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Seed Bugs of Virginia

(Heteroptera: Lygaeidae)

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Note regarding cover illustration: The tiger swallowtail butterfly, *Papilio glaucus* Linnaeus, was selected as a symbol for this series because it was the first insect to be described from North America, and the first specimen to originate from Virginia. The tiger swallowtail was designated by the Virginia General Assembly in 1991 as the state insect of Virginia.

CONTENTS

ACKNOWLEDGMENTS

Access to the various collections consulted was granted by the late Dr. Reece Sailer and Dr. Richard C. Froeschner, National Museum of Natural History (USNM); Dr. L. L. Pechuman, Cornell University (CU); Dr. R. R. Mills, Virginia Commonwealth University (VCU); Dr. L. L. Deitz and Mr. Robert L. Blinn, North Carolina State University (NCSU); and Dr. Michael Kosztarab, Virginia Polytechnic Institute & State University (VPISU).

Very extensive series of Heteroptera (including new taxa) came from inventories conducted throughout Virginia by the Virginia Division of Natural Heritage (VDNH), Richmond. I am indebted to former staff zoologist Christopher A. Pague for placing this wealth of material with the Virginia Museum of Natural History. His successor, Dr. Steven M. Roble, has ably continued this precedent since 1990. Large collections from the George Washington National Forest, assembled by Dr. Barry R. Flamm in 1988 and 1989, were also transmitted to the museum through the Natural Heritage office. Still other material, accumulated during contractual inventory work at localities across the state, was donated by Dr. Joseph C. Mitchell. John M. Anderson, VMNH biotechnician, has contributed to many aspects of the project, especially in searching for species in specialized habitats. Susan C. Kirby performed a majority of the clerical duties, including preparation of the maps and everything even remotely quantitative in data management.

Knowledge of Virginia lygaeids has been substantially advanced by the field studies of Dr. A. G. Wheeler, Jr., as well as the example set by his ability to locate seldom-collected species.

Major credit for the completion of this fascicle must be given to the Nestor of lygaeid studies, Professor (Emeritus) James A. Slater, who has throughout its preparation served as both midwife and godfather, proving identifications, factual insights, literature, and ongoing support. Both he and Dr. Wheeler have been so kind as to review a penultimate draft of the manuscript.

Several of the illustrations (Figs. 6, 19, 28, 33, 56, and 57) depicting the appearance of entire animals were made available by Dr. Froeschner; they are already well known to entomologists as the work of his wife Elsie H. Froeschner. Dr. R. M. Baranowski granted permission to reproduce some of the elegant carbon dust renditions (as Figs. 5, 9, 59, 60, and 64) that were prepared for *The Lygaeidae of Florida*. Two others (Figs. 66 and 67) are reproduced with permission from the *Annals* of the Entomological Society of America and *Proceedings* of the Entomological Society of Washington. All drawings not thus credited are original, made from Virginia specimens. Dr. Joseph C. Mitchell kindly provided the base map used for depicting distributions.

"Seed Bugs of Virginia"
ERRATA

P. 8. The lower part of the second colum in table 1 is erroneous, please replace that part or entire table with the following corrected version:

Table I: Lygaeinae

Blatchley, 1926:	Current:
Lygaeinae	Lygaeinae
Lygaeini	Lygaeospilus
	Lygaeus
Lygaeus	Neacoryphus
	Ochrimnus
	Melacoryphus
Oncopeltus	Oncopeltus
Orsillini	Orsillinae
	Orsillini
Belonochilus	Belonochilus
Ortholomus	Neortholomus
	Nysiini
	Nysius
Nysius	Metrargini
	Xyonysius

p. 16: Figure 14 is the **righthand** drawing; Figure 15 the **left.**
p. 22: 2nd line under *Cymodema breviceps* should read ". . .long **1st** antennomere. . ."
p. 36: Key couplet (top of column 1) leading to *Phlegyas abbreviatus* should read "1.3 times length of **3rd**" rather than "1st"
p. 46: Figure 46 is the **lefthand** drawing; Figure 47 the **right.**
p. 50: In 2nd line under "Tribe Ozophorini", Fig. 00 should be **Fig. 38.**
p. 64: In first line under "Genus Ptochiomera", 1926:00 should be **1926: 406**

The author would appreciate being informed of any additional errors that might be found.

INTRODUCTION

Twenty years have elapsed since publication of my synopsis of the coreoid bugs of Virginia (Insects of Virginia, no. 9, 1975), during which time information has been accumulated for a similar treatment of the family Lygaeidae. It is a matter of some regret that although personal field work has yielded a substantial number of records for many species of seed bugs, opportunities to conduct the specialized collecting needed to obtain the scarcer species have not been fully exploited. Thus, although many important contributions to the knowledge of eastern lygaeids have been published since 1975, progress within the state has by no means kept pace, and it is with some diffidence that the present treatment is added to the serial coverage of Virginia bugs now in its fourth part.

Despite the substantial number of species (68) known from Virginia (the family being second only to the Miridae in diversity), lygaeids are less commonly collected than members of many other families, and our knowledge of the geographic and seasonal distribution of these bugs within the Commonwealth is notably deficient. The number of species certain to occur here, but so far not yet collected within our boundaries (at least eight), is somewhat greater than in the respective families of Pentatomomorpha treated in the first two fascicles.

In general, the introductory remarks set forth in the first part (Insects of Virginia, no. 4, 1971) apply equally well here. The primary source of material consulted in preparation of this fascicle is the collection of the Virginia Museum of Natural History, Martinsville (VMNH), which includes the specimens formerly housed at Radford University. Additional major sources of material and records are the collections of the National Museum of Natural History (cited as USNM) and the Blacksburg branch of the Virginia Museum of Natural History at Virginia Polytechnic Institute & State University (VPISU). The entire collection of insects previously located at the Virginia Truck Crops Experiment Station at Norfolk (cited in previous fascicles as VTX) was transferred in 1994 to the VPISU facility in Blacksburg. Material in the collections at Virginia Commonwealth University, Richmond (VCU), and at Cornell University (CU) has been examined; and the status of several taxa south of Virginia was checked on material in the North Carolina State University insect collection (NCSU). In all, approximately 3500 lygaeids from Virginia have been examined.

One development of major importance during the past decade has been the utilization of pitfall trapping by personnel of the Virginia Museum of Natural History and the Virginia Division of Natural Heritage (formerly the Virginia Natural Heritage Program and often still cited as VNHP), as well as individual researchers such as Joseph C. Mitchell and Barry R. Flamm. This technique is remarkably effective in sampling members of the soil-litter biotopes and often obtains substantial series of lygaeids which are rarely if ever taken by "handpicking" techniques.

Persons interested in Heteroptera, and Lygaeidae in particular, have the benefit of several outstandingly useful references:

(1) "A Catalogue of the Lygaeidae of the World" (Slater, 1964), and its recent (1995) supplement,

(2) "Catalog of the Heteroptera, or True Bugs, of Canada and the Continental United States" (Ashlock & A. Slater in: Henry & Froeschner, 1988),

(3) "How to Know the True Bugs" (Slater & Baranowski, 1978), which contains keys to most of the lygaeid genera represented in Virginia, and

(4) "Lygaeidae of Florida" (Slater & Baranowski, 1990), in which many of our austral species are beautifully illustrated.

The internal classification of the Lygaeidae has undergone a number of major changes since the appearance, over a half-century ago, of Blatchley's classic volume "Heteroptera or True Bugs of Eastern North America" (1926). Since this book still enjoys a substantial usage by students of Nearctic heteropterans, it seems desirable to outline the departures from its arrangement of the Lygaaeidae that have been adopted in the following text. These are explained under the respective subfamily headings to avoid a lengthy essay at this point, but in brief, the major differences in current use result from the breakup of *Lygaeus*, *Nysius*, *Orthaea*, and *Ptochiomera* into smaller genera, and division of the former tribes Rhyparochromini and Lethaeini into five and three, respectively, more exclusive tribes.

The sequence of taxa adopted here basically follows that of Slater & Baranowski (1990), the main differences being the addition of the subfamilies Artheneinae and Oxycareninae immediately after the Cyminae, and the addition of several tribes of Rhyparochrominae not occurring in Florida.

As in preceding parts of this series, species are numbered consecutively to provide a general idea about how many forms have been treated in synopses to date. There is a slight discrepancy from the last numbered rhopalid (106) and first lygaeid (117), reflecting the addition of ten pentatomoids and coreoids in recent years (Hoffman, 1994). Species that have not been collected in Virginia, but which certainly occur here, are included in keys and in correct taxonomic position in the text, but their accounts are unnumbered and bracketed (see following section on "Relative diversity of Virginia lygaeids"). As a general rule, any lygaeids that have been collected within about 100 mi/160 km of the state boundaries have been considered as probables, although this is probably far too stringent a criterion, and would have excluded *Carpilis barberi*, previously known only from Florida. I have tended to exclude austral species with northern records for New York or Massachusetts (disjunct from Florida, for instance) if the record was old or in some way suspect, and have perhaps done an injustice to some valid claims for inclusion. Time and more collecting may give redress in such cases.

Non-Virginians who may have occasion to use this reference are reminded that a number of the former 100 counties have become incorporated municipalities and are no longer mapped under the names that may occur on pin labels of an earlier time. These include:

Former county	Present city
Princess Anne	Virginia Beach
Norfolk	Chesapeake
Nansemond	Suffolk
Elizabeth City	Hampton
Warwick	Newport News

In citations of individual collections, incorporated cities are usually listed under the county in which they are geographically located even though they are politically independent; thus Radford is cited under Montgomery County, for instance, and Richmond under Henrico (there is a Richmond County in the Northern Neck region of the state). Although this method is scarcely necessary for location of larger settlements, it is followed for consistency since many collection sites might be difficult to find by persons lacking detailed maps and for whom county identification might be useful. As in earlier parts of the series, full collection data are usually supplied only in the cases of those species known from ten or fewer localities (although that number has not always been strictly observed). To avoid redundancy, the author is understood to be the collector of all cited but unattributed samples.

Citations to original descriptions have been omitted on the presumption that anyone interested in such information will be serious enough about taxonomy to have a copy of the Henry-Froeschner Catalog.

A departure from previous parts is the introduction of distribution maps for all species treated, instead of for arbitrarily selected taxa only. Map symbols correspond to an actual diameter of about 3.6 miles (6 km) and are placed as precisely as their size permits, not centered in each county. All of the localities cited may be located on the *Virginia Atlas and Gazetteer* (1989) published by the DeLorme Mapping Company, Freeport, Maine, and also on the series of county maps issued by the Virginia Department of Transportation.

Representation of specific ranges in the small inset maps must be taken as highly provisional, except for those few cases in which revisionary papers have included spot maps. In addition to the generalized range statements in Blatchley's manual, known states of occurrence were taken from the catalog of Henry & Froeschner. "Fine-tuning" was then done for the few states whose lygaeid faunas have been treated in print, and recourse was taken to biogeographic likelihood and the crystal ball for the many small species known from a few widely disjunct localities.

The numbers cited beside specific months in tabulating the seasonal abundance of many species indicate the total number of individual specimens (*not* collections!) taken in those months. This presentation may be a little imprecise, since all of the records for, e.g., June, may have come from the last week of that month, but in general gives a fair impression of seasonal activity of adults.

To the extent known, preferred food plants are mentioned for individual species. Adults are often captured on a wide variety of plants ("sitting" or even feeding records,) and usually the presence of eggs and/or feeding nymphs is necessary to establish what might be the real host plants for particular species.

Relative diversity of Virginia lygaeids

Following the precedent of earlier fascicles, I have tabulated for comparative purposes the number of lygaeids recorded from a number of eastern states. Obviously, many of the figures taken from earlier sources are no longer accurate, owing both to taxonomic changes and recent discoveries. Of course the level of collecting intensity has varied considerably from state to state, but in very general terms the following tabulation suggests the extent of lygaeid diversification in the areas surveyed (species considered by the respective authors as

likely additions to the faunas treated follow in parentheses):

Florida (Slater & Baranowski, 1990)	105 (3)
North Carolina (Brimley, 1938; Wray, 1967)	66
Virginia (this paper)	68 (12)
New York (Leonard, 1926)	63
Connecticut (Slater, pers. comm.)	73
Missouri (Froeschner, 1944)	50 (10)
Indiana (Blatchley, 1926)	47
Illinois (Slater, 1952)	57
Iowa (Slater, 1952)	57
Oklahoma (Schaeffer & Drew, 1969)	40 (18)

The obvious advantage of Florida in lygaeid diversity reflects the occurrence of numerous tropical elements that extend no further north. The expected number of about 75-80 species each for Virginia and North Carolina results from a combination of boreal faunal elements in their western parts and austral in the eastern lowlands. Georgia should be expected to rank very high for the same reason. The somewhat lower number (around 60 species) for the states of Missouri, Iowa, and Oklahoma perhaps reflects reduced boreal influence.

Since many of the smaller lygaeids are obtained by specialized collecting techniques, they do not appear in general collections nearly as frequently as members of families such as Pentatomidae. For my treatment of four pentatomoid families in 1971, I could claim personal experience in life with 57% of the 79 species listed. In the case of three coreoid families, four years later, the comparable figure was 66% of the 27 species. For lygaeids, although 52 of 68 species (74%) have been collected personally, this proportional increase is more the result of an additional two decades of opportunistic field work than of any greater skill or diligence. Many of my 52 lygaeids were found only once, and then only by serendipity, while looking for something else. Others have been obtained by utilizing successful techniques (both published and shared in correspondence) developed by Dr. A. G. Wheeler, Jr.

Distribution in Virginia

The paucity of records for most species of Virginia seed bugs severely limits the reliability of any attempt to generalize on distributional patterns. However, it seems clear that a number of species occupy basically austral ranges and are found only in eastern Virginia, while others are more boreal and occur chiefly in the western Piedmont and/or mountains. Some are statewide. Many seem to be collected so rarely that they must occur only as widely separated, stenotopic (possibly relictual) populations.

1. Species that are known **only** in the Coastal Plain include *Ochrimnus mimulus*, *Lygaeospilus tripunctatus*, *Blissus arenarius*, *Ischnodemus badius*, *I. conicus*, *Peritrechus paludemaris*, *Eremocoris depressus*, and *Carpilis barberi*, many of which occupy submaritime habitats (*B. arenarius* is known to be a stenophage on the salt-marsh grass *Ammophilia breviligulata*, and *I. badius* on *Spartina alterniflora*). *Ischnodemus conicus* and *Carpilis barberi* reach their northernmost known locality at Virginia Beach; the others extend further northward for variable distances.

2. Species that are chiefly tidewater in occurrence but extend sporadically well up onto the Piedmont include *Cymodema breviceps*, *Cymus discors*, *Blissus l. leucopterus*, *Ischnodemus slossonae*, *Oedancala crassimana*, *Neopamera bilobata*, and *Antillocoris discretus*. So far the only state records for *Ochrimnus lineoloides* are in the Piedmont, but the species occurs in the Coastal Plain both north and south of Virginia and surely merits inclusion in this category locally as well.

3. Several species have been found only west of the Blue Ridge, and clearly are boreal elements: *Ligyrocoris diffusus*, *L. sylvestris*, *L. depictus*, *Zeridoneus costalis*, and *Eremocoris borealis*. With one exception these are not confined to higher elevations and may occur as low as 1000 ft/300 m ASL in intermontane valleys. The two records for *L. depictus* are from spruce-associated meadowland at 5000 ft., and may indicate a real "Canadian Zone" element.

4. Many species *appear* on distribution maps to be statewide but rarely occur above 2000 feet and may be absent from many of the southwestern counties.

5. The few lygaeids that are abundant from sea level to above 5000 feet include *Lygaeus kalmii*, *Neortholomus scolopax*, *Kleidocerys resedae geminatus*, *Phlegyas abbreviatus*, *Oedancala dorsalis*, *Myodocha serripes*, and *Pseudopachybrachius basalis*. All of these species are widespread over most of eastern North America.

It is well known that distributional records tend to reflect the distribution of collection efforts rather than of organisms. Nonetheless, it is often of moderate interest to indicate in a faunistic study the relative intensity with which different areas have been sampled, and I provide here a roster of the nine political units having the greatest number of lygaeid species (it would be of interest for a different reason to indicate the many counties for which not a single species has been thus far documented).

Montgomery County	31
City of Virginia Beach	26
Greensville County	26
Floyd County	25
Alleghany County	24
Fairfax County	24
Loudoun County	24
Augusta County	23
Pittsylvania County	22

Biology

Lygaeids have acquired the vernacular name "seed bugs" because so many of them feed upon ripe (dry) seeds or fruits of various plants. Others, however, imbibe plant fluids, and some are predators on other small insects. It is interesting that many of the spermophages have noticeably incrassate and toothed profemora, to which the term "raptorial" is descriptive even if misleading in its implication of carnivory. Presumably the enlarged femora provide both a stabilizing mechanism (spines on the ventral surface) and increased area for muscle attachment (for flexing the tibiae) to hold smooth and awkward seeds or fruits. Conversely, in the big-eyed bugs (Geocorinae) which are near-obligate predators, the profemora are **not** enlarged or armed, and this point is likewise true for many other insectivorous bugs, such as reduviids, gerrids, and asopine pentatomids.

Slater & Baranowski (1990) suggested three major groups of lygaeids on the basis of preferred habitat: arboreals, geophiles, and laminaphiles. Although the substance of these categories is perfectly obvious to any literate naturalist, a semantic objection could be raised against "arboreal" in terms of its two precise meanings: of or pertaining to trees, or adapted to living in trees. In at least the Virginia fauna, the only lygaeid that spends the majority of its active life in trees is *Belonochilus numenius*, associated with sycamore balls.

I am unaware of any collective scientific category, used for insects, that means "living on plants" (= above the ground surface). As a provisional measure, I suggest "phytophile" as a category equivalent to "geophile". In this sense both "arboreal" and "laminaphilic" would be considered subcategories of phytophily. Since many species may spend time feeding on attached fruit as well as foraging in surface litter, probably distinctions could be made reflecting facultative and obligate capabilities. However, it must be recognized that the definition of categories is subjective and arbitrary, there being nearly a complete spectrum of habitats from soil to fruits to pine cones, and some species which are at home in several situations.

Species considered to be phytophilic include the larger species of Lygaeinae (*Oncopeltus, Lygaeus*). Most of these forms, necessarily exposed to view, display prominent aposematic colors of black and red. Other plant-inhabiting forms (orsillines, cymines, ischnorhynchines) feed upon dry fruits or seeds of many flowering shrubs as well as grasses and sedges and are effectively camouflaged by resemblance in size and coloration to their food items. "Laminaphiles" can be regarded as highly specialized phytophiles, cryptically colored and characteristically flattened in body form, hiding between the leaves and stems of grasses and sedges.

The majority of lygaeids qualify as geophiles and occur either in bare open sites (e.g., geocorines) or in soil and litter mileaux (most rhyparochromines). Geocorines search for prey in full exposure to sunlight, and in shiny black color, body size, and quick movements suggest carabid beetles of the genus *Amara*, with which they often occur. Rhyparochromines tend to be dusky and dull in appearance, reflecting their preference to edaphic biotopes (although some, e.g., *Ozophora* and *Neopamera*, do have brightly patterned hemelytra and antennae annulated with white).

Although most lygaeids do not manifest much social behavior, some frequently occur in small apparent aggregations composed of adults and one or more immature stadia — *Myodocha serripes* being one that comes to mind. Exploitation of a specialized food source can result in enormous multistadium populations, such as occurs with the cattail bugs, *Chilacis typhae* and *Holcocranum saturejae*, that live inside the pistillate fruiting heads of *Typha*; and *Belonochilus numenius* on and in sycamore fruits. Aggregations possibly related to reproductive activity are sometimes noticed as well, as described for *Ochrimnus lineoloides* (p. 13).

SYSTEMATICS

Identification

It is assumed that the majority of users of this guide will be working with adult specimens, and the keys and descriptions relate entirely to sexually mature individuals. Identification of immatures to species is not always easy, although young stages (nymphs) found associated with adults may be presumed to be conspecific, and mature nymphs with wing pads can often be confidently recognized in context of a local fauna. Those for whom identification of immatures may be necessary are referred to a key by Sweet & Slater (1961) which will take specimens of most local lygaeids as far as genus. It must be recalled that the adults of some genera are brachypterous or coleopteroid, and are distinguished from nymphal stadia by the more rigid body wall and presence of sclerotized genital segments. Nymphs, except occasionally some in the penultimate instar, do not make good dried specimens, and are better preserved in 70% alcohol. Existing keys to subfamilies and tribes often require observation of spiracles on the abdominal segments (almost impossible to see on very small or pubescent specimens without dissection or clearing), or a value judgment on the relative thickness of the profemora, often difficult for someone unaware of the full range of possibilities. Some time and effort has thus been invested in devising keys based on more easily observable and less subjective characters. The result seems to be effective, but the qualification must be emphasized that the characters are valid only with reference to taxa occurring in Virginia. Also, since the characters were chosen for convenience, the sequence in which subfamilies or tribes are presented in the keys is purely artificial. The usual caveat applies, that specimens must be in good condition with all parts of the body clearly visible. "Side-pointing" must be strictly observed, and greasy specimens cleaned by immersion in a safe organic solvent (e.g., ether or ethyl acetate; exposure to benzene, acetone, or carbon tetrachloride may have deleterious medical effects).

Many users may prefer to skip the keys entirely, and attempt identifications by reference to the habitus illustrations and scanning the brief generic and specific characterizations for relevant details of size and coloration.

Illustrations (Figs. 1-4, and many others) are provided to assist in the recognition of body parts mentioned in keys and descriptions. The novice at lygaeid identification is reminded that the full number of abdominal segments is visible only in dorsal aspect with the forewings (hemelytra) spread to reveal the tergal sclerites. In *lateral* aspect (Fig. 2) the first segment is not visible, and the count begins with the **second**, as indicated on the drawing.

The modified mouthparts of Heteroptera, forming an elongated, 3- or 4-segmented instrument for penetration, have been traditionally referred to as the "beak", but sometimes also as labium or rostrum. Although I prefer a classically-based term over a vernacular, in this case "beak" seems a more accurate collective term that includes the rostrum, labium, and two pairs of stylets.

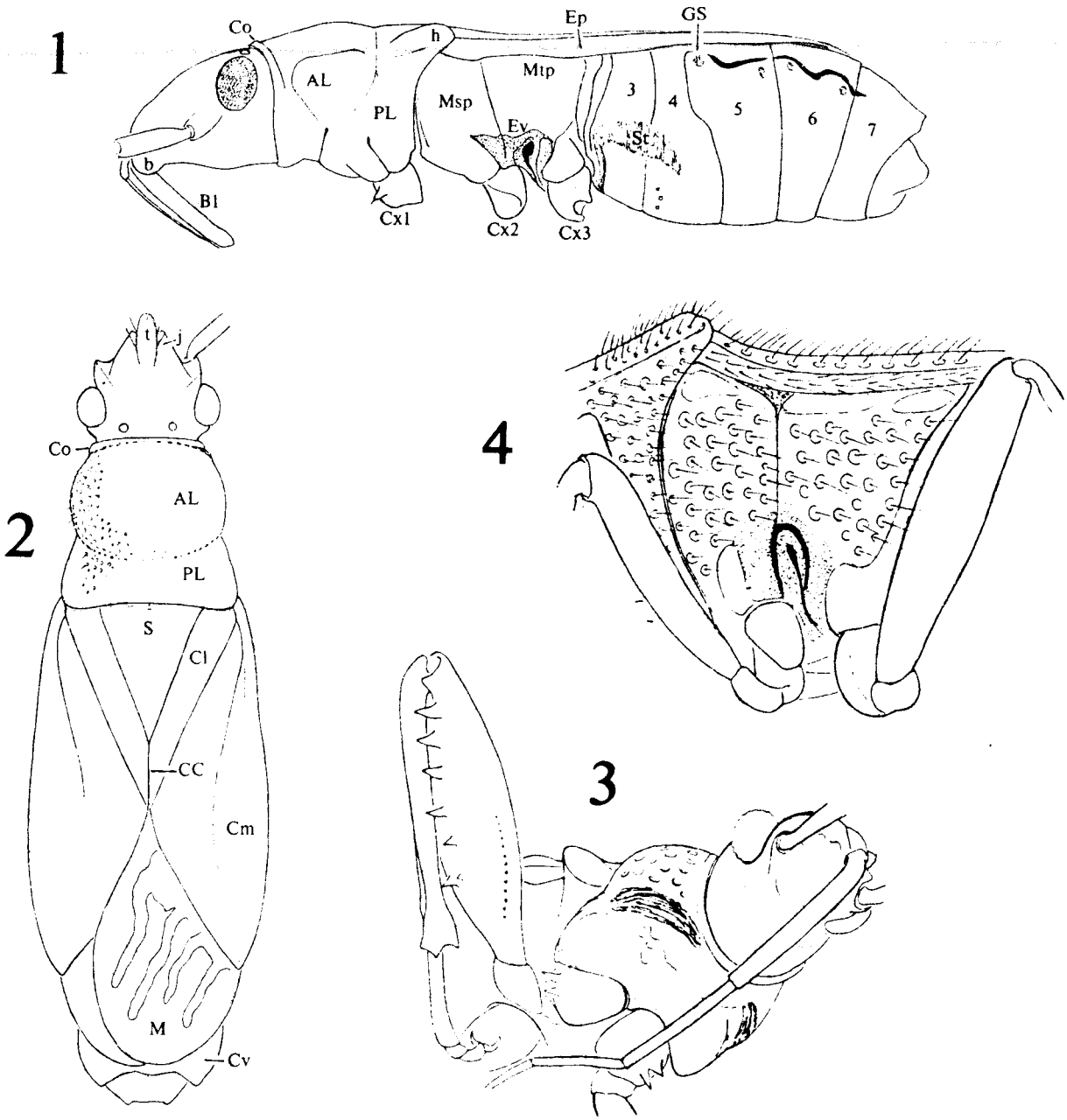
Another traditionally entrenched although etymologically incorrect term is the use of "lobe" to denote a subdivision of the pronotum when that region is transversely constricted. Such an application may be confusing to someone accustomed to the term as descriptive of a rounded marginal projection (as in leaves) or a protuberance of a larger entity (such as the liver), but as I have been unable to invent a better term to denote the two subunits of a constricted pronotum, "lobe" is retained here with misgivings.

Following the precedent of R. E. Snodgrass, I use "spine" to denote an immovable projection from the cuticle (such as the denticles on the profemora of many lygaeids), and "spur" for a movable (socketed), usually short and thick projection. The term "seta" is used to denote any long slender hairlike object, and "bristle" for one that is shorter, thicker, and rigid.

Finally, the point must be emphasized that considerable taxonomic work remains to be done even with the lygaeid fauna of eastern North America. The status of our local species in several genera, such as *Nysius*, *Blissus*, *Perigenes*, and *Antillocoris*, is still unsettled, and some arbitrary decisions have been made in their treatment. In most cases, such problems can be solved through the accumulation of additional in-state study material.

Key to subfamilies of Lygaeidae occurring in Virginia

1. Suture between 3rd and 4th abdominal segments directed obliquely forward and not attaining side margins (Fig. 2); head usually with two setae near eyes . . . . . Rhyparochrominae, p. 38
— All sutures between abdominal segments extending to lateral margins; head usually without setae near eyes 2
2. Elytra impunctate, or with microscopic punctations only; central area of scutellum separated from rear edge of pronotum by distinct transverse basal de-



Figures 1-4. Anatomical structures of lygaeids. Figure 1. *Ligyrocoris depictus*, latersal view, appendages omitted. Figure 2. The same individual, dorsal aspect. Figure 3. *Pseudocnemodus canadensis*, oblique anteroventrolateral aspect of forebody, showing paired procoxal spines, stridulatory fields (their distinctness emphasized, and row of plectral spines on inner basal surface of profemur. Figure 4. *Stygnocoris rusticus*, lateral view of thorax, showing ostiolar peritreme as an auricle raised above surface of metapleuron.

Abbreviations: AL, anterior lobe of pronotum; Bl, basal segment of beak; b, bucculum; CC, claval commissure; Cl, clavus of hemelytron; Cm, corium of hemelytron; Co, "collar" of pronotum; Cv, connexival surface of abdominal segment; Cx1, Cx2, Cx3, coxal podomeres of 1st, 2nd, and 3rd pairs of legs; Ep, epipleural flange of hemelytron; Ev, evaporatorial surface surrounding ostiole; GS, "glandular spot" of abdominal sterna; h, humeral area of pronotum; j, jugum; M, hemelytral membrane; Msp, mesopleuron; Mtp, metapleuron; PL, posterior lobe of pronotum.

pression 3
— Elytra distinctly, usually coarsely punctate, at least on clavus; central area of scutellum usually not separated from basal edge of pronotum by distinct transverse groove 4
3. Pronotum and scutellum impunctate; color usually black with red markings; claval region of hemelytra forming median commissure (Fig. 1, CC); apical margin of corium straight; membrane of elytra dark in color (pale but opaque in one species) . . . . . Lygaeinae, p. 7
— Pronotum and scutellum conspicuously punctate; color gray, tan, light brown, yellowish, without red markings; claval region of hemelytra not forming median commissure but rather broadly overlapped (Figs. 14–16); apical edge of corium sinuate distally; membrane of hemelytra clear or hyaline . . . . . Orsillinae, p. 15
4. Abdomen shorter than thorax, wings therefore appearing very long, apex of corium reaching to or beyond end of abdomen and apex of membrane far beyond . . . . . Ischnorhynchinae, p. 20
— Abdomen at least as long as thorax, thus wings relatively much shorter, apex of corium not reaching back as far as end of abdomen and apex of membrane rarely exceeding 5
5. Clavi strongly narrowed posteriad, not forming a median claval commissure behind apex of scutellum (Fig. 32) 6
— Clavi of normal form, forming a long median commissure beyond scutellum (Fig. 1, CC) 7
6. Eyes enlarged, reniform, projecting caudolaterad around anterior corner of pronotum (Fig. 30); femora of anterior legs not incrassate or provided with a row of spines; prothorax and abdomen basically flattened dorsoventrally . . . . . Geocorinae, p. 32
— Eyes of normal size and shape, not projecting stronglycaudolaterad; femora of anterior legs thickened and armed with a row of acute spines; body notably convex dorsally (almost cylindrical in cross-section) . . Pachygronthinae (*Phlegyas* only), p. 35
7. First two visible abdominal segments apparently coalesced, appearing as a basal segment much longer than those posterior to it 8
— Abdominal segments nearly equal in size 9
8. Scutellum much shorter than claval commissure; abdominal sterna conspicuously striated; metacoxae separated by space less than a coxal diameter; ostiolar peritreme a small inconspicuous rounded knob; pronotal punctures without glandular setae . . . . . Cyminae, p. 21
— Scutellum about equal in length to claval commissure; abdominal sterna not striated; metacoxae separated by space much greater than coxal diameter; ostiolar peritreme very large and auriculate, its dorsal half almost completely separated from pleural surface; pronotal punctures each with a short, apparently glandular hair . . Oxycareninae, p. 24
9. Profemora incrassate, with a row of acute spines; juga compressed into thin vertical lamina adjacent to base of antennae; ocelli as close to each other as either is to an eye; antennae at least half as long as body . . Pachygronthinae (*Oedancala* only), p. 35
— Profemora not thicker than the others and without spines; juga not modified; ocelli much closer to eyes than to each other; antennae not longer than length of head and prothorax Artheneinae, p. 25

Subfamily I. LYGAEINAE

According to Slater & Baranowski (1990: 6), this subfamily contains 58 genera worldwide, ten of them in America north of Mexico. A. Slater (1993) considered two American genera to be invalid, but added four new ones, so the totals are now 60 and 12. Only five genera are represented in the Virginia fauna, and since most of them are monotypic locally, the following key covers both genera and species. The subfamily includes the largest lygaeid in our fauna, as well as species less than 5 mm in length. The larger forms tend to be occur above ground on fruits and foliage of forbs and shrubs, and most of them are aposematically colored with bright red markings on a black background.

The genus *Lygaeus*, in the inclusive sense of former workers such as Barber and Blatchley, has been rendered during the past several decades into a number of more homogeneous genera based to a considerable extent upon configuration of internal genitalia. Fortunately, in treatment of a local fauna, the number of species is small enough that easily seen external features may be used for identification. For the benefit of those interested in following the taxonomy involved, references to the relevant literature are given with each genus. The latest treatment of the entire subfamily is that of A. Slater (1993), which provides keys to all genera and most New World species, as well as illustrations of structural features.

As the classification of the Lygaeinae has experienced numerous changes since the appearance of Blatchley's manual, it may be useful to provide a tabular concordance for this section of the family.

Table I: Lygaeinae

Blatchley, 1926:	Current:
Lygaeinae	Lygaeinae
Lygaeini	Lygaeospilus Lygaeus Neacoryphus Ochrimnus Melacoryphus
Lygaeus	
Oncopeltus	Oncopeltus
Orsillini	Orsillinae
	Orsillini
Belonochilus	Belonochilus
Ortholomus	Neortholomus
	Nysiini
Nysius	Metrargini Xyonysius Nysius

Key to Virginia taxa of Lygaeinae

1. Median carina visible for entire length of pronotum; scutellum notably convex, with median carina only vaguely indicated; beak long, extending onto 1st or 2nd abdominal segment, its 1st article almost attaining procoxae .... *Oncopeltus fasciatus*, p. 9
— Median carina of pronotum visible only on posterior half; scutellum with deep subapical depression on each side, producing effect of a large and prominent median carina extending back from a transverse basal ridge; beak shorter, extending only to metasternum, first article reaching just beyond anterior edge of prosternum 2
2. Small (5 mm) light grayish-brown bugs without red markings, membrane of hemelytra pale, with the venation prominently darker and a distinct basal white spot; entire dorsal surface and all appendages invested with long bristly erect setae .... *Lygaeospilus tripunctatus*, p. 14
— Larger (length usually more than 5 mm) bugs brightly marked with red or orange, membrane of hemelytra including venation uniformly black with venation not evident; dorsal surface and appendages clothed in very fine, decumbent pubescence 3
3. Ostiolar peritreme red or whitish, contrasting sharply with dark color of upper sides; pronotum with transverse series of impressions behind calli ... 4
— Ostiolar peritreme black, concolorous with sides of thorax; pronotum with four transverse impressions 5
4. Pronotum red, front lobe with two sharply-defined transverse black spots; head with small median yellow spot between the ocelli; peritreme red ... . *Ochrimnus lineoloides*, p. 13
— Pronotum yellowish, front lobe with a broad transverse red band, rear lobe with two paramedian blackish spots; head with a yellow spot adjacent to each eye; peritreme whitish .... *Ochrimnus mimulus*, p. 14

5. Head black with red markings; sides of thorax uniformly black; lateral series of black abdominal spots at upper end of sterna; body length 10-12mm . . 6
— Head without red markings; sides of thorax dark dorsally, lighter near base of legs; lateral abdominal spots at about midheight of sterna; body length 8-10 mm 7
6. Head with only a median red spot between the eyes; clavi entirely black; hemelytral membranes with one or white markings basally or medially, and narrow white margins . . . . . *Lygaus kalmii angustomarginatus*, p. 10
— Head with large Y-shaped red marking between eyes, extended forward and downward in front of them; anterior half of clavi red; membrane of hemelytra uniformly black . . . . . *Lygaeus turcicus*, p. 10
7. Rear lobe of pronotum and entire corium except hind margin dull red; front margin of pronotum, clavus, and hind margin of corium pale yellow; callar impressions oblique throughout entire length; dorsal surfaces essentially glabrous . . . . . *Neacoryphus bicrucis*, p. 12
— Rear lobe of pronotum and entire corium black or piceous; interior (posterior) ends of callar impressions becoming transverse; dorsal surfaces invested with fine, short, declivent silvery pubescence . . . . . *Melacoryphus facetus*, p. 12

Figure 5. *Oncopeltus fasciatus* (Dallas)

Genus Oncopeltus Stål

Oncopeltus is easily recognized among other local genera of Lygaeinae by the characters cited in the key. Additionally, the anterior edge of the pronotum forms a distinctly elevated rim, in front of an impunctate transverse depression. The 3rd abdominal segment in females is produced into a rounded median lobe, and in both sexes, this segment is largely black except at the upper ends. The bases of the hemelytra are not red, and the corial spots merge medially to produce a broad black transverse band at about midlength of body. Size alone is diagnostic, as the other local lygaeines do not exceed 12 mm in length.

The genus, with about 48 species, occurs widely in the Southern Hemisphere with centers of diversification in South America and Australasia. Four or five species occur in Florida, but only one ranges northward as far as southern Canada.

117. **Oncopeltus fasciatus** (Dallas)
Figure 5, Map 1

Body length 12-18 mm, the females usually slightly larger than males. Body basically black except for the following parts, which are luminous red or reddish-orange: margins of pronotum, apex of scutellum, bases and apices of coria, basal halves of clava, and abdominal sterna.

This largest Virginia species of lygaeid is also one of the most abundant and frequently seen. As implied by its name, the preferred food plants are milkweeds of the genus *Asclepias*, upon which the bugs are often seen along with the likewise red and black cerambycid milkweed beetle (*Tetraopes tetraophthalmus*). Subjective recollections implicate *A. incarnata* as a favorite food plant, as well as, infrequently, dogbane (*Apocynum cannabinum*). On 30 May 1953 a specimen was observed feeding on the flowers of *Rhus toxicodendron* at Griffith, Alleghany Co.

Professor Slater suggests (in litt.) that *O. fasciatus* may not overwinter in Virginia, and our populations are annual vernal immigrants from farther south. Adult specimens seen from Virginia were taken between early June and mid October, with the greatest number of captures taking place in June and July. Mated pairs were noted on 19 July 1950, on an unidentified *Asclepias*. Distributionally, the species is essentially statewide but so far there are no records higher than 3300 ft./1090 m. (Map 7). The paucity of localities in southwestern Virginia is surely an artifact of inadequate sampling. Specimens have been seen from Accomack, Albemarle,

Alleghany, Augusta, Brunswick, Chesterfield, Craig, Frederick, Giles, Gloucester, King & Queen, Loudoun, Montgomery, Page, Pittsylvania, Powhatan, Prince William, Pulaski, Rockbridge, and Rockingham counties, and the cities of Chesapeake, Suffolk, Richmond, and Virginia Beach.

The ease with which *fasciatus* may be maintained in colonies on a diet of milkweed seeds has contributed to its wide use as an experimental animal. Slater & Baranowski (1990: 12) have provided a thorough review of the species' biology.

Genus **Lygaeus** Fabricius

The two Virginia species of this genus are boldly marked with red and black like the milkweed bug, but are much smaller (body length 10-12 mm) than that species and the black spots of the corium do not merge to form a broad black band across midlength of the body. The genus is nearly cosmopolitan in distribution, with about two dozen species. Six species occur north of Mexico, two of them in Virginia.

118. **Lygaeus kalmii angustomarginatus** Parshley
Figure 6, Map 2

Body length 10-12 mm, females usually a little larger than males. Basically a sooty black insect, with the following parts red: abdominal sterna except the last, spot between the eyes, posterior lobe of pronotum, and inner margins of hemelytral coria. Base of membrane typically with scattered white markings of varied size and shape, and distal edge narrowly margined with white.

This species is among the ten most frequently collected local species of lygaeids. Formerly it was considered to be largely a specialist on various milkweeds (*Asclepias* spp.) but more recent investigations (reviewed by Slater & Baranowski, 1990, especially Wheeler, 1983) indicate that *kalmii* (a) is more of a generalist with a preference for milkweed when it is available, and (b) spends a considerable part of its life cycle as an opportunistic feeder in leaf litter. Most of the specimens taken by me were from indiscriminant sweeping of weedy fields; the VMNH pitfall operations have never captured a single specimen.

The range of *L. kalmii* covers most of the United States, the nominate subspecies occurring west of the 100th meridian and southward into Mexico (geographic variation was surveyed by Slater & Knop, 1969). In Virginia it appears to be statewide, from sea level at Virginia Beach to over 5000 ft. on Whitetop Mountain. Numerous specimens are recorded from Albemarle, Alleghany, Appomattox, Augusta, Bath, Bedford, Buchanan, Buckingham, Chesterfield, Essex, Frederick, Giles, Grayson, Henrico, Highland, Isle of Wight, Loudoun, Lunenburg, Montgomery, Nottoway, Page, Pittsylvania, Powhatan, Rockingham, Surrey, Tazewell, and Washington counties, and the cities of Chesapeake, Suffolk, and Virginia Beach.

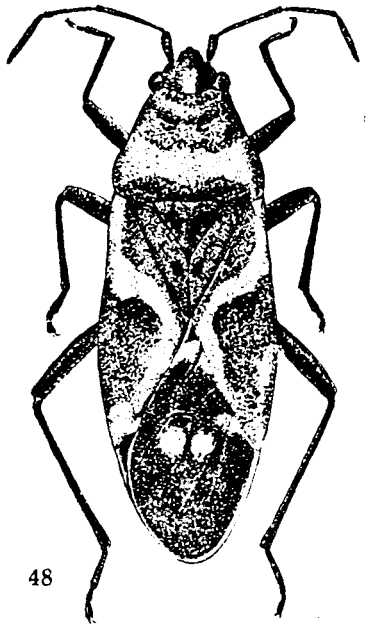


Figure 6. *Lygaeus kalmii angustomarginatus* Parshley

Collection data indicate that the species has been found in Virginia from April to mid-December, with the vast majority of records about evenly distributed through June, July, and August. Blatchley found it "throughout the year" in Indiana.

119. **Lygaeus turcicus** Fabricius
Figure 7, Map 3

A black insect with red or orange markings, similar in size and coloration to *L. kalmii*, from which it differs as follows: red spot on head much larger and extended anteroventrad between antennae and eyes, thus Y-shaped; basal half of clavus red; membrane without trace of basal white markings or white distal edge.

Many early references to the feeding habits of *turcicus* (when it was recognized as a species at all) associated it with various species of milkweeds and a scattering of other plants quite unrelated to the Asclepiadaceae. J. A. Slater (1983) reviewed this subject

in detail and showed persuasively that the preferred host plant is in fact a composite, *Heliopsis helianthoides* (L.), which is widespread in eastern North America.

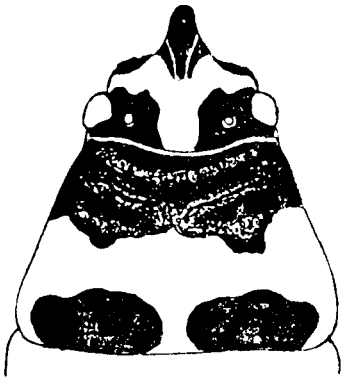


Figure 7. *Lygaeus turcicus* (Fabr.). Forebody showing color pattern.

Doubtless many of the early milkweed records were due to confusion of *turcicus* with *L. kalmii*, which is a genuine milkweed specialist. However, Froeschner (1944) found *turcicus* on flowers of *Asclepias tuberosa* in Missouri, and two specimens that I collected on Buffalo Mountain, Floyd Co., Va., 16 July 1992, were taken from *Asclepias syriaca* (with Slater's findings fresh in mind). Apparently *turcicus* is a facultative feeder on *Heliopsis* with the capability of utilizing other food plants. Regrettably the constraints of other duties have prevented personal investigation of this intriguing situation. The record by Banks (1910) for the flowers of New Jersey Tea (*Ceanothus)* in Fairfax County, Virginia, can only be fortuitous; I have examined thousands of these plants in Virginia for four decades, looking for cerambycid beetles, and have never found a *Lygaeus* of any description.

The notable scarcity of this lygaeid is in striking contrast to the abundance of its close relative *kalmii*. Blatchley (1926) recorded it from only two Indiana counties, with the comment "scarce." Brimley (1938) cited only six localities, mostly in the Piedmont region of North Carolina. Data on Virginia specimens suggest sporadic occurrence in the western part of the state, although *Heliopsis helianthoides* appears to be virtually statewide. Complete collection data are provided below:

Fairfax County: many specimens from Vienna, Great Falls, and Glencarlyn, various dates (USNM). **Floyd County**: Buffalo Mountain, 6 mi SW of Willis, 3500 ft., two on milkweed, 16 July 1992, VMNH field party (VMNH). **Montgomery County**: Radford, 21 Sept., 25 Sept., 19 Oct. 1982, student collections (VMNH 3). **Nelson County**: Wingina, 26 July and 12 August, W. Robinson (USNM). **City of Norfolk**: no precise data (USNM). **Rockbridge County**: Panther Mountain, 9 mi NW of Natural Bridge, 2600 ft., under bark on ground, 2 November 1980 (VMNH 2). **Rockingham County**: Rader Mountain, 3600 ft., ca 7 mi NNW of Rawley Springs, 18 May 1994, A. G. Wheeler, Jr. (VMNH 1). With the exception of this last specimen, collection dates range from July to November.

Genus **Neacoryphus** Scudder

The single Virginian representative of this recently defined genus was for a long time assigned to the subgenus *Melanocoryphus* of *Lygaeus*. In 1965 it was extracted therefrom and designated type species of the new genus *Neacoryphus* by G. G. E. Scudder. As originally established, *Neacoryphus* contained 15 species, distributed chiefly in western United States, and Central and South America. In 1988, *Neacoryphus* itself was dismembered by A. Slater, with seven of the original 15 species removed to his new genus *Melacoryphus* (**not** *Melanocoryphus!*), five others to several Neotropical genera, and two referred to "incertae sedis". In his 1993 synopsis, A. Slater recognized only *bicrucis* and *verecundus* (Distant) as members of *Neacoryphus*.

In our fauna, this genus is easily recognized by the distinctive color pattern of the single local species. Structural generic characters are those specified by A. Slater (1993) and relate primarily to details of genitalic configuration.

120. **Neacoryphus bicrucis** (Say)
Figure 8, Map 4

Slightly smaller than the two species of *Lygaeus* (length 7-9 mm), this colorful bug is recognized by the trim pinstripe St. Andrew's cross on its back, formed by the white clavi and inner edge of the coria. In contrast to the uniformly black thorax of the two species of *Lygaeus*, *M. bicrucis* has large white areas on the pleura, and a white band across front margin of pronotum. Head, antennae, front half of pronotum, scutellum, legs, and elytral membrane are black, the latter with thin white outer edge. Abdominal sterna red with small black spots in paramedian series only, none at outer corners.

The biology of *N. bicrucis* has been investigated in some detail, a good review of the literature is provided by Slater & Baranowski (1990: 17, 18). The species depends largely on composites of the tribe Senecioneae for its food plants, with a preference shown for species of *Senecio* itself. Further, *bicrucis* has been identified as

adapted to temporary habitats, with females able to delay oviposition and disperse when local food sources are inadequate. It seems to prefer rather drier habitats than its relatives. Over-wintering occurs in the adult stage. The species is photopositive and a number of Virginia specimens were taken from black light traps as well as white and neon lights. Mating was noted near Clifton Forge, Va., in early May 1950 on an unidentified *Senecio* (probably the common *S. smallii*.).

Figure 8. *Neacoryphus bicrucis* (Say)

N. bicrucis is widespread over eastern and southern United States, as far west as California, and southward into Mexico. In Virginia it appears to be statewide, although we still have no records for the higher parts of the Mount Rogers area. Specimens have been examined from Accomack, Albemarle, Alleghany, Bedford, Botetourt, Greensville, Hanover, Henrico, Highland, Isle of Wight, King & Queen, Loudoun, Mecklenburg, Montgomery, Nelson, Nottoway, Patrick, Pittsylvania, Prince Edward, Prince George, Southampton, Surry, Tazewell, and Washington counties, and the cities of Norfolk, Richmond, and Virginia Beach. The absence of data from the far southwestern counties is surely only an artifact of inadequate collecting. In terms of vertical range, the species extends from sea level to at least 4000 ft. (at Locust Springs, Highland County).

Although capture dates extend from March to early October in Virginia, by far the greatest number are for May as the following breakdown shows:

March	1	July	9
April	5	August	4
May	19	September	1
June	9	October	2

Blatchley (1926: 347) gave May 9–July 1 for his Indiana collections, and Brimley (1938: 67) states "March to August" for North Carolina.

[Genus **Melacoryphus** A. Slater]

As noted under the heading for *Neacoryphus*, that genus was further divided a few years ago (A. Slater, 1988) with seven of its species being transferred to *Melacoryphus*. There is some doubt that this genus is represented in the Virginia fauna, but one species is admitted to the foregoing key to cover the possibility that it may be found in the state.

The two species M. *facetus* (Say) and *N. admirabilis* (Uhler) have been recorded from eastern states. The latter is discussed by Slater & Baranowski (1990: 20) as follows: "*Melacoryphus admirabilis* (Uhler) was reported by Torre Bueno (1946) from Florida and Maryland without definite locality. All of the other distribution records for this species are from far western states and authentication of these eastern records is necessary." It does not appear likely that *admirabilis* occurs naturally east of the Mississippi River, much less along the Atlantic Coast.

M. facetus requires more serious consideration. Blatchley (1926: 348) defined the species' range as "New Jersey southwestward in the coastwise states to Texas...". Ashlock & A. Slater (1988) cite "Fla., Ga., La., Md., N.J., Pa., S.C., Tex..." for distribution, but J. Slater & Baranowski (1990: 19) apparently disallow northern records, stating: "The range is southern from Georgia and South Carolina and Florida west to Arizona . . ." Eventually this ambiguity can be resolved by the examination of voucher specimens, if any exist for the northeastern states listed. Brimley (1938: 67) recorded *facetus* from Lee County, and the USNM collection has it from adjacent Moore County, in the North Carolina coastal plain, which suggests that the species might occur as far north as southeastern Virginia.

Genus **Ochrimnus** Stål

The local species are relatively small bugs (ca 4-7 mm long), which share the characters of transverse pronotal impressions and reddish to whitish ostioles. Neither has been frequently taken in Virginia.

As treated by A. Slater (1993), *Ochrimnus* is a dominantly Neotropical genus of 42 species, organized

into five subgenera. Of the two Virginia species, one (*lineoloides*) is referable to the subgenus *Parochrimnus*, the other (*mimulus*) to *Phaeochrimnus*. With so few local species involved, reference to subgeneric categories seems unnecessary.

121. **Ochrimnus lineoloides** (J. A. Slater)
Figure 9, Map 5

Body length about 4-6 mm; body dominantly piceous to blackish, with pronotum dorsally and dorsolaterally, costal and posterior margins of corium, claval commissure, and median scutellar stripe red. Legs and antennae sooty black. Head with a small rounded median red spot. Pronotum with paramedian, square, black marks on calli and usually a black line of variable width extending caudad from each.

In earlier literature this species was recorded as *Lygaeus lineolus* Dallas, 1852. Prof. Slater discovered that this combination was preoccupied by *Lygaeus lineolus* Curtis, 1831, and proposed the replacement name in 1964.

The biology of this small bug is poorly known. Blatchley (1926) mentioned finding it on thistle flowers in Florida, and Palmer & Bennett (1988) reported breeding of the species on the composite *Baccharis halimifolia* L. Slater & Baranowski (1990) took both nymphs and breeding adults on the composite *Pluchea foetida* (L.). Both of these plants occur in eastern Virginia, but have not yet been found inland as far as the three Piedmont localities for *lineoloides*. However, *Pluchea camphorata* (L.) does occur well across Southside Virginia, and should be investigated as a possible food plant of choice. The material from Dillwyn, Va. was labeled as being taken from "*Solidago* sp." The Mecklenburg County specimen taken by me was swept from a low, marshy floodplain field sometimes in cultivation. No attempt was made at selective sweeping, nor identification of the weedy plants, aside the observation that a species of *Senecio* appeared to be dominant locally. Collecting at the same site one week later produced no additional *lineoloides* despite prolonged effort, nor were any found on later visits. The series from Charlotte County was taken from inflorescence of the composites *Eupatorium* (sp.) and *Solidago* (? *bicolor*) growing in a recovering clearcut floodplain woods. Although a hundred could easily have been captured, neither mating nor immature stages were observed. The same plants, ten feet away, had not a single specimen nor did any other plant in the vicinity. *Pluchea* was not noticed nearby, although two species of that genus occur in Charlotte County.

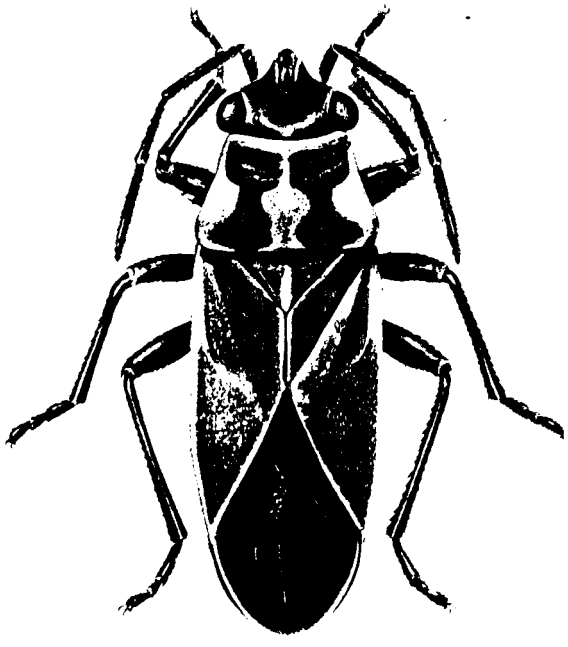


Figure 9. *Ochrimnus lineoloides* (J. A. Slater)

Ochrimnus lineoloides is distinctly a lowland species, ranging from Virginia south and west as far as New Mexico. Slater & Baranowski (1990) showed it to be widespread and abundant in Florida except for the western panhandle. Further north the records become much fewer. Brimley (1938) mentioned only Raleigh for North Carolina, and I know only three Virginia collections made in recent years. The original record for the state is that of Torre-Bueno & Engelhardt (1910) for Virginia Beach (where it has never been subsequently found). I give here full collection data for the few specimens known from Virginia:

Buckingham County: Dillwyn, 29 July 1947, A. M. Woodside (VPISU 5). **Charlotte County**: Cub Creek floodplain along Va. 695, ca. 2.5 miles NNW of Phenix, 10 August 1994 (VMNH 10). **Halifax County**: marshy field in Banister River floodplain, Va. Rt. 716, ca. 2.5 mi. SW of Scottsburg, 25 July 1992 (VMNH 1). It is interesting that these northernmost known localities for the species are well inland on the Piedmont rather than in the Coastal Plain.

Slater & Baranowski (1990: 22) indicate that the body regions mentioned above as being red, are yellow in Florida specimens.

122. **Ochrimnus mimulus** (Stål)
Figure 10, Map 6

Body 5-6 mm in length, brownish, with pronotum, costal and posterior margins of corium, claval commissure, and median scutellar stripe pale yellowish; calli and a large propleural spot bright red, usually a dark square dark marking posterior to each callus. An elongate vertical yellow marking in front of each eye; no median spot on vertex. Legs and antennae brown, femora with an apical light ring.

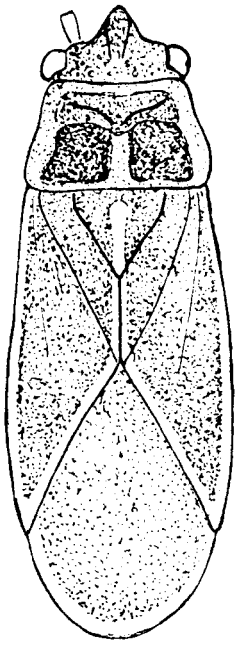


Figure 10. *Ochrimnus mimulus* (Stål)

In Florida and elsewhere, this species is closely associated with species of the composite genus *Baccharis*, one of which (*B. halimifolia*) occurs throughout the Virginia Coastal Plain. I have found it only once, during general sweeping of dune shrubs, dominantly a species of *Myrica*, and do not recall seeing any composites at the site. As in Florida, *mimulus* has been taken at blacklight in southeastern Virginia.

The species has been recorded in the Coastal Plain from Virginia to Texas. Brimley (1938) had seen North Carolina material only from Beaufort, on the sea coast, and Aberdeen, which is well inland on the Fall Line. In contrast, Virginia records for *mimulus* are confined to a narrow belt within a mile or two of the seacoast. Perhaps this picture will be modified by future investigation of *Baccharis halimifolia* in our Tidewater area.

The known range of the species can be extended some 120 miles even further northward, as the National Museum collection has a series taken at Chesapeake Beach, Calvert County, Maryland. This location implies a general distribution in the Cheaspeake Bay area, probably including the two "eastern shore" counties of Virginia.

Available local records are for **City of Portsmouth**: without further data, 9 August 1975, blacklight trap, W. A. Allen (VPISU). **City of Virginia Beach**: Cape Henry (USNM); Virginia Beach (the resort area), 18 October 1932, L. D. Anderson (VPISU); Naval Air Station, Oceana, 9 August 1975, blacklight trap, W. A. Allen (VPISU); Little Island Park, 4 miles south of Sand Bridge, 12 September 1992, R. L. Hoffman & Barbara J. Abraham (VMNH).

The few collection dates clearly indicate a late summer and autumn period of activity for adults.

Genus **Lygaeospilus** Barber

A. Slater (1993) noted the close affinity of this genus with *Melacoryphus*. Of the four species recognized by him, two are confined to the Pacific Coast, the third chiefly to interior North America, and the fourth ranges widely from Quebec and South Dakota south to Florida and Texas. These are the smallest local species of the subfamily and somewhat atypical in appearance, lacking the usual red or yellow markings, and (our species at least) presenting a distinctly hairy aspect.

123. **Lygaeospilus tripunctatus** (Dallas)
Figure 11, Map 7

Length 4-5 mm. Body dark brown or piceous. Hemelytral membranes pale, with darkened veins; front edge of pronotum and posterior angles light brownish-yellow. Body surface thickly beset with short, declivent grayish hairs.

The distributional picture is equally fragmentary. Despite the wide range of *tripunctatus*, museum collections are not replete with material. Blatchley (1926: 348) found it only at Dunedin in Florida (and in Indiana not at all). Froeschner (1944) saw only two specimens from Columbia, Missouri. Brimley (1938) cited no records for North Carolina, and the NCSU collection has material only from Bladen Lakes State Park, Bladen Co. The few known Virginia specimens have the following documentation:

City of Virginia Beach: Dam Neck Navy Base, pitfall in interdunal swale, 12 October 1990, VNHP survey, via Kurt A. Buhlmann (VMNH 3), and 14 May 1991

(VMNH 2). **Mecklenburg Co.**: Elm Hill State Game Management Area, 6 mi. SE of Boydton, at black light beside marsh, 1 August 1995, museum survey (VMNH 1).

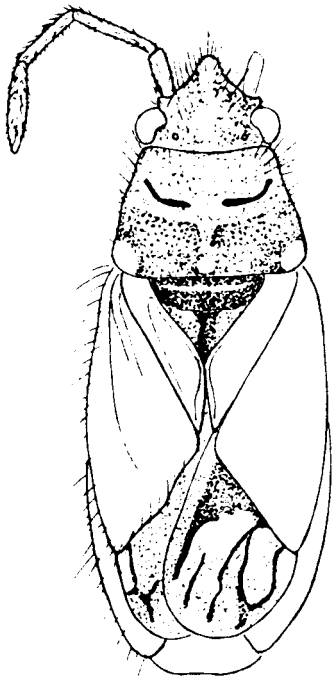


Figure 11. *Lygaeospilus tripunctatus* (Dallas)

Little is known of the biology of *L. tripunctatus*. It seems to be more an edaphobite than its local relatives. Slater & Baranowski (1990) mention taking it on *Erigeron quercifolius* in Florida.

This rather sombre little bug scarcely seems at home in the Lygaeinae, owing to the dusky coloration and absence of the usual bright reds or yellows. It is not surprising that it was originally described as an *Aphanus*, and I initially mistook my first (and only) Virginia specimen to be some kind of orsilline.

Subfamily II. ORSILLINAE

The species of this subfamily are mostly small to medium-sized lygaeids, basically some shade of gray or light brown ornamented with small areas of black. All of the abdominal spiracles are placed dorsally as in the Lygaeinae, and the scutellum at a lower level than basal edge of pronotum. Also as in that subfamily, the posterior edge of the metapleura is free from the adjacent sternal surface, in posterior oblique view one may actually see "in between" these two sclerites. The posterior edge of the metacoxal acetabulum is likewise flared outward. Ostiolar peritreme generally similar in all genera, large and prominent, auriculate, anterior edge folded at least partly over posterior, apical end thickened and microgranulate. Posterior edge of the hemelytral corium emarginate toward the base. A character which I have not seen mentioned in the literature is the failure of the claval ends to form a straight median commissure: in all local genera the distal edges of the clavi *overlap* (usually right over left) (Fig. 15).

Blatchley (1926) treated the orsillines as a tribe under Lygaeinae. Scudder (1957) elevated the group to subfamily rank, but included the ischnorhynchines, which Stichel (also in 1957) ranked as a separate subfamily. The world fauna of the Orsillinae in its modern sense was reviewed by Ashlock (1967), who provided keys to and diagnoses for all genera, and lists of known species. A more recent contribution to the group is the restriction of *Ortholomus* to the Palearctic Region by the removal of Nearctic species to the new genus *Neortholomus* by Hamilton (1983). These various changes are summarized in Table I (p. 8).

Although a tribal classification was developed by Ashlock, the number of Virginia genera is so limited that this intermediate level in the hierarchy can be omitted.

Key to Virginia genera and species of Orsillinae

1. Head as long as pronotum, beak extending back at least to 6th sternite, sometimes to genital segment; 1st antennomere not extending beyond apex of tylus . . . . . *Belonochilus numenius*, p. 16
— Head shorter than length of pronotum; beak not extending beyond 1st sternite; 1st antennomere equalling or surpassing end of tylus 2
2. Lateral (costal) edge of hemelytra straight for its entire length; body notably hairy-tomentose; corial veins mostly unmarked . . *Neortholomus scolopax*, p. 18

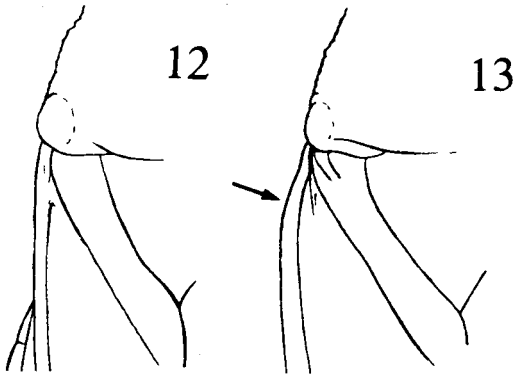


Figure 12. *Neortholomus scolopax* (Say). Figure 13. *Xyonysius californicus* (Stål). Left side of midbody showing outline of corium.

— Costal edge not straight, explanately widened at some point along its length; body only sparsely pilose; veins of corium with distinct dark spots and dashes 3

3. Bucculae relatively short, disappearing before level of front edge of eye, thus exposing much of first segment of beak (Fig. 17); edge of corium finely costulate as a stridulatory surface . . . . . *Xyonysius californicus*, p. 18

— Bucculae relatively longer, extending back nearly to base of head and thus largely concealing 1st segment of beak (Fig. 18); costal edge of hemelytra not modified for stridulation 4

4. Size averaging smaller, ca. 3-4 mm, costal margin of hemelytra very gradually broadened at level of scutellar apex; head short, space between eye and apex of tylus about equal to length of an eye (Fig. 15) . . . . . *Nysius raphanus*, p. 19

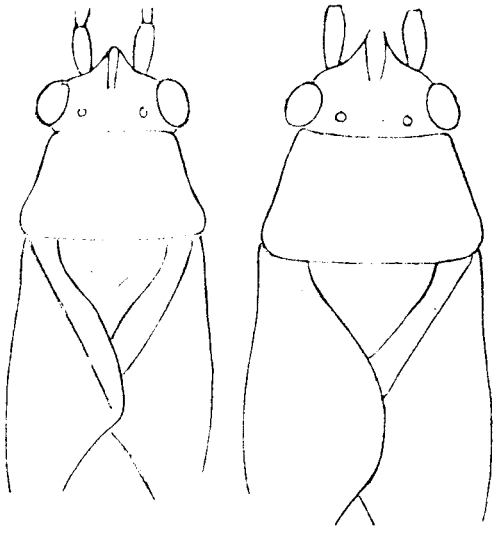


Figure 14. *Nysius ericae* (Schilling). Figure 15. *Nysius raphanus* Howard. Forebodies in dorsal aspect, showing head shape and costal margins.

— Size larger, about 4-5 mm, costal margin of hemelytra broadening more perceptably; space between eye and apex of tylus much greater than an eye diameter (Fig. 14) . . . . . *Nysius ericae*, p. 19

Genus **Belonochilus** Uhler

Head exceptionally long (equal to length of pronotum); eyes separated from front corner of pronotum. Beak also remarkably long, often extending posteriad to base of male genital segment. Ostiolar peritreme with rounded distal lobe. Profemora with a single, large and acute subapical spine on anterior side. Procoxae and mesocoxae widely separated, with a round, smooth and polished convexity between them; meso- and metasterna relatively broad, separated by a deep narrow transverse groove between the mesocoxae. All of the abdominal sterna mesially divided in females to accomodate the enlarged ovipositor mechanism.

The genus is monotypic and endemic to North America, with the single species apparently an obligate feeder on the fruits of sycamore and London plane tree (both species of *Platanus*).

124. **Belonochilus numenius** (Say)
Figure 16, Map 8

Body up to 7 mm long, females distinctly larger than males; color basically testaceous yellow to light brown, head, pronotum and scutellum with narrow ivory to yellow median line, head often with black paramedian lines. Apical part of corium with red or brownish spot; claval commissure narrowly marked with black. Thoracic sterna black in males. Connexiva with large diffuse reddish spots, and pronotum also often with reddish infusion.

The species occurs over most of United States from New England to California, and extends southward well into Mexico. Curiously, it seems to be missing from the southeastern states. Brimley (1938: 67) gave only Raleigh as a North Carolina locality, and the NCSU collection has material only from that city. Slater & Baranowski (1990: 34) cited only a single Florida record: Disney World near Orlando. The massive landscaping involved in the construction of Disney World suggests the possibility of accidental introduction on transplanted sycamores (*Platanus* is not native to Florida).

Only a few Virginia records are available for *numenius*, none of them in the Coastal Plain. However, since *Platanus occidentalis* occurs in probably every county in the state, collecting on the ripe fruiting heads of that tree will doubtless show the bug to have an equally extensive distribution.

Albemarle Co.: Greenwood, on peach, 6 April 1946, M. L. Bobb (VPISU); "Rt. 671 bridge" [northeast of Whitehall], 26 November 1980, B. C. Kondratieff (VMNH 2). **Alleghany Co.**: Clifton Forge, 8 July 1950 (material lost). **Carroll Co.**: tributary to Lovett's Creek, ca 4 mi NE of Cana, 16 April 1995, J. M. Anderson (VMNH 6). **Cumberland Co.**: outfall of Trice Lake, ca 5 mi W of Cartersville, 4 April 1995 (VMNH 1). **Fairfax**

Co.: Mount Vernon, Great Falls, Rosslyn (all USNM, various dates). **Floyd Co.**: Flat Creek, 4 January 1978, B. C. Kondratieff (VMNH 1). **Franklin Co.**: Smith Mountain Lake 4-H Center, 9 mi ENE of Rocky Mount, 17 April 1995, J. M. Anderson (VMNH 10). **Grayson Co.**: along New River, Va. 274, ca 6 mi. NE of Independence, 16 April 1995, J. M. Anderson (VMNH 8). **Henry Co.**: Martinsville, May-August 1994, March-October 1995 (VMNH ∞). **Loudoun Co.**: Purcellville, 15 July 1954, E. J. Hambleton (VPISU 10). **Montgomery Co.**: Radford, May 1960, 1965, 1969 (VMNH 3). **Patrick Co.**: ca 3 mi SW of Ararat on Va. 699, 16 April 1995, J. M. Anderson (VMNH 1). **Rockingham Co.**: South Fork Shenandoah River at Island Ford, 17 September 1995 (VMNH 13).

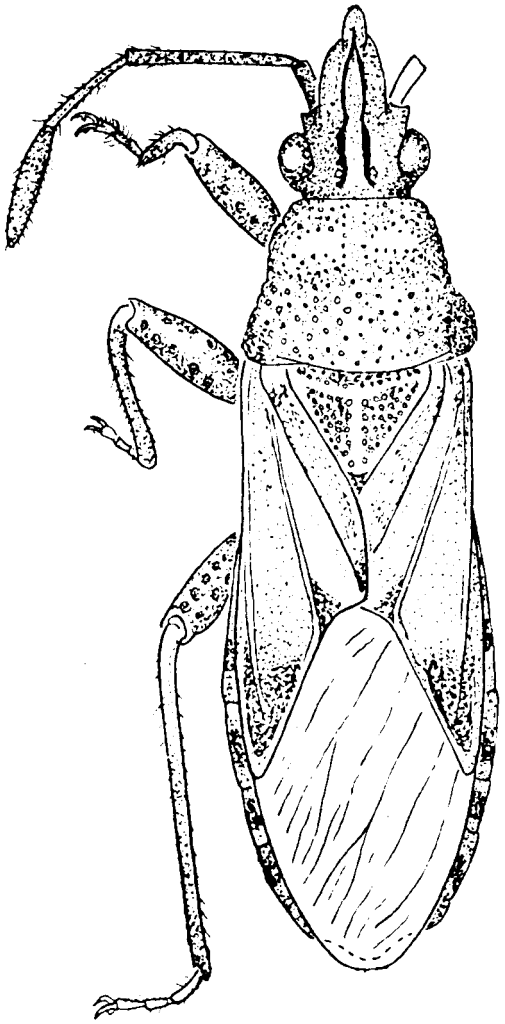


Figure 16. *Belonochilus numenius* (Say)

In the Carroll County sample, 5th instar nymphs transformed into adults around 21-23 April. At Martinsville, only late-stage nymphs were found on sycamore balls in mid-May; adults and last-stage nymphs were present on 31 May; only 1st and 2nd stadia nymphs on 18 July; and on 8 August adults were very numerous (up to 8-10 per ball), invariably clustered at the "south Pole" of the sphere. Mating was observed on 10 October, the females at least 50% longer and up to 100% bulkier than their consorts. In late March and early April adults were active on the surface of disintegrating balls, and several of these (two out of six balls contained bugs) examined with magnification in the laboratory produced large numbers of all stages except I. Actual counts are impressive:

II	18	V	28
III	21	Adult	4
IV	37		

These fragmentary observations concur generally with the more extensive and carefully documented studies made by Wheeler (1984) at Harrisburg, Pennsylvania, except for the findings noted for April. Wheeler's data implied a sequence of four generations per season, with the eggs produced by adults of the 3rd or 4th overwintering. If only eggs overwintered in Virginia, one might expect that all of the bugs found in early Spring would be roughly in the same stadium, unless hatching occurred at sequential intervals. My failure to detect either intact eggs (shell fragments were noted) or stadium I juveniles suggests that eclosion in these particular balls was completed by the 4th week in March. The distribution of developmental stages throughout the year in Virginia requires a lot of work by someone with sufficient time and motivation to carry it out. Despite the abundance of *numenius* on sycamore fruits, the species is rarely taken by sweeping or other random techniques.

Genus **Neortholomus** Hamilton

Body coarsely punctate, densely invested in short erect setae; 4th antennomere as long as 2nd (♀♀) or longer (♂♂), incrassate and fusiform; bucculae low but as long as 1st segment of beak; latter extending as far as 2nd abdominal sternum; peritreme large, auriculate, anterior edge folded over posterior except apically where thickened and microgranulate; posterior half of hemelytra enclosed within connexivia.

This genus was set up in 1983 for several New World species previously referred to *Ortholomus*. Only one of them occurs generally in eastern United States.

125. **Neortholomus scolopax** (Say)
Figure 12, Map 9

Length 5-6.5 mm, females notably larger than males; dorsally variable in color, from almost uniformly light yellowish brown to darker grayish brown, pronotum often with darker longitudinal markings and with sooty black transverse lines across the calli; scutellum piceous with elevated ivory median carina, often with reddish transverse basal line; clavus almost always reddish apically; membrane with varying amounts of dark markings; abdominal dorsum dark, with a light spot at each incisure dorsally, ventrally reddish brown with irregular black markings.

This species is widespread over much of eastern North America and appears to be statewide in Virginia. Specimens have been seen from Albemarle, Alleghany, Augusta, Buckingham, Charlotte, Chesterfield, Floyd, Giles, Grayson, Loudoun, Mecklenburg, Montgomery, Prince Edward, Rockingham, Tazewell, and Wythe counties, and the City of Norfolk. Collection sites range from sea level to about 5500 feet on Mount Rogers.

Collection dates, although not numerous, are nonetheless random and reflect a possibly bivoltine, activity pattern:

April	1	September	0
May	0	October	10
June	10	November	0
July	2	December	1
August	1		

Most specimens have been taken by sweeping weedy fields and roadsides. The species does not seem to be attracted to blacklight traps.

Genus **Xyonysius** Ashlock & Lattin

The three Nearctic members of this New World genus were not distinguished from *Nysius* by Barber (1947), although they were separated out in the first couplet of his key to species by characters of the beak and bucculae. The stridulatory "file" of the corial edge was not mentioned as a taxonomic character until *Xyonysius* was proposed by Ashlock & Lattin in 1963 (*xyo* being a Greek word meaning "to scrape").

126. **Xyonysius californicus** (Stål)
Figures 13 and 17, Map 10

Length of body to about 7 mm. Head and pronotum uniform yellowish to brownish gray The origin of the costal explanation quite near the base of the hemelytra (Fig. 13) is an easily seen diagnostic character for this species.

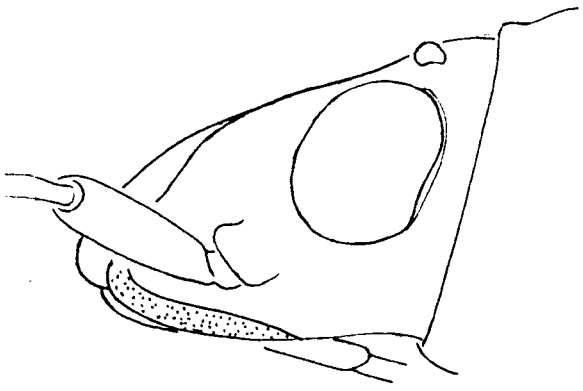


Figure 17. *Xyonysius californicus* Stål. Lateral view of head showing relatively short buccula (stippled).

As *californicus* occurs over most of the United States and much of South America, it is astonishing that this species was not named until 1859, from material collected in California. How could Say have missed such a common species? It seems to be widespread across Virginia and occurs in abundance from sea level to about 5500 ft at Mount Rogers. As a rule specimens are taken by sweeping weedy fields in late summer.

Material has been seen from the counties of Alleghany, Buckingham, Chesterfield, Dickenson, Dinwiddie, Grayson, Greensville, Halifax, Mecklenburg, Montgomery, Pittsylvania, Prince George, and Smyth, and the city of Norfolk. Collection dates suggest an early Fall activity peak:

July	6
August	3
September	20
October	2

The subspecific name *alabamensis* Baker, 1906, has been applied to populations in eastern North America, but this nominal geographic race is probably unjustifiable.

Genus **Nysius** Dallas

Small, rather dingy, grayish yellow to brown bugs, length 3-5 mm. Bucculae equalling or slightly longer than first beak segment. Scutellum without distinct

median carina (if present, not light-colored).

The North American species of *Nysius* were revised in some detail by Barber (1947). Subsequently, several taxa have been removed to *Xyonysius*, and some changes in specific names have occurred. Barber's key is not easy to use, and some of the couplets contradict those which come before. Locally, however, our two species should

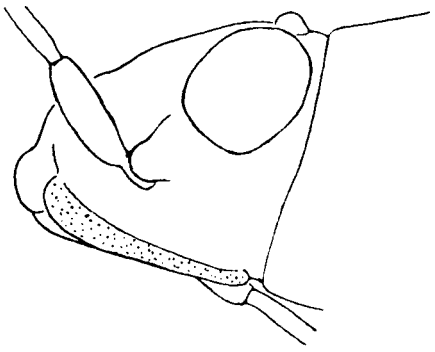


Figure 18. *Nysius* sp. Lateral view of head showing long buccula (stippled) extending to base of head.

offer no serious problems of identification. Prof. Slater suggested use of the hemelytral costal margin as a primary diagnostic character (cf. Figs. 14 and 15), and I herewith propose size of the eye relative to length of the preocular head region as a possible secondary feature. The relative width:length values of the pronotum used by Barber do not seem to hold true in local material.

127. **Nysius ericae** Schilling
Figures 14 and 19, Map 11

As indicated in the foregoing key, *ericae* is slightly larger than *raphanus*, with broader costal explanation and somewhat longer head. Otherwise the two are generally very similar.

The name *ericae* has experienced a rather confused history, with some other names confused under it, and for a time (e.g., in the catalogue of Ashlock & A. Slater, 1988) replaced by the name *niger* (Baker, 1906) on the premise that *ericae* in the strict sense was an Old World species. At present (March 1995) Prof. Slater accepts the opinion of Dr. F. Schmidt that North American populations are not specifically distinct from nominotypical *ericae*. Because of this long-standing ambivalence, as well as the difficulty of distinguishing species in this genus, published records for either species are not entirely reliable, and ranges are imperfectly known. In general, *ericae* seems to be a more northern form in North America, and *raphanus* generally more southern. In Virginia the ranges overlap broadly, however, and material is inadequate to provide a sensible picture of distribution.

Accomack Co.: without specific locality, 26 September 1932 (VPISU 1). **Loudoun Co.**: Purcellville, 22 June 1964 (VPISU 5). **City of Norfolk**: 15 October 1930, 10 October 1932, 26 August 1966 (VPISU 4). **City of Virginia Beach**: beach resort area, 18 October 1932 (VISU 2); Oceana Naval Air Station, 26 August 1975 (VPISU 1). As with other orsillines, the species seems to have a Fall activity peak: September-October.

Most material at hand seems to have been collected by general sweeping in weedy fields and roadsides.

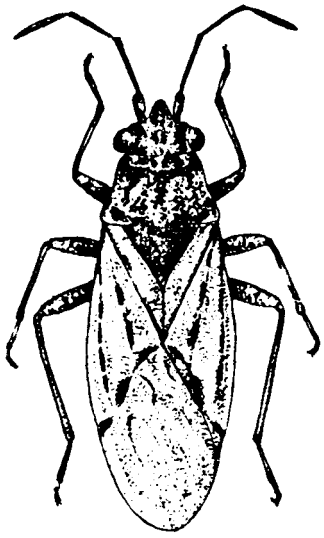


Figure 19. *Nysius ericea* Schilling.

128. **Nysius raphanus** Howard
Figure 15, Map 12

Slightly smaller than *ericae*, with less dilated costal margin, this species is more frequently collected in Virginia, where it enjoys a statewide distribution.

The few scattered Virginia records are for: **Accomack Co.**: without precise data, 26 September 1932 (VPISU 2). **Floyd Co.**: 3 mi SW Indian Valley, 25 June 1989 (VMNH 1). **Giles Co.**: Mountain Lake, 27 September 1950 (VPISU 1). **Halifax Co.**: 3 mi NW of Turbeville, 26 July 1994 (VMNH 1). **Highland Co.**: 1 mi SE of Hightown, 30 July 1994 (VMNH 2). **Mecklenburg Co.**: 5 mi S of Boydton, 24 September 1988 (VMNH 4). **Nottoway Co.**: Fort Pickett, pine savannah, 7 September 1993 (VMNH 1). **Pittsylvania Co.**: 4 mi ESE of

Cascade P.O., 8 June 1993 (VMNH 2); Cascade P.O., 16 June 1989 (VMNH 2); Chatham, 28 July 1963 (VMNH 2). **City of Norfolk**: 10 October 1932 (VPISU 3). **City of Virginia Beach**: Oceana, 2 September 1975 (VPISU 1).

Adults are active throughout the summer and fall, with no peak clearly shown in the available data. Most specimens were taken by general sweeping in ruderal situations but those from Fort Pickett, Chatham, and Oceana were taken at UV light. At several sites in the southeast, both species of *Nysius* were taken together.

Subfamily III. ISCHNORHYNCHINAE

The status of this taxon has been variously interpreted in the past. Originally established as a tribe in the Cyminae, it retained that status until 1957 when G. G. E. Scudder transferred it to the Orsillinae and H. Stichel independently elevated it to subfamily status. The latter action was endorsed by Usinger & Ashlock in 1959 and subsequently adopted by Scudder in his overview of the world fauna in 1962. The subfamily is one of the smallest in the Lygaeidae with only 14 genera (seven of them named since 1958), but is represented in all parts of the world.

Only the Holarctic genus *Kleidocerys* (for a long time known by the younger name *Ischnorhynchus)* occurs in North America, with one species in Virginia.

Genus **Kleidocerys** Stephens

Kleidocerys is a Holarctic genus with two or three Eurasian species and four or five in North America, one of them shared by the two continents. As in the case of *Nysius ericae*, there is some uncertainty whether *Kleidocerys resedae geminatus* is conspecific with European populations of *resedae*. The North American taxa of the genus were revised by Barber (1953).

129. **Kleidocerys resedae geminatus** (Say)
Figure 20, Map 13

This small (4-5 mm) lygaeid is easily distinguished by the transparent, almost glassy elytra, the membranes of which project far beyond sides and apex of the abdomen. As the elytra have the proportions normal for the family, this effect is caused by the condensation of the abdomen as noted in the key to subfamilies. The ostiolar peritreme is elongate and apically acute, extending more than halfway up the metapleuron, and the distal end stands free of the pleural surface. The hemelytral clavi form the normal median commissure.

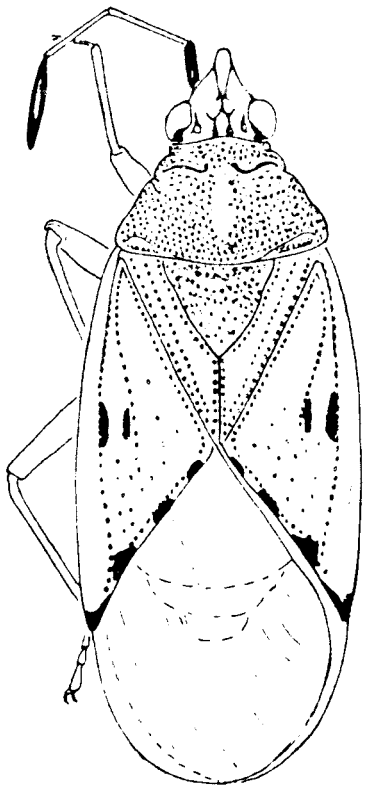


Figure 20. *Kleidocerys resedae geminatus* (Say).

The status of this bug in North America has been dissentiously treated in the past. It was originally described by Say (1831) from Indiana and Missouri and appeared in the literature for a century under the name *Ischnorhynchus geminatus*. By some authors, during this same time period, *geminatus* was considered to be a synonym of the Palearctic *I. resedae* (Panzer). In 1953 the Nearctic species of *Kleidocerys* were revised by Barber, who concluded that the two names were indeed conspecific, but that two forms (subspecies) of *resedae*, differing in corial texture, occurr in North America. For the southern form, with a more hyaline corium, he restricted the name *geminatus;* the northern with more opaque corium appeared to Barber to be identical with European populations and thus took the trinomial *K. r. resedae*. The respective ranges of these nominal subspecies in North American have not been carefully defined, although the species in its broad sense is essentially continentwide.

Wheeler (1976) summarized host plants used by both adult and nymphal stages, listing 43 species in 14 families that virtually span the Spermatophyta. Apparently there is a preference shown for the ovulate cones

of birches, wherever species of *Betula* occur, and in the case of cultivated birches dense populations of *Kleidocerys* can build up. In Virginia, the species has been found on many of the plants listed by Wheeler, as well as one not on his list: *Hydrangea arborescens* L. (Saxifragaceae), many adults on the dried fruit heads at Clifton Forge, Alleghany County, October 1950. In mid-May, adults and 1st stadium nymphs (the latter assumed to be of this species) are often found in the dry ovulate cones of *Alnus serrulata* at Martinsville. The species also frequently occurs in the pistillate second-year heads of cattails (*Typha* sp.). Near Clifton Forge, Alleghany Co., adults have been found (2 July 1954) in abundance on the seeds of *Rhododendron maximum*, and in great numbers (nearly all in copula, 14 September 1954) on the seeds of mullein, *Verbascum thapsus*.

Kleidocerys r. geminatus is statewide in Virginia, found from sea level to 5200 ft on Mount Rogers, and doubtless occurs in every county and city. Records at hand are for Accomack, Albemarle, Alleghany, Augusta, Bath, Brunswick, Carroll, Floyd, Giles, Grayson, Greensville, Loudoun, Montgomery, Patrick, Roanoke, and Washington counties and the cities of Suffolk and Virginia Beach. Collection dates range from late February (Suffolk) to early December (Augusta Co.). Other dates are for April to October, with a preponderance (eight of 21) in May.

Subfamily IV. CYMINAE

Cymines are "seed bugs" in every sense of the word: these small slender bugs not only feed upon, but also resemble, the fruits of grasses and sedges. The body tends to be tawny to testaceous brown, often with some regions darker, and the dorsal surface (except membrane of the hemelytra) is densely and coarsely punctate. The anteriormost abdominal segments are notably coalesced, and the ostiolar peritreme is very small, located in the anteroventral corner of the metapleuron and extending dorsad less than a sixth of the anterior margin. The bucculae are small flaps abruptly bent caudad, but the caudal edge is not fused with the head surface, leaving a small but deep notch (Fig. 21).

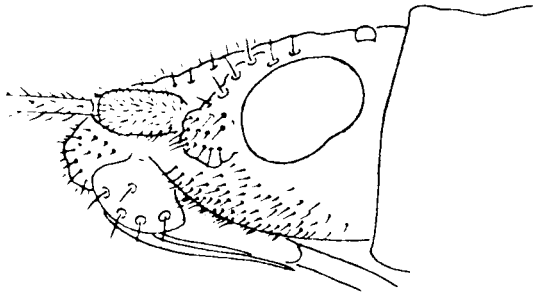


Figure 21. *Cymus angustatus*, side of head showing modified buccula typical of this subfamily.

Several authors have recently proposed reallocating this subfamily to either the Berytidae, Malcidae, or Piesmatidae; such a transfer would remove a somewhat discordant element from the Lygaeidae. Until a general reclassification of the higher categories of Heteroptera has been accomplished, however, it seems reasonable to observe the traditional placement of long standing.

The biology of cymines in Connecticut was discussed by Hamid (1971); the same author later (1975) treated the classification of the entire subfamily worldwide, published unfortunately in a journal not readily available in this country.

Key to the Virginia genera and species of Cyminae

1. Preocular part of head notably shortened, 1st antennomere extending well beyond apex of tylus; 3rd twice as long as 2nd (Fig. 22) . . . . . *Cymodema breviceps*, p. 22
— Preocular part of head elongated, 1st antennomere not exceeding apex of tylus, 3rd much less than twice length of 2nd 2
2. 2nd and 3rd antennomeres approximately equal in length; length of body greater than 4.5 mm . . . . . [*Cymus luridus*, p. 24]
— 2nd antennomere longer than 3rd; body length less than 4.0 mm 3
3. Median carina of pronotum distinct throughout pronotal length at least as a light line; head relatively long, apex of tylus extended beyond end of 1st antennomere, the base of which is distinctly separated from front edge of eye; pronotum much longer than its basal width, and lacking lateral carinae . . . . . *Cymus angustatus*, p. 22
— Median carina of pronotum distinct only in region of collar; head relatively short, apex of tylus at most equalling end of 1st antennomere, which is scarcely removed from front edge of eye; pronotum scarcely if at all longer than its basal width and with small but distinct lateral carinae . *Cymus discors*, p. 23

Genus **Cymodema** Stål

As implied by the name of its type species, this genus differs from *Cymus* chiefly by the less prolonged head (Fig. 22). The longer 3rd antennomere is more in the nature of a specific character, such as occurs among species in *Cymus*.

130. **Cymodema breviceps** (Stål)
Figure 22, Map 14

This species is generally similar to those of *Cymus* but is readily distinguished by the long 3rd antennomere and short head. Length 4.5-5 mm. Color uniform light yellowish-brown, antennae reddish. Pronotum with whitish median line. Only the posterior-most abdominal segments are striated, rather than most of them as in *Cymus*.

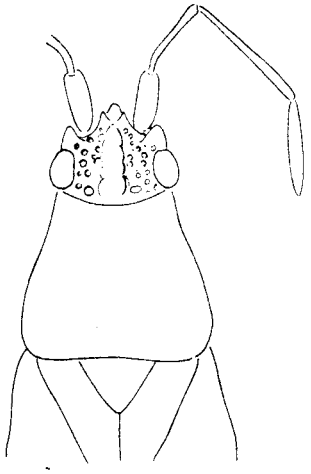


Figure 22. *Cymodema breviceps* (Stål), forebody showing proportions of antennomeres and shape of head.

The species was treated by Blatchley (1926: 362) and many other authors as *Cymus virescens* (Fabricius), but that name actually refers to a species of *Kleidocerys*. The correct name *breviceps* was resurrected in *Cymus* by Ashlock (1960), but was not united with *Cymodema* until more than a decade later (Hamid, 1975). However, *Cymodema* had been recognized as the right genus for this species a half-century earlier by Horvath (1908) when he redescribed it as *Cymodema exiguum* from specimens taken in the District of Columbia.

Published records indicate that species of *Spartina* and *Juncus* are preferred food plants. None of the material seen from Virginia had pin label information, but the three VMNH specimens were taken by sweeping grasses and sedges along ditches and low ground. Three of the five Virginia specimens were taken in August, the other two in April and June.

The distribution of *breviceps* is very extensive, from New York and Indiana south through the West Indies, Middle America, and most of South America east of the Andes. In eastern United States, the range coincides closely with the Coastal Plain but does extend up onto the Piedmont in some places. Virginia records are for: **Greensville Co.**: drift fence site 1 mile east of Claresville on Va. 666, 21 June 1993 (VMNH 1). **Mecklenburg Co.**: Clyde's Pond, Elm Hill State Game Management Area, 6 mi SE of Boydton, 13 April 1995 (VMNH 1). **Northampton Co.**: 2 miles east of Nassawaddox, Va. 608, 9 August 1993 (VMNH 1); Cobbs Island, 26 August 1889 (Cornell 1). **City of Norfolk**: 23 August (VPISU 1). The species undoubtedly occurs in all of the counties fronting on the Chesapeake Bay, and, sporadically, also in much of the Coastal Plain and outer Piedmont.

Genus **Cymus** Hahn

The much longer head and more prominent bucculae distinguish the local members of this genus from the closely related *Cymodema*.

With 33 known species, *Cymus* is essentially world wide in range. Nine species occur north of Mexico, of which two (possibly three) are represented in the Virginia fauna.

Existing keys rely heavily upon relative lengths of 2nd and 3rd antennomeres to distinguish the two confirmed Virginia species. Although this character "works" it is difficult to determine unless one's microscope is fitted with an ocular micrometer and is capable of at least 60X magnification. In fact, the forebody shape in these two species is dramatically different, very diagnostic, and easy to use, as can be noted by comparison of Figures 23 and 24.

131. **Cymus angustatus** (Say)
Figures 21 and 23, Map 15

Length, 3.7-4.5 mm, females slightly larger than males. Body generally uniform straw-yellow, light brown, or grayish brown, the posterior pronotal lobe sometimes much darker, scutellum sometimes nearly black; a small black spot at end of claval commissure and another at apex of each corium.

As already noted by Blatchley (1926) and Slater & Baranowski (1990), *angustatus* is partial to species of *Carex*, *Juncus*, and *Scirpus*, and in the northern part of its range prefers *Carex vesicaria* as its host plant. In Virginia this sedge is very spottily distributed in the mountain areas only, and *angustatus* feeds upon a variety of related plants. Adults have been obtained even from 2nd-year pistillate heads of cattails (*Typha latifolia*).
Cymus angustatus is widespread over much of North America east of the Rockies, and is statewide in Virginia, from sea level up to at least 4000 ft. Specimens

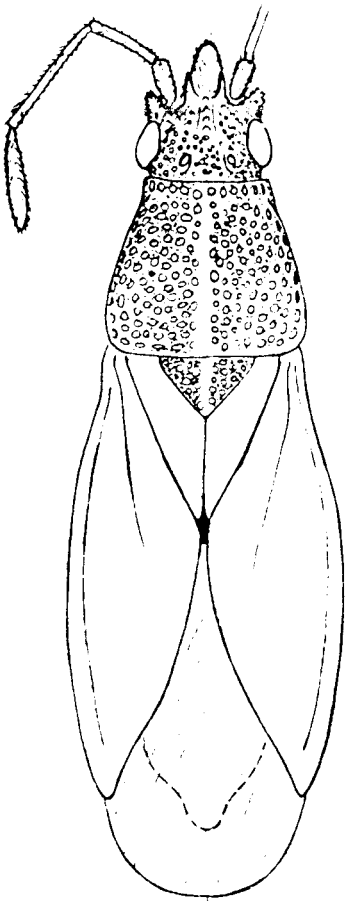


Figure 23. *Cymus angustatus* (Say).

have been seen from the counties of Accomack, Alleghany, Augusta, Bath, Bland, Brunswick, Fairfax, Giles, Greensville, Halifax, Highland, Loudoun, Louisa, Mecklenburg, Montgomery, Nelson, Northampton, Pittsylvania, Rockingham, and Tazewell, and the City of Virginia Beach.

Collections seen from Virginia were made between early May and late August, with the monthly distribution being May (11), June (4), July (6), and August (6). At Clifton Forge, Alleghany County, this species was very abundant in a mixed stand of *Juncus* and *Carex* along a small stream on 17 May 1950. Prolonged sampling at the same site on 25 July did not yield a single specimen.

Also near Clifton Forge, on 9 June 1952, a female found on a *Carex* fruiting head was being ridden by two males attempting to effect mating, whilst a third male scrambled atop the cluster.

132. Cymus discors Horvath
Figure 24, Map 16

Length 3-3.5 mm; body uniformly light yellowish-brown without tendency for pronotum to become infuscated as in *angustatus*; spots on claval commissure and apex of corium inconspicuous.

On direct comparison of specimens, *discors* differs strikingly from *angustatus* both in general appearance and in numerous small details of structure. The head of *discors* is smaller and shorter, the front half of the pronotum more flattened and provided with distinct dorsolateral carinae composed of a row of enlarged tubercles; in *angustatus* the pronotum is much longer and more slender anteriad, lacks lateral carinae, and dorsally is evenly convex. Further, in *discors* the anterior dorsal margin of the pronotum is distinctly depressed, giving the edge itself an elevated effect. In general facies, *discors* is distinctly more similar to *Cymodema breviceps* than to *angustatus*.

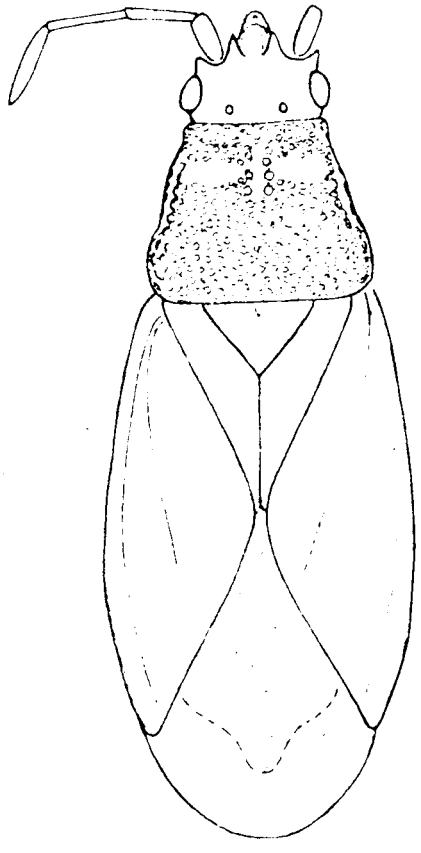


Figure 24. *Cymus discors* Horvath.

This small yellowish species is apparently more stenophagic than the preceding and has been confirmed as breeding only on *Scirpus cyprinus* (L.) (Hamid, 1971). This is one of the commonest sedges in eastern United States and is statewide in Virginia; thus records for *discors* should be far more numerous than are currently available. The few Virginia localities extend across the state from sea level to nearly 4000 ft.:

Alleghany Co.: Warm Springs Mountain, 3800 ft., 20 July 1950 (VPISU 1); pond at Griffith, 30 May 1953 (VPISU 4). **Craig Co.**: Potts Cove, 0000 ft., 11 August 1992 (VMNH 5). **Fairfax Co.**: Vienna [several, dates not transcribed (USNM)]; Dyke Marsh, Potomac River, 28 May 1915 (USNM). **Louisa Co.**: Gum Spring, 3 May 1914 (USNM). **Mecklenburg Co.**: Elm Hill SGMA, sweeping grasses and sedges at Clyde's Pond, 14 May 1995 (VMNH 1). **Prince William & Stafford cos.**: Occquaquan Falls, without date (Cornell 4). "Dismal Swamp" [probably City of Chesapeake], 4 May 1941 (VPISU 1).

The southern distribution of the species remains very imprecisely known. Blatchley (1926: 362) had no records south of New Jersey. Brimley (1938: 67) cited Raleigh as the only North Carolina locality known to him (and at that time the far disjunct southernmost station). The NCSU insect collection has material only from Bladen, Onslow, and Scotland counties, in the Coastal Plain south and southeast of Raleigh. Slater & Baranowski (1990) cited a single locality in the Florida panhandle, so the species surely occurs in both Georgia and South Carolina. The lack of records for the Appalachians south of Virginia is noteworthy.

The very few available dates suggest a possible activity peak in late May.

[Cymus luridus Stål]

Much larger than either of the other two local species, with a length greater than 4.5 mm, this northern species has not yet been taken in Virginia, and Blatchley cited no records south of New Jersey. Brimley (1938: 67) listed *luridus* from Terra Ceia, in the southeastern coastal plain of North Carolina, but the NCSU collection has no material from that state. Slater & Baranowski (1990: 48) mention "Georgia" in their statement of the range. The absence of Virginia records, as well as the lack of local material in the NCSU collection, call the Terra Ceia record (and that for Georgia) into question.

Hamid (1971) showed that the definitive host plant in New England is *Carex vesicaria*. The restriction of this sedge to several counties in the western mountains of Virginia might imply a similar constraint upon the insect (but see the analogous case of *Cymus angustatus*).

Subfamily V. OXYCARENINAE

Small lygaeids having some of the characters of both the Cyminae and Ischnorhynchinae. The forebody resembles that of a cymine, as does the coalescence of several basal abdominal segments. The hemelytra suggest the form occurring in *Kleidocerys*, vitreous in texture, and extending beyond the abdomen both laterally and posteriorly, and the form of the peritreme is much the same as in that genus: large, occupying much of the metapleuron, and with the distal half standing free of the evaporatorial surface. Features of our local genus, not shared with either subfamily mentioned, are the widely separated meso- and metacoxae (and mesosternum with a deep median groove), and the occurrence of transverse paramedian patches of white hairs on the penultimate male sternum.

Oxycareninae is a dominantly Old World group, as only three of its 18 genera occur in the Americas. One of them (*Dycoderus*) is monotypic and confined to southwestern United States; another (*Neaplax*) is endemic to Mexico; most of the species of *Crophius* occur in western North America, but a few have extended southward as far as Argentina, and one into eastern United States.

Genus **Crophius** Stål

Features of this genus not already mentioned under the subfamily heading include the elongated bucculae which extend back as far as midlength of eye, and the presence on the forebody of short, white, glandular hairs originating on small basal tubercles (especially evident along lateral sides of pronotum). The corium is translucent, very light testaceous, its venation distinct, and costal margin explanate from base to tip of corium, turned upward for much of its length.

Most of the nine North American species of *Crophius* are boreal and/or western in range; only one extends southward in the eastern States.

133. **Crophius disconotus** (Say)
Figure 25, Map 17

A small (length 3.5 mm) lygaeid at first glance resembling a broad cymine. Head, prothorax, scutellum and abdominal terga dark brown to piceous, broad rear margin of metapleura nearly white, abdomen ventrally

lighter brown, legs testaceous; hemelytra translucent, very light testaceous, abdomen visible through corial areas as well as membrane, apex of latter broadly rounded.

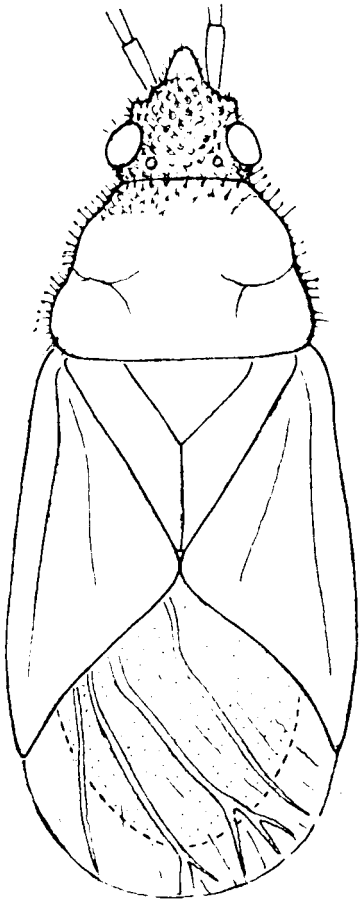


Figure 25. *Crophius disconotus* (Say)

This bug is apparently transcontinental across Canada, extending southward about as far as the 37th parallel. I know but a single Virginia specimen, collected by me at Blacksburg, Montgomery Co., on 3 July 1961 (VMNH). Regrettably no habitat data were recorded as the bug was not recognized as noteworthy at the time of capture. It may have been found under cover or taken by sweeping. This is apparently the southernmost locality in the eastern part of the range.

Subfamily VI. ARTHENEINAE

Antennae short, only equalling length of head and pronotum. Pronotum with wide, transparent, slightly upturned, lateral lamina, becoming obsolete on posterior lobe. Mesocoxae distinctly separated medially, metacoxae nearly in contact. Ostiolar peritreme present as a simple vertical slit, dorsally not flared or modified. Basal half of corial margin explanate, transparent, with prominent plica on ventral side; distal half contained within connexiva when at rest.

The two local species are sexually dimorphic in both size and color, the males being about 25% smaller than females, and largely black ventrally. Females tend to remain light grayish-brown or beige overall, with only the meso- and metasterna darker brown.

This small subfamily (two tribes, five genera) was until recently thought to be confined to the Old World. Slater & Brailovsky (1986) transferred the neotropical species *Polychisme ferruginea* from its previous placement in the Ischnorhynchinae to the Artheneinae, as type of the new tribe Polychismini, and incidental to giving the subfamily a foothold in the New World, exposed an interesting biogeographic situation: other members of the group are either Holarctic or Notogaean in distribution.

While the paper of Slater & Brailovsky was in press, another artheneinine — the common Holarctic cattail specialist *Chilacis typhae* — was discovered in eastern North America. This insect had apparently gained access to this country at some time after the early 1920s, and was surreptitiously occupying an extensive range with many large populations before being discovered on 4 June 1986 by Jonathan E. Fetter. Immediate investigations on the distribution and biology of this European immigrant showed that it occurred widely from central New York to western Maryland (Wheeler & Fetter, 1987), in the pistillate heads of cattails that had been already occupied and mined by larvae of *Limnaecia phragmitella* Stainton, a cosmopterygid moth. In the expectation that *typhae* might have extended southward into Virginia, a search of cattail colonies was commenced in July of 1994. The very first pistillate heads examined yielded artheneines, but which were not *C. typhae*. Specimens submitted to Professor Slater were noted to be *Holcocranum* and sent to Dr. J. Péricart, who identified the species as *H. saturejae*. During the late summer and Fall of 1994, extensive field work in Virginia not only showed this bug to be widespread across the southern half of the state, but also revealed several populations of *Chilacis typhae*. A detailed account of the situation has recently been published (Hoffman & Slater, 1995). That two alien bugs could have colonized the middle Atlantic States without being detected sooner is an intriguing entomological mystery. Despite being found from New York to Florida, and having built up gigantic, successful populations everywhere, appar-

ently neither one was represented in any major museum collections prior to 1987. If Jonathan Fetter had not found the first *typhae* in 1986, it is entirely possible that the Artheneinae would still be unknown on this continent, because I — for one — would certainly never have thought to look inside cattail heads for lygaeids in Virginia.

Apparently dispersal by these bugs can be very rapid. Cattails tend to be colonizers of disturbed (or newly created) wet habitats, and often appear within a year or two at the edge of an artificial pond. In Franklin Co., Virginia, *Holcocranum saturejae* arrived and built up a substantial population within five years of the construction of a small lake. It would be interesting to monitor such a situation from the date of its initiation.

The fruits (achenes) of *Typha* are very small and obviously easily spread by wind; their vast numbers virtually guarantee that some will eventually get to suitable new sites. But several years must elapse before maturity and flowering of the plants occurs, to produce pistillate heads suitable for oviposition by the moth which precedes arrival of the bugs (and which, of course, must be able to locate new cattail colonies very quickly). How either insect accomplishes this remarkable feat, and how the bugs are able to build up large populations almost at once, are questions that cry out for investigation.

Key to Virginia genera and species of Artheneinae

Body length 4 to 4.5 mm. Pronotum without four longitudinal smooth pale ridges. Dorsal surfaces heavily infuscated with dark brown to black; membranes with diffuse brown areas; paramedian dark stripes of head converging between eyes; beak long, reaching nearly to mesocoxae, over half of the 2nd segment surpassing base of head . . . . . *Chilacis typhae*, p. 26

Body length 3 to 3.5 mm. Pronotum with four more or less well-defined longitudinal smooth pale ridges. Dorsal surfaces dominantly light brown (beige) or yellowish-gray, little if at all infuscated; usually only posterior median diffuse brown spot on corium; membranes without brown areas; beak short, barely attaining front of procoxae, its 2nd segment not surpassing base of head . . . . . *Holcocranum saturejae*, p. 27

Genus **Chilacis** Fieber

Beak much longer than in *Holcocranum*, and pronotum without polished low ridges; peritreme inconspicuous, nearly flat against pleuron, only posterior edge a little elevated. Paramedian black lines on head convergent between eyes.

Chilacis is a monotypic genus whose single species occurs naturally in the West Palearctic region from Ireland to the Urals and Caspian Sea, and which is adventitiously established from Virginia to New York.

134. **Chilacis typhae** (Perrin)
Figure 26, Map 18

Larger (4-4.5 mm) and darker than the related *Holcocranum saturejae*, dorsum almost uniform grayish-brown, inner angle of corium with a darker diffuse marking; underside of head and thorax glossy black, abdomen ventrally reddish to mahogany, legs and antennae yellowish.

The reader is referred to the excellent paper by Wheeler & Fetter (1987) which documents the discovery of this species in Pennsylvania, New York, and Maryland, with details on habitat and biology. This paper catalyzed a search for *typhae* in Virginia which led directly first to the discovery of *Holcocranum saturejae* and, indirectly, then to *typhae* in southwestern Virginia as reflected by the following collection data:

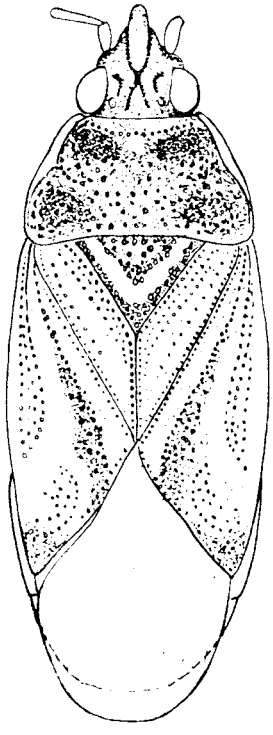


Figure 26. *Chilacis typhae* (Perrin)

Craig Co.: beside Va. 311, ca 1 mi west of Newcastle, 23 September 1994, M. W. Donahue (VMNH 56). **Franklin Co.**: county recreation park, 4.5 mi SSE of Rocky Mount, 8 October 1994, J. M. Anderson (VMNH 1). **Grayson Co.**: along Va. 622, ca 3 mi (AL) SW of Galax, 16 April 1995, J. M. Anderson (VMNH 5). **Montgomery Co.**: VPISU campus, Blacksburg, 3 November 1994, M. W. Donahue and Cheryl Gruver (VMNH 2). **Russell Co.**: beside US Hy 58, 1 mile west of Moccasin Gap, 8 September 1995 (VMNH 2). **Smyth Co.**: Saltville, 12 July 1995 (VMNH 1).

In the Blacksburg sample, only two specimens were taken along with 24 specimens of *H. saturejae*, and in Saltville, only one among hundreds of *saturejae*. In the Craig and Grayson county samples, only C. *typhae* was present. As the latter was taken only three miles from the North Carolina state line, there seems little doubt that the species will be found also in that state although two cattail stands sampled in Alleghany County, southwest of Sparta, were negative for *typhae*.

A new southernmost and new state record is afforded by a small sample of *typhae* taken along TN Rte 91 at Laurel Bloomery, Johnson Co., Tennessee, 14 July 1995 (VMNH). This locality is in a high valley (near 3000 ft.) between Holston and Iron Mountains. No specimens of *saturejae* were present in this material.

Genus **Holcocranum** Fieber

Six species were listed in this genus by Slater (1964); subsequently three of these names have been synonymized under *H. saturejae* (Slater 1995: 79). As thus restricted the genus extends from western Europe to India, and one of its species has successfully invaded both tropical Africa and eastern North America, apparently in recent years.

135. **Holcocranum saturejae** (Kolenati)
Figure 27, Map 19

Length 3-3.5 mm. Dorsum generally light brown to yellowish-gray, hemelytral membranes without brown markings. Pronotum with four distinct smooth pale longitudinal ridges.

So far, this immigrant species has been found in this country from Jacksonville, Florida to New Jersey, and inland across much of southern Virginia, as summarized by Hoffman & Slater (1995). The following are known Virginia localities: **Accomack Co.**: NASA, Wallops Island, 24 May 1955, C. S. Hobson (VMNH 5). **Botetourt Co.**: Daleville, jct. US 220 and Va. 181, 3 November 1994, M. W. Donahue (VMNH 6). **Caroline Co.**: pond beside US 301, ca 6 mi N of Dawn, 15 February 1995 (VMNH 00). **Charles City Co.**: north approach to Benjamin Harrison Bridge, Va. Rts. 106/156, ca. 8 mi W of Charles City Court House, 12 January 1995, J. M. Anderson (VMNH > 30). **Charlotte Co.**: floodplain of Cub Creek, ca. 2.5 mi NW of Phenix, 11 August 1994 (VMNH 12). **Franklin Co.**: county recreation park, ca 5 mi. SE of Rocky Mount, 8 October 1994, J. M. Anderson (VMNH 28). **Greenville Co.**: Meherrin River floodplain, ca 1 mi E of Claresville, 19 August 1994, VMNH survey (VMNH >100). **Hanover Co.**: beside Va. Rte. 271 at Hylas, 7 September 1994, W. H. Mitchell (VMNH 20). **Henry Co.**: Martinsville, Forest Hills Country Club, August-October 1994 (VMNH >100). **Montgomery Co.**: Blacksburg, VPISU campus, 3 November 1994, Cheryl Gruver and M. W. Donahue (VMNH 24). **Roanoke Co.**: jct. US I-581 and Va. 117, 12 November 1994, M. W. Donahue (VMNH 5). **Russell Co.**: beside US Hy. 58, 1 mile west of Moccasin Gap, 8 September 1995 (VMNH > 50). **Smyth Co.**: Saltville, 12 July 1995 (VMNH > 200). **City of Suffolk**: US 58 at Magnolia, 13 September 1994 (VMNH >50).

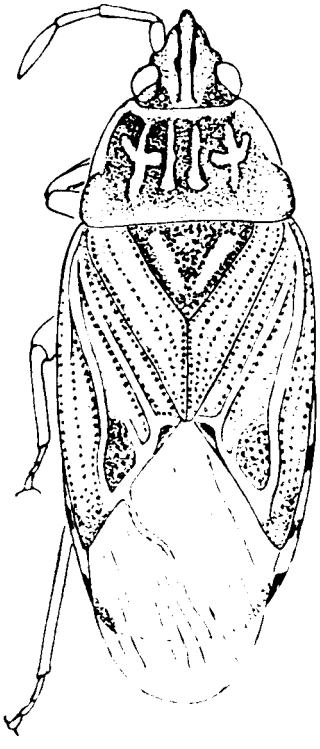


Figure 27. *Holcocranum saturejae* (Kolenati)

Most of the foregoing records are at low elevations across "southside Virginia" from Suffolk to Martinsville. However, the species also occurs west of the Blue Ridge in Botetourt, Roanoke, Montgomery, Russell, and Smyth counties, at elevations as high as 2500 ft. ASL. The Saltville sample of over 200 specimens came from only two pistillate heads; virtually all were adults. As the site is less than 20 miles from the Tennesse state line, there can be little doubt that *saturejae* occurs in the Ridge & Valley Province of that state.

Since publication of the distribution map in Hoffman & Slater (1995), I have been informed by Dr. Wheeler that the records cited for *Chilacis typhae* in New Castle Co., Delaware and Chester Co., Pennsylvania by Wheeler & Fetter (1987) are based on specimens of *H. saturejae*. These two states are herewith included in the known range of the latter. Mr. R. L. Blinn (in. litt.) advises of his captures during 1995 of *saturejae* in Bladen, Columbus, Johnston, Robeson, and Wake counties, North Carolina (all NCSU), largely correcting the large hiatus that existed for the species in that state.

So far, very little is known about the biology of this bug in Virginia. Cattail heads sampled during late summer contained large numbers of both adults and nymphs in all stages. One collection made in mid-January and a second in mid-February also contained adults and nymphs, but the latter were fewer in number, especially the 1st and 2nd stadia. It seems entirely likely that the bugs are able to remain active within the well-insulated cattail heads all winter, although those which have left their home base would have to overwinter on the ground under debris as is reported to be the case in European populations.

Subfamily VII. BLISSINAE

A highly diverse group of flattened, often brachypterous, lygaeids adapted for life on the stems and inside the sheaths of grasses, feeding on plant sap rather than the dry fruits. The entire subfamily has been reviewed by J. A. Slater (1979) in a definitive treatment of systematics, functional anatomy, and biogeography. Earlier (1976) the same author summarized knowledge about feeding habits and general biology of the group. Despite occasionally bizarre modification of the legs in tropical genera, there seems to be no major disjunctions that would facilitate recognition of tribes in the world fauna of 45 genera and 367 species.

Only two genera are represented in Virginia, and these only marginally in the context of their global faunas. Despite much collecting on grasses and sedges in damp biotopes, only a few blissines have been found in Virginia away from the seacoast, and our knowledge of their occurrence in the state is very deficient.

The technical distinction between *Blissus* and *Ischnodemus* involves formation of the procoxal cavities (open or closed behind), which is difficult to see on pinned material. Fortunately, the general body form is quite different, and the elongated abdomen of *Ischnodemus*adequately characterizes that genus in our fauna.

Members of this subfamily develop on various parts of the exoskeleton a surface feature called "pruinosity" which imparts a dull dusty or powdery appearance, microgranulate under high magnification, as opposed to the usual smooth shiny condition.. As used in the definition of species particularly in *Ischnodemus*, this condition can be seen adequately only in very clean specimens: those with surface greasiness **must** be cleaned thoroughly by immersion in a solvent such as ethyl acetate or petroleum ether. Pruinosity should not be confused with pubescence: a pubescent surface may still be "shiny" beneath the hairs but a pruinose one will be dull, and white to grayish in color.

Key to the Virginia genera and species of Blissinae

1. Pronotum uniformly dull black and set with numerous erect hairs, basal fourth not testaceous; abdomen about as long as head and thorax united (as seen from the *side*) . . . . (*Blissus*) 2
— Basal fourth of pronotum testaceous, smooth and shiny, preceded by shallow, densely punctate transverse furrow, anterior half with two paramedian polished areas, surface set with short declivent pubescence; abdomen up to twice as long as head and thorax combined . . . . (*Ischnodemus*) 4
2. Body less than 3 mm long; labium (beak) reaching back to caudal edge of 1st visible abdominal segment . . . . *Blissus breviusculus*, p. 30
— Body length greater than 3 mm; labium not extending beyond caudal edge of metasternum 3
3. 3rd antennomere concolorous with 2nd, or at least paler than 4th . . . . *Blissus a. arenarius*, p. 29
— 3rd antennomere concolorous with 4th, or at least much darker than 2nd, latter often with dark apical annulus . . . . *Blissus leucopterus*, p. 29
4. Head and pronotum dorsally pruinose (finely powdery or "velvety" in appearance) . . . . *Ischnodemus rufipes*, p. 32
— Head and pronotum sparsely setose or pubescent, not pruinose 5
5. Anterior lobe of pronotum with distinct longitudinal median groove; body length 5 - 7 mm 6
— Anterior lobe of pronotum flat, without median

groove; body less than 5 mm in length . . . . . *Ischnodemus slossonae*, p. 32

6. Only lateral edges of abdominal dorsum yellowish, or without yellow coloration . . . . . *Ischnodemus conicus*, p. 31

— Entire connexivum yellowish 7

7. Head and pronotum black; specimens almost always macropterus . . . . . *Ischnodemus falicus*, p. 31

— Head dark, contrasting with dull yellow anterior lobe of pronotum, specimens almost always brachypterus . . . . . *Ischnodemus badius*, p. 31

Genus **Blissus** Burmeister

Blissus is a large, exclusively New World genus of small grass-feeding bugs sometimes collectively referred to as chinch bugs. One species (*B. leucopterus*) is notorius for its often severe impact on corn and other grain crops in midwestern United States, but in Virginia it is not common and in no way an agricultural pest at the present. This scarcity is in striking contrast to earlier reports of massive destruction by *leucopterus* of corn and wheat in the 1780s and again in 1839. Even as recently as 1938, Brimley stated "Central and eastern sections, a pest of corn, small grains, and grasses" for North Carolina.

The genus is taxonomically difficult, with species distinctions very subtle and qualitative; to make things worse, hybridization has been noted between our two local species. The most comprehensive recent work with North American species is that of Leonard (1966, 1968). In the 1968 paper, Leonard discussed the possibility that Say's original material of *leucopterus* might actually have been *arenarius*, but in order to stabilize the name in the sense of traditional usage he arbitrarily designated a neotype of *leucopterus* from Webster Grove, Missouri and this solution by fiat has apparently won general acceptance.

The amount of material available to me from Virginia is really inadequate for a satisfactory treatment of the two nominal subspecies of *Blissus leucopterus*, which are at best extremely difficult to separate. I therefore provide a brief summary of the problem with the hope that someone will be successful in accumulating adequate study series.

136. **Blissus arenarius arenarius** Barber
Map 20

Length to 4.0 mm, females slightly longer than males. Body dark gray, invested in silvery setae that impart a lighter appearance; head, all of pronotum, and scutellum dark gray, overlain with pruinosity (visible in fresh and clean specimens). Apical spot of corium light brown. Legs and basal three antennomeres yellowish, 4th dark brown.

Originally described from New Jersey, this inhabitant of coastal dunes has since been found from New Brunswick to the eastern shore of Virginia. The dune grass *Ammophila breviligulata* Fernald appears to be the primary host plant. The only published Virginia locality known to me is that of Leonard (1966) for Chincoteague Island, Accomack Co., November 1961. Prof. Slater has advised (in litt.) that he and Dr. B. J. Harrington collected a series of *arenarius* breeding on dune grass at Cape Charles, Northampton Co., on 16 June 1969.

From the Outer Banks of North Carolina south to Florida, *arenarius* is represented by another subspecies, *a. maritimus* Leonard 1966. Presumably this taxon might occur in the Back Bay region of Virginia Beach, although the only *Blissus* taken so far in that area has been *leucopterus* (det. H. G. Barber). But perhaps collections have not been made specifically on *Ammophila*.

137. **Blissus leucopterus** (Say)
Figure 28, Map 21

The "chinch bug" is a rather handsome little insect, males 3.6 mm long, females to 4.0 mm., the body generally very dark gray to piceous, with most of the hemelytra milky-whitish (membrane veins and apex of corium dark brown); legs and basal two antennomeres cinnamon. Entire surface invested in rather dense erect pubescence; abdomen covered with fine dense recumbent pubescence; a transverse belt across calli and top of head pruinose (visible only in clean fresh specimens).

The taxonomic status of the Virginia populations of *leucopterus* remains unsettled. Mr. Barber recognized the name *Blissus hirtus* Montandon as a valid species, and the name was accorded specific rank in the Slater catalogue (1964). Other writers (such as Blatchley, 1926) felt that subspecific rank better reflected the trivial structural differences between *hirtus* and *leucopterus*, and this point of view was supported by the revisionary work of Leonard (1966, 1968). The primary difference between the two — relative length of thoracic hairs — is variable and equivocal in Virginia populations; Barber himself identified both "species" from nearby populations in the Norfolk region. Leonard (1966) outlined a wide belt of intergradation between the two subspecies, which probably, in the view of Professor Slater (after seeing some of our material), should include virtually all of Virginia. *B. l. hirtus* is a more northern taxon (Pennsylvania north and west), and nominate *leucopterus* more

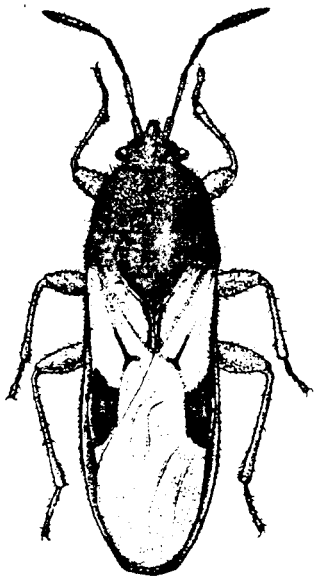


Figure 28. *Blissus leucopterus* (Say)

southern, although it is not known at what point south of Virginia the species is represented solely by the nominate form. Prof. Slater points out (in litt.) a biological distinction: nominate *leucopterus* tends to be associated particularly with grain crops, *hirtus* with turf grasses. Would this be likely to break down in populations of genetically intermediate chinch bugs? The few specimens I have collected were taken by sweeping mixed grasses and sedges in low meadows. One specimen from Blacksburg is certainly hairy enough to qualify as *hirtus* in its original sense, and is labeled "turf grass".

In this uncritical and inclusive context, the species *leucopterus* is widespread but quite scarce across Virginia, from sea level to about 5500 feet on Mount Rogers. Material has been seen from Accomack, Appomattox, Arlington, Grayson, Lancaster, Loudoun, Montgomery, Prince Edward, and Tazewell counties, and the cities of Chesapeake, Norfolk, and Virginia Beach. Collection dates range from May to September, with one for November.

In former years chinch bugs constituted a serious agricultural pest in Virginia, but no outbreaks have occurred in recent decades according to Extension Entomologists at VPI&SU, nor is it currently a significant pest in North Carolina.

138. **Blissus breviusculus** Barber
Map 22

This tiny species is easily distinguished from its Virginia relatives by length: 2.6 mm or less. Wings reduced to small pads about as long as scutellum. Forebody invested in dense long black hairs even longer than those in *B. leucopterus hirtus*.

Not described until 1937, this minute bug was known from only a few localities in New England until it was discovered in southeastern Pennsylvania (Wheeler & Fetter, 1989). At that locality it seems to be confined to little bluestem grass (*Schizacrium scoparium* Michx.) in serpentine barrens. *B. breviusculus* can now be recorded for Virginia: Cumberland Co.: pine stand ca 5.5 km SW of Columbia, 2 Sept. 1990, J. C. Mitchell (VMNH 1♂). There is no serpentine outcrop in this region, although little bluestem is abundant in old fields and roadsides.

The species occurs even farther south: Robert L. Blinn (N. C. State University) has advised me of his recent capture of *breviusculus* in Surry and Watauga counties, North Carolina, and graciously allowed publication of these new southernmost and state records for this rare lygaeid.

Genus **Ischnodemus** Fieber

A very large, virtually worldwide genus, *Ischnodemus* is well represented in the southern parts of the United States, and all of our four species occur in the Coastal Plain. Individuals live between the stems and leaf sheaths of various grasses, and this specialized habitat is reflected in the long and flattened body form with short powerful limbs. The interested student is referred to Professor Slater's admirable monograph of the Blissinae (1979) for additional information on taxonomy and structure, and his earlier paper (1976) treating biology of this and other blissine genera. Harrington (1972) summarized biological information for a number of eastern species.

Blatchley's (1926: 364) treatment of this genus has been substantially modified by subsequent research and is not satisfactory for identification. *I. conicus* Van Duzee and *I. brunneipennis* Germar were not included. *I. atramedius* Blatchley is now considered a synonym of *I. praecultus* Distant; *I. intermedius* Blatchley of *I. rufipes* Van Duzee; and *I. minutus* Blatchley has been transferred to *Blissus*. Slater's key to species of *Ischnodemus* (1979: 112) covers the world fauna and works well for local species, except that *rufipes* is not included. The key to Florida species (Slater & Baranowski, 1990: 58) includes all Virginia species except for the more northern *falicus*.

The key given above is adapted from the latter, with strictly Floridian taxa omitted and *falicus* added. Ashlock & A. Slater (1988) cite "N.J." and "S.C." as states of record for *I. brunneipennis*, implying occurrence of the species in Virginia, but until the New Jersey record has been confirmed I am inclined to disallow the possibility of state residency. A detailed revision of the genus in North America is very much to be desired.

139. **Ischnodemus badius** Van Duzee
Map 23

A relatively large species (5-7 mm), the body yellowish to light brown; head dark, pronotal calli yellowish. Connexivum usually entirely yellow. Median pronotal groove conspicuous. Beak extending back between mesocoxae. Most specimens are micropterous.

This lower austral species occurs primarily along the sea coast from Maryland to Florida and west to Texas, mirroring the distribution of its preferred host plant, *Spartina alterniflora* Loisel. In Virginia, the species should be found in all of the counties subject to tidal influences, but so far the only state record known to me is that of Harrington (1972): "Virginia" without further attribution. Prof. Slater advises me (in litt.) that this record is based upon a series collected by him and Dr. Harrington at Cape Charles, Northampton Co., on 16 June 1969 (breeding on *Spartina patens* Ait.).

140. **Ischnodemus conicus** Van Duzee
Map 24

Somewhat longer than *I. badius* (length to 9 mm), from which it differs in having the head and pronotum uniformly piceous. Legs and basal three antennomeres clear reddish-brown, apical antennomere piceous. Connexivum yellowish only along its lateral margin, if at all.

This species was omitted by Blatchley from his treatment of the genus in 1926, being known at that time only from the original locality in Texas (and possibly through confusion with the structurally similar *I. badius*). Harrington (1972) reported *conicus* from nearly all of the southeastern states, Virginia to Louisiana. We have only two records for this state: **City of Virginia Beach**: (probably the present resort area), 13 August 1913, F. Knab (USNM 10); **City of Hampton**: Wythe Creek Road, 22 September 1993, B. J. Abraham (VMNH 4). The latter locality appears to be the northernmost known for the species.

Thought to breed mainly on *Spartina alterniflora*, this bug should occur generally around the Chesapeake Bay in areas under tidal influence.

The VMNH sample consists of three adult females (length to 9 mm, with wings as long as length of pronotum) and a penultimate stage male nymph.

141. **Ischnodemus falicus** (Say)
Figure 29, Map 25

Length to 6.5 mm; head and antennae, pronotum except basal fourth, and scutellum deep black; dorsum of abdomen dark reddish brown medially, shading into yellowish brown on the connexivia; wings whitish-gray with light brown venation. Beak short, only extending between procoxae.

Widespread in eastern North America, but apparently not present in southeastern United States between North Carolina and Louisiana. Our scant Virginia material is from **James City Co.**: Colonial Park 3 mi E of Jamestown, 22 April 1995, J. M. Anderson (VMNH 1); **Mecklenburg Co.**: Elm Hill SGMA, Clydes Pond, 11 May 1995 (VMNH 1); and the **City of Virginia Beach**: (presumably the resort area) 7 April 1970, "Donaldson" (VMNH 1). Brimley's sole North Carolina record (1938: 67) was for Brunswick County, in the coastal plain.

Harrington (1972) records this species breeding on *Spartina pectinata* Link.

Figure 29. *Ischnodemus falicus* (Say)

142. **Ischnodemus rufipes** Van Duzee
Map 26

A moderate-sized species, 5.0-5.5 mm in length, very similar to *I. praecultus* Distant (with which it has been synonymized in the past), but differing in the brownish rather than yellowish basal antennomeres. It differs from other Virginia species of the genus in having the dorsal surface of head and pronotum pruninose, and in being usually macropterus, in which case the veins of the membrane are not noticeably darkened.

Variant specimens from Florida were described by Blatchley (1926: 365) as *I. intermedius*; this name is treated as a synonym of *rufipes* by Slater (1979: 53).

I. rufipes has been recorded, chiefly along the seacoast, from Mexico to Florida and north to Pennsylvania. So far, we have only two in-state localities: **Fairfax Co.**: Four-mile Run, 31 May 1914, W. L. McAtee (USNM 2); **City of Virginia Beach**: Cape Henry, 24 June 1932 and other dates, H. G. Barber and others (USNM 57).

Harrington (1972) mentions collecting both adults and nymphs of *rufipes* on *Cyperus odoratus* L. in Florida. As this sedge (and 31 other members of its genus) occurs commonly in Virginia, perhaps it will be found to host *rufipes* in this state also.

143. **Ischnodemus slossonae** Van Duzee
Map 27

With a length of 4.0 to 5.2 mm, this is our smallest species of *Ischnodemus*. Head, all but basal fourth of pronotum, and scutellum intense black, coarsely and densely punctate, invested with mostly appressed pubescence; hemelytra usually short, whitish, with brown venation; legs and basal two (or three) antennomeres clear testaceous yellow.

Slater & Baranowski (1990: 65) suspected that this species may be a complex of sibling forms, ranging from New England south to Florida, west to Texas, and north to Illinois. Most of the few Virginia localities are in the Coastal Plain, with two on the Piedmont. In Connecticut, Harrington (1972) found the species' host plant to be the grass *Panicum agrostoides* (now *P. rigidulum* Bosc); Slater (1976) added the sedge *Cladium mariscoides* (Muhlenberg) and grass *Sacciolepis striata* (L.). All three of these plants occur in Virginia, chiefly coastal in range. Our small series of *slossonae* from Albemarle and Lancaster counties were taken by sweeping in low marshy areas along a stream, and emergent vegetation in a millpond; unfortunately no vouchers of the plants were taken for identification.

Albemarle Co.: Charlottesville, near the University gymnasium, 13 May 1949 (this site has been destroyed by development) (VMNH 2). **Fairfax Co.**: Four-mile Run, 31 May 1914 (USNM). **Lancaster Co.**: millpond beside Va. 201, 2 miles SW of Lively,, 12 May 1979 (VMNH 4). **Prince Edward Co.**: floodplain of Buffalo Creek, 2 miles W of Hampden-Sydney, Va. 665, 1 May 1993 (VMNH 1). **City of Virginia Beach**: Seashore State Park, along main trail, 24 May 1989 (VMNH 1); Cape Henry, 11 September 1934 (VPISU), also 24 June 1922 (USNM).

The specimen from Seashore State Park is full-winged; the other seven are brachypterous.

Subfamily VIII. GEOCORINAE

The appropriate vernacular name applied to members of this subfamily collectively is "big-eyed bugs". The increased size and odd shape of these organs is surely relevant to their active predatory lifestyle, for which improved vision would be advantageous. They often occur in dry open places and course about in full hot sunshine in search of other small insects. Their speed and agility require some dexterity on the part of anyone aspiring to capture them undamaged.

The family is represented worldwide by 13 genera. Two genera and 14 species occur in eastern United States, four of them having been found in Virginia with two others possible residents. The eastern geocorines were revised by Readio & Sweet (1982), whose paper should be consulted for details about distribution and variation of these taxa.

Key to Virginia genera and species of Geocorinae

1. Eyes strongly produced caudolaterad but distant from anterior corner of pronotum (Fig. 30); pronotum smooth and polished with punctures few and widely spaced; hemelytra strongly convex without evident distinction into clavus and corium; claval region of the two prolonged posteriad and in contact medially behind the scutellum (although a normal median commissure is not formed); membrane reduced to a small remnant shorter than length of scutellum . . . . . *Isthmocoris piceus*, p. 33

— Eyes less produced, nearly or quite in contact with anterior corner of pronotum (Fig. 31); pronotum flat and dull, rather densely punctate except for the paramedian calli; hemelytra flattened, with clavus and corium distinguishable; clavi not in contact behind scutellum; membrane longer than length of scutellum 2

2. Median groove of tylus extending back onto vertex and intersected by a sinuate transverse sulcus (Fig. 31), scutellum with elongated smooth yellow spot on each side; hemelytra transparent . . . . . *Geocoris punctipes*, p. 34

— Median groove of tylus not extended onto vertex, not crossed by a transverse sulcus (Fig. 32); scutellum without yellow markings or if present, not elongated and conspicuous; hemelytra opaque, usually dark in color 3

3. Dorsal color whitish, ivory, to light gray, hemelytral punctures dark and conspicuous; pronotum with two round pale paramedian spots in the transverse dark band; caudal margin of corium with two small brown spots 4

— Color darker, light brown to black, dorsally usually light only along costal margins of elytra, punctures, if dark, not conspicuous; pronotum without light paramedian spots; caudal margin of corium without brown spots 5

4. Size averaging smaller, females less than 3.6 mm; dorsal color nearly white . . . . . *Geocoris bullatus floridanus*, p. 34

— Size averaging larger, females more than 3.5 mm; dorsal color grayish to light brownish-gray . . . . . [*Geocoris b. bullatus*, p. 35]

5. Pronotum distinctly margined laterally with whitish or yellowish, corium pale yellow to amber, head and 4th antennomere reddish-yellow . . . . . [*Geocoris limbatus*, p. 35]

— Pronotum indistinctly margined laterally if at all, corium light brown to black, head and 4th antennomere black . . . . . *Geocoris uliginosus*, p. 34

Genus **Isthmocoris** McAtee

The numerous points of difference between *Isthmocoris* and *Geocoris* are tabulated in the foregoing key and do not need repetition. The larger and longer eyes alone are distinctive when one has seen their condition in both genera (cf. Figs. 30 and 32).

Members of this genus were treated under the name *Hypogeocoris* until 1982, when Readio & Sweet revived *Isthmocoris* for four North American species considered by them to be generically different from the Old World species representing *Hypogeocoris* in a strict sense.

144. **Isthmocoris piceus** (Say)
Figure 30, Map 28

A convex shiny black bug, length to about 4.2 mm, with abbreviated elytral membranes and hypertrophied eyes, which are sometimes described as being "stalked".

Figure 30. *Isthmocoris piceus* (Say)

As mapped by Readio & Sweet (1982, map 1), this species occurs from the Ozarks eastward across the Great Lakes region to New England, southward to Maryland on the Atlantic Coast. That only two Virginia localities are known so far suggests either a disjunct, fragmented southern range or a occupation of a habitat not normally sampled by entomologists.

Loudoun Co.: Purcellville, 15 July 1969, E. J. Hambleton (VPISU 1). **Grayson Co.**: the "Glades" ca 4 mi. S of Galax, 4 August 1990, T. J. Rawinski (VMNH 1). The site near Galax was identified by the collector as an *Andropogon gerardii* grassland developed on a substrate rock with high magnesium content. It is not evident that soil chemistry should be relevant to a predatory bug.

The range of this bug can now be extended even further south into the Piedmont region of North Carolina: **Chatham Co.**: Siler City, 5 September 1969, L. L. Dietz leg (NCSU 1). The species was not listed for the state by Brimley (1938) nor in any of the three supplements to the "Insects of North Carolina."

Genus **Geocoris** Fallén

Differences between this genus and *Isthmocoris* are set out in detail in the foregoing key and do not require reiteration. As currently defined, *Geocoris* is widespread, but with relatively few species in North America.

Species of this genus are notoriously difficult to distinguish because of both subtlety and variability in the color characters to which appeal is made in diagnosis. Those occurring in eastern United States have been revised by Readio & Sweet (1982). In general, these authors recognize the same common eastern species as did Blatchley, but define the ranges more stringently, and elevate the varietal names *floridanus* and *limbatus* to specific rank, recording the first from Virginia and the second from as close as Maryland.

145. **Geocoris punctipes** Say
Figure 31, Map 29

Length to about 4.5 mm; color generally yellowish-beige, with top of head, middle of scutellum, and sides of abdomen piceous to black; legs yellowish, femora with numerous round brown spots. Clavus and corium unpigmented, transparent. The median groove on the head and transverse groove between the eyes are diagnostic.

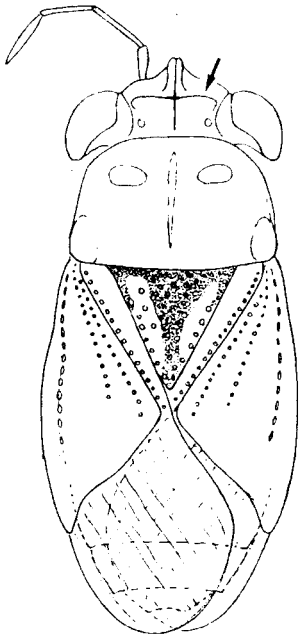


Figure 31. *Geocoris punctipes* Say

Correctly characterized by Blatchley as "an austroriparian species", *punctipes* ranges from New Jersey to Florida, westward to California and north in the interior to Indiana and Iowa. In Virginia the species is predominantly a lowland form, and even the several localities west of the Blue Ridge are at modest elevations (up to 2000 ft.in Wise County). Counties of record include Accomack, Albemarle, Alleghany, Augusta, Buckingham, Campbell, Charlotte, Greensville, Hanover, Henrico, Henry, Isle of Wight, Mecklenburg, Montgomery, Nottoway, Patrick, Pittsylvania, Prince George, Roanoke, Rockingham, Westmoreland and Wise, and the cities of Chesapeake and Suffolk. Collection dates extend from early May to mid October, but the vast majority cluster in July and August.

146. **Geocoris uliginosus** (Say)
Map 30

Length about 3.5-4.0 mm; almost uniformly piceous to black overall, the coria sometimes maroon or light brown with pale costal margins.

G. uliginosus is distinctly more general in its distribution than *punctipes*, occurring over much of eastern North America. It is statewide in Virginia, found from sea level to at least 5000 ft. on Mount Rogers. We have records for Accomack, Albemarle, Alleghany, Augusta, Bath, Charlotte, Dickenson, Dinwiddie, Floyd, Grayson, Henry, Highland, Loudoun, Mecklenburg, Montgomery, Nelson, Rockingham, Shenandoah and Wise counties, and the cities of Chesapeake and Virginia Beach. Collection records extend from early May to mid October, but peak in August and September, somewhat later than *punctipes*.

Specimens have been taken by general sweeping, in pitfalls, and by hand-capture. The species apparently does not come to black light.

147. **Geocoris bullatus floridanus** Blatchley
Figure 32, Map 31

A small (length to 3.5 mm) species; with nearly white hemelytra and pronotum, the former with two brown spots on caudal edge of coria, the latter with two pale spots in the dark transverse subapical (callar) band.

This pallid *Geocoris* was described from Florida as a geographic race of the more northern *bullatus*, and as such it was carried in subsequent literature (e.g., the Slater catalog of 1964). The 1982 revision by Readio & Sweet proposed to elevate *floridanus* to specific rank but this has not met with universal agreement. Although Slater & Baranowski (1990: 76) treat *floridanus* as a species, they qualified this usage with the observation that no specimens have been available from the area between the ranges of these allopatric forms (implying some reservation about the actual relative ranking, "pending further study"). The single VMNH specimen from Virginia Beach keys out readily to *floridanus* in Readio & Sweet's revision, but the dorsal ground color tends more to parchment than ivory-white, the apical

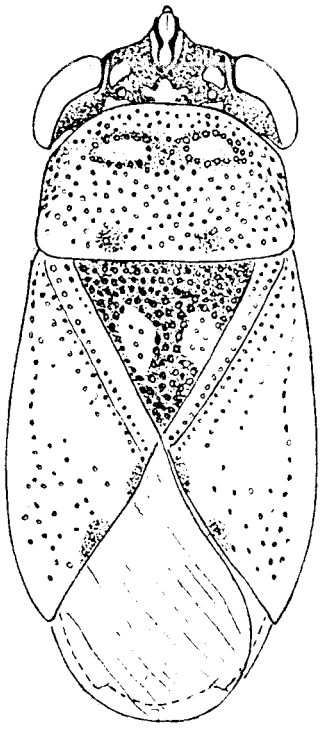


Figure 32. *Geocoris bullatus floridanus* Blatchley

antennomere is light brown rather than red, and the 2nd is dorsally dark with a white apical spot. The specimen could be construed as somewhat intermediate, and its far northern provenance brings it close to the known range of *bullatus*. I provisionally favor Blatchley's original perception of rank, with the qualification that far more material is needed for any definitive resolution. Specimens from eastern and northern Virginia will be of special interest in this respect.

Readio & Sweet (1982: 40 and Map 5) record *floridanus* as far north as Maryland and the District of Columbia, and show a spot in southeastern Virginia (? Brunswick Co.) based on material in the Cornell collection. The only Virginia specimen known to me was obtained in a pitfall operated at the Dam Neck Naval Base, City of Virginia Beach (7 September 1990, VDNH survey) (VMNH 1♀).

[Geocoris bullatus bullatus Say]

As implied by couplet 4 in the preceding key, the nominate race of this species is generally very similar to the more southern form *b. floridanus*, but specimens tend to be somewhat larger and darker in color. Readio & Sweet identified a difference in structure of the spermathecae, but the average non-specialist is unlikely to perform the dissection needed to disclose this character.

The range of this form is generally northern, extending from Maine west through the Dakotas and Iowa. Readio & Sweet examined material from central Maryland, only a few dozen miles from northern Virginia. The occurrence of *bullatus* in Virginia may thus be more or less assumed, and the accumulation of specimens is critical in assessing its relationship with *floridanus*.

[Geocoris limbatus Stål]

"A small brightly colored species with conspicuous yellowish-red head, pale yellow legs and wings, and with pronotum, scutellum, and mesal portion of hemelytra forming a linear brown area" (Readio & Sweet, 1982: 42). Males are only 3.0 mm long or less, females 3.5 mm.

Originally considered to be distinct species, *limbatus* was later treated as a "variety" of *uliginosus* and not restored to its original status until the revision by Readio & Sweet (1982). Its range tends to be northern: virtually all of the localities represented on the distribution map of Readio & Sweet (east of the Great Plains) are in formerly glaciated areas. Those authors do show a symbol in central Maryland — at or near Baltimore — which justifies the assumption that the species is likely to be found in northern Virginia.

Subfamily IX. PACHYGRONTHINAE

The two genera of this subfamily occurring in Virginia are currently placed in different tribes, but the differences between them are of a magnitude usually reflecting subfamily status in the Heteroptera. *Oedancala* is generally similar in appearance to species in the Orsillinae and has little superficial similarity with *Phlegyas* as suggested by the following contrasts.

Key to Virginia genera and species of Pachygronthinae

1. Short, stubby bugs with wings shortened, exposing most of abdominal dorsum, clavi reduced and not forming median commissure (fully winged individuals occur, but are very scarce and none have been seen from Virginia); first antennomere short, not reaching apex of tylus, jugae almost obliterated; head declivent at about 45°; legs annulated . . . . . (*Phlegyas*) 2

— Elongate slender insects, wings fully developed; clavi forming the normal long median commissure; first antennomere extending far beyond apex of tylus; juga well developed, the dorsal edge of each pro-

duced upward as a thin sharp carina paralleling base of first antennomere; head nearly horizontal; legs not annulated (*Oedancala*) 3

2. 2nd antennomere twice as long as 1st, nearly equal to length of 3rd . . . . . *Phlegyas annulicrus*, p. 36

— 2nd antennomere 2.5 to 3 times length of 1st, and 1.2 to 1.3 times length of 1st . . . . . *Phlegyas abbreviatus*, p. 36

3. Ventral side of profemora and median third of scutellum solid black; overlapping bases of hemelytral membrane with shared fuscous spot; distal margin of corium without brown or piceous spot; first antennomere shorter than length of pronotum . . . . . *Oedancala dorsalis*, p. 38

— Ventral side of profemora at most with small black dots; median third of scutellum brown or maroon, never black; overlapping bases of membrane without darkened area; distal edge of corium normally with small brown marking; first antennomere longer than pronotal length . *Oedancala crassimana*, p. 37

Genus **Phlegyas** Stål

These are compact little bugs, short and cylindrical, with the head strikingly declivent and retracted snugly against the pronotum. Entire surface of body coarsely punctate. Scutellum with deep transverse basal groove. Although full-winged individuals occur, most collections contain only brachypters; one consequence of this condition being a strong reduction of the claval region as noted in the foregoing key to genera. Two species of this American genus occur in eastern United States, the third is endemic to the Plata region (Argentina, Paraguay, Uruguay) of South America, a curious distribution. Both Nearctic forms occur in Virginia; one is quite abundant whereas the other has been found but once and that many years ago.

148. **Phlegyas abbreviatus** (Uhler)
Figure 33, Map 32

A rather small (length to about 4.5 mm) bug (suggesting a tiny barrel on six legs); basically reddish-brown with the head uniformly reddish, pronotum yellowish with a transverse black bar (or four spots), and three longitudinal lines (or three spots on caudal margin); hemelytra yellowish to brownish; femora black, tibiae yellow with a basal black ring and another at distal two-thirds.

An almost ubiquitous species across North America, *abbreviatus* is essentially statewide in Virginia with collections ranging between sea level and 5000 ft.

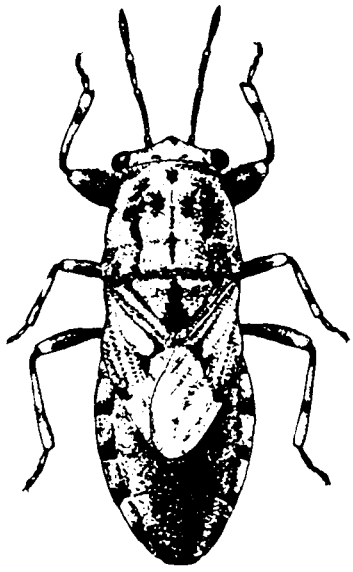


Figure 33. *Phlegyas abbreviatus* (Uhler)

Records are from Alleghany, Augusta, Bland, Craig, Fairfax, Floyd, Frederick, Grayson, Greensville, Henry, Highland, King George, Loudoun, Louisa, Montgomery, Page, Pittsylvania, Roanoke, Tazewell, and Wythe counties, and the cities of Suffolk and Virginia Beach. Undoubtedly it occurs in every county in the state.

Specimens at hand were mostly taken by sweeping grasses and sedges in low meadows and swales. Collection dates range from May to October, although the majority are from May and early June. Mated pairs are frequently swept during these two months. Late stage (?4th) nymphs were taken 11 August 1992. Nearly uniform black, these individuals have the lateral pronotal carina better developed than in adults. This species does not come to black light traps.

149. **Phlegyas annulicrus** (Stål)
Map 33

Length to 5.0 mm; similar to *abbreviatus* in nearly all characters but differing in relative lengths of the antennal segments as noted in the key. Slater & Baranowski note that *annulicrus* is "generally much paler, giving a dull straw yellow impression. Darker markings usually dark reddish rather than black."

Although this species is documented (Ashlock & A. Slater, 1988) from an essentially continent-wide range, the majority of localities suggest a lower austral or coastal plain distribution: New Jersey to Florida, west to Arizona, California, and Mexico. Records for Utah and

especially British Columbia seem much out of place. I have located only one Virginia collection: Wingina, Nelson Co., 12 August 1924, W. Robinson (USNM 2). I cannot explain the failure of all subsequent collectors to locate additional colonies in this state.

For North Carolina, Brimley (1938: 68) listed Black Mountain and Pineola in the mountains, and Raleigh in the central Piedmont. NCSU has material also from Pamlico, Johnson, and Moore counties, all in the Coastal Plain. Collectively these records reflect a statewide distribution.

Genus **Oedancala** Amyot & Serville

This exclusively American genus contains 13 species, four of which occur in Florida and two further north in the mid Atlantic states. These are rather compact bugs, up to 7 mm long,with streamlined smooth bodies and generally pale yellowish-brown coloration; the profemora are enlarged and spined beneath. They prefer low wet ground, along water courses, feeding on the seeds of grasses and sedges, and are more often captured in Spring and early summer.

150. **Oedancala crassimana** Fabricius
Figures 34 and 35, Map 34

O. *crassimana* (treated under the synonymous name *dorsilinea* in Blatchley's manual) is easily separated from *dorsalis* by the characters cited in the foregoing key. The several color differences (especially the lack of black on the profemora) are definitive even if the antennae are broken off pinned specimens. This species, which extends northward at far as Long Island, is basically a Lower Austral form and in Virginia occurs only sporadically on the Piedmont. In the Fall Zone south of Richmond, its range overlaps broadly with that of O. *dorsalis*. We have the following records:

Brunswick Co.: beside Va. Rte. 600, ca. 0.6 mi west of the Greensville Co. line, 11 August 1988 (VMNH). **Fairfax Co.**: Four-mile Run, 31 May 1914 (USNM). **Greensville Co.**: Fontaine Swamp at Va. Rte. 625 bridge, 24 May 1989 (VMNH). **Henrico Co.**: Richmond, 19 June 1975 (VCU). **Lunenburg Co.**: pond beside Va. Rte 40, 4 mi. E of Pleasant Grove, 3 September 1978 (VMNH). **Pittsylvania Co.**: 3 mi. E of Cascade P. O., 27 May 1993 (VMNH 3). **City of Virginia Beach**: Sand Bridge, 14 May 1949 (VMNH).

Although collection dates range from May to September, by far the majority are from the last two weeks of May. The far more extensive data listed by Slater & Baranowski (1990: 80) suggest that in Florida the species is often collected later in the summer.

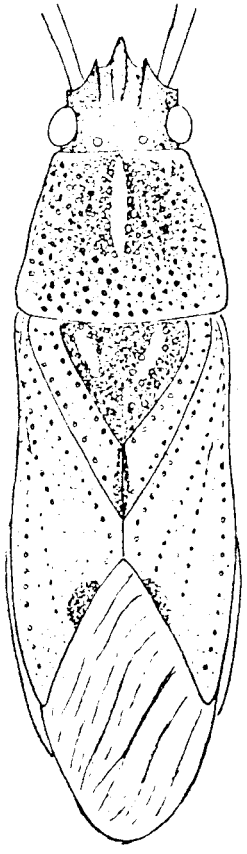
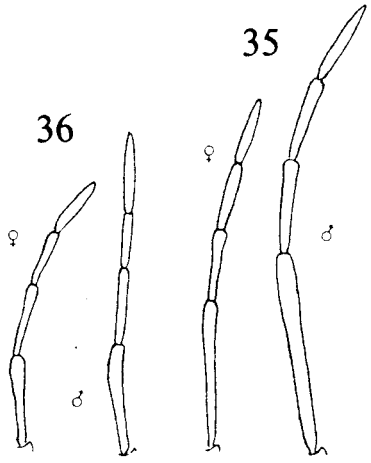


Figure 34. *Oedancala crassimana* (Fabricius)

A population of *crassimana* in southwestern Pittsylvania County may be isolated from the main part of the species' range in the Coastal Plain. Considerable collecting has been done at intervening localities on the piedmont, so far without success in locating other inland populations. Brimley (1938: 68) cited a possibly similar disjunction in North Carolina, his record for Greensboro being well on the central Piedmont and in fact only 40 miles south of Pittsylvania County site. Perhaps these two localities represent a geographically continuous inland segment of the species' range.

There is some sexual dimorphism in relative lengths of the antennomeres in *Oedancala*, the first being much longer in males (Figs. 35,36). Same sex comparisons are therefore necessary since females of *crassimana* have antennae similar to those of male *dorsalis*.



Figures 35, 36. Antennomere proportions in local species of *Oedancala*. Fig.35: O. *crassimana* from Brunswick Co. Fig.36: O. *dorsalis* from Mongomery Co.

151. **Oedancala dorsalis** (Say)
Figures 36 and 37, Map 35

Length to about 6.5 mm. Coloration as specified in the preceding key. Generally similar to O. *crassimana*, but easily separated by the solid black ventral surface of the profemora and dark apical corial spot.

As graphically shown on map 35, the species is essentially statewide in Virginia and ranges from sea level to at least 5000 ft. at Whitetop Mountain. There are as yet no records for the far southwest counties (where it surely occurs) or the Eastern Shore (where it probably does not). Whether the species extends east of the Blackwater River remains to be established; the attention of local naturalists is directed to this situation.

Material has been examined from Alleghany, Appomattox, Augusta, Bath, Charlotte, Craig, Essex, Fairfax, Floyd, Giles, Grayson, Greensville, Halifax, Henrico, Henry, Highland, Lancaster, Loudoun, Louisa, Montgomery, Nelson, Page, Pittsylvania, Prince Edward, Prince George, Pulaski, Russell, Southampton, Tazewell, and Washington counties. Collection dates range from early May to late July only. As in the case of *crassimana*, most VMNH material of this species was taken by sweeping grasses and sedges in low meadows and along watercourses; occasionally a specimen will appear at a lighted sheet.

Despite a wide overlap of the range with that of *crassimana* in southeast Virginia, the two species have not yet been taken together. In southeastern Greensville County, they have been found about four miles apart at Fontaine Swamp, and surely a shared site will eventually be found. I have detected no geographic variation whatever, and specimens from the edge of the Chesapeake Bay could pass as clones of those from Mount Rogers.

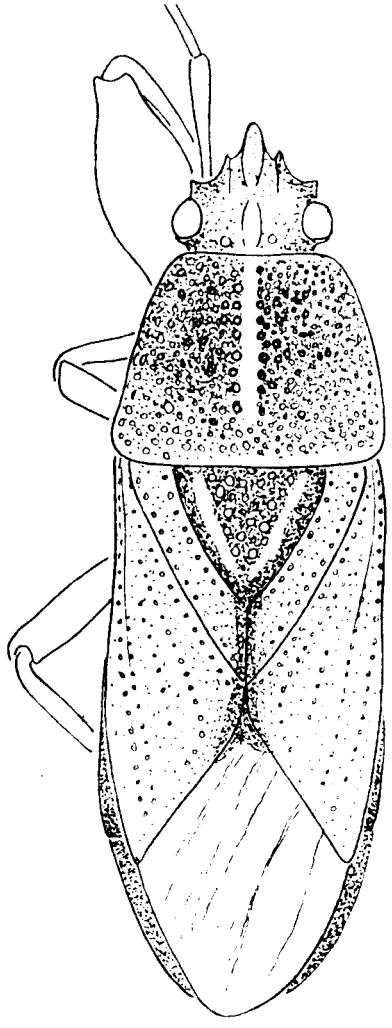


Figure 37. *Oedancala dorsalis* (Say)

Subfamily X. RHYPAROCHROMINAE

The presence of trichobothria on the head, adjacent to inner margin of the eyes, sufficiently diagnoses this subfamily, and the form of the suture between 3rd and 4th abdominal sternites is an easily observed character that holds true for all of the Virginia taxa. This is the largest subfamily of Lygaeidae, divided into a considerable number of tribes which have been defined and discussed in detail by Sweet (1967).

Although many of the genera are monospecific in Virginia, the large number would greatly complicate a key of the sort used in the preceding subfamilies, there-

fore genera and species will be keyed in the context of individual tribal headings. Technically the tribes are based upon differences in location of spiracles and other details including those of nymphal structure (e.g., the "Y-suture at base of the abdominal terga"). Spiracles are exceptionally difficult to see on the smaller or hairier species, and the Y-suture character is impractical since virtually all lygaeids in the average collection are adults. In an attempt to devise a key more friendly to a non-specialist user, I have utilized some conspicuous but superficial characters (often of only generic or even specific importance) which "work" only in the context of the Virginia fauna. The indulgence of lygaeid specialists is solicited.

Key to Virginia tribes of Rhyparochrominae

1. Coxae of front legs with an acute spine (rarely two) directed ventrolaterad (except in *Kolonetrus* and females of *Myodocha*); sides of pronotum rounded, without dorsolateral carina . . Myodochini, p. 51
— Coxae of front legs without ventral spine; sides of at least front part of pronotum with ridge, carina, or explanate lamina 2
2. Armature of ventral side of profemora consisting of one or two rows of modified, socketed macrosetae placed on low tubercles or knobs (Figs. 38, 39) . 3
— Armature of ventral surface of profemora composed of one or two rows of true spines 5
3. Profemoral armature in the form of a single row of large stout spiniform macrosetae set on rounded pedestals (Fig. 38); body large, 8-10 mm, dorsally glabrous with bright color pattern, eyes distant from pronotum; latter constricted into two distinct lobes . . . . . Ozophorini, p. 50

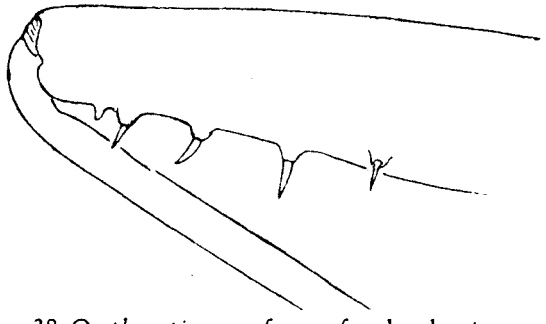


Figure 38. *Ozophora picturata*, femur of proleg showing modified spines on pedestals.

— Profemoral armature in the form of several irregular rows of short wiry bristles set on low tubercles (Fig. 39) or a single subapical spine similar to that in Ozophorini; body small, less than 4 mm, head inserted into pronotum to eyes; pronotum not constricted 4

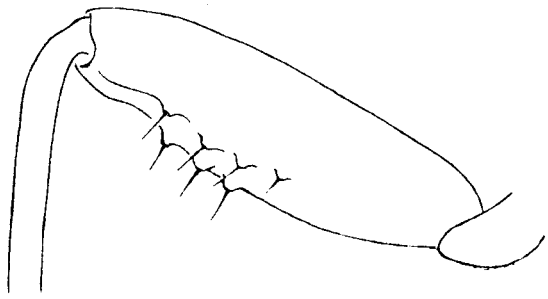


Figure 39. *Stygnocoris rusticus*, femur of proleg showing two rows of pedicillate macrosetae.

4. Body covered with conspicuous dense recumbent setae; sides of thorax with large coarse punctations, evaporatorial area small, less than a third pleural height, on mesopleuron confined to surface of mesepimeron, peritreme auriculate, its dorsal edge elevated above adjoining surface (Fig. 40); profemoral spines small, setiform, on low tubercles . . . . . Stygnocorini, p. 44

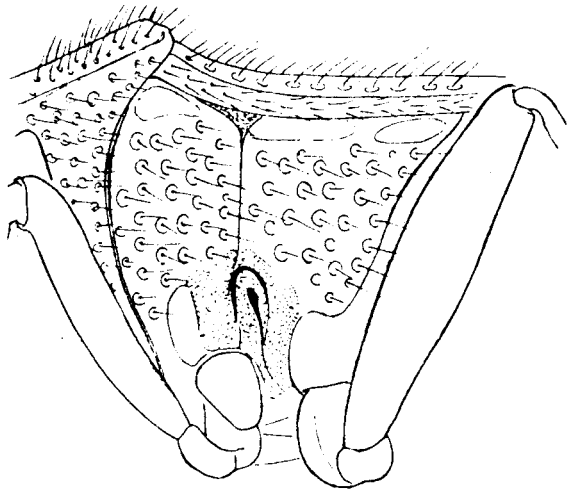


Figure 40. *Stygnocoris rusticus*, lateral view of thorax.

— Body nearly glabrous, setation if present inconspicuous; sides of thorax finely punctate if at all, evaporatorial area more extensive, occupying half or more of metapleural surface, also on caudal margin of mesopleuron nearly to edge of elytron, peritreme

larger and longer, not elevated above adjoining surface (Fig. 41); profemoral spine single, subapical . . . . . Gonianotini, p. 69

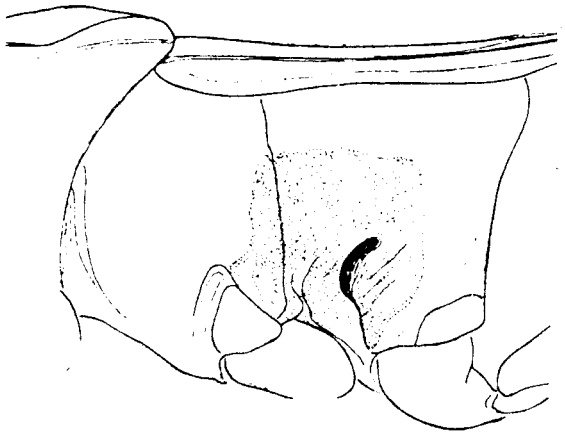


Figure 41. *Malezonotus rufipes*, lateral view of thorax.

5. Posterior edge of corium emarginate just distad of claval commissure (Fig. 44) (use 90X!) . . . . . Antillocorini, p. 42
— Posterior edge of corium not emarginate 6
6. Posterior edge of metapleuron forming fixed (fused) union with first visible abdominal sternum; dorsum glabrous and shiny, punctation very fine or absent . . . . . Lethaeini, p. 71
— Posterior edge of metapleuron free from surface of first visible abdominal (in oblique posterior view one can see in *between* these two sclerites); dorsum matte or coarsely punctate, never shiny and polished . . . 7
7. Lateral pronotal carina having the form of two very fine parallel ridges, with the surface between them dull, flat or slightly concave (Fig. 42, examine with high magnification in caudolateral aspect); anterior half of pronotum nearly black, posterior half pale with black punctures . . Rhyparochromini, p. 66
— Lateral pronotal carina either a thin, sharp, projecting lamina or rounded elevated ridge without sharp definition; pronotum either entirely black or if posterior half pale, then without black punctures . 8
8. Beak long, reaching back between metacoxae or to first abdominal segment; prosternum with a narrow transverse pit in front of each procoxal socket (Fig. 43) . . . . . Drymini, p. 45

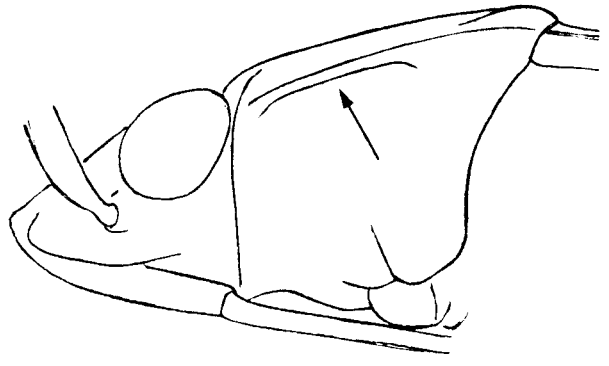


Figure 42. *Peritrechus fraternus*, side view of prothorax, showing fine parallel carinae.

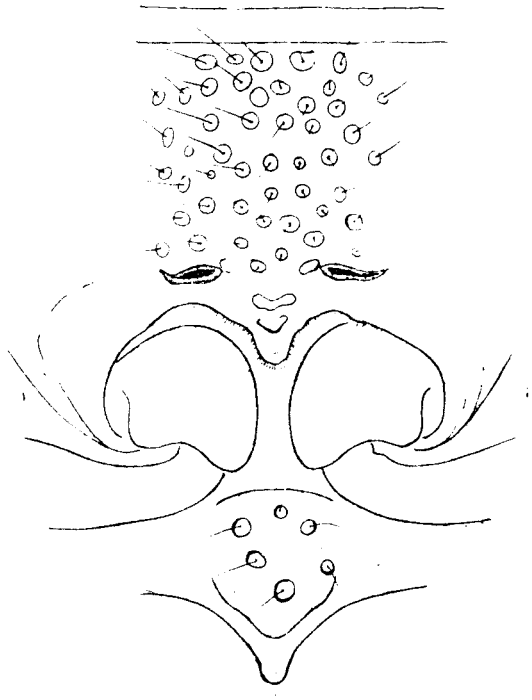


Figure 43. *Drymus crassus*, ventral view of thorax showing prosternal pits.

— Beak shorter, reaching only to mesosternum; prosternum without a narrow transverse pit in front of each coxa 9
9. Scutellum about 4X as long as claval commissure, without median carina; head and pronotum with numerous erect brownish bristles; corium with two vague, rounded small dots near caudal edge; body length about 5 mm . . . . . Megalonotini, p. 67
— Scutellum and claval commissure about equal in length, the former with a distal carina; body glabrous or finely pubescent; corium with large whitish spot near center of apical fourth (sometimes attaining lateral edge); length about 3 mm . . . . . Udeocorini, p. 45

Table II: Rhyparochrominae

Blatchley, 1926	Current
Myodochini	Myodochini
Myodocha	Myodocha
Heraeus	Heraeus
Sphaerobius	Slaterobius
Ligyrocoris	Ligyrocoris
Orthaea	Neopamera, Paromius, Pseudopachybrachius
Zeridoneus	Zeridoneus
Perigenes	Perigenes
Ptochiomera	Ptochiomera, Sisamnes, Carpilis
Kolonetrus	Kolonetrus
Cnemodus	Cnemodus
Pseudocnemodus	Pseudocnemodus
Rhyparochromini	Rhyparochromini
Peritrechus	Peritrechus
	Ozophorini
Ozophora	Ozophora
	Antillocorini
Antillocoris	Antillocoris
	Stygnocorini
Stygnocoris	Stygnocoris
	Udeocorini
Tempyra	Tempyra
Beosini	Gonianotini (+ Beosini)
Malezonotus	Malezonotus
Aphanus	Atrazonotus
Trapezonotus	Trapezonotus
Gonianotini	
Emblethis	Emblethis
Lethaeini	Lethaeini
Cryphula	Cryphula
Xestocoris	Xestocoris
	Drymini
Drymus	Drymus
Eremocoris	Eremocoris
	Megalonotini
No entry	Megalonotus

ANTILLOCORINI

In Blatchley's manual (1926: 414), the genus *Antillocoris* was referred to the tribe Rhyparochromini with five other genera of eastern United States. When comprehensive reorganization of the subfamily began in the 1950s, the genus was included by Scudder (1957) in the tribe Lethaeini, which was shortly thereafter rendered into three tribes by Ashlock (1964). One of these was the Antillocorini, to which Ashlock referred ten genera. The most recent review of the tribe is that of Slater (1980), which treats eleven New World genera cladistically and provides a generic key. Species of the tribes Antillocorini and Stygnocorini are very similar externally and can be definitively separated — on a worldwide basis — only by the presence of the abdominal "Y-suture" present in the nymphal stages of stygnocorines. Fortunately each tribe is represented in our fauna by only a single genus, easily recognized by adult characters. The close similarity of the two genera *Antillocoris* and *Stygnocoris* was already reflected by their inclusion in the last couplet of Blatchley's key to rhyparochromine genera.

Genus **Antillocoris** Kirkaldy

The species of this genus are the smallest lygaeids in the Virginia fauna and can be identified by size alone: body length less than 2.5 mm. These diminutive bugs are basically pale yellow, cinnamon, light brown, or castaneous; the entire body is invested in pale setae. The front lobe of the pronotum is impunctate, and the scutellum as broad as long.

The North American species of *Antillocoris* were defined by Barber (1952) in a very succinct, unillustrated review. The key to the four recognized species relied heavily upon the relative length of body hairs, shades of coloration, and texture of the dorsum. Barber implied substantial allopatry that seemed to exclude two of the species as native to Virginia: *A. pallidus* being restricted to Florida and *A. minutus* to Canada and northern United States. Remaining were *A. pilosulus* and *A. discretus*, both stated to range from New Jersey to Florida and west to Texas.

Despite the existence of this apparent *fait accompli*, the taxonomy of *Antillocoris* remains confused (J. A. Slater, in litt.) pending a complete revision. While no improvements can be attempted in the context of a local treatment, it is desirable for users of the present survey to be aware of the situation in Virginia, to the extent that available material permits.

Specimens that unambiguously key to *A. discretus* in Barber's paper are at hand from Virginia Beach and from Charlotte County in the central Piedmont. In addition to being essentially "bald" dorsally, these bugs are uniformly testaceous yellow.

Specimens invested with long, partially erect setation, and with a reasonably constant — if diffuse — hemelytral pattern, are represented in collections mostly in Piedmont localities. In consideration of Barber's reference to a "variegated corium" such insects are tentatively referred to *A. pilosulus*.

Lastly, an apparent third form is represented by a few brachypterous individuals (lacking any trace of membrane) from Augusta, Bath, Floyd, Franklin, and Highland counties. It is difficult to evaluate the taxonomic status of such specimens because of their anatomical condition (brachyptery produces a pronotal shape different from that in the full-winged condition). In addition, however, these antillocorines also differ in color: a uniformly dull brown except for a diffuse yellow mark at base of each clavus. And vestiture is more extreme than in the Piedmont material referred to *pilosulus*: on the abdominal sterna the setae tend to be even longer than the individual sternites. Whether these brachypters are merely a normal morph within the parameters of *pilosulus* or a different taxon cannot be assessed with the limited material available, which does not include full-winged individuals from the same populations needed for a meaningful comparison. The Floyd County specimens were taken at the crest of a high exposed monadnock with boreal facies, a situation that would seem to favor wing reduction. But identical specimens from the other counties were taken from sheltered hardwood forest at much lower elevations.

An option suggested by Barber's article is that *A. minutus* (Bergroth) may be involved in this third form. The expressions "dull, dark castaneous" and "membrane absent and the posterior margin of the corium truncate" are precisely applicable, and are contradicted only by the phrase "sparse, recumbent, silvery hairs." Pending a thorough modern taxonomic revision, discretion justifies no further speculation on the status of this apparently montane representative of the genus, particularly since the brachypterous condition is very rare among the extensive USNM material identified by Barber as *minutus*.

Specimens of *Antillocoris* are sometimes taken by handpicking or sifting litter, or by sweeping, but most of the VMNH material originated in pitfall samples, litter berleseates, or from blacklight traps. The series of 18 from Charlotte County was arbitrarily limited to that number; actually twice as many could have been taken from the lighted sheet.

Key to the Virginia species of *Antillocoris*

Entire body invested in long pale hairs, both declivent and erect (examine specimen in lateral aspect!); corium pale beige with a small dark spot near midlength of costal margin, a longer brown streak adjacent to clavus, and entire caudal margin infuscated . . . . . *A. pilosulus*, p. 43

Vestiture extremely short, on dorsum scarcely more than fine pubescence, all hairs recumbent against integument; dorsum uniformly pale yellow or yellowish-brown, the hemelytra without darker markings . . . . . *A. discretus*, p. 43

152. **Antillocoris discretus** Barber
Figure 44, Map 36

The uniform pale yellowish dorsal coloration and absence of long erect setae distinguish this minute lygaeid from *A. pilosulus*.

At the time of describing this species, Barber had extensive series from Florida, as well as a specimen from Texas and three from New Jersey. A Lower Austral distribution was thus even at that time indicated, although more recent collections have established localities well up on the Piedmont in the Middle Atlantic States. So far I know only a few Virginia localities even though they indicate an extensive in-state range.

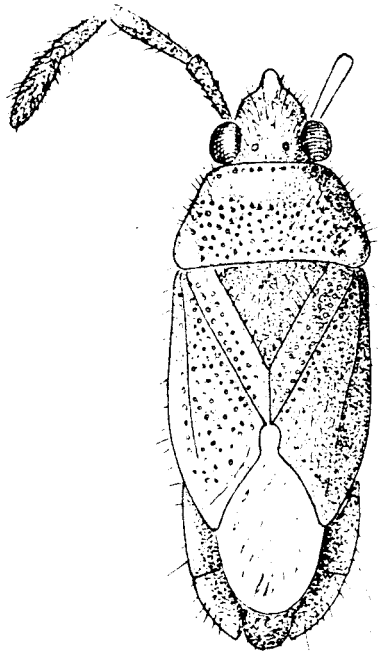


Figure 44. *Antillocoris discretus* Barber, showing indentation of corial margin.

Charlotte Co.: Cub Creek floodplain along Va. Rte. 695, 2.5 mi N of Phenix, 11 August 1994, UV light (VMNH 3). **Greensville Co.**: Nottoway River at Va. Rte 619 bridge, ca 5 mi NW of Jarratt, 29 August 1991, blacklight (VMNH 1). **City of Virginia Beach**: Oceana, 21 July 1978, black light, W. A. Allen (VMNH 1); also Dam Neck Navy Base, "dune" drift fence site [date label lost] (VMNH 1).

At the Charlotte County site, the three specimens of *discretus* were taken along with 15 individuals of *pilosulus*. The very few capture dates suggest a midsummer peak of activity. All of the cited specimens are fully winged.

Further south, the NCSU collection has series of *discretus* from Wake and Stanly counties, North Carolina, the latter far inland from the Fall Line, but not inconsistent with the Piedmont Virginia site.

153. **Antillocoris pilosulus** Stål
Map 37

Virtually identical in body structure to the preceding species, *A. pilosulus* is distinguished by the profuse declivent hairs intermixed with others nearly erect, and by the consistent brown markings of the hemelytra.

Barber (1952: 85) outlined a southern range, "from southern New Jersey . . . to Florida, Tennessee, Missouri, Alabama, Louisiana, Arkansas and Texas." The very extensive distributions cited by Ashlock & A. Slater (1988) for this species and *A. minutus* may incorporate mixed identifications and should be held in abeyance pending a revision of the genus. In Virginia, material that answers unequivocally to Barber's concept of *pilosulus* is at hand from the following localities:

Charlotte Co.: Cub Creek floodplain, 2.5 mi N of Phenix, 11 August 1994, blacklight (VMNH 15). **Culpeper Co.**: Hazel River at Va. Rte. 707, 14 July 1979, B. C. Kondratieff (VMNH 1). **Greensville Co.**: 2.5 mi NE of Claresville, beside Meherrin River at blacklight, 15 July 1994, museum survey (VMNH 7); also 1 mi E of Claresville, Va. Rt. 606, 21 April 1994, sweeping grasses (VMNH 1). **Halifax Co.**: Dan River floodplain 3 mi NNW of Turbeville, Va. 658, 1 July 1993, 26 July 1994, blacklight (VMNH 8), also Banister River, 3.2 mi E of Five Corners, 25 July 1992, blacklight (VMNH 1). **Hanover Co.**: South Anna River, 6 mi NW of Ashland, 19 July 1977, at light, J. R. Voshell (VMNH 1). **Louisa Co.**: North Anna River, 19 July 1977,

blacklight, C. R. Parker (VMNH 6). **Lunenburg Co.**: Juniper Creek at Va. Rte. 690, 4 mi N of Rehoboth, pitfall trap, 5-22 April 1991, and sweeping weedy field, 6 June 1991, museum survey (VMNH 2). **Mecklenburg Co.**: Elm Hill State Game Management Area, 6 mi. SE of Boydton, 18 July 1995, UV light, museum survey (VMNH 2). **Pittsylvania Co.**: pond beside Va. Rte. 863, NW of Danville, 1 July 1991, blacklight (VMNH 4); Mount Airy Mill, Va. Rte. 883, 26 June 1990, blacklight (VMNH 1); Chatham, 27 July 1963, UV light, W. A. Tarpley (VMNH 12). All of these specimens are fully winged.

Material identified as *pilosulus* by H. G. Barber is in the USNM collection from **Nelson Co.**: Wingina, and **Fairfax Co.**: Four-mile Run.

[**Antillocoris** sp. indet.]

Records for the differently colored, brachypterous form are grouped separately under this heading rather than obscuring the existence of a possibly distinct taxon by lumping them under *A. pilosulus* (which, of course, may prove to be their correct placement).

Augusta Co.: George Washington National Forest, ca 5 mi W of Stokesville, pitfall in oak woods, 3-17 June 1989, Barry Flamm (VMNH 1). **Floyd Co.**: Buffalo Mountain, ca 5 mi. SE of Willis, ex berleseate of rhododendron litter from 3900 ft., 15 September 1984 (VMNH 3); also Willis Ridge, ca 00 mi SW of Floyd, ex berleseate of rhododendron litter, 19 October 1980 (VMNH 1). **Franklin Co.**: ca 1 mi E of Endicott on Va. Rt. 40, ex berleseate of rhododendron litter, 19 February 1991 (VMNH 2). **Highland Co.**: Headwaters, on *Phlox subulata*, 26 August 1994, A. G. Wheeler (VMNH 1). **Rockbridge Co.**: Goshen, 17 July 1993, A. G. Wheeler, Jr. (VMNH 1).

STYGNOCORINI

The 15 genera referred to this small taxon are distributed predominately in the Palearctic, Oriental, and Ethiopian Regions; a few occur in New Zealand and Tasmania, and the nominate genus is represented by several native species in western North America. Slater & Woodward (1982) mention that since stygnocorine genera share no known synapomorphy the tribe may be paraphyletic.

Genus **Stygnocoris** Douglas & Scott

Body short, stocky, convex; overall densely punctate and setose; head small and declivent, the anteocular part no longer than length of an eye; antenniferous tubercle set as low as ventral edge of eye; juga not distinct from tylus, latter not as long as projecting front edges of bucculae. Peritreme small, distally elevated, evaporatorial surface restricted to ventral third of metapleuron (Fig. 40). Each "glandular spot" of abdominal segments whitish and distinct, with exceptionally long seta. Profemora incrassate, with two series of stout bristles each set on a low rounded basal tubercle (Fig. 39).

Stygnocoris is a West Palearctic genus with about a dozen species, two of which occur also in northern North America. Presumably, their presence in the New World is due to accidental introduction, and at least one (*rusticus*) is closely associated with an introduced European plant (*Achillea millefolium*) and appears to be migrating southward through the Appalachians.

154. **Stygnocoris rusticus** (Fallen)
Figures 39, 40, and 45, Map 38

A small (3-4 mm), stocky, completely blackish lygaeid with dense, decumbent yellow setae, *rusticus* is usually found in the brachypterous condition, with only short rudiments of the hemelytral membrane evident.

Figure 45. *Stygnocoris rusticus* (Fallen).

A thorough review of the biology and distribution of this Palearctic bug in North American was published by Wheeler (1983). At the time of Blatchley's handbook (1926: 421) *S. rusticus* was known only from Quebec and Nova Scotia. By 1980 it had been collected as far west as western Ontario, and south to eastern West Virginia, where Wheeler found specimens on yarrow (*Achillea millefolium*) at two localities in Tucker County in August 1982. In view of an apparently successful southward dispersal along the Appalachians, the discovery of *rusticus* in Virginia seemed very probable.

On 30 August 1994 I obtained a single specimen from flowering heads of yarrow beside Va. Rte. 640, 1 mile south of Hightown, Highland Co., Virginia. This record extends the known range only 48 miles (80 km) south of Wheeler's localities, but adds the species to the Virginia fauna. Intensive collecting on yarrow at Mountain Lake, Giles Co., Va., 90 miles (150 km) southwest of Hightown, a week later was negative.

UDEOCORINI

This is another small taxon of uncertain status and affinity. The majority of included genera are Australian in range; a few occur in South and Middle America, and one is present in the Nearctic Region.

Genus **Tempyra** Stål

Pronotum with distinct dorsolateral carinae; antennae short and stout, 4th article incrassate and fusiform; head exserted and narrowed behind the eyes, the latter thus not in contact with pronotum. One of the two known species is widespread, but very rare, across southern United States, the other is confined to the Sonoran Region.

[**Tempyra biguttula** Stål]
Map 39

A small (3.0–3.5 mm) insect somewhat resembling a species of *Blissus*; body piceous to black with elytra reddish-brown with a prominent pale spot on corium; legs yellow.

Although no Virginia specimens are known to me, the species surely occurs in at least the northern part of the state. The USNM collection has three specimens collected on Plummer's Island, Maryland, on 18 February 1912, 2 February 1913, and 25 January 1914, by W. L. McAtee. This site, on the east side of the Potomac River, is less than 200 feet from Fairfax County. Scores of Berlese soil extractions and dozens of pitfall units from all over Virginia have failed to produce a single specimen, suggesting that it occupies a very specialized habitat rather than some generic litter type One USNM specimen is labeled "under sycamore bark".

At first glance, the two prominent white corial spots give *biguttula* the aspect of a miniature *Eremocoris* (in which, to be sure, the spots are on the membranes).

DRYMINI

This group of about three dozen genera is virtually worldwide in distribution, apparently most diverse in the Palearctic and Oriental regions and well represented also in Australia and Africa. In the New World, a few genera occur in North America, none seem to be recorded south of Panama.

Key to Virginia genera of Drymini

1. Entire dorsal surface of pronotum densely and coarsely punctate, anterior half not convexly elevated above posterior; protibiae of males curved, fitting against convex opposed surface of femora . *Drymus*, p. 45
— Anterior half of pronotum at most very finely punctate, convexly arched and distinctly above level of posterior; protibiae of males straight, or slightly bent near apex 2
2. Length 5.5 mm or more; apex of tylus not reaching middle of first antennomere; sides of pronotum with setae . . . . . *Eremocoris*, p. 47
— Length less than 5 mm.; apex of tylus reaching middle of basal antennomere or beyond; sides of pronotum not setose . . . . . *Scolopostethus*, p. 50

Genus **Drymus** Fieber

A genus of stout-bodied, dark-colored lygaeids notable for the dense, coarse punctation of dorsum and thoracic sides. The profemora are strongly incrassate with a large subapical spine and several much smaller spinules in a row on anterior (median) side. Metatibiae are arcuately curved in both sexes, and mesocoxae of males provided with acute recurved spine.

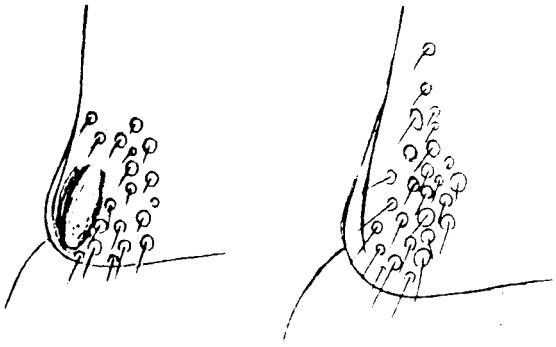
Most of the dozen or so species of this genus occur in the Holarctic Region. One of the two Nearctic species is common and widespread in Virginia, the other almost certainly will be found in the state.

Key to the Virginia species of **Drymus**

Side margins of pronotum pale, front lobe darker (maroon) and more finely punctate than the light

brown posterior lobe; humeral corners of pronotum with small but distinct and impunctate convexity; surface of male genital capsule with shallow median subapical depression length 4.0–4.5 mm . . . . . [*unus*, p. 47]

Pronotum uniformly dark and evenly coarsely punctate; humeral umbones punctate; male genital capsule lacking median depression length 4.9-7.0 mm . . . . . *crassus*, p. 46



Figures 46 and 47. 46: *Drymus unus*; 47: *Drymus crassus*, humeral region of pronotum.

155. **Drymus crassus** Van Duzee
Figures 47 and 48, Map 40

Length 4.9-6.0 mm (males), 6.0-7.0 mm (females). Body entirely a uniform dark brown to piceous, nearly black in some; clavi and coria usually light brown; membrane smoky, the veins a little darker. Posterolateral pronotal umbones punctate like rest of the surface.

The species occupies an extensive range in North America, excepting the southeasternmost states. Brimley (1938: 69) cited only Raleigh as a North Carolina locality. In Virginia, *crassus* seems clearly a lowland form most abundant near the coast, with few records yet known west of the Blue Ridge.

Alleghany Co.: along Dunlap Creek near Callaghan, 19 December 1993, S. M. Roble (VMNH 1). **Bath Co.**: Fort Lewis, Cowpasture River at Va. 678 bridge, 3 July 1994, A. G. Wheeler, Jr. (VMNH 1). **Chesterfield Co.**: Falling Creek at US 360 bridge, 10 October 1982 (VMNH 2). **Greensville Co.**: Catttail Creek, 3 mi. SW of Skippers, 30 May 1990, J. C. Mitchell (VMNH 1). **Fluvanna Co.**: Kent's Store, 4-16 April 1995, Molly Bell (VMNH 3). **King George Co.**: Naval Weapons Laboratory, Dahlgren, 7 October, VNHP survey 1991 (VMNH 1). **Loudoun Co.**: Purcellville, 7-20 July 1967, E. J. Hambleton (VPISU 3). **Mecklenburg Co.**: Elm Hill State Game Management Area, 15 March–5 April 1991, VMNH survey (VMNH 1). **Patrick Co.**: Pinnacles of Dan, 4 mi SW of Vesta, 14 July 1953 (VPISU 3). **Pittsylvania Co.**: 4 mi. ENE of Axton, Nov.-Dec. 1992, VMNH survey (VMNH 1), Dec.-Jan. 1993 (VMNH 2), Jan.-Feb. 1993 (VMNH 2). **Prince Edward Co.**: Hampden-Sydney College, 2 February 1993, J. March (VMNH 2). **York Co.**: Grafton Ponds, many dates, VNHP survey (VMNH 16). **City of Chesapeake**: Fentress Naval Air Station, many dates, VNHP survey (VMNH 30). **City of Virginia Beach**: Seashore State Park, many dates (VMNH 4); Oceana Naval Air Station, 3 May 1989 (VMNH 2); Munden Point, 8 June 1990 (VMNH 1); Little Creek Amphibious Base, 24 July 1989 (VMNH 1) (all from VNHP surveys).

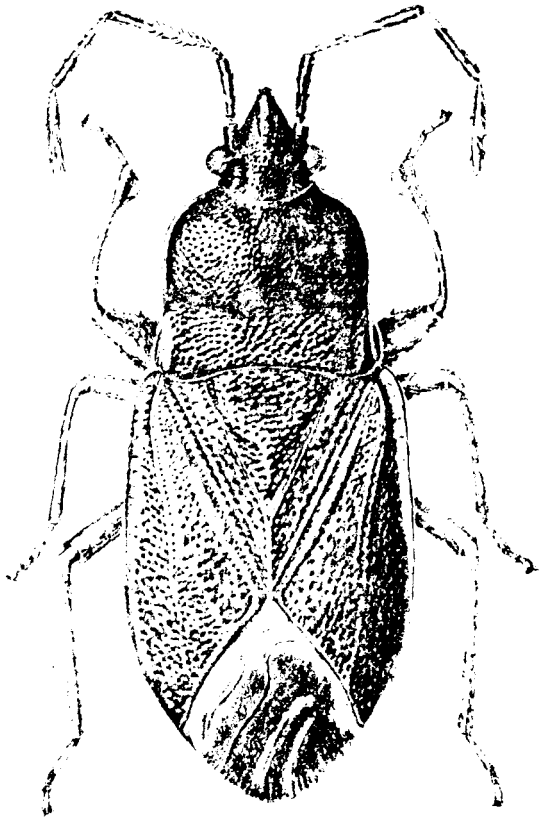


Figure 48. *Drymus crassus* Van Duzee.

The specimens from Chesterfield County were taken by Berlese funnel extraction; those from Alleghany, Bath, Patrick and Loudoun counties by hand-picking. All of the others cited were obtained by pitfall trapping. The species does not come to UV light. In southeastern Virginia, at least, it is active throughout the year. The largest series have been taken in April, but captures of three to six in January and February are

routine. Curiously, there are no records for September. Apparently *crassus* is a winter-spring active species. A breakdown by months of capture shows dramatically the peak of surface activity in April:

January	10	July	3
February	7	August	2
March	4	September	0
April	32	October	5
May	7	November	3
June	8	December	1

[**Drymus unus** (Say)]
Figure 46

Similar to *D. crassus* except as noted in the key. The presence of a shallow round median subapical depression on the male genital capsule in *unus* seems not to have been mentioned previously.

The status of *Drymus unus* in Virginia remains unsettled. States of record (Ashlock & Slater 1988) include Maryland and North Carolina, suggesting a northeastern-midcontinent range similar to that of *D. crassus*. Theoretically *unus* should occur at least in northern Virginia, but, if present, it has so far evaded capture. Brimley (1938: 69) listed *unus* from Raleigh, N.C., but this record should be verified since in Virginia specimens of *crassus* occur which approximate the upper size limits cited by Blatchley for *unus* and the identification may have been made on the basis of size.

Genus **Eremocoris** Fieber

Generally similar in body form to *Drymus*, the species of *Eremocoris* are somewhat more slender and with very reduced punctation. Profemora with one or two large spines and a row of smaller spines on anterior margin, also with a row of small spines along posterior (*lateral*) margin. Protibiae of males curved, with several rows of flattened nodules on ventral surface (as in species of *Neopamera*).

In my experience, members of this genus do not come to lights, and only one is so documented in material collected by others. At least two species are surface-active and are taken in pitfall traps, sometimes in numbers.

Key to the Virginia species of *Eremocoris*

1. Body and legs densely pilose with long erect hairs; hemelytra dark brown; pronotum dorsally uniform piceous, including side margins; profemora with two major ventral spines . . . . . *setosus*, p. 49
— Femora, and usually hemelytra, with short and inconspicuous hairs; hemelytra at least partially pale; pronotum bicolored, anteriorly piceous, posterior reddish; profemora with one ventral spine 2
2. Corium uniformly shiny light brown with only a very small dark mark near midlength; hemelytral membrane without white spot on each side; dorsum nearly glabrous; body strongly flattened dorsoventrally . . . . . *depressus*, p. 48
— Corium dull, bicolored, pale beige anteriorly, brown posteriorly, with large conspicuous dark marking near midlength, membrane with round white spot on each side adjacent to corial edge; at least scutellum with setae; body not evidently flattened . . 3
3. Tibial setae profuse, longer than tibial bristles, and standing perpendicular to tibial axis; abdomen evenly pilose; beak extending to base of abdomen . . . . . *ferus*, p. 49
— Tibial setae sparse, shorter than the tibial spurs; long hairs present on only last two abdominal segments; beak not reaching beyond metacoxae . . . . . *borealis*, p. 47

156. **Eremocoris borealis** (Dallas)
Map 41

Length 6-7 mm, without sexual dimorphism. Head, anterior pronotal lobe and four longitudinal marks on posterior, scutellum, sides of thorax, and sometimes abdomen black or nearly so; antennae and legs piceous, the femora darkest; posterior lobe of pronotum reddish; hemelytra beige basally, darker apically, usually with subapical blackish mark; membrane brown to nearly black, with rounded pale spot on each side adjacent to corial apex.

This species was confused with *E. ferus* for many years, and not distinguished until M. H. Sweet, suspecting that two species were masquerading under the name *ferus*, identified taxonomic differences and published a review of the situation in 1977. He noted that in New England, where there is an area of sympatry between *borealis* and *ferus*, the former "was found in cooler hemlock forest ravines," the latter "in warmer deciduous edge habitats." In the virtual absence of the specialized collecting required to find *Eremocoris*, knowledge of the Virginia species is extremely fragmentary. However, it is clear that *borealis* is confined to the Blue Ridge and westward, while *ferus* — although clearly a more lowland species — does co-exist with

borealis in at least two localities and is much more frequently collected with the pitfall technique. Only one of our few specimens of *borealis* was taken that way. It is particularly to be noted that three pitfall-drift fence arrays operated by VMNH in the lower red spruce-birch zone (5000 ft.) on Mount Rogers and Whitetop Mountain (a full year in each case) failed to secure a single *Eremocoris* of either species. There is plenty to do for someone interested in comparative ecology and distribution of these bugs. In the list that follows, habitat data are provided insofar as known:

Augusta Co.: ca 5 mi W of Stokesville, pitfall array in predominately red oak woods 16 June 1989, B. Flamm (VMNH 1). **Craig Co.**: Clover Hollow Mountain, 6 mi. ENE of Newport, 15 March 1954 (VPISU 1). **Floyd Co.**: Willis Ridge, 0000 ft., ca 5 mi SW of Floyd, in rhododendron litter, 19 October 1980 (VMNH 1); Shooting Creek, Va. Rte. 860, rhododendron litter, 1 May 1983 (VMNH 1); mile 174.3, Blue Ridge Parkway, 4 mi. N of jct with US Hy. 58, rhododendron litter, 20 May 1983. **Lee Co.**: White Rocks trail, NW of Ewing, 11 April 1981, D. W. Ogle (VMNH 1). **Montgomery Co.**: Radford, 13 March 1968, Janet Derting (VMNH 1); two miles west of Blacksburg, 11 April 1981, T. Williams (VPISU 1). **Patrick Co.**: Pinnacles of Dan, 4 mi SW of Vesta, litter under hemlocks, 9 April 1978 (VMNH 1).

The majority of the specimens cited above were taken during March, April, May, and June (see table under *E. ferus*). Hemlock (*Tsuga canadensis*) was probably present at most of the rhododendron sites although not specifically recalled.

157. **Eremocoris depressus** Barber
Figure 49, Map 42

Length to 7.5 mm. The notably flattened body form and virtually hairless dorsum distinguish this lowland species from its local relatives. Head, anterior half of pronotum, thoracic pleura, and scutellum glossy black; antennae and legs light brown; hemelytra uniformly pale beige, with only a vaguely defined small dark marking near midlength of inner corial margin; membrane without light spots.

Known records for this species reflect a distinctly "lower Austral" range: New Jersey and eastern Pennsylvania south to Florida, west to Louisiana. The very few Virginia records also imply an eastern lowland distribution:

Fairfax Co.: Vienna, 16 August 1922, H. G. Barber (USNM 1, **paratype!**). **Gloucester Co.**: without further locality, 11 January 1959, 20 January 1959, L. A. Hetrick (VPISU 3). **Isle of Wight Co.**: Blackwater Ecological Reserve, 4 mi S of Zuni, pitfall in longleaf pine barren, 4 June 1985, C. A. Pague (VMNH 1). **City of Norfolk**: "Norfolk", 7 September 1963 (USNM 1); Ornamental Truck Crops Experiment Station, 11 July 1975, W. A. Allen (VPISU 1).

Figure 49. *Eremocoris depressus* Barber

For a long time very little was known about the biology of this obviously specialized insect, and locality records were few and far between. Recently, Slater & Baranowski (1990: 104) reported the independent discovery by F. W. Mead in Florida and A. G. Wheeler in Pennsylvania that *depressus* feeds on the seeds of pines still in the cones. The flattened body form is clearly an adaptation for gaining entry between the mega-sporophylls.

Personal attempts to collect this species by beating foliage and cones of various pines in eastern Virginia have been unsuccessful; perhaps the timing was wrong There may be only a fairly narrow "window" from the time that female cones begin to open and the final dispersal of the seeds. The species will doubtless be found elsewhere in the state as soon as the collection technique has been fine-tuned. The dates cited above indicate a midsummer activity season.

158. **Eremocoris ferus** (Say)
Map 43

Length to about 6 mm; the series of specimens at hand average slightly larger than those of *borealis*. The two species are essentially identical in color and body form, but the setal differences cited in the key are constant and easy to see.

Material identified by Sweet defined a lowland range extending from coastal New Hampshire south to the Gulf Coast states, thence north in the Mississippi Valley as far as Iowa and Indiana. Slater & Baranowski (1990) cited no records for Florida, pointing up the need to establish the southern limits of distribution in Georgia and Alabama.

In Virginia the species is known from the counties of Augusta, Chesterfield, Floyd, Fluvanna, Halifax, Henrico, Lee, Loudoun, Montgomery, Nelson, Pittsylvania, and Rockingham, and the City of Virginia Beach.

Most of the Virginia records are for the Piedmont and Coastal Plain, but *ferus* does extend up to nearly 4000 feet in the Alleghanies of western Rockingham County and on Buffalo Mountain in Floyd County, probably the highest sites from which the species has been recorded. Virtually none of the material at hand has any habitat data, one exception being a notation "pine needles". The few I caught were under surface cover: one in mixed hardwoods, another in a grassy field. A specimen from Lee County was captured in a dry "cedar [*Juniperus*] glade", and Dr. Wheeler collected two in Fluvanna County by beating the foliage of *Juniperus virginiana*.

Dates of collection are spaced from March to November with a clearcut activity peak indicated for October, a striking contrast with the more vernal activity period of *borealis*.

	E. ferus	*E. borealis*
March	2	2
April	2	2
May	1	2
June	2	2
July	2	
August	4	
September	4	
October	9	1
November	2	
December	1	

Thomas Say (1831) did not provide a type locality in the description of his *Pamera fera*. Since the type material is lost, and Say's description could apply to either *ferus* or *borealis*, Sweet (1977) arbitrarily assumed that Say had material of the southern form with long tibial setae, and selected a specimen from Nelson County, Virginia as neotype of the name *ferus*.

159. **Eremocoris setosus** Blatchley
Map 44

Length to 7.5 mm. Overall piceous to black, with corial margins, tibiae, and tarsi reddish brown; hemelytral membranes with two small white spots and also a v-shaped pale reddish marking just behind end of claval commissure. Entire surface of body and legs densely setose with erect yellowish hairs.

The original description of this species was based on specimens from Indiana, New York, New Jersey, and Virginia. Subsequently collected material indicated an austral distribution from Massachusetts south to Florida, but with an apparently disjunct population in Ohio and Indiana (a pattern recurring in a number of insect and plant groups). Virginia records suggest a basically coastal plain range with a few isolated localities in the Piedmont. Whether these represent established populations or (as seems more likely) randomly dispersed individuals remains to be established. Nothing seems to be known about the biology of the species. In eastern Virginia it often enters pitfall traps.

Fairfax Co.: Chain Bridge and Vienna (USNM). **Franklin Co.**: Smith Mountain Lake 4-H Center, 9 mi ENE of Rocky Mount, 13 March-17 April 1995 (VMNH 5). **Greensville Co.**: 2.5 mi NW of Skippers, date lost, J. C. Mitchell (VMNH 1); pitfall site ca 1 mi E of Claresville, 28 April-10 May 1993 (VMNH 1). **Henrico Co.**: Elko Natural Area, 1 mi W of Elko, 15 June 1990, C. A. Pague (VMNH 1). **Henry Co.**: Moore's Mill Road, ca 4 mi SE of Spencer, April 1993, Ellen Compton-Gooding (VMNH 1). **Prince Edward Co.**: Twin Lakes State Park, 10 October 1992, F. Bell (VMNH 1). **York Co.**: ponds near Grafton, 16 April, 1 May, 11 June 1990, VNHP survey (VMNH 5). **City of**

Virginia Beach: Seashore State Park, mesic pitfall site, 21 June, 18 August 1989 (VMNH 2); Munden Point, 2 mi S of Creeds, 25 March, 18 June 1990, N. L. Bland (VMNH 6).

Collection dates range from April to October, with no obvious peak. Virtually all of the specimens were taken in pitfall traps, and most nearly at sea level.

[Genus **Scoloposthethus** Fieber]

Four species of this dominantly Palearctic genus are known from North America and one has been described from Guatemala (a remarkable occurrence!). Three (*S. atlanticus* and *S. diffidens* of Horvath, *S. thomsoni* Reuter) occur in New England, south to New Jersey, and either might extend southward onto the Delmarva Pensinsula. The last-named almost certainly occurs in the mountains of Virginia. These bugs appear to be miniature versions of *Eremocoris*, differing in the somewhat longer tylus and lack of pronotal marginal setae.

[Scolopostethus thomsoni Reuter]

This Holarctic species occurs entirely across the continent from Alaska to Newfoundland, southward in the East to the level of New Jersey and Iowa, and in the Rockies to Arizona and New Mexico.

It also inhabits higher elevations in the southern Appalachians, whence Sweet (1963) recorded it for Roan Mountain, North Carolina–Tennessee. It is thus a likely resident in western Virginia and should be sought particularly in mountain meadows in Grayson and Highland counties.

Tribe Ozophorini

Profemoral spines in a single series on the anterior side, each placed on a globose basal pedestal (Fig. 00), anterior surface of the femora with numerous fine dark setules (in our single genus). Pronotum with distinct dorsolateral carinae.

The tribe is pantropical, most diverse in the Neotropical Region. Only a few species extend northward into North America and eastern Eurasia.

Genus **Ozophora** Uhler

With the characters of the tribe as cited above.

If species of the preceding tribe have reflected largely boreal affinities, our single species of Ozophorini represents the local tip of a large Neotropical lygaeid iceberg. Ten species of *Ozophora* occur in Florida, and the genus becomes extremely speciose in the West Indies and northern South America.

160. **Ozophora picturata** Uhler
Figures 38 and 50; Map 45

Length of females to 7.0 mm, males about 1 mm shorter. Head, front lobe of pronotum, and undersurfaces light brown with a reddish tinge; rear lobe of pronotum, scutellum, and hemelytra light brown to beige with numerous dark punctations, each clavus with a black mark near tip of scutellum, corium with an irregular transverse black marking near midlength, enclosing a round white spot at inner angle, and apex also black; membrane piceous with pale veins. Legs yellow. Antennae yellowish, with apex of 3rd article and distal half of 4th black, basal half of latter white. In *picturata*, as well as some other members of the genus, the thin sharp edge of the corium is finely microserrulate, the denticles easily visible at 30X magnification. As there is

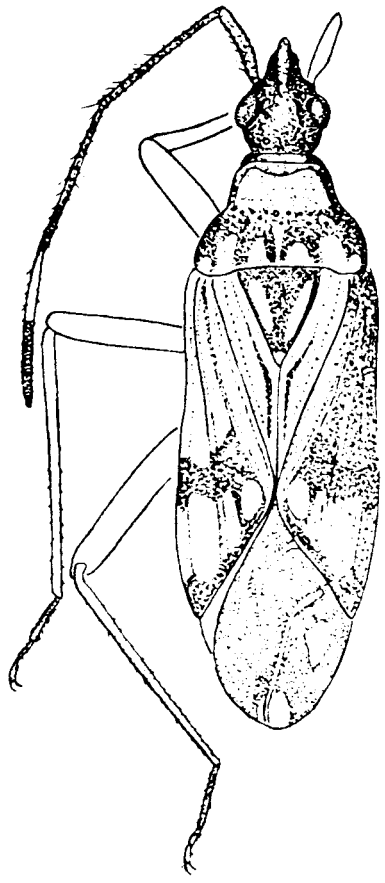


Figure 50. *Ozophora picturata* Uhler.

no corresponding modification of inner femoral surfaces, there is apparently no stridulatory function. In general habitus and coloration, this species is superficially similar to some myodochines, particularly *Neopamera albocincta*.

Despite its clearly southern affinities, O. *picturata* is widespread in Virginia, and has been found as high as 4200 ft. Specimens have been seen from Accomack, Alleghany, Amherst, Augusta, Bath, Campbell, Chesterfield, Dinwiddie, Fairfax, Floyd, Goochland, Greensville, Hanover, Henrico, Henry, Isle of Wight, Lee, Louisa, Loudoun, Mecklenburg, Montgomery, Nelson, Nottoway, Pittsylvania, Prince Edward, Prince William, Shenandoah, and York counties, and the cities of Chesapeake, Suffolk, and Virginia Beach. The highest elevation attained by the species is 4200 ft. at Bald Knob, 6 miles south of Hot Springs, in Bath County.

O. *picturata* is one of the few lygaeids which are taken by a wide variety of techniques, including pitfall traps, sweeping, lights (including UV black lights), and handpicking under shelter. Material has been taken in Virginia in every month except February and November, with the month of greatest activity being July as the following chart demonstrates (specimens taken during the winter months are from pitfalls):

January	1	July	47
February	0	August	30
March	1	September	5
April	5	October	3
May	17	November	0
June	23	December	1

The value given for July would be vastly increased by the inclusion of a single sample (VMNH) taken by blacklight at the Blackwater Ecological Preserve, Isle of Wight Co., on 1 July 1994 (S. M. Roble). This material, accumulated during an all-night operation of a UV light trap, contained 198 specimens. From its frequency in collections, one must account *picturata* as one of the most abundant lygaeids in the state fauna.

Tribe **Myodochini**

Species of this tribe vary considerably in size, form, color pattern, and minor structural details. All local genera except *Kolonetrus* share the two characters of pronotal collar and procoxal spines (but the latter reduced in males and absent from females of *Myodocha*, presumably a secondary loss). *Kolonetrus* is placed in the tribe on the basis of other structural features, such as the absence of a dorsolateral pronotal carina or explanation, and position of the spiracles.

The largest and most diverse tribe within the Rhyparochrominae, the Myodochini was revised at the generic level by Harrington (1980) who provided a cladogram and proposed a number of new generic names. Although worldwide in range, the tribe is perhaps most diverse in the Neotropical Region, least in Australia.

One of the larger myodochine genera treated by Blatchley in 1926 was *Orthaea*, credited with eight species in the eastern states. In 1953 this generic name was subsumed under the earlier *Pachybrachius* (Hahn, 1826) by Barber, but even this concept was further refined with the revival of *Paromius* for some of its species, and proposal of the new generic names *Pseudopachybrachius* and *Neopamera* for others. Myodochines are superficially characterized by the absence of a dorsolateral pronotal carina or margin and by constriction of the prothorax into two "lobes", the anterior usually the longer and posterior the broader. The thirteen genera represented in Virginia may be distinguished by "key characters" that do not, of course, always reflect relationships.

The sequence of genera more or less follows that cladistically established by Harrington. Several local genera seem to cluster into subtribal groups, such as *Heraeus* + *Myodocha*, *Paromius* + *Neopamera*, *Carpilis* + *Ptochiomera*, and *Perigenes* + *Zeridoneus* + *Ligyrocoris*. In addition to simply "looking alike", the local species of the last three taxa share a trivial but constant synapomorphy: the presence of an apical seta on the procoxal spine.

Key to Virginia genera of Myodochini

1. Pronotum without trace of a collar, but with distinct dorsolateral sulcus (Fig. 51); procoxae without spine . . . . . *Kolonetrus*, p. 53

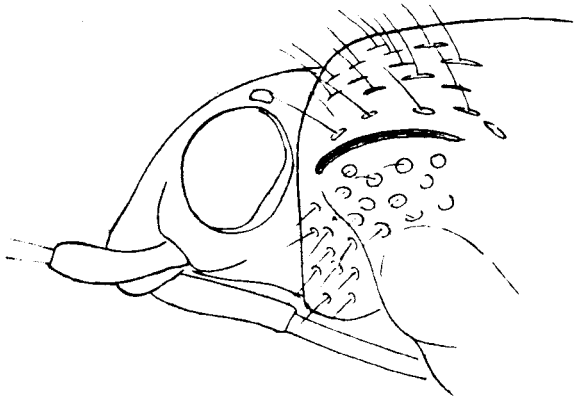


Figure 51. *Kolonetrus plenus*, side view of prothorax, showing dorsolateral sulcus.

— Pronotum with collar but lacking dorsolateral sulcus; procoxae with one or two acute spines (except in females of *Myodocha*) 2

2. Head without ocelli . . . . . *Cnemodus*, p. 53

— Ocelli present 3

3. Lower side of prothorax with conspicuous stridulatory area (Fig. 3); mesofemora of males with a row of large spines . . . . . *Pseudocnemodus*, p. 54

— Prothorax without stridulatory surface; mesofemora of males without spines 4

4. Posterior region of head elongated, the postocular distance about twice as great as width across eyes (Fig. 56) . . . . . *Myodocha*, p. 55

— Posterior region of head not prolonged (or, if slightly so, postocular distance less than ocular width) . 5

5. Eyes placed about at midlength of head, e.g., the head as long behind the eyes as in front of them, and strongly constricted forming a prominent "neck" (Fig. 57) . . . . . *Heraeus*, p. 56

— Head behind eyes much shorter than in front, and not constricted to form a distinct "neck", eyes often in contact with pronotum 6

6. Antennae short and obviously incrassate, 4th article at most three times as long as broad, usually about as long as first; small species, <3 mm long . . . 7

— Antennae long and slender, 4th article 10 to 20 times as long as broad and usually much longer than first; length usually more than 3 mm 8

7. 3rd and 4th antennomeres not notably thicker than 1st and 2nd (Fig. 64); antennae with stiff erect hairs . . . . . *Carpilis*, p. 65

— 3rd and 4th antennomeres twice as thick as 2nd (Fig. 63), antennae without stiff erect hairs 7

8. Front lobe of pronotum much narrower and darker than posterior; scutellum with prominent pale carina . . . . . *Ptochiomera*, p. 64

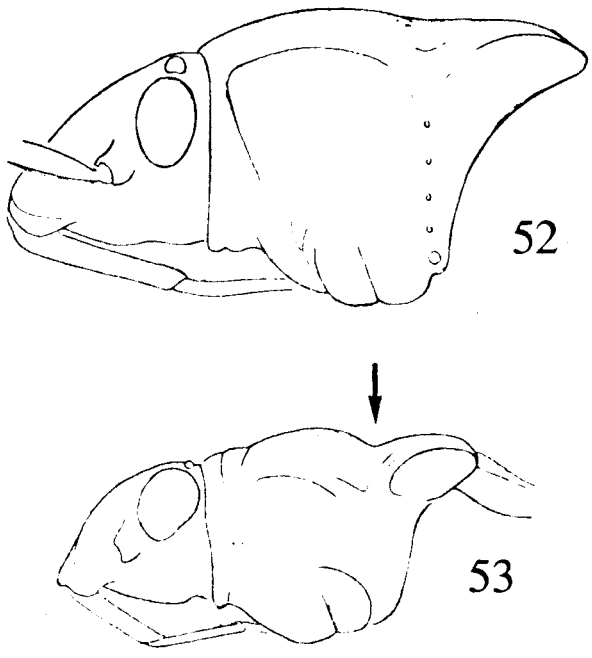
— Front lobe of pronotum nearly the same color and width as posterior; scutellum with indistinct carina . . . . . [*Sisamnes*, p. 66]

9. Pronotum only slightly divided into two lobes, a constriction, if one exists, not evident in side view (Fig. 52) 10

— Pronotum prominently constricted near base; anterior part thus nearly circular in outline and much narrower than posterior, the difference very distinct in lateral view (Fig. 53) 12

10. Sides of abdominal sterna 3-4 with smooth, crescent shaped stridulatory area (Fig. 2), inner surface of rear femora with numerous small but distinct spicules (plectrum) . . . . . *Ligyrocoris*, p. 56

— Sides of abdominal sterna without stridulatory fields; inner surface of hind femora without spicules . 11



Figures 52 and 53. Forebodies of rhyparochromines showing relative degrees of transverse constriction of prothorax. 52. *Perigenes similis*. 53. *Pseudopachybrachius basalis*.

11. Entire body including legs and antennae densely invested in long erect hairs in addition to the coating of fine decumbent pubescence; procoxal spine low, apically truncate . . . . *Perigenes*, p. 59

— Body without dense investment of long bristly hairs, dorsal surface virtually glabrous; procoxal spine long and acute . . . . . *Zeridoneus*, p. 59

12. Front lobe of pronotum nearly spherical, as wide as posterior lobe and much longer; head and front lobe smooth and shiny . . . . . [*Slaterobius*, p. 66]

— Front lobe of pronotum not spherical, narrower than posterior; head and front lobe usually not shiny . 13

13. Procoxae each with two acute ventrolateral spines; pronotal constriction with a single row of readily visible punctures . . . . . *Neopamera*, p. 61

— Procoxae with a single spine; pronotal constriction without evident punctures 14

14. Body long and slender, the part posterior to apex of scutellum as long as that in front; claval commissure as long or longer than scutellum; clavus with four or five rows of punctures; collar with two or three rows of punctures; profemora yellow . . *Paromius*, p. 63

— Body shorter and robust, the part posterior to apex of scutellum shorter than distance to tip of tylus; claval commissure shorter than length of scutellum; clavus with three rows of punctures; collar with one row of punctures; profemora black . . . . . *Pseudopachybrachius*, p. 62

Genus **Kolonetrus** Barber

Pronotum without collar, dorsolateral side of its anterior part with a longitudinal sulcus delimiting upper edge of pleural region. Clavus with three rows of equal-sized punctures. Entire dorsal surface densely and coarsely punctate, surface smooth and polished. Procoxae without trace of ventrolateral spine. Body black, only basal area of corium brownish.

Because of the missing pronotal collar and several other generalized characters, Harrington placed this genus at the base of myodochine diversification. It is currently considered monotypic, but the enormous range of the one nominal species (Quebec to Guatemala) implies that a close comparison of material might disclose others masquerading under the name *plenus*.

161. **Kolonetrus plenus** (Distant)
Figures 51 and 54; Map 46

A small (3.0–3.5 mm long), nearly black, smooth, densely punctate bug, *K. plenus* is easily distinguished from other Virginia lygaeids by the characters mentioned under the generic heading.

The species has not been recorded from Virginia, although H. G. Barber collected it near Washington 70 years ago. I know only three in-state localities: **Augusta Co.**: Staunton, "7/8/27", A. M. Woodside (USNM 1). **Fairfax Co.**: Vienna, 22 August 1922, H. G. Barber (USNM 4). **Floyd Co.**: Buffalo Mountain, 3900 ft., ca 5 mi. SE of Willis, 4 August 1992 (VMNH 1); also 27 August 1994, A. G. Wheeler, Jr. (VMNH 8).

One specimen from Buffalo Mountain was found under a small flat stone partly embedded in turf. The eight collected by Dr. Wheeler were "brushed" by hand from the foliage and inflorescence of *Paronychia argyrocoma* (Michaux), which forms dense mats on the thin dry soil at the crest of Buffalo Mountain.

K. plenus has been recorded south of Virginia, in the Great Smoky Mountains (Sweet, 1964). The NCSU collection has a specimen from Rural Hall, Forsyth Co., in the western Piedmont region of North Carolina and at a much lower elevation. Dr. Wheeler's collecting technique invites application in other sites where *Paronychia* (and similar plants) occurs. Most (possibly all) of the material recorded here was collected in August.

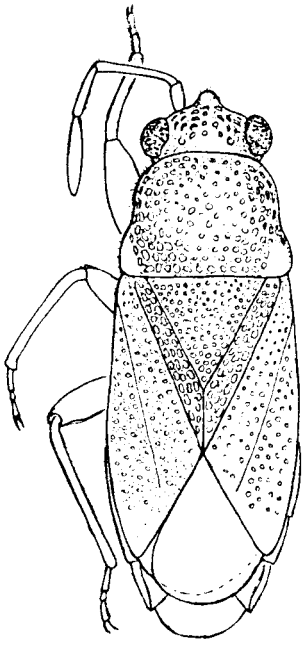


Figure 54. *Kolonetrus plenus* (Distant)

Genus **Cnemodus** Herrich-Schaeffer

This genus of long-legged, slender myodochines is endemic to the Western Hemisphere: two of its four nominal species occur in temperate South America, two in eastern United States. The apparent absence of species from the vast intervening area is curious. The key character (lack of ocelli) that sets off the genus is doubtless of only secondary importance, and among other local genera *Cnemodus* is most similar to *Pseudocnemodus*. Aside from enlargement of the anterior pronotal lobe (and reduction of the posterior) and presence of a strong tibial spine in the males, the mesofemora have a row of small tubercles that exactly presage the prominent femora spines present in *Pseudocnemodus*. Both genera are clearly replete with specialized traits.

162. **Cnemodus mavortius** (Say)
Figure 55, Map 47

A large (8.8–10 mm) black, shiny myodochine, with the elongated anterior pronotal lobe giving a somewhat humpbacked impression in lateral aspect. Contrary to most myodochines, there is no sexual dimorphism in size, the largest Virginia specimen is a male and the

smallest a female but the sexes average out closely.

The species is widespread in eastern United States, south of Canada and east of the Rockies. In Virginia it is a distinctly lowland form; the few records technically in the mountains are in areas occupied by migrating austral forms in many taxa. Most museum specimens are single captures, and only one of the many pitfall sites in the state has produced many individuals.

AlleghanyCo.: Covington, 21 June 1975, R. Kelley (VMNH 1). **Fairfax Co.**: Great Falls, Vienna, various dates (USNM 00). **Henry Co.**: Martinsville, inside VMNH building, 9 September 1992, 4 August 1993 (VMNH 2). **Henrico Co.**: University of Richmond campus, May-October (VMNH 5). **James City Co.**: Williamsburg, 29 April 1937, C. C. Walton (VMNH 1). **King and Queen Co.**: without further data,28 September 1939 (VPISU 1). **Lee Co.**: crest of Wallen Ridge, Va. Rte. 70, SE of Jonesville, 26 September 1976. **Loudoun Co.**: Purcellville, 15 March 1969, E. J. Hambleton (VPISU 1). **Montgomery Co.**: Blacksburg, 1896 (VPISU 1). **Nottoway Co.**: Blackstone, 19 July 1988, M. L. Barnes (VPISU 1). **Orange Co.**: without locality, 1 July 1976, collector not recorded (VPISU 2). **Prince Edward Co.**: Hampden-Sydney College, 6 September 1991, A. Lowe (VMNH 1). **City of Virginia Beach**: Dam Neck Navy Base, May-November (VMNH 19).

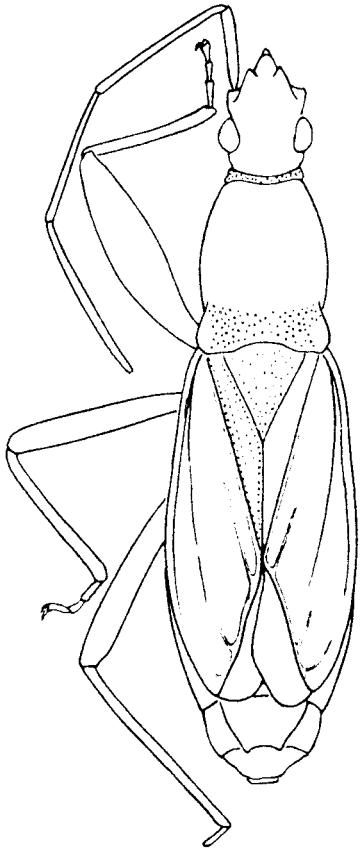


Figure 55. *Cnemodus mavortius* (Say)

Collection records implicate a late summer activity peak:

March	1	August	12
April	2	September	7
May	2	October	5
June	1	November	1
July	3		

It is intriguing that our only long series came from one locality, and pitfalls operated at the same time only a few miles distant never captured a single individual. Populations apparently can be extremely localized. The record for Covington is rather far inland, and perhaps should not be taken seriously until confirmed by more recent finds; the same may be true for the very old Blacksburg specimen which could have been an aeolian migrant or simply mislabeled. The specimen from Lee County, however, was collected personally, and is possibly part of a population that extends up the Tennessee Valley into southwestern Virginia, where a substantial Upper Austral biota has been documented.

Dimorphism in pronotal shape in this species was discussed by Slater & Hoffman (1994) in their evaluation of the name *Cnemodus inflatus* Van Duzee.

Genus **Pseudocnemodus** Barber

A monotypic genus endemic in North America. The single included species is evidently specialized in many features, and may be the most derived of local myodochines.

163. **Pseudocnemodus canadensis** (Provancher)
Figure 3, Map 48

Length to 6.5 mm, females slightly larger than males. Head and thorax nearly black, abdomen brown; hemelytra yellowish-brown, explanate costal margin and pronotal humerus pale; legs brown with femora darker, antennae uniform yellowish-brown. No other lygaeid in the eastern states has the combination of a stridulitrum on the prothorax, a prominent tibial spur in males, and a row of spines on the mesofemora.

Known locality records indicate a main area from

Quebec to South Dakota, southward to Kansas and North Carolina, with a disjunct population in British Columbia. Slater & Baranowski (1990) recorded two localities in northern Florida, implying that *canadensis* may yet be found in Georgia. Virginia records, although very few, imply a distribution in the Piedmont and mountains (as do those cited by Brimley for North Carolina).

Arlington Co.: Falls Church, 19 September, without further data (CU). **Augusta Co.**: George Washington National Forest, ca 5 mi W of Stokesville, 8 August (2), 2 September (2), 1 October (7), 15 October (1), 1988, Barry Flamm (VMNH 12). **Fairfax Co.**: Vienna, 29 August 1925, H. G. Barber (USNM 2). **Montgomery Co.**: Blacksburg, 26 August 1954; Radford Arsenal, 16 July 1955 (VPISU 3).

The Blacksburg specimen was found under a small stone in an open field; those from Radford Arsenal at light. The series from Augusta County is from a single pitfall array placed in an area that had been clear-cut two years previously. Six other such arrays placed in nearby oak stands about 70 and 138 years old did not produce a single *Pseudocnemodus*.

A late summer-autumn activity period, peaking in early October, is clearly suggested by pin label dates.

Genus **Myodocha** Latreille

As characterized superficially by the extremely elongated posterior head region (postocular length much greater than anteocular), this genus embraces about eight species clustered in the circum-Caribbean countries and northern Andes. One of these (*serripes*) is widespread in eastern United States and occurs northward as far as Quebec and Minnesota, another (*annulicornis* Blatchley is restricted to Florida). Contrary to the condition in other local myodochines, the procoxal lateral spines are much reduced in males, absent from females, presumably a secondary loss in this group of specialized species.

164. **Myodocha serripes** (Say)
Figure 56, Map 49

Length 8-10 mm, females not larger than males. Head, coxae, and sterna shiny black, thorax and scutellum dark gray, pruinose. Hemelytra light reddish-brown, with costal margin, a broader subapical corial spot, small spot near inner corial angle, and tip of scutellum whitish to yellowish. Legs and antennae stramineous except for dark brown distal third of profemora and basal antennomere. The long, necklike extension of the head posterior to the eyes immediately

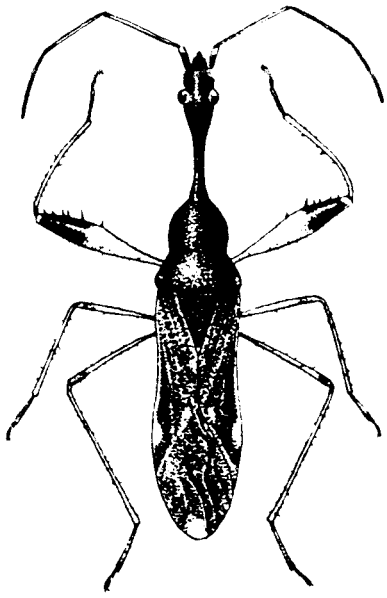


Figure 56. *Myodocha serripes* (Say)

distinguishes this species from all other regional lygaeids.

Although other members of the genus are strictly tropical in range, *serripes* has successfully adapted to cooler and seasonal climatic regimes, and is among the few lygaeids that occur from sea level to 5500 feet in Virginia. At lower elevations, at least, it is one of the commonest members of the family and is often found in small colonies under suitable shelter. Virginia counties of record are Accomack, Alleghany, Augusta, Campbell, Carroll, Charlotte, Craig, Chesterfield, Cumberland, Fairfax, Floyd, Franklin, Frederick, Grayson, Greensville, Halifax, Hanover, Henrico, Henry, Isle of Wight, Loudoun, Mecklenburg, Northampton, Northumberland, Pulaski, Pittsylvania, Roanoke, Rockingham, and Warren, and the cities of Norfolk and Suffolk. The species unquestionably occurs in all counties of the state, even though records from the extreme southwest are lacking.

Collection dates suggest a long period of activity with a decided midsummer peak:

March	1	August	11
April	2	September	1
May	9	October	3
June	6	November	2
July	22		

M. serripes is one of the most frequently encoun-

tered lygaeids in Virginia, and is equally at home in urban and undisturbed ruderal situations. Adults and late-stage nymphs are frequently found in some numbers on the undersides of boards laid out in grassy places in late summer. The larger nymphs have a distinct median abdominal dark line.

Genus **Heraeus** Stål

With about a dozen species, two of them in southeastern United States, this genus is endemic to the New World. In general body structure and coloration, there is close agreement with *Myodocha* and the two are often placed sequentially in classifications (a headless specimen might prove difficult to place in either genus!). However, the entire profemora are dark in color, and the procoxal spines large and distinct.

The head is strongly constricted behind the eyes to form a narrow "neck" and is thus set off from the prothorax, suggesting a first step along an evolutionary track taken by *Myodocha*.

165. **Heraeus plebejus** (Say)
Figure 57, Map 50

Body 5.0–5.8 mm long in Virginia material, both extremes represented by females. Head, coxae, sterna, and abdomen dark shiny brown, thorax and scutellum medium brown, pruinose. Hemelytra brown with costal margin and subapical spot nearly white, spot at inner corial angle yellowish. Membrane brown with paler veins. Legs yellowish except for uniformly light brown profemora.

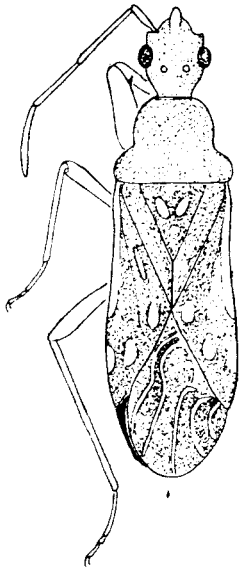


Figure 57. *Heraeus plebejus* (Say)

Ventral surface of protibiae in this species are set with low, elongated tubercles suggesting those of *Neopamera* but much smaller and less conspicuous.

The species is widespread over eastern North America, extending north as far as Ohio, Massachusetts, and Quebec. Apparently statewide in Virginia, *plebejus* seems to reflect its Neotropical origins by avoiding the higher elevations: only one capture site is higher than 2000 feet, and the map shows a preponderance of localities east of the Blue Ridge. Oddly, it was never taken during the extensive pitfall trapping conducted by VDNH in Chesapeake and Virginia Beach.

Records are available for Alleghany, Augusta, Bath, Campbell, Charlotte, Clark, Cumberland, Dinwiddie, Essex, Floyd, Giles, Greensville, Halifax, Hanover, Henry, Isle of Wight, Loudoun, Louisa, Mecklenburg, Montgomery, Patrick, Pittsylvania, Rappahannock, Russell, and Washington counties, and the City of Hampton. The activity period in Virginia is clearly midsummer and closely comparable to that of *Myodocha serripes*:

May	1	August	11
June	17	September	4
July	23	October	3

About half of the VMNH material was taken at UV lights, most of the rest by sweeping in weedy open fields. Five adults and two 5th instar nymphs were taken together under cover on 31 July 1993, near Blackford, Russell Co.

Genus **Ligyrocoris** Stål

This genus of about 12 known species is essentially a New World group, but only marginally represented south of Panama. One of the more boreal species occurs also in Eurasia, the result of trans-Beringian migration in the Pleistocene in the opinion of Slater (1986). As noted under the tribal heading, the genus is defined in part by the presence of a stridulitrum on abdominal segments 3 and 4, the sole definitive external way of separating the genus from its relatives *Zeridoneus*, *Perigenes*, and *Neopamera* in the Virginia fauna. However, as already noted by Sweet (1986), there is considerable variation in the expression of this character. It is large and conspicuous in most species, but small and difficult to see in *L. obscurus*, which moreover bears a striking external similarity to *Zeridoneus costalis* (much more than to some supposedly congeneric species). This latter species exhibits both a kind of stridulatory behavior and traces of a stridulitral primordium, and Sweet reasonably

suggested that, upon a reappraisal of the taxonomic significance of the stridulitrum, *L. obscurus* "may prove to be cladistically congeneric with *Zeridoneus*". Professor Slater (in litt.) believes that this type of stridulatory mechanism probably arose independently several times within the Myodochini.

One of the species treated under *Ligyrocoris (abdominalis)* by Blatchley has been transferred to the genus *Froeschneria*, and two additional eastern species (*barberi* and *caricis*) have been added, neither of which are likely to occur in Virginia.

In the original description of *L. barberi*, Sweet (1986:282) cited material from numerous localities suggesting a coherent lowland distribution from Florida to Texas, and northward to southern Illinois. He included also several specimens labeled "Valley of Black Mts., NC", and if these were to be confirmed by future collecting in the area named, *barberi* would qualify as a possible resident of Virginia. However, the Black Mountains are so disjunct both geographically and ecologically from the otherwise strictly austral range, one may hold such records in suspicion.

Key to the Virginia species of *Ligyrocoris*

1. Stridulitrum poorly defined, present as several small vaguely striate areas mostly obscured by abdominal pubescence; length 8-9 mm ..... *obscurus*, p. 58
— Stridulitrum well developed and conspicuous, a broad shiny crescentic area of dense vertical striae on segments 2-4; length 4-6 mm 2
2. Entire dorsal surface, but especially head and prothorax, densely invested in long coarse erect setae; abdominal sterna partly or almost entirely dull red ..... *diffusus*, p. 58
— Dorsal surface nearly glabrous, only a few sparse short setae present on head and thorax; abdominal sterna without red coloration 3
3. Costal margin of hemelytra uniformly pale for its entire length ..... *depictus*, p. 57
— Costal margin of hemelytra interrupted near midlength by a broad dark band extending across corium ..... [*sylvestris*, p 58]

166. **Ligyrocoris depictus** Barber
Figures 1, 2, and 58; Map 51

Length from 5.0 (males) to 6.0 mm (females). Head and abdominal sterna shiny black, the former clothed in appressed golden hairs, the latter with silvery. Front lobe of pronotum, scutellum, and sides of thorax dull piceous to black, with only scattered metallic hairs and isolated small punctures. Rear lobe of pronotum, clavus, and most of corium several shades of reddish brown, the broad costal margin and elongate spot at inner angle of corium white; corium with subapical dark marking; membrane brown with light veins, a round yellowish spot behind claval commissure, and a smaller white apical spot. Rear lobe of pronotum with three vague dark stripes, the humeri yellowish, pronotum with irregular pattern of fine pale lines. Legs mostly yellow, profemora and apical third of 2nd and 3rd femora darker; 2nd antennomere yellow, apex of 3rd and all of 1st and 4th brown.

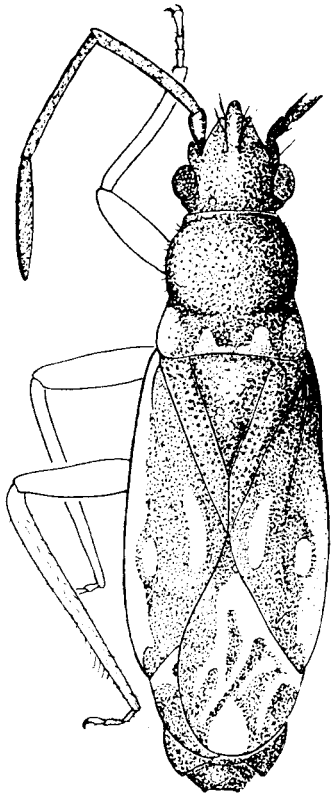


Figure 58. *Ligyrocoris depictus* Barber.

This small species, strictly endemic to northeastern North America, is known from Quebec, New England, New York, and a far disjunct area in the Great Smoky Mountains, North Carolina. It is apparently very local in Virginia, and has been taken only twice.

Grayson Co.: Whitetop Mountain, open fields at 5000 ft.along FS Rt. 89, 23 June 1994, VMNH field party (VMNH 7); Grayson Highlands State Park, pitfall at head of Sullivan Swamp, 4800 ft., 15-30 August 1990 (VMNH 1).

The two localities are 5.0 miles apart. Specimens from Whitetop were taken by sweeping in open field communities of grasses, composites, blackberries, and ferns, adjacent to beech woods. The pitfall at Grayson Highlands State Park was placed near a small stream at the edge of a grassy field, immediately adjacent to stands of *Rhododendron maximum* and *Picea rubens*.

167. **Ligyrocoris diffusus** (Uhler)
Map 52

Length from 5.0 (males) to 6.2 mm (females); larger and stockier than *depictus* but generally similar in structure and coloration except that the abdominal sterna are distinctly reddish, the posterior lobe of pronotum has four well-defined broad dark stripes, the membrane lacks a basal round yellow spot and the basal antennomere is yellow like the 2nd.

This subboreal species extends entirely across Canada, southward through the Rockies to Arizona and New Mexico, and in the east as far as North Carolina (although not restricted to higher elevations). Virginia localities are statewide, from sea level to about 4000 ft.: **Alleghany Co.**: Griffith, 26 September 1950 (VPISU 1). **Essex Co.**: Tappahannock, 7 August 1978 (VMNH 1). **Fairfax Co.**: Vienna, Herndon, dates not recorded (USNM). **Montgomery Co.**: Blacksburg, August-October, student collections (VPISU 9); Radford, 7 October 1970, student collection (VMNH 1). **Rockingham Co.**: Grottoes, 19 August 1950 (VPISU 1). **Tazewell Co.**: Beartown Mountain, 4000 ft., Burkes Garden, 15 May 1977 (VMNH 1). **Washington Co.**: along Holston River, 2 miles NE of Mendota, 16 September 1974 (VMNH 1), and **Wythe Co.**: Wytheville, 11 July 1954 (VPISU 1), and "Shenandoah National Park" [Page or Rappahannock County], 20 August 1946 (USNM 1). Recorded collection dates are for May (1) and August-October.

July	1	September	7
August	7	October	4

Most specimens were taken by sweeping; that from Essex County came to UV light.

168. **Ligyrocoris obscurus** Barber
Map 53

Except for the weakly developed stridulatory features, this species could easily pass as a *Zeridoneus*. Body 8.5-9.0 mm long (in two Virginia females). Head, front of pronotum, scutellum, and ventral surfaces dull black, head and abdomen densely clothed with appressed yellow pubescence, thoracic surfaces sparsely so. Rear lobe of pronotum reddish brown with indistinct darker markings, the humeri yellowish. Costal margin of corium uniformly pale, the light color not broadened medially near apex as in other species, and hemelytra generally much darker; membrane nearly black, the veins pale only near their bases, distal half of membrane with profuse yellowish speckling, no apical light spot.

Originally described from the vicinity of Washington, D.C., this species has since been recorded from chiefly midcontinental states: Illinois, Indiana, Kansas, and Missouri. It is not commonly collected, and I know only two Virginia localities: **Montgomery Co.**: Blacksburg, 20 August 1972, collector not recorded (VMNH 1). **Pittsylvania Co.**: Lacy Farm pitfall site, 4 mi. E of Axton, 2 Oct.-13 Nov. 1992, VMNH survey (VMNH 1). The collection data are too few to permit even the most rudimentary inference about seasonal activity and habitat preference.

[**Ligyrocoris sylvestris** (L.)]

This presumably Holarctic species is continent-wide across northern United States, Canada, and Alaska, as well as Eurasia. Ashlock & A. Slater (1988) include "N.C." in their list of states of record. *L. sylvestris* may thus be considered a possible resident Virginia species and it has been included in the foregoing key. It should be sought in the higher mountains in Rockingham, Highland, Tazewell, and Grayson counties.

[Genus **Froeschneria** Harrington]

This nominal genus shares many characters with *Ligyrocoris* and *Perigenes*, differing from the first by having two series of profemoral spines instead of one, and from the second by the presence of stridulatory structures. Four species have been referred to *Froeschneria*, two of which occur in southeastern United States.

[**Froeschneria piligera** (Stål)]

Earlier records, which I have been unable to trace, reported *piligera* from Massachusetts and Ontario. These seem highly improbable, and may have been based on misidentified specimens of *Perigenes*, as implied by Slater & Baranowski (1990: 140) who state that this Neotropical species occurs from Florida to Texas. The record for Illinois (Slater, 1952), however, may represent a northern lobe of the actual range. There seems little

justification for including *piligera* as a probable member of the Virginia fauna at this time. The species was treated in Blatchley's manual under the name *Ligyrocoris abdominalis*.

Genus **Zeridoneus** Barber

One of the 11 myodochine genera endemic to North America, *Zeridoneus* is known from three described species. One occurs in the south-central part of the continent, a second is known only from Utah; the third is distinctly boreal in range and extends southward only along the Appalachians. These species bear a striking similarity to some now placed in *Ligyrocoris*, and probably are the sister group of that nominal genus of that nominal genus, as implied in the cladogram devised by Harrington (1980).

169. **Zeridoneus costalis** (Van Duzee)
Map 54

A robust, rather stocky myodochine, females to 7.5mm long (males a little shorter), and thus among our largest rhyparochromines. Body a uniform piceous, head clothed in dense golden pubescence, abdomen with appressed silvery hairs. Pronotal collar reddish, posterior lobe light brown with four broad darker lines (or often appearing dark brown with three narrow light lines). Scutellum black with extreme tip whitish. Hemelytra variable, basally more beige or tan, distally and inwardly on coria becoming darker brown, no dark bar imposing on light costal margin, an elongate yellowish mark near inner corial angle and another just posterolateral to it; membrane brown with pale veins and irregular light speckling and spotting. Legs and antennae yellowish-brown, most of profemora and distal third of meso- and metafemora dark brown, apex of 3rd antennomere darker brown than basal half.

The range of this species is decidedly northern, extending from Alberta to Quebec, and south through the Appalachians to the Great Smoky Mountains. In Virginia Z. *costalis* is apparently an upland species, all but two of the known records being west of the Blue Ridge. There, however, it is not limited to high elevations and several of its localities are as low as 800 ft. The species prefers rather dry habitats, and most of the material collected by me was taken by sweeping in open meadows or turning stones or wood in such places. Dr. A. G. Wheeler, Jr. found it frequently in association with clumps of *Phlox subulata* in shale barren habitats in central western Virginia.

Material has been examined from Alleghany, Bath, Bland, Floyd, Giles, Grayson, Hanover, Highland, Loudoun, Montgomery, Roanoke, Rockbridge, Rockingham, Russell, Scott, Tazewell, and Wythe counties. While there is no reason to doubt the accuracy of the Hanover Co. record (Falls of North Anna River, 6 July 1977, C. R. Parker, VMNH 1), it is so much out of the range that the specimen might be adventitious rather than representive of a local native population. Dates of collection range from late June to early November, with an obvious clustering in September:

June	6	September	14
July	4	October	2
August	9	November	1

Genus **Perigenes** Distant

With only three recognized species, this small genus is endemic to Guatemala and North America. In general appearance these bugs are similar to those of both *Ligyrocoris* and *Zeridoneus*, but the body is appreciably hairier and stockier. The short, blunt, procoxal spine in *Perigenes* seems a very trivial character but is constant and easy to see in all material examined. An equally trivial but constant color difference is the occurrence of *two* elongate pale marks near the inner corial angle in *Zeridoneus*, but only one *round* spot in *Perigenes*.

Prior to Distant's proposal of *Perigenes* in 1893 for the Guatemalan *P. dispositus*, the common Nearctic species *constrictus* had been usually referred to *Ligyrocoris*. Blatchley (1926: 404) treated only *P. constrictus* in his manual since at that time *P. similis* had not been recognized from sites east of the Mississippi. And with good reason, since Barber's description (1906) of *similis* based the species solely on number of relative differences, and did not mention any of the three characters now considered to provide the most tangible distinction. These, used in the following key, were published first by Froeschner (1944: 663), who encountered both species in Missouri. It is not surprising that Blatchley did not distinguish his Indiana specimens from Floridian. The situation in Virginia requires a lot of additional study, as available material does not provide a good idea of the status of *constrictus* within the state. All recently collected specimens (VMNH) in good condition are from "Southside" counties, and all are clearly *similis* on the basis of the three key characters. Two females from northern Virginia (Dulles International Airport) are 7.8 and 8.0 mm in length and look substantially more robust than the *similis* females, but the 2nd antennomere is only 1.13 longer than the 4th, instead of the 1.2 specified by Froeschner or the 1.5

stipulated by Slater & Baranowski (1990: 167). A male specimen (VPISU) from Washington, D. C., 7.2 mm long and with the femora ringed with brown, should be *constrictus* on these two points, but the 2nd and 4th antennomeres are essentially equal in length. Is there geographic variation in this character? Are the two taxa actually only geographic races? *Perigenes* appears to be a genus that amply merits careful revision. For the present, its status in Virginia must be considered as inadequately known.

Key to the Virginia species of *Perigenes*

2nd antennomere 1.2X as long as 4th; all femora and 1st antennomere of males entirely (1st) or apically ringed (2nd and 3rd) with brown; length of females greater than 7 mm ..... *constrictus*, p. 60

2nd and 4th antennomeres subequal in length; 1st antennomere and femora of males uniformly yellowish; length of females less than 7 mm .... *similis*, p. 60

170. **Perigenes constrictus** (Say)
Map 55

Length of females 7.5–8 mm, males slightly smaller. Entire body piceous to black, virtually entire integument including appendages covered in dense appressed golden pubescence interspersed with long erect yellow hairs; basal lobe of pronotum with yellowish humeri and three reddish middorsal stripes. Hemelytra generally dark brown with costal margin narrowly pale except where interrupted by a black postmedial spot; inner angle of corium with an indistinct pale spot; membrane dark, veins paler. Antennae and legs yellowish, profemora and apical fourth of meso- and metafemora black.

As presently defined, *constrictus* occupies a transcontinental range, from Alaska to Nova Scotia, southward to California, Texas, and North Carolina. The few Virginia localities suggest that it occurs in northern and western parts of the state.

Augusta Co.: vicinity of Greensville, 26 August 1976, J. McCaffrey (VPISU 1). **Highland Co.**: Head Waters, 26 June 1994, 26 August 1994, A. G. Wheeler, Jr. (VMNH 2). **Loudoun Co.**: Dulles International Airport, without date, W. A. Allen (VPISU 2). **Montgomery Co.**: vicinity of Blacksburg, 1969, R. Ecklund (VPISU 1).

The two specimens found by Dr. Wheeler in Highland County were associated with clusters of *Phlox subulata*. The very few collecting dates suggest a general midsummer period of activity.

171. **Perigenes similis** Barber
Figure 59, Map 56

Extremely similar to *constrictus* in general appearance, this species is a credit to its name. It is, however, about a millimeter shorter (compare the same sex), and the legs of males are uniformly clear yellow. As noted under the generic heading, the relative lengths of the antennomeres may not offer a definitive difference. The species was originally described from Texas, and the range has subsequently been extended north to Illinois and Iowa, and east to Florida, implying a lower Austral distribution. The few Virginia specimens seen (verified by Prof. Slater) are mostly from south of the James River:

Greensville Co.: Emporia, at blacklight beside Meherrin River, 16 August 1991 (VMNH 1). **Henrico Co.**: Richmond, at blacklight near James River, 19 August 1963, W. A. Tarpley (VMNH 1). **Louisa Co.**: without specific locality, 11 August 1976 (VPISU 1). **Mecklenburg Co.**: Elm Hill State Game Management Area, ca. 7 mi SE of Boydton, sweeping grasses and

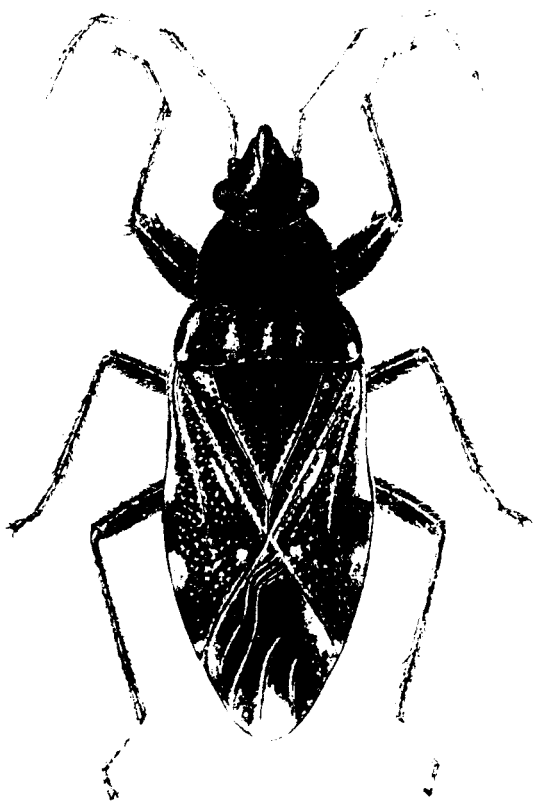


Figure 59. *Perigenes similis* Barber.

sedges in marshy field at Clydes Pond, 28 August 1992 (VMNH 2). **Pittsylvania Co.**: pond beside Va. 863, NW of Danville, UV light, 1 July 1991 (VMNH 2); 4 mi ESE of Cascade, UV light, 2 June 1993 (VMNH 1).

All of the foregoing sites are adjacent to standing or running water, or marshy areas. The few collecting dates range between early June and late August, most in the latter month.

Central Virginia appears to be the northeastern terminus of the species' range.

Genus **Neopamera** Harrington

A large American genus (20 described and many undescribed species) of slender, brownish lygaeids with elegantly variegated hemelytral patterns of tan, black, and white. Profemora with two series of acute spines. Hemelytra distinctly narrowed at basal third of length. In addition to the key characters used above to distinguish *Neopamera*, and the more technical features employed by Harrington, males of the two Virginia species have *paired* procoxal spines and two rows of elongated low tubercles on the ventral side of the tibiae, neither feature is present in *Paromius* or *Pseudopachybrachius*. Paired coxal spines do occur in *Pseudocnemodus*, possibly acquired independently.

The components of this genus were treated by Blatchley (1926) under the name *Orthaea* and as recently as the Slater catalog (1964) under *Pachybrachius*.

Key to the Virginia species of *Neopamera*

Antennae unicolorous; pronotal humerus without a pale spot; corium with a broad dark crossbar at midlength; male genital capsule dark brown, with two small subapical paramedian shiny tubercles . . . . . *bilobata*, p. 62

Proximal third of 4th antennomere white; pronotal humerus with a small pale spot; margin of corium with a narrow black bar; male genital capsule yellowish brown, with two paramedian oblique black markings . . . . . *albocincta*, p. 61

172. **Neopamera albocincta** (Barber)
Figure 60, Map 57

Length 5.5 to 5.9 mm, without sexual dimorphism. General ground color variable, from light yellowish brown to reddish-brown to cinnamon; head invested in decumbent golden pubescence, anterior lobe of prothorax with sparse erect long setae and a vermiculate pattern in thin lines of silvery pubescence; posterior lobe unicolorous except humeral region where the white umbone is preceded by a black mark. Scutellum pruinose-gray except for shiny black median carina. Hemelytra very variable in shade of color, clavus and corium ranging from light brown to nearly white, costal margin with a dark bar behind midlength; apex of corium and a dash just anterior to inner angle black, with other dark markings sometimes present. Membrane dark with veins and apical median spot almost white, some of the shorter veins constantly C-shaped or lunate. Legs and antennae yellowish except for apical dark femoral annulae and basally white, apically brown 4th antennomere.

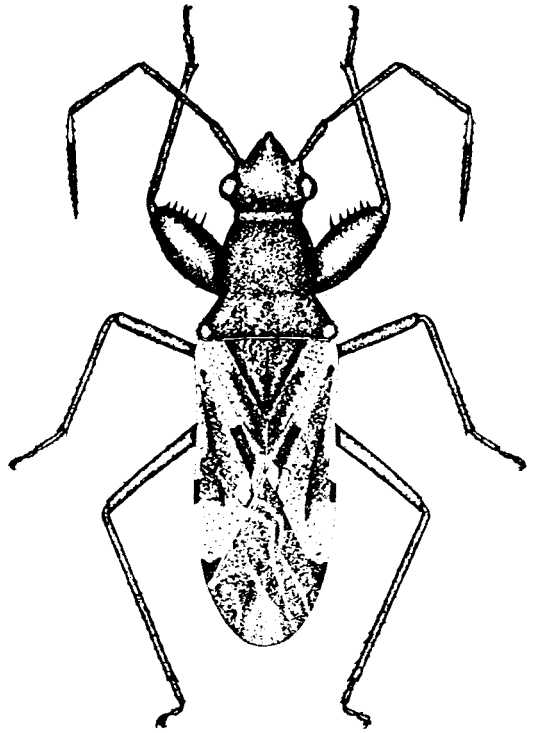


Figure 60. *Neopamera albocincta* (Barber)

For many years this myodochine was treated by heteropterists (including Blatchley, 1926: 403) under the name *Orthaea servillei* (Guerin). H. G. Barber (1953) pointed out the distinctness of the North American species from *servillei* and renamed it, in allusion to the antennal coloration.

It is noteworthy that Blatchley found the species in only four Florida localities, and considered it to be "scarce." In 1990, Slater & Baranowski recorded it from over 50 Floridian localities, the majority of collections carrying the information "blacklight trap." Did Blatchley not collect at lights, or has the species become more

numerous in recent decades? Whereas Blatchley mentioned only the Florida records in his range statement, Slater & Baranowski state (1990: 1444) that ". . . it extends northward to Illinois, Michigan, New York and Connecticut."

The earliest record of a Virginia capture known to me is 1933 (Lake Drummond, paratypes). The in-state range is dominantly eastern, with scattered occurrences across the Piedmont. Material has been seen from Charlotte, Dinwiddie, Essex, Fairfax, Goochland, Greensville, Halifax, Hanover, Henrico, Henry, Louisa, Nelson, and Pittsylvania counties, and the cities of Chesapeake, Suffolk, and Virginia Beach. A specimen from Crabtree Meadows, ca 3000 ft., Nelson Co., is far out of both range and biotope and must be an aeolian transient, but the record is genuine as I took the bug myself on 4 July 1990, from a blacklighted sheet.

Collection records reflect a midsummer peak of activity, as shown here:

April	1	July	27
May	0	August	16
June	15	September	2

Virtually all of the VMNH material was taken at blacklights.

173. **Neopamera bilobata** (Say)
Map 58

Length 5.0–5.9 mm, without sexual dimorphism. Color generally similar to that described for *albocincta* except: anterior lobe of pronotum without clear-cut pattern of gray pubescence and rear lobe with three distinct dark lines between the humeral black areas; apical third of femora rarely blackish, typically fusco-testaceous; 4th antennomere uniformly light brown.

A widespread Neotropical species, *bilobata* now extends northward to southern Ontario and Connecticut, although Blatchley recorded it only as far as North Carolina. Is this a case of successful migration within the past few decades, similar to the situation in *N. albocincta*? In Virginia, *bilobata* is widespread over both Coastal Plain and Piedmont, with but a single record west of the Blue Ridge.

Specimens have been seen from Alleghany, Bedford, Charlotte, Greensville, Halifax, Hanover, Henrico, Isle of Wight, Loudoun, Mecklenburg, Northampton, Patrick, Pittsylvania, and Southampton counties, and the cities of Hampton, Norfolk, and Suffolk.

The single far inland record (Alleghany County) is based on two specimens (VPISU) collected by me at Clifton Forge on 17 July 1950. This area, despite being well into the Ridge and Valley Province, is on the upper James River at an elevation of about 1000 ft., and is inhabited by a number of lowland forms in numerous other animal taxa, so the record is accepted as peripheral on the Virginia range of *bilobata*.

Collection dates show that this species, like *albocincta*, is most active during the summer months:

March	1	July	10
April	0	August	17
May	1	September	1
June	6	October	1

Genus **Pseudopachybrachius** Malipatil

The seven species of this small genus were placed in *Orthaea* or *Pachybrachius* prior to its proposal in 1978. Looking at first like miniature versions of *Neopamera*, they differ from species of that genus in having a much shorter mesepimeron and only one procoxal spine.

One wonders what short, euphonius name would have been suggested for this genus by either Stål or Distant.

Key to Virginia species of *Pseudopachybrachius*

Posterior margin of corium pale or light brown; posterior femora with dark subapical annuli . . *basalis*, p. 62

Posterior margin of corium black, posterior femora immaculate without dark subapical annuli . . . . . [*vinctus*, p. 63]

174. **Pseudopachybrachius basalis** (Say)
Figure 61, Map 59

Length of Virginia specimens varies from 4.0 to 5.2 mm, both represented by females; there is no evident sexual dimorphism in size. Ground color variable, from light brown to nearly black; in mature specimens in good condition head, anterior lobe of pronotum dorsally, and abdominal sterna glossy black with dense decumbent pubescence, posterior lobe of pronotum dark brown with two yellowish paramedian spots on caudal margin and two small yellow spots on each humerus; scutellum grayish pruinose except for black median carina. Hemelytra light yellowish-brown, beige or parchment, with costal margin nearly white; apex of corium with small blackish mark, also inner corial angle blackish with median white spot; membrane infuscated, with broad pale veins. Legs yellowish except profemora which are entirely lustrous shiny deep brown; other femora

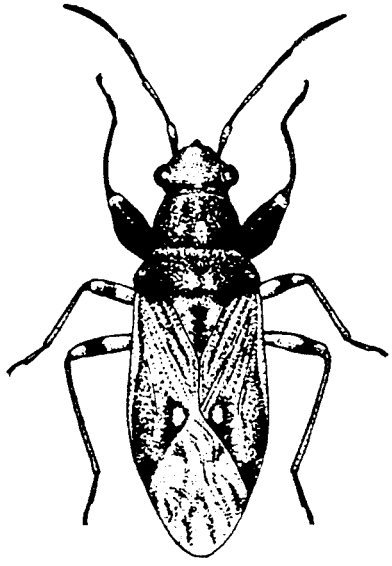


Figure 61. *Pseudopachybrachius basalis* (Say).

with subapical dark annulus. Basal three antennomeres yellowish, 4th brown.

P. basalis is widespread over most of eastern North America, and is statewide in Virginia from sea level to at least 5000 ft. Records exist for the counties of Accomack, Albemarle, Alleghany, Augusta, Bath, Campbell, Carroll, Culpeper, Cumberland, Fairfax, Floyd, Franklin, Giles, Grayson, Greensville, Halifax, Henrico, Henry, Isle of Wight, Louisa, Loudoun, Mecklenburg, Montgomery, Nelson, Nottoway, Pittsylvania, Smyth, Tazewell, York, and the cities of Suffolk and Virginia Beach. The absence of material from the far southwestern counties is surely only an artifact of inadequate collecting.

Seasonally, *basalis* is active during much of the year, with a notable peak during midsummer, as the collection dates reflect:

January	0	July	18
February	2	August	4
March	2	September	6
April	4	October	10
May	5	November	2
June	3	December	2

The paucity of June and August collections is surely only an artifact.

[**Pseudopachybrachius vinctus** (Say)]

An abundant species in southeastern United States, this small lygaeid extends northward along the Coastal Plain as far as eastern North Carolina (Bladen, Brunswick, Duplin, Onslow, and Hyde counties). The northernmost record known to me (Swan Quarter, Hyde Co. [NCSU]) is only 70 miles from the Virginia state line and discovery of *vinctus* in southeastern Virginia thus seems entirely likely. Slater & Baranowski (1990: 158) state that "It is a ubiquitous species in Florida in temporary habitats such as roadsides, gardens, abandoned fields and lawns, and even occurs on extremely hot dry sites on beaches."

Genus **Paromius** Fieber

This genus of about a dozen species is predominantly Old World Tropical in distribution, but several extend into the Palearctic Region and one of the two American species occurs in southern United States. In one guise or another *Paromius* has been the genus in which our species resided from 1862 until 1926, in which year Blatchley resorted to the use of a heterogeneous genus *Orthaea* for *longulus* and a variety of other myodochines. In 1939 *Paromius* was reinstated by H. G. Barber, and it has enjoyed general usage since then.

P. longulus is superficially distinctive by virtue of its elongate abdomen, broad flat pronotal collum, usually immaculate hemelytra, and lack of any dark color on the femora. In the net it gives somewhat the impression of a large *Nabis*.

175. **Paromius longulus** (Dallas)
Figure 62, Map 60

Body notably long and slender, length of Virginia specimens from 6.8 to 7.3 mm, without sexual differences in size. Head, front lobe of pronotum, scutellum, and undersides deep black with silvery decumbent pubescence. Posterior lobe of pronotum yellowish to reddish-brown, with humeral angles and two small paramedian spots on caudal margin pale yellowish to white. Hemelytra generally uniform light brown or beige, occasional specimens marked with dark near inner corial angle. Membrane but slightly darkened, veins lighter. Legs uniformly testaceous yellow; 4th antennomere brown.

Published records for this elongate, grass-feeding myodochine reflect a range from North Carolina to Texas, with a lobe northward to Missouri, thence southward through Mesamerica and the West Indies as

far as Argentina. To my knowledge, there are no published Virginia localities, although H. G. Barber found specimens (USNM) at Cape Henry in 1932. Both Ashlock & A. Slater (1988) and Slater & Baranowski (1990) cite North Carolina as the northernmost state of record. Although it is by no means common within Virginia, *longulus* occurs spottily in both its southeast and southwest corners, and may be somewhat more widespread than the few available records would indicate.

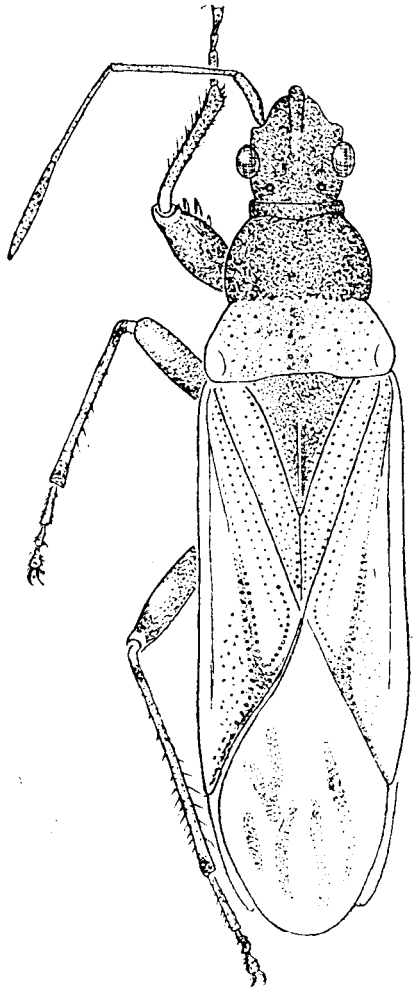


Figure 62. *Paromius longulus* (Dallas)

Alleghany Co.: Clifton Forge, in low grassy swale, 14 June 1950, (VPISU). **Greensville Co.**: end of Va. Rte 666, ca 1 mi E of Claresville, sweeping sedges/grasses along ditch, 6 October 1993, (VMNH 3). **Halifax Co.**: Dan River floodplain, ca 3 mi NNW of Turbeville, Va Rte 658, blacklight, 1 July 1993 (VMNH 1). **Mecklenburg Co.**: Elm Hill State Game Management Area, sweeping grasses/sedges in marshy area, 28 August 1992 (VMNH 1). **Washington Co.**: sweeping grassy pasture beside North Holston River, 2 mi NE of Mendota, 16 September 1974 (VMNH 5). **City of Norfolk**: without further data, March, July, Sept., L. D. Anderson (VPISU 4). **City of Virginia Beach**: sweeping low swamp area, 3 mi N of Blackwater, 12 September 1992, R. L. Hoffman & B. J. Abraham (VMNH 1).

The specimen from Clifton Forge is so far out of range that it must be considered an aeolian transient. Only one was ever found during several years of collecting in the vicinity of the capture. Interestingly, all of the other localities are about the same short distance north of the Virginia state line (Map 59). The few collection dates clearly reflect a late summer period of activity (omitting the single Norfolk record for March):

June	1	September	8
July	2	October	3
August	1		

Genus **Ptochiomera** Say

As treated by Blatchley (1926: 00), this genus was heterogeneous and was subsequently refined by Barber (1928), who restored the generic names *Sisamnes* and *Carpilis*, and proposed the new genus *Exptochiomera*. In its restricted sense, *Ptochiomera* contains only its type species *nodosa*, and is distinguished from other genera with modified antennae by the 3rd antennomere being notably thicker than the 4th and the protibia of males lacking a subapical spine. Costal edge of the corium is microserrulate, a character apparently not heretofore mentioned in descriptions, but apparently not a stridulatory modification.

176. **Ptochiomera nodosa** (Say)
Figure 63, Map 61

Length to 3.5 mm. Dorsum light brown or beige, with anterior pronotal lobe and 3rd antennomere black, 4th reddish. Body surface glabrous. *P. nodosa* is easily distinguished from other local myodochines by its small size, globose black anterior pronotal region, and strongly clavate antennae with two dark distal articles. Specimens can be easily recognized in the field without magnification.

The species appears to be widespread east of the Rockies, from Massachusetts to Florida, west to Texas and Mexico. Within this range, however, *nodosa* seems to be distinctly austral. Only three of the samples at hand are from west of the Blue Ridge, and two of these are from relatively low elevation (± 1000 ft.).

Figure 63. *Ptochiomera nodosa* (Say)

Material has been seen from Albemarle, Alleghany, Charlotte, Cumberland, Floyd, Franklin, Greensville, Halifax, Hanover, Henrico, Henry, Loudoun, Madison, Mecklenburg, Nottoway, and Rockbridge counties. Brimley (1938) mentioned only three localities for North Carolina, all in the Piedmont.

Collection dates range between 2 June and 2 October, with the majority of captures occurring in July. Specimens are found by hand collecting under scraps of cover in mostly dry places; many of our specimens were taken at blacklight. One female was captured in a Malaise trap during August, 1995, at Elm Hill SGMA, Mecklenburg County. They seem to be only rarely taken by sweeping.

Genus **Carpilis** Stål

Very small, stocky bugs, in which the light-colored hemelytra are shortened, without membrane, exposing several abdominal segments; antennae are relatively short but not clavate as in *Ptochiomera*, the 3rd and 4th articles no thicker than 1st. Protibiae with small subapical spine near distal end, and a row of acute tubercles on inner surface near base (at least in *barberi*). Profemora with 3-5 sharp spines in a row on each side.

This small genus, endemic to North America, was combined with *Ptochiomera* by Barber in 1918, considered a subgenus by Blatchley (1926), and restored by Barber (1928) to generic status, which it has held ever since. The three known species occupy widely separated ranges: *barberi* from Virginia to Florida, *consimilis* from New Jersey to Quebec, and *ferruginea* from Texas to California.

177. **Carpilis barberi** (Blatchley)
Figure 64, Map 62

One of our smallest lygaeids, length 2.8-3.0 mm. Body mostly reddish-brown, hemelytra light beige or parchment with a few diffuse pale brown markings,

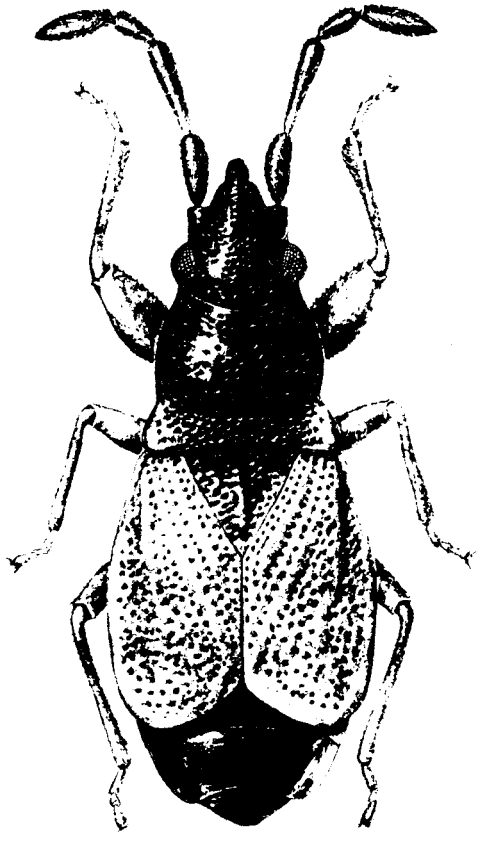


Figure 64. *Carpilis barberi* (Blatchley)

pronotal humeri pale, acetabulae whitish; legs immaculate, nearly colorless; antennomeres 2-3 yellowish, 1 and 4 brown; scutellum with median brown marking; posterior lobe of pronotum pale, with three vaguely defined brownish bars.

Our single Virginia specimen, a female, agrees generally with Blatchley's detailed description. However, the protibiae are provided with large and conspicuous subapical spines, previously attributed only to the male sex. Also unmentioned is the presence of a row of small, acute tubercles on inner side of basal third of protibiae. Whether these differences are peculiar to the Virginia population, or merely overlooked in Floridian specimens, remains to be established.

The northernmost locality cited for *barberi* by Slater & Baranowski (1990) is Tallahassee, Florida. The capture of a female in extreme southeastern Virginia thus represents an extension of the known range of about 650 miles to the northeast. This specimen was removed on 12 October 1990 from a pitfall array operated by the Virginia Natural Heritage Program in an interdunal swale in the Dam Neck Navy Base, City of Virginia Beach (VMNH). As the pitfall had been cleared two weeks earlier, it is probable that the bug was taken during the first two weeks of October, a time at which operation of a blacklight trap at the site might obtain additional specimens.

[Genus **Sisamnes** Distant]

This genus of very small myodochines includes three New World species, one of which occurs in eastern United States. It is in general rather similar to *Ptochiomera* and is grouped with that genus in the foregoing key to myodochine genera.

[Sisamnes claviger (Uhler)]

Prior to 1928, this species was placed by most writers in *Ptochiomera*. In that year it was referred by H. G. Barber to *Sisamnes*, and again so treated by the same author in 1953.

Despite its minute size (less than 3 mm long), *claviger* has been reported from much of North America: New England to British Columbia and south to North Carolina and Texas. Brimley's sole N.C. record (1938) was for Southern Pines, implying a lowland eastern range. There is no *a priori* reason for omission of Virginia from its area, and almost certainly specimens will be found in the eastern part of the state. Our failure to obtain material at blacklight suggests that *claviger* is not photopositive like its relative *Ptochiomera nodosa*.

[Genus **Slaterobius** Harrington]

This taxon was treated by Blatchley (1926: 00) under the name *Sphaerobius*, which Harrington (1980) restricted to West Indian species in providing the new patronym for the North American forms. The recent review of the genus by Slater et al. (1993) accounts four species, two of them confined to southwestern United States and Mexico, a third more widespread in western and northern North America. One species is restricted to northeastern United States and is a possible member of the Virginia fauna.

In this genus, the front lobe of the pronotum is much longer than the posterior and nearly as wide; in dorsal aspect it looks almost globose owing to the very deep constriction. The head is substantially wider than the pronotum, and the body form superficially suggests that of the nymphal stages of, e.g., alydiine bugs (or a large black ant).

The review by Slater et al. (1993) provides detailed information on biology and excellent illustrations of two of the species.

[Slaterobius quadristriatus (Barber)]

This rather large (7.5 mm) blackish lygaeid, with notably enlarged anterior pronotal lobe and four longitudinal stripes on the corium, was described from New Jersey, and there are few subsequent records of its capture. Slater et al. reported recent finds in Wisconsin and northern Michigan.

Although I do not know any Virginia localities, the Cornell collection has a small series labeled only "D.C.", originally part of the collection of Otto Heidemann. None appear to have been subsequently taken in or near the District of Columbia, but the occurrence of *quadristriatus* in Virginia is at least a possibility. Dr. A. G. Wheeler collected the species on pitch pine (*Pinus rigida*) in New Jersey, but nowhere else during his extensive surveys of the insects associated with that tree. It is obviously either very rare numerically or confined to a very specialized niche.

RHYPAROCHROMINI

In its present restricted sense this taxon occurs chiefly in the Palearctic Region and the Old World tropics. It is not represented in South America, and the only North American genera (*Peritrechus* and *Uhleriola*) are merely the tiny Nearctic tip of a Palearctic iceberg.

Slater & Baranowski (1990:181) state that "This tribe is characterized by having the spiracles of abdom-

inal segments 3 and 4 located dorsally, carinate or (frequently) explanate lateral pronotal margins and nymphs with a Y-suture present between abdominal terga 3-4." As the first of these features requires displacing an elytron, and the third is unavailable in identifying adult specimens, recourse must be made to some superficial character that will distinguish the single Virginian representative of the tribe. As indicated in the key to tribes of Rhyparochrominae, *Peritrechus* is readily separated from other local members of the subfamily by the curious form of the pronotal dorsolateral carina. If a specimen be examined with 90X magnification from a posterolateral aspect, the carina can readily be seen to consist of two elevated, parallel, *sharply defined* thin edges, the surface between them flat or slightly concave (Fig. 42). The effect is totally different from the usual rhyparochromine convex ridge, and likewise not comparable to the "explanate" condition occurring in many taxa. It must be emphasized that this feature is *not* suggested as a tribal apomorphy of the Rhyparochromini, but simply an easily visible trait that sets *Peritrechus* off from other local lygaeids. It is recognizable on the general habitus drawing of *P. paludemaris* in Slater & Baranowski (1990: Fig. 98).

Other features of *Peritrechus* are the absence of a pronotal collar, reduction of pronotal constriction (not evident in side view), and non-emergent mesepimeron which is completely occupied by evaporatorial surface texture. The mostly black legs of our local species, in connection with the black anterior pronotum, also aid in recognizing this genus.

Genus **Peritrechus** Fieber

Only four of the some 21 species of this genus are North American; all others are confined to the Palearctic Region. Three of the Nearctic taxa are basically northern in range, with only *P. paludemaris* occurring in the southeastern Coastal Plain.

Key to Virginia species of *Peritrechus*

Body less than 5 mm long; 2nd antennomere longer than 4th ..... *fraternus*, p. 67
Body length 5.3–6 mm; 2nd and 4th antennomeres equal in length ..... *paludemaris*, p. 67

178. **Peritrechus fraternus** Uhler
Figure 42, Map 63

Length 4-5 mm. Head and abdomen shiny black with fine appressed silvery pubescence; front half of pronotum, sides of thorax, and base of scutellum dull grayish black. Posterior half of pronotum, apex of scutellum, and hemelytra brownish-yellow to beige, sparsely covered with dark punctures; apex of corium with small black spot; membrane translucent with several vague brown dashes. Protibiae yellowish, femora dark reddish brown, mid and rear legs entirely piceous; basal antennomeres black, 4th grayish brown.

Blatchley (1926: 420) knew no localities south of New Jersey for this transcontinental species. Brimley (1938: 69) had material from Spruce, in the North Carolina Blue Ridge. *P. fraternus* has not been recorded from Virginia and is not common here, with only three known collection sites, none of them at higher elevations:

Amherst Co.: Monroe, 28 June 1948 (collector unknown) (VPISU 1). **Montgomery Co.**: Blacksburg, 17 April 1948 (collector unknown) (VPISU 1); 18 April 1952 (VPISU 1). **Patrick Co.**: Blue Ridge Parkway, ca 4 mi. N of jct with US 58 at Meadows of Dan, 8 May 1986 (VMNH 1).

The Patrick County specimen was taken in rhododendron litter, under a canopy of Canada hemlock and red maple, near a small stream. The few collection dates hint at a spring-early summer period of activity by adults.

179. **Peritrechus paludemaris** Barber
Map 64

Length 5-6 mm. Coloration similar to that of *fraternus*, but corium and membrane somewhat darker; femora with dark apical annulus.

This species, the austral counterpart of *fraternus*, occurs in salt marshes from Massachusetts to Florida. It has not been recorded from Virginia, and only two collection sites are available: **Henrico Co.**: city of Richmond, waterfront along James River, 19 August 1965 (W. A. Tarpley) (VPISU 1). **City of Newport News**: without further locality, 15 July 1977 (W. A. Allen) (VPISU 1).

The Richmond specimen (and possibly that from Newport News) was taken at a blacklight trap. Almost certainly the species is far more common in eastern Virginia than the few records would suggest.

MEGALONOTINI

This tribe, like the preceding, is so nearly confined to the Old World (Africa, Eurasia) that such records as those for *Lamprodema* in Argentina seem most impro-

bable and invite confirmation.

Genus **Megalonotus** Fieber

About twenty species of this genus occur in the Palearctic Region, one of which has immigrated into North America and become widely established in disturbed areas as far south as western Virginia. This is a small, nondescript lygaeid, dark in color with profuse long yellowish setae dorsally and laterally, differing superficially from other local rhyparochromines in the extreme reduction of the claval commissure, here only 1/6th the length of the scutellum instead of being 1/3d to 1/2th its length. The entire surface of the mesepimeron is involved in the granular evaporatorial surface, to the extent of being virtually indistinguishable from the metepisternum. The greatly incrassate profemora are compressed, much higher than thick, each with a single large spine near midlength on front side, and a subapical ventral field of denticles.

180. **Megalonotus sabulicola** (Thomson)
Figure 65, Map 65

Length of Virginia specimens varies from 4.6 to 5.2 mm; both extremes are females. Entire body dull black and setose, hairs longest and most evident on head and pronotum; hemelytra beige with darker infusion, enclosing two rounded light spots near inner corial angle; membrane slightly darkened, with lighter veins. Tibiae, tarsi, and antennomeres 2 and 3 yellowish-brown.

The distribution and biology of this immigrant Palearctic bug in northeastern United States has been thoroughly treated by Wheeler (1989). It was first reported from North America (California) by Van Duzee (1928), but not from the east (Connecticut) until three decades later (Slater & Sweet, 1958). By collecting in detritus at the base of an introduced thistle, spotted knapweed (*Centaurea maculosa* Lamarck), Wheeler discovered that *sabulicola* was abundant throughout most of Pennsylvania and southward in western Virginia almost as far as Tennessee.

All but one of the known Virginia localities are west of the Blue Ridge. Since spotted knapweed is essentially statewide, the lack of eastern localities may be due either to a lack of collecting or to a preference by the bug for cooler climates. Wheeler cited records for Augusta, Roanoke, Rockbridge, Shenandoah, and Wythe counties, mostly along major highways. The VMNH collection has five individuals: **Montgomery Co.**: without further locality but probably vicinity of Blacksburg, 4 August 1974, P. W. Larkins (det. J. A. Slater). **Roanoke Co.**: Bandy Road, Back Creek district, 30 June 1994, M. W. Donahue, and **Rockbridge Co.**: Goshen, 17 June 1993, A. G. Wheeler (VMNH 2); west of Goshen, Va. Rts. 39-42, 27 March 1991, Wheeler (VMNH 1). These fall within the area defined by Wheeler's records, but the Montgomery County capture is of interest in showing that the species occurred that far south by 1974, only 16 years after its discovery in

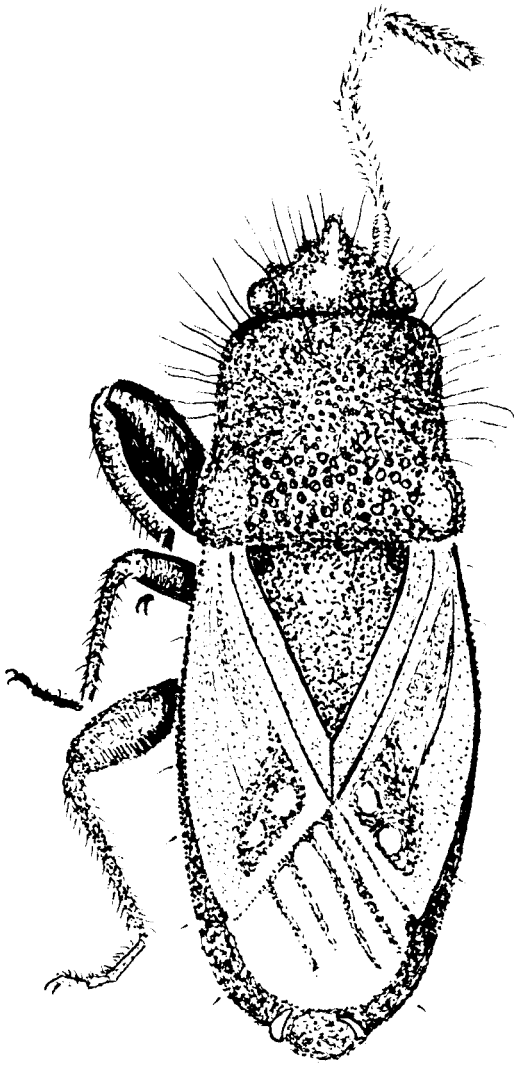


Figure 65. *Megalonotus sabulicola* (Thomson).

Connecticut. VPISU has a single specimen from **Nottoway Co.**: Blackstone, 15 July 1988, M. L. Barnes. This record establishes *sabulicola* in the southeastern Piedmont region, almost in the Coastal Plain; it was taken by a blacklight trap in an alfalfa field. The

presence of *Centaurea* at the site could not be established.

M. sabulicola overwinters in the adult stage, from October to early May in Pennsylvania (probably November to April in Virginia). Young nymphs should be expected to appear in May and 1st generation adults in June. Second generation adults may occur here in October or November. Although these bugs feed largely on the seeds of *Centaurea* species, there is no evidence that they exert a limiting effect on density of the thistle populations.

GONIANOTINI

In Blatchley's manual (1926: 428) this tribe contained only the genus *Emblethis*. More recently it was enlarged with genera derived from the former tribe Beosini, with the result that three genera of this augmented Gonianotini should be represented in Virginia. In both *Atrazonotus* and *Malezonotus* the profemora have only a single ventral spine; it is formed like those of *Ozophora* although it is much smaller. In both genera named the evaporatorial surface extends dorsad along caudal edge of mesopleuron nearly to lower edge of hemelytron.

Key to Virginia genera and species of Gonianotini

1. Three basal antennomeres with erect stiff bristles: explanate side margins of pronotum as wide as an eye width, punctate like discal surface; dorsum grayish-yellow with numerous darker punctures . . . . . [*Emblethis vicarius*, p. 71]
— Basal antennomeres without rigid bristles; pronotum not densely punctate, its side margins much narrower than width of an eye; dorsum partly or completely black 2
2. Entire insect including wing membranes black, body surface shiny, side margin of pronotum evident only along anterior half; front margin concave behind head . . . . . *Atrazonotus umbrosus*, p. 69
— Most of hemelytra and side margins of pronotum light brown; side of pronotum narrowly marginate for entire length; front margin straight . . . . . *Malezonotus rufipes*, p. 70

Genus **Atrazonotus** Slater & Ashlock

The single species of this Nearctic genus resided in the genera *Aphanus* and *Delochilocoris* for a long time in American literature, coming to rest in *Atrazonotus* only in 1966.

Most of body completely glabrous, only the abdominal sterna pubescent and appendages setose; profemora with a single subapical spine on anterior side; evaporatorial surface occupying nearly ventral half of metapleuron, extending also onto extreme caudal edge of mesopleuron.

181. **Atrazonotus umbrosus** (Distant)
Figure 66, Map 66

Body 6-7 mm long. Entire surface, except tarsi, uniformly dull black; abdomen very finely punctate, with appressed pubescence.

This robust black little bug is said to occur over much of eastern North America and southward to Panama (an amazing range for a small insect), but seems to be missing from southeastern United States. It is not recorded for North Carolina (Brimley 1938, Wray 1950), and an early Florida record seems highly dubious. The few Virginia localities give little insight about its in-state range. The Franklin County specimen was found under

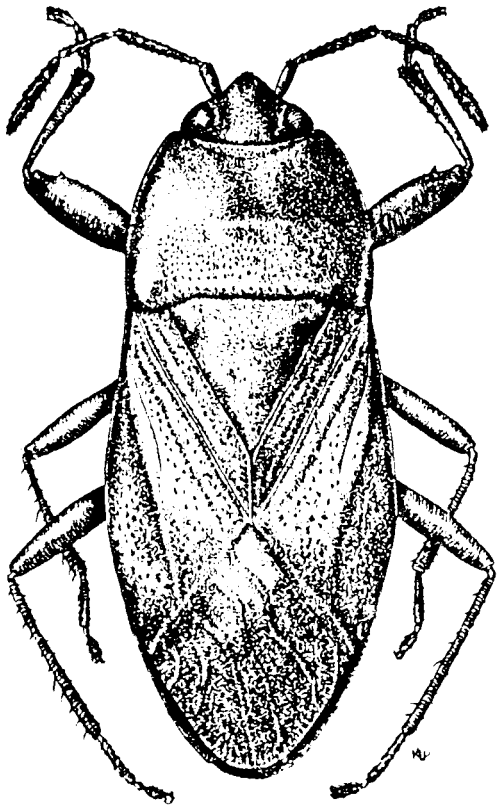


Figure 66. *Atrazonotus umbrosus* (Distant)

slabs at a sawmill site; that from Roanoke County recovered from a swimming pool skimmer. Collection data for Virginia material are as follows:

Franklin Co.: Algoma, 15 July 1953 (VPISU 1). **Montgomery Co.**: Blacksburg, 1 May 1955, 26 October 1957 (VPISU 2). **Roanoke Co.**: Back Creek district, Bandy Road, 30 June 1994, M. W. Donahue (VMNH 1). **City of Norfolk**: Old Dominion University campus, 7 March 1971 (collector unknown) (VMNH 1).

The available material is far too limited to provide any ideas about seasonal activity.

The Roanoke County specimen agrees precisely with published descriptions of *umbrosus*. That from Norfolk is smaller, only 5 mm long despite being a female, has the legs and claval veins reddish-brown, and the metapleura more distinctly punctate. The situation invites a closer look when more specimens are available.

Genus **Malezonotus** Barber

The genus was revised by Ashlock (1958), who recognized seven species, all but two of them occurring in western North America. One of the latter ranges from Virginia south and west as far as Arizona, the other (*M. fuscosus* Barber, 1918) is known from New Jersey and may possibly occur on the eastern shore of Virginia.

Key to Virginia species of *Malezonotus*

Elytra mostly brownish-yellow, membrane brownish, paler toward base . . . . . *rufipes*, p. 70
Elytra piceous except for paler margins, membrane entirely blackish . . . . . [*fuscosus*, p. 70]

182. **Malezonotus rufipes** (Stål)
Figures 41 and 67; Map 67

Length 4-5 mm. Head, pronotum, and scutellum piceous to black with dorsolateral carinae and humeral spots yellowish; hemelytra beige, apical fourth of corium darker; margins of membrane milky-white, central area light brown with darker brown veins. Legs and antennae uniformly testaceous to pale rufous.

This species was treated by Blatchley (1926: 425) as *M. sodalicus*. Ashlock (1958) showed that *sodalicus* is restricted to western United States and revived Stål's name for the common eastern member of the genus.

Although Ashlock saw specimens from Virginia and Louisiana, implying a Coastal Plain distribution, *rufipes* had not been found in Florida as recently as the 1980s (Slater & Baranowski, 1990). Clearly a lot of fine-tuning remains to be done simply in working out the distribution of the species. Virginia records are notably deficient; both are in the Piedmont but *rufipes* is surely more widespread. Collection data for our two samples are as follows:

Charlotte Co.: Spring Creek at Va. Rt. 654, 4.5 mi E of Charlotte Court House, 1 August 1978, B. C. Kondratieff (VMNH 1). **Henry Co.**: Smith River bluff at Va. Rt. 636 bridge, 2 mi S of Irisburg, 6 May 1989 (VMNH 2).

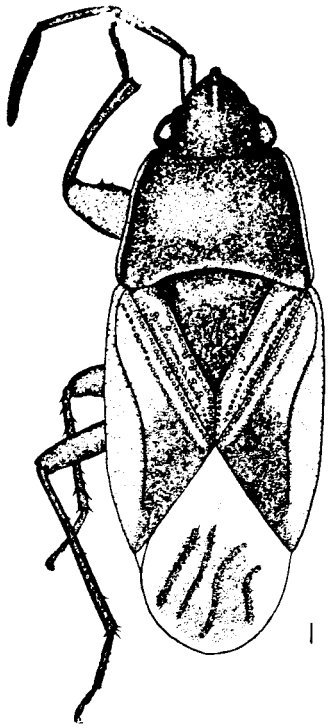


Figure 67. *Malezonotus rufipes* (Stål)

The Henry County specimens were extracted from a soil sample taken under a stand of *Rhododendron maximum*. That from Charlotte County was probably captured during sweeping of streamside vegetation.

The NCSU collection contains material of this species from Chatham County, North Carolina, adding another state to those already named for this species.

[**Malezonotus fuscosus** Barber]

This localized eastern species is known from Connecticut to New Jersey only. It is included here on the assumption that it might occur on the "Eastern Shore" — a notably undercollected part of the state. In New Jersey it has been found under *Vaccinium* and in beach drift.

[Genus **Emblethis** Fieber]

Body form relatively broad, the pronotum wider than long, without trace of transverse constriction, with explanate margins wider than diameter of an eye and coarsely punctate. Integument nearly glabrous, dorsally beset with numerous dark punctures. Antennae and hind tibiae with erect setiform bristles.

The genus is predominantly Palearctic, with only one species (apparently native), found throughout much of North America and south as far as Guatemala.

[Emblethis vicarius Horvath]

This compact, broadly oval insect is at once distinguished from all other local lygaeids by its singular dorsal color: a sort of yellowish-gray, almost olive in some individuals, overall speckled with dark punctures.

This species has been recorded from virtually all of the United States and southern Canada. Brimley (1938: 69) cited Raleigh for his sole North Carolina locality. Because the NCSU collection has *vicarius* from Dare, Johnston, and Scotland counties in that state, the absence of Virginia records is even more remarkable. The preferred habitat appears to be open, dry sandy places, of which there are plenty in the Coastal Plain. It seems only inevitable that sooner or later in-state populations will be discovered, but enough collecting has been done already to suggest that *vicarius* neither comes to lights nor enters pitfall traps.

Tribe Lethaeini

As noted previously, the Lethaeini as used by Blatchley included the tribe Drymini as well as Lethaeini in the strict sense. As redefined, the tribe has only two Virginia genera, *Cryphula* and *Xestocoris*, each with a single local species. Our two species are smooth and shiny, their tibiae with large erect bristles on all surfaces. In both species the eyes and especially the ocelli are much reduced, and are relatively smaller than in any other local lygaeids.

Key to Virginia genera and species of Lethaeini

Dorsum with very fine short pubescence, visible only in lateral aspect; head broader than long; scutellum and posterior third of pronotum impunctate or nearly so; pronotum dark brown with extensive light markings on posterior margin; profemora distinctly more crassate than the others . . . . . *Cryphula trimaculata*, p. 71

Entire dorsum beset with long, erect setae; head longer than broad; posterior third of pronotum and scutellum finely but uniformly punctate; pronotum uniformly dark brown; profemora not evidently thicker than meso- or metafemora . . . . . *Xestocoris nitens*, p. 72

Genus **Cryphula** Stål

Cryphula is a small genus endemic in the New World with the majority of its eleven species represented in Central America and southwestern United States. One extends eastward as far as New England.

Dorsum smooth and polished, shiny, virtually glabrous but pronotum with long seta near each anterior corner. Head, front half of pronotum, and sides of thorax iridescent under proper light conditions. Profemoral spines very small, subapical. Evaporatorial surface extensive, occupying nearly posterior third of mesopleural surface.

183. **Cryphula trimaculata** Distant
Figure 68, Map 68

Body length 3.4–4.4 mm, females appreciably larger than males. Dorsum varying shades of brown, basal two antennomeres light brown, distal two nearly black;

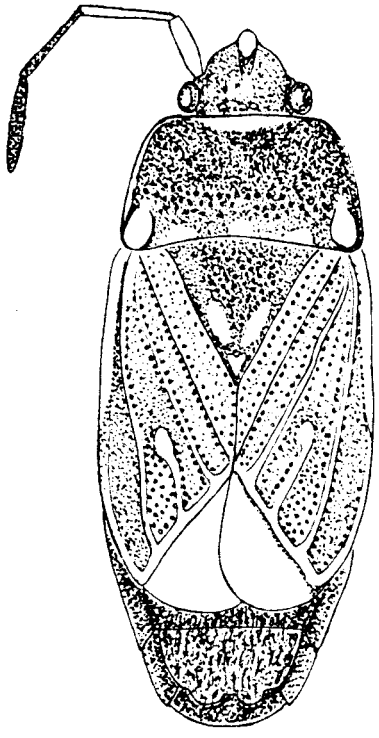


Figure 68. *Cryphula trimaculata* Distant

pronotum brown with a light spot in front of each humerous and extensive paler markings along posterior margin; hemelytra lighter brown, veins light and conspicuous, coria with four spots and entire margin pale.

The species was treated by Blatchley (1926: 436) and most earlier writers under the name C. *parallelogramma* Stål, which, however, is properly applied to a Sonoran species. The name *trimaculata* was revived for the *Cryphula* of eastern United States by Scudder (1962).

C. *trimaculata* is widespread over much of eastern United States, recorded from New England south to Florida, west to Texas, thence north to Indiana, Iowa, and Colorado. An austral distribution is thus implied, and in Virginia the range of the species is distinctly lowland. Material has been seen from Alleghany, Carroll, Chesterfield, Cumberland, Fairfax, Halifax, Mecklenburg, Montgomery, Pittsylvania, Prince Edward, Warren, and York counties, and the City of Virginia Beach. The highest collection site (Blacksburg, Montgomery County) is about 1900 ft ASL; all of the others are below 1000 ft. Most of the VMNH specimens were taken in pitfalls or Berlese extractions, and the largest series are from sites in Virginia Beach. At least in Virginia, the species is not attracted to lights. The great majority of collection dates are evenly distributed from March to September (three or four each month) with a notable increase in October (eight).

Genus **Xestocoris** Van Duzee

Head notably convex, longer than wide, antennal tubercles prominent, nearly size of eye; pronotum transversely quadrate, corners rounded, anterior two-thirds smooth, posterior third and scutellum finely punctate, entire dorsal surface smooth and polished, with profuse erect pale setation. Hemelytra coarsely punctate, membrane short, not exceeding corial apices, exposing last abdominal tergite. Profemora not evidently thicker than the others, the two or three ventral spines small, subapical. Evaporatorial surface occupying caudal fourth of mesopleuron, as far dorsad as edge of hemelytra. The genus is monotypic and endemic in eastern North America.

184. **Xestocoris nitens** Van Duzee
Figure 69, Map 69

Body length of Virginia specimens 3.5 mm. Head and pronotum (except humeri and sometimes posterior margin) black, scutellum piceous to dark brown, hemelytra brown, coria paler laterad and distad. Antennae either uniformly brown or with basal two articles paler; legs light brown to testaceous.

This minute, shiny bug was described in 1906 from New York specimens, and two decades later was still known only from that state and New England (Blatchley, 1926: 435). Since then it has been found in eastern Canada, west as far as Illinois and Iowa, and south along the Appalachians to the Great Smoky Mountains. A distinctly boreal distribution is thus implied. Curiously, two Virginia records seem to oppose such a generalization.

The following material has been examined: **Augusta Co.**: Shenandoah Mountain, ca 5 mi SW of Reddish Knob on FS 85, 17 June 1988, K. A. Buhlmann (VMNH 1). **Fairfax Co.**: Vienna, "8/6/29" (USNM 1). **Floyd Co.**: Buffalo Mountain, 3950 ft, ca 5 mi SW of Willis, 19 May 1974, under stone in grassy field (VMNH 1). **Greensville Co.**: 2 mi SW of Emporia, 18 June 1990, pitfall trap, J. C. Mitchell (VMNH 7); also 2.3 mi NE of

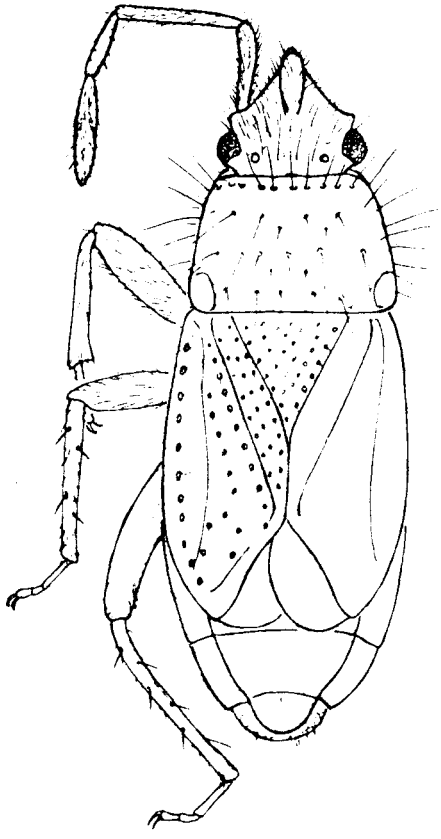


Figure 69. *Xestocoris nitens* Van Duzee.

Slates Corner, 18 June 1990, pitfall, J. C. Mitchell (VMNH 1); also 1 mi E of Claresville, 19 May-3 June 1993, pitfall, VMNH survey (VMNH 1).

The Buffalo Mountain site, high and bleak, fulfills exactly one's expectations for a northern species. For several years I had been inclined to distrust the Fairfax County record: the place seems notable for a number of insects unlikely to be there and/or found only once, many years ago (invoking the spectre of mislabeling). The specimens from Greensville County, however, are unimpeachable, as I personally sorted some of them from Dr. Mitchell's samples and then several years later, another from a pitfall array operated by VMNH. The two Mitchell sites are on the Fall Line, the Claresville site well out on the Coastal Plain, in the floodplain of the Meherrin River and not far from a cypress-black gum swamp. It would be difficult to find a more "austral" locality in Virginia.

It is tempting to speculate that these populations in southeastern Virginia might be Pleistocene relicts. After all, only 18,000 YBP the entire area was occupied by taiga biome. If the species is really cold-adapted the collection dates of May and June are discordant: it should be active during the winter. It is clear that a lot of sampling remains to be done before we understand the range of this little bug.

M. H. Sweet found *nitens* at high elevations in western North Carolina. The NCSU collection has a single specimen, labeled only "Rowan Co., 3 Dec 1954", identified as *nitens* by R. F. Hussey and confirmed by me. Rowan County is in the western Piedmont region of North Carolina and more in line with what one might have assumed would be the species' natural range.

LITERATURE CITED

Ashlock, P. D. 1958. A revision of the genus *Malezonotus* (Hemiptera-Heteroptera: Lygaeidae). Ann. Ent. Soc. America, 50: 407-426.

—. 1960. New synonymies and generic changes in the Lygaeidae (Hemiptera-Heteroptera). Proc. Biol. Soc. Washington, 73: 235-238.

—. 1964. Two new tribes of Rhyparochrominae: a re-evaluation of the Lethaeini (Hemiptera-Heteroptera: Lygaeidae). Ann. Ent. Soc. America, 57: 414-421.

—. 1967. A generic classification of the Orsillinae of the world (Hemiptera-Heteroptera: Lygaeidae). Univ. Calif. Publ. Entom. 48: vi + 1-82.

Ashlock, P. D., and A. Slater 1988. Family Lygaeidae. Pages 167-245, in: T. J. Henry & R. C. Froeschner (eds.), Catalog of the Heteroptera, or true bugs, of Canada and the continental United States. E. J. Brill, Leiden, New York. pp. i-xix, 1-958.

Barber, H. G. 1928a. Revision of the genus *Ptochiomera* Say. Journ. New York Ent. Soc., 36: 175-177.

—. 1928b. The genus *Eremocoris* in the eastern United States, with description of a new species and a new variety (Hemiptera-Lygaeidae). Proc. Ent. Soc. Washington, 30: 59-60

—. 1928c, Lygaeidae, in: Leonard, M. D. 1928. A list of the insects of New York, with a list of the spiders and certain other allied groups. Mem. Cornell Univ. Agr. Exp. Stat. 101: 1-1121.

—. 1947. Revision of the genus *Nysius* in the United States and Canada (Hemiptera Heteroptera: Lygaeidae). Journ. Washington Acad. Sci., 37: 354-366.

—. 1952a. The genus *Antillocoris* in the United States (Hemiptera-Lygaeidae). Journ. Brooklyn Ent. Soc., 47: 85-87.

—. 1952b. The genus *Pachybrachius* in the United States and Canada with the description of two new species (Hemiptera: Lygaeidae) Journ. New York Ent. Soc., 60: 211-220.

—. 1953a. A second revision of the genus *Ptochiomera* Say and its allies (Hemiptera, Lygaeidae). Proc. Ent. Soc. Washington 55: 19-27.

—. 1953b. A revision of the genus *Kleidocerys* Stephens in the United States (Hemiptera, Lygaeidae). Proc. Ent. Soc. Washington, 55: 273-283.

Blatchley, W. S. 1926. The Heteroptera or True Bugs of Eastern North America, with Special References to the Faunas of Indiana and Florida. Nature Publishing Company, Indianapolis. 1116 pages.

Brimley, C. S. 1938. The Insects of North Carolina, being a list of the insects of North Carolina and their close relatives. North Carolina Department of Agriculture, Raleigh. 560 pages.

Froeschner, R. C. 1944. Contributions to a synopsis of the Hemiptera of Missouri, Part III. Amer. Midl. Nat. 31: 638-683.

Hamid, A. 1971. The life cycle of three species of *Cymus* Hemiptera: Lygaeidae) in Connecticut. Univ. Connecticut Occ. Papers, Biol. Sci.,2: 21-28.

—. 1975. A systematic revision of the Cyminae (Heteroptera: Lygaeidae) of the world with a discussion of the morphology, biology, phylogeny and zoogeography. Occ. Publ. Entom. Soc. Nigeria, 14: 1-179.

Harrington, B. J. 1980. A generic level revision and cladistic analysis of the Myodochini of the world (Hemiptera, Lygaeidae, Rhyparochrominae). Bull. Amer. Mus. Nat. Hist., 167: 45-116.

Hoffman, R. L. 1994. Additions and emendations to the Virginia fauna of "true bugs" (Heteroptera: Cydnidae, Scutelleridae, Pentatomidae, Alydidae). Banisteria 4: 15-19.

Hoffman, R. L., & J. A. Slater. 1995. *Holcocranum saturejae*, a Palaearctic cattail bug established in eastern United States and tropical Africa (Heteroptera: Lygaeidae: Artheneinae). Banisteria 5: 12-15.

Leonard, D. E. 1966. Biosystematics of the "leucopterus complex" of the genus *Blissus* (Heteroptera: Lygaeidae). Connecticut Agr. Exp. Stat. Bull. 677: 1-47.

—. 1968. A revision of the genus *Blissus* (Heteroptera: Lygaeidae) in eastern North America. Ann. Ent. Soc. America, 61: 239-250.

Readio, J., & M. H. Sweet. 1982. A review of the Geocorinae of the United States east of the 100th meridian (Hemiptera: Lygaeidae). Misc. Publ.Ent. Soc. America, 12: 1-91.

Schaefer, K. F., & W. A. Drew. 1969. Lygaeidae (Hemiptera) of Oklahoma.Proc. Oklahoma Acad. Sci., 48: 83-104.

Scudder, G. G. E. 1962. The Ischnorhynchinae of the world (Hemiptera: Lygaeidae). Trans. R. ent. soc. London 114: 163-194.

—. 1962. The world Rhyparochrominae (Hemiptera: Lygaeidae). I. New synonymy and generic changes. Canad. Ent. 94: 764-773.

Slater, A. [J. A. Slater II]. 1992. A genus level revision of Western Hemisphere Lygaeinae (Heteroptera: Lygaeidae) with keys to species. Univ. Kansas Sci. Bull. 55: 1-56.

Slater, J. A. 1952. An annotated list of the Lygaeidae of Iowa and Illinois (Hemiptera: Heteroptera). Proc. Iowa Acad. Sci., 59: 521-540.

—. 1952. A contribution to the biology of the subfamily Cyminae (Heteroptera: Lygaeidae). Ann. Ent. Soc. America 45: 315-325.

—. 1955. A revision of the subfamily Pachygronthinae of the world (Hemiptera: Lygaeidae). Philippine Journ. Sci., 84: 1-160.

—. 1964. A catalogue of the Lygaeidae of the world. Vols. 1, 2. Univ. Connecticut, Storrs. pp. 1-1668.

—. 1979. The systematics, phylogeny, and zoogeography of the Blissinae of the world (Hemiptera; Lygaeidae). Bull. Amer. Mus. Nat. Hist., 165: 1-180.

—. 1980. Systematic relationships of the Antillocorini of the Western Hemisphere (Hemiptera: Lygaeidae). Syst. Entom., 5: 199-226.

—. 1983. On the biology and food plants of *Lygaeus turcicus* (Fabr.) (Hemiptera: Lygaeidae). Journ. New York Ent. Soc., 91: 48-56.

—. 1986. A synopsis of the zoogeography of the Rhyparochrominae (Heteroptera: Lygaeidae). Journ. New York Ent. Soc., 94: 262-280.

Slater, J. A., & P. D. Ashlock. 1966. *Atrazonotus*, a new genus of Gonianotini from North America (Hemiptera: Lygaeidae). Proc. Ent. Soc. Washington, 68: 152-156.

Slater, J. A., & R. M. Baranowski. 1978. How to know the true bugs (Hemiptera-Heteroptera). Wm. C. Brown, Dubuque, Iowa. 256 pp.

—. 1990. Lygaeidae of Florida (Hemiptera: Heteroptera), in: Arthropods of Florida and Neighboring Land Areas, 14: i-xv, 1-211.

Slater, J. A., & R. L. Hoffman. 1994. The taxonomic status of *Cnemodus inflatus* Van Duzee (Hemiptera: Lygaeidae). Journ. New York Ent. Soc., 102: 117-119.

Slater, J. A., and N. F. Knop. 1968. Geographic variation in the North American milkweed bugs of the *Lygaeus kalmi* complex. Ann. Ent. Soc. America, 62: 1221-1232.

Slater, J. A., and J. E. O'Donnell. 1995. A catalogue of the Lygaeidae of the world (1960-1994). New York Ent. Soc., New York. 410 p.

Slater, J. A., M. H. Sweet, and H. Brailovsky. 1993. Two new species of *Slaterobius* Harrington with comments on the ecology and distribution of the genus (Hemiuptera: Lygaeidae). Proc. Ent. Soc. Washington, 95: 590-602.

Slater, J. A., and T. E. Woodward. 1982. Lilliputocorini, a new tribe with six new species of *Lilliputocoris*, and a cladistic analysis of the Rhyparochrominae (Hemiptera: Lygaeidae). American Mus. Nov., 2754: 1-23.

Sweet, M. H. 1964. The biology and ecology of the Rhyparochrominae of New England (Heteroptera: Lygaeidae). Pt. 1. Ent. Americana, 43: 1-123; Pt. II. Ent. Americana, 44: 1-201.

—. 1967. The tribal classification of the Rhyparochrominae (Heteroptera: Lygaeidae). Ann. Ent. Soc. America, 60: 208-226.

—. 1977. Elevation of the seedbug *Eremocoris borealis* (Dallas) from synonymy with *Eremocoris ferus* (Say) (Hemiptera: Lygaeidae). Ent. News, 88: 169-176.

—. 1986. *Ligyrocoris barberi* (Heteroptera: Lygaeidae), a new seedbug from the southeastern United States, with a discussion of its ecology, life cycle, and reproductive isolation. Journ. New York Ent. Soc., 94: 281-290.

Sweet, M. H., and J. A. Slater. 1961. A generic key to the nymphs of North American Lygaeidae (Hemiptera-Heteroptera). Ann. Ent. Soc. America, 54: 333-340.

Torre Bueno, J. R. 1919. Virginia Heteroptera. Bull. Brooklyn Ent. Soc., 14: 124-25.

Torre Bueno, J. A., and G. P. Engelhardt. 1910. Some Heteroptera from Virginia and North Carolina. Canad. Ent., 42: 147-151.

Wheeler, A. G., Jr. 1976. Life history of *Kleidocerys resedae* on european white birch and ericaceous shrubs. Ann. Ent. Soc. America 69: 459-463.

—. 1983. The small milkweed bug, *Lygaeus kalmi* (Hemiptera: Lygaeidae): Milkweed specialist or opportunist? Journ. New York Ent. Soc. 91: 57-62.

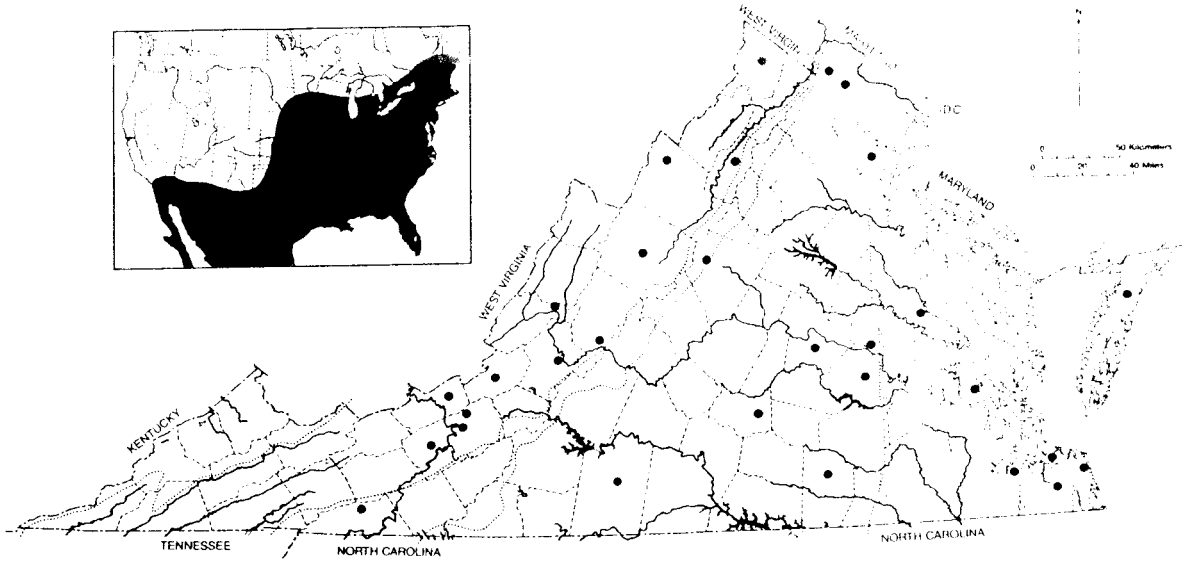
—. 1983. *Stygnocoris rusticus*: new records in eastern North America, with a review of its distribution (Hemiptera-Heteroptera: Lygaeidae). Ent. News 94: 131-135.

—. 1984. Seasonal history, habits, and immature stages of *Belonochilus numenius* (Hemiptera: Lygaeidae). Proc. Ent. Soc. Washington, 86: 790-796.

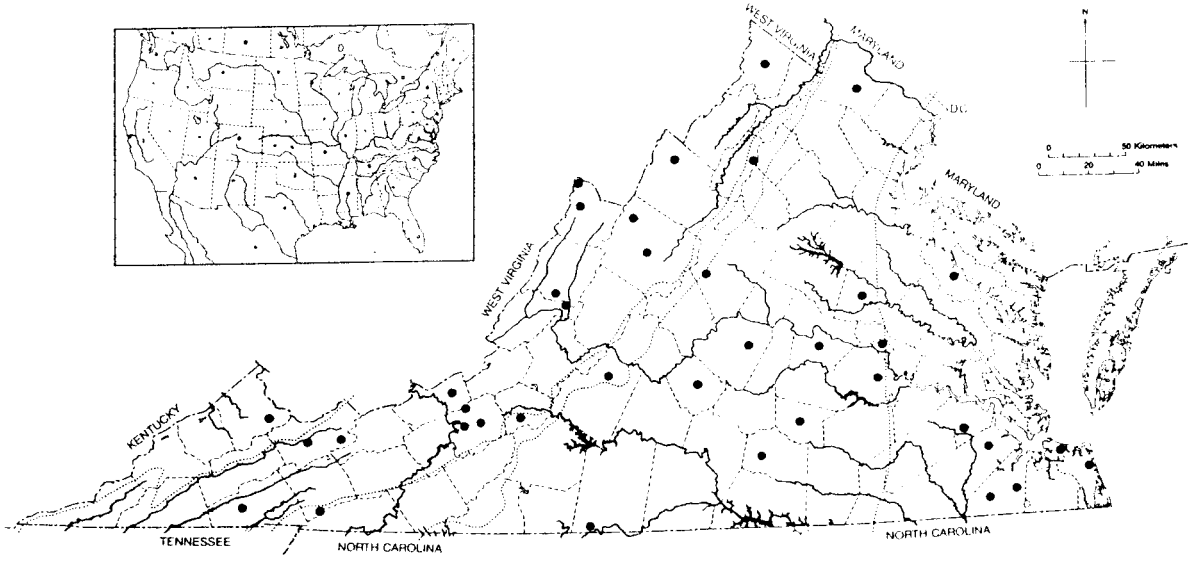
—. 1989. *Megalonotus sabulicola* (Heteroptera: Lygaeidae), an immigrant seed predator of *Centaurea* spp. (Asteraceae): distribution and habits in eastern North America. Proc. Ent. Soc. Washington 91: 538-544.

Wheeler, A. G., Jr., & J. E. Fetter. 1987. *Chilacis typhae* (Heteroptera: Lygaeidae) and the subfamily Artheneinae new to North America. Proc. Ent. Soc. Washington 89: 244-249.

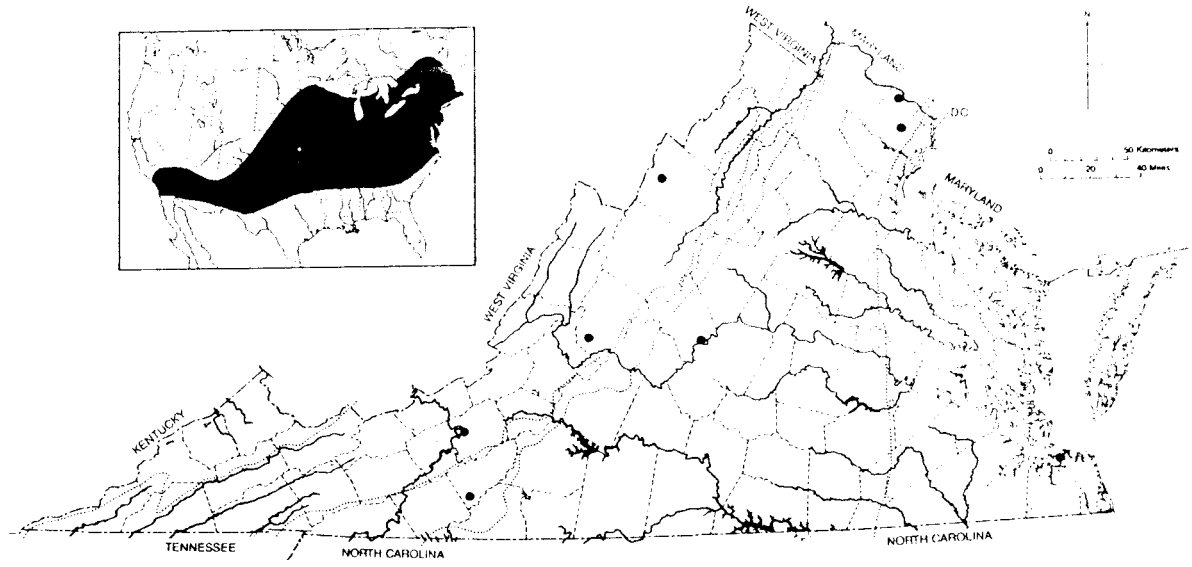
—. 1989. *Blissus breviusculus*: new distribution records of a little-known chinch bug (Heteroptera: Lygaeidae). Journ. New York Ent. Soc. 97: 265-270.



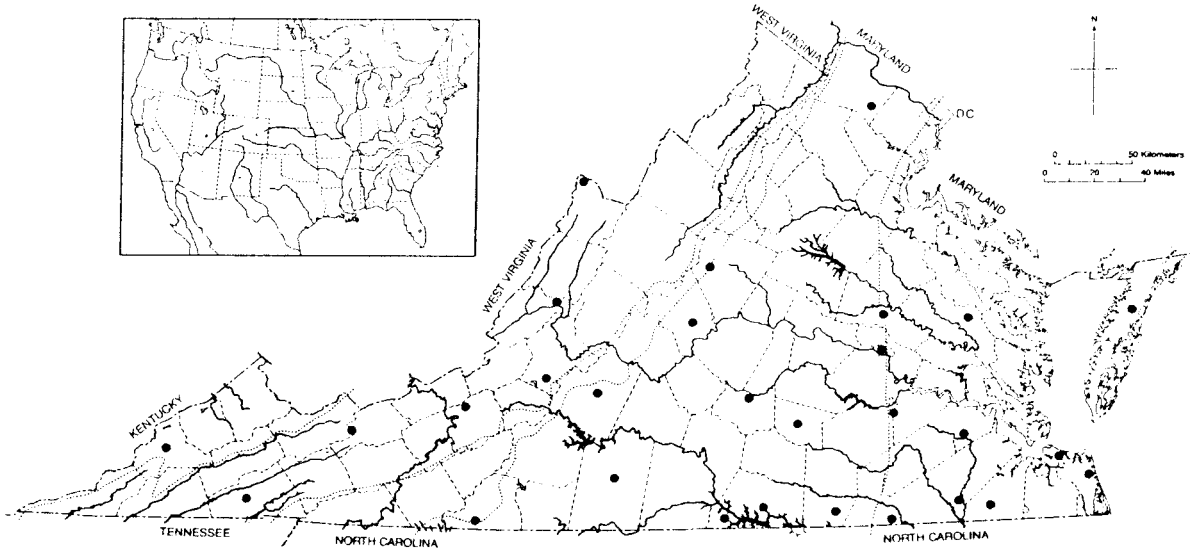
Map 1. *Oncopeltus fasciatus* (Dallas).



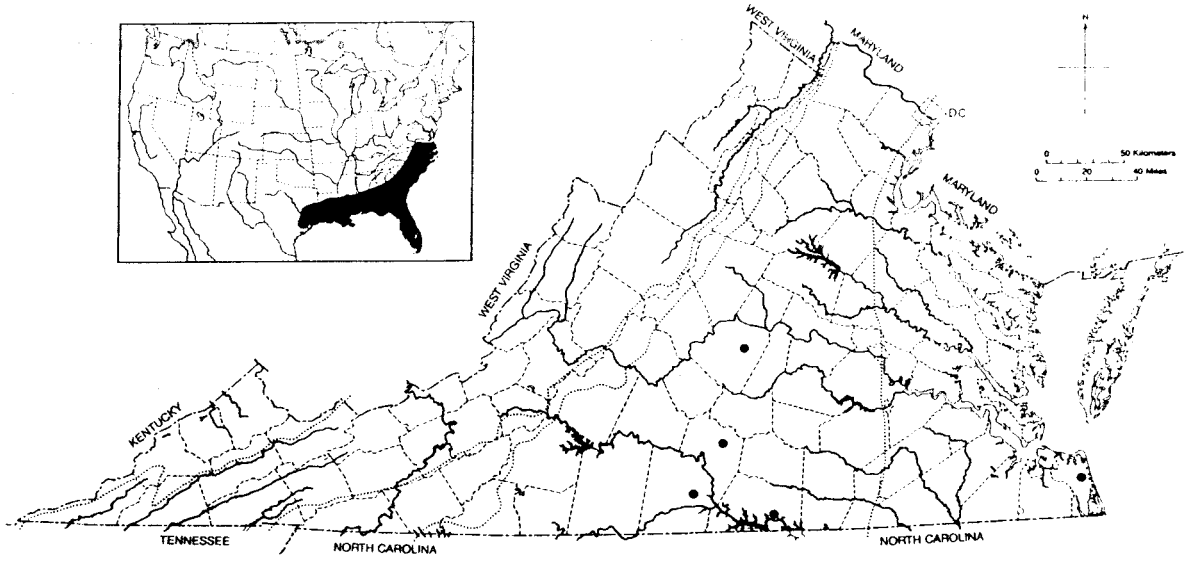
Map 2. *Lygaeus kalmii* (Fabr.). The species occurs in all of the contiguous States and the adjoining Canadian provinces, the inset map therefore is not shaded.



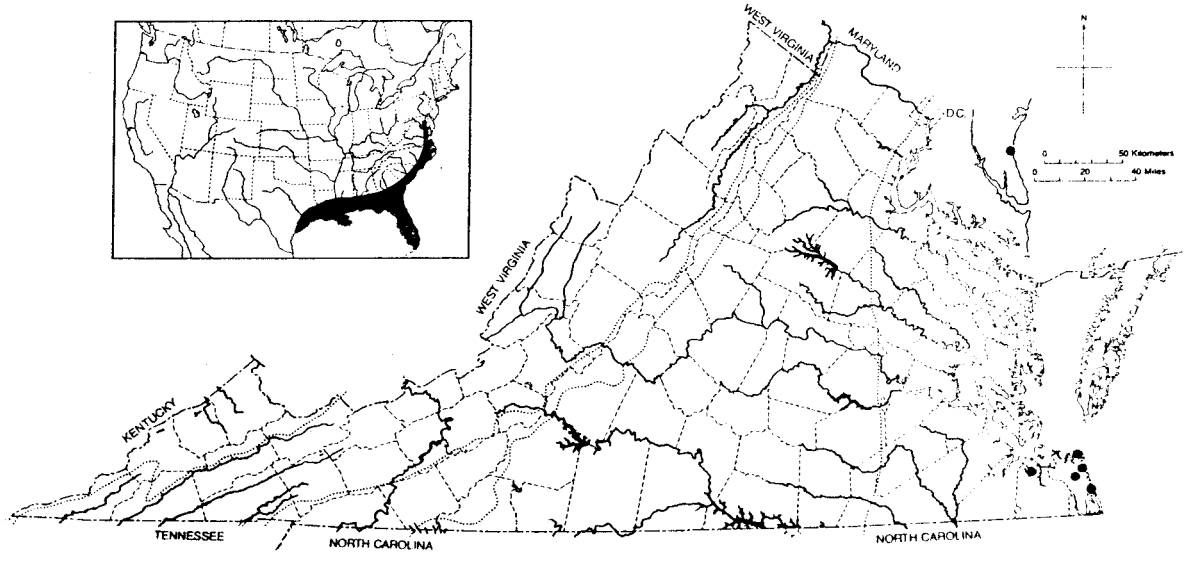
Map 3. *Lygaeus turcicus* (Fabr.). The species is almost certainly statewide in Virginia, despite the paucity of localities.



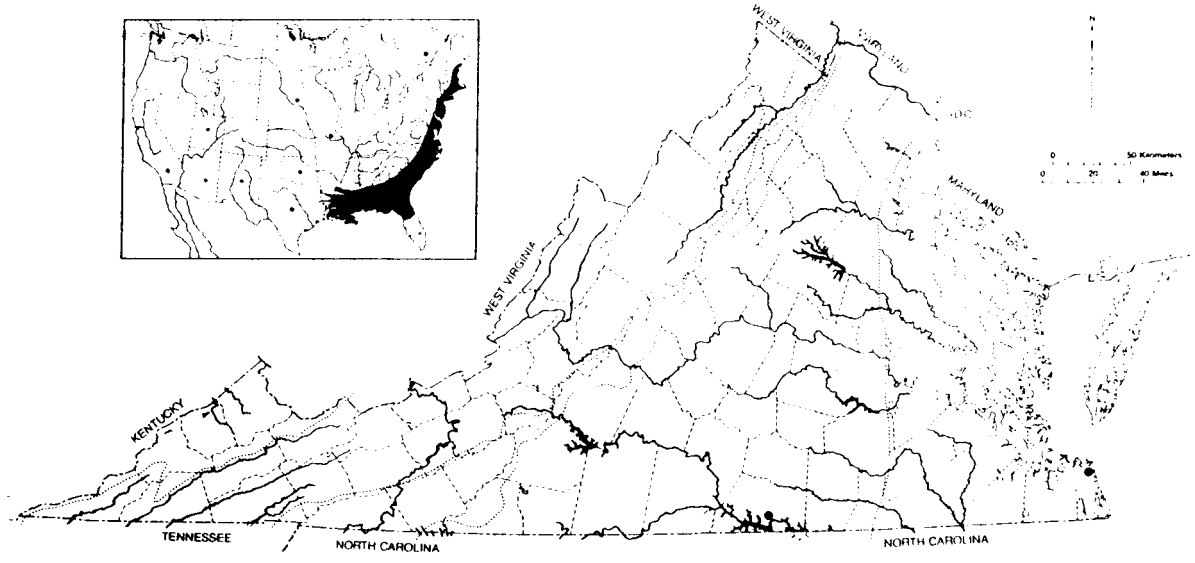
Map 4. *Neacoryphus bicrucis* (Say). The species occurs entirely across United States and the adjacent provinces of Canada, the inset map is therefore not shaded.



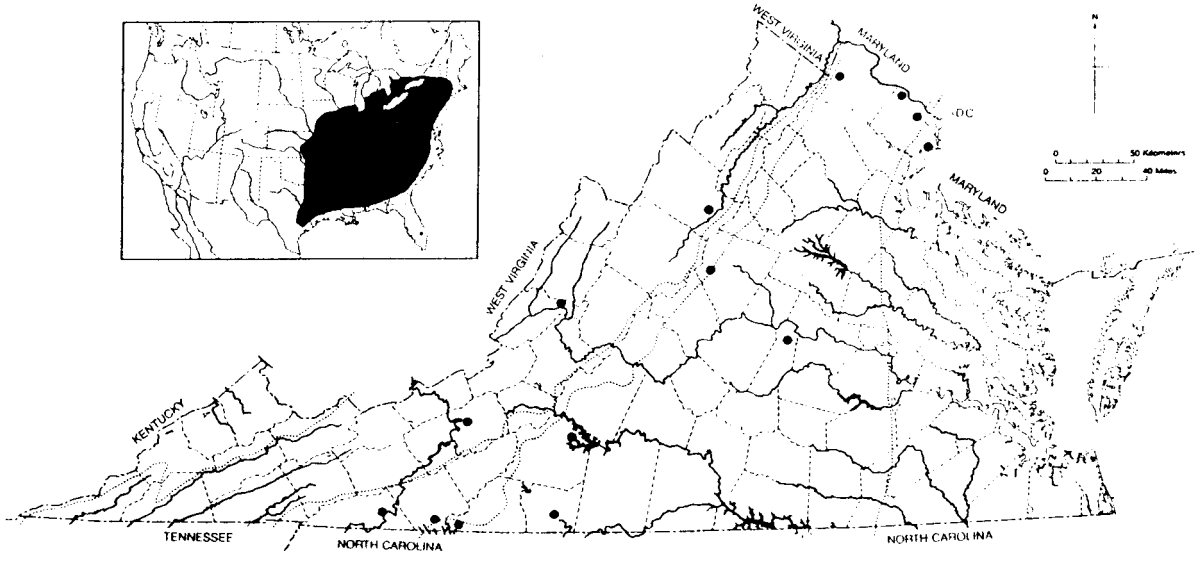
Map 5. *Ochrimnus lineoloides* (J. A. Slater). The species is probably widespread in eastern Virginia south of the Potomac estuary.



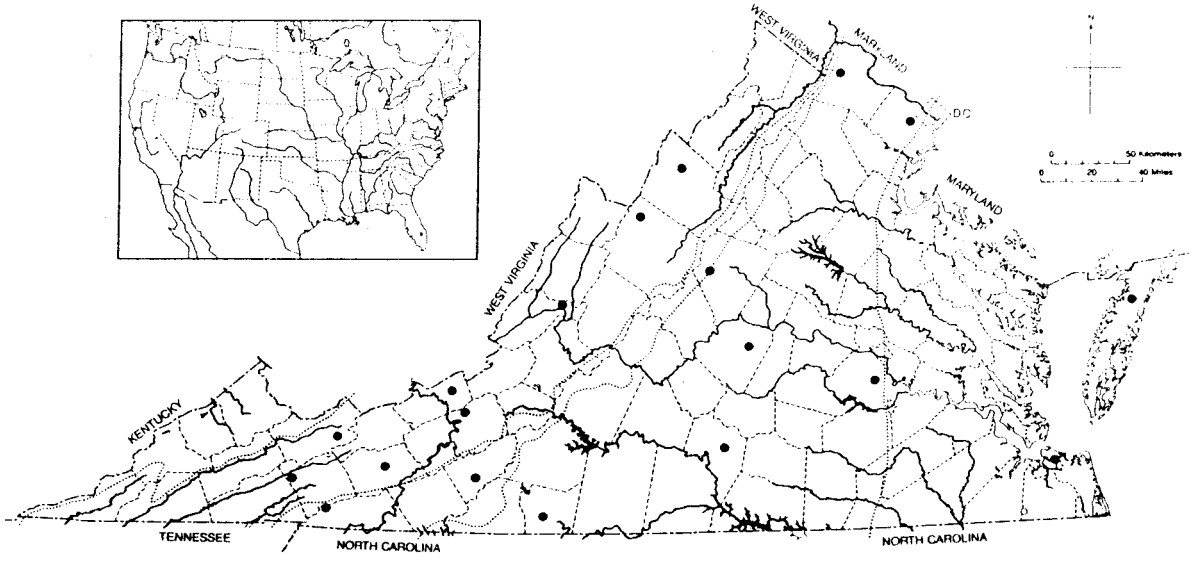
Map 6. *Ochrimnus mimulus* (Say). The approximate location of the Maryland record is also shown, suggesting a more widespread distribution in eastern Virginia.



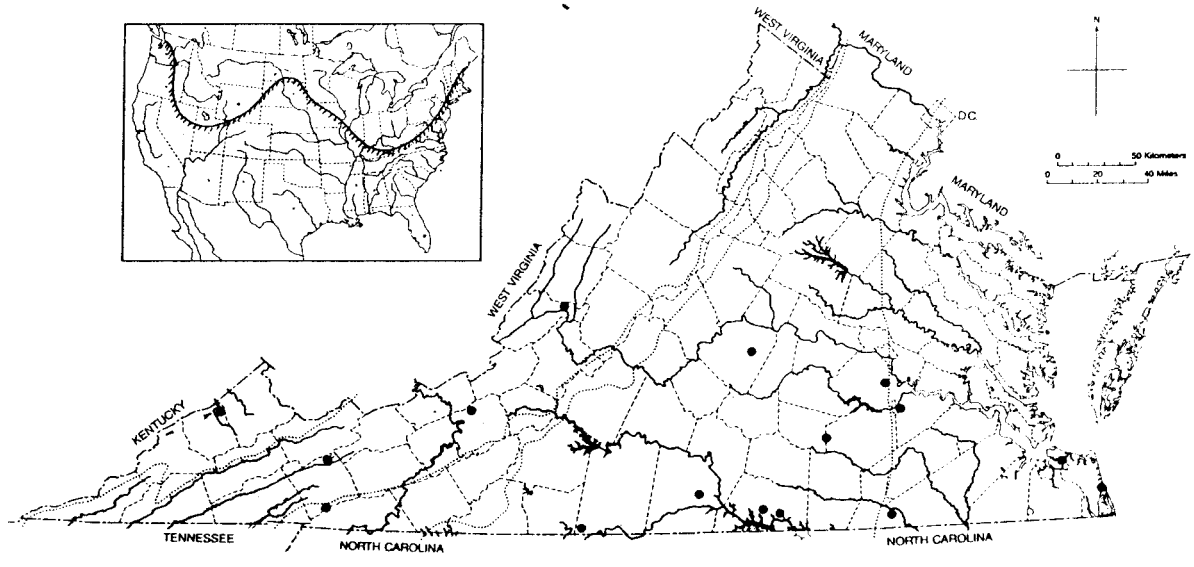
Map 7. *Lygaeospilus tripunctatus* (Dallas). The western part of the range is uncertain; surely parts are disjunct (the Quebec record also seems unlikely, perhaps based on aeolian migrants rather than an established population).



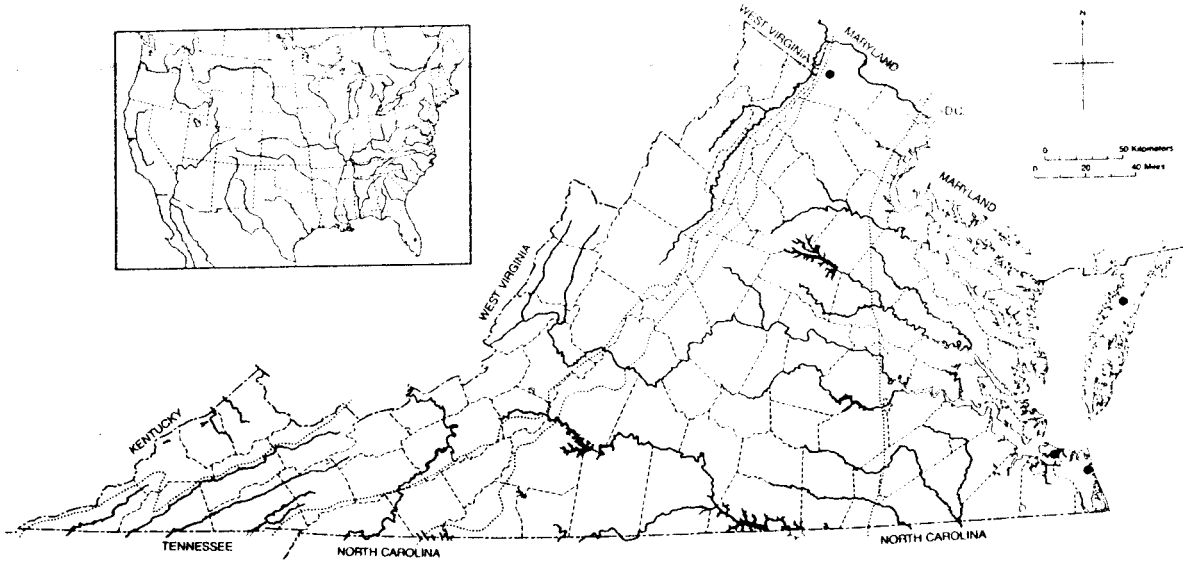
Map 8. *Belonochilus numenius* (Say). The range of this species probably corresponds closely to that of the American sycamore *(Platanus occidentalis)*.



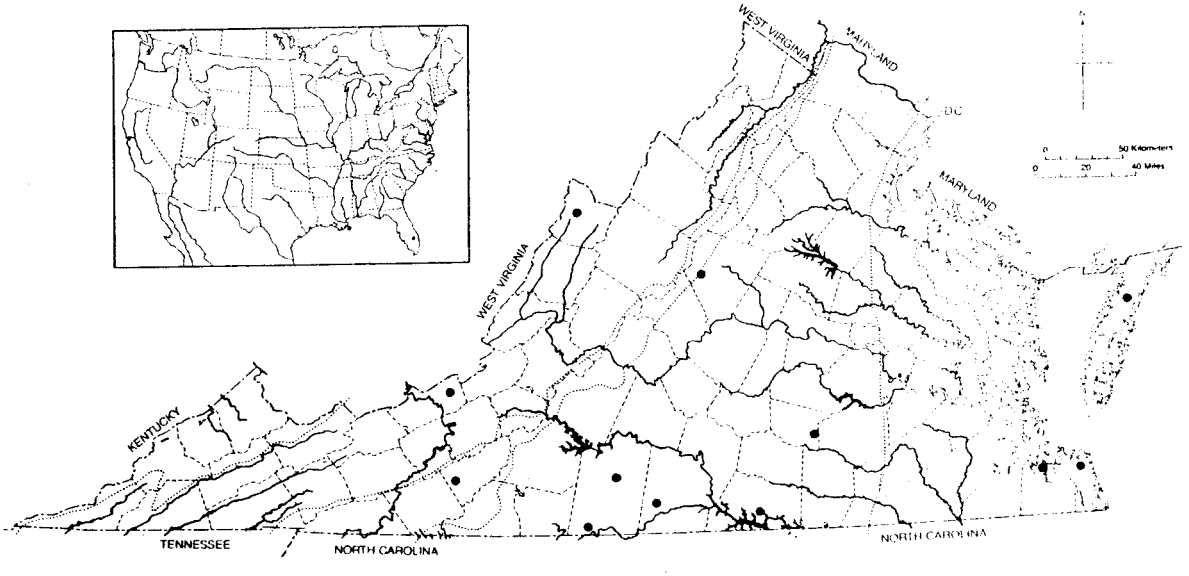
Map 9. *Neortholomus scolopax* (Say). The species seems to occur throughout United States and southern Canada, the inset map therefore is not shaded.



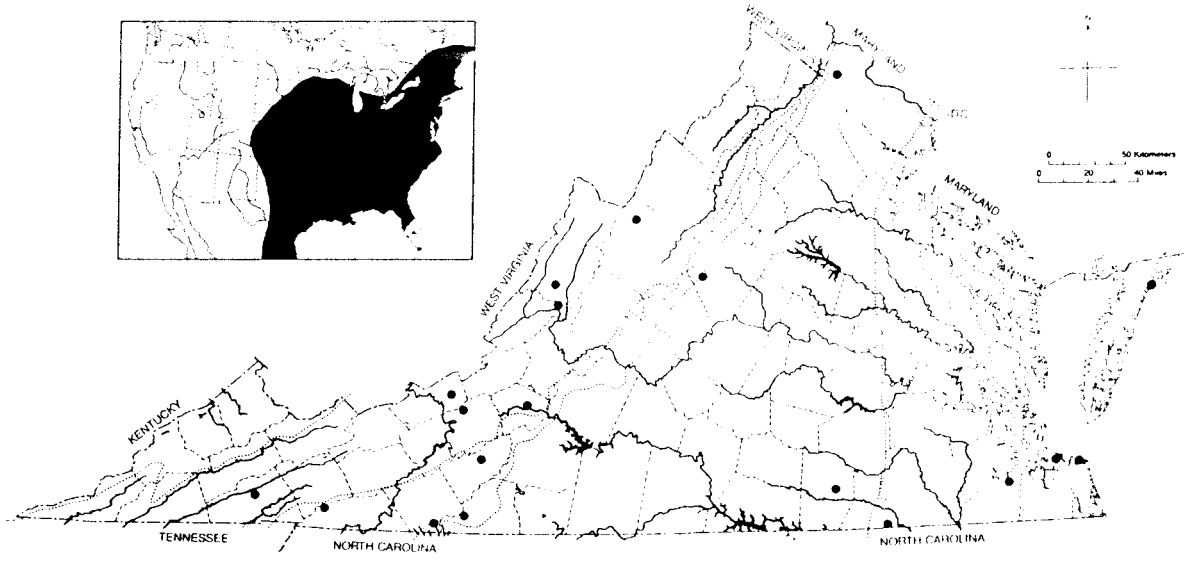
Map 10. *Xyonysius californicus* (Stal). The species occurs throughout United States south of the hatched line on the inset map.



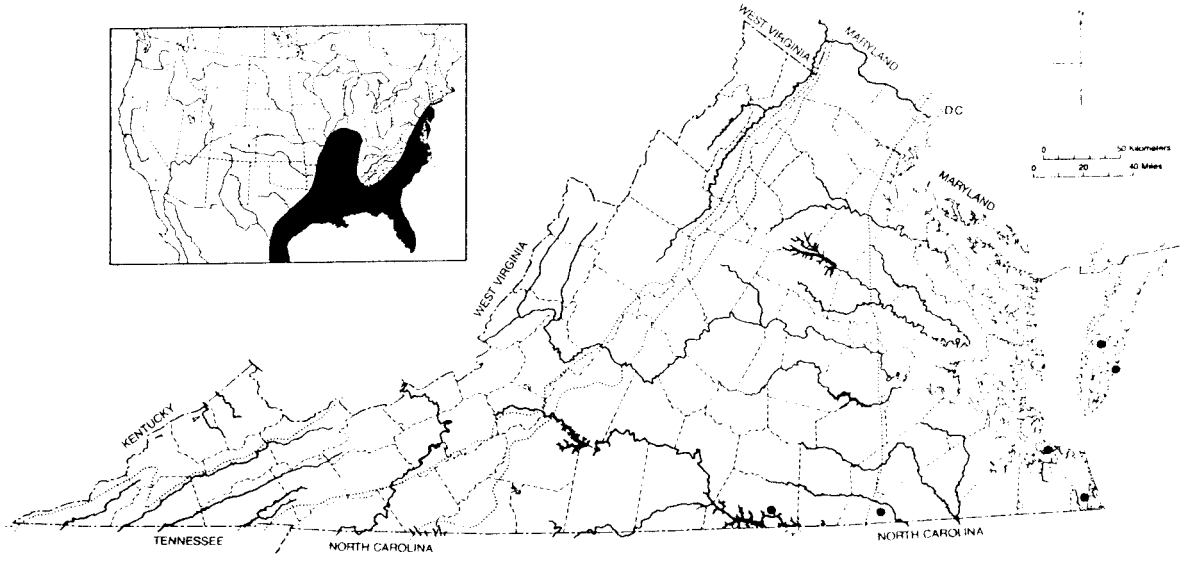
Map 11. *Nysius ericae* (Schilling). The inset map is not shaded, owing to past confusion of species' identities in this genus. The species is doubtless nearly statewide in Virginia, despite the paucity of records.



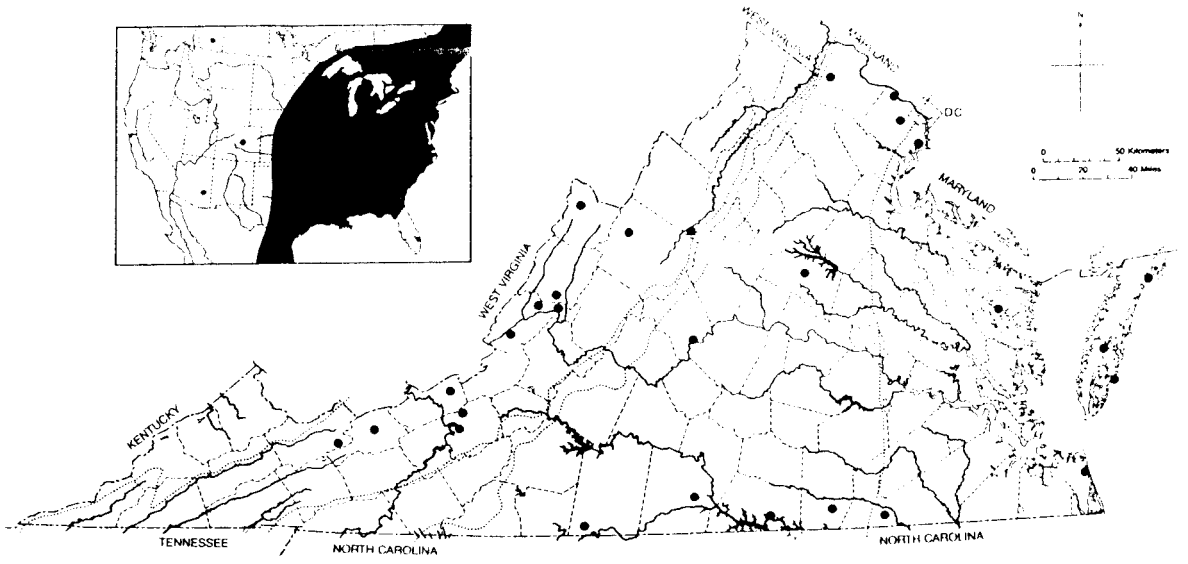
Map 12. *Nysius raphanus* Howard. The inset map is not shaded, owing to past confusion of species' identities in *Nysius*, and unreliability of existing distributional records.



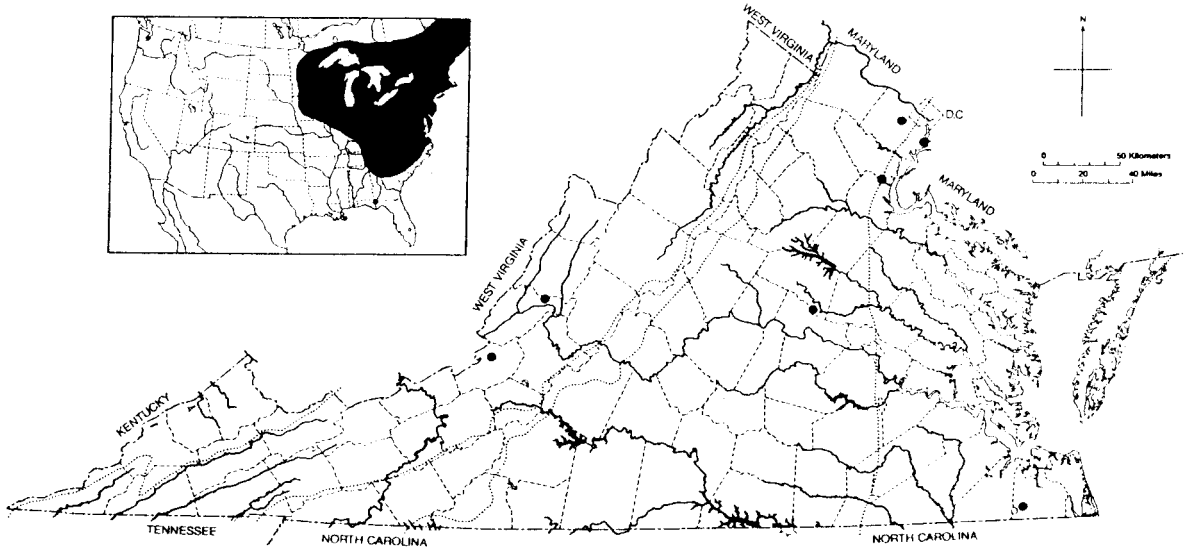
Map 13. *Kleidocerys resedae geminatus* (Say).



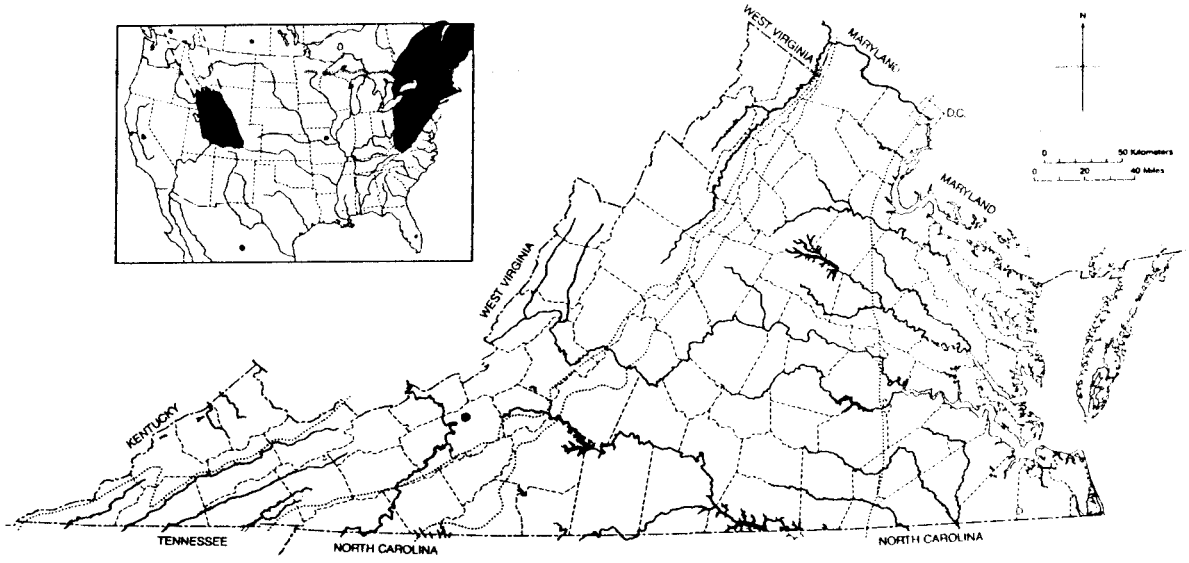
Map 14. *Cymodema breviceps* (Stal). The species is surely more abundant in eastern Virginia than the few localities would suggest.



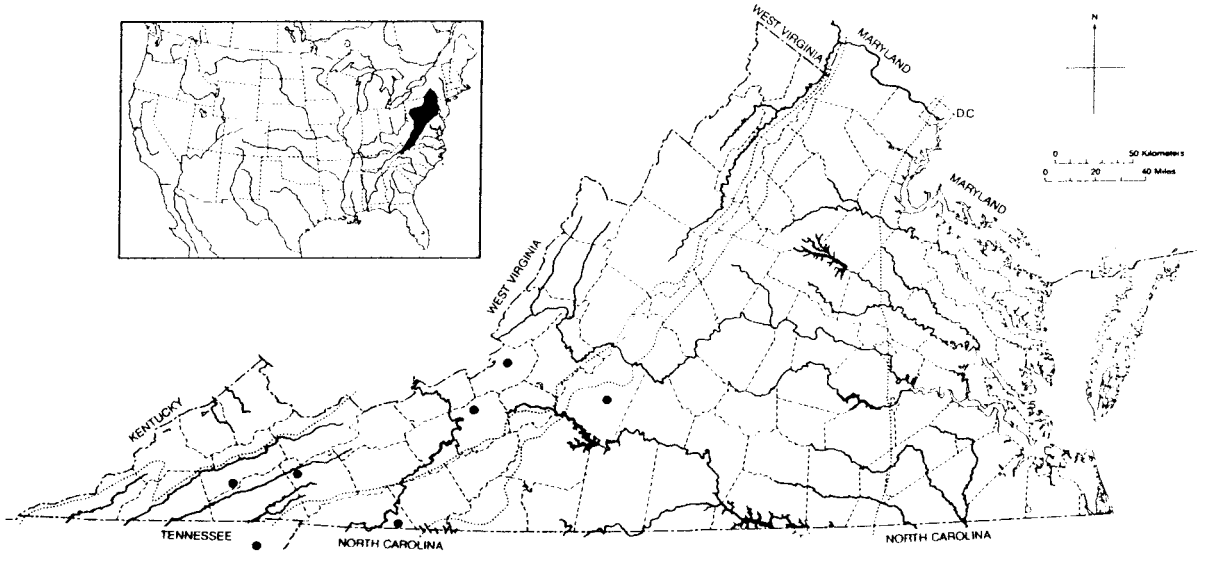
Map 15. *Cymus angustatus* (Say). Outlying records in Florida and the western states may be disjunct populations or accidental dispersals (or the western edge of the shaded inset map simply inaccurate).



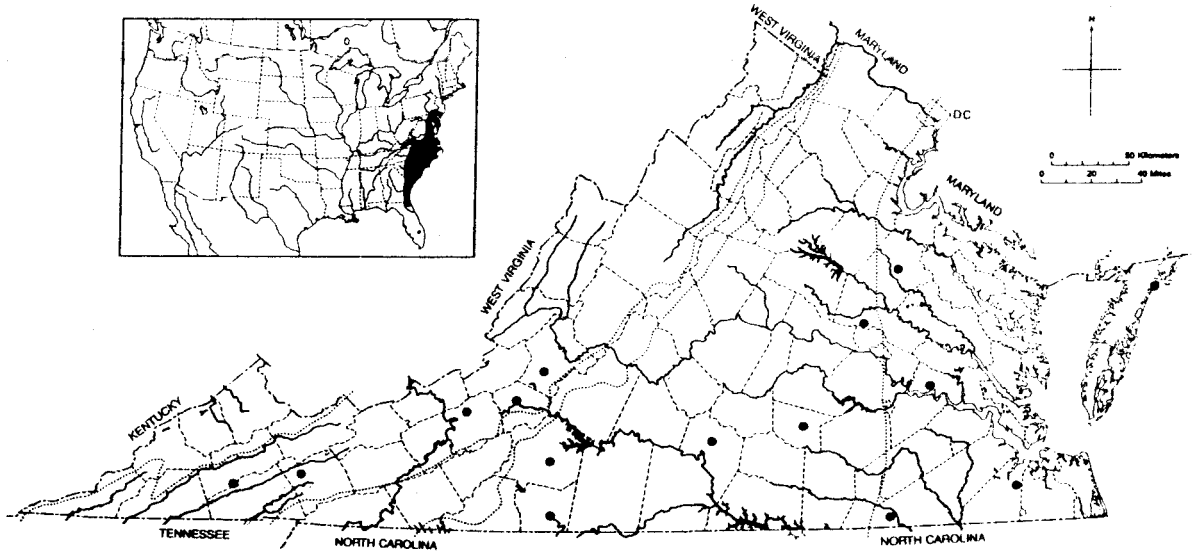
Map 16. *Cymus discors* Horvath. The disjunct Floridian locality on the inset map is possibly continous with the bulk of the species' range in western Georgia.



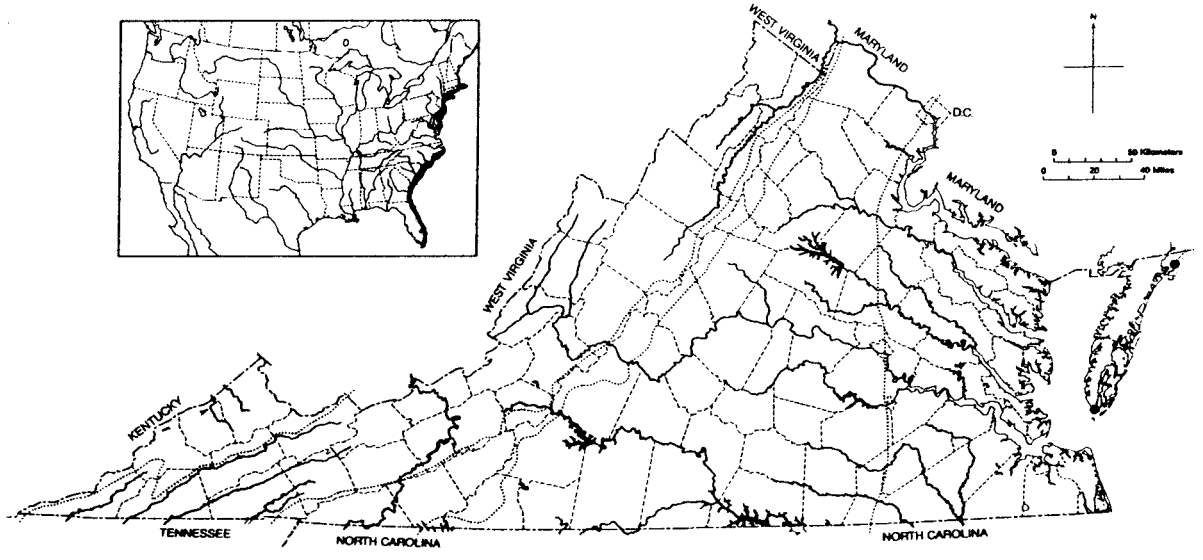
Map 17. *Crophius disconotus* (Say). Apparently very scarce in Virginia. Populations in the central Rockies may be continuous with that in British Columbia, those in Missouri and Mexico may be substantially disjunct.



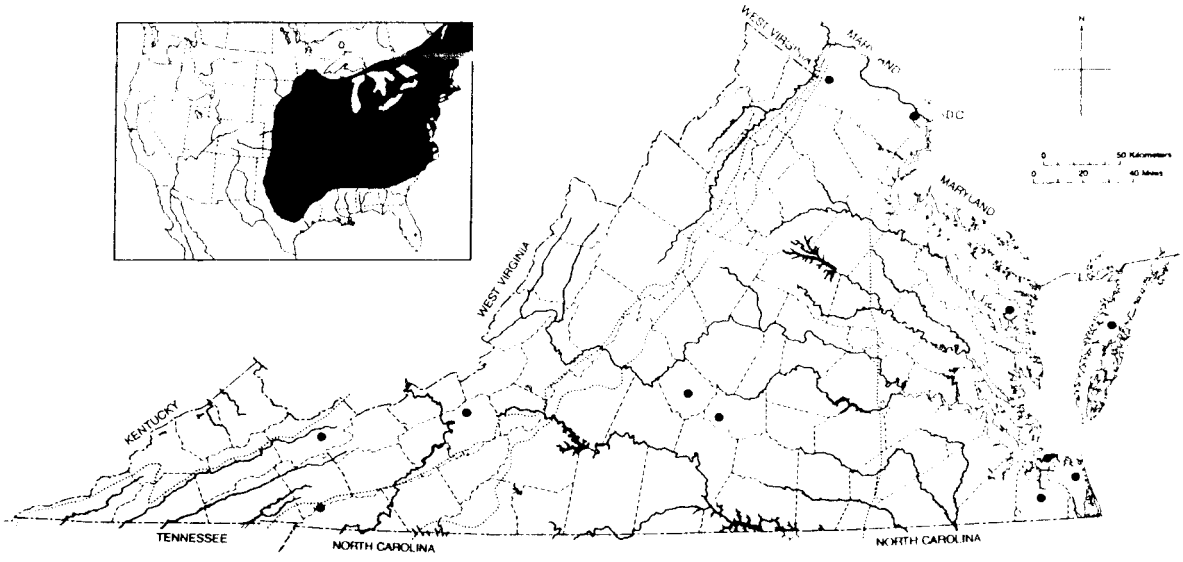
Map 18. *Chilacis typhae* (Perrin). The present range in the Great Lakes region is probably much greater than shown in the inset map.



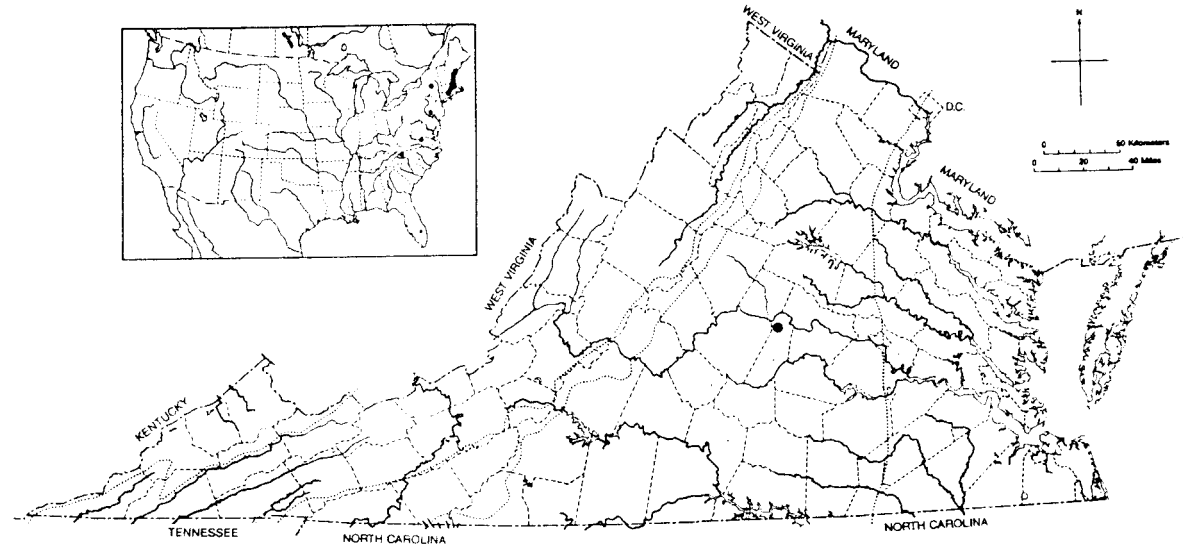
Map 19. *Holcocranum saturejae* (Kolenati). The distribution in the southeastern States is doubtless more extensive than shown on the inset map.



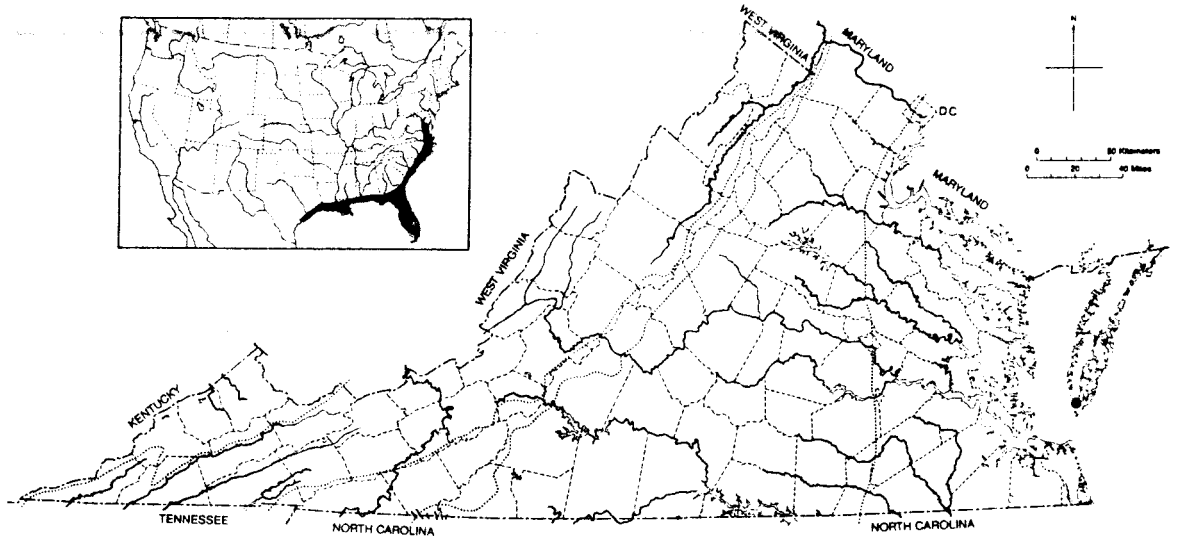
Map 20. *Blissus arenarius* Barber. The range of this species in the Chesapeake Bay region is surely more extensive than indicated by the two extant records on the Eastern Shore.



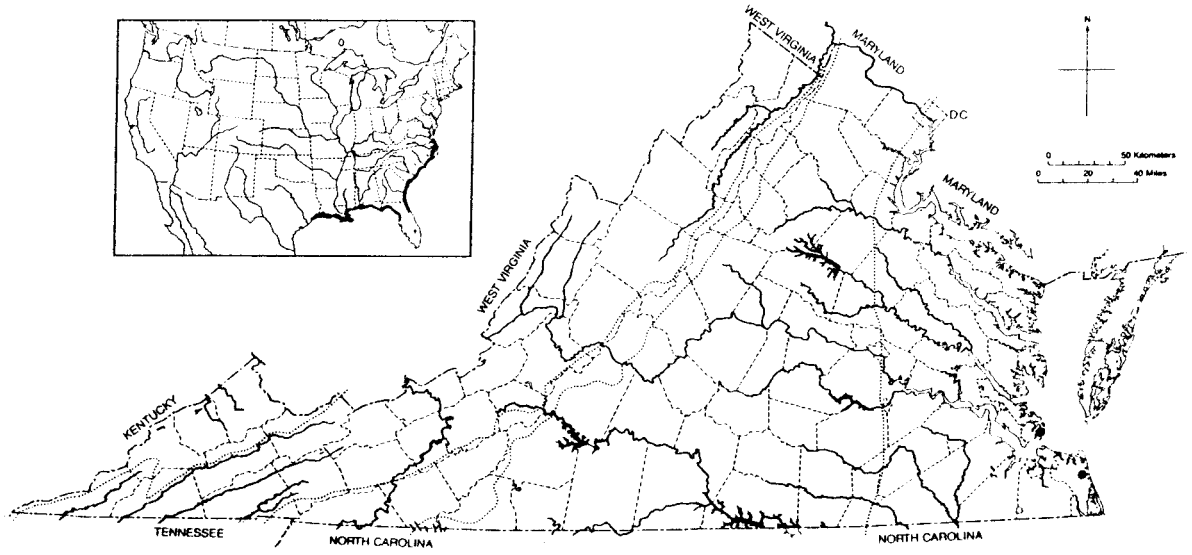
Map 21. *Blissus leucopterus* (Say) (inset map after Leonard, 1969).



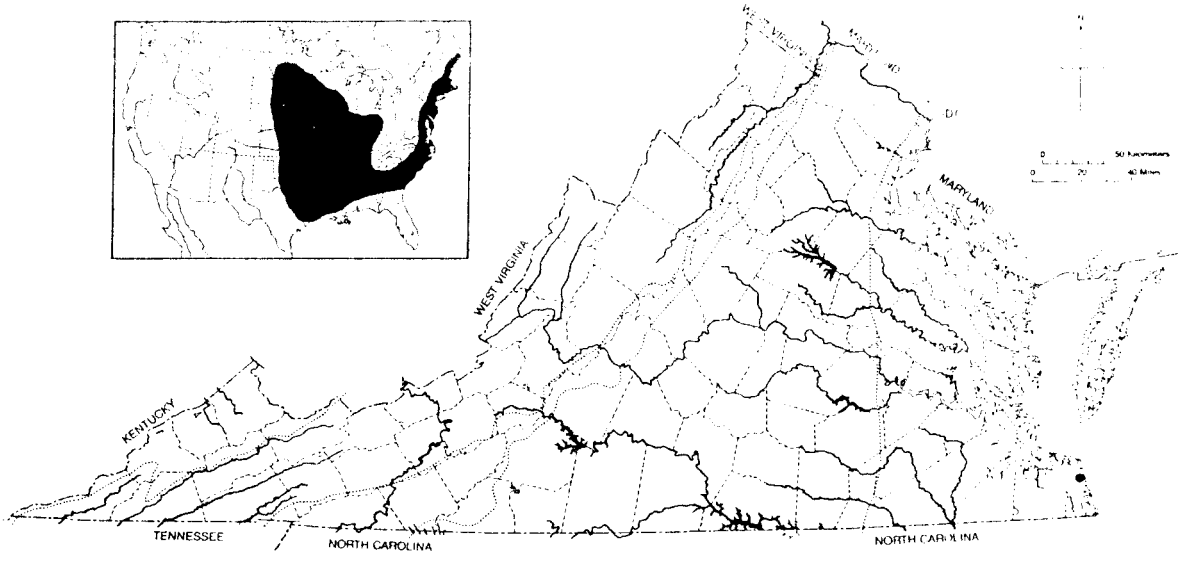
Map 22. *Blissus breviusculus* Barber (inset map after Wheeler & Fetter, 1989).



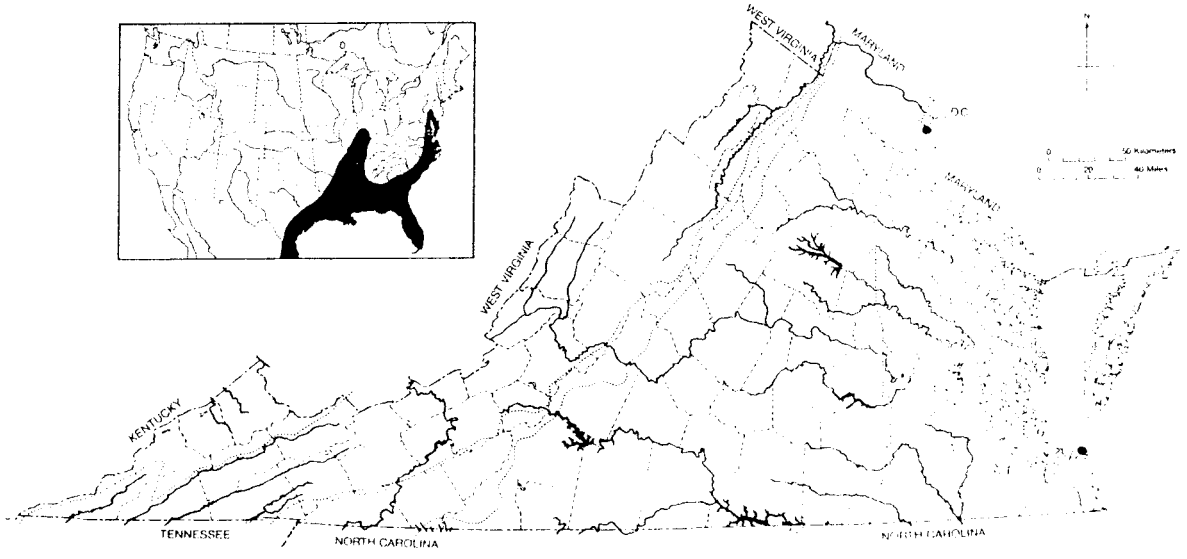
Map 23. *Ischnodemus badius* Van Duzee.



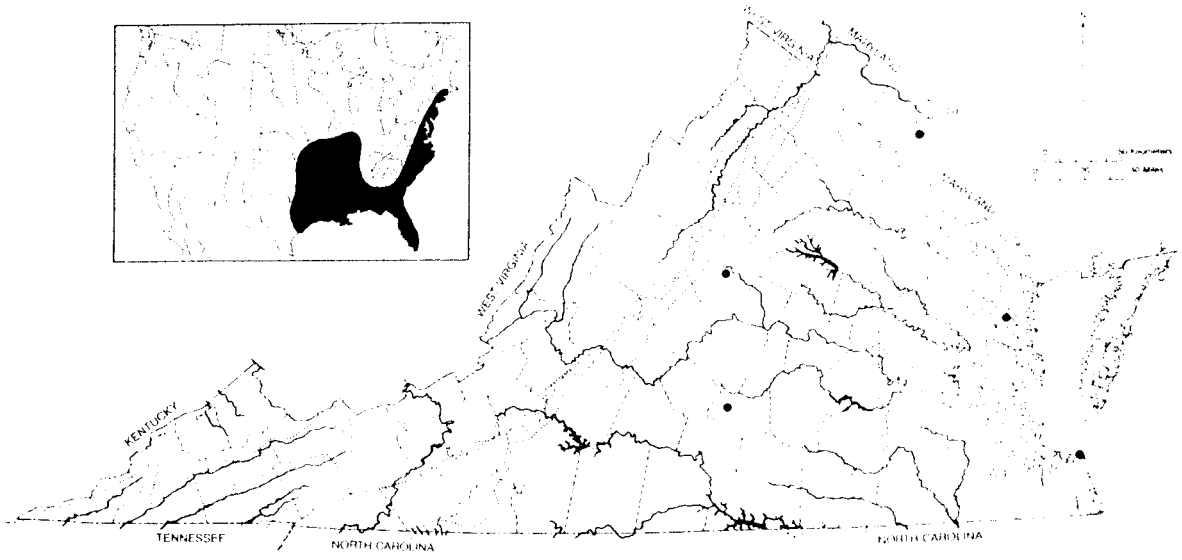
Map 24. *Ischnodemus conicus* Van Duzee. The western limits of the range in Texas are unknown.



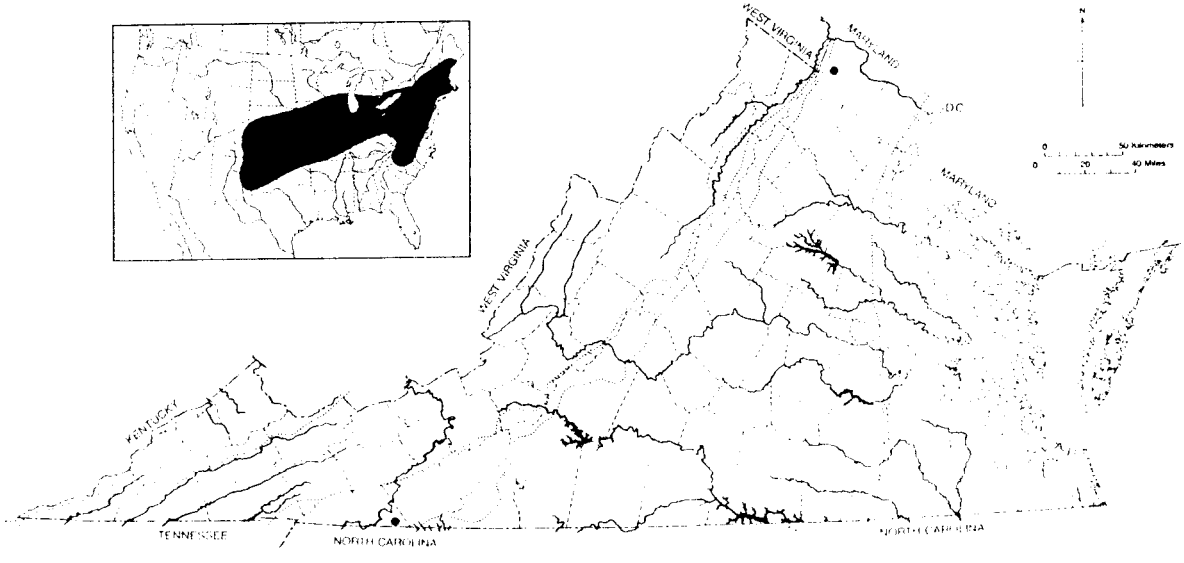
Map 25. *Ischnodemus falicus* (Say). The species is surely widespread in the Virginia Coastal Plain.



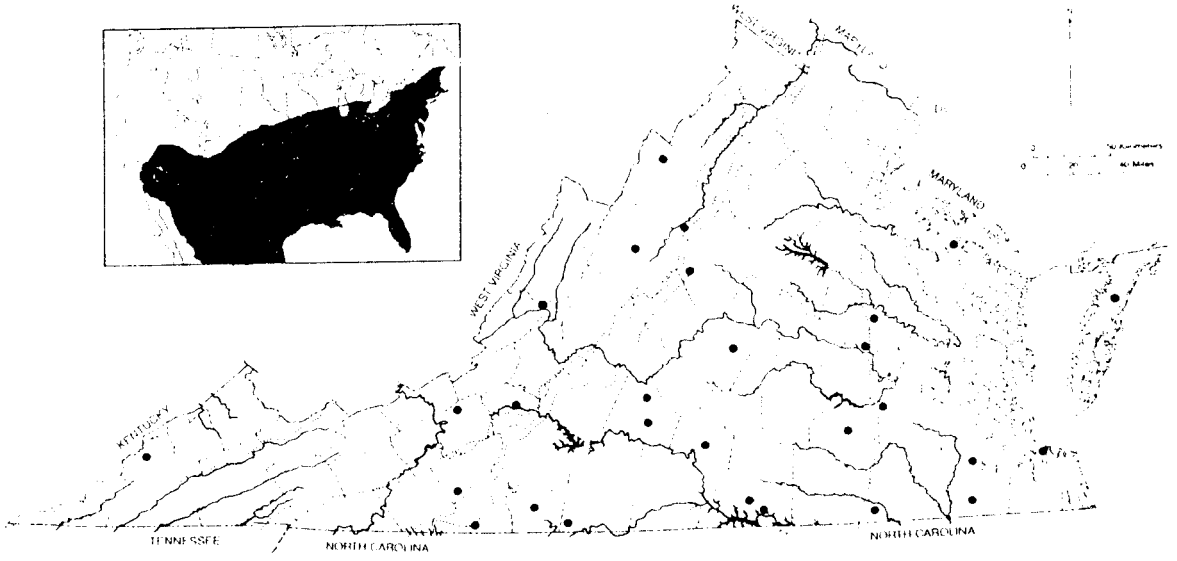
Map 26. *Ischnodemus rufipes* Van Duzee.



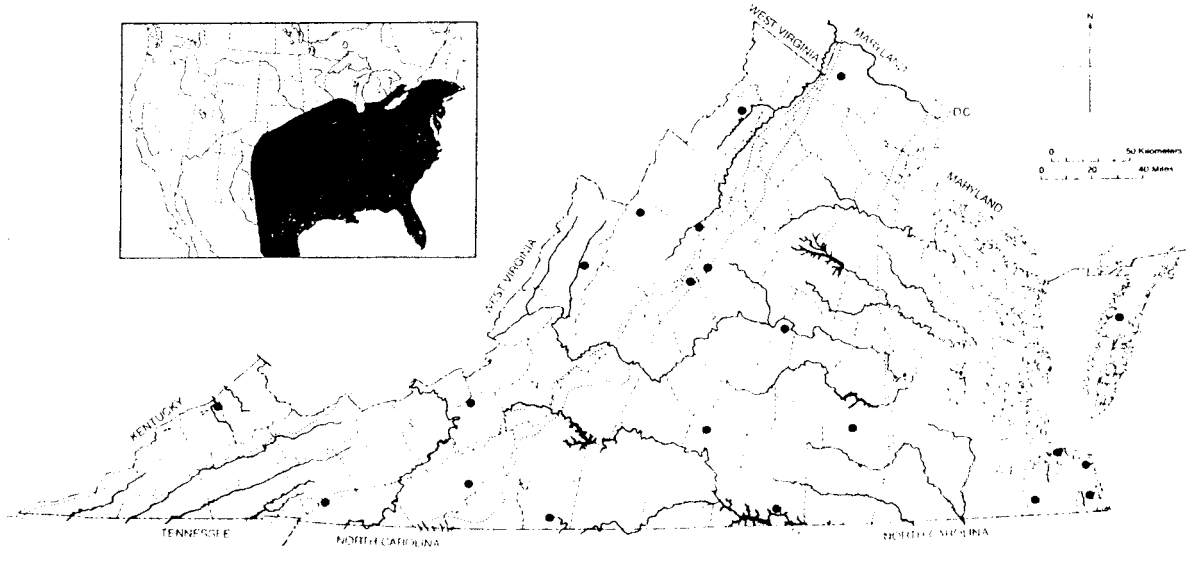
Map 27. *Ischnodemus slossonae* Van Duzee.



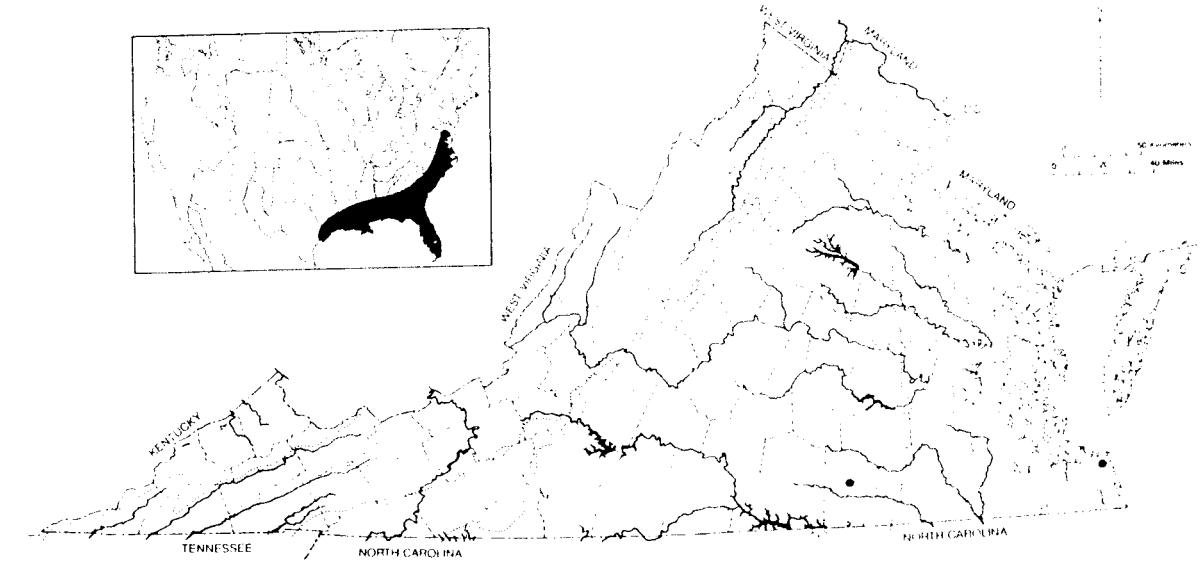
Map 28. *Isthmocoris piceus* (Say). The species is surely widespread in the Virginia Piedmont.



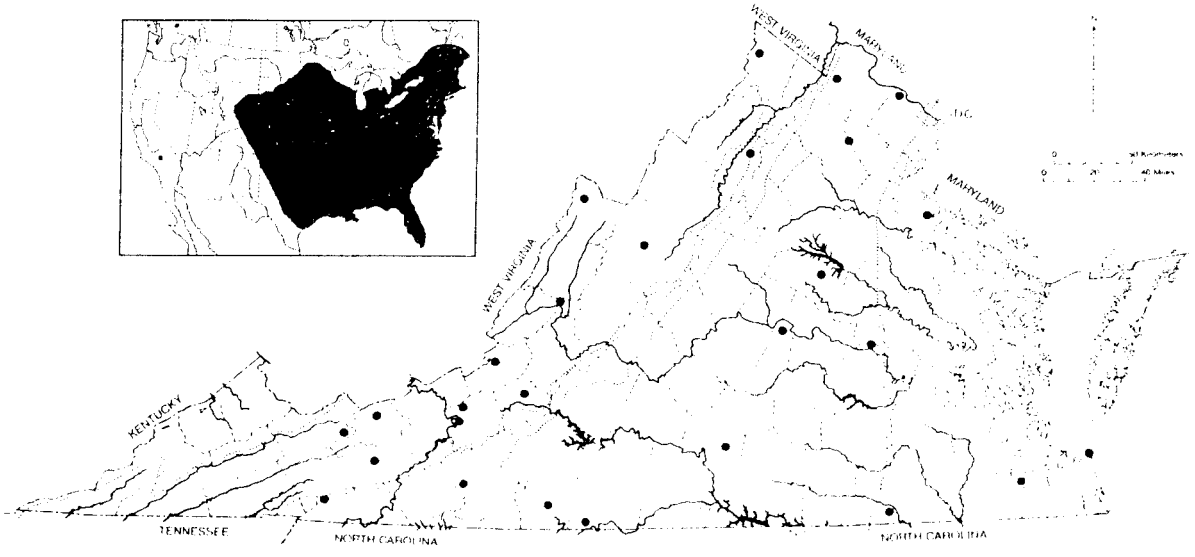
Map 29. *Geocoris punctipes* (Say).



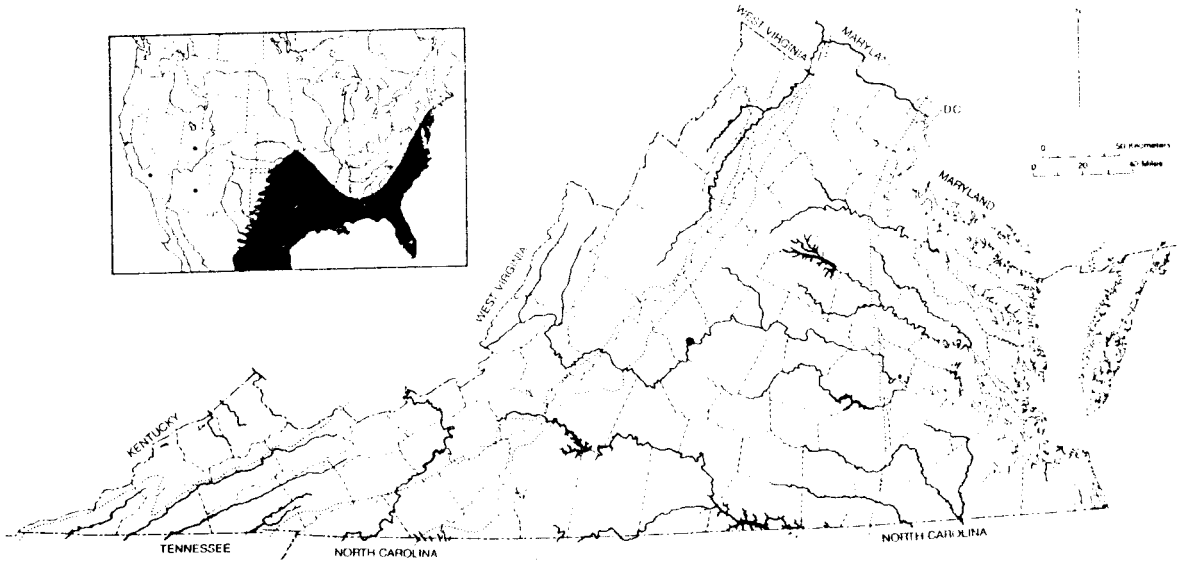
Map 30. *Geocoris uliginosus* (Say).



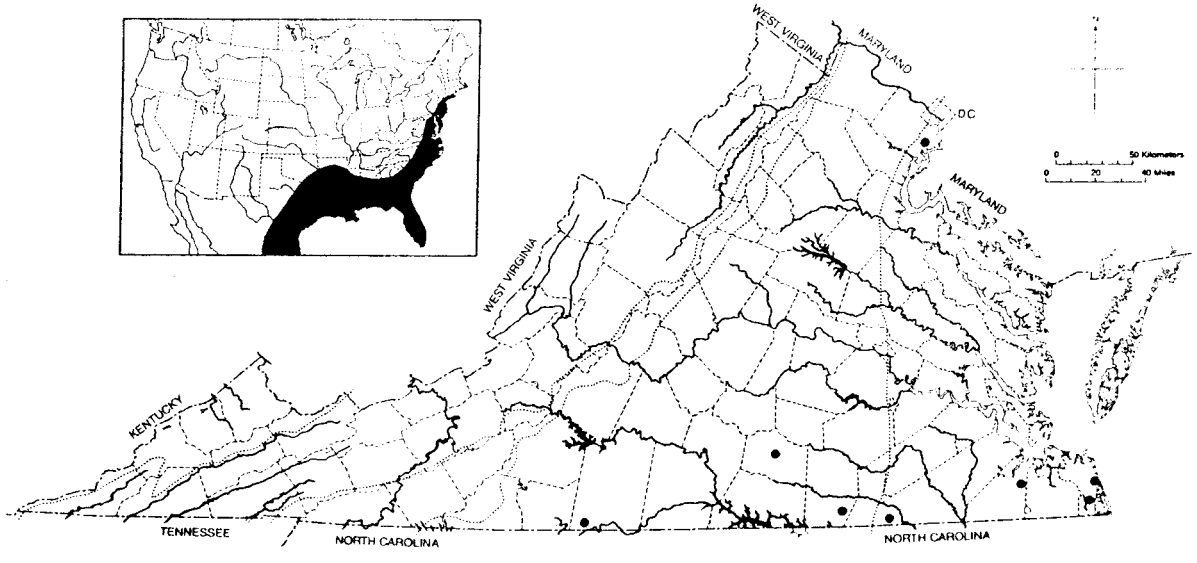
Map 31. *Geocoris bullatus floridanus* Blatchley. Virginia populations of this taxon may be intermediate with the more northern nominate subspecies.



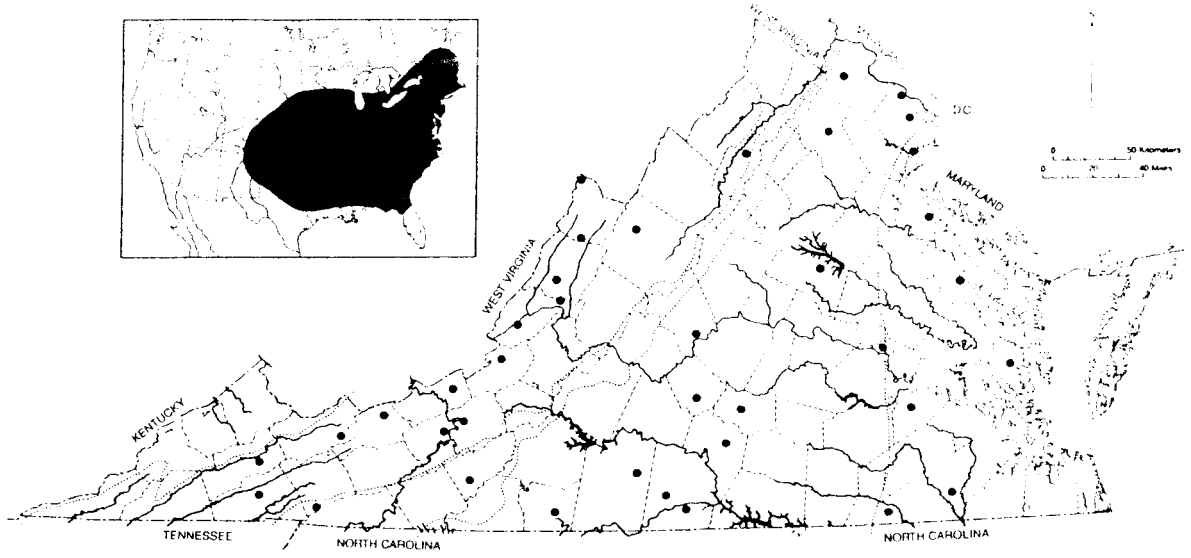
Map 32. *Phlegyas abbreviatus* (Say).



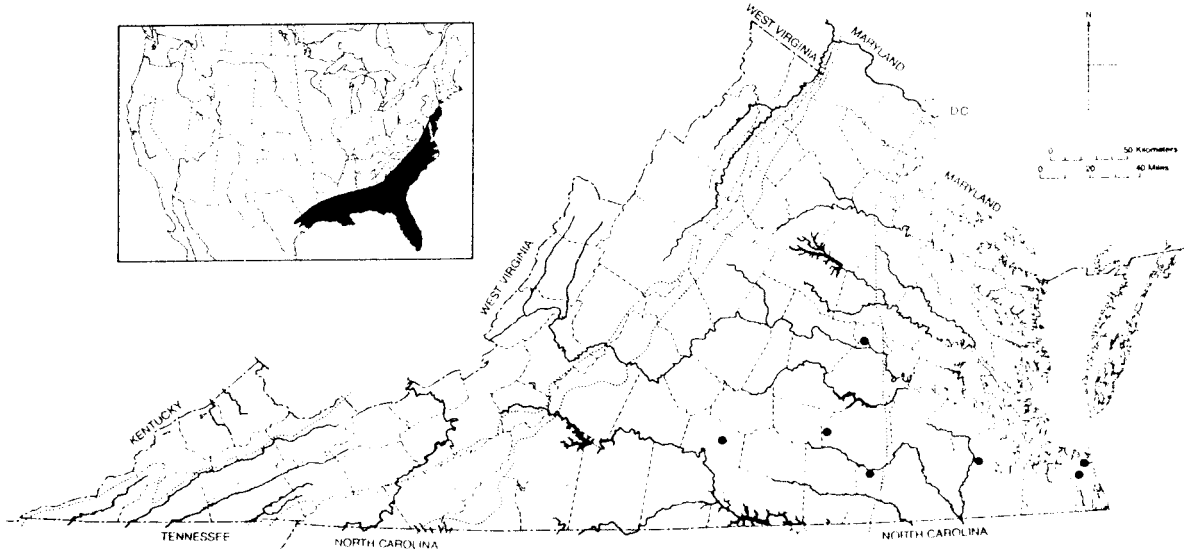
Map 33. *Phlegyas annulicrus* Stål.



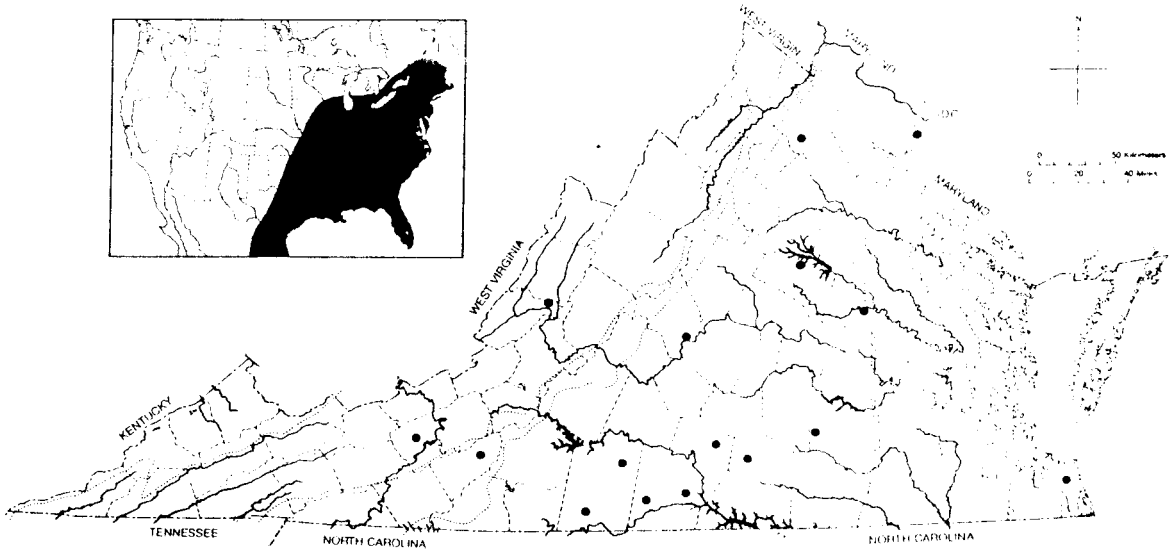
Map 34. *Oedancala crassimana* (Fabr.) The species doubtless occurs in every county in the Virginia Coastal Plain.



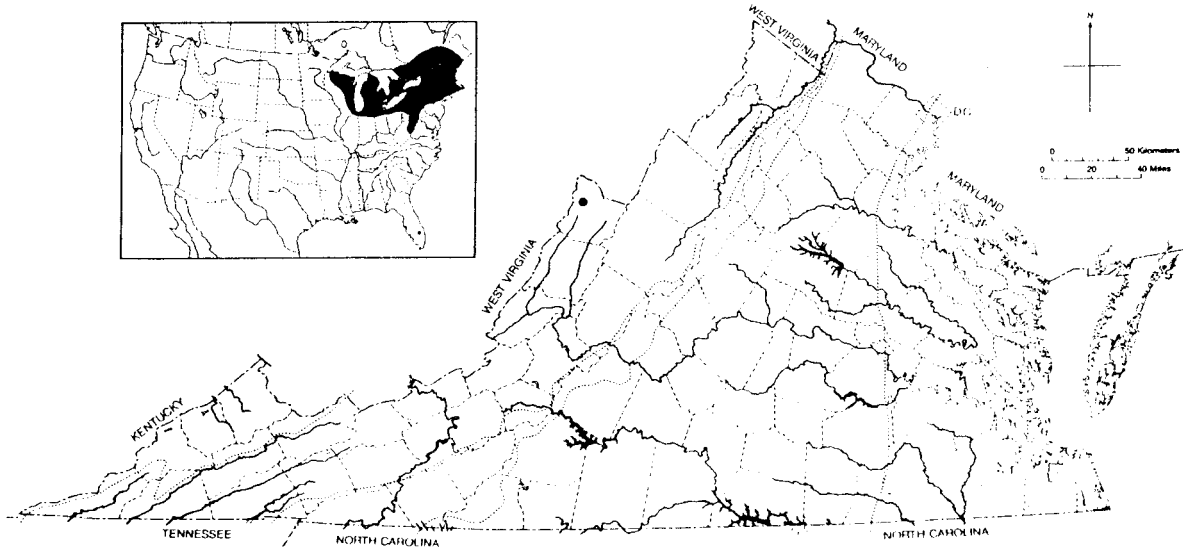
Map 35. *Oedancala dorsalis* (Say).



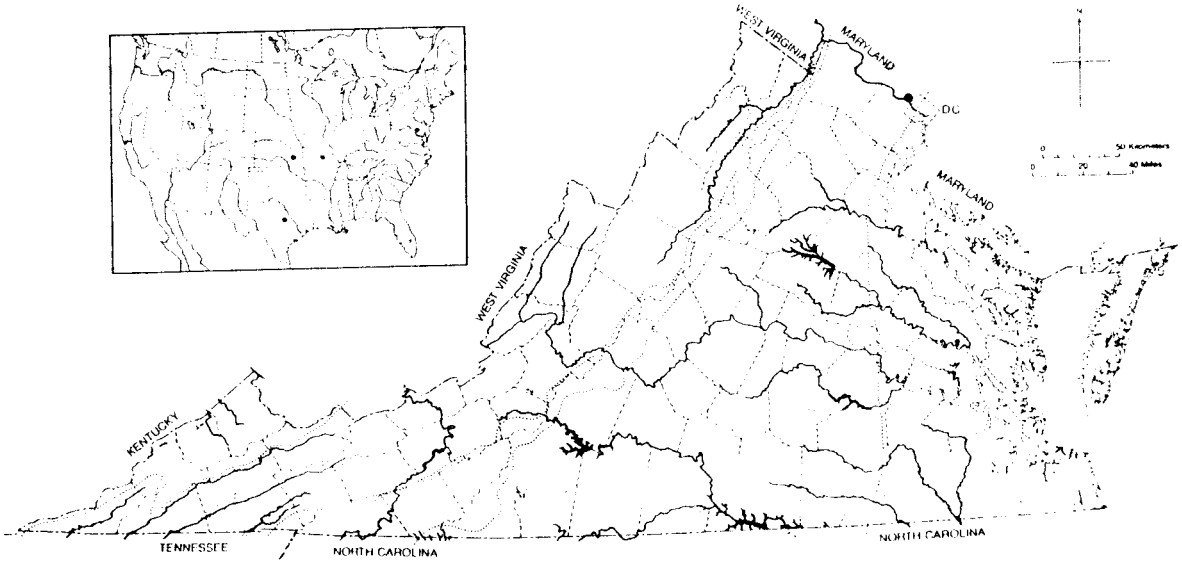
Map 36. *Antillocoris discretus* Barber. The western extent of the range is unknown.



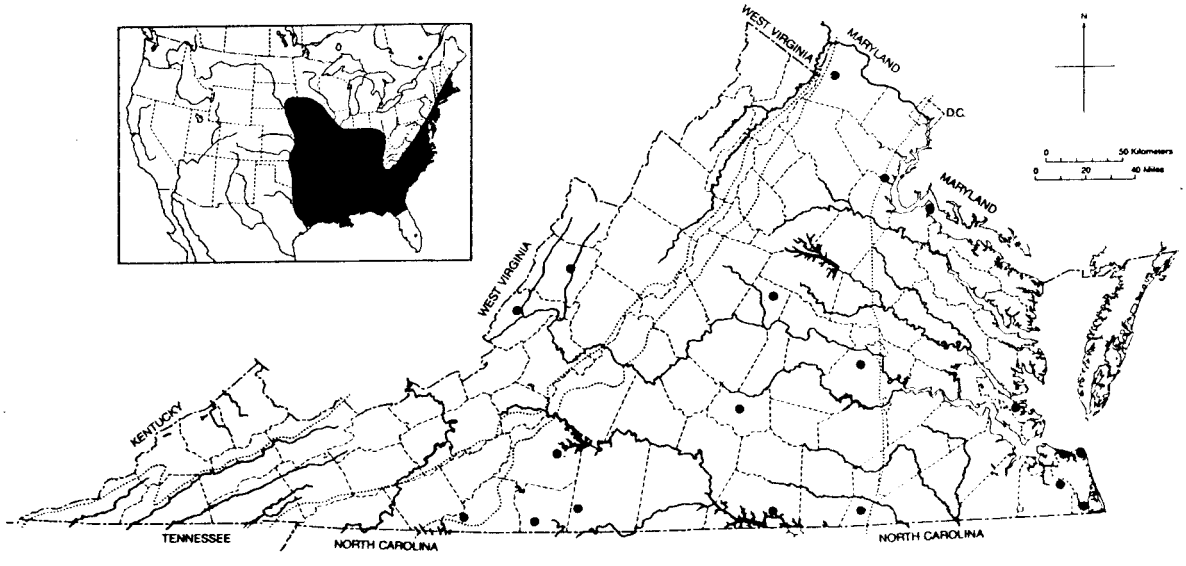
Map 37. *Antillocoris pilosus* (Stal). The shaded inset map is probably inaccurate, owing to past confusion of the species with *A. minutus*.



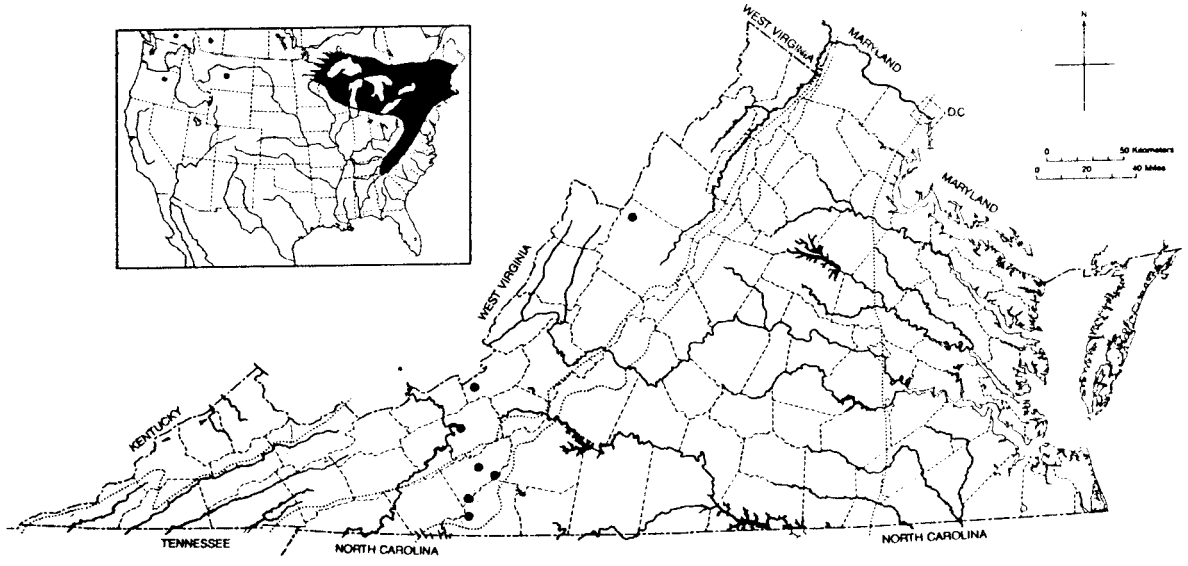
Map 38. *Stygnocoris rusticus* (Fallen) (inset map from Wheeler, 1983).



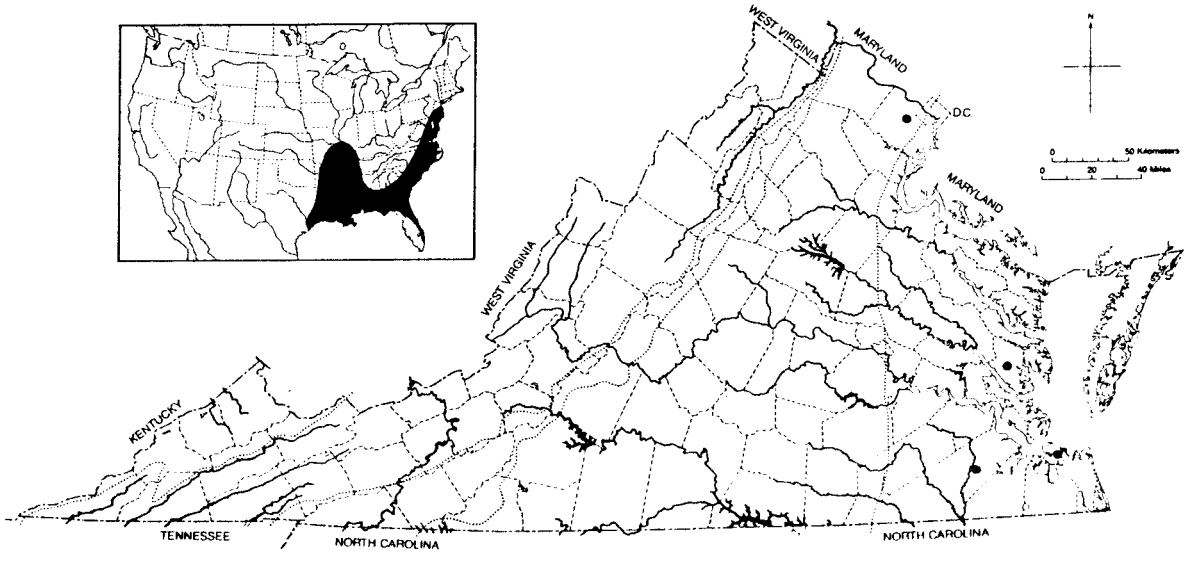
Map 39. *Tempyra biguttula* Stal. The collection site indicated is on the Maryland side of the Potomac River.



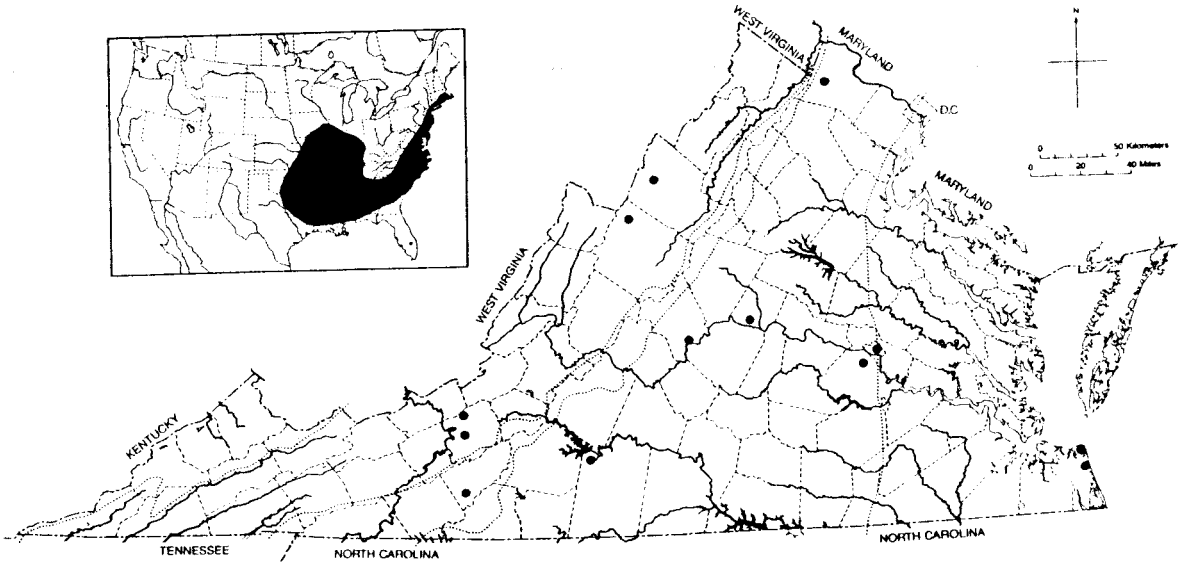
Map 40. *Drymus crassus* Van Duzee. The record for Quebec invites confirmation in light of the obviously "lower Austral" range of this species.



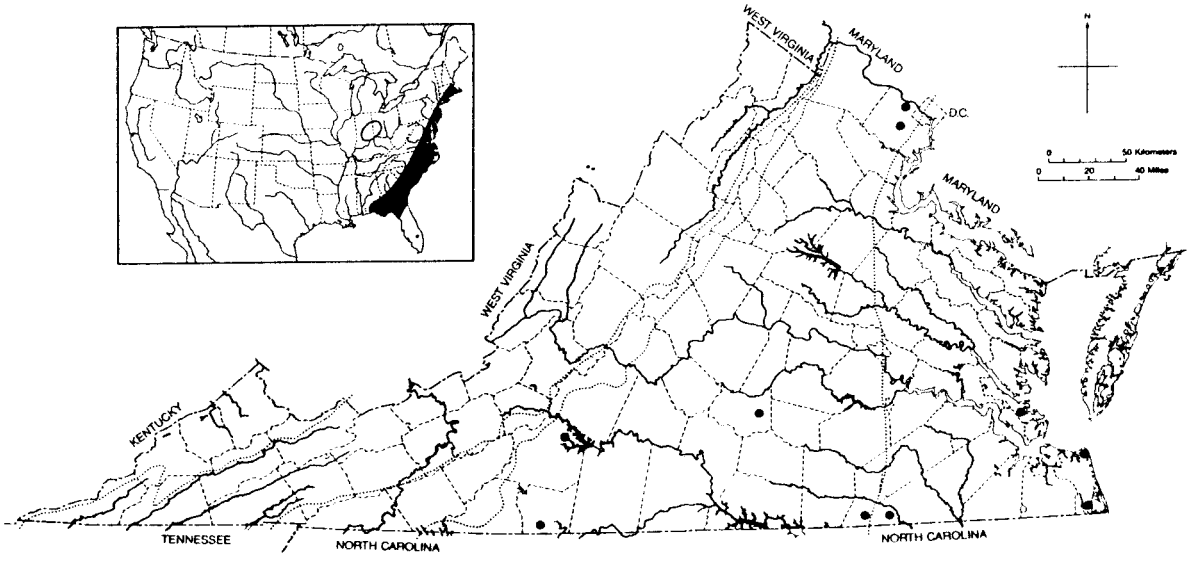
Map 41. *Eremocoris borealis* (Dallas). It is not known if the range of this species is continuous across the northern Great Plains; western states and provinces of record are shown separately.



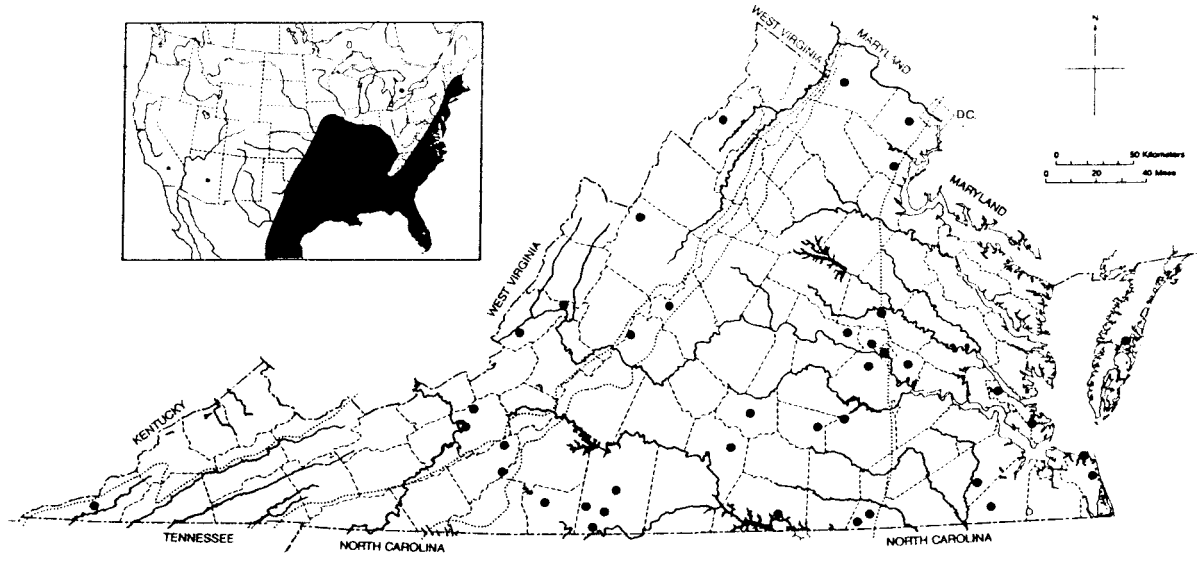
Map 42. *Eremocoris depressus* Barber.



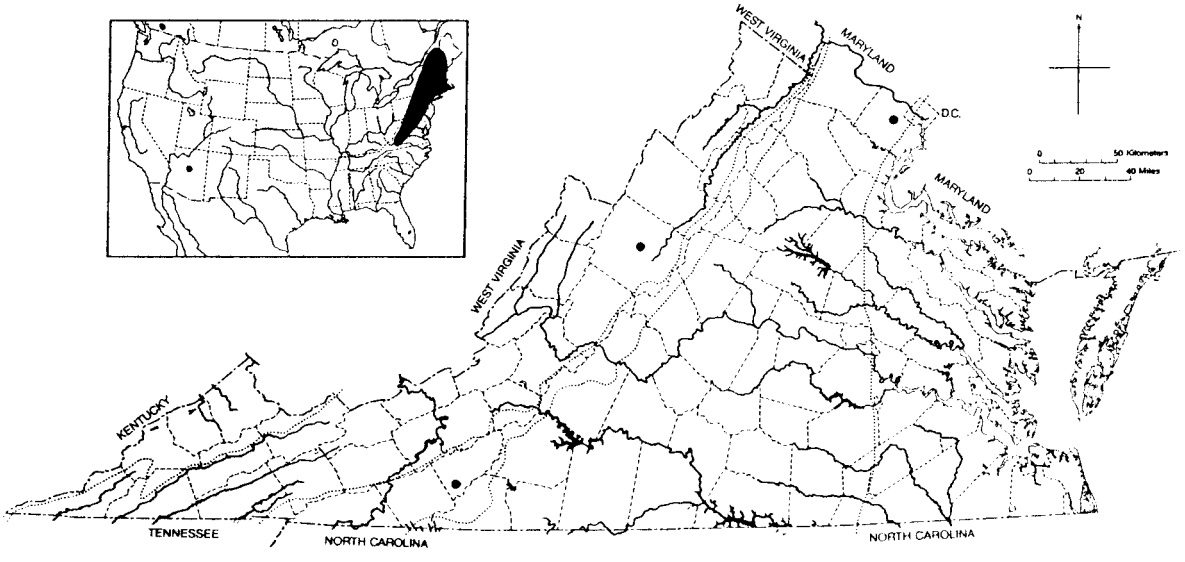
Map 43. *Eremocoris ferus* (Say).



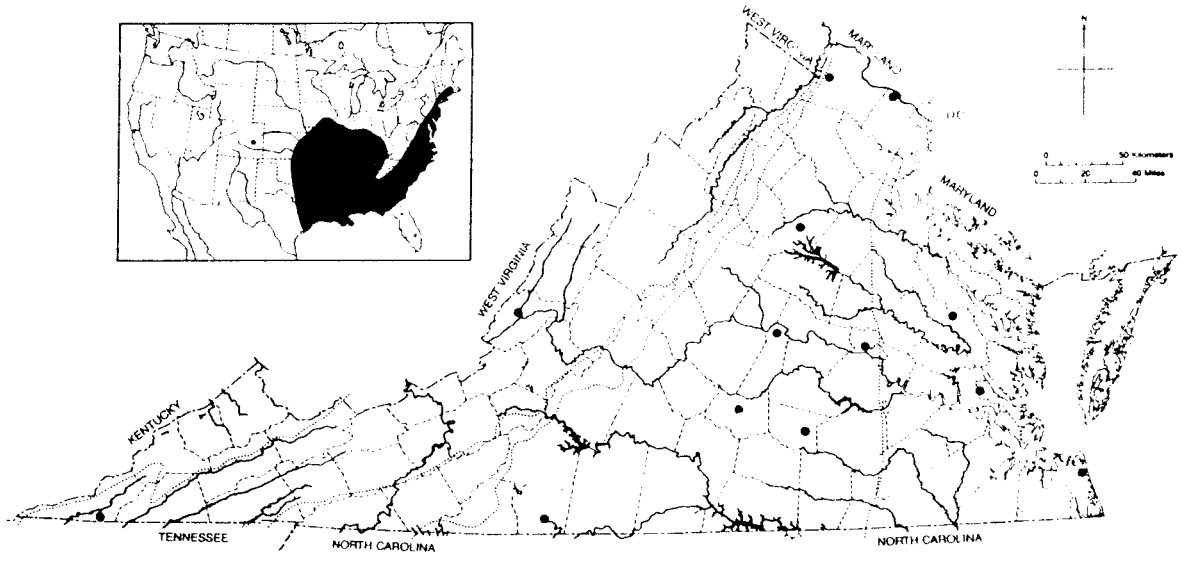
Map 44. *Eremocoris setosus* Blatchley. The interior population, encircled on the inset map, may be geographically disjunct from the main part of the species' range.



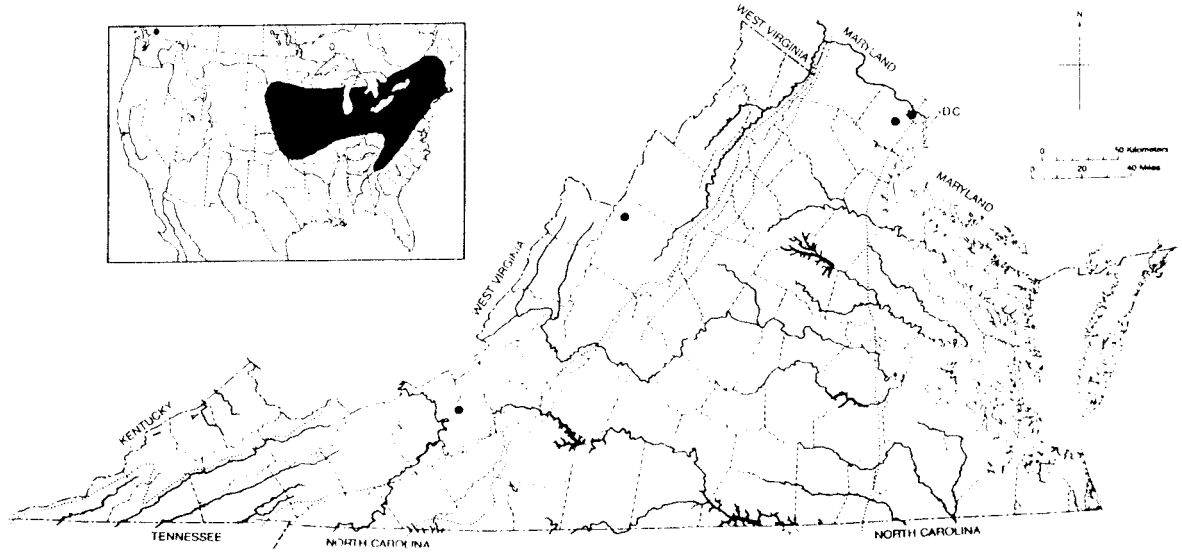
Map 45. *Ozophora picturata* (Uhler). Relationship of the several outlying records on the inset map to the main distribution area is uncertain; they are perhaps not really disjunct.



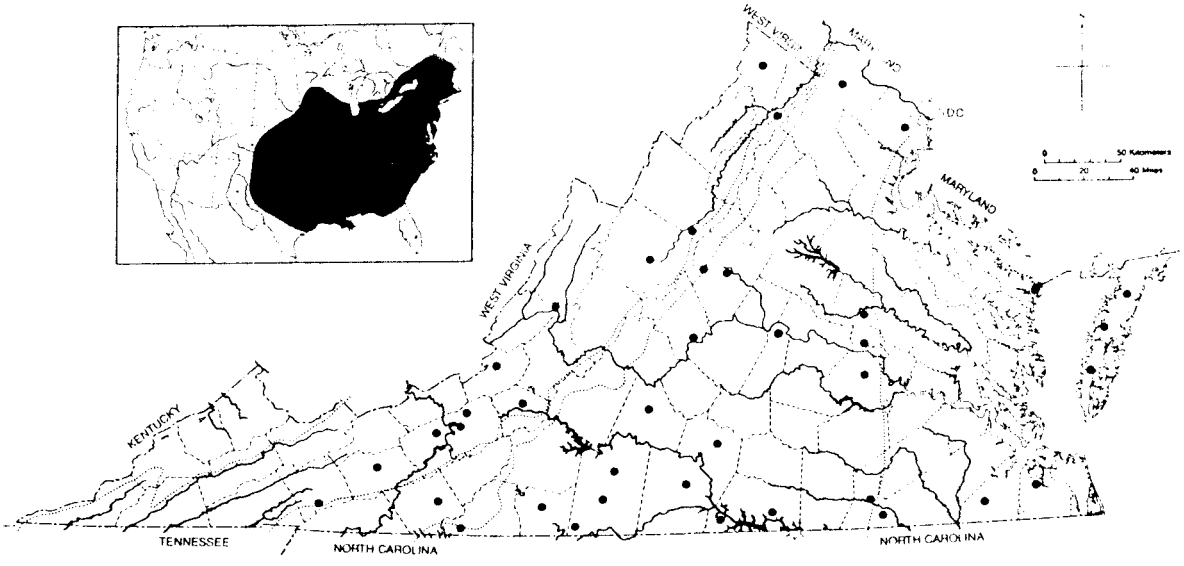
Map 46. *Kolonetrus plenus* (Distant). Status of the records for Arizona and British Columbia vis-à-vis the Appalachian range (and the type area in Guatemala) remains uncertain.



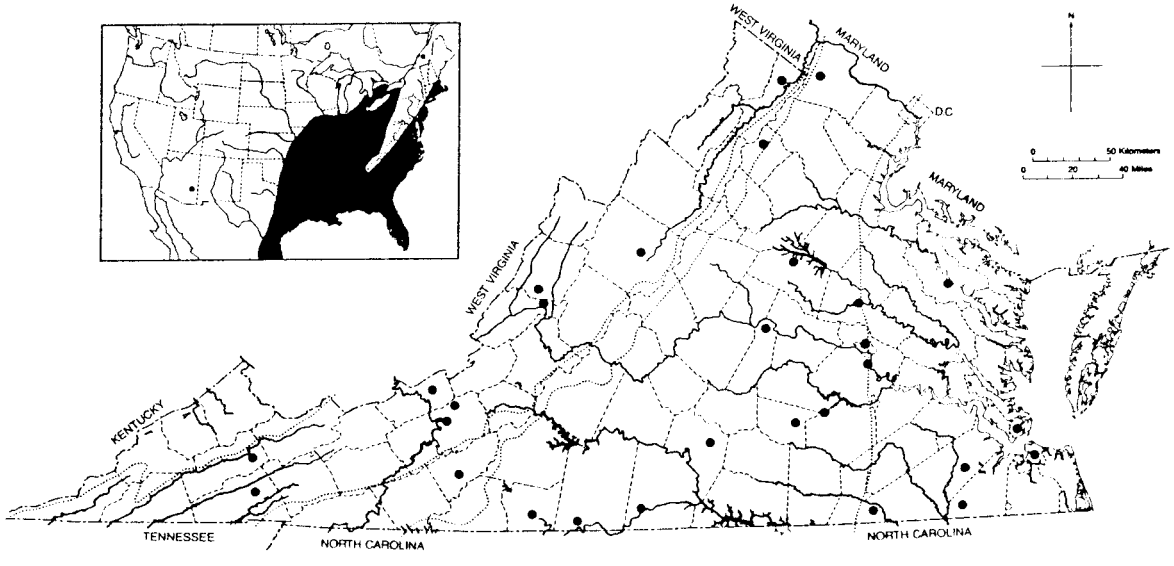
Map 47. *Cnemodus mavortius* (Say).



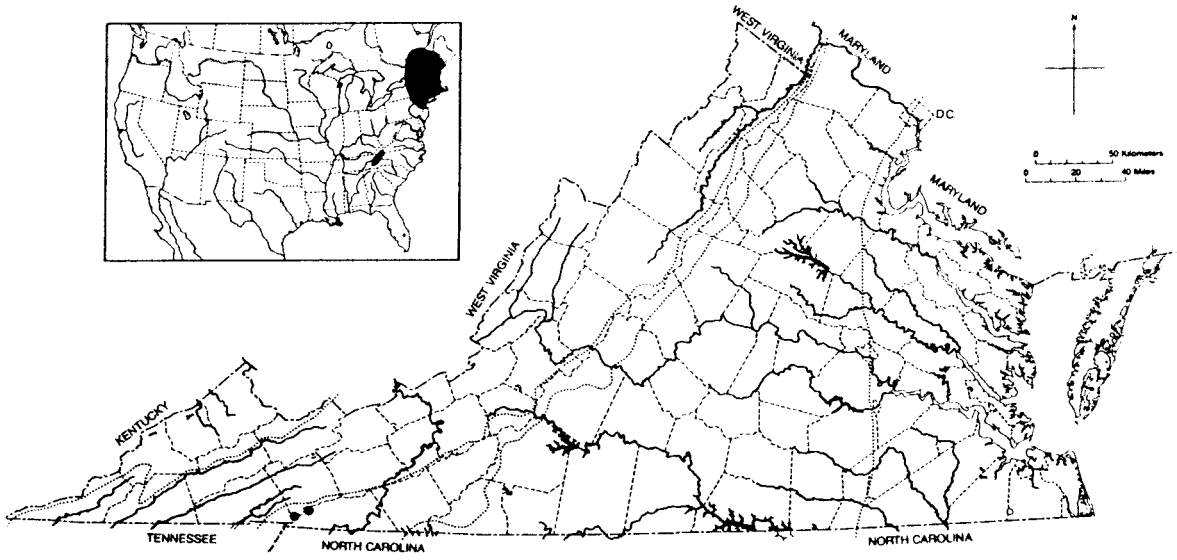
Map 48. *Pseudocnemodus canadensis* (Provancher).



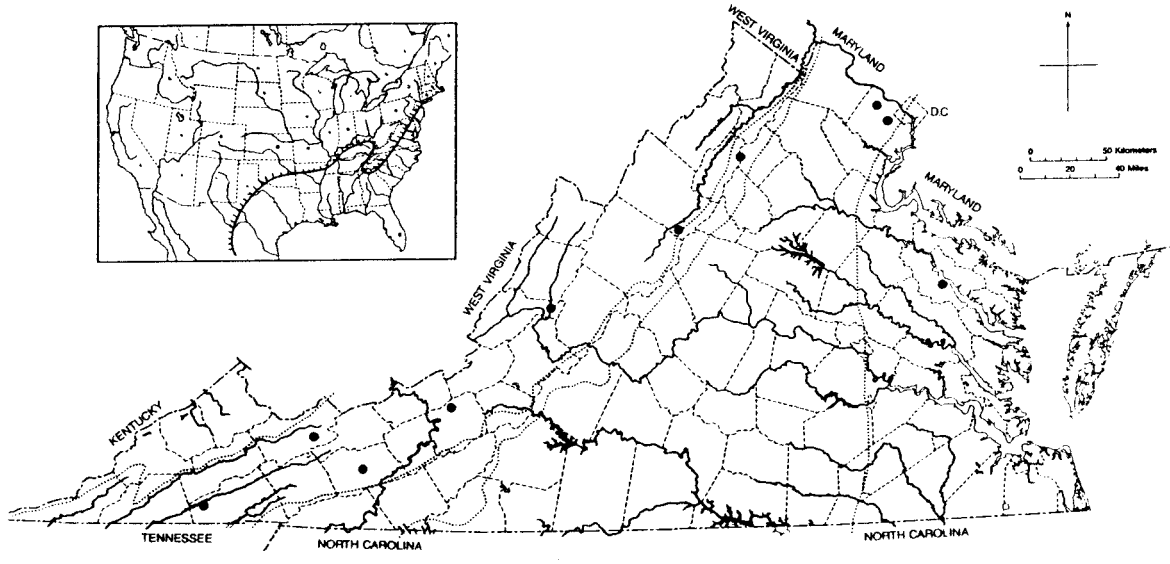
Map 49. *Myodocha serripes* (Say).



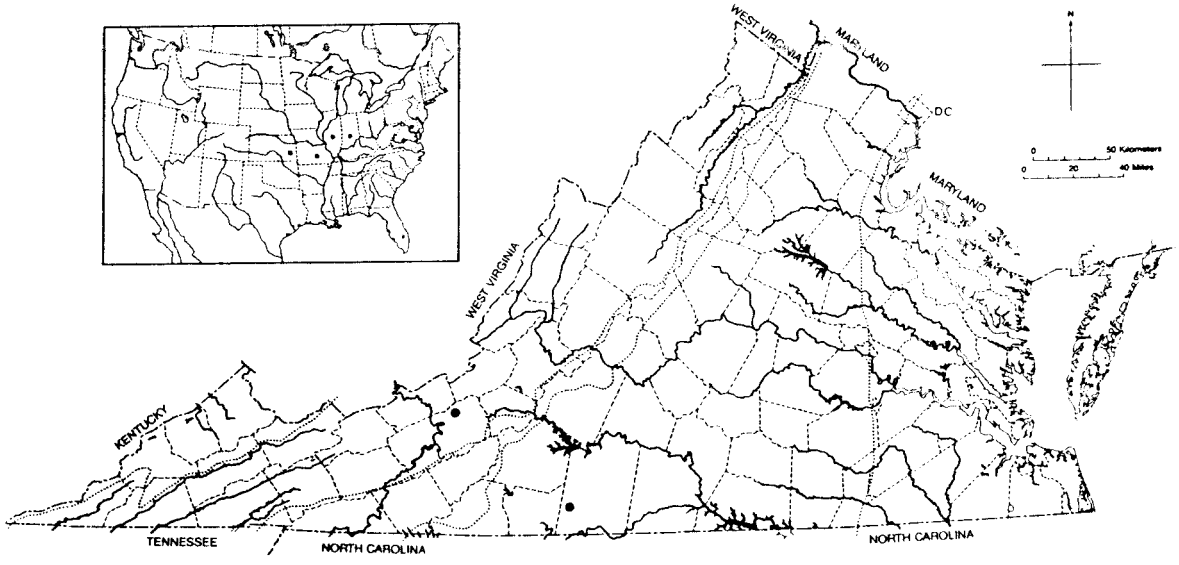
Map 50. *Heraeus plebejus* (Say). The Appalachian hiatus shown on the inset map may not be real; the Quebec record invites confirmation.



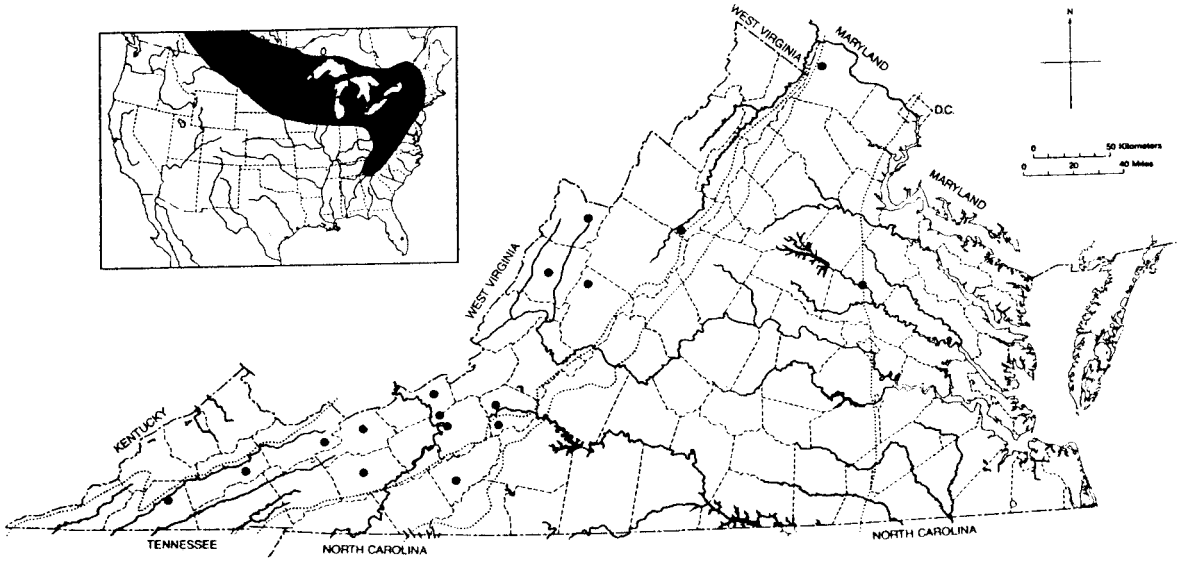
Map 51. *Ligyrocoris depictus* Barber. The range may be continuous rather than disjunct as shown on the inset map.



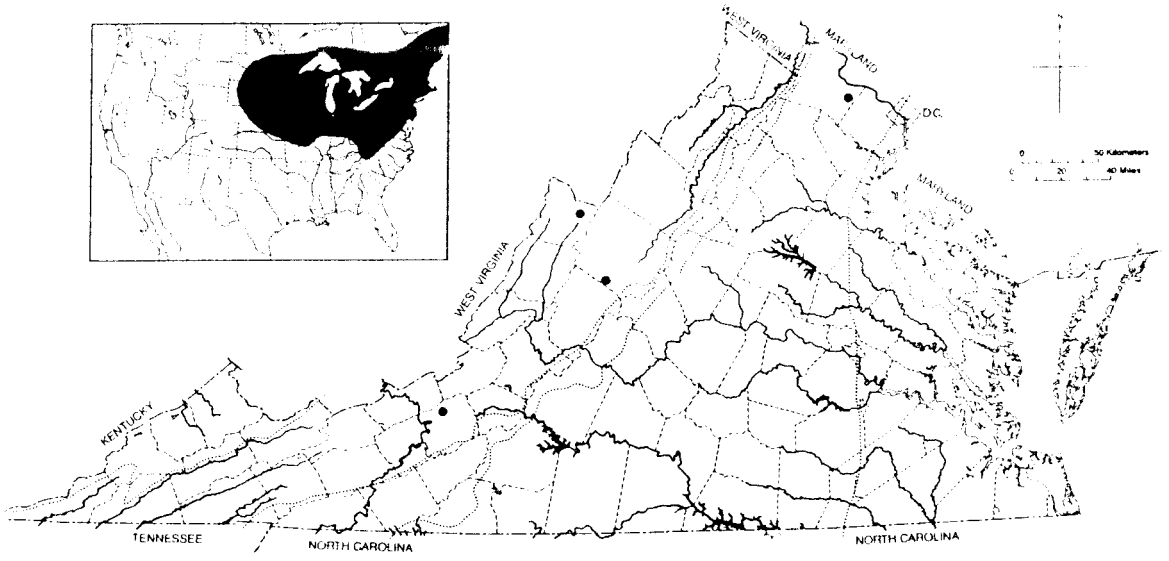
Map 52. *Ligyrocoris diffusus* (Uhler). The species appears to be continent-wide except for the southeastern coastal plain, therefore north and west of the hatched line on the inset map.



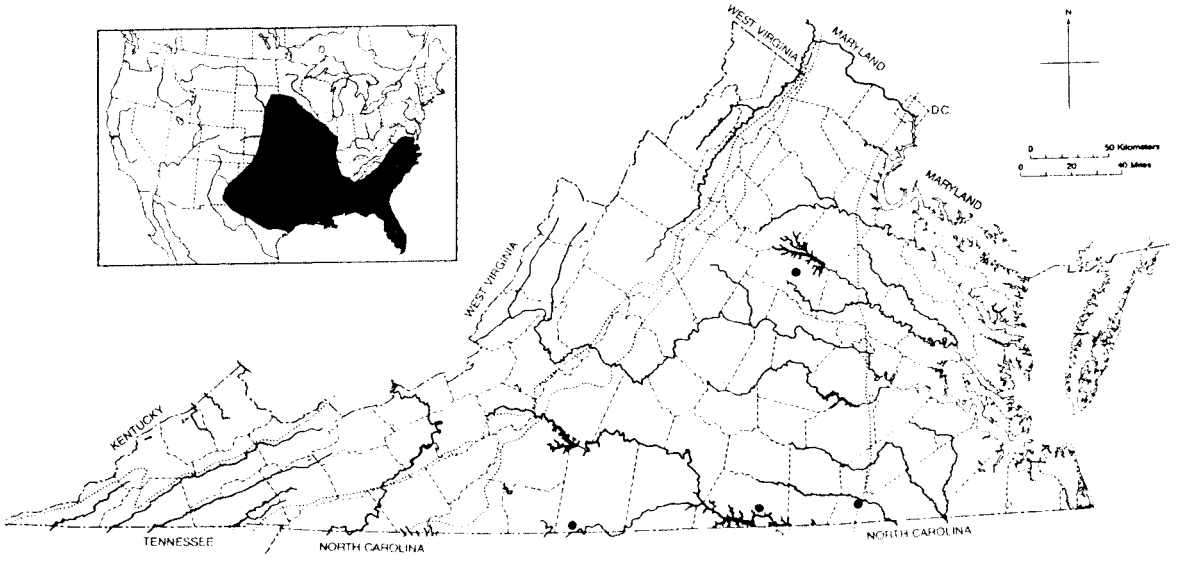
Map 53. *Ligyrocoris obscurus* Barber. States of record for this scarce species are dotted on the inset map rather than depicted as an east-west continuum.



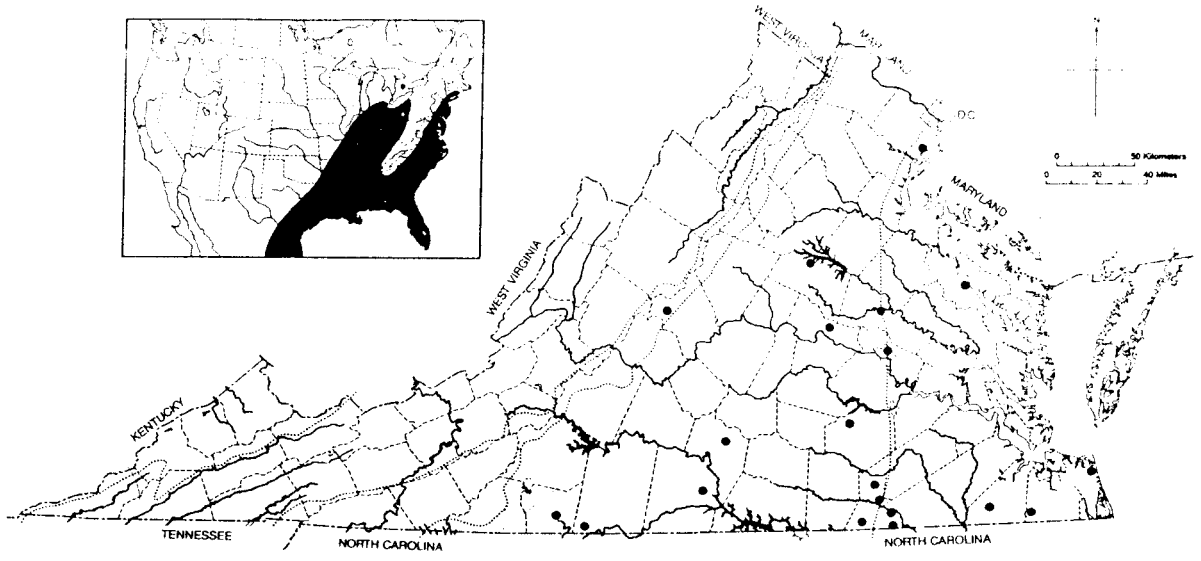
Map 54. *Zeridoneus costalis* (Van Duzee).



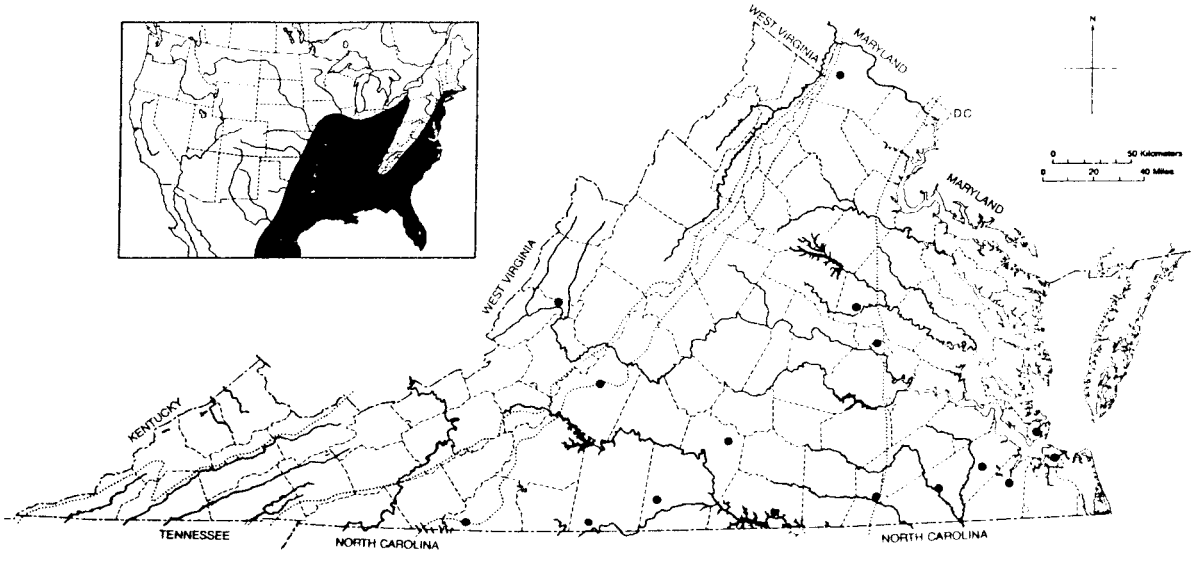
Map 55. *Perigenes constrictus* (Say). Midwestern part of the range (inset map) is only approximate, owing to previous confusion of this species and *P. similis*.



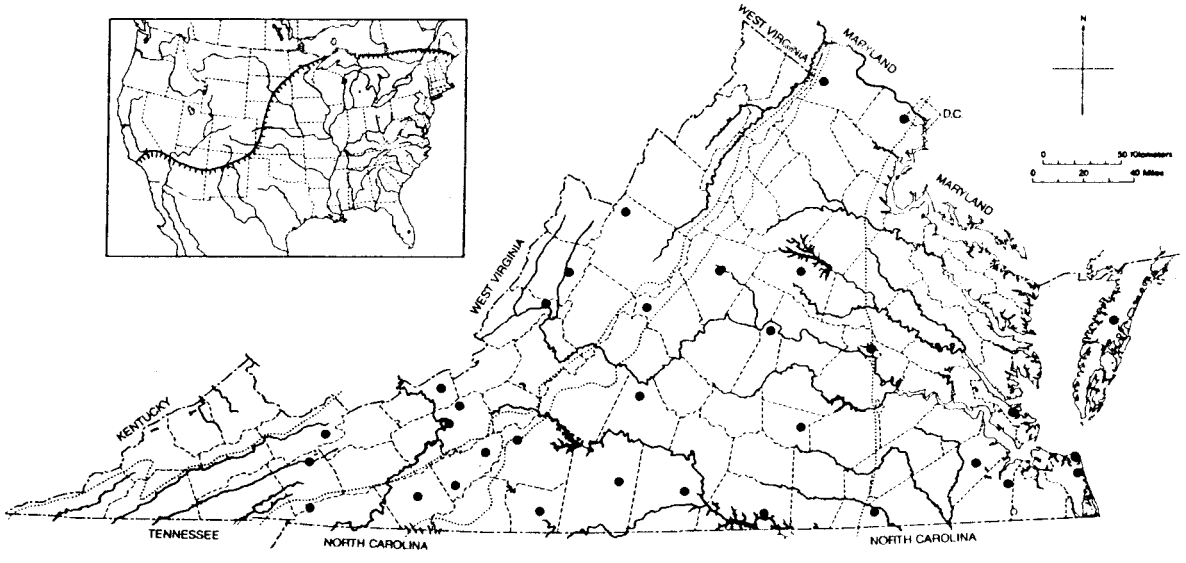
Map 56. *Perigenes similis* Barber. The general range is assumed to be continuous despite the lack of records for most of the Gulf Coast states.



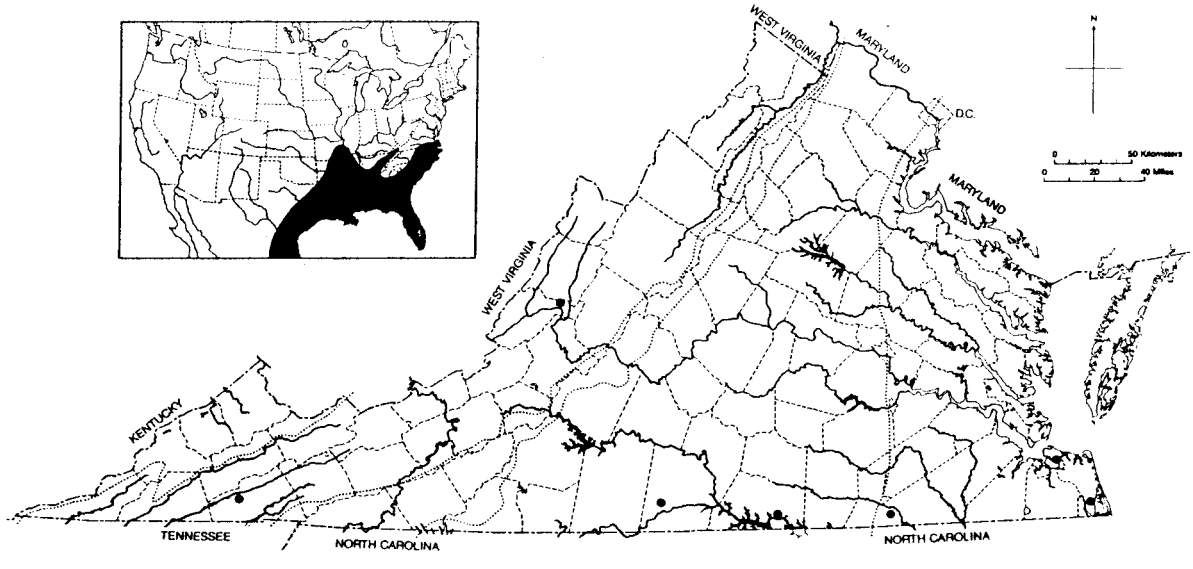
Map 57. *Neopamera albocincta* Barber.



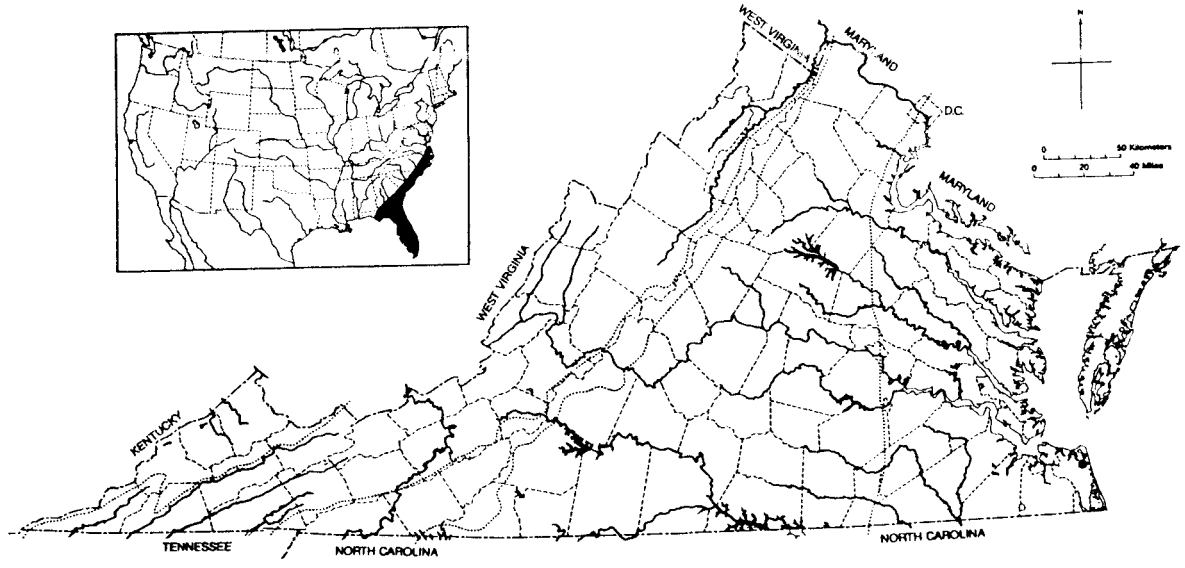
Map 58. *Neopamera bilobata* (Say).



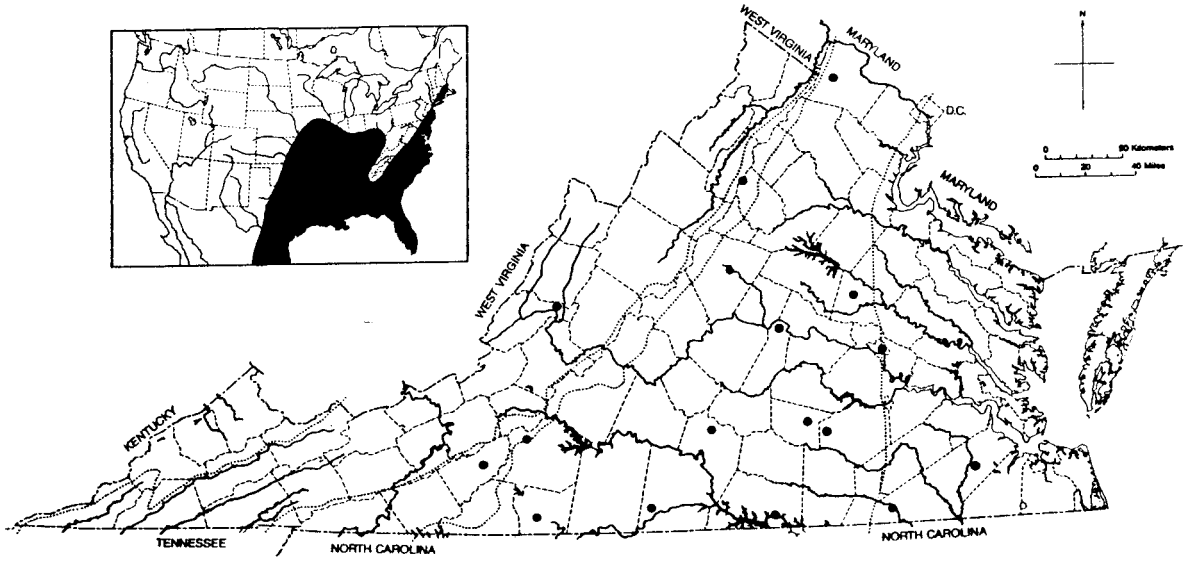
Map 59. *Pseudopachybrachius basalis* (Say). Continentwide in range, south of the hatched line.



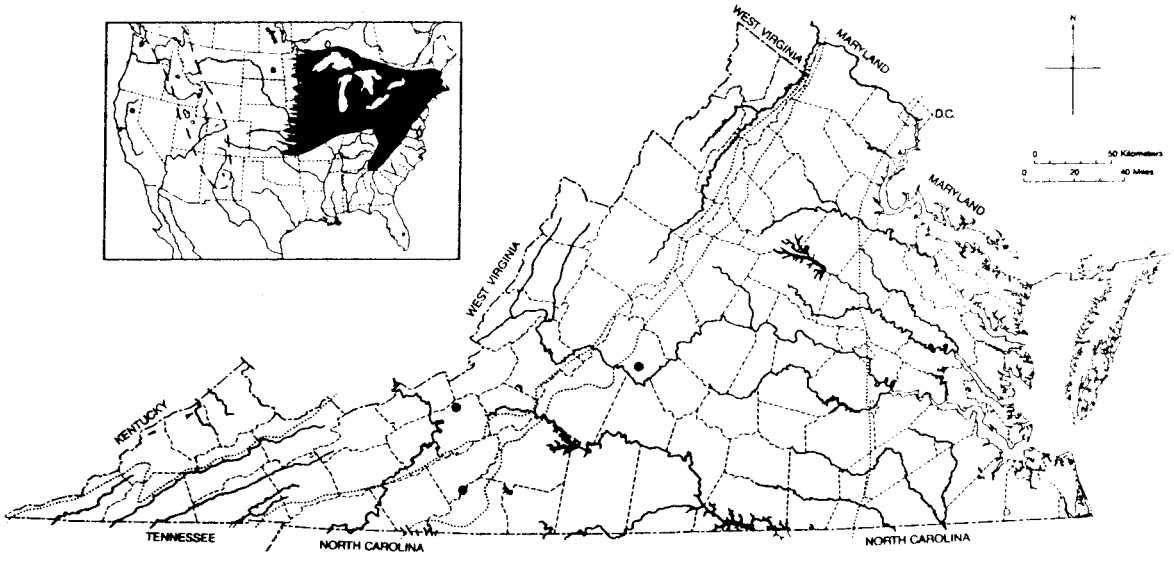
Map 60. *Paromius longulus* (Say).



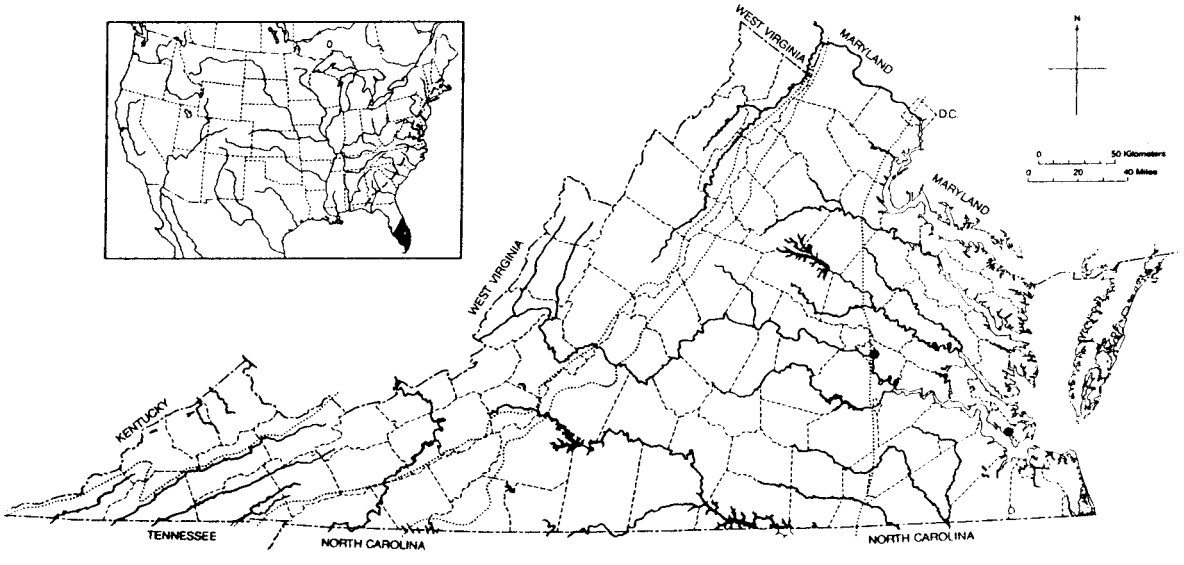
Map 61. *Carpilis barberi* Blatchley.



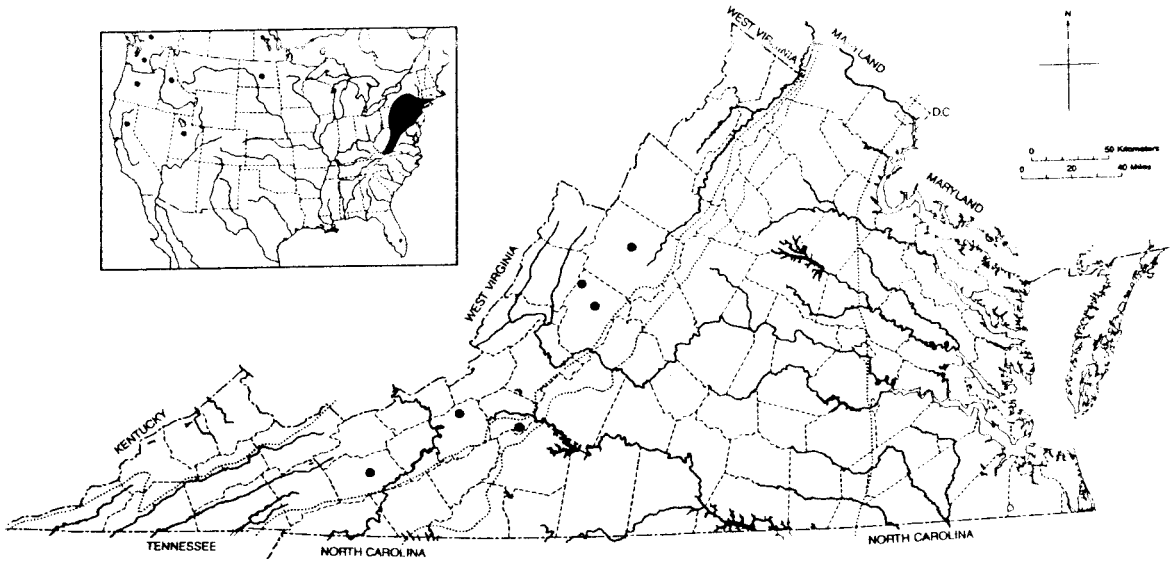
Map 62. *Ptochiomera nodosa* (Say).



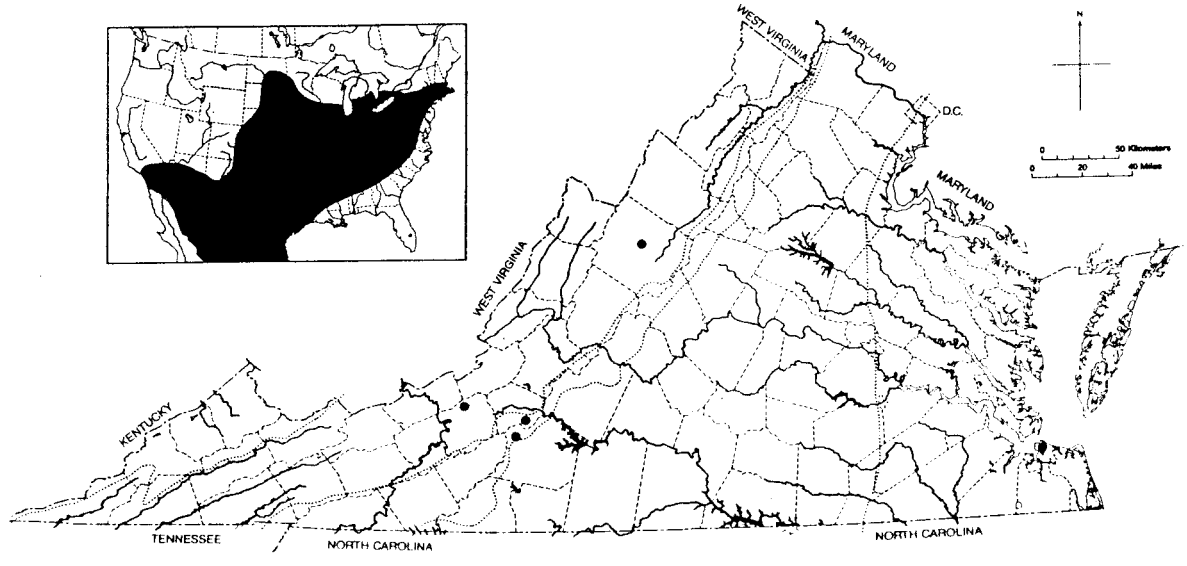
Map 63. *Peritrechus fraternus* (Say). Status and distribution of this species in western North America are uncertain; representation on the inset map is conjectural (the California record may be of another species).



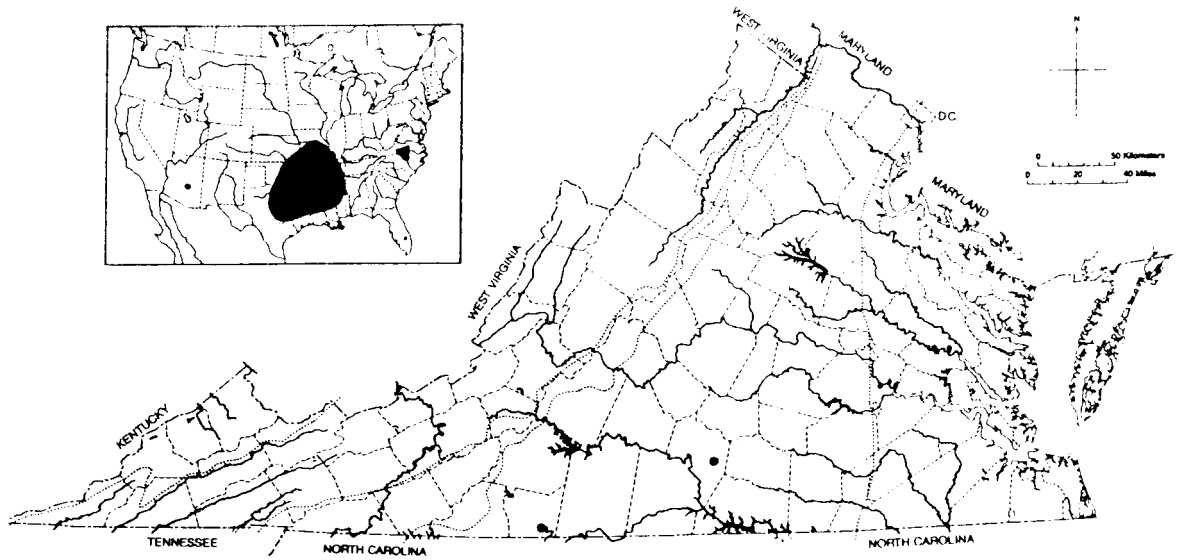
Map 64. *Peritrechus paludemaris* Barber. The scarcity of records for the southeastern states (particularly northern Florida) suggests the possibility of disjunction along the Atlantic coast, within the area delimited by the dashed line on the inset map.



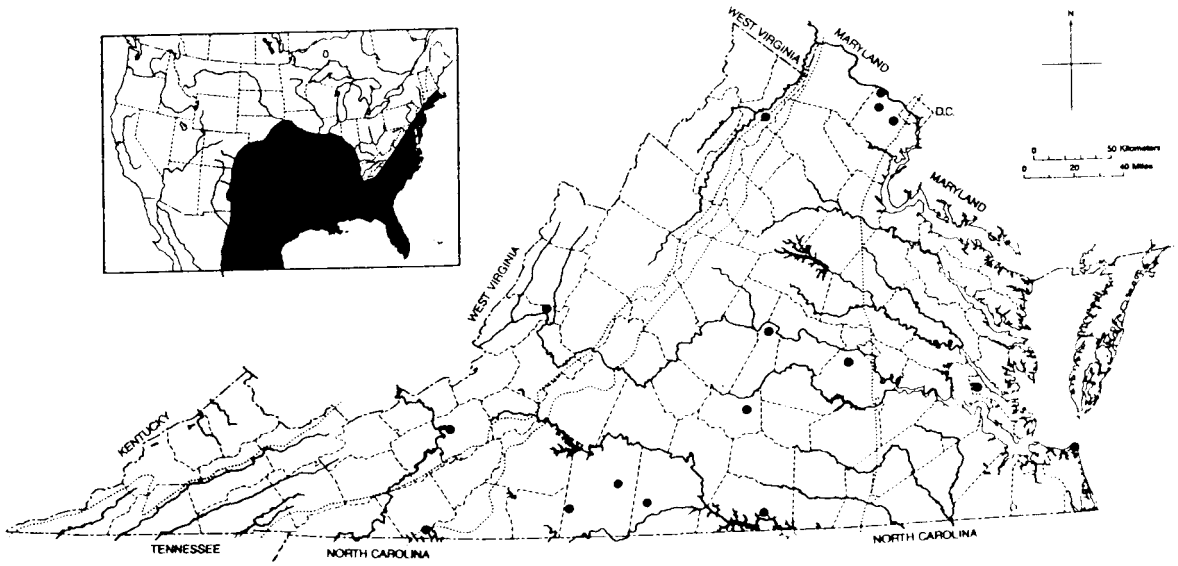
Map 65. *Megalonotus sabulicola* (Thomson). Eastern distribution on inset map after Wheeler (1989); western records indicated only for state and province, their continuity unknown.



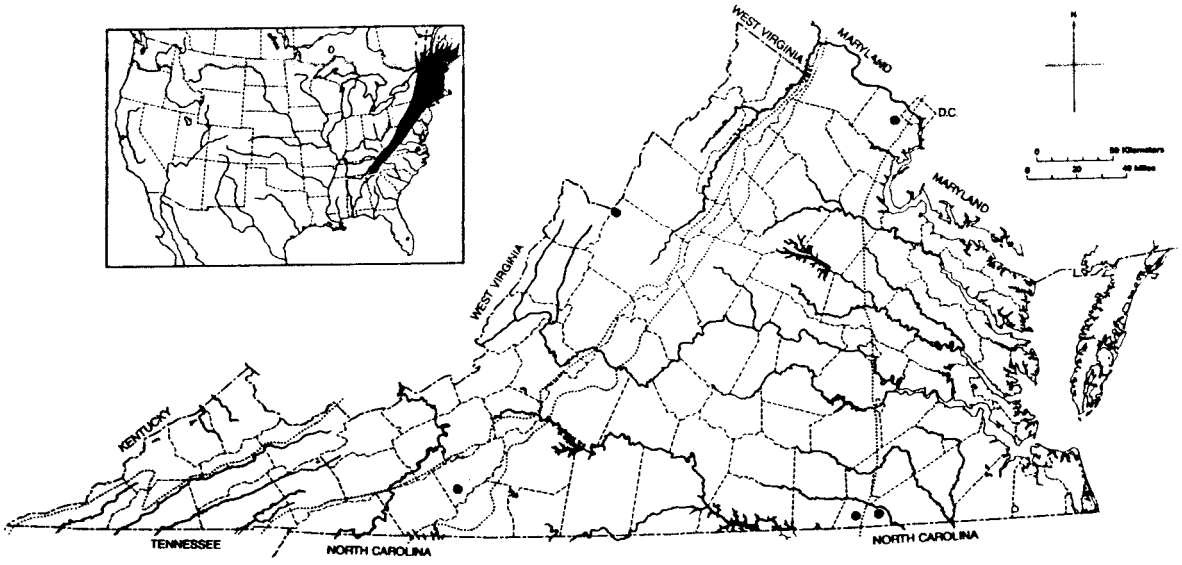
Map 66. *Atrazonotus umbrosus* (Say).



Map 67. *Malezonotus rufipes* (Stal). Disjunction of the eastern population seems likely; distributionlal status of the Arizona record is uncertain.



Map 68. *Cryphula trimaculata* (Distant).



Map 69. *Xestocoris nitens* Van Duzee. Extent of area in northern Appalachians unknown, shown on inset map as open-ended.