholomidea denticulata*, and *Rhytidolomia belfragei*) previously known only from central United States. *Euschistus luridus* is tentatively regarded as a species separate from *E. tristigma*; the latter represented in Virginia by two nominal subspecies, *E. t. tristigma* and *E. t. pyrrocerus*. It is suggested that *Mineus* Stal, 1867, be considered a synonym of *Perillus* Stal, 1862, with *M. strigipes* thus becoming *Perillus strigipes*, new combination. In general, the scutelleroid fauna of Virginia compares very favorably in size and diversity with that of other states which have been fairly well studied.

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Richard L. Hoffman

INTRODUCTION

The order Hemiptera contains some of the best-known, as well as economically important, of the hemimetabolous insects. Many are major agricultural pests, some are injurious to man either directly through their bites or through their role as vectors of microorganisms, while many others are highly beneficial to man's interest by being predators upon a variety of other insects whose way of life is in conflict with our own.

The true bugs have been classified by different authorities as a distinct order (called either Hemiptera, Heteroptera, or Rhynchota) or as a suborder equivalent to the Homoptera—a group which contains such forms as cicadas, leafhoppers, aphids, and coccids. But regardless of their relative standing in the hierarchy of classification, the true bugs comprise a fairly homogeneous and easily recognized category of insects distributed among 40 to 50 families.

Many of these families may be aligned into larger categories on the basis of structural similarities, and often it is convenient to treat such superfamilies, or suborders, in a collective sense. The present initial account of Virginian Hemiptera is devoted to the so-called scutelleroid or pentatomoid forms, an aggregation of species here distributed among four families. Subsequent fascicles may cover similar conglomerate units or single families, depending upon their size or availability of material, and probably no attempt will be made to follow any particular phylogenetic sequence.

In accord with the stated rationale of this series of papers on insects, primary emphasis is placed upon the currently known facts of distribution of species within Virginia. For the benefit of persons not having access to the basic manual on eastern Hemiptera (Blatchley, 1926), keys to families, genera, and species are provided; but it is nonetheless felt that the following treatment will be of greatest use and interest to entomologists (and particularly hemipterologists) curious to learn something about the geographic and seasonal occurrence of particular species within this political region. In this connection, the occasion is taken to provide additional remarks pertinent to the taxonomy and biology of the included forms.

Finally, it is to be hoped that resident amateur or professional biologists might be challenged to commence the collection and study of the Hemiptera

of their localities, as a means of augmenting both the available study material and present knowledge of distributional patterns. Such a show of interest might well provide the incentive for eventual preparation of a formal treatment of the Virginia Hemiptera, with diagnoses and illustrations, toward which the present account must be considered an initial overture.

SOURCES OF MATERIAL

The largest single collection of Virginia hemipterons is that of the Department of Entomology, Virginia Polytechnic Institute and State University (VPI), with which I have been informally associated since 1950. The VPI collection contains at present, 57 of the 79 species covered in this fascicle. Virtually as extensive, and with a number of species not therein contained, is the collection of the United States National Museum, consulted over a period of many years through the courtesy of Drs. Reece I. Sailer and Richard C. Froeschner. This source contains 65 of our 79 species of scutelleroids. Lastly, records have been obtained from two smaller, but locally useful collections: the one of Radford College, the other that housed at the Virginia Truck Experiment Station at Norfolk. This latter accumulation was built up over a long period of time by Dr. L. D. Anderson and contains many rare and unusual species, some not contained in the other collections consulted. Literature records have been utilized, unless later revisions have cast doubt upon recorded identifications. All published records are accounted in a separate category from those based upon museum material.

My personal interest in Hemiptera originated in an undergraduate entomology course taken at the University of Virginia in 1948, and gained impetus during the early 1950's because of the opportunity to work on the VPI collection. Field work of quite varied intensity has been continued to the present in many parts of Virginia, but especially in the central-western and south-western parts of the state. Nearly 200 species were obtained around Clifton Forge during the years 1950-1954, with less intensive collections being made at Grottoes, Rockingham County, in extreme southeastern Virginia and in the vicinity of Blacksburg and Radford. I have personally collected 45 of the 79 scutelleroid species covered in the following account.

ACKNOWLEDGMENTS

It is a pleasure to mention here the names of several colleagues whose cooperation and interest enhanced an already pleasant undertaking. Dr. Douglas E. Greenwood permitted access to the insect collection of the Virginia Truck Experiment Station at Norfolk (cited hereafter as VTX) which provided a number of excellent records; Dr. Reece I. Sailer determined a large number of specimens during the early phases of my collecting and made available the extensive material of the U.S. National Museum (USNM); and Dr. Richard

C. Froeschner (whose own papers on the Hemiptera of Missouri served as the initial stimulus for this one) who has most generously provided determinations, literature, miscellaneous information, and encouragement. Dr. Froeschner has likewise been so kind as to read the manuscript and save its author the embarrassment of various errors of omission and commission.

Two of my technicians at Radford College, Linda Knight and Gloria Worf, greatly accelerated completion of the project by preparing all the drawings and maps; and Miss Knight typed the final draft from my original rough copy.

TAXONOMIC ARRANGEMENT

The basic sequence of taxa adopted here is that of Blatchley's outstanding manual on eastern United States Hemiptera (1926), from which many of the keys to genera and species have been taken with little or no modification. Relatively little revision of the scutelleroid forms has subsequently been published, aside from the monograph on corimelaenids by McAtee and Malloch (1933) and that on cydnids by Froeschner (1960). Various small emendations and changes have occurred during the past four decades; and hopefully, most, if not all, of these have been incorporated—thanks to the kind help of several colleagues. As considerable disputation still attends the higher classification of scutelleroids, I here follow Blatchley's rather liberal system—with only one small departure, as discussed in a later section.

RELATIVE DIVERSITY OF VIRGINIA SCUTELLEROIDS

It is always a matter of interest to compare the extent of a local fauna with its representation in other comparable areas. Such comparisons, however, must be taken with some reservation because of the relative thoroughness, in particular, with which collecting has been carried on. A number of Eastern States have been surveyed as regards all or part of their hemipterous fauna; and by using such published data, we can derive a table which shows in a general way the approximate representation of the various scutelleroid groups.

Numerically the 79 species actually on record for Virginia falls somewhat short of a total of about 90 to be expected on the basis of known geographic distributions. But since many hemipterons are known to have wide although sporadic ranges (e.g., the recent discovery of the midwestern forms *Galgupha loboprosthesis* and *Rhytidolomia belfragei* in Virginia), it is not inconceivable that our list may go as high as 100 or more. In the following accounts any taxa known to occur within 100 miles of the boundaries of Virginia are included (without number, but marked with an asterisk, *) on the assumption that they will eventually be found here—a sort of challenge to local collectors.

<i>State</i>	<i>Scutelleridae</i>	<i>Cydnidae</i>	<i>Corimelaenidae</i>	<i>Pentatomidae</i> (incl. <i>Podopidae</i>)	<i>Total</i>
Florida (Blatchley, 1926)	9	14	5	67	95
North Carolina (Brimley, 1938)	8	10	7	54	79
Virginia (this paper)	7	11	10	51	79
New York (Leonard, 1928)	6	8	7	49	70
Missouri (Froeschner, 1941)	3	6	10	44	63
Indiana (Blatchley, 1926)	4	9	8	44	65

EXTENT OF LOCAL COLLECTING

It is a well-known platitude that, in the present state of our knowledge of insects, currently available records often reflect the distribution of collectors rather than of species. A glance at the relative intensity of collecting in Virginia as regards the scutelleroid forms covered in this fascicle might be of interest.

The part of the state most thoroughly collected is the immediate vicinity of Blacksburg—taking in Montgomery, Pulaski, Giles, and Floyd counties—which has been subjected to investigation for the past 50 years, chiefly by students and staff at VPI and, more recently, by similar groups at Radford College. At the present time, this region claims no less than 47 of the 79 scutelleroids known from Virginia.

Several generations of diligent federal entomologists have run up a total of 40 species for the adjoining counties of Arlington and Fairfax. Some of these species are unknown elsewhere in the state so far.

Other regions boasting fair samples of the scutelleroid fauna are the extreme southeast (Nansemond County and the three cities of Chesapeake, Norfolk, and Virginia Beach) with 35 species; the adjoining west Piedmont counties of Albemarle and Nelson with 36; and the vicinity of Clifton Forge (Alleghany and Bath counties) with 33. The last figure, incidentally, was run up in only three collecting seasons, indicating the relative ease with which these bugs may be obtained. No other counties or combination of adjacent counties can muster as many as 20 species, although the regions of Roanoke and Richmond come fairly close. The accompanying map (Figure 1) summarizes the foregoing data. Obviously, the extreme southwestern counties will provide the most significant contributions to our knowledge of Virginia Hemiptera (and of insects generally).

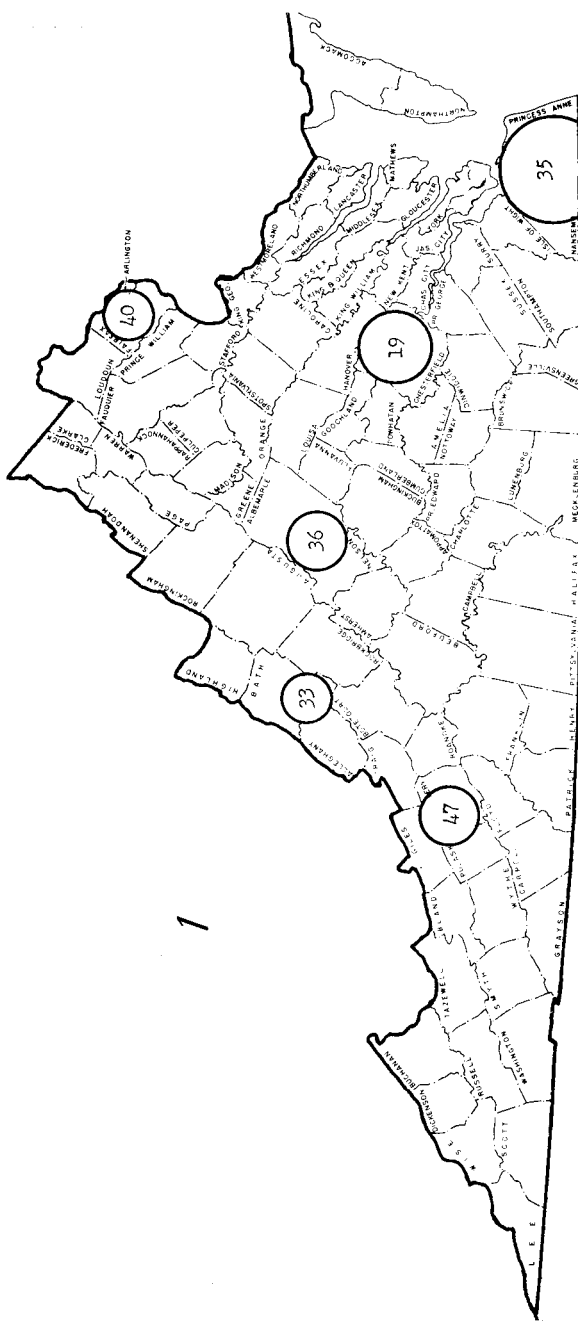


FIGURE 1. Relative intensity of collecting for scutelleroids in Virginia. Encircled numbers indicate the number of species recorded from the various regions (see text for discussion).

DISTRIBUTION OF SPECIES WITHIN THE STATE

The thoroughness with which collecting has been done for pentatomoids in Virginia, outlined in the preceding section, is extremely variable and renders generalizations about distributional patterns a little risky. Some common forms appear to be essentially statewide and are abundantly represented in the material examined. For all too many, however, local records are very scanty, and perhaps years will pass before we know much about local distributions. But a few observations may be of interest at this point.

Under the heading of "statewide" may be listed all those forms which are not only widespread on the basis of a spot map, but which likewise enjoy an extensive vertical range, such as from sea level to above 4,000 feet. In this category may be listed *Mormidea lugens*, *Acrosternum hilare*, *Banasa dimidiata*, *Corimelaena lateralis*, *C. pulicaria*, *Galgupha carinata*, and *Podisus maculiventris*, to mention a few.

A second grouping may be compiled of species which, although essentially statewide, have so far not been found at very high elevations, and whose distribution corresponds generally to the "Carolinian" biotic region of my 1969 paper. The most conspicuous members of this ensemble would be *Pangaeus bilineatus*, *Amnestus basidentatus*, *Brochymena arborea*, *B. carolinensis*, *B. quadripustulata*, *Peribalus limbolarius*, *Thyanta calceata*, *T. pallidovirens*, *Hymenarcys nervosa*, *Murgantia histrionica*, and *Stiretrus anchorago fimbriatus*. These are all widespread in eastern United States.

A number of taxa may now be distinguished on the basis of their essential boreal or austral affinities which, in Virginia, correspondingly favor one or the other of these major regions:

(a) Species of generally northern distribution which follow the Appalachians southward and which, in Virginia, appear to occur exclusively west of the Blue Ridge. These include *Homaemus aenifrons*, *Euschistus luridus*, *Podisus modestus*, *Apateticus cynicus*, *Perillus bioculatus*, and *Elasmucha lateralis*.

(b) Species of northern affinities which extend southward through Virginia and beyond, but occur on the Piedmont as well as in the mountains. Usually they are most abundant west of the Blue Ridge, and Piedmont records are at best sporadic. *Homaemus parvulus*, *Euschistus variolarius* (Figure 11), *E. politus*, *Hymenarcys aequalis*, *Dendrocoris humeralis*, *Coenus delius*, *Meneclis insertus*, and *Cosmopepla bimaculata* are good representatives.

The various subgroups with obvious austral distributional patterns are as follows:

(c) Several species which extend northward along the coast and probably occupy the entire Virginia coastal plain, with sporadic inland records for the Piedmont, such as *Stethaulax marmoratus*, *Cyrtomenus ciliatus*, *Proxys punctulatus* (Figure 10), and *Perillus strigipes* (Figure 13).

(d) Lastly, those species which are truly austral in the traditional sense of the word, largely confined to the Coastal Plain and often with close neotropical affinities; in Virginia they are known to occur only in the extreme southeast in the vicinity of Norfolk: *Camirus porosus*, *Oncozygia clavicornis*, *Galgupha denudata*, *Microporus obliquus*, *Brochymena punctata*, and *Euthyrhynchus floridanus*. Some find their northernmost limits here.

Two final categories can be recognized:

(e) Maritime species restricted to the Atlantic Coast between New Jersey and Florida. *Edessa bifida*, *E. florida*, *Rhytidolomia senilis* and *R. saucia* belong here, as does *Podisus fretus*, although this species occurs likewise at the Great Lakes region in a pattern common to many species of flowering plants.

(f) Unaccountable distributions, chiefly of forms common to the interior of North America, which have turned up at single localities in Virginia. Most of these must eventually be confirmed by additional collections in the state: *Acantholomidea denticulata*, *Galgupha loboprosthesis*, *Rhytidolomia belfragei*, and perhaps *Allopodops mississippiensis* are notable examples. The Virginia stations for these forms are removed by hundreds of miles from the "normal" range of the species.

Obviously, plenty of refinement remains to be accomplished when it is recalled that less than half of our scutelleroids are known from enough localities to warrant inclusion in the foregoing tabulation.

SUPERFAMILY SCUTELLEROIDEA

Hemiptera characterized by the occurrence of five antennomeres (except in a few species of cydnids and corimelaenids); moderate to very large sized scutellum which in some cases largely covers the entire dorsal side of abdomen; membrane of front wing usually with numerous veins; tarsi normally with three segments; head usually compact, seated closely against prothorax, ocelli present, beak with four segments. Body form generally compact and broadened, often nearly as wide as long, although elongated species occasionally occur (Fig. 2).

The bugs referable to this category of families are often collectively referred to as "pentatomoids" in allusion to the normally five-segmented antennae. The great majority of them are semiarbooreal plant-feeders, although some groups have become terrestrial or fossorial, and a few are predators upon other insects. Many of them are large and brilliantly colored, and comprise an important element in our insect fauna.

The classification of the superfamily remains in an unsettled condition, and a variety of arrangements is available. Some specialists recognize as many as five families, others reduce the number by making various combinations of the major segregates: uniting the cydnids and corimelaenids, or the podopids and pentatomids, or even all four of the preceding. Until there is some sem-

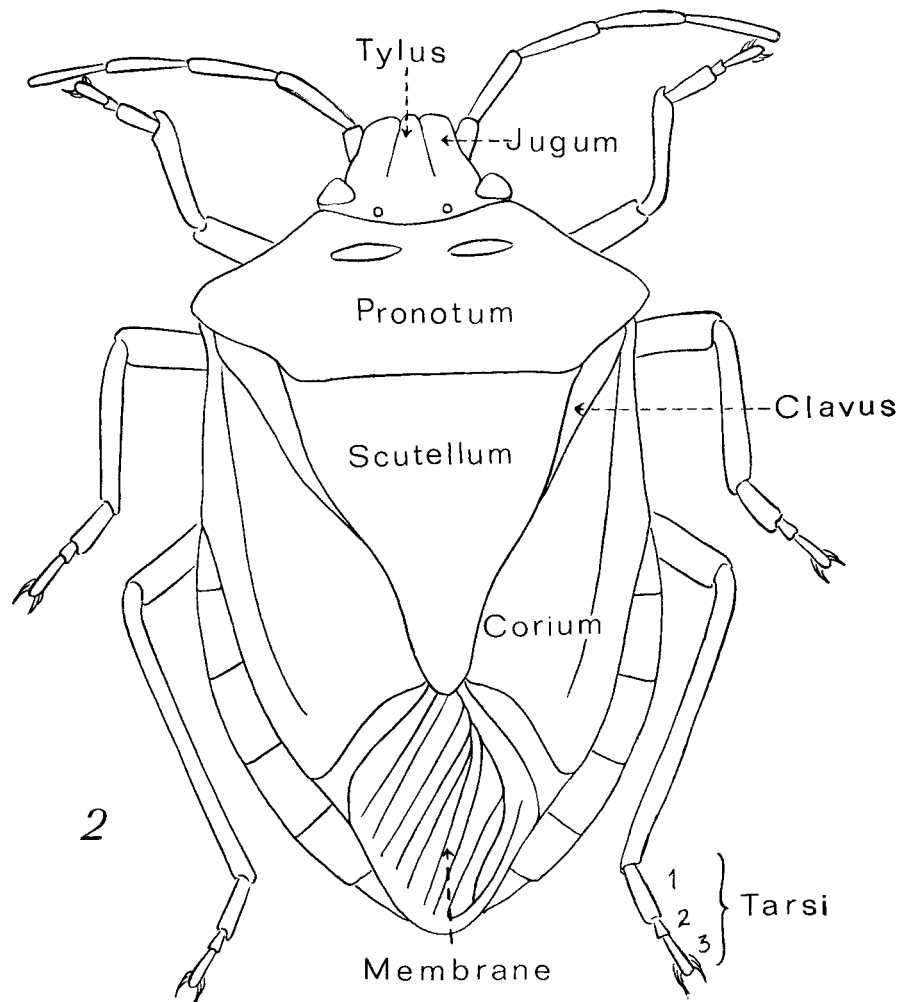


FIGURE 2. Dorsal aspect of a pentatomid bug (*Thyanta pallidovirens*), showing characters utilized in classification (see also Figures 7-9).

blence of unanimity among hemipterologists, the best course for a state list appears to be adherence to an existing and comprehensive standard—in this case the monumental “Heteroptera of True Bugs of Eastern North America” by Willis S. Blatchley (1926), still available in many libraries and still widely used by more professional hemipterologists than care to admit it.

A single departure from Blatchley’s classification is the subordination of the family Podopidae to the rank of subfamily within the Pentatomidae.

Using virtually the same characters as did Blatchley, we get the following brief key for recognition of the four Virginia families:

Key to Virginia families of Scutelleroidea

1. Scutellum very large, normally covering entire dorsal surface of abdomen; in one genus (*Eurygaster*) exposin gbase of elytra but fully as long as abdomen medially 2
- Scutellum smaller, normally subtriangular in outline and broadly exposing bases of wings, in one genus (*Stiretrus*) broader and U-shaped, but not extending beyond middle of abdomen medially 3
2. Color basically shiny black; tibiae with two or more rows of stout black spines; chiefly terrestrial and fossorial species Corimelaenidae (p. 13)
- Color variegated browns and grays, never uniformly black; tibiae without stout spines; chiefly arboreal species Scutelleridae (p. 9)
3. Tibiae with two or more rows of stout black spines; the front legs with one or more segments broadened or otherwise modified for digging; small, black or dark brown species, rarely over 7 mm in length Cydnidae (p. 19)
- Tibiae without rows of spines, the front legs not modified for digging; moderate to larger species, rarely less than 7 mm in length, often brightly colored and variegated Pentatomidae (p. 24)

FAMILY SCUTELLERIDAE

A small group of basically tropical or subtropical bugs, apparently all phytophagous. The species occurring in Virginia seem to be nowhere abundant and the commonest form is recorded only from six counties.

Key to the Virginia Genera of Scutelleridae

1. Scutellum narrow and oblong, not covering any portion of costal border of elytra *Eurygaster* (p. 13)
- Scutellum broadly oval, covering at least the apical third of costal border of elytra 2
2. Pronotum with a distinct submedian transverse groove 3
- Pronotum without such a groove 4
3. Side margins of head and pronotum entire, smooth *Camirus* (p. 12)

- Side margins of head and pronotum finely and irregularly denticulate *Acantholomidea* (p. 12)
- 4. Osteolar opening extended dorsally on a broad flattened ridge 5
- Osteolar opening not prolonged or extended dorsally 6
- 5. Second joint of antennae shorter than third; dorsal extension of osteolar opening flattened against metapleural surface
..... *Homaemus* (p. 12)
- Second joint of antennae equal to or longer than third; osteolar canal distinctly elevated above level of metapleuron....*Stethaulax* (p. 10)
- 6. Head longer than broad, rounded in front; length more than 12 mm *Tetyra* (p. 10)
- Head smaller, triangular; length less than 10 mm * *Diolcus* p. 10)

GENUS TETYRA FABRICIUS

A group of large scutellerids of chiefly tropical affinities, one species of which is fairly widespread in eastern United States but apparently nowhere particularly abundant.

1. *Tetyra bipunctata* (Herrich-Schaeffer). A species of clearly austral distribution, extending from the vicinity of Long Island south through Florida, thence west into Mexico and northward in the Mississippi basin to Indiana. Despite the large size of *bipunctata*, it has been seen only from six Virginia counties, all in the Piedmont region (Figure 3): Albemarle, Amherst, Bedford, Fairfax, Nelson, and Pittsylvania; April-July. Blatchley (1926: 39) recorded it from Vienna, Fairfax Co., and suggested that the species is partial to pine.

*GENUS DIOLCUS MAYR

Medium-sized species similar to those of *Tetyra*; one confined to Florida and a second somewhat more widespread in the southeast, as well as others in the western part of the country.

* *Diolcus chrysorrhoeus* (Fabricius). Recorded by Brimley (1938: 60) from Cape Hatteras, N. C., and thus very likely to be discovered in extreme southeastern Virginia. According to Blatchley it is to be found in the foliage of shrubs and trees around the borders of wet hammocks, and hibernates in bunches of Spanish moss.

GENUS STETHAULAX BERGROTH

Small, and apparently scarce, species that occur in eastern United States, with a distribution ranging from New Jersey to Florida, northward to Illinois. The modification of the osteolar canal, which runs dorsally up the metapleuron as a flattened, elevated ridge, is a good recognition character. A similar ridge occurs in *Homaemus*; but is virtually flattened there onto the metapleural surface.

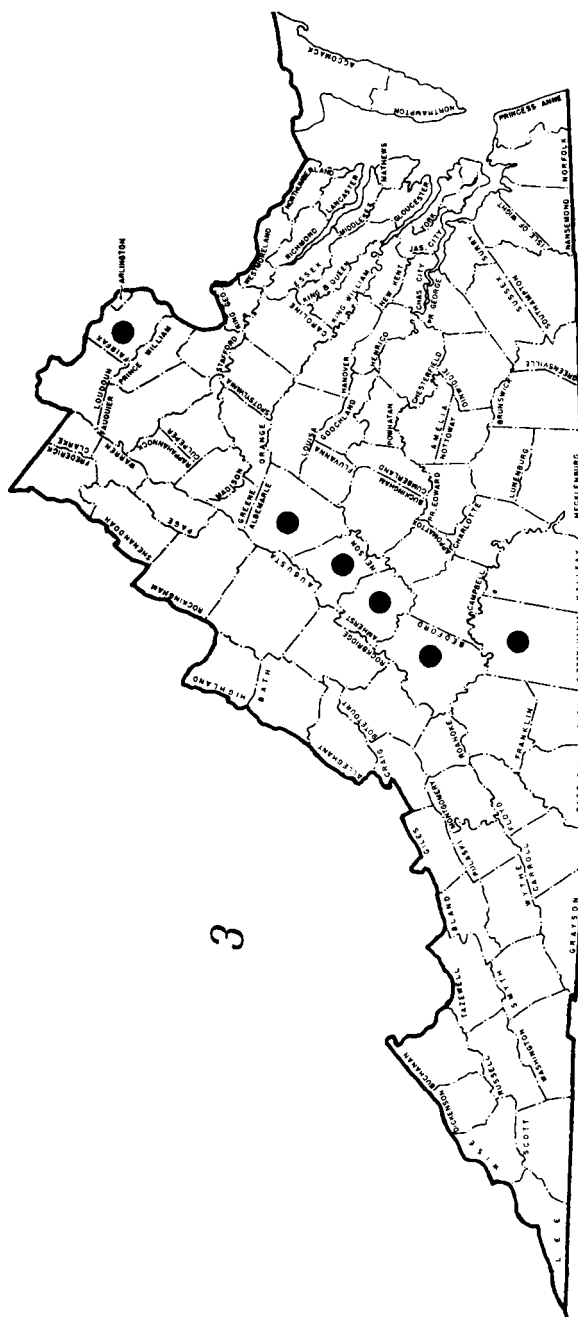


FIGURE 3. Distribution of *Tetyra bipunctata* in Virginia. All of the known records are restricted to the Piedmont physiographic province.

2. *Stethaulax marmoratus* (Say). So far seen from only two Virginia localities: Hood's Nursery, Richmond, and Midlothian, Chesterfield Co., eleven specimens in the VPI collection taken by G. W. Underhill. All are dated in July of several different years; several cases of double pinned specimens (presumably indicating mated pairs) occur. Pin data for two specimens read "On dogwood" and "On elderberry".

GENUS HOMAEMUS DALLAS

Three species of this genus occur in eastern United States, two of them in Virginia. The favored habitat appears to be low shrubs and grasses in low damp areas. The local forms can be easily distinguished by size alone, *aeneifrons* being 7-9 mm in length, *parvulus* 4-6 mm. There is also difference in coloration, as *aeneifrons* tends to be brown with indistinct darker markings; *parvulus* nearly uniform gray with definite black lines on the scutellum.

3. *Homaemus aeneifrons* (Say). A widespread, basically northern species, ranging across the continent and south into Mexico along the Rockies. In the east, Blatchley had no records from south of Maryland, but Brimley later recorded specimens from western North Carolina. In Virginia, the species is confined to the mountainous regions, specimens being seen from Alleghany, Dickenson, Giles, Montgomery, and Tazewell counties, as well as Shenandoah National Park. Collection dates range from mid-June to late September.

4. *Homaemus parvulus* (Germar). A small southern counterpart of the preceding, and regarded by Blatchley as the most common scutellerid in Florida. Northward more scarce and not previously recorded from Virginia, but our material all comes from the western part of the state instead of the south-east as might be expected. Seen from Alleghany, Fairfax, Montgomery, Nelson, and Wythe counties, May-July.

GENUS CAMIRUS STAL

A small genus with several species in western United States and Mexico, one extending eastward to Florida and Virginia along the coast.

5. *Camirus porosus* (Germar). Originally described from California, this small species was later recorded from Florida by Barber and Blatchley, and from North Carolina by Brimley (1938: 60). Its inclusion in Virginia rests upon a single record for Virginia Beach, where specimens (determined by H. G. Barber) were found in high tide drift on October 18, 1932 (Jones, 1935). It should, however, be widespread in southeastern Virginia.

GENUS ACANTHOLOMIDEA SAILER

A, so far, monotypic genus previously considered confined to central United States. Stal's original name *Acantholoma* being preoccupied, Dr. Sailer proposed the new form in 1945.

6. *Acantholomidea denticulata* (Stal). Another small scutelleroid similar to *C. porosus* and *H. parvulus*, but easily recognized by the dentate edges of the head and pronotum and white spots at base of scutellum. Previously recorded only from Indiana, Illinois, Kansas, and Missouri, the species is added to the Virginia list on the basis of two nymphs taken by me while sweeping grasses at Clifton Forge, Alleghany County, on May 4, 1950, and determined as almost certainly *denticulata* by Dr. Sailer.

GENUS EURYGASTER LAPORTE

A genus of medium-sized scutelleroids easily recognized by the narrow scutellum that does not cover the clavus and costal border of the elytra. The group is widespread in the Old World, but represented in this country by only four species.

7. *Eurygaster alternatus* (Say). Widely distributed across North America from Quebec to Vancouver, south to California and New Mexico. In the east, the southernmost records cited by Blatchley were from New Jersey and Maryland; the present locality, therefore, constitutes a new southern limit for the species: Blacksburg, Montgomery Co., two specimens in the VPI collection taken May 4, 1947 and May 18, 1948. Unfortunately no indication of habitat is given for either. Farther north, *alternatus* is noted as partial to low, swampy, or lacustrine environments.

Brimley's (1938: 60) inclusion of this species in the North Carolina list on the basis of a citation to "N.C." in the Van Duzee catalog is an error; there is no such abbreviation listed in that reference.

FAMILY CORIMELAENIDAE

(= Thyreocoridae of some authors)

A dominantly American group of small oval-shaped black bugs, best developed in the Neotropical Region but also well represented in western North America, and with a single genus in the Old World. The genera, as well as species, are separated by subtle and technical characters; but for a local region, both categories can often be distinguished by use of superficial traits.

These bugs are not well known; a few of the most common have some host plant preferences, but for most species, the biology remains uninvestigated. Some are often taken by sweeping low vegetation; others, apparently, are more terrestrial in habits and may be found under cover on the ground.

Two of the genera of eastern North America occur in Virginia. A third, *Cydnoides*, has been recorded from North Carolina, but the species involved (*C. ciliatus*) is basically southern and western in distribution and probably does not extend into our area. The Virginia species of *Galgupha* are uniformly black, those of *Corimelaena* have at least a little white or yellow pigmentation

on the costal margins of the elytra, and of course the two genera are basically distinguished by structural characters.

GENUS CORIMELAENA WHITE

(Allocoris, McAtee & Malloch)

Widespread in North and Central America, this genus of attractive little insects is represented in Virginia by two abundant species and several others of quite sporadic distribution. Most are taken by sweeping flower heads, especially species of umbelliferous plants.

Key to Virginia species of *Corimelaena*

1. Pale costal marking of elytra conspicuously broadened at base extending over onto corium (very abundant species) *pulicaria*
.... Pale costal marking essentially straight edged, not broadened at base 2
2. Apex of corium rounded or very obtusely pointed (see Fig. 5) *lateralis*
.... Apex of corium attenuate, acutely pointed 3
3. Length greater than 3.5 mm; pale costal stripe somewhat angulated near its middle *agrella*
.... Length less than 3.5 mm; costal stripe straight 4
4. Front of tylus slightly upturned, resembling a small tubercle on front of head; hind tibiae with three or four spines on posterior side *marginella*
.... Front of tylus not distinctly upturned and tuberculate; hind tibiae unspined on posterior side *harti*

8. *Corimelaena agrella* McAtee. Known so far from Maryland, Virginia, Kentucky, and Texas, this form appears to be locally common although very sporadic in its occurrence. All of the recorded Virginia material is from Great Falls and nearby localities in Fairfax County; most of it is part of the original type series. The favored biotope remains unknown.

9. *Corimelaena harti* Malloch. Originally described from Illinois, Maryland, and Virginia, this rare species has been subsequently recorded from Georgia, Mississippi, Missouri, New York, and North Carolina. Known in Virginia only from the vicinity of Great Falls, in Fairfax County. Nothing is known of its biology or habitat. In size and general appearance it is said to resemble the common *C. lateralis*.

10. *Corimelaena lateralis* (Fabricius). The status of Fabricius' *lateralis* was for many years disputed, and the alternative name *gillettii* was proposed in 1904 by Van Duzee. McAtee & Malloch (1933: 369) supported the contention that *lateralis* could not be associated with any precision with a known American species, and various other authors have likewise used the name *gil-*

lettii. In keeping with a general reversal of this sentiment (Sailer, 1945) I here re-adopt *lateralis* in the same sense as it was employed by Blatchley and earlier workers.

In general, this form ranges over all of eastern United States, from New York and North Dakota into Florida and Mexico. Specimens from Mexico were named *C. l. mexicana* by McAtee & Malloch. *C. lateralis* is common and widespread all over Virginia, from sea level up to 4,000 feet. It is often found on wild carrot and some other plants with diffuse inflorescences.

Material seen from Albemarle, Alleghany, Augusta, Bland, Brunswick, Buckingham, Chesterfield, Fairfax, Franklin, Frederick, Isle of Wight, Montgomery, Nelson, Northampton, Page, Rockingham, Tazewell, Warren, and Wythe counties, and from Norfolk and Virginia Beach cities (Fig. 4).

Both Blatchley (1926) and McAtee & Malloch (1933) have alluded to variability in the costal light stripe in this species, without any allusion to possible geographic association. All of the Virginia material has been absolutely homogeneous for the straight-edged, normal stripe (Fig. 5) except for specimens from South Gap, Bland Co. (VPI 2), Burkes Garden, Tazewell County (VPI 2) and Wytheville, Wythe County (VPI 1), in which there is a notable constriction at midlength (Figure 6). Further collections in the higher regions of southwest Virginia and adjacent West Virginia and North Carolina will be of interest to establish whether or not there is a definite correlation between stripe variation and physiography in the central Appalachians. The exceptional material just mentioned is from the area of my "Teaysian" biotic region (Hoffman, 1969, fig. 8).

11. *Corimelaena pulicaria* (Germar). Generally distributed across North America from New England to British Columbia and Oregon, south through Florida and also into Mexico and Guatemala. Apparently abundant throughout this wide range.

In Virginia, *pulicaria* occurs from sea level to at least 4,000 feet; seen from Accomac, Albemarle, Alleghany, Augusta, Arlington, Bath, Buckingham, Fairfax, Loudon, Middlesex, Montgomery, Nansemond, Pittsylvania, Warren, and Wythe counties, and Norfolk and Virginia Beach cities.

Blatchley (1926: 69) provided information on the food plant preferences and general habitat for *pulicaria*, noting that at times it becomes sufficiently numerous to be injurious to vegetation.

GENUS GALGUPHA AMYOT & SERVILLE

A very large genus of small, dominantly black insects; the revision by McAtee & Malloch (1933) recognized about 150 species dispersed through 15 subgenera, and several additional taxa have since been described. The group is endemic to the New World and is dominantly tropical. Of the dozen or so species known from North America, eight occur in eastern United States,

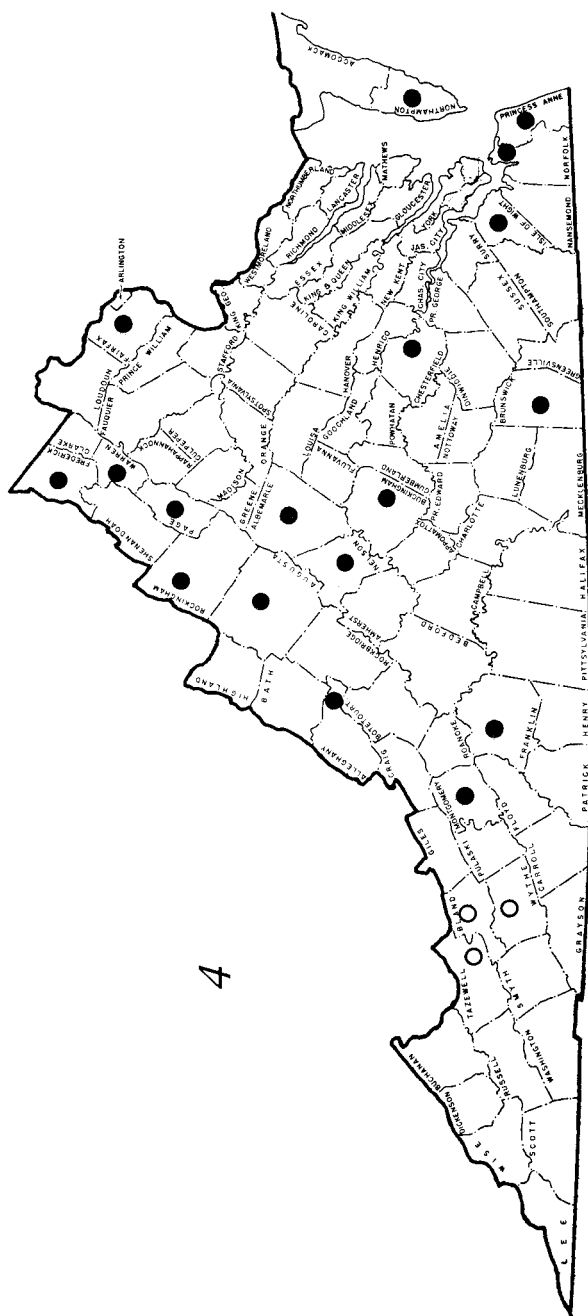


FIGURE 4. Distribution of *Gorimelaena lateralis* in Virginia. Black dots represent records for the normally colored phase; open circles, the upland phase with reduced white markings on elytral costal margins.

4



FIGURE 5, 6. Elytral bases of *Corimelaena lateralis*, dorsal aspect, showing distribution of white pigmentation. Fig. 5, normal pattern; Fig. 6, specimen from Bland County, showing reduced pattern possibly confined to the Teaysian biotic region.

and all may be expected to occur in Virginia. Although occasionally swept from low vegetation, these bugs are more frequently found on the ground and under cover; very little is yet known about their biology.

Because there are no differences between the species in size and color pattern, identification is often difficult and tedious and best made by comparison with material of known identity. I therefore omit a key and recommend that specimens known or thought to be *Galgupha* be sent to a specialist for naming.

12. *Galgupha aterrima* Malloch. Originally described from Illinois and Maryland, this species was subsequently reported from most of the eastern states by McAtee & Malloch (1933: 281), although Virginia was not included in the list. The only material I have seen from this state is a specimen in the Agricultural Experiment Station at Norfolk; it was collected at Norfolk on August 1, 1938, by L. D. Anderson and identified by H. G. Barber.

13. *Galgupha atra* Amyot & Serville. A widespread species occurring entirely across northern North America from Ontario to Washington, south to Florida and into Mexico. Brimley cited it from eight localities in North Carolina, chiefly from the Piedmont and mountains, and our Virginia material is likewise from upland places: Fairfax, Montgomery, Nelson, and Rockbridge counties. It seems to be nowhere common, the VPI and USNM collections having only six specimens from the above-mentioned counties.

14. *Galgupha carinata* McAtee & Malloch. This species is fairly common and widespread in southeastern United States, from Maryland south and west to Texas and Oklahoma. Published records suggest a lowland distribution, but *carinata* also occurs sporadically in western Virginia and has been taken as high as 3,000 feet at Burkes Garden, Virginia. Specimens have been seen from Albemarle, Alleghany, Chesterfield, Giles, Fairfax, Floyd, Montgomery, Tazewell, and Washington counties; dated from March 20 (Chester) to August 31 (Alvarado), although most were taken in midsummer. Brimley (1938) did not include the species in the North Carolina list.

Specimens taken by me near Clifton Forge (Alleghany Co.), and identified as this form by Dr. Sailer, were found feeding in some numbers on the pods of an *Oxalis* growing on an exposed roadside. I am not aware of previous records of feeding habits for *carinata*.

15. *Galgupha denudata* (Uhler). Originally described from "Louisiana," this species was not included in Blatchley's manual, although McAtee & Malloch later (1933: 284) were able to record material from most of the southeastern states as far north as the Potomac River. I have only seen one specimen from our area, taken at Norfolk by L. D. Anderson on September 10, 1938, and identified by H. G. Barber. Possibly *denudata* is confined to the coastal plain, from Maryland to Texas. According to McAtee & Malloch, it may be recognized by having the apex of the scutellum (as seen in dorsal aspect) subacutely angular instead of broadly rounded.

16. *Galgupha loboprosthesis* Sailer. A recently described species heretofore known from the Midwest; its occurrence in western Virginia thus constitutes a considerable extension of range analogous to that noted for *Rhytidolomia belfragii*. Two specimens of *loboprosthesis* have been taken at Bonsack (US NM) and Roanoke (VPI), in Roanoke County. The latter bug is dated April 19, 1938.

* *Galgupha nitiduloides* (Wolff). Reported by McAtee & Malloch (1933: 309) from a virtually transcontinental range, southward in the East as far as North Carolina. They did not mention any material from Virginia, however, nor has any become available in local collections. Possibly some or all of the North Carolina records cited by Brimley (1938: 60) refer actually to *G. ovalis*, a common eastern form not included in his list; McAtee & Malloch observed that these two taxa were often confused prior to their revision.

17. *Galgupha ovalis* Hussey. Another widespread species, ranging from Massachusetts to Montana and southward as far as Guatemala. Apparently statewide in Virginia; on record from Accomac, Alleghany, Bedford, Fairfax, Giles, Greene, Montgomery, and Roanoke counties, with a vertical distribution from sea level up to about 3,800 feet. April-August, most records for May.

FAMILY CYDNIDAE

A moderately large group of chiefly fossorial or cryptic pentatomoids, only a few of which are conspicuous enough to be noted by the general collector, and none of which are locally of any economic importance. The New World taxa have been reviewed in a recent (1960) and exemplary monograph by R. C. Froeschner.

Key to subfamilies represented in Virginia

1. Clavi of hemelytra meeting dorsally behind the short scutellum and forming commissure nearly as long as the scutellum Amnestinae (p. 19)
- Clavi of hemelytra not in contact behind the scutellum 2
2. Pronotum with a lateral submarginal row of setiferous punctures; 2nd joint of tarsus similar to joints 1 and 3 Cydninae (p. 21)
- Pronotum without a lateral submarginal row of punctures; 2nd joint of tarsi distinctly narrower than joints 1 and 3....Sehirinae (p. 24)

SUBFAMILY AMNESTINAE

Represented only by the following genus.

GENUS AMNESTUS DALLAS

Small to minute cydnids, endemic to the Western Hemisphere from Canada to Argentina, easily recognized by their size, the presence of a claval commissure behind the scutellum, and by the occurrence of small peg-like projections on the jugae. None of the four species known to occur in Virginia exceed 4

mm in total length; all of them are some shade of brown, varying from yellowish to dark reddish brown.

So far very little is known about the biology of the species. Froeschner (1960: 429) stated that both adults and nymphs are root-feeders, and that the adult stages overwinter to lay eggs in the spring. The preferred habitats appear to be moist, as most adults are captured in low wet ground or near bodies of water. Adults frequently appear at lights, and may be captured by sweeping low vegetation in moist places. They often swarm at twilight during the months of April and May, and I have sometimes taken them along with mayflies and various small Diptera, in an insect net held out of an automobile window.

In this genus the females frequently lack obvious external differentiation, and males are necessary for specific determination. This fact is true for two of our Virginia species, *A. pusillus* and *A. basidentatus*; and females of *Amnestus* having four jugal pegs on each side of the head may have to be sent to a specialist for identification.

Key to the Virginia species of *Amnestus*

- | | |
|--|---------------------|
| 1. Jugum with five marginal pegs | 2 |
| ... Jugum with four marginal pegs | 3 |
| 2. Labium (beak) long, extending between or beyond coxae or hind legs | <i>spinifrons</i> |
| ... Labium shorter, not extending beyond middle coxae | <i>pallidus</i> |
| 3. Males with ventral spine of posterior femur longer than 1/3rd of tibial length; female with medially flattened, glabrous area on last sternite | <i>pusillus</i> |
| ... Males with subapical ventral spine of posterior femur shorter than vertical height of femur; females without medially flattened glabrous area on last abdominal sternite | <i>basidentatus</i> |

18. *Amnestus basidentatus* Froeschner. This recently distinguished species ranges widely over most of eastern United States, and is by far the most common member of the genus. Prior to 1960, it had been confused with both *A. pusio* and *A. pusillus*, making most published literature records for them entirely unreliable. Fairly widespread in Virginia: Alleghany, Bedford, Montgomery, Nelson, Norfolk, and Page counties; all records for June and August.

19. *Amnestus pallidus* Zimmer. Continent-wide in distribution. Virginia records are for Augusta, Fairfax, Montgomery and Tazewell counties; April-September.

20. *Amnestus pusillus* Uhler. Virtually continent-wide in range. For Virginia, the following county records: Alleghany, Bath, Chesterfield, Fairfax, Henrico, and Nelson; May-August. Specimens taken in May by sweeping vegetation in damp areas; one August specimen at light.

21. *Amnestus spinifrons* (Say). Eastern United States, west as far as Iowa, and Arkansas. This largest local species of the genus was not recorded for Virginia in Froeschner's monograph, and available records are for Alleghany and Montgomery counties and Virginia Beach city only; April to October.

SUBFAMILY CYDNINAE

This subfamily contains the majority of the cydnid genera. Froeschner accounted twelve in his review of the New World forms as opposed to only one genus in each of the other subfamilies. These genera are distinguished primarily upon rather subtle characters of the legs and pleural sclerites which may prove difficult for a non-specialist; but for any given area, it is usually possible to contrive a generic key utilizing more obvious superficial characteristics, as I have tried to do for our forms. Most members of the subfamily Cydninae appear to be extremely secretive in habits, and our knowledge of their occurrence and distribution is very deficient. Specimens are sometimes taken at lights, more often under stones and other shelter in low moist places. Perhaps sifting and the use of Berlese-type soil sampling would be profitable collecting techniques.

Key to the Virginia genera of *Cydninae*

1. Tibiae of posterior legs curved, conspicuously compressed, the anterior and posterior surfaces not spined, the dorsal edge with stout spines, the ventral with setae; body length 7-9 mm.
..... *Cyrtomenus* (p. 23)
- ... Tibiae of posterior legs slender, nearly straight, not strongly compressed, setae uniform in size; body length usually less than 7 mm (except in *Pangaeus*) 2
2. Anterior part of osteolar peritreme lacking an enlarged and modified apical region 3
- ... Anterior part of peritreme apically modified into a broadened and distinctly differentiated, more or less polished, loop, lobe, or band 4
3. Pronotum with a deep, sharply impressed submarginal transverse line paralleling the anterior edge *Pangaeus* (p. 23)
- Pronotum lacking a transverse subapical line *Tomnotus* (p. 24)
4. Lateral margins of head with a row of small, short, stout pegs; upper surface of body with numerous long slender hairs
..... *Microporus* (p. 23)
- ... Lateral margins of head unarmed; upper side of body essentially hairless *Melanaethus* (p. 22)

GENUS MELANAETHUS UHLER

An endemic American genus of about 16 species, centered around southern United States and the West Indies, although a few forms extend south to Argentina and northwestward as far as Alaska. These are mostly small bugs, averaging 3 to 6 mm in length, and virtually nothing is recorded of their biology. By most previous authors, including Blatchley, this genus has been treated under the name *Geotomus* which, however, is properly restricted to Old World cydnids.

Key to the Virginia species of *Melanaethus*

1. Body large, the length greater than 5 mm, 4th antennal article longer than 2nd or 3rd **cavicollis*
- ... Body smaller, length less than 4.5 mm, 4th antennal article subequal to 2nd and 3rd 2
2. Head impunctate, or with at most, very small punctations *pennsylvanicus*
- ... Head punctate or rugopunctate dorsally 3
3. Punctations of pronotal disk numerous, many of them as large as those toward the sides; scutellum punctate to base *robustus*
- ... Punctations of pronotal disk sparse, much smaller than those on the sides; base of scutellum chiefly impunctate 4
4. Costa straight and subparallel on basal half, neither explanate nor recurved near base **uhleri*
- ... Costa gently convex, divergent on basal half, explanate and slightly recurved near base *subpunctatus*

**Melanaethus cavicollis* (Blatchley). Originally described from Florida, and recorded by Blatchley (1926: 81) from Alabama and North Carolina, this large species seems a likely candidate for eventual discovery in southeastern Virginia.

22. *Melanaethus pennsylvanicus* (Signoret). Widely distributed from Maryland to north Florida, west to Nebraska and Louisiana. Recorded in Virginia, so far, only from Fairfax, Loudon, and Montgomery counties, and Hampton City, suggesting, however, essentially a statewide distribution.

23. *Melanaethus robustus* Uhler. Another species with an extensive range in eastern United States, known from Pennsylvania to Florida and west to Iowa and Texas. It has been taken, so far, only in two Virginia counties: Fairfax (at Vienna and Great Falls, USNM) and Giles (between Newport and Pembroke, VPI). The specimen from the latter locality was found by the author among leaf litter at the bottom of a large sinkhole on April 21, 1956.

24. *Melanaethus subpunctatus* (Blatchley). Southeastern United States, from Maryland to Florida and west to Texas. The only Virginia record to

date is for "Trammel's Landing" on the Potomac River, county not determined, (Froeschner, 1960: 452).

* *Melanaethus uhleri* (Signoret). Southeastern United States. Having been recorded from Roane County, Tennessee, this species should certainly be expected to occur in the southwestern counties of Virginia.

GENUS MICROPORUS UHLER

Small to moderate-sized cydnids characterized by extreme reduction of the metapleural evaporatorium. The single Virginia species has a row of pegs along the front margin of the head as in *Amnestus*, but is much more broadly oval than members of that genus, its dorsal surface set with profuse long hairs, and is blackish in color instead of yellowish-brown. Our species is nearly transcontinental in range; a second is restricted to the West Coast, and a third occurs in Argentina.

25. *Microporus obliquus* Uhler. Widespread over most of western United States and into Mexico; in the east not yet known north of Virginia and Indiana. Recorded in our state so far only at Cape Henry (Virginia Beach), among the roots of *Hudsonia* (Froeschner, 1960: 404).

GENUS PANGAEUS STAL

This endemic New World genus is credited by Froeschner with 24 species distributed between two subgenera. The majority of these forms occur in the Neotropical region and southwestern United States, only one extending into the eastern part of this country.

26. *Pangaeus bilineatus* (Say). A species with very extensive distribution, ranging from Massachusetts and South Dakota southward to Florida, Arizona, southern California, and Guatemala. It is often abundant, and Froeschner was able to examine nearly 800 specimens for his revision (far more than any other cydnid species). The few collected by me have been found in loose soil beneath stones and other debris. As noted by Sailer in 1954 and confirmed by Froeschner in 1960, the name *P. uhleri* must be regarded as a synonym of *bilineatus*.

Virginia localities for *P. bilineatus* are in the counties of Albemarle, Allegheny, Frederick, Fairfax, Henrico, Montgomery, Nansemond, Roanoke, and Washington, and from Norfolk and Virginia Beach cities. April-September, but most records for May and June.

GENUS CYRTOMENUS AMYOT & SERVILLE

An American genus of large cydnids (our species to 8 mm, a tropical form to 14 mm) with eight species distributed between two subgenera. The group is basically tropical, only one species extending northward into eastern United States.

27. *Cyrtomenus ciliatus* (Palisot de Beauvois). A large, robust, yellowish-brown cydnid ranging from Staten Island south throughout Florida, west to Texas and up the Mississippi Valley as far as Illinois and Missouri. Listed by Blatchley (1926: 73) under the name *mirabilis*, which Froeschner, however, restricts to a Brazilian species. Scarce in Virginia: material seen from Nansemond and Nelson counties and Norfolk and Virginia Beach cities. July-September.

*GENUS TOMINOTUS MULSANT & REY

Fourteen known species comprise this genus, all but two of them Neotropical in range. One is fairly widespread in the southeastern United States, and will perhaps be found in Virginia. It should be easily recognized by means of characters cited in the generic key. The genus has previously gone under the name *Aethus*.

* *Tominotus communis* (Uhler). Southeastern United States and the West Indies. Having been collected as close to Virginia as Roane County, Tennessee, *communis* should be expected to occur in the southwestern region near Bristol. It was described by Blatchley (1926: 84) as *Aethus communis*.

SUBFAMILY SEHIRINAE

A small subfamily consisting of two genera, one of which is confined to the Old World. The sole American genus occurs widely in the Nearctic Region, its single northeastern species is relatively large, flattened, and agile, and not adapted for burrowing.

GENUS SEHIRUS AMYOT & SERVILLE

28. *Sehirus cinctus cinctus* (Palisot de Beauvois). Generally distributed over much of southern United States, this attractive white-edged cydnid is likewise abundant and general through Virginia, with the possible exception of the higher mountains. It is common in cultivated areas. Albemarle, Botetourt, Brunswick, Fairfax, Franklin, Giles, James City, Loudoun, Montgomery, Nelson, Pittsylvania, Pulaski, and Rockingham counties, and Norfolk City.

According to Froeschner (1960: 361) this bug overwinters as an adult, the young feed chiefly upon labiate (mint) plants, and the adults feed upon a variety of plant hosts. At Grottoes (Rockingham County) I found *cinctus* very common under flat boards in a garden; on August 9 all stages were found, from egg clusters through several nymphal instars to winged adults. Presumably, the eggs would hatch in time to permit achievement of maturity before the onset of very cold weather.

FAMILY PENTATOMIDAE

The largest family of the scutelleroid group, and in terms of local species, the third largest family of eastern Hemiptera. Blatchley included 97 penta-

tomids in his total of 1253 species, following the Miridae (467 species) and Lygaeidae (120 species). Many are of considerable economic importance, and the majority are large and colorful enough to be familiar and frequently collected objects.

In striking contrast to the cydnids, most pentatomid genera are relatively easy to distinguish once a little experience has been gained with their appearance. At the species level, some taxa have been distinguished on the basis of characters that are either subjective or variable, and the identification of species in such genera as *Euschistus* and *Podisus* may occasionally pose problems to the beginner lacking a reference collection. Potential points of difficulty are noted in the following account wherever they occur.

As noted in the introduction, a satisfactory arrangement of the genera of this family has yet to be achieved. In the interest of consistency and convenience, I largely follow the sequence of Blatchley's manual, with the following exceptions; (1) no tribes are recognized, (2) the "subfamily" Asopinae is withdrawn into the Pentatominae, (3) the "family" Podopidae is included as a subfamily, and (4) some genera are regrouped on the basis primarily of the osteolar peritreme.

Blatchley relied upon the presence or absence of a "spine" projecting from the second abdominal segment to organize two large groups of genera in his tribe Pentatomini. But in my experience, the degree of development of this process varies so greatly—not only between genera, but even within them—that its use is rendered liable to considerable doubt and uncertainty. Specimens of *Banasa* might be keyed out either way, for instance. I find that characters of the peritreme offer less difficulty and result in groups of genera that appear to be much more homogeneous on the basis of overall appearance.

In my view, some of the local genera fall into groups quite readily, others are more disjunct and difficult to reconcile. For instance, *Rhytidolomia*, *Chlorochroa*, and *Thyanta* obviously are more closely related to *Nezara*, *Acrosternum*, and *Banasa* than to the numerous genera which separate these two aggregates in Blatchley's sequence. A number of genera obviously fall into the orbit of *Euschistus* on the basis not only of coloration and auriculated peritreme, but also the form of the enlarged genital capsule of males. To a considerable extent, these suprageneric groupings are reflected by the organization of the following key to genera, although it must be emphasized that in many cases some very superficial characters have been employed to distinguish the groups, many of which features hold true only for Virginia species.

Three subfamilies may be distinguished in the Virginia fauna: one containing the majority of our genera, the other two each with only a few.

Key to the Virginia subfamilies of Pentatomidae

1. Eyes appearing pedunculated, set on a small basal lobe and, thus, slightly removed from side of head; scutellum apically broadened and covering a large part of the dorsal side of abdomen Podopinae (p. 26)
- ... Eyes not pedunculate, set against sides of head; scutellum of normal subtriangular outline and not covering majority of abdomen except in one genus (*Stiretrus*), our species of which differs from podopids in its greater size and bright variegated coloration 2
2. Tarsi 3-jointed; thoracic sterna with, at most, a small narrow median carina between 2nd and 3rd pairs of legs....Pentatominae (p. 28)
- Tarsi 2-jointed; thoracic sterna with a very prominent, compressed median crest between the legs, projecting ventrad beyond level of coxae and overlapped at caudad end by large spine of 2nd ventral segment Acanthosomatinae (p. 59)

SUBFAMILY PODOPINAE

(= Subfamily Graphosomatinae: Tribe Podopini)

The North American species of this small group have been recently revised by Barber & Sailer (1953), who regarded it as a tribe within the family Pentatomidae, following the precedent of VanDuzee (1917). As regards the subfamily name, it appears that *Podops* formed the basis of a family-group name (Podopidae, Dallas) as long ago as 1851, and should have priority over Graphosomini (Jakowleff, 1884) as the collective name of any taxon that included both *Podops* and *Graphosoma*.

According to Blatchley (1926: 53) podopids are "terrestrial and subaquatic, occurring amidst the roots of clumps of grass and beneath debris along the margins of ponds, sloughs, and streams." I have never found a specimen in Virginia.

Key to Virginia genera of Podopinae

1. Anterior margin of pronotum produced laterally behind the head into a broad, truncate, minutely denticulate lobe; jugae projecting forward of end of tylus *Oncozygia* (p. 28)
- ... Anterior margin of pronotum at most produced as a small triangular lobe; jugae not longer than tylus 2
2. Jugae slightly shorter than tylus; sides of head with a small acute tubercle in front of each eye; antennae with four articles
..... *Allopodops* (p. 28)
- Jugae equal to tylus or slightly longer, but not confluent in front

of it; sides of head without preocular tubercle; antennae with five articles *Amaurochrous* (p. 27)

GENUS AMAUROCHROUS STAL

The species of this genus were formerly included in *Podops* by various authorities including Blatchley, but important differences in the male genitalia were found and utilized in diagnosis by Barber and Sailer (1953); as now defined *Amaurochrous* contains five species, confined to North and Central America. Only one (*A. dubius*) extends south of the United States. One form has been collected in Virginia, and two others certainly occur in the eastern lowlands.

Key to the Virginia species of *Amaurochrous*

(adapted from Barber & Sailer, 1953)

1. Tylus and jugae equal in length or nearly so 2
.... Jugae somewhat longer than tylus, sometimes contiguous in front of it * *ovalis*
2. Beak long, extending beyond coxae of 3rd pair of legs; lobe of anterior corner of pronotum extending laterally beyond level of eye * *magnus*
.... Beak shorter, not extending beyond coxae of 2nd pair of legs; lobe of anterior corner of pronotum smaller, acute, not extending beyond eyes *dubius cinctipes*

29. *Amaurochrous dubius cinctipes* (Say). Widespread over eastern North America from Quebec to Minnesota, south to Texas and New Mexico. Replaced in the southeastern Coastal Plain by the nominate subspecies. Apparently statewide in Virginia, although on record only from Accomac (New Church, July 15, 1935), Fairfax, and Montgomery (Blacksburg, May 13-21) counties.

Barber & Sailer (1953) referred twice to the virtual certainty that *dubius* and *cinctipes* are merely geographic races of a single species, and I see no reason for continued recognition of the latter form at the species level.

* *Amaurochrous magnus* Barber & Sailer. Southeastern United States, from Maryland to Louisiana. According to Barber & Sailer (1953) the species reported by Van Duzee as *cinctipes* (1904: 77) from Fortress Monroe, Virginia, is doubtless *A. magnus*, but the specimens cannot be found for confirmation.

* *Amaurochrous ovalis* Barber & Sailer. Central eastern United States, from Maryland to South Carolina. The species surely occurs in eastern Virginia.

GENUS ALLOPODOPS HARRIS & JOHNSTON

A recently described and still monotypic genus, apparently the type species is excessively secretive in habits having been found at only three localities.

30. *Allopodops mississippiensis* Harris & Johnston. Known only from Mississippi, western South Carolina, and a single locality in Virginia: Falls Church, Fairfax County, one male taken by F. Andre on sedge, November 8, 1943. Additional collections are much to be desired!

GENUS ONCOZYGIA STAL

Another monotypic genus confined to southeastern United States, and nowhere collected in any abundance.

31. *Oncozygia clavicornis* Stal. Described from Texas, ranges from Brownsville in that state east to Florida and north along the coast to extreme southeastern Virginia: Fortress Monroe, in the present city of Hampton.

SUBFAMILY PENTATOMINAE

Containing the majority of our pentatomid genera, this large group has been divided into several tribes, most of which, however, are represented in Virginia by a single genus only, and it seems that no practical ends would be served by utilization here of these subordinate categories.

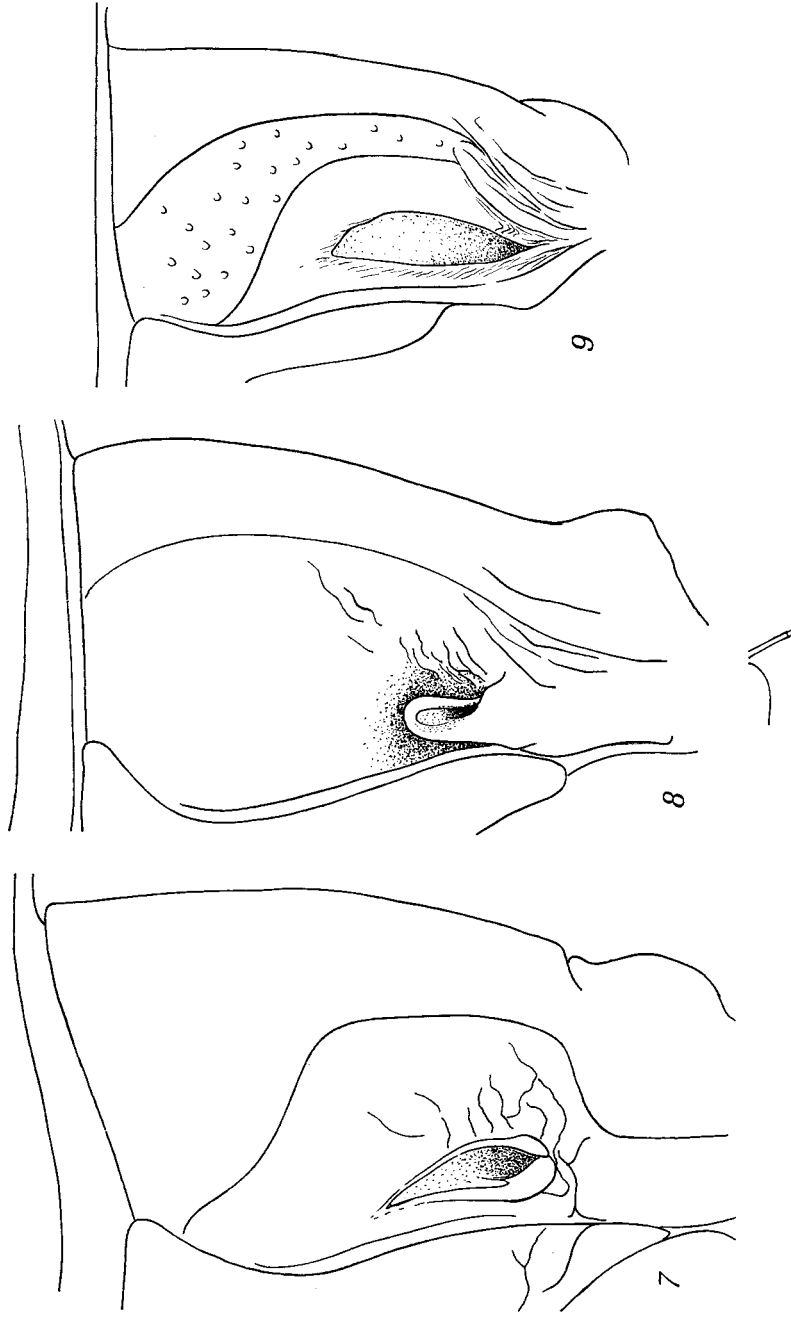
By placing somewhat more emphasis upon characters of the *osteolar peritreme*, one arrives at groupings of the genera that are different from those devised by Blatchley, and the sequence followed here is at some variance from his more traditional arrangement.

Key to Virginia genera of *Pentatominae*

1. Osteolar opening small, without obvious peritrematic modification; black and red species with strongly declivent head
..... *Murgantia* (p. 52)
- Osteolar opening conspicuous, always leading dorsally into some kind of peritrematic or supratrematic channel or groove 2
2. Osteolar peritreme auriculate, *i.e.*, in the form of a small flap-like or earlobe-like process the apex of which stands free from the surface of the metapleuron (Figure 8) 3
- Osteolar peritreme canaliculate, the opening merging dorsally into an elongated canal or groove lying flush upon the metapleural surface 12
3. Edges of jugae notched (toothed) in front of antennal insertion; sterna of thorax and to some extent also abdomen with distinct median groove; lateral edges of pronotum with prominent irregular dentations *Brochymena* (p. 32)
- Edges of jugae entire, not notched in front of antennae; sterna of thorax either flat or with (usually) a small but prominent median carina upon which the beak rests; lateral edges of pronotum smooth or at most finely crenulate 4

4.	Scutellum shorter than apices of coria	5
....	Scutellum as long as or exceeding apices of coria	10
5.	Tibia of posterior legs without evident groove along the dorsal (posterior) surface	6
....	Tibia of posterior legs with prominent groove on the dorsal surface	8
6.	Tylus much longer than jugae; color black with tip of scutellum yellow; humeri prominently spined	<i>Proxys</i> (p. 34)
....	Tylus equaling or shorter than jugae; coloration not as above	7
7.	Humeral spines of pronotum turned forward; uniformly light brown or straw-yellow insects	<i>Oebalus</i> (p. 40)
....	Humeri of pronotum rounded, without trace of spines; grayish- brown species with margins of scutellum and front edge of pro- notum yellow	<i>Mormidea</i> (p. 43)
8.	Side margins of pronotum crenulate, humeral angles subacute to spiniform	<i>Euschistus</i> (p. 34)
....	Side margins of pronotum smooth, humeral angles broadly rounded	9
9.	Lateral margins of pronotum broadly explanate, the anterior corners produced forward to level of front edge of eyes and head thus appearing recessed into pronotum; reddish-brown, distinctly flattened insects	<i>Meneclis</i> (p. 41)
....	Lateral margins of pronotum of normal form, not broadly flat- tened and the anterior corners not strongly produced forward; grayish-brown, dorsally convex insects	<i>Hymenarcys</i> (p. 40)
10.	Scutellum apically rounded, lingulate; animal broadest across mid-length of abdomen and thus strongly fusiform in outline; coloration yellowish-brown with median yellow stripe on head	<i>Coenus</i> (p. 41)
....	Scutellum generally more triangular apically; animal broadest across base of pronotum; coloration otherwise	11
11.	Short, broadly oval black insects with base of pronotum and two apical spots on scutellum bright red; head declivent but not especially modified from the normal appearance.....	<i>Cosmopepla</i> (p. 42)
....	Elongate, slender light brown insects, with yellow spot on each basal corner of scutellum; head distinctly broadened, apically truncate, medially depressed or concave	<i>Neottiglossa</i> (p. 41)
12.	Osteolar canal narrow, forming a sharply defined ridge (Fig- ure 7)	13
....	Osteolar canal broad, flat, and polished (Figure 9)	22
13.	Jugae longer than tylus, broadly confluent in front of it	14
....	Jugae equaling or shorter than tylus	15
14.	Grayish-brown bugs with sides of pronotum and apex of scutel- lum yellow, humeral angles of pronotum not prominent.....	<i>Peribalus</i> (p. 43)

- Reddish-brown bugs without lighter markings; humeral angles prominently projecting and a little darker than central part of pronotum *Dendrocoris* (p. 51)
15. Entire surface of body, except membrane of wings, set with long prominent hairs, color brownish *Trichopepla* (p. 43)
- Surface of body glabrous except for a few sporadic hairs on ventral side of abdomen; color green, olive, or some similar shade 16
16. Peritrematic ridge short, extending dorsally to about middle of metapleural plate 17
- Peritrematic ridge long, extending quite or nearly to upper front edge of the metapleuron 20
17. Metasternum with a prominent, broad, elevated median crest, notched at each end, accommodating the apices of the beak and of the spine from 2nd ventral segment *Edessa* (p. 45)
- Metasternum normal, without an elevated structure as described above (although a very rudimentary homolog appears in *Thyanta*) 18
18. 2nd and 3rd joints of beak subequal in length *Rhytidolomia* (p. 46)
- .. 2nd joint of beak much longer than 3rd 19
19. Broadly oval bugs scarcely wider across humeri than middle of abdomen; sides of pronotum and hemelytral base broadly orange *Chlorochroa* (p. 47)
- ... Subtriangular bugs distinctly widest across humeri and tapering evenly to end of abdomen; sides of pronotum at most with a thin pale line *Nezara* (p. 47)
20. Dorsal or posterior side of hind tibiae convex, polished.....*Banasa* (p. 48)
- Dorsal (posterior) side of hind tibiae flattened and with distinct longitudinal groove 21
21. Body green with entire margins of head, pronotum, abdomen, and base of corium polished, lemon-yellow *Acrosternum* (p. 47)
- ... Body dull green or brownish, not extensively margined with yellow as above, at most with reddish or black pronotal margins *Thyanta* (p. 44)
22. Body prominently convex, scutellum long, broadly oval, strong resemblance to a species of Scutelleriidae *Stiretrus* (p. 52)
- ... Body variable but more generally pentatomoid in facies, the scutellum triangular and not concealing much of elytral bases 23
23. Large (more than 15 mm) brownish-black insect with bases of legs, three oval spots on scutellum, and median pronotal stripe reddish-orange; humeri produced into long cylindrical spines *Euthyrhynchus* (p. 58)
- Smaller (generally less than 15 mm) forms with different coloration and humeral spines, if present, acute or acicular 24



FIGURES 7-9. Metapleura of three species of Pentatomidae showing variations in form of the osteolar peritreme utilized in generic grouping. Fig. 7, canaliculate type (short phase) with elevated and sharply defined edges. Fig. 8, auriculate type with upper edge standing free from surface of pleuron. Fig. 9, canaliculate type with broad and polished surface, no well-defined edges. Fig. 7 from *Chlorochroa uhleri*, Fig. 8 from *Euschistus variolarius*, Fig. 9 from *Podisus modestus*.

24. Humeri rounded; colorful black and red species *Perillus* (p. 53)
 Humeri acute to spiniform, coloration yellowish to reddish-brown 25
25. Large species, up to 15 mm in length, jugae slightly longer than
 tylus, lateral edges of pronotum tuberculate, concolorous with
 dorsum, abdomen nearly as wide as base of pronotum. *Apateticus* (p. 55)
 Smaller sized bugs, less than 12 mm long; jugae equaling tylus
 only; lateral edges of pronotum crenulate-denticulate, shiny
 white and sharply contrasting with dorsum; abdomen tapering
 evenly backward from base of pronotum *Podisus*. (p. 55)

GENUS BROCHYMENA AMYOT & SEVILLE

An endemic American genus of more than a dozen species, its nearest relatives occurring in the Old World. These are relatively large and somewhat flattened bugs, ashy-grayish to brownish in coloration, often strongly mottled and sometimes densely punctate with black. Commonly found on the trunks and foliage of trees, and prone to hibernate under bark, often in considerable numbers. Four species are recorded from Virginia, and another almost certainly occurs here.

Heretofore, the genus has been placed in a tribe Halyini, but the group characters employed do not appear to me to oppose *Brochymena* in a category against a wide variety of other pentatomoid genera that differ equally as much among themselves.

Key to Virginia species of *Brochymena*

1. Humeral projection of pronotum broad, distally truncate, provided with several prominent teeth; basal half of scutellum transversely elevated *arborea*
 Humeral angles rounded or subtriangular, never truncate; basal half of scutellum not distinctly elevated 2
 2. Jugae longer than tylus; 2nd antennomere shorter than 3rd
 *quadripustulata*
 Jugae equalling or shorter than tylus; 2nd antennomere variable 3
 3. Front half of pronotum with two conspicuous, elevated, ivory-white smooth areas, and a similar but smaller white spot on each basal angle of scutellum; side margins of hind lobe of pronotum smooth * *myops*
 Front lobe of pronotum and base of scutellum without smooth elevated white spots; side margins of hind lobe dentate 4
 4. Dorsal surface, including elytra with numerous small elevated white tubercles; legs yellowish, with brown spots *punctata*
 Dorsal surface dark, lacking elevated white tubercles; legs dark, the femora each with a broad yellow band at midlength *carolinensis*
32. *Brochymena arborea* (Say). Widespread in eastern United States but never as abundant as *B. quadripustulata*, this species appears to be statewide

in Virginia, although records are lacking for higher elevations. The only specimens taken by me were beaten from alders in September and found under bark in early December. Albemarle, Alleghany, Carroll, Fairfax, Montgomery, Nelson, Roanoke, Rockbridge, and Rockingham counties, and Hampton and Virginia Beach cities. Collection dates range from March to December, the majority from April to July.

33. *Brochymena carolinensis* (Westwood). Apparently this is a species of lowland affinities, ranging from New England south throughout Florida, and not, as Blatchley remarks, recorded from west of the Alleghanies. Not common in Virginia, and seen from only a few localities: Fairfax, Montgomery, Nelson, and Smyth counties and Virginia Beach City. The VPI collection has only one specimen from the Blacksburg area (taken November 14, 1966) in contrast to dozens of *quadripustulata*.

Blatchley's key (1926: 96) does not work well since both of the VPI specimens come out to *quadripustulata* on the basis of jugal and antennal characters. The prominently enlarged and elevated humeral angles and conspicuous yellow bands of the tibiae provide much better diagnostic features for *carolinensis*, as suggested in the foregoing key to species.

34. *Brochymena punctata* Van Duzee. A rare species confined to southeastern United States, with a single Indiana record cited by Blatchley. Apparently nowhere common, the first records given by Van Duzee (1909) for Georgia and Virginia (without precise locality), and subsequently recorded by Brimley for Southern Pines, N. C. The National Museum collection has a single specimen from Norfolk City.

* *Brochymena myops* Stal. Ranging from North Carolina south and west to Mexico, this large species was found by C. S. Brimley (quoted by Blatchley, 1926: 100) to be "rather common" at Raleigh, N. C., and it seems a likely candidate for eventual addition to the Virginia fauna. It might be expected in the area between Danville and Emporia, in pine woods.

35. *Brochymena quadripustulata* (Fabricius). The most widespread and abundant North American species of the genus, this well-known arboreal bug occurs over most of the continent except for the northwestern states. Often found beneath loose bark, as well as crawling over the branches and foliage of various trees, frequent in orchards. The species has been implicated in occasional damage to young twigs of apple, and also recorded as a predator upon other insects, but no detailed studies of its biology appear to have been published.

Virginia records represent all regions of the state except, so far, for the higher mountains: Accomac, Albemarle, Alleghany, Augusta, Bedford, Fairfax, Hanover, Henrico, Giles, Greenville, Isle of Wight, James City, Loudoun, Montgomery, Nelson, Patrick, Pulaski, Prince Edward, Rockingham, Roanoke and Southampton counties, and Hampton and Norfolk cities. February-November.

Specimens from southeastern Virginia tend to have the spots on the outer angles of the scutellum more distinct and a brighter orange color than those from farther north and west.

GENUS PROXYS SPINOLA

A small genus of several species endemic to tropical and subtropical America, one species of which invades southern United States in lowland areas.

36. *Proxys punctulatus* (Palisot de Beauvois). Recorded by Blatchley from North Carolina south through Florida, west to Mexico and the Mississippi Valley, a sort of "Lower Austral" classic distribution pattern. The species is apparently not rare in eastern Virginia, nine specimens having been examined from Richmond, Henrico Co., Holland, Nansemond Co.; "Dismal Swamp" in Chesapeake city; and Norfolk city. Seasonal occurrence of these specimens by month: February 1, June 2, July 3, August 2, September 1.

By virtue of its deep black coloration with yellow legs and scutellar apex, and prominently spined humeral angles, *P. punctulatus* is one of our most striking and easily recognized pentatomids.

GENUS EUSCHISTUS DALLAS

Euschistus is not only one of the largest New World genera of pentatomids, but in many parts of the range, one or more of its species may be the commonest and most familiar local member of the family. The genus is nonetheless still far from adequately known, and even in eastern United States the status of several taxa remains uncertain. Two species, *servus* and *tristigmus*, are represented in Virginia by two more or less allopatric races, although in both instances the region of overlap and intergradation of characters is extremely broad; the average worker may wish to disregard subspecific categories. Occasional hybridization may occur at least between *E. servus* and *E. variolarius*, producing offspring which may be difficult to identify properly.

Six species have been taken so far in Virginia, and the presence here of a seventh seems virtually assured.

Key to the Virginia species of *Euschistus*

1. Spines of humeral angles of pronotum directed upward and forward; membrane of hemelytra with oblong black dashes between the veins * *crassus*
- Spines of humeral angles, if present, directed more or less straight outwardly; membrane without black dashes between the veins 2
2. Ventral (abdominal) segments with a distinct black dot at each anterior-lateral angle 3
- Abdominal segments lacking black dots on the anterior-lateral angles 6
3. Middle of abdomen with a row of 1 to 5 black spots 4
- ... Middle of abdomen without a row of black spots 5

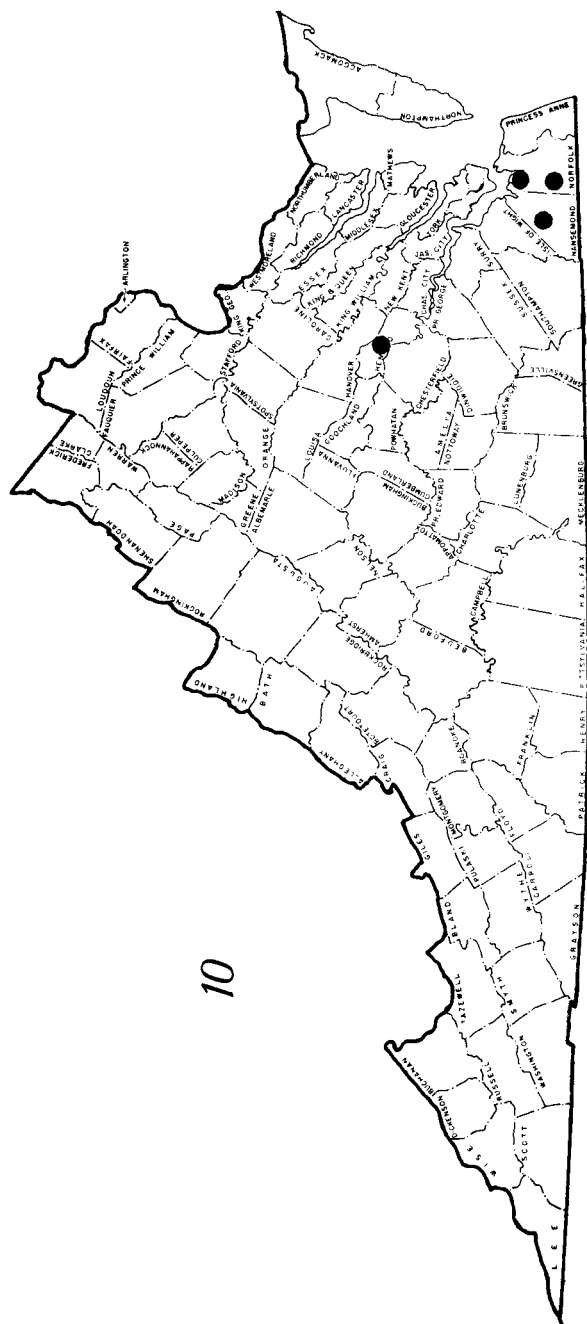


FIGURE 10. Distribution of *Proxys punctulatus* in Virginia. The species is doubtlessly generally distributed in the Coastal Plain.

4. Humeral angles of pronotum broadly rounded; distal two articles of antennae piceous to black *luridus*
 Humeral angles subacute to spiniform; distal articles of antennae brown, concolorous with the others *tristigmus*
5. Side margins of pronotum whitish, bordered within by a row of black punctures; small bugs, size less than 10 mm *politus*
 Side margins of pronotum not as above; body length much greater, 12-15 mm *servus*
6. Pronotum with a distinct light smooth transverse line between the humeral angles; sides of thorax with small black spots; spiracular openings dark in color; genital capsule of male without a median black spot *ictericus*
 Pronotum without a distinct transverse light line; sides of thorax unspotted; spiracles concolorous with abdomen; genital capsule of male with a median black spot *variolarius*

* *Euschistus crassus* Dallas. This species, confined to the southeastern States, is recorded by Brimley (1938: 62) from Raleigh, N. C., and is therefore quite likely to be found in the southcentral part of Virginia near Danville and east.

37. *Euschistus ictericus* (Linnaeus). A very widespread species in eastern North America but of sporadic occurrence; said by Blatchley to be common in Florida and northern Indiana, but other records reflect local scarcity. Froeschner (1941: 138) examined only four Missouri specimens and Virginia material has been seen only from Dyke in Fairfax County and from Woodbridge and Quantico in Prince William County (all USNM). Brimley (1938: 62) cites chiefly Coastal Plain localities for North Carolina, with the exception of Swannanoa in the Blue Ridge. Possibly the preferred habitat precludes frequent captures. Apparently *ictericus* occurs chiefly on grasses, sedges, and other low vegetation in the immediate vicinity of water, a sort of niche not often searched by the general collector. It should be widespread in eastern Virginia during the summer months.

39. *Euschistus variolarius* (Palisot de Beauvois). A common species in northeastern United States, and recorded from as far west as Idaho and British Columbia. To the south it becomes progressively confined to higher elevations, and Brimley stated that in North Carolina it occurred only in the "mountains, north of Asheville". This pattern is clearly reflected by the Virginia localities (see Fig. 11) in the following counties: Albemarle, Alleghany, Augusta, Culpeper, Fairfax, Floyd, Frederick, Highland, Loudoun, Montgomery, Nelson, Roanoke, Rockbridge, and Rockingham.

The reports of this species in Florida obviously require confirmation in view of the zoogeographic improbability involved.

39. *Euschistus servus* (Say). The most abundant and widespread pentatomid in Virginia, and over much of eastern United States as well, *E. servus*

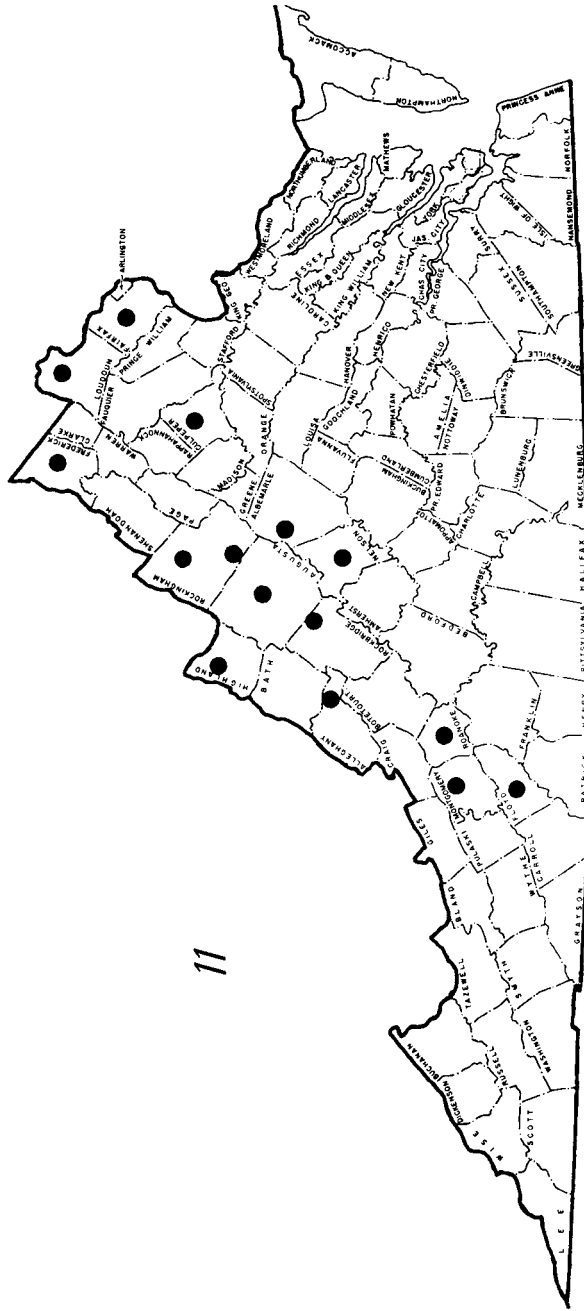


FIGURE 11. Distribution of *Eschistus variolarius* in Virginia, showing a range of a northern form becoming progressively more restricted to the mountains in going southward.

is *the* bug to which the name "stink-bug" is commonly applied.

Earlier authors recognized two separate species within the framework of what is here called *servus*. Say's name was applied to a more southern form with pale antennae and jugae not exceeding the tylus in length. A more northern taxon with apically darkened antennae and much longer jugae was designated by the name *euschistoides* of Vollenhoven. Although these two forms were admitted by Blatchley as full species, he nonetheless expressed the opinion that they no doubt were really only geographic races of a single species, and this idea has gradually found general acceptance.

In Virginia, *servus* has been examined from the following counties: Albemarle, Alleghany, Augusta, Brunswick, Buckingham, Botetourt, Chesterfield, Culpeper, Fairfax, Frederick, Henrico, Isle of Wight, Loudoun, Montgomery, Nansemond, Nelson, Patrick, Rappahannock, and Rockingham, as well as the cities of Norfolk and Virginia Beach.

The subspecific status of the Virginia material is not entirely clear-cut. If resort is made to the two characters of jugal length and antennal color, it is possible to sort our specimens out into both taxa as well as two categories of intermediates. Thus *euschistoides*-like specimens occur over much of the state, as well as various grades of intermediates. It seems best to deal with the matter on the basis of population structure wherever local series are large enough to permit such treatment. In the extreme southeastern region, all of 17 specimens examined are referable to *servus* on both of the mentioned characters; occasional such specimens occur elsewhere in the state but never make up a significant part of the population. Over most of Virginia, the dominant form of *servus* is some kind of intergrade; at no locality so far have I found anything like a population completely dominated by *euschistoides*-like individuals. The following tabulation will give an idea of the situation:

<i>Locality</i>	<i>Number</i>	<i>Per cent</i> <i>Servus</i>	<i>Per cent</i> <i>Intermediate</i>	<i>Per cent</i> <i>Euschistoides</i>
Nansemond, Chesapeake, Virginia Beach	17	100	0	0
Blacksburg and vicinity	41	2	59	39
Upper Shenandoah Valley	29	7	34	59

Since by most criteria subspecific denomination is reserved for populations in which more than 75% of the individuals conform to a particular set of characters, it seems likely that we should delimit the Virginia distribution of *servus* with the statement that the nominate subspecies, *E. s. servus* (Say), occurs only in the Norfolk region, and that the remainder of the state is, so far as known, occupied by an intermediate population, tending in the western counties towards *E. s. euschistoides* (Vollenhoven). This would agree generally with the statement of Sailer (1954: 380) that the two subspecies inter-

grade through a long belt from Maryland to Kansas. In this respect, it would be very interesting to have large series from the higher elevations of southwestern Virginia to see if the percentage of euschistoides-like individuals might show local dominance of the northern subspecies. But none of the available material has come from high elevations within the state.

E. servus is especially abundant in areas disturbed by man: orchards, gardens, and other kinds of cultivations.

40. *Euschistus politus* Uhler. A diminutive and easily recognized member of the genus, with obvious boreal distribution. Blatchley (1926: 134) had no records south of Maryland, but Brimley later (1938: 62) cited Raleigh and Waynesville as two North Carolina stations. The former is in the Piedmont, the latter in the Blue Ridge. Available Virginia records are in line with this pattern, in that only two lie east of the Blue Ridge. Alleghany, Augusta, Dinwiddie, Fairfax, Montgomery, Nelson, Page, and Rockingham counties. May-August.

41. *Euschistus tristigmus* (Say). Widespread in North America, this form is geographically variable and has in the past been divided into three subspecies, each of which was said to coincide with one of the "Life Zones" as defined by C. H. Merriam and his associates. The status of these nominal forms in Virginia is not clear-cut and, in fact, strongly parallels the situation noted for *E. servus*.

Disregarding subspecies categories, we have records for *tristigmus* from Albemarle, Alleghany, Augusta, Fairfax, Giles, Henrico, Isle of Wight, Montgomery, Nansemond, Nelson, Page, Prince William, Roanoke, Rockingham, Wise, and Wythe counties, and Norfolk City. Most records are for July and August.

Specimens with spinose humeral angles and a more southern distribution can be distinguished as a subspecies *pyrrhocerus* Herrich-Schaeffer. Such bugs may be found virtually over the entire state, except the higher mountains, and often occur together with the nominate subspecies. In general, however, only in the extreme southeast does it occur exclusively, as no specimens referable to "typical" *tristigmus* have been seen from farther east than Smithfield and Richmond. In the Shenandoah Valley, Augusta and Rockingham counties, 9 of 17 specimens could be called *tristigmus*, the other 8 *pyrrhocerus*; at Blacksburg, 6 and 2 respectively. The *pyrrhocerus* form occurs in the western counties of Alleghany and Giles; unfortunately there is no material of the species from further in the southwestern part of the state aside single specimens (both of them "*tristigmus*") from Wythe and Wise counties.

As in the case of *E. servus*, perhaps the best solution for the present is to limit the Virginia range of *E. t. pyrrhocerus* to the southeastern Coastal Plain, and regard the remainder of the state, except possibly for the southwestern part, to be occupied by a population genetically intermediate between *pyrrho-*

cerus and *tristigmus*. More large series from numerous localities will be required for a more precise delimitation.

Apparently *E. tristigmus* is of no great economic significance. Blatchley cites information on preferred host plants and local abundance. It is of some interest to record the observation that during the first part of the 1950 decade, on or near the first of April for several consecutive years, I found a pair of *tristigmus* in copula among the flowers of a Forsythia at my home at Clifton Forge. Oviposition was never observed, nor young stages, on this shrub, nor have I ever found the species subsequently mating on Forsythia or feeding upon it.

42. *Euschistus luridus* (Dallas). It is with some diffidence that I venture to follow the precedence of Malloch (1919) in assigning species status to this taxon. By Blatchley and later workers it has been regarded as a northern subspecies of *tristigmus*, but the occurrence of three subspecies at a given locality (as in this case at Blacksburg) seems so improbable, even granting the possibility of triple intergradation, that I prefer the present course. The combination of dark terminal antennomeres and broadly rounded humeral angles easily separates out the Virginia material and appears to be as satisfactory a basis for recognition as the single character of lateral abdominal black dots used to distinguish *E. variolarius* and *E. servus*. The range of *E. luridus* is northern, and in Virginia, western, material seen only from Alleghany, Bath, Giles, Grayson, Montgomery, and Rockbridge counties.

GENUS OEBALUS STAL

A small Neotropical genus with a single species in North America, the latter being one of our most widespread and ubiquitous pentatomids. *Oebalus pugnax* is easily recognized by virtue of the prominent, anteriorly directed humeral spines of the pronotum and uniform yellowish brown coloration.

Oebalus has previously been treated in various references, including Blatchley, by the unnecessary substitute name *Solubea* of Bergroth.

43. *Oebalus pugnax* (Fabricius). Ranging from Connecticut west to Colorado, and thence south into Mexico and the West Indies, this species occurs in Virginia from sea level to the higher mountain tops, usually associated with grasses and sedges in wet places. Recorded from Accomac, Alleghany, Augusta, Brunswick, Buckingham, Chesterfield, Fairfax, Grayson, Henrico, Isle of Wight, Montgomery, Nelson, and Rockingham counties, as well as Hampton, Norfolk, and Virginia Beach cities. May-October, but most records for mid-summer.

GENUS HYMENARCYS AMYOT & SERVILE

An endemic North American genus consisting of four small brownish species, two of which occur in the east. They are generally similar in form, except that *H. aequalis* is the smaller (6-8 mm in length) and with the head longer than

wide; *H. nervosa* ranges from 9-11 mm in length and its head is as wide as long.

44. *Hymenarcys aequalis* (Say). Widespread across northern United States, but not extending south of Oklahoma and North Carolina; in Virginia it is decidedly scarce and apparently confined to the western half of the state. Material seen from Augusta, Alleghany, Fairfax, Montgomery, and Nelson counties all represented by single specimens, except for Fairfax. Other references likewise mention this scarcity, Brimley having the species only from two places in North Carolina, for instance.

45. *Hymenarcys nervosa* (Say). This larger form is likewise widespread in North America but decidedly more southern. Virginia records are for the counties of Accomac, Alleghany, Amelia, Buckingham, Floyd, Montgomery, Northampton, Rockbridge, and Scott, and the city of Norfolk. April-October. Of these, only the Floyd County station could be considered as "upland".

GENUS COENUS DALLAS

A small genus (two species) confined to North America, *Coenus* is closely related to both *Meneclis* and *Hymenarcys*, but differs from both and easily recognized by the fusiform body outline, convex dorsum, and broadly rounded scutellum.

46. *Coenus delius* (Say). A widespread species extending entirely across the continent in the north and southward to Oklahoma and North Carolina. In Virginia it is clearly a western form, only a few records lying east of the Blue Ridge, and it has been found up to 5200 feet at Mount Rogers. Most specimens appear to be taken by sweeping in low grassy areas. Alleghany, Augusta, Chesterfield, Fairfax, Frederick, Giles, Grayson, Highland, Montgomery, Nelson, Page, Roanoke, and Wythe counties. March-October.

GENUS MENECLIS STAL

Another monotypic North American genus, the type species moderately large, broadly oval in shape, and distinctly flattened in appearance. The anterior corners of the pronotum project forward to front edge of eyes, the head thus appearing recessed.

47. *Meneclis insertus* (Say). Dominantly northern in range, *insertus* is found from New England west to Nebraska, and southwestward to Arizona and California. Brimley (1938: 63) records the species only for Raleigh, in the central part of North Carolina; most of the Virginia localities are west of the Blue Ridge. Fairfax, Frederick, Fauquier, Montgomery, Prince William, and Wythe counties. April-July, most VPI specimens taken in April. As noted by Blatchley, the species is rarely taken by sweeping.

GENUS NEOTTIGLOSSA KIRBY

A genus widely distributed in the Palearctic region, with four species in eastern North America. These are small curious bugs, strongly convex, with

depressed head; they are nowhere common and details of their distribution remain sketchy. Two have been found in Virginia, and a third may possibly occur here.

Key to Virginia species of *Neottiglossa*

1. Head broadly oval, not narrowed toward apex, distinctly concave in front *cavifrons*
- Head narrowed toward front, not noticeably concave 2
2. Edges of jugae prominently notched in front of eyes, each jugum with a distinct median convexity *sulcifrons*
- Edges of jugae not, or but feebly, notched in front of eyes, central part of jugae not elevated * *undata*

48. *Neottiglossa cavifrons* Stal. Described from Texas, this species was for a long time known in eastern United States only from Illinois and Indiana. But Brimley (1938: 62) listed it from several places in North Carolina and we have two Virginia records: Vienna, Fairfax Co., and New Church, Accomac Co., a single specimen from each place. Recorded dates range from April to July.

49. *Neottiglossa sulcifrons* Stal. Recorded from a southern range, New Jersey and Nebraska south to Georgia, Texas, and New Mexico, *sulcifrons* appears to be somewhat more abundant than the preceding, although Brimley cited it only from Raleigh and Southern Pines, N. C., and only one Virginia specimen has been seen: A nursery at Richmond, Henrico Co., June 15, 1929, G. W. Underhill, leg. (VPI).

* *Neottiglossa undata* (Say). Recorded from a transcontinental range between New England and the Pacific coast, the only record south of New Jersey known to Blatchley being Southern Pines, N. C. Possibly the material taken there was adventive, as Brimley later cited no further finds, and Uhler did not collect the species in Maryland.

GENUS COSMOPEPLA STAL

A small American genus, chiefly western in distribution, with only one species in the eastern United States where, however, it is a common and well-known bug.

50. *Cosmopepla bimaculata* (Thomas). Virtually continent-wide in range, except for parts of the southeast. Brimley states that it occurs from Raleigh westward in North Carolina, thus absent from the Coastal Plain, and the same distribution holds for Virginia; material seen from Albemarle, Alleghany, Augusta, Fairfax, Floyd, Frederick, Grayson, Highland, Montgomery, Nelson, Rappahannock, Rockbridge, Rockingham, and Tazewell counties; April-October. Records in the VPI Extension Pest Survey Files add the counties of Amherst, Charlotte, and Louisa; several lots noted as feeding on marigolds and snapdragons. Extends up to 5200 feet at Mount Rogers.

Blatchley (1926: 152-53) gives a long list of host plants, to which I can add the cultivated "Baby's Breath" (*Gypsophila* sp.); at Clifton Forge I once found large numbers of specimens, some mating, on May 30, 1950, on this plant.

GENUS MORMIDEA AMYOT & SERVILE

A large genus, dominantly Neotropical in distribution, represented in most of eastern North America by a single abundant species.

51. *Mormidea lugens* (Fabricius). General in North America east of the Rockies, usually abundant everywhere. This small blackish bug with white-edged scutellum is one of our easiest species to recognize. Virginia records show that it occurs from sea level at Cape Henry up to 4,000 feet in the western counties. Albemarle, Alleghany, Augusta, Caroline, Dickenson, Fairfax, Giles, Highland, Isle of Wight, Montgomery, Nansemond, Tazewell, Wythe, and York counties, and Virginia Beach city. April-September, the majority of the records for July.

GENUS TRICHOPEPLA STAL

A small genus endemic to North America, its species characterized in part by the conspicuous pilosity of the entire body upon which condition Stal based his generic name. In general habitus, our local species bears considerable resemblance to *Hymenarcys aequalis*. Another eastern species *T. atricornis* occurs across northern United States and Canada.

52. *Trichopepla semivittata* (Say). A small reddish pentatomid, unique among the Virginia species by its dense pilosity. Generally distributed east of the Rockies and apparently statewide in Virginia, although not yet recorded from the higher mountains. Specimens seen from Albemarle, Alleghany, Augusta, Brunswick, Buckingham, Chesterfield, Fairfax, Frederick, Greene, Henrico, Mecklenburg, Montgomery, Nelson, Patrick, Roanoke, and Warren counties, and Norfolk city. May-November.

The species' partiality for umbelliferous plants, already cited by Blatchley, is confirmed by three labels stating "wild carrot."

GENUS PERIBALUS MULSANT & REY

A genus of small pentatomoids of chiefly western and neotropical distribution, with a single species occurring in the northern part of eastern United States.

53. *Peribalus limbolarius* Stal. A handsome and moderately abundant little bug widely distributed across northern and western United States. Scarce in the southeast, not mentioned for Florida by Blatchley; Brimley cites six localities in the Piedmont of North Carolina. In Virginia, it is recorded from Albemarle, Alleghany, Arlington, Greenville, Henrico, Montgomery, Nansemond, Nelson counties and Norfolk City; all of the material from east of the Blue

Ridge except for two specimens taken at Blacksburg, Montgomery Co., and Clifton Forge, Alleghany Co., both of these places are relatively low and inhabited by numerous organisms with dominantly eastern ranges.

GENUS THYANTA STAL

A large, chiefly Neotropical ensemble of small to medium-sized greenish species, about a dozen being known from the United States and three from the mid-Atlantic region. The status of several of the commonest species has been confused by previous workers, including Blatchley, and the correct application of the names not achieved until fairly recently (Ruckes, 1957).

As in several other pentatomoid genera, the species of *Thyanta* occur in two seasonal "broods" (referred to as "summer" and "autumnal-vernal"), the individuals of which differ somewhat both in coloration and minor details of structure. In the case of our Virginia species, however, there is no seasonal fluctuation in the characters used for diagnosis.

One of our species, *T. pallidovirens*, is one of the commonest local pentatomids and very frequently taken from various crop plants. In the Midwest it sometimes becomes sufficiently abundant to cause considerable damage to cereals and legumes.

Key to the Virginia species of *Thyanta*

1. Inner ends of the two pronotal cicatrices without black spots; antero-lateral edges of pronotum not edged with black pigmentation *pallidovirens*
- ... Inner ends of the pronotal cicatrices each with a distinct black spot; anterolateral edges of pronotum edged above or below with a distinct black line 2
2. Apex of scutellum surpassing inner angles of the coria; apical margin of male genital segment with a minute median notch subtended by a rectangular impression; under side of pronotal margins black-edged * *custator*
- ... Apex of scutellum about equalling inner angles of coria; apical margin of male genital segment with a small erect median tubercule; under and upper side of pronotal margin black *calceata*

54. *Thyanta calceata* (Say). Widespread in eastern United States, chiefly east of the Mississippi. Apparently statewide in Virginia but much scarcer than *pallidovirens*, having been seen so far only from Albemarle, Alleghany, Chesterfield, Fairfax, Floyd, and Montgomery counties, and Virginia Beach and Norfolk cities. Already recorded from Fairfax by Blatchley (1926: 117) April-October.

* *Thyanta custator* (Fabricius). The status of this species has been established in Dr. Ruckes' recent study (1957) in which it is shown that *custator*

is confined to southeastern United States, chiefly in the coastal plain. An interesting discontinuity has been found along the mid-Atlantic coast, in that the species apparently does not occur in southeastern Virginia and the Del-Mar-Va peninsula, leaving a hiatus between North Carolina and New Jersey. On the basis of known distributional patterns in other organisms, however, it seems almost certain that *custator* will eventually be found in the Norfolk region, and local collectors should be challenged to search for it there.

55. *Thyanta pallidovirens accera* McAtee. This exceptionally widespread and abundant species (the nominate subspecies of which occurs in western United States) is apparently statewide in Virginia, although we have no records for the higher mountains. It thrives on cultivated plants, and upon occasion may become an agricultural pest of some importance. On record for Albemarle, Allegheny, Augusta, Buckingham, Chesterfield, Dinwiddie, Fairfax, Frederick, Henrico, Montgomery, Nansemond, Nelson, Patrick, Pittsylvania, Rockingham, and Wythe counties, as well as Norfolk and Virginia Beach cities. April-October.

Blatchley summarized plant associations for this species (under the name *custator*) up to 1926, and the examination of his remarks shows a preference for grasses, legumes, and composites. Label notes on the VPI specimens are confirmatory for Virginia as well:

Gramineae: buckwheat, panicum grass, "grass"

Leguminosae: lima beans, cow peas, alfalfa, soybeans

Compositae: ragweed, yarrow, chichory, goldenrod, ox-eye daisy

Of the foregoing, alfalfa appeared on the labels most frequently, perhaps reflecting sampling bias by the collectors' interest in forage crops. Other plants mentioned include elderberry, peach, evening primrose, and dogwood, but perhaps these are merely "sitting records." Of more special interest are specimens from Richmond, with the notation "reared from nymphs on arborvita seed pods" (G. W. Underhill, August 23, 1933) which suggests a quite different sort of host plant association.

GENUS EDESSA FABRICIUS

A large Neotropical genus with two species in southeastern United States, both of them occurring in Virginia. *Edessa* seems to be related to the *Banasa-Acrosternum* group of genera, with the metasternum modified into an elevated, polished ridge, notched at each end.

The two species, said by Barber to be very closely related, differ superficially in that the underside of the body is punctate in *bifida*, impunctate in *florida*. There are also differences in the shape of the metasternal ridge and form of the male hypopygium, illustrated in Barber's 1935 paper.

56. *Edessa bifida* (Say). A large oval greenish bug, said by Blatchley to range from Florida and Texas south into Brazil. Brimley (1938: 63) recorded

it from eastern North Carolina, and Virginia specimens have been seen from two localities: Phoebus in Hampton city (USNM 1, October 11, 1930) and Norfolk city (VTX 1, September 1, 1936). The files of the VPI Extension Pest Survey record the species from somewhat further north, however, at White Stone in Lancaster County (determined by R. C. Froeschner), and this seems to be the northernmost known locality.

57. *Edessa florida* Barber. Described from a single locality in Florida over three decades ago (Barber, 1935), this species is known to be abundant in eastern Maryland (Bissell, 1964) and has also been found in Tidewater Virginia. Bissell reported the occurrence of "a hundred or more" specimens on the porch screens of a house in Lottsburg (Northumberland County) in October of 1957, and a record in the VPI Pest Survey files is for Mathews (Mathews County), July 1, 1964 (Froeschner, det.). The host plant in Maryland appears to be the introduced European bindweed, *Convolvulus sepium* L.

GENUS RHYTIDOLOMIA STAL *subg. of Chloroclema*

A small genus of rather elongated greenish to olive-brown species. Two of the three eastern species are known to be halophiles, restricted to salt marsh biome, the environment of the third remains unknown because of its excessive rarity. Virginia is the only state in which all three forms have been found.

Key to the eastern species of *Rhytidolomia*

1. Smaller, body less than 11 mm in length; second joint of beak nearly as long as third and fourth combined *saucia*
- Larger, body length greater than 11 mm; second joint of beak only as long as third 2
2. Body elongated, maximum width 7-8 mm, color dark olive-brown *senilis*
- Body more oval, width 9-10 mm, color greenish-yellow with costal border of elytra blackish in part *dismalia* *bellifragei*

58. *Rhytidolomia bellifragei* Stal. *Previously recorded from midwestern United States (Illinois, Iowa, Nebraska), this species is now known from extreme southeastern Virginia. A single specimen (determined by H. G. Barber) was collected August 2, 1938 by L. D. Anderson in the Dismal Swamp (Chesapeake City), and presently in the collection of the Virginia Truck Experiment Station at Norfolk. [Whether the species is really established as a native member of the Virginia fauna must be decided by the accumulation of additional specimens.]

59. *Rhytidolomia saucia* (Say). A subarctic species confined to the east coast between New England and Florida, and therefore to be reckoned as a member of my "Littoral" biotic region. Although sometimes numerous, they seem to be rarely collected by the non-specialist, and only one Virginia specimen has been seen: Smith's Island, Northampton Co. (USNM). Brimley (1938: 61) records *saucia* only from Cape Hatteras, N. C.

(46)

* - C(R.) dismalia Thomas, 1983, ♂ holotype!

60. *Rhytidolomia senilis* (Say). Another salt marsh species previously known from Virginia northward to New England (Brimley's record for Harnett Co., N. C., may be based upon an adventitious specimen). Material seen from Smithfield, Isle of Wight Co. (G. W. Underhill, leg., VPI) and from Virginia Beach (USNM, 11 specimens). This is a relatively large, elongated pentatomid.

GENUS CHLOROCHROA STAL

A characteristically western and southwestern genus, with only one species east of the Mississippi. Closely allied to *Rhytidolomia*, differing chiefly in small details of the beak, head proportions, and coloration.

61. *Chlorochroa uhleri* Stal. Widespread across northern United States and Canada from Quebec to Alaska, south through the Rockies into Mexico. In the east, not reported south of New York by Van Duzee (1919) or Blatchley, but Brimley cites a single locality (Southern Pines) in North Carolina. The VPI collection contains four specimens only: one from Winchester, Frederick Co. (July 1936, J. M. Grayson); two from Crozet, Albemarle Co. (July 10 and September 20, 1934, G. W. Underhill); and one penultimate nymph from the Peaks of Otter, Bedford Co. (September 3, 1953, R. L. Hoffman).

* GENUS NEZARA AMYOT & SERVILLE

A group of largely tropical bugs closely related to *Acrosternum*, the latter name considered by Blatchley to be hardly more than subgenerically distinct from *Nezara*. On the basis of external features, however, I judge *N. viridula* to be generically different from *A. hilare*, and probably more nearly allied to *Chlorochroa*. One species occurs in southeastern United States and may be established in eastern Virginia.

* *Nezara viridula* (Linnaeus). A nearly cosmopolitan species in warmer parts of the world, and apparently established also in Eurasia, this form appears to be common in Florida. Van Duzee (1904: 58) included Virginia in the range of the species on the advice of P. R. Uhler, but no specimens have been seen from this state nor is it mentioned for North Carolina by Brimley.

Records in the VPI Insect Pest Survey File indicate that *N. viridula* is abundant in Nansemond, Gloucester, and Westmoreland counties (July-September), but no authority is given for the identification. The status of this species in Virginia therefore still requires confirmation.

GENUS ACROSTERNUM FIEBER

A large, widely distributed genus of generally moderate-sized, greenish bugs closely related to both *Nezara* and *Banasa*. Three species occur in the United

States, two of them endemic, the third a Neotropical form restricted to the southern tier of states.

Our two local species differ considerably in general appearance when both are compared directly: *A. hilare* is longer and relatively more slender, its greatest width about 50-55% of the length; *A. pennsylvanicum* is more broadly oval, with a width/length ratio of nearly 70%. In the former species, the spiracular openings are pale, in the latter they are narrowly edged with black and conspicuous even to the unaided eye.

62. *Acrosternum hilare* (Say). Widespread over much of North America, this common insect is one of the most abundant members of the family in Virginia and probably occurs in every county (Figure 12). Material seen from Albemarle, Alleghany, Amherst, Bedford, Buckingham, Brunswick, Chesterfield, Fairfax, Fauquier, Franklin, Halifax, Henrico, Loudoun, Montgomery, Nelson, Pittsylvania, Pulaski, Roanoke, Rockingham, Smyth, and Tazewell counties, and the cities of Chesapeake and Virginia Beach. April-September, most records for May and August.

Records in the VPI Insect Pest files further establish the species in the counties of Caroline, Charlotte, Dinwiddie, Fluvanna, Goochland, Hanover, Isle of Wight, King and Queen, Louisa, Lunenburg, Mecklenburg, Middlesex, Nansemond, Nottoway, Richmond, Russell, Scott, Spotsylvania, Sussex, and Wise.

This species is a general feeder and occurs on a wide variety of plants including truck crops and forage. Elsewhere it has been recorded breeding on various species of *Tilia* although we have no Virginia material from this host plant. Presumably it does not locally become especially troublesome to agriculturists.

63. *Acrosternum pennsylvanicum* (DeGeer). This oval green bug, although among the first American species to be scientifically described, appears to be uncommon all over its fairly wide range. There are Virginia specimens only from Fairfax, Henrico, and Loudoun counties, suggesting an eastern distribution, but Brimley (1938) cites the form from Blantyre, in the mountains of western North Carolina.

GENUS BANASA STAL

A genus of chiefly Neotropical bugs, small to moderate in size, and often greenish or yellowish-brown in coloration. Five species occur in the eastern states, and all should be found in Virginia although material has been seen of only two of them. In most characters the species of *Banasa* are quite close to those of *Acrosternum* and *Nezara*.

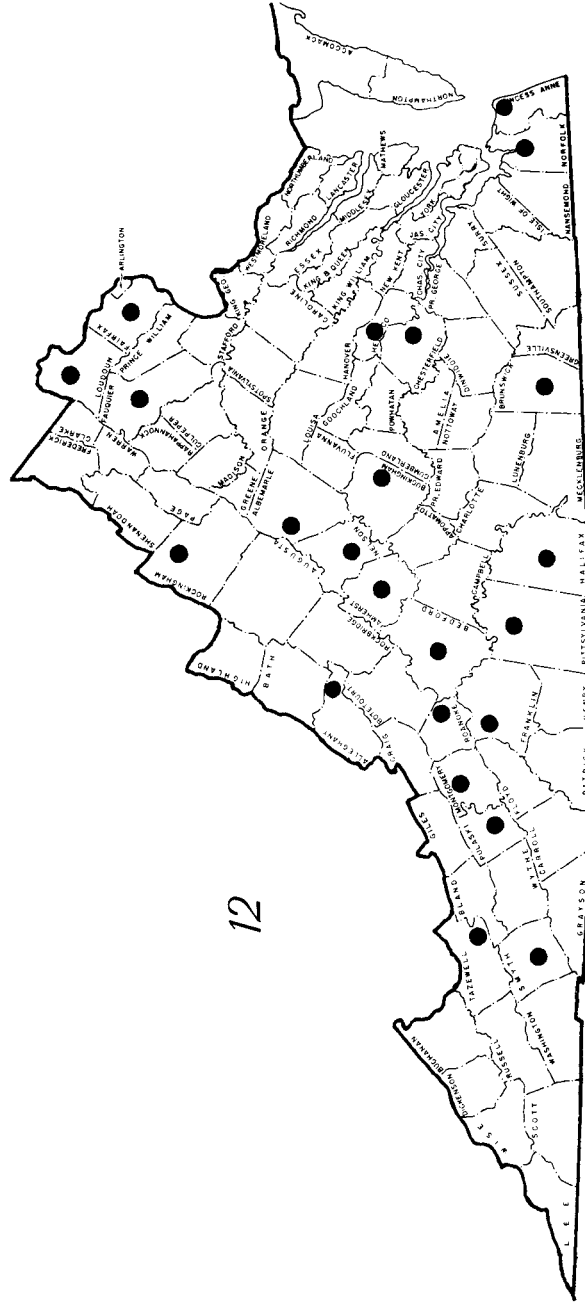


FIGURE 12. Distribution of *Acrosternum hilare* in Virginia.

Key to Virginia species of *Banasa*

1. General color above clear green, basal angles of scutellum each with a large calloused ivory-white spot *euchlora*
- Coloration otherwise, green in combination with reddish-brown or general overall shades of brown, olive, or fuscous 2
2. Extreme lateral ends of ventral abdominal segments with a small black dot, second antennomere about half the length of third 3
- Ends of ventral segments without black dot, second antennomere about $\frac{3}{4}$ the length of third 4
3. Dorsal coloration uniformly dull yellow, so thickly marked with dark punctures as to appear fuscous; side margins of pronotum and tip of scutellum pale yellow * *packardi*
- Dorsal coloration variegated, the head, apical half of pronotum, and most of scutellum greenish-yellow; basal half of pronotum and apical third of scutellum either green or reddish-brown *dimidiata*
4. Pronotum uniformly colored, yellowish-green or pale reddish brown; rear angles of abdominal segments obtuse * *sordida*
- Pronotum bicolored, the front half pale green or yellowish, the posterior half darker green, reddish, or purple; rear angles of abdominal segments acute or spiniform *calva*

64. *Banasa calva* (Say). This colorful species was originally described from Virginia and is known to occur from Ontario to British Columbia south as far as Georgia. The VPI Extension Pest Survey files contain records of this species from light traps in the cities of Newport News and Norfolk (July-August, 1968), determinations by R. C. Froeschner, and presumably specimens were added to the USNM collection after my last survey of that material. I venture the opinion that Say's types came from the lower part of the Del-Mar-Va peninsula, and that the species might be sought for generally in the eastern part of the state. The localities cited by Brimley (1938: 63) for North Carolina suggest, however, a statewide distribution there.

In color pattern *calva* is apparently nearly identical with the fairly common *dimidiata*, differing chiefly in the presence of black spots at the ends of the abdominal segments. Blatchley stated that "Fresh specimens are among the most brilliant of our eastern Pentatomids . . ."

65. *Banasa dimidiata* (Say). Widespread across northern North America and extending southward to northern Florida, Oklahoma, and Texas; and according to Blatchley, nowhere especially common. But *dimidiata* is apparently statewide in Virginia and sometimes taken in fair numbers. Specimens have been seen from Alleghany, Dickenson, Fairfax, Grayson, Halifax, Henrico, Henry, Montgomery, Nansemond, Nelson, Pittsylvania, Tazewell, and Wythe counties, as well as Norfolk and Virginia Beach cities. The vertical range is from sea level to about 5,000 feet at Mount Rogers.

The Truck Experiment Station at Norfolk has a series of 17 specimens taken at one time at Cape Henry, and I once found the species very abundant on mountain ash atop Warm Spring Mountain (4,000 feet) in Alleghany County.

66. *Banasa euchlora* Stal. A beautiful jade-green insect with white markings on pronotum and scutellum, *euchlora* is widely distributed from Maryland south to Florida, and west to Illinois, Iowa, Colorado, and Arizona. Virginia material has been seen from Fluvanna County (USNM), without precise data), Montgomery County (Blacksburg, April 12, 1947 and July 26, 1952, both VPI), and Henrico County (Richmond, Sept. 17, 1967, VPI). The several localities mentioned for North Carolina by Brimley are in the eastern half of that state.

According to Blatchley, the preferred host plant appears to be red cedar, as is the case also for the following species.

* *Banasa packardi* Stal. Originally described from North Carolina, this species is known to inhabit the east coast region from Florida to New Jersey. There are as yet no Virginia records, but the species certainly occurs here, and is to be looked for on red cedar, *Juniperus virginiana*.

* *Banasa sordida* (Uhler). Another widespread northern species, extending entirely across the continent but southward only as far as North Carolina. Recorded for Virginia by Van Duzee, but no specimens have been seen in any of the collections consulted. Brimley (1938) cites Raleigh and Southern Pines, N. C., and Blatchley (1926: 167) recorded material from Washington, D. C., so we can expect *sordida* to occur at least in the Virginia Piedmont region.

GENUS DENDROCORIS BERGROTH

Nine species, chiefly western, comprise this endemic North American genus. Two occur in the east: one of them not uncommon in western Virginia and the other to be regarded as "possible" for the southeastern corner. These small reddish-brown bugs were thought by Uhler to resemble the *tristigmus* group of *Euschistus*, but to my mind the similarity is much greater in the direction of *E. politus*. The prominently contiguous jugae render the genus easy to recognize; in many other external characters it agrees very closely with *Acrosternum*, in particular the conformation of the osteolar peritreme. *D. humeralis*, our recorded form, has the side margins of the pronotum strongly concave and the spiracles pale; *D. fruticicola*, which may occur in the southeast, has nearly straight pronotal margins and its spiracles are edged in black.

67. *Dendrocoris humeralis* (Uhler). Stated by Blatchley to range from New England west to Colorado, and south through the Appalachians to Georgia. Available Virginia material comes from localities suggesting a western, montane range in this state, although none of it is from above 2,000 feet.

Alleghany, Albemarle, Fairfax, Nelson, Montgomery, and Roanoke counties, April-October. The species is predaceous and to be regarded as "useful" although apparently never especially abundant.

* *Dendrocoris fruticicola* Bergroth. Endemic to the southeast, where it replaces the preceding in the Atlantic Coastal Plain, this species has been found as far north as Wilmington and Southern Pines, N. C. It may eventually be found in the extreme southeastern part of Virginia; apparently young oak sprouts are a favorite resting place, if not food source.

GENUS MURGANTIA STAL

A small genus of brightly colored Neotropical species, two of which extend into eastern North America. The genus is remarkable by its total lack of osteolar modification, and our local species is readily distinguishable at a glance by virtue of its brilliant red and yellow markings upon a black background.

68. *Murgantia histrionica* (Hahn). A southern species apparently extending its range northward, now known as far as New England and Colorado. The well-known Harlequin Cabbage Bug is statewide in Virginia, except perhaps for the higher mountains, and appears to be largely synanthropic in habits. Specimens seen from Albemarle, Alleghany, Bedford, Carroll, Charlotte, Fairfax, Frederick, Giles, Loudoun, Montgomery, Nelson, and Northampton counties, as well as the cities of Virginia Beach and Chesapeake. Additional county records obtained from the Insect Pest Survey Files are for Accomac, Augusta, Buchanan, Caroline, Cumberland, Fauquier, Isle of Wight, Mathews, Mecklenburg, Nottoway, Pittsylvania, and Westmoreland. Often a pest upon cabbages and related plants.

GENUS STIRETRUS LAPORTE

An assemblage of colorful, chiefly Neotropical, species easily recognized by the enlarged scutellum, subapical spine on the front femora, and ventral pubescent patches in the male sex. Only a single species extends into eastern United States, where it is not uncommon as far north as New England and Iowa.

69. *Stiretrus anchorago fimbriatus* (Say). Treated by Blatchley as a full species in its own right, *fimbriatus* appears to me to be little more than a northern subspecies of the neotropical *S. anchorago* of Fabricius. It is widespread in the lower parts of eastern United States, and in Virginia occurs sporadically in the mountainous western counties as well. Material seen from Albemarle, Chesterfield, Fairfax, Giles, Greenville, Montgomery, Nansemond, Nelson, Prince William, Rockingham, and York counties, and the city of Norfolk. May-September. The species is a well-known predator upon both larvae and adults of various beetles as well as caterpillars.

GENUS PERILLUS STAL

(= *Mineus* Stal, and all later authors)

Colorful black and red bugs native to North and Central America; about seven species are recognized, four of which occur in eastern United States. As is the case with so many groups, some of these are more northern and extend across the continent through southern Canada and the northern United States, although the bulk of the species may be tropical in affinity. Two species are known from Virginia: *P. bioculatus* with the front femora having a small sub-apical spine and the basal third of pronotum being black, and *P. strigipes* which lacks the femoral spine and in which the entire pronotum is red except for two large paramedian oval black spots.

The only character utilized by Blatchley to separate *Perillus* and *Mineus* is the absence of the small femoral spine in the latter, although in his generic diagnoses he implied other differences in form of the peritreme and in relative lengths of the beak segments. The direct comparison of *bioculatus* and *strigipes* shows little, if any, appreciable variation in either of these points, aside from the fact that the fourth segment of the beak in *strigipes* is relatively a little longer than in *bioculatus*. In the form of the osteolar peritreme, pubescent areas on the ventrals, male genitalia, and other external details, I see nothing whatever that might tend to set *strigipes* off, except for the absence of the femoral spine. Yet, even this character varies within the old limits of *Perillus*; *P. exaptus* having only a small tubercle instead of a "spine". In view of the virtual identity of the two Virginia species mentioned, I see no justification for continued recognition of a monotypic genus *Mineus* which rests upon a single mutable character of hardly specific value. I herewith propose to unite the two names, with *Perillus* Stal, 1862, having five years priority over *Mineus* Stal, 1867 (new synonymy!).

Obviously, taxonomic stability in this group of species has yet to be achieved, since *bioculatus* is the type species of a later genus *Perilloides* (Schouteden, 1907), and since even that nominal genus is scarcely separable from the Neotropical group *Oplomus*. Here again, the so-called generic characters seem arbitrary and of a low level of importance in the face of the virtual identity of the various species in all other respects. Until such a time as the male genitalia of *Oplomus tripustulatus* (the type of genus) can be studied closely, however, I defer making the transfer of *Perillus* into the synonymy of the much older name *Oplomus*.

70. *Perillus bioculatus* (Fabricius). Widespread over much of northern and western North America, this pretty red and black insect apparently occurs only in the extreme western parts of Virginia. Material seen (all in the VPI and Radford collections) from Augusta, Floyd, Montgomery, Rockbridge, Rockingham, and Tazewell counties; April-August. None of the localities over 2,000 feet, however.

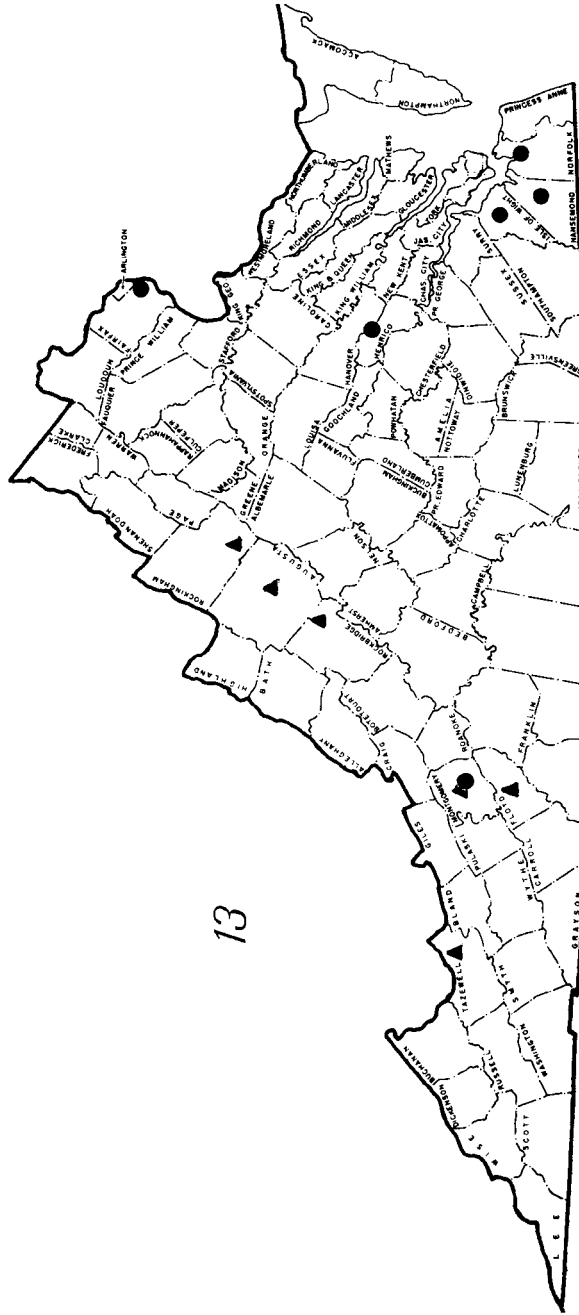


FIGURE 13. Distribution of *Perillus bioculatus* (triangles) and *P. strigipes* (dots) in Virginia. Confirmation of the latter species in western Virginia is desirable.

The earlier records of *bioculatus* for Florida apparently are erroneous or based on adventive specimens. Brimley did not include the species in his 1938 list of North Carolina species, and unless material has subsequently been taken in the southeast, the Virginia specimens may represent the southeasternmost localities for *bioculatus*.

71. *Perillus strigipes* (Herrich-Schaeffer), new combination. A slightly smaller species than *bioculatus*, which it seems to replace in the southeast, *strigipes* has been recorded from Massachusetts south to Florida, west and north to Texas and Indiana. In Virginia it is obviously a "lower austral" form, and I have seen only one specimen from an inland locality. Fairfax, Henrico, Isle of Wight, Montgomery, and Nansemond counties, and the city of Norfolk; April-early August. Brimley's localities in North Carolina are likewise in the eastern part of that state. The Montgomery County specimens (Blacksburg, April 3, 1932, G. W. Underhill, leg., VPI) may conceivably be mislabeled, as no other specimens have turned up in nearly three decades of subsequent collecting at Blacksburg.

GENUS APATETICUS DALLAS

As presently defined, *Apateticus* is restricted to a group of species closely related to those embraced by the name *Podisus*, the two in fact having earlier been regarded merely as subgenera within a more inclusive genus *Apateticus*. The characters used by Blatchley to distinguish the two nominal genera seem quite arbitrary, and perhaps the most reasonable course would be adoption of the concept used by Schouteden as far back as 1907, possibly with the elimination of subgeneric names.

72. *Apateticus cynicus* (Say). A large (15-20 mm) bug resembling a large form of *Podisus*, this northern species ranges from New England to Colorado, and according to Blatchley, south to Florida and Arizona. It is, however, obviously scarce in the central Atlantic states. Only a single Virginia specimen has been seen, an adult female taken on a tree trunk at Burkes Garden, Tazewell Co., on October 25, 1970 (D. J. Moore, leg., USNM). This locality is at an elevation of 3,840 feet on the crest of Clinch Mountain.

Brimley (1938: 64) was able to cite but one old record for North Carolina (Highlands, Macon Co., at about 4,000 feet); I am thus inclined to view the Florida record as dubious, possibly based upon a mislabeled or adventive specimen.

GENUS PODISUS HERRICH-SCHAEFFER

A large genus represented in much of the New World as well as in Eurasia; Van Duzee listed nine species for the United States, four of which occur or should occur in Virginia. Insofar as is known, these bugs are all predatory upon other insects and are of considerable value in reducing the number of agricultural pests, particularly the immature stages of beetles and moths.

The species are generally quite similar in size and appearance and are not easy to distinguish. The characters used in Blatchley's key, particularly size and modification of the humeral angles, appear to be somewhat variable and not really diagnostic. The following key is therefore provisional and not to be regarded as authoritative.

Key to the Virginia species of *Podisus*

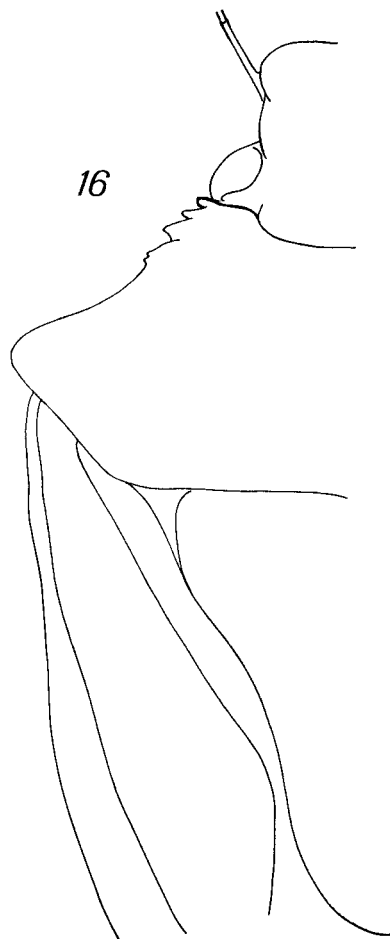
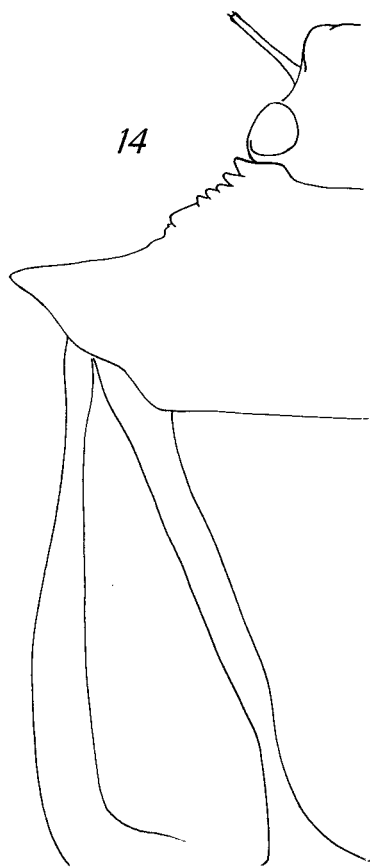
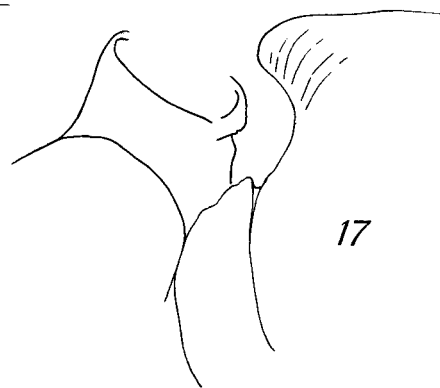
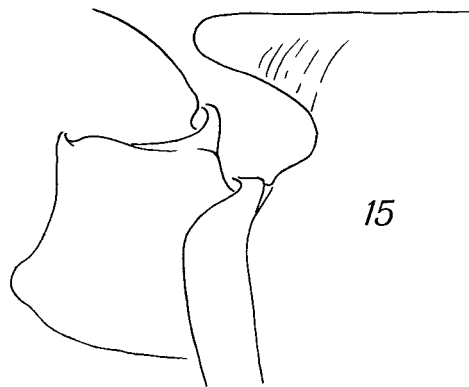
1. Legs immaculate, without spots, flecks, or bands; median spine of 2nd ventral segment short (Fig. 17); length less than 10 mm.....*modestus*
- ... Legs with some variety of dark markings; median spine longer (Fig. 15); length generally greater than 10 mm 2
2. Femora with two small black spots near apex; humeral angles of pronotum acute to spiniform (Fig. 14) *maculiventris*
- Femora variously flecked but without two apical black spots; humeral angles subacute to obtusely rounded (Fig. 16) 3
3. Antennae uniformly reddish-brown; midventral abdominal spots large and poorly defined; length greater than 12 mm *fretus*
- Third and fourth articles of antennae dark brown or blackish; midventral abdominal spots small and sharply defined; length less than 12 mm *serieiventris*

73. *Podisus fretus* Olsen. A subarctic species known from the Atlantic Coast between Massachusetts and North Carolina, also found sporadically in the Great Lakes region. Although doubtlessly widespread and common in eastern Virginia, material has been seen so far only from Virginia Beach, in the municipality of the same name (USNM 2). Specimens have been taken by beating the foliage of oak and pine; also found in the washup along the beaches.

74. *Podisus maculiventris* (Say). The "spined soldier bug" is one of our most abundant and widespread pentatomids and occurs over much of North America, although not common in the extreme south. In Virginia it is statewide and ranges from sea level up to about 4,000 feet. Material seen from Albemarle, Alleghany, Augusta, Buckingham, Culpeper, Fairfax, Frederick, Henrico, Highland, Loudoun, Montgomery, Nelson, Pulaski, Roanoke, Rockbridge, Rockingham, and Shenandoah counties, and the cities of Virginia Beach and Norfolk.

Pin labels indicate specimens swept from a variety of plants and taken from orchard trees. Specimens are occasionally found feeding upon caterpillars and

FIGURES 14-17. Structural characters of two species of *Podisus*. Fig. 14, *maculiventris*, left side of thorax to show spiniform production of humeral angle; Fig. 15, the same species, median projection of second abdominal segment as seen in oblique ventrolateral aspect. Fig. 16, *P. modestus*, left side of thorax to show rounded humeral angles; Fig. 17, the same, median projection of second abdominal segment, indicating its small size.



small beetles. One individual from Richmond, Va. (G. W. Underhill, leg., VPI) bears the label "Taken in last instar feeding on pear slugs, 8/6/26."

The degree to which the humeral angles are produced varies considerably in this species, and many specimens on hand would key out better to *P. serieventris* in Blatchley's key. But all grades of intermediacy may be noted at any one place, however; Dr. Froeshner advises that specimens with only acutely angled (not spiniform) humeri are best regarded merely as variants of *maculiventris*. The characters of leg coloration are perhaps better for recognizing the local forms of this genus.

75. *Podisus modestus* (Dallas). Widespread across northern United States, this species extends southward through the Appalachians as far as Georgia. But it seems to be uncommon in our region, and only four Virginia specimens are known: Blacksburg, May 24, 1962 (H. M. Swisher leg. VPI 1), 5 miles west of Blacksburg, June 24, 1958 (R. L. Hoffman leg. VPI 1), Montgomery County, and Mount Rogers, 5,200 feet, Oct. 4, 1970 (R. L. Hoffman & L. S. Knight leg. RC 2) Grayson County.

Brimley (1938: 64) states merely "Mountains" for the North Carolina distribution of this form, without further particulars.

76. *Podisus serieventris* Uhler. Another widespread but locally uncommon form, *serieventris*, is likewise more northern in distribution and sporadic southward. The only Virginia material seen is from Arlington and Fairfax counties (all USNM).

However, Brimley (1938: 64) records the species from Raleigh and Southern Pines, so it should be expected to occur in the Virginia Piedmont at the least. Apparently the presence of a dark band near the apex of the femora is a constant diagnostic character for *serieventris*.

GENUS EUTHYRHYNCHUS DALLAS

A small genus, endemic to the American tropics, containing two large and colorful species, one of which extends northeastern in this country as far as eastern Virginia. Among other characters, these species are notable for their long, porrect head, and virtually obliterated bucculae, the beak almost entirely exposed to its point of attachment.

77. *Euthyrhynchus floridanus* (Linnaeus). The range of this striking bug is stated by Blatchley to extend from Pennsylvania south throughout Florida and on into Central America. Virginia records suggest that *floridanus* is not uncommon in the extreme southeastern region, specimens being on hand from Holland in Nansemond County (October, VPI 1) and the cities of Norfolk (September-October, VTX 3) and Newport News (October, VPI 1). Furthermore, records from the Insect Pest Survey files mention that the species is common at Sedley, Southampton County (October 5, 1962) and at Gloucester, Gloucester County. An interesting northern and inland locality is for

Appomattox County (September 11, 1962), where specimens were taken "feeding on larvae of the alfalfa weevil" and determined as this species by Dr. J. L. Herring, USDA. The lateness of the collecting dates is notable.

Brimley (1938: 64) cites records for the coastal plain of North Carolina only, with the season of activity stated as June-November. Authenticity of the old record for Pennsylvania is subject to some doubt.

SUBFAMILY ACANTHOSOMATINAE

(= Acanthosominae, Blatchley)

A group of obviously specialized pentatomids having the tarsi reduced to two segments, and with the median sternal carina enlarged, prominent, and extending between all the coxae, the midventral spine of the second abdominal segment likewise large, overlapping on the end of the thoracic carina. Most of the dozen or so New World genera are Neotropical, but the two genera of eastern United States are definitely northern in range and extend southward into Virginia only along the Appalachians. Our local species appear to be extremely scarce and only rarely collected.

Key to Virginia genera of *Acanthosomatinae*

1. Osteolar canal short, broad, and curved, not extending beyond middle of mesopleuron; body length less than 10 mm.. *Elasmucha* (p. 59)
- ... Osteolar canal longer and nearly straight, extending up well beyond middle of mesopleuron; body length more than 10 mm
..... *Elasmotethus* (p. 59)

GENUS ELASMUCHA STAL

(= *Meadorus* Mulsant & Rey; Van Duzee; Blatchley)

A small genus confined to the Northern Hemisphere, with a single species in the United States. For many years it was treated in the literature by the name *Meadorus*.

78. *Elasmucha lateralis* (Say). Ranging from New England west to the Pacific Coast, this form extends southward into western North Carolina in the high mountains. In Virginia, *lateralis* is recorded only from four localities: three miles northwest of Clifton Forge, Alleghany Co. (VPI 1); Peaks of Otter, Bedford Co. (RC 1); Blacksburg, Montgomery Co. (VPI 1); and Stony Man Mountain, Page Co. (USNM 2).

GENUS ELASMOTETHUS FIEBER

Another small genus of Holarctic distribution, with several species in Eurasia and three in North America, all of which occur in the northern parts of the country. Generally similar in structure to *Elasmucha*, but the species are larger and the posterior edge of the pronotum is not strongly concave in front of the scutellum, as is the case in *Elasmucha*.

One species occurs in Virginia and a second has been found as close as

Maryland, so certainly to be expected as a member of our fauna. *E. cruciatus* has the humeral angles and basal four antennal articles pale; *E. atricornis* is piceous or black in the two areas mentioned, and averages a little smaller than *cruciatus*.

79. *Elasmotethus cruciatus* (Say). Recorded from Quebec to Vancouver Island, and southward to New Mexico and North Carolina. Apparently quite scarce in Virginia, whence specimens are available only from "Nelson Co." (without further data) (USNM).

Brimley cites Waynesville and Highlands as the North Carolina localities for *cruciatus*, and the Radford College collection has a specimen from Linville. It seems only a matter of time until additional stations will be established for the western part of Virginia.

* *Elasmotethus atricornis* (Van Duzee). Described from western New York, known to range from Montreal west to Indiana and south to Maryland. Batchley found it abundant and breeding on *Aralia racemosa* and suggested that *atricornis* would be found throughout most of the range of that plant (which is quite common in western Virginia).

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