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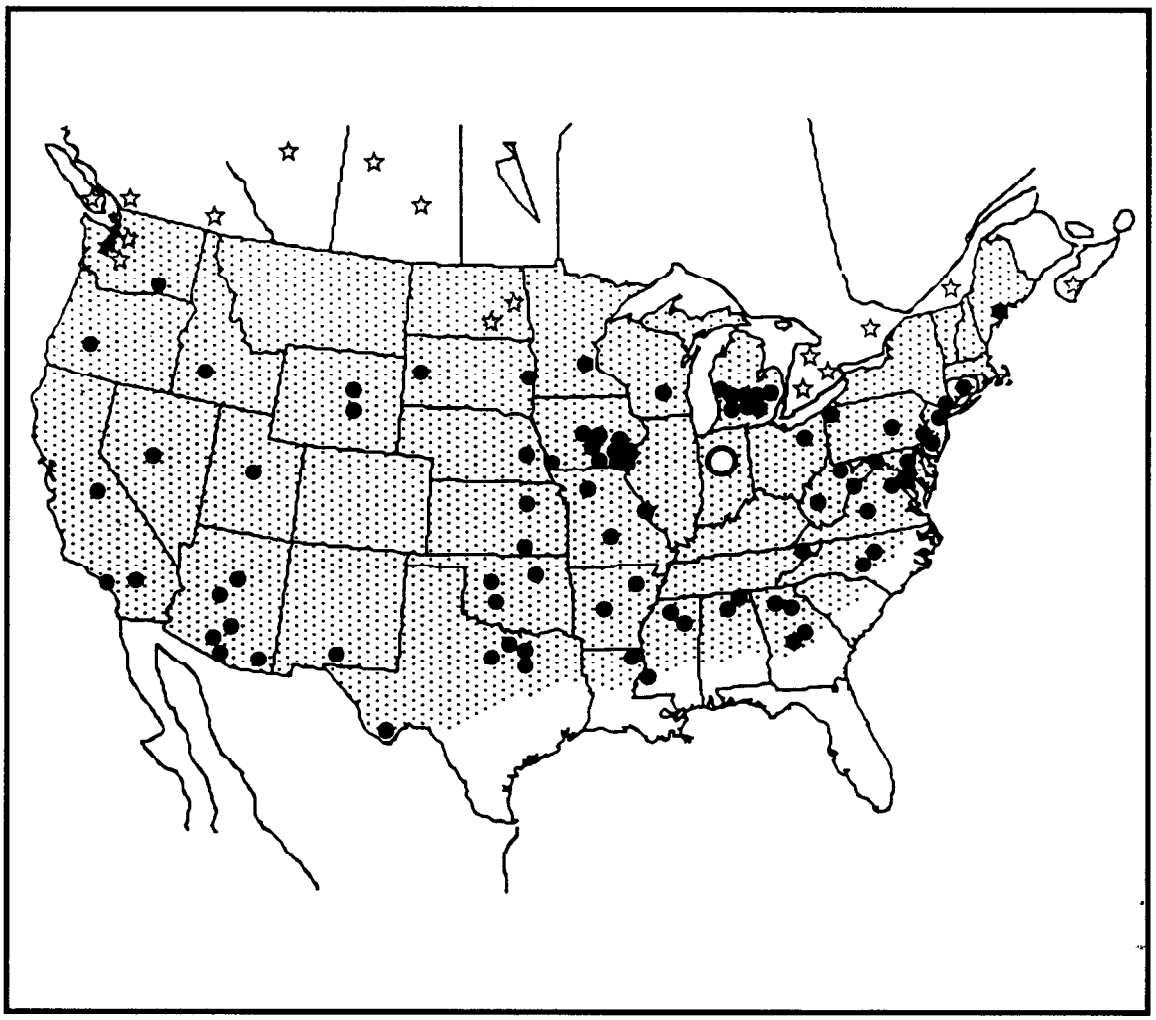

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Catalog and Atlas of the Cockroaches (Dictyoptera) of North America North of Mexico

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Abstract

Synonymy, taxonomic references, ecological summary, and distributions are presented for 69 species of cockroaches recorded from North America north of Mexico. Twenty-four of these species have been introduced from other areas. *Euthlastoblatta diaphana* (F.), *Arenivaga rehni* Hebard, *Holocompsa azteca* Saussure and *Ischnoptera rufa occidentalis* Saussure have been listed from the United States by previous authors but probably do not occur here. *Nauphoeta cinerea* (Olivier) was introduced into Florida, but the infestation apparently did not persist. *Neostylopyga rhombifolia* (Stoll) has been intercepted numerous times in the southwest but it may not actually be established. *Ischnoptera nox* Hebard, established in southern Florida, is reported for the first time from the United States. Maps are included for 49 species.

Introduction

STIMULATED BY THE RECENT INTRODUCTION of the Asian cockroach, *Blattella asahinai* Mizukubo, into Florida, we began to examine patterns of distribution and ecology of native and exotic cockroaches in the United States. Despite the enormous economic impact of several important pest species, there has been very little recent taxonomic work on cockroaches in the United States. Because of the lack of a current treatment, we began reviewing the available literature to estimate current geographical distributions and ecology of native and exotic species. Published records were complemented by examining specimens in major United States collections and regional collections from the southern United States, the area with the greatest number of cockroach species. These data are presented here. Synonymies and important taxonomic and ecological references are also given for each species.

The most recent comprehensive treatment of the taxonomy of the cockroaches of the contiguous 48 states of the United States and Canada was that of Hebard (1917). Pratt (1988) published the first updated checklist of United States species but did not include information on distribution, synonymy, or ecology and did not critically review the status of all the species he listed. Regional treatments subsequent to Hebard's monograph include Alabama (Dakin & Hays 1970), Arizona (Hebard 1935b, Ball et al. 1942), Colorado (Hebard 1929), Florida (Atkinson et al. 1990a), Illinois (Hebard 1934), Indiana (Blatchley 1920), Iowa (Froeschner 1954), Kansas (Hebard 1931), Michigan (Cantrall 1968), Minnesota (Hebard 1932), Montana (Hebard 1928), New England (Morse 1920), Oklahoma (Hebard 1938), South Dakota (Hebard 1925), and Texas (Hebard 1943). Generic revisions relevant to the United States include *Arenivaga* (Hebard 1920), *Blattella* (Roth 1985), and *Symploce* (Roth 1984).

Based on a critical review of the literature and museum specimens, we conclude that breeding populations of 69 species of cockroaches may be found in the continental United States and Canada. Pratt (1988) listed 66 species for North America north of Mexico. Closer examination of the taxonomic literature shows that four species listed by Pratt, *Euthlastoblatta diaphana* (F.), *Arenivaga rehni* Hebard, *Holocompsa azteca* Saussure, and *Ischnoptera rufa*

occidentalis Saussure, probably do not occur here and should be deleted from the list. Seven additional species were either overlooked by Pratt (1988) (*Blaberus discoidalis* Serville [Roth 1969], *Myrmecoblatta wheeleri* Hebard [Deyrup & Fisk 1984]), subsequently recorded from the United States (*Neoblattella detersa* (Walker) [Peck & Beninger 1989], *Symploce morsei* Hebard [Peck & Beninger 1989], *Chorisoneura parishi* Rehn [Atkinson et al. 1990a], *Ischnoptera bilunata* (Saussure) [Atkinson et al. 1990b, treated as *I. bergrothi* Griffini]), or not previously reported from the United States (*Ischnoptera nox* Hebard).

Local breeding populations of *Nauphoeta cinerea* (Olivier) were found in Tampa (Gresham 1952), and there is little doubt that this species was actually established. There have been no subsequent records of this species, leading us to question whether this infestation persisted. *Nauphoeta cinerea* is a large species which is considered a major pest elsewhere (Cornwell 1968). Local pest control operators with whom we have spoken have not seen it. It is unlikely that its presence or spread would have passed unremarked. *Neostylopyga rhombifolia* (Stoll), native to southeastern Asia and established in tropical Mexico, was reported from Nogales, Ariz., on the Mexican border by Hebard (1917). Ball et al. (1942) did not consider this species to be established in Arizona. Ebeling (1975) listed several interceptions of this species in California but did not indicate that breeding populations were present. For the present, these are left on the list and we hope to stimulate interest in clarifying their status.

Twelve native species are very narrowly restricted in the United States to southern Florida (*Eurycotis lixa* Rehn, *Holocompsa nitidula* (F.), *Neoblattella detersa* (Walker), *Plectoptera poeyi* (Saussure), *Symploce morsei* Hebard, *Blaberus craniifer* Burmeister, *B. discoidalis* Serville, *Hemiblaberus tenebricosa* Rehn & Hebard, *Phoetalia pallida* (Brunner)), the lower Rio Grande Valley of Texas (*Euthlastoblatta abortiva* (Caudell)), and the Mexican border area of California and Arizona (*Arenivaga genitalis* Caudell, *Latiblattella lucifrons* Hebard). All of these species are more widely distributed in Mexico, Central America, or the Caribbean. Some have been considered to be introduced by earlier authors (e.g., *Blaberus craniifer* and *Phoetalia pallida* by Hebard (1917)). In the absence of information to the contrary, we are treating all of these species as natives because the above-mentioned areas could plausibly be considered as the northernmost limits of their natural ranges.

Distributions of native species can be inferred from collection data with a reasonable degree of confidence. Exotic species, on the other hand, present special problems. Many cockroaches, both native and exotic, are easily transported. There is no evidence that any native species has extended its range in this way, and in most cases it is relatively simple to distinguish resident from adventive records. This is not the case with exotic species. Because of their closer association with humans, they are more likely to be transported and more likely to be noticed subsequently. Some of these species are capable of breeding indoors over a wide area as well as outdoors in a more restricted region (e.g., *Periplaneta* spp.). As a result, locality data from specimens or the literature are more difficult to interpret for these species than

for natives. Another complicating factor is that major domestic pest species such as *Blatta orientalis* L., *Periplaneta americana* (L.), *Blattella germanica* (L.), and *Supella longipalpa* (F.), all exotic, are generally "known" to be widely distributed, and actual distributions have seldom been documented, especially in the recent literature.

Materials and Methods

The arrangement of subfamilies follows the classification of McKittrick (1964). Genera and species are arranged alphabetically. Hebard's (1917) monograph was taken as our starting point and no attempt was made to review earlier literature. Synonyms listed for each species include only names and generic combinations used in the recent North American literature subsequent to Hebard's monograph (1917). Complete synonomy is available in Princis' world catalog (1962 – 1971) and is not repeated here. References cited in the synonymy include those dealing with the taxonomy (since 1917), distribution, and description of adults, immatures, or oothecae. Ecological references include only those referring to habitat, local distribution, and association with man-made structures. The term "natural communities," as used here, refers to relatively undisturbed primary or secondary biotic communities characterized by native vegetation. It is used principally in contrast to urban, suburban, or other man-made habitats. Some life history studies are cited for native and nondomiciliary exotic species. Some references listed in the synonymy are not cited directly in the text, but the complete bibliographic citation is cited with other references as an aid to readers. No attempt has been made to reference the extensive literature on control and biology of structural pest species.

All common names that have been used previously in the literature are cited. Most of these were proposed by Blatchley (1920), Helfer (1963), or Pratt (1988) and do not reflect common usage as generally understood; such "uncommon" names are enclosed in quotation marks. Common names in the approved list of the Entomological Society of America (Stoetzel 1989) are boldfaced and indicated with an asterisk.

Distributional data are summarized by county. Numbered superscripts, corresponding to references cited, are used in lists of counties. Localities verified by examining museum specimens are indicated by including abbreviations of collections in parentheses. The following abbreviations are used (taken from Arnett & Samuelson 1986): ANSP (Academy of Natural Sciences, Philadelphia, Pa.), CASC (California Academy of Sciences, San Francisco), EGRC (E.G. Riley personal collection, College Station, Tex.), FSCA (Florida State Collection of Arthropods, Gainesville), LSUC (Louisiana State University, Baton Rouge), NCSU (North Carolina State University, Raleigh), TAMU (Texas A & M University , College Station), UADE (University of Arkansas, Fayetteville), UAIC (University of Arizona, Tucson), UMIC (University of Mississippi, Oxford), USNM (National Museum of Natural History, Washington, D.C.), and WVDA (West Virginia Department of Agriculture, Charleston). Maps are included for most species, except some which have very

limited distributions in the United States and several others which are virtually ubiquitous, such as the German and brown-banded cockroaches. Probable distribution ranges are indicated by shading when available information allows a reasonable hypothesis.

Catalog and Atlas of the Cockroaches of North America North of Mexico

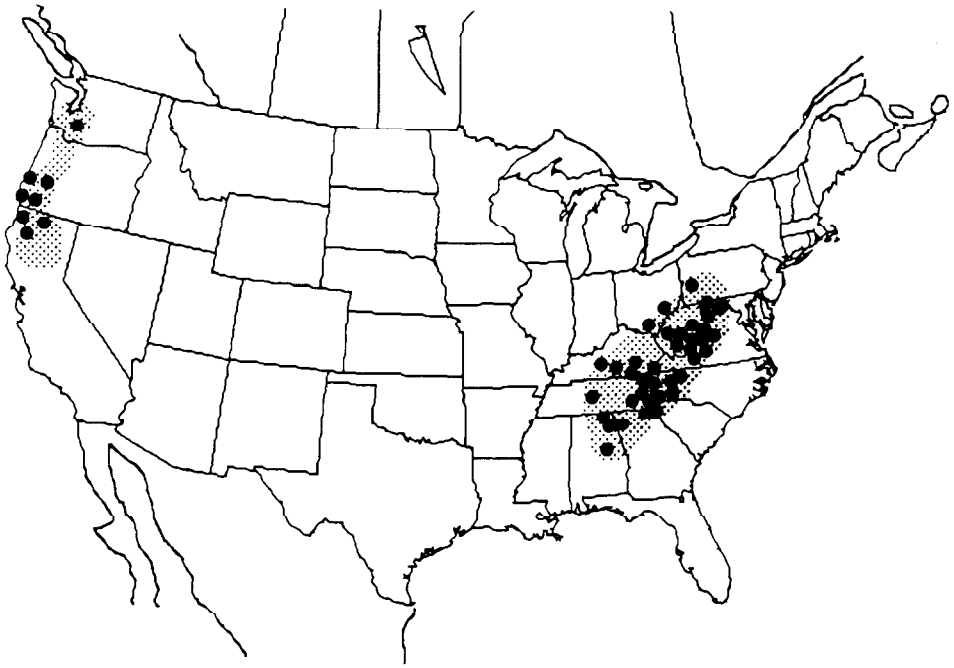
Cryptocercidae

Cryptocercus punctulatus Scudder
"woodeating cockroach," "brown wingless cockroach"
Map 1

Cryptocercus punctulatus Scudder 1862: 420; Hebard 1917a: 255 (taxonomy U.S., figure); Cleveland 1934: 187 (distribution, ecology, biology, figure); Roth & Willis 1960: 9 (ecology, photo); Helfer 1963: 56 (key U.S., figure); Princis 1965: 332 (world catalog); Roth 1968: 85 (ootheca); Cornwell 1968: 93 (general information, photo); Dakin & Hays 1970: 12 (taxonomy Ala.); Ebeling 1975: 238 (general information); Pratt 1988: 883 (checklist U.S.); Appel 1989: 286 (external morphology).

Distribution. Disjunct distribution with eastern and western ranges. Eastern United States: **Alabama**: Dekalb[14], Jackson[14], Tallapoosa[14]; **Georgia**: Floyd[26], Rabun (USNM)[26]; **Kentucky**: Edmonson[26], Green[26], Laurel[26], Whitley (USNM); **Maryland**: Garrett[26]; **Pennsylvania**: Allegheny[26]; **North Carolina**: Avery[26], Graham (USNM), Haywood (NCSU, FSCA), Henderson (USNM)[26]; Jackson (NCSU)[26], Swain (FSCA), Watauga (FSCA, USNM)[26]; **New York**: "New York"[26]; **Ohio**: Adams[17], Hamilton[12], Washington[12]; **South Carolina**: Oconee (ANSP); **Tennessee**: Blount (ANSP), Claiborne[26], Decatur (ANSP), Monroe (ANSP), Sevier (ANSP); **Virginia**: Bath[26], Boteturt (USNM), Giles (NCSU, FSCA)[26], Highland[26], Lee[26], Pulaski[26], Roanoke (NCSU), Rockbridge[26]; **West Virginia**: Fayette (WVDA), Hardy (USNM), Kanawha (WVDA), Pendeton (USNM), Pocahontas (WVDA), Raleigh (WVDA), Summers[26]. Western United States: **California**: Del Norte (USNM)[12], Humboldt[12], Siskiyou (CASC); **Oregon**: Coos (ANSP), Douglas[26], Josephine (FSCA, USNM), Lane[12]; **Washington**: Lewis[26].

Ecology. Found in very humid, montane environments in rotten wood. In the East, this species is more common in the southern part of its range than in the northern (Cleveland 1934). There are no substantiated collection records of this species from New York, suggesting that the early record cited by Hebard (1917) and others may be erroneous. The eastern and western populations have long been separated and differ in their protozoan symbionts

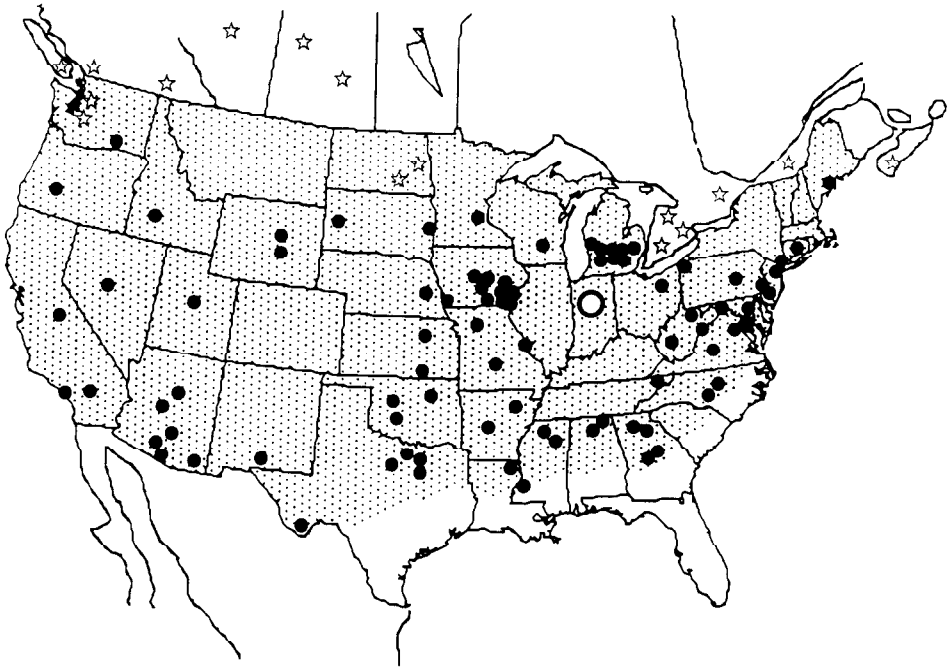


Map 1. *Distribution of* Cryptocercus punctulatus *Scudder.*

Blattidae

Blatta orientalis L.
Oriental cockroach*
Map 2

Blatta orientalis Linnaeus 1758: 424; Hebard 1917a: 173 (taxonomy U.S., figure); Blatchley 1920: 94 (taxonomy U.S., figure); Morse 1920: 315 (taxonomy New England); Hebard 1929: 315 (taxonomy CO); Hebard 1931: 127 (taxonomy Kans.); Hebard 1932: 21 (taxonomy Minn.): Hebard 1934: 157 (taxonomy Ill.); Hebard 1935b: 274 (taxonomy Ariz.); Ball et al. 1942: 266 (taxonomy Ariz.), Cantrall 1943: 74 (ecol Mich.); Hebard 1943: 271 (taxonomy Tex.); Rehn 1945: 266 (dispersal); Froeschner 1954: 180 (taxonomy Iowa, figure); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 8 (ecology, photo); Helfer 1963: 50 (key U.S., figure); Princis 1965: 475 (world catalog); Cantrall 1968: 302 (taxonomy Mich.); Roth 1968: 86 (ootheca); Cornwell 1968: 49 (general information, photo); Dakin & Hays 1970: 12 (taxonomy Ala.); Wright & McDaniel 1973: 251 (ecology N.C.); Ebeling 1975: 229 (general information); Vickery & McKevan 1985: 95 (taxonomy Canada); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 307 (taxonomy Fla.).



Map 2. *Distribution of* Blatta orientalis *(L.). Open circles represent unspecified state records. Question marks indicate areas where the species is probably present. Stars are taken from map (exact localities not given) by Vickery & McKevan (1985).*

Distribution. Cosmopolitan in temperate areas of North America. Canada: Alberta[58], British Columbia[58], Manitoba[58], Ontario: Toronto[26]; Quebec[58], Nova Scotia[58], United States: **Alabama**: Madison (USNM), Morgan[26]; **Arkansas**: Hot Springs (USNM), Lawrence (USNM); **Arizona**: Cochise[3], Coconino[26], Maricopa[3], Mohave (UAIC), Pima[3], Sta. Cruz (USNM)[26], Yavapai (USNM)[26], **California**: Los Angeles (USNM)[26], Mariposa (USNM), San Bernardino (USNM)[26]; **Colorado**: Arapahoe (USNM)[26], El Paso[29]; **Connecticut**: New Haven[26]; **District of Columbia**: Washington (USNM); **Georgia**: Bibb (USNM), Dekalb (USNM), Fulton (USNM), Peach (USNM); **Iowa**: Appanoose[20], Boone[20], Des Moines[20], Fremont[26], Henry[20], Jefferson[20], Johnson (USNM)[26], Lee[20], Louisa[20], Polk[20], Story[20], Van Buren[20], Washington[20]; **Idaho**: Ada (USNM); **Illinois**: Champaign[32], Cook[32], Jackson[32], Macon[32], McLean[32]; **Indiana**: "widespread, in all the larger towns and Cities"[4]; **Kansas**: Riley (USNM), Wellington (USNM); **Louisiana**: Carroll (LSUC); **Maryland**: Baltimore (USNM); **Maine**: Cumberland (USNM); **Michigan**: Ingham[8], Jackson[8], Kalamazoo[8], Kent[8], Livingston[7], Musk[8], Oakland[8], Washtenaw[8]; **Minnesota**: Hennepin[26]; **Mis-**

souri: Gentry (USNM), St. Louis (USNM), Wright[26]; **Mississippi**: Adams (USNM), Lafayette (UMIC), Lee (UMIC); **North Carolina**: Cumberland[60], Moore[26], Wake[26]; **Nebraska**: Lancaster[26]; **New Jersey**: Camden[26], Essex (USNM); **New Mexico**: Otero[26]; **Nevada**: Nye (FSCA); **New York**: Brooklyn (USNM); **Ohio**: Portage (USNM); **Oklahoma**: Comanche (USNM), Custer (LSUC), Payne (USNM); **Pennsylvania**: Dauphin[26], Erie[26], Lebanon (USNM), Philadelphia[26]; **South Dakota**: Brookings (WVDA), Pennington (WVDA); **Tennessee**: Washington[26]; **Texas**: Brewster[26], Callahan[26], Dallas (USNM)[36], Denton (USNM), Ellis[36]; **Utah**: Utah (USNM); **Virginia**: Alexandria (USNM), Roanoke[57]; **Washington**: Walla Walla (USNM); **Wisconsin**: Dane[26]; **West Virginia**: Berkeley (WVDA), Hardy (WVDA), Kanawha (WVDA), Monongalia (WVDA).

This species occurs throughout most of the United States and southern Canada. Blatchley (1920) reported this species from Florida (Miami and West Palm Beach), but these records are undoubtedly based on interceptions because there is no evidence that breeding by *B. orientalis* occurs anywhere in Florida or on the southeastern Coastal Plain. Although it is apparently absent from the warmer parts of the Southeast, it is found in southern California, Arizona, and southwestern Texas (see map). The drier climate and higher elevations in the southwestern United States may be responsible for this difference. Given its abundance and pest status in cooler parts of the United States, it is probably being constantly introduced to the lower southeast and specimens are likely to be found there from time to time.

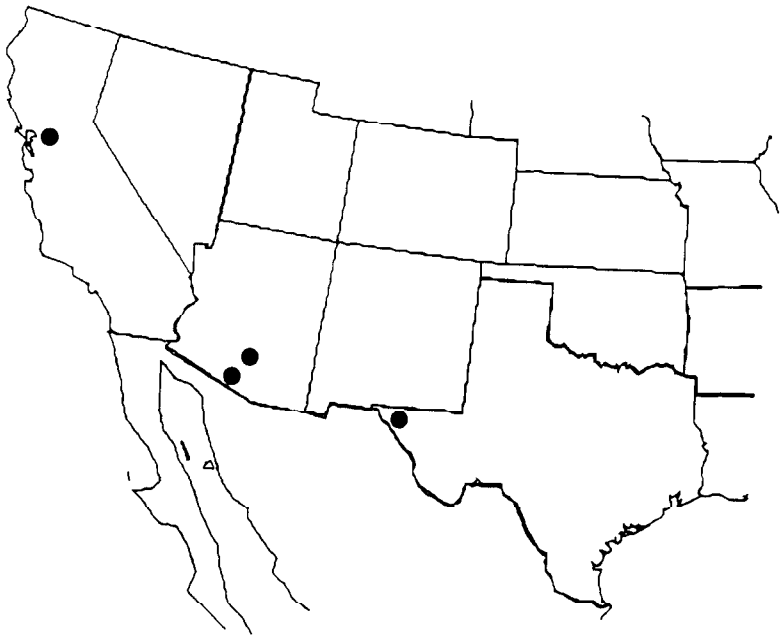
Ecology. The oriental cockroach has been long established in North America and probably was transported here via Europe. Rehn (1945) speculated that it is native to northern Africa, but Princis (1957) suggested that its original native range was the Middle East and southcentral Asia. This species occurs commonly in and about houses and other structures over most of the temperate United States (Cornwell 1968, Thoms & Robinson 1987). It apparently does not occur in natural communities in the parts of the country where it is found. It was not found in natural communities in a study in southern Michigan, although it was collected in buildings in the same area (Cantrall 1943). In the more temperate parts of its range, outdoor breeding occurs, but only indoor populations persist in the colder parts of the United States and Canada where this species is found.

Blatta lateralis (Walker)
Turkestan cockroach*
Map 3

Periplaneta lateralis Walker 1868: 136.

Blatta lateralis Gurney 1978: 295 (introduction U.S., distribution).

Blatta (Shelfordella) lateralis: Roth & Willis 1960: 8 (ecology); Princis 1966: 507 (world catalog); Spencer et al. 1979: 14 (habits, control, distribution, photographs); Olson 1985: 30 (distribution Ariz., figures); Pratt 1988: 883 (checklist U.S.).



Map 3. *Distribution of* Blatta lateralis *(Walker).*

Distribution. Egypt, Libya, Sudan, Saudi Arabia, Israel, Jordan, Iraq, Iran, Pakistan, India, southern USSR[24]. United States: **Arizona**: Maricopa[56], Pima[44]; **California**: San Joaquin[24]; **Texas**: El Paso[56].

Ecology. The Turkestan cockroach was first detected in the United States at a military installation in California in the late 1970's (Gurney 1978). In Arizona, this species has been found only in urban settings outside of structures (Olson 1985). The Califonia and Texas localities that have been reported are from military installations where breeding populations were established in and around buildings (Gurney 1978, Spencer et al. 1979). The native range of this species basically includes areas that are arid or semiarid and temperate or subtropical in climate. Its distribution to date in the United States follows the same pattern.

Eurycotis floridana (Walker)
"Florida cockroach," "Florida woods roach,"
"Florida stinkroach," "palmettobug"
Map 4

Periplaneta floridana Walker 1868: 135.

Eurycotis floridana: Hebard 1917a: 166 (taxonomy U.S., figure); Blatchley 1920: 97 (taxonomy U.S., figure); Lawson 1953: 28 (ootheca); Friauf 1953: 122 (ecology Fla.); Roth & Willis 1960: 10 (ecology, photo); Helfer 1963: 49 (key U.S., figure); Princis 1966: 553 (world catalog); Roth 1968: 87 (ootheca); Cornwell 1968: 85 (general information, photo); Dakin & Hays 1970: 13 (taxonomy Ala.); Ebeling 1975: 237 (general information); Gurney & Walker 1976: 824 (biology, ecology); Hagenbuch et al. 1988: 378 (ecology Fla.); Brenner 1988: 583 (ecology Fla.); Pratt 1988: 883 (checklist U.S.); Lago et al. 1988: 87 (distribution Miss.); Peck & Beninger 1989: 614 (ecology Fla.); Atkinson et al. 1990a: 308 (taxonomy Fla.).

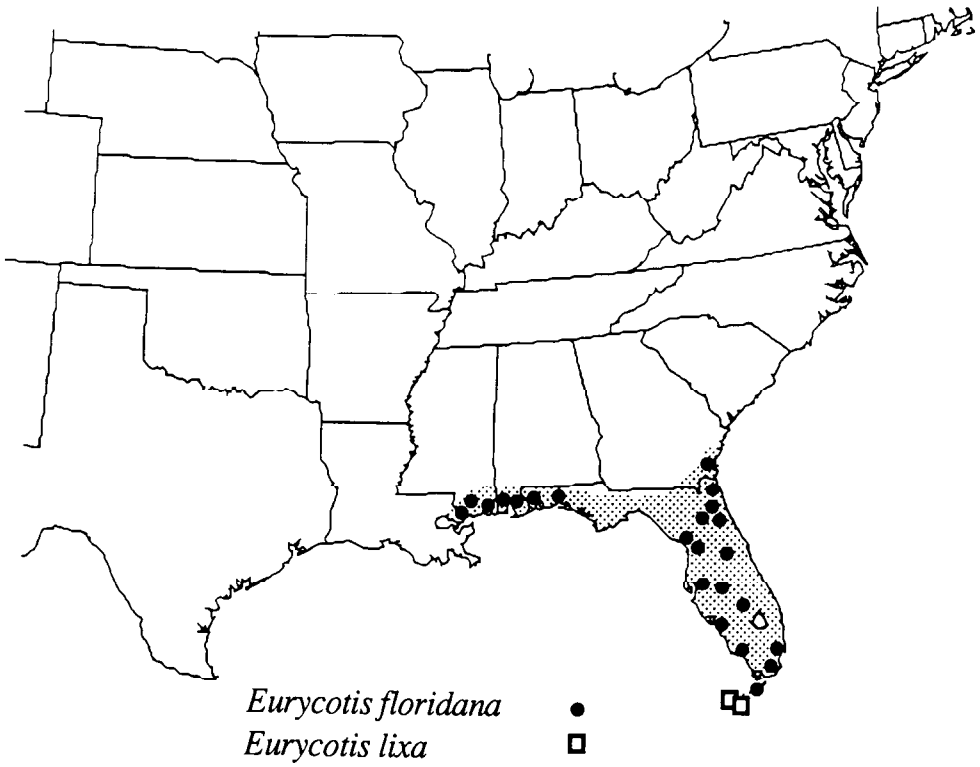
Distribution. Peninsular Florida, lower Gulf and Atlantic coasts: **Alabama**: Baldwin[14], Mobile[14]; **Florida**: Alachua[25], Broward[26], Charlotte[26], Citrus[26], Clay[26], Collier[26], Dade[26], Duval[26], Escambia[26], Levy[26], Highlands[2], Hillsborough[26], Monroe[26,43], Okaloosa (UAIC), Polk[26], Putnam[19], Seminole (LSUC); **Georgia**: Glynn[26]; **Mississippi**: Hancock[39], Harrison[26], Jackson (UMIC).

Ecology. Common in native vegetation as well as near human habitation, this species will enter houses occasionally but is not known to breed indoors. This species is unique in that it is the only native species in Florida which is abundant around dwellings and is considered an important pest. One of the more noteworthy characteristics of this species is the ability of adults of both sexes to emit an oily liquid with an extremely repellent odor. It is found in many native communities throughout Florida (Friauf 1953, Peck & Beninger 1989).

Eurycotis lixa Rehn
"hustler cockroach"
Map 4

Eurycotis lixa Rehn 1930: 45; Gurney 1959: 75 (occurrence in Fla., taxonomy, figure); Roth & Willis 1960: 10 (ecology); Helfer 1963: 49 (key U.S.); Princis 1965: 550 (world catalog); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 308 (taxonomy Fla.).

Distribution. Jamaica[22]. United States: **Florida**: Monroe (FSCA, USNM)[22]. Gurney (1959) believed that this species had been introduced into Florida. It is presumed to be native to the West Indies so its "immigrant" status



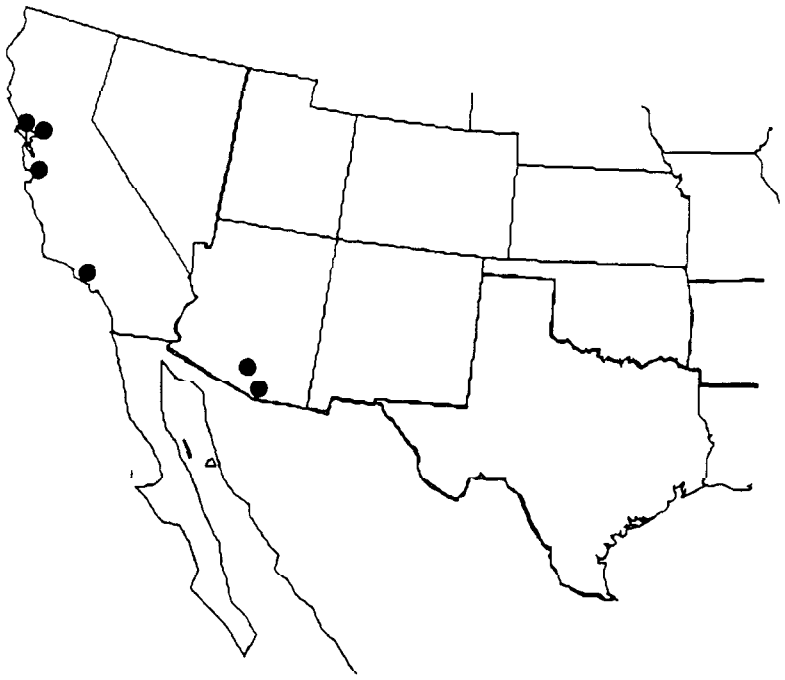
Map 4. *Distribution of* Eurycotis floridana *(Walker) and* E. lixa *Rehn.*

in Florida is open to doubt. It is known from Key West and Stock Island and has been collected with some frequency.

Neostylopyga rhombifolia (Stoll)
harlequin cockroach*
Map 5

Blatta rhombifolia Stoll 1813: 5.

Neostylopyga rhombifolia: Hebard 1917a: 171 (taxonomy U.S., figure); Hebard 1935b: 274 (taxonomy Ariz.); Ball et al. 1942: 265 (taxonomy Ariz.); Rehn 1945: 273 (dispersal); Roth & Willis 1960: 11 (ecology, photo); Helfer 1963: 46 (key U.S., figure); Princis 1965: 534 (world catalog); Roth 1968: 86 (ootheca); Cornwell 1968: 82 (general information, photo); Ebeling 1975: 237 (general information); Pratt 1988: 883 (checklist U.S.).



Map 5. *Collection localities for* Neostylopyga rhombifolia *(Stoll). It is not certain whether these represent interceptions or established populations.*

Distribution. Widespread in the Old World tropics, probably of tropical Asian origin (Rehn 1945, Princis 1965). Mexico: Baja California Sur[26], Sinaloa[26]. United States: **Arizona**: Pima[3], Sta. Cruz[26]; **California**: Los Angeles[16], Sta. Cruz[16], Solano[16], Sonoma[16].

Ecology. Based on its distribution in humid tropical areas of Southeast Asia (Rehn 1945, Princis 1965), this species could probably become established in the lower southeastern United States as well as in the Southwest. This species was reported from Nogales, Ariz., on the Mexican border by Hebard (1917). Ball et al. (1942) stated that it was not established. Ebeling (1975) listed some additional localities in California, but some of these were clearly interceptions (at military installations during the Vietnam War) and it is not clear that other records actually constituted established populations. There are numerous specimens in the National Museum of Natural History intercepted at the Mexican border from Texas to California. It probably is not established anywhere in the United States.

Periplaneta americana (L.)
American cockroach*

Blatta americana L. 1758: 424.

Periplaneta americana: Hebard 1917a: 176 (taxonomy U.S., figure); Blatchley 1920: 99 (taxonomy U.S., figure); Morse 1920: 314 (taxonomy New England); Hebard 1929: 15 (taxonomy Colo.); Hebard 1932: 20 (taxonomy Minn.); Hebard 1934: 157 (taxonomy Ill.); Hebard 1935b: 274 (taxonomy Ariz.); Ball et al. 1942: 266 (taxonomy Ariz.); Hebard 1943: 269 (taxonomy Tex.); Rehn 1945: 269 (dispersal); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 181 (taxonomy Iowa); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 51 (key U.S., figure); Princis 1965: 405 (world catalog); Cantrall 1968: 302 (taxonomy Mich.); Roth 1968: 86 (ootheca); Cornwell 1968 (general information, photo); Dakin & Hays 1970: 12 (taxonomy Ala.); Wright & McDaniel 1973: 277 (ecology N.C.); Ebeling 1975: 230 (general information); Powell & Robinson 1980: 216 (first-instar nymph); Vickery & McKevan 1985: 99 (taxonomy Canada); Appel & Rust 1985: 670 (distribution Tex.); Appel 1986: 57 (ecology Tex.); Hagenbuch et al. 1988: 378 (ecology Fla.); Brenner 1988: 583 (ecology Fla.); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 308 (taxonomy Fla.).

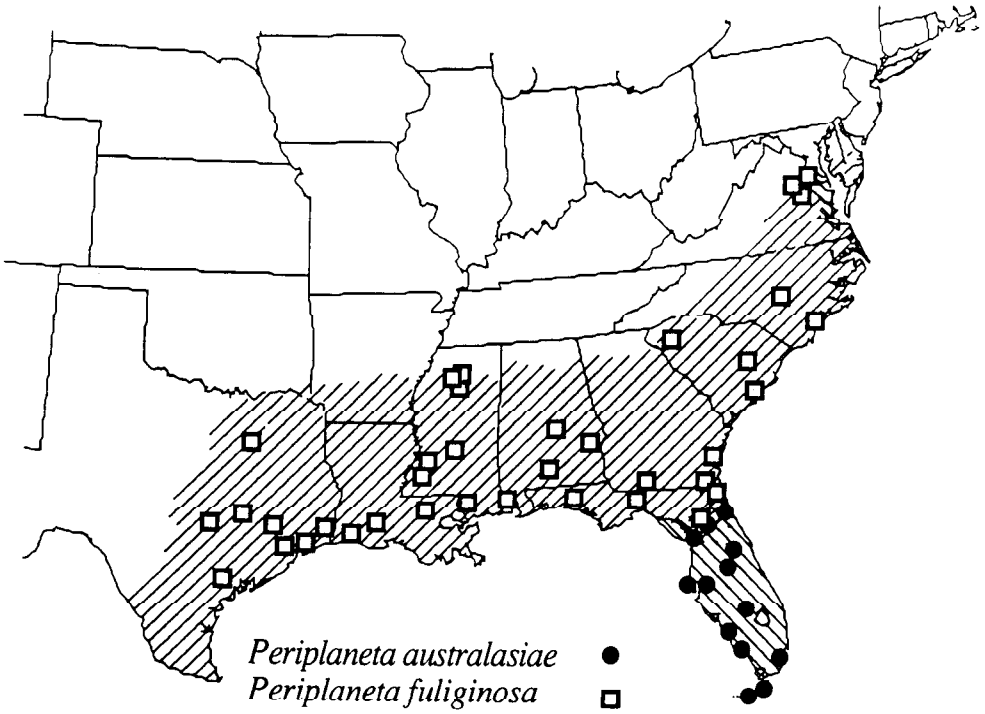
Distribution. Cosmopolitan, originally from Africa (Rehn 1945). Because of the widespread occurrence of this species as a domiciliary and structural pest, it is difficult to estimate accurately the geographic limits within which outdoor populations can persist. Hebard (1917) suggested that it occurred outdoors along the Gulf coast and eastern seaboard to Washington, D.C.

Ecology. This cockroach is probably found in all urban areas in the United States. It commonly breeds in warm, very moist places, notably sewer systems and ducts of buildings (Ball et al. 1942, Cornwell 1968, Ebeling 1975). Localities (presumably indoor records) for Canada shown by Vickery & McKevan (1985) are restricted to the areas near the United States border, suggesting limits to its ability to survive in urban settings in very cold areas. Outdoor breeding does occur in Florida, although *Periplaneta fuliginosa* and *P. australasiae* are more abundant around residences (Brenner 1988; Hagenbuch et al. 1988; T.H. Atkinson & J.R. Mangold, unpublished data).

Periplaneta australasiae (F.)
Australian cockroach*
Map 6

Blatta australasiae Fabricius 1775: 217.

Periplaneta australasiae: Hebard 1917a: 185 (taxonomy U.S., figure); Blatchley 1920: 101 (taxonomy eastern U.S., figure); Morse 1920: 314 (taxonomy New England); Ball et al. 1942: 266 (taxonomy Ariz.); Rehn 1945: 269 (dispersal); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 182 (taxonomy Iowa); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 51 (key U.S., figure); Princis 1965: 447 (world catalog);



Map 6. *Outdoor distribution of* Periplaneta australasiae *(L.) and* P. fuliginosa *(Serville). See text for explanation.*

Lawson 1967: 269 (ecology, distribution Fla.); Cantrall 1968: 303 (taxonomy Mich.); Roth 1968: 86 (ootheca); Cornwell 1968: 60 (general information, photo); Ebeling 1975: 233 (general information); Powell & Robinson 1980: 222 (first-instar nymph); Vickery & McKevan 1985: 99 (taxonomy Canada); Hagenbuch et al. 1988: 378 (ecology Fla.); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 309 (taxonomy Fla.).

Distribution. Cosmopolitan in tropical areas, probably African in origin (Rehn 1945). United States: **Florida**: Alachua[25], Charlotte[26], Clay[4], Collier[26], Dade[26], Highlands[2], Hillsborough[26,40], Levy[26], Monroe (incl. Keys) [26], Orange[26], Pinellas[4], Seminole[4].

Outdoor breeding occurs throughout peninsular Florida, but records from other parts of the United States are apparently interceptions or reflect indoor populations. Cantrall (1968) lists this species as a domiciliary species in Michigan. This species does not breed outdoors in Arizona, although it has been collected there (Ball et al. 1942).

Ecology. In an ecological study in northeastern Florida, this species was found only around buildings, not in native habitats (Friauf 1953). It is the

dominant peridomestic species in southern and central Florida, where it also occurs in native vegetation. It is a common peridomestic species in northern Florida (Hagenbuch et al. 1988), although less abundant than *Periplaneta fuliginosa*. It is the principal peeridomestic species in central and southern Florida in suburban areas (T.H. Atkinson & J.R. Mangold, unpublished data). As an indoor species, it occurs in situations similar to those where *Periplaneta americana* is found but is much less frequent (Cornwell 1968, Ebeling 1975).

Periplaneta brunnea Burmeister
Brown cockroach*
Map 7

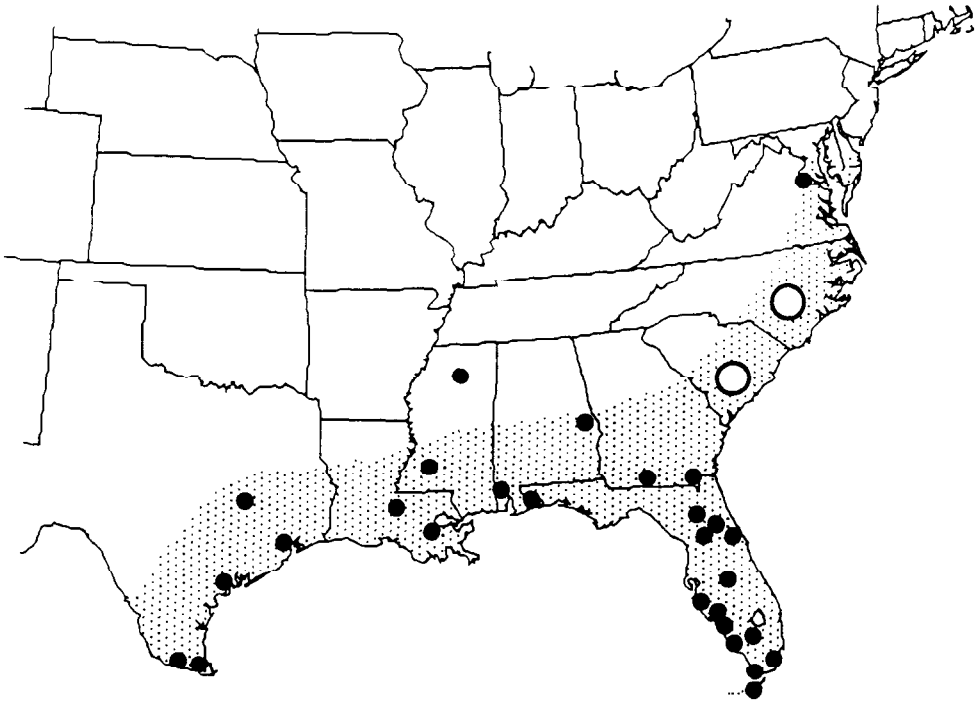
Periplaneta brunnea Burmeister 1838: 503; Hebard 1917a: 182 (taxonomy U.S., figure); Blatchley 1920: 101 (taxonomy eastern U.S.); Hebard 1943: 270 (taxonomy Tex.); Rehn 1945: 270 (dispersal); Friauf 1953: 122 (ecology Fla.); Pratt 1955: 9 (taxonomy, figure, key); Edmunds 1957: 283 (biology); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 52 (key U.S., figure); Princis 1965: 438 (world catalog); Roth 1968: 86 (ootheca); Cornwell 1968: 64 (general information, photo); Dakin & Hays 1970: 13 (taxonomy Ala.); Ebeling 1975: 234 (general information); Powell & Robinson 1980: 223 (first-instar nymph); Vickery & McKevan 1985: 101 (taxonomy Canada); Hagenbuch et al. 1988: 378 (ecology Fla.); Brenner 1988: 583 (ecology Fla.); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 310 (taxonomy Fla.).

Periplaneta fuliginosa of Caudell, Rehn, and Hebard before 1917 (*fide* Hebard 1917a).

Distribution. Circumtropical, probably African in origin (Rehn 1945). Found outdoors in the southeastern United States: **Alabama**: Lee[14], Mobile[14]; **Florida**: Alachua[25], Charlotte[26], Collier (UMIC)[26], Dade[26], Escambia (USNM), Hendry[26], Lee[26], Monroe (Keys and mainland)[4,26], Polk[26], Putnam[26], Sarasota[4], Volusia[4]; **District of Columbia**: Washington (USNM); **Georgia**: Thomas[26]; **Louisiana**: E. Baton Rouge (LSUC), Orleans (USNM); **Mississippi**: Hinds (UMIC), Lafayette (UMIC); **Texas**: Galveston[36], Hidalgo (USNM), Jackson[36], Robertson[36], Willacy[26]. Hebard (1917) listed Asheville, N.C. but did not believe that the species was actually established there. Edmunds (1957) stated that this species occurred in North and South Carolina but did not indicate any localities or discuss whether or not outdoor populations were present.

Ecology. In an ecological study in northeastern Florida, this species was found only around buildings, not in native habitats (Friauf 1953). It is a common peridomestic species in north- central Florida (Hagenbuch et al. 1988). This species is apparently not as widely distributed as *Periplaneta americana*, although it could easily be confused with that species. Indoor populations do occur (Cornwell 1968, Ebeling 1975). Vickery & McKevan (1985) listed a single occurrence in Canada that was supposedly eliminated, but they showed numerous records for *P. americana* and *P. australasiae*.

Comments. According to Hebard (1917), many earlier references to this species actually were due to misidentifications of *P. fuliginosa*.



Map 7. *Outdoor distribution of* Periplaneta brunnea *Burmeister. Open circles*

Periplaneta fuliginosa (Serville)
smokybrown cockroach*, "palmettobug"
Map 6

Kakerlac fuliginosa Serville 1839: 70.

Periplaneta fuliginosa: Hebard 1917a: 188 (taxonomy U.S., figure); Blatchley 1920: 103 (taxonomy eastern U.S.); Hebard 1934: 156 (taxonomy Ill.); Hebard 1943: 270 (taxonomy Tex.); Froeschner 1954: 182 (taxonomy Iowa); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 50 (key U.S., figure); Princis 1965: 442 (world Catalog); Roth 1968: 86 (ootheca); Cornwell 1968: 66 (general information, photo); Dakin & Hays 1970: 13 (taxonomy Ala.); Wright & McDaniel 1973: 251 (ecology N.C.); Ebeling 1975: 236 (general information); Powell & Robinson 1980: 225 (first-instar nymph); Appel & Rust 1985: 684 (ecology Tex., distribution); Appel & Rust 1987: 175 (bibliography); Brenner 1988: 583 (ecology Fla.); Pratt

1988: 883 (checklist U.S.); Appel et al. 1990: 23 (now established in Calif.); Atkinson et al. 1990a: 310 (taxonomy Fla.).

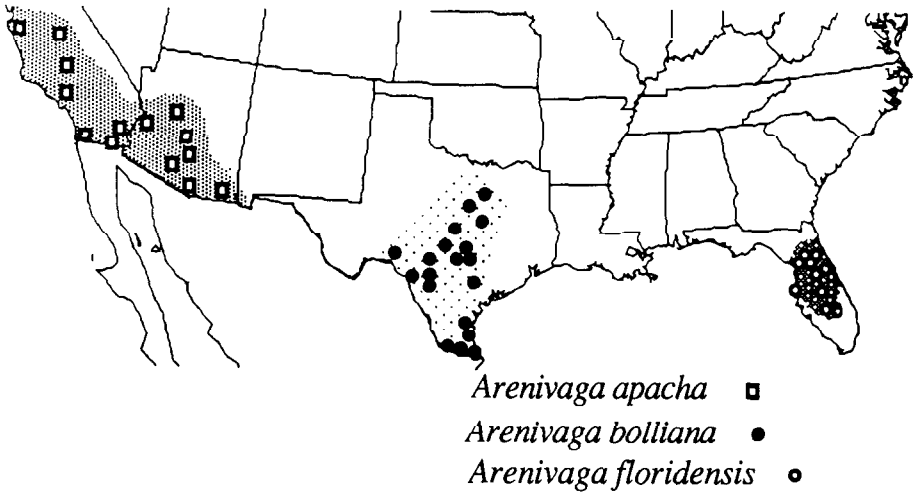
Periplaneta brunnea: of Rehn & Hebard before 1917 (*fide* Hebard 1917a).

Periplaneta truncata: of Caudell, Rehn & Hebard before 1917 (*fide* Hebard 1917a).

Distribution. Eastern Asia[49]. Found outdoors in the southeastern United States: **Alabama**: Conecuh[26], Lee (USNM)[14], Mobile[14], Montgomery (USNM); **District of Columbia**: Washington (USNM); **Florida**: Duval[26], Leon[26], Nassau[4], Walton[26]; **Georgia**: Glynn[26], Thomas[26]; **Iowa**: Story (greenhouse)[20]; **Illinois**: Cook (greenhouse)[32]; **Louisiana**: Acadia (USNM)[26], Caddo (LSUC), Cameron (USNM)[26], E. Baton Rouge(LSUC)[26], Jefferson Davis[26], Livingston (USNM), Orleans (USNM)[26]; **Mississippi**: Adams (UMIC), Hancock[26], Hinds (UMIC), Lafayette (UMIC), Panola (UMIC), Yalobusha (UMIC); **North Carolina**: Cumberland[60], New Hanover (USNM); **South Carolina**: Charleston (USNM), Clarendon (USNM); **Texas**: Brazos (TAMU), Chambers (USNM), Ellis[36], Galveston[36], Harris[1], Orange[26], Victoria (USNM)[26]; **Virginia**: Fairfax (USNM). No specimens have been reported from central and southern Florida. In other parts of the United States, this species is sometimes found in greenhouses or inside buildings. Appel et al. (1990) recently confirmed the establishment of outdoor breeding populations of this species in urbanized areas of southern and central California.

Ecology. This is one of the most common peridomestic species in the warmer parts of the Southeast (Appel & Rust 1985, Hagenbuch et al. 1988, Brenner 1988). It is particularly common in tree holes and in the bracts of palms (Brenner 1988). It is apparently not found in central and southern Florida where it is "replaced" by the Australian cockroach, *Periplaneta australasiae*. This species was not found around houses in central Florida (Pinellas and Hillsborough Counties) or southern Florida (Broward and Dade Counties) in a recent survey of suburban houses (T.H. Atkinson & J.R. Mangold, unpublished data). In other parts of the United States occasional populations have been reported, principally in greenhouses (e.g., Froeschner 1954). Sustained breeding inside closed structures is apparently rare, and indoor infestations are usually due to situations where cockroaches have been able to colonize walls or attics from the outdoors.

Comments. According to Hebard (1917) most earlier records of *P. brunnea* actually refer to this species.



Map 8. *Distribution of* Arenivaga apacha *(Saussure),* A. bolliana *(Saussure), and* A. floridensis *Caudell.*

Polyphagidae

Arenivaga apacha (Saussure)
"Apache sand cockroach"
Map 8

Homeogamia apacha Saussure 1893: 296.

Arenivaga apacha Hebard 1917a: 235 (taxonomy, figure); Hebard 1920: 213 (taxonomy, figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Roth & Willis 1960: 7 (ecology); Princis 1962: 60 (world catalog); Roth 1968: 91 (ootheca); Cohen & Cohen 1976: 273 (ecology); Cohen & Cohen 1981: 165 (ecology); Pratt 1988: 883 (checklist U.S.).

Distribution. United States: **Arizona**: Cochise[13], La Paz[26], Maricopa[26], Pima[26], Pinal[26], Sta. Cruz[26], Yavapai[27]; **California**: Fresno[26], Kern[26], Imperial[26], Los Angeles[26], Monterrey[26], Riverside[26], San Diego[26]. Mexico: Sonora: Sierra de San Francisco, Sonorita[26].

Ecology. This species is associated with burrows of the kangaroo rat in southern California and Arizona. Hebard (1917) also found it in nests of wood rats, *Neotoma* sp. It makes small burrows ("shelves") which lead into the larger rodent burrows. These "shelves" are lined with plant material, which helps buffer humidity changes. The cockroaches also cache seeds, presumably taken from the rodents' caches. Most roaches are found from 30 – 45 cm below the

surface, even though the rodent burrows extend much deeper (Cohen & Cohen 1976). This species is less tolerant of low humidity than *A. investigata*, a free-living congener (Cohen & Cohen 1981).

Arenivaga bolliana (Saussure)
"Boll's sand cockroach"

Homeogamia bolliana Saussure 1893: 298.

Arenivaga bolliana: Hebard 1917a: 223 (taxonomy, figure); Hebard 1920: 201 (taxonomy, figure); Hebard 1943: 272 (taxonomy); Roth & Willis 1960: 7 (ecology); Princis 1962: 58 (world catalog); Helfer 1963: 57 (key U.S., figure); Roth 1968: 91 (ootheca); Pratt 1988: 883 (checklist U.S.).

Distribution. Texas: Bexar[36], Bosque[26], Burnett[26], Caldwell[36], Cameron[26], Comal[26], Dallas[26], Dimmit[26], Hays[26], Hidalgo[36], Kenedy[36], Kerr[26], Maverick[26], McLennan[26], Nueces[26], Starr[26], Sutton[36], Travis[36], Uvalde[26], Val Verde[26], Victoria[26], Zavala[26].

Ecology. This species has been collected in the nests of wood rats, *Neotoma* sp., and under litter (Hebard 1917a). Although species of *Arenivaga* are generally considered to be desert cockroaches, the greater part of this species' native range in central and southern Texas is scrub and grassland communities.

Arenivaga erratica Rehn
"erratic sand cockroach"
Map 9

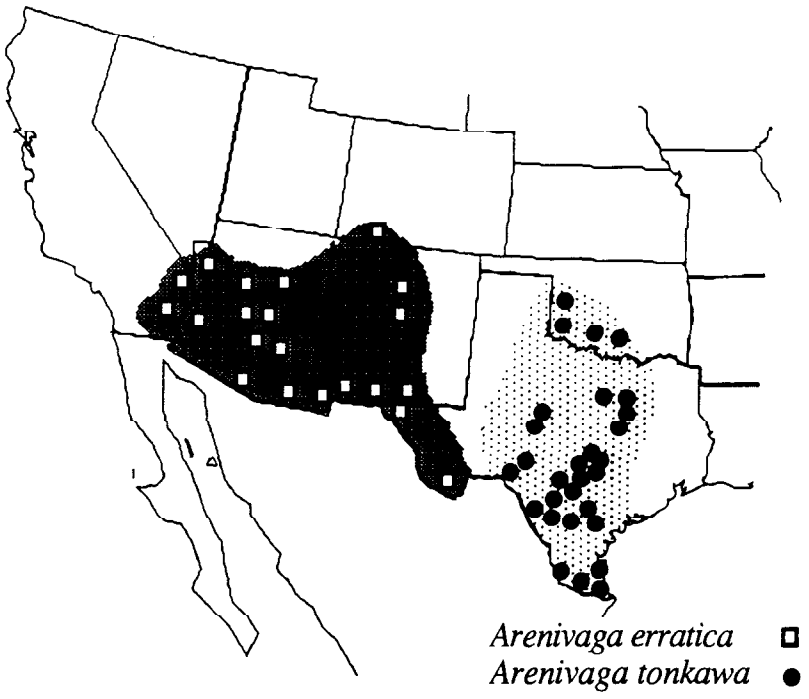
Homeogamia erratica Rehn 1903b: 187.

Arenivaga erratica: Hebard 1917a: 231 (taxonomy, figure); Hebard 1920: 208 (taxonomy, figure); Hebard 1929: 315 (taxonomy); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Hebard 1943: 274 (taxonomy); Roth & Willis 1960: 7 (ecology); Princis 1962: 59 (world catalog); Roth 1968: 91 (ootheca); Pratt 1988: 883 (checklist U.S.).

Distribution. Mexico: Sonora[26]. United States: **Arizona**: Cochise[26], Graham[26], Gila[26], Maricopa[26], Mohave[26], Navajo[26], Pima[26], Pinal[26], Yavapai[26], Yuma[26]; **California**: Riverside[26], San Bernardino[26]; **Colorado**: La Plata[26]; **New Mexico**: Bernalillo[26], Doña Ana[26], Hidalgo[26], Luna[26], Otero[26], Sandoval[26]; **Texas**: Brewster[26], El Paso[26], Jeff Davis[36], Presidio[36]; **Utah**: Washington[26].

Ecology. This species has been reported from burrows of wood rats and ground squirrels in Arizona (Ball et al. 1942).

Comments. Some of the specimens treated as *A. erratica* by Hebard in 1917 were later referred to *A. tonkawa* by the same author (Hebard 1920).



Map 9. *Distribution of* Arenivaga erratica *Rehn and* A. tonkawa *Hebard.*

Arenivaga floridensis Caudell
"Florida sand cockroach"
Map 8

Arenivaga floridensis Caudell 1918: 156; Hebard 1920: 206 (key, figure); Blatchley 1920: 110 (taxonomy); Friauf 1953: 122 (ecology); Roth & Willis 1960: 7 (ecology); Princis 1962: 59 (world catalog); Helfer 1963: 57 (key U.S., figure); Roth 1968: 91 (ootheca); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 311 (taxonomy Fla.); Deyrup 1990: 531 (biogeography).

Distribution. Florida: Alachua[2], Highlands[2], Lake[2], Levy[2], Marion[61], Polk[4], Pinellas[4], Putnam[19], Volusia[2].

This is the only eastern species of this genus. It is restricted to sandy areas of central Florida. All other species are found in the southwestern United States and Mexico (Hebard 1920). This endemic species is a remnant of a larger, xeric-adapted biota that was more abundant along the southeastern coastal plain during the last glacial period (Deyrup 1989, 1990).

Ecology. Friauf (1953) found this species occasionally in longleaf pine flatwoods in an ecological study of native vegetation in northern Florida. It is found in native vegetation in sandhill and scrub communities of central Florida (Deyrup 1990). It has been reported from burrows of the oldfield mouse, *Peromyscus polionotus rhoadsi* (Bangs) in sandhill areas of the Ocala National Forest (Young 1949). Females and nymphs are known to burrow freely in loose sand (M.A. Deyrup, personal communication).

Arenivaga genitalis Caudell
"Arizona sand cockroach"
Map 10

Homeogamia apacha Rehn (not Saussure 1893) 1903: 188.
Arenivaga apacha Hebard (in part, not Saussure 1893) 1917a: 236.
Arenivaga genitalis Caudell 1918: 155(description, figure); Hebard 1920: 214 (taxonomy, figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Princis 1962: 61 (world catalog); Pratt 1988: 883 (checklist U.S.).

Distribution. Arizona: Graham[27]; Pima[27], Pinal[27], Maricopa[27]; **California**: Imperial[27].
Comments. Specimens of this species were treated by Hebard (1917) as *A. apacha*.

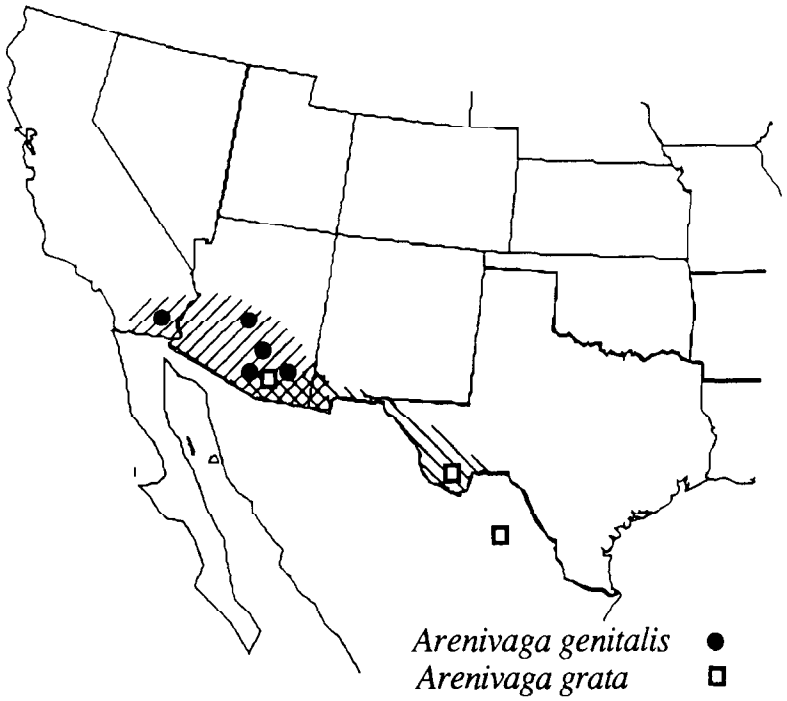
Arenivaga grata Hebard
"pleasant sand cockroach"
Map 10

Arenivaga rehni Hebard 1917a: 227 (in part).
Arenivaga grata Hebard 1920: 203 (description, figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Hebard 1943: 274 (taxonomy Tex.); Roth & Willis 1960: 7 (ecology); Princis 1962: 59 (world catalog); Pratt 1988: 883 (checklist U.S.).

Distribution. Mexico: Coahuila: San Lorenzo[26]. United States: **Arizona**: Pima[26]; **Texas**: Brewster[36].
Ecology. This species was reported from guano in a bat cave in Arizona (Ball et al. 1942).

Arenivaga investigata Friauf & Edney
"southern California sand cockroach"

Arenivaga investigata Friauf & Edney 1969: 1 (description, figure); Edney et al. 1977: 120 (ecology, biology, photo); Cohen & Cohen 1981: 165 (ecology); Appel et al. 1983: 598 (photo ootheca, life cycle); Pratt 1988: 883 (checklist U.S.).



Map 10. *Distribution of* Arenivaga genitalis *Caudell and* A. grata *Hebard.*

Distribution. California: Riverside County only (Friauf & Edney 1969).

Ecology. Females and nymphs live freely in sand dunes and burrow just under the surface while foraging at night (Edney et al. 1977). This species tolerates higher temperatures and lower humidity than does *A. apacha*, a sympatric species which is commensal with burrowing rodents (Cohen & Cohen 1981).

Arenivaga rehni Hebard
"Rehn's sand cockroach"

Arenivaga rehni Hebard 1917a: 227 (description, taxonomy, figure); Hebard 1920: 203 (taxonomy, figure); Princis 1962: 59 (world catalog); Pratt 1988: 883 (checklist U.S.).

Distribution. Mexico: Baja California: Sn. Pedro[26], Sierra El Tosti[26], Comondu[26], San Jose del Cabo[26].

Comments. Hebard (1920) described *Arenivaga grata* from specimens which he had treated as *A. rehni* in his 1917 monograph. Based on his later treatment, *A. rehni* is not known from the United States and is not listed in his checklist of Arizona species (Hebard 1935b). As the species occurs in northern Baja California, it may also occur in southern California, but there are no published records from the United States. Pratt's inclusion of this species in his 1988 checklist is probably based on Hebard's United States monograph (1917).

Arenivaga tonkawa Hebard
"Tonkawa sand cockroach"
Map 9

Homeogamia bolliana Rehn (not Saussure 1893) 1902: 331.
Arenivaga erratica Hebard (in part) 1917a: 231.
Arenivaga tonkawa Hebard 1920: 210 (description, taxonomy, figure); Hebard 1938: 13 (taxonomy Okla.); Hebard 1943: 275 (taxonomy Tex.); Roth & Willis 1960: 7 (ecology); Princis 1962: 60 (world catalog); Pratt 1988: 883 (checklist U.S.).

Distribution. Mexico[46]. United States: **Oklahoma**: Comanche[36], Greer[35], Murray[36], Roger Mills[35]; **Texas**: Bexar[26], Blanco[26], Bosque[26], Burnett[26], Cameron[26], Dallas[36], Dimmit[26], Ellis[36], Goliad[26], Hidalgo[36], Karnes[36], Kenedy[36], Kerr[26], La Salle[26], Maverick[36], McLennan[26], Runnels[26], Starr[26], Sutton[36], Tarrant[36], Taylor[36], Travis[26], Uvalde[26], Val Verde[26], Williamson[26]; Mexico.

Ecology. Hebard (1943) collected immatures in a prairie dog burrow. As is the case with *A. bolliana*, the native range of this species in central Texas is mostly grassland or scrub rather than desert.

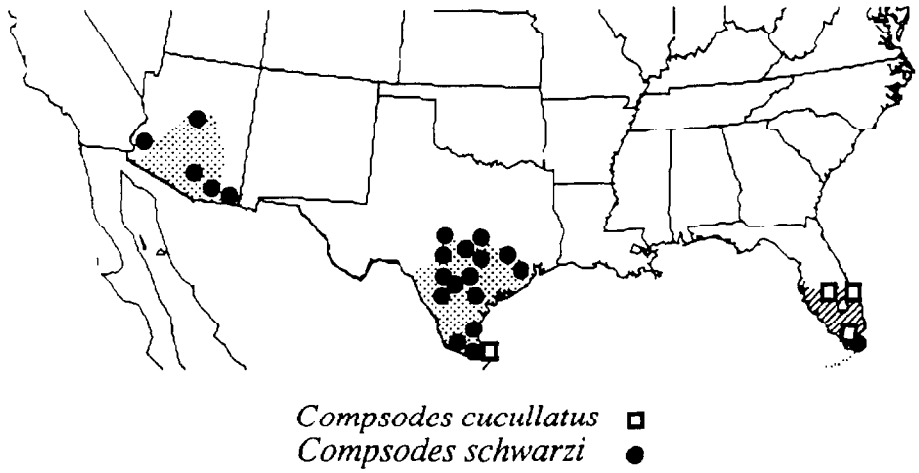
Comments. Specimens of this species were previously treated as *A. erratica* by Hebard in his 1917 monograph.

Compsodes cucullatus (Saussure & Zehntner)
"hooded cockroach"
Map 11

Latindia cucullatus Saussure & Zehntner 1894: 111.
Compsodes cucullatus: Blatchley 1920: 108 (taxonomy eastern U.S.); Princis 1963: 103 (world catalog); Helfer 1963: 55 (key U.S.); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 311 (taxonomy Fla.).

Distribution. Guatemala[4], Panama[47]. United States: **Florida**: Dade (USNM)[4], Highlands (FSCA, USNM)[2], Indian River (FSCA, USNM)[2]; **Texas**: Cameron (USNM).

Ecology. This species has been found in xeric habitats in central Florida (M.A. Deyrup personal communication) and pinelands in southern Florida (Blatchley 1920).



Map 11. *Distribution of* Compsodes cucullatus *(Saussure & Zehntner) and* C. schwarzi *(Caudell).*

Compsodes schwarzi (Caudell)
"Schwarz's hooded cockroach"
Map 11

Latindia schwarzi Caudell 1903: 165.

Compsodes schwarzi: Hebard 1917a: 210 (taxonomy U.S., figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 266 (taxonomy Ariz.); Hebard 1943: 272 (taxonomy Tex.); Roth & Willis 1960: 9 (ecology); Princis 1963: 103 (world catalog); Helfer 1963: 55 (key U.S., figure); Pratt 1988: 883 (checklist U.S.); Peck & Beninger 1989: 614 (ecology); Atkinson et al. 1990a: 311 (taxonomy Fla.).

Distribution. Mexico: Baja California[26], Southwestern United States: **Arizona**: Cochise (USNM, FSCA), Pima (CASC, USNM, FSCA)[26], Sta. Cruz (CASC, FSCA)[26], Yavapai[36], Yuma (USNM); **Florida**: Dade[45]; **Texas**: Austin[36], Bastrop (USNM), Bee[26], Bexar[36], Brazos (TAMU), Cameron (TAMU, USNM)[26], Dimmit[36], Fort Bend[36], Frio (USNM), Hidalgo (FSCA, USNM), Kenedy (USNM), Real (USNM), Uvalde[26], Williamson (TAMU), Zavala (USNM)[26]. We have not seen the specimens from Florida reported by Peck & Beninger (1989), but southern Florida represents a considerable disjunction from the previously known distribution of this species in southern Texas, Arizona, and northern Mexico. This record should be viewed with caution until more specimens are collected or until its distribution in the Gulf and Caribbean basins is better known.

Ecology. In Arizona, this species is found in montane habitats within desert regions but not on the desert floor (Hebard 1917a). Peck & Beninger (1989) reported a single specimen from open pine lands in Everglades National Park in Florida in a flight-intercept trap.

Eremoblatta subdiaphana (Scudder)
"hairy desert cockroach"
Map 12

Homeogamia subdiaphana Scudder (*In* Scudder & Cockerell) 1902: 19.

Eremoblatta subdiaphana: Hebard 1917a: 240 (taxonomy, figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Hebard 1943: 276 (taxonomy Tex.); Roth & Willis 1960: 9 (ecology); Princis 1962: 70 (world catalog); Helfer 1963: 56 (key U.S., figure); Pratt 1988: 883 (checklist U.S.).

Distribution. Arizona: Graham (CASC), Maricopa[26], Yuma[26]; **California**: Kern[26], Riverside[26], San Bernardino[26], San Diego[36]; **New Mexico**: Bernalillo[26], Doña Ana[26], Eddy (TAMU), Otero[26]; **Nevada**: Clark; **Texas**: Brewster (UAIC)[36], El Paso[36], Hudspeth[36], Presidio[36].

Comments. There is no published information on the ecology of this species.

Holocompsa azteca Saussure
"aztec hairy cockroach"

Holocompsa azteca Saussure 1862: 230; Caudell 1931: 204 (taxonomy); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 266 (taxonomy Ariz.); Roth & Willis 1960: 10 (ecology); Princis 1963: 95 (world catalog); Pratt 1988: 883 (checklist U.S.).

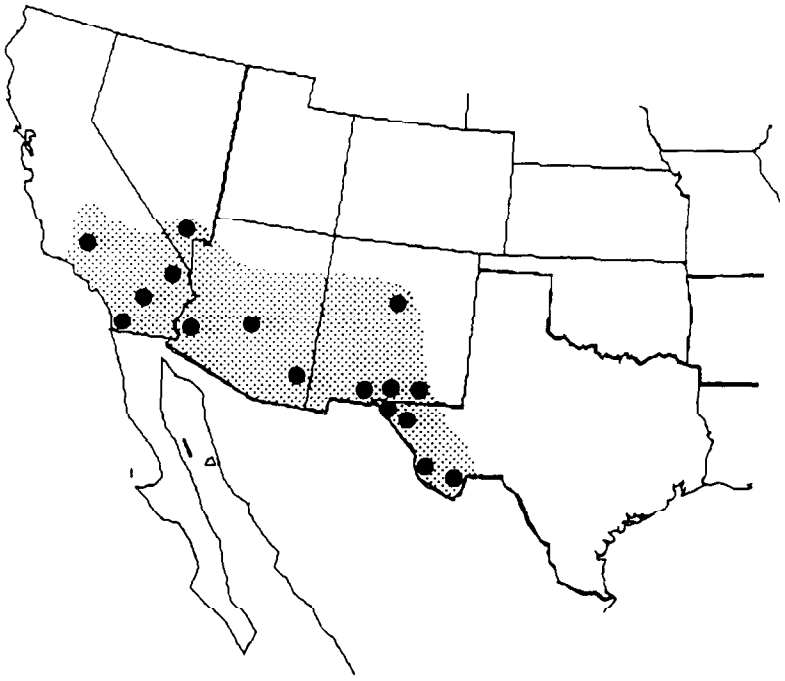
Distribution. Mexico[47]. United States: **Arizona**: Sta. Cruz[9].

Comments. Caudell (1931) and Hebard (1935b) treated this species as an introduction to Arizona without specifying its origin or distribution elsewhere. Saussure & Zehntner (1893) listed it from the state of Veracruz, Mexico, but we have been unable to find any other distribution information from Mexico. Ball et al. (1942) did not believe that this species was actually established in Arizona.

Holocompsa nitidula (F.)
"small hairy cockroach"

Blatta nitidula F. 1781: 345.

Holocompsa nitidula: Hebard 1917a: 206 (taxonomy U.S., figure); Blatchley 1920: 107 (taxonomy eastern U.S.); Gurney 1942: 55, Helfer 1963: 55 (key U.S.,



Map 12. *Distribution of* Eremoblatta subdiaphana *(Scudder).*

figure); Princis 1963: 93 (world catalog); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 311 (taxonomy Fla.).

Holocompsa cyanea Saussure 1864: 150 (not Burmeister 1838) Mem. Hist. Nat. Mexique; Roth & Willis 1960: 10 (ecology).

Distribution. Circumtropical, originally from American tropics[47]. Cuba[26]. United States: **Florida**: Monroe (Key West)[26].

Ecology. Collected inside open structures in Key West (Hebard 1917a).

Myrmecoblatta wheeleri Hebard

Myrmecoblatta wheeleri Hebard 1917b: 361 (description, figure); Roth & Willis 1960: 11 (ecology); Princis 1963: 109 (world catalog); Deyrup & Fisk 1984: 183 (distribution, biology key, figure); Atkinson et al. 1990a: 312 (taxonomy Fla.).

Distribution. Costa Rica[15], Guatemala[47]. United States: **Florida**: Highlands[15].

Deyrup & Fisk (1984) consider this wingless species to be a native (previously undetected because of its cryptic habits) rather than an introduced species.

Ecology. In Florida, it is associated with nests of carpenter ants, *Camponotus abdominalis floridanus* (Buckley), and with other ant species in Central America (Deyrup & Fisk 1984).

Blattellidae

Attaphila fungicola Wheeler
"ant cockroach"

Attaphila fungicola Wheeler 1900: 860 (description, habits, figure); Hebard 1917a: 214 (taxonomy U.S., figure); Hebard 1943: 273 (taxonomy Tex.); Roth & Willis 1960: 8 (ecology); Helfer 1963: 36 (key U.S., figure); Princis 1963: 110 (world catalog); Moser 1964: 1048 (ecology La.); Moser 1967: 304 (ecology La.); Pratt 1988: 883 (checklist U.S.).

Distribution. Louisiana: Rapides (LSUC); **Texas**: Montgomery (USNM), Travis (USNM)[26].

Ecology. This species is an obligate inquiline of leaf-cutting ants of the genus *Atta*. Moser (1964) found that cockroaches are able to follow the trail-marking pheromone of their ant hosts. Adult female cockroaches ride on alate female ants and may be found in new burrows (Moser 1967).

Blattella asahinai Mizukubo
Asian cockroach*
Map 13

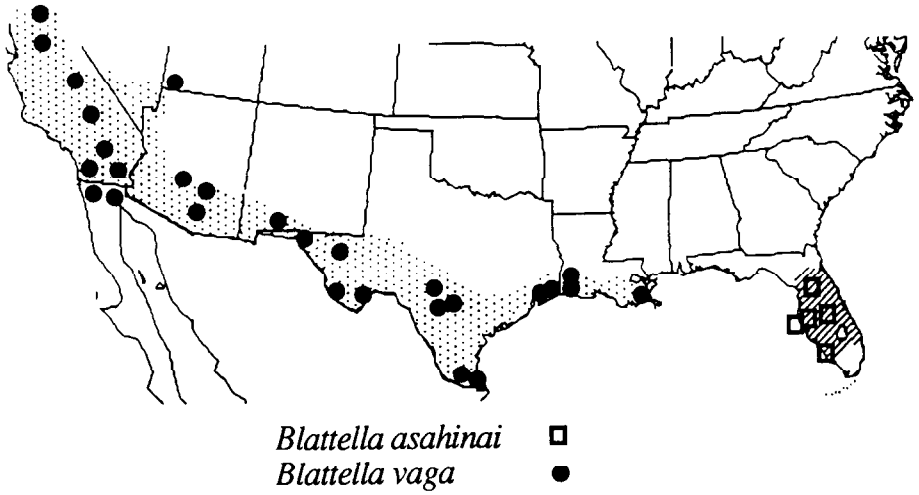
Blattella asahinai Mizukubo 1981: 149; Roth 1986: 371 (occurrence in U.S.); Ross & Mullins 1988: 1645 (nymph, ootheca); Brenner et al. 1988: 432 (ecology Fla., behavior, distribution); Carlson & Brenner 1988: 711 (taxonomy); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 312 (taxonomy Fla.), Brenner in press (ecology Fla.).

Blattella beybienkoi Roth 1985: 28 (description, key, figure).

Distribution. India, China, Okinawa, Southeastern Asia[54]. United States: **Florida**: Collier[2], Hillsborough[5], Marion[2], Pinellas[5], Polk[5]. Recently introduced into Florida.

Based on its distribution in Asia this species could spread over a large part of the southeastern United States.

Ecology. Found outdoors in shaded areas with abundant litter. Attracted to lights and flies actively (Brenner et al. 1988).



Map 13. *Distribution of* Blattella asahinai *Mizukubo and* B. vaga *Hebard.*

Blattella germanica (L.)
German cockroach*, "crotonbug"

Blatta germanica L. 1767: 668.

Blattella germanica: Hebard 1917a: 57 (taxonomy U.S., figure); Blatchley 1920: 73 (taxonomy eastern U.S., figure); Morse 1920: 310 (taxonomy New England); Hebard 1925: 40 (taxonomy); Hebard 1928: 220 (taxonomy); Hebard 1929: 315 (taxonomy); Hebard 1931: 124 (taxonomy); Hebard 1932 (taxonomy Minn.); Hebard 1934: 153 (taxonomy); Hebard 1935b: 273 (taxonomy Ariz.); Ball et al. 1942: 265 (taxonomy Ariz.); Hebard 1943: 262 (taxonomy Tex.); Rehn 1945: 268 (dispersal); Friauf 1953: 122 (ecology); Froeschner 1954: 178 (taxonomy Iowa); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 8 (ecology); Helfer 1963: 47 (key U.S., figure); Cantrall 1968: 303 (taxonomy Mich.); Roth 1968: 101 (ootheca); Cornwell 1968: 42 (general information, photo); Princis 1969: 807 (world catalog); Dakin & Hays 1970: 14 (taxonomy Ala.); Wright & McDaniel 1973: 251 (ecology N.C.); Ebeling 1975: 222 (general information); Roth 1985: 14 (taxonomy, key, figure); Vickery & McKevan 1985: 108 (taxonomy Canada); Appel & Tucker 1986: 422 (ecology); Carlson & Brenner 1988: 711 (taxonomy); Pratt 1988: 883 (checklist U.S.); Ross & Mullins 1988: 1645 (nymph, ootheca); Atkinson et al. 1990a: 312 (taxonomy Fla.).

Distribution. Cosmopolitan. Found in and around human habitations throughout the world, originally from eastern Asia (Roth 1985). Vickery & McKevan (1985) show records of this species from Greenland, Iceland, and the Canadian High Arctic.

Ecology. This is the most abundant and economically important domicilary species in the United States. So far as we have been able to

ascertain, this species breeds only inside structures in the United States, and no permanent outdoor populations occur. Appel & Tucker (1986) reported collecting *B. germanica* near structures during spring and summer in southern Texas and Alabama. Most of their collections were clearly associated with structures and probably represented "overflow of indoor populations from saturated indoor harborages."

Blattella vaga Hebard
field cockroach*
Map 13

Blattella vaga Hebard 1935a: 112 (description, figure); Hebard 1935b: 275 (taxonomy Ariz.); Ball et al. 1942: 267 (taxonomy Ariz.); Helfer 1963: 47 (key U.S.); Flock 1941: 121 (ecology); Riherd 1953: 39 (distribution, ecology); Roth & Willis 1960: 8 (ecology); Buxton & Freeman 1968: 168 (taxonomy, figure); Roth 1968: 101 (ootheca); Cornwell 1968: 88 (general information, photo); Ebeling 1975: 227 (general information); Roth 1985: 91 (taxonomy, photos); Carlson & Brenner 1988: 711 (taxonomy); Pratt 1988: 883 (checklist U.S.).

Blattella personata Bey-Bienko 1967: 410.

Distribution. Afghanistan[54], India[54], Pakistan[54], Sri Lanka[54], Mexico: Baja California Norte: San Bruno[54], Mexicali[54]. United States: **Arizona**: Maricopa (UAIC, USNM)[33], Pima (UAIC)[54], Pinal (CASC, USNM)[33], Santa Cruz (LSUC), Yuma (UAIC)[18]; **California**: Butte (USNM)[6], Imperial (CASC, USNM)[54], Inyo (CASC, USNM), Riverside (CASC, USNM)[54], San Diego[54] Stanislaus (USNM), Tulare (CASC); **Louisiana**: Calcasieu (LSUC), Cameron (TAMU), Jefferson (LSUC); **New Mexico**: Doña Ana (USNM); **Texas**: Bexar[54], Brewster (UADG), Cameron (TAMU), Chambers (TAMU), El Paso (TAMU), Hidalgo[52,54], Jefferson (USNM), Kerr (TAMU), Medina (CASC), Presidio (TAMU), Reeves[54]; **Utah**: Washington (USNM).

Ecology. This species is found in irrigated fields and yards, as well as in arid areas far from inhabited areas. It sometimes comes to lights and may occasionally enter houses, although it is much more likely to be found in mulch and leaf litter around foundations (Flock 1941, Riherd 1953, Ebeling 1975). Although originally described from Arizona, the field cockroach is native to semiarid regions of southern Asia. *B. vaga* appears to be adapted to arid and semiarid environments based on its native and United States distribution. It arrived in southern Texas in the early fifties (Riherd 1953). Recent records from eastern Texas and southwestern Louisiana are all from salt marsh or coastal habitats.

Cariblatta lutea (Saussure & Zehntner)
"small yellow cockroach"
Map 14

Ceratinoptera lutea Saussure & Zehntner 1893: 48.

Cariblatta lutea lutea: Hebard 1917a: 51 (taxonomy U.S., figure); Blatchley 1920: 71 (taxonomy eastern U.S., figure); Hubbard & Goff 1939: 154 (ecology Fla.); Gurney 1942: 17 (taxonomy); Lawson 1952: 296 (ootheca); Friauf 1953: 122 (ecology Fla.); Roth & Willis 1960: 8 (ecology); Helfer 1963: 48 (key eastern U.S., figure); Lawson 1967: 269 (ecology); Roth 1968: 94 (ootheca); Princis 1969: 779 (world catalog); Dakin & Hays 1970: 14 (taxonomy Ala.); Hagenbuch et al. 1988: 378 (ecology Fla.); Brenner 1988: 583 (ecology Fla.); Pratt 1988: 883 (checklist U.S.); Atkinson et al. 1990a: 313 (taxonomy Fla.).

Distribution. Cuba[26]. Southeastern United States: **Alabama**: Baldwin[14], Barbour[14], Cherokee[14], Covington[14], DeKalb[14], Houston[14], Lee[14], Macon[14], Mobile[26], Perry[14], Winston[14]; **Arkansas**: Hot Springs (USNM); **Florida**: Alachua (FSCA, USNM)[25], Brevard[26], Citrus (FSCA), Duval[26], Escambia (FSCA), Franklin[26], Glades[26], Hendry[4], Highlands (FSCA)[2], Hillsborough (USNM)[40], Lee (LSUC), Liberty (FSCA), Okaloosa (UAIC), Pinellas[4], Polk[26], Putnam (LSUC, NCSU, USNM)[19], St. Johns[26], Sarasota[4], Seminole[4], Volusia (USNM)[26], **Georgia**: Bibb[26], Chatham[26], Decatur (USNM), Dougherty[26], Emmanuel (USNM), Glynn[26]; Meriwether[26], Thomas[26]; **Louisiana**: E. Baton Rouge (LSUC), St. Landry (LSUC), Webster (LSUC), W. Feliciana (FSCA); **Mississippi**: Adams (USNM)[26], Harrison (USNM); **North Carolina**: Bladen (NCSU), Cumberland[26], Dare[26], Durham (LSUC), Harnett (NCSU), Moore (NCSU)[26], New Hanover[26], Pitt (NCSU), Wake (NCSU)[26], **South Carolina**: Georgetown (UAIC), Lexington[26], Pickens (USNM); **Tennessee**: Knox[40].

Based on distributions of other cockroach species in the Southeast, we would expect that this species will eventually be found in eastern Texas and coastal Virginia.

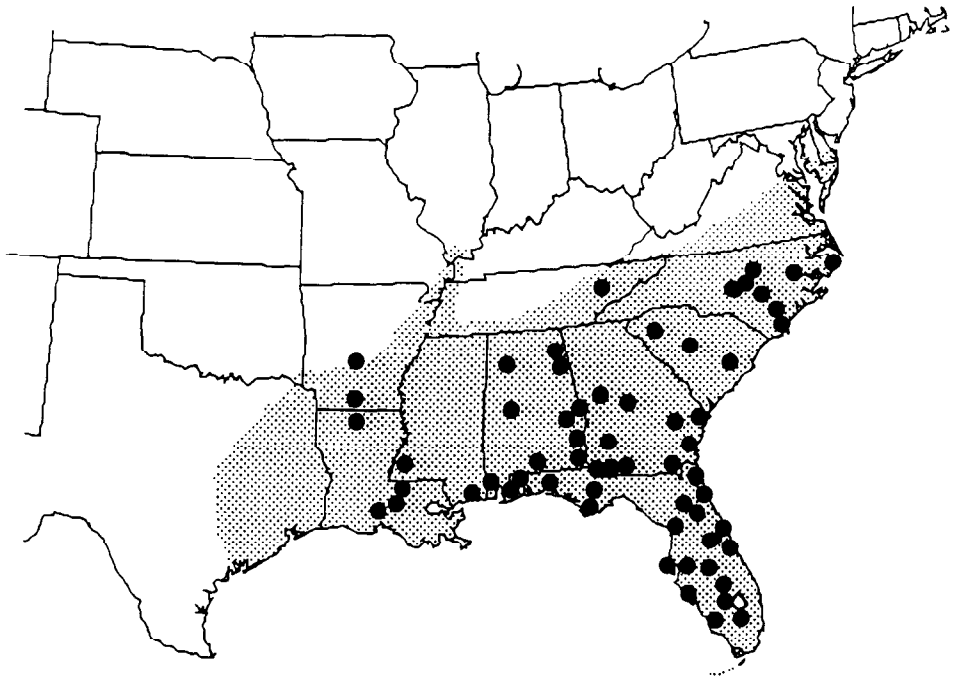
Ecology. This species is commonly found in a variety of natural plant communities in Florida (Blatchley 1920, Friauf 1953, Dakin & Hays 1970). It has also been found near houses and disturbed areas, particularly in lawns and leaf litter (Lawson 1967, Hagenbuch et al. 1988). Hubbard & Goff (1939) found immatures in burrows of pocket gophers, *Geomys* sp.

Cariblatta minima Hebard
"least yellow cockroach"
Map 15

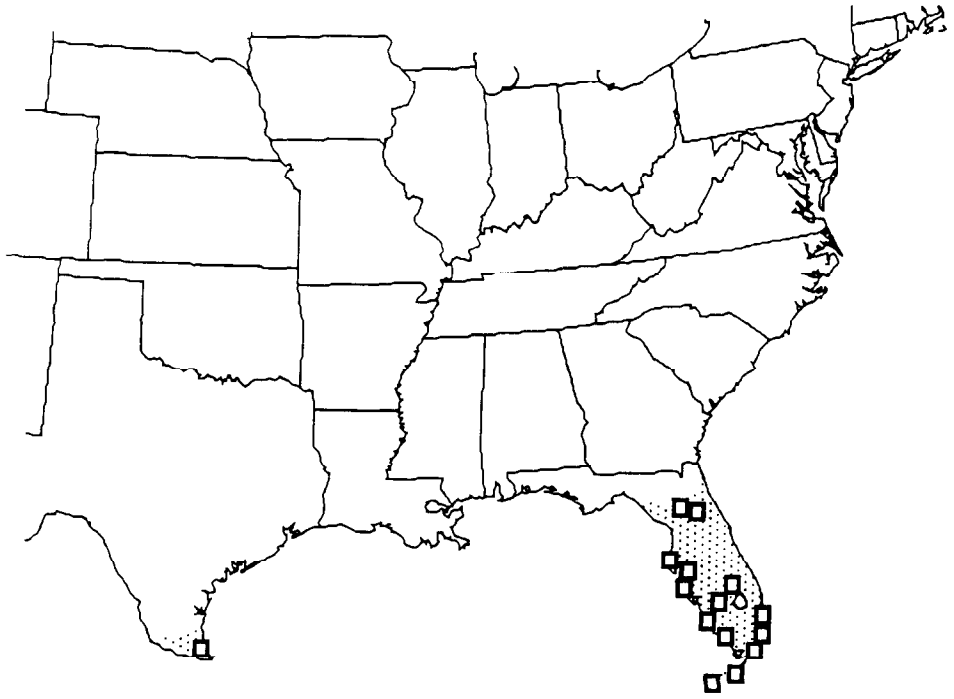
Cariblatta lutea minima Hebard 1916a: 170; Hebard 1917a: 54 (taxonomy U.S., figure); Blatchley 1920: 72 (taxonomy eastern U.S., figure); Friauf 1953: 122 (ecology Fla.); Roth & Willis 1960: 8 (ecology, photo); Helfer 1963: 48 (key U.S.); Roth 1968: 94 (ootheca); Princis 1969: 780 (world catalog); Pratt 1988: 883 (checklist U.S.); Peck & Beninger 1989: 614 (ecology Fla.); Atkinson et al. 1990a: 313 (taxonomy Fla.).

Ceratinoptera lutea Davis & Leng 1912: 121 (not Saussure & Zehntner 1893) J. New York Entomol. Soc.

Distribution. Cuba[51]. United States: **Florida**: Alachua (FSCA), Collier[26], Dade (USNM, FSCA)[26], Glades[26], Highlands (USNM), Hillsborough (FSCA),



Map 14. *Distribution of* Cariblatta lutea *(Saussure & Zehntner).*



Map 15. *Distribution of* Cariblatta minima *Hebard.*

Lee[26], Monroe (FSCA)[26], Palm Beach (FACA, USNM)[26], Pinellas[4], Putnam[19], Sarasota[4]; **Texas**: Hidalgo (USNM).

Ecology. This species was collected in hardwood hammocks in southern peninsular Florida and the upper and lower Keys, and in open pinelands in Dade County (Peck & Beninger 1989). Friauf (1953) found this species commonly in a variety of scrub, flatwoods, and hammock communities in northeastern Florida. It was the only species found in *Spartina* marshes and sawgrass marshes, where it was frequent. Blatchley (1920) collected this species in grasses behind the beach at Cape Sable (Monroe County).

Comments. *Cariblatta lutea* and *C. minima* occur sympatrically over most of peninsular Florida and Cuba. Differences in habitat (Friauf 1953), oothecae (Roth 1968), and in the subgenital plates of the males (Hebard 1917a) have been reported, suggesting that two distinct species are involved. For these reasons, we are treating these as distinct species rather than subspecies as has traditionally been the case.

Chorisoneura parishi Rehn
Map 16

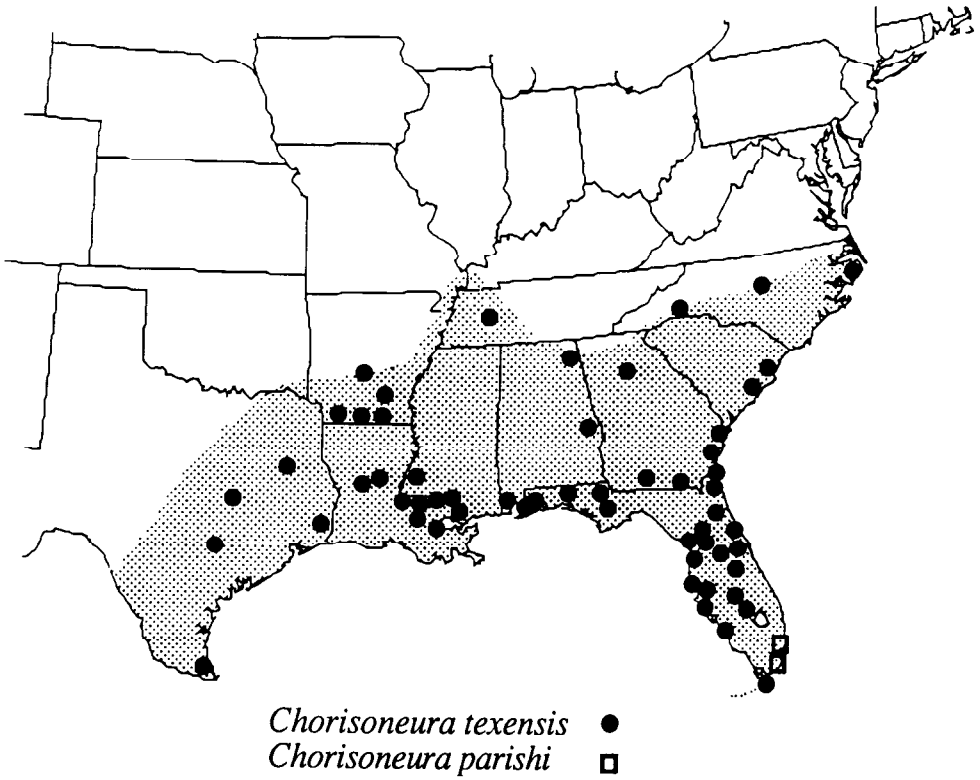
Chorisoneura parishi Rehn 1918: 163; Roth & Willis 1960: 8 (ecology); Princis 1965: 336 (world catalog); Atkinson et al. 1990a: 313 (taxonomy, introduction Fla.).

Distribution. Bahamas (FSCA), Panama, Colombia, Venezuela, Guyana, Surinam, French Guiana, Brazil[49]. United States: **Florida**: Dade County (FSCA, USNM)[2]. The earliest records of this species from the United States were from the vicinity of Miami International Airport in 1961. Since then, it has been collected at least nine times (based on specimen labels) in and around Miami (Hialeah, Matheson Mammock, Homestead), leaving little doubt that this species is well established.

Chorisoneura texensis Saussure & Zehntner
"small Texas cockroach"
Map 16

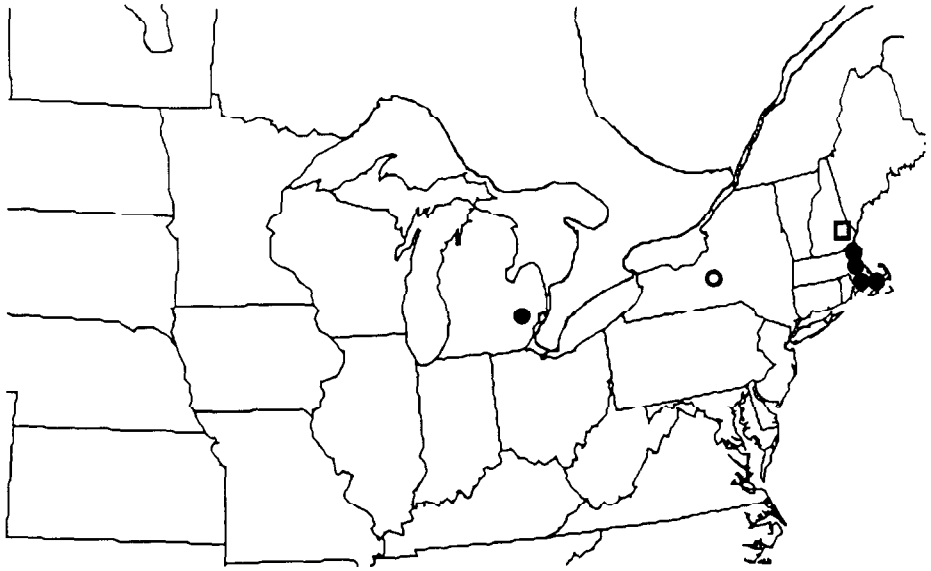
Chorisoneura texensis Saussure & Zehntner 1893: 80, Orthoptera; Hebard 1917a: 247 (taxonomy U.S., figure); Blatchley 1920: 111 (taxonomy eastern U.S., figure); Hebard 1943: 260 (taxonomy Tex.); Friauf 1953: 122 (ecology Fla.); Roth & Willis 1960: 8 (ecology); Helfer 1963: 58 (key U.S., figure); Princis 1965: 334 (world catalog); Dakin & Hays 1970: 14 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Pratt 1988: 883 (checklist U.S.); Peck & Beninger 1989: 614 (ecology Fla.); Atkinson et al. 1990a: 314 (taxonomy Fla.).

Distribution. Southeastern United States: **Alabama**: Baldwin (LSUC), Dekalb[14], Lee[14], Mobile[14]; **Arkansas**: Ashley (USNM), Drew (USNM), Grant (USNM), Lafayette (USNM), Union (USNM); **Florida**: Alachua (FSCA), Dixie



Map 16. *Distribution of* Chorisoneura texensis *Saussure & Zehntner and* C. parishi *Rehn.*

(USNM), Duval[26], Escambia (FSCA), Hernando (FSCA), Highlands (FSCA)[2], Hillsborough (FSCA, USNM), Jackson (EGRC), Lake[4], Liberty (FSCA, USNM), Manatee (FSCA), Marion (LSUC), Monroe (incl. Keys)[26], Nassau (FSCA), Orange[26], Pinellas[4], Polk[26], Putnam[19], Seminole[4], Volusia[4], Walton (FSCA); **Georgia**: Chatham (USNM), Cobb[26], Glynn[26], Loundes (FSCA), Thomas[26]; **Louisiana**: E. Baton Rouge (LSUC), E. Feliciana (LSUC), Grant (LSUC), Natchitoches (LSUC), St. John the Baptist (FSCA), St. Helena (LSUC), St. Tammany (LSUC), Tangipahoa (LSUC), Washington (LSUC), W. Feliciana (LSUC); **Mississippi**: Adams[26], Wilkinson (LSUC); **North Carolina**: Dare (USNM), Polk[26], Wake (NCSU); **South Carolina**: Charleston (NCSU), Georgetown (USNM); **Tennessee**: Chester[17], **Texas**: Bastrop (TAMU), Cameron[26], McLennan[26], Orange[36], Smith (TAMU). Based on collection localities in northern Alabama and Georgia, western Tennessee, and distributions of other southeastern species, we would expect this species to be found in coastal Virginia.



Map 17. *Distribution of* Ectobius lapponicus *(L.),* E. pallidus *(Olivier), and* E. sylvestris *Poda.*

Ecology. Found in a wide variety of native habitats (Friauf 1953, Dakin & Hays 1970, Peck & Beninger 1989). Hebard (1943) stated that most specimens were found in foliage of shrubs and low trees.

Ectobius lapponicus (L.)
"dusky cockroach"
Map 17

Blatta lapponicus L. 1758: 425.

Ectobius lapponicus: Roth & Willis 1960: 9 (ecology); Roth 1968: 103 (ootheca); Cornwell 1968: 90 (general information); Princis 1971: 1053 (world catalog); Chandler 1985: 98 (taxonomy, figure, introduction U.S.); Pratt 1988: 883 (checklist U.S.).

Distribution. Eurasia east of the Urals (Princis 1971). United States: **New Hampshire**: Carrol[10].

Ecology. In the infestation in New Hampshire, individuals were found around and on a house, particularly in wood piles and under loose roofing. Some individuals were found in houses, but these may have entered from outdoors (Chandler 1985). Based on its distribution in Eurasia, this species has the potential to spread over a significant area of the northern United States and to become a peridomestic pest species.

Ectobius pallidus (Olivier)
spotted Mediterranean cockroach*
Map 17

Blatta livida F. 1793: 538 (name preoccupied).
Blatta pallidus Olivier 1789: 319.
Ectobius pallidus: Roth & Willis 1957: 31 (biology, behavior); Roth & Willis 1960: 9 (ecology, photo); Helfer 1963: 58 (key U.S., figure); Cantrall 1968: 305 (taxonomy Mich.); Gurney 1968: 684 (taxonomy, ecology); Roth 1968: 103 (ootheca); Cornwell 1968: 90 (general information); Princis 1971: 1045 (world catalog); Ebeling 1975: 236 (general information); Pratt 1988: 883 (checklist U.S.).
Blatta livens Turton 1806: 529.
Ectobius livens: Flint 1951: 53 (introduction to US); Gurney 1953: 39 (taxonomy, figure).

Distribution. Southern England, Germany, Belgium, Switzerland, northern Italy, Spain, Portugal, Algeria, Tunisia (Princis 1971). United States: **Massachussetts**: Barnstable[21], Middlesex[23], Plymouth[21]; **Michigan**: Oakland[8], Wayne[23].

Ecology. This European species was introduced into the United States in Massachussetts (Flint 1951). It was subsequently found in Michigan (Cantrall 1968), but there are no records of its occurring in intervening areas. Gurney (1953, 1968) reported that this species occurred around houses and was a pest in some cases. Roth & Willis (1957) concluded that there was one generation annually in Massachussetts, and that eggs in oothecae and possibly nymphs were the overwintering stages. Based on its native distribution, this species has the potential to spread over a significant area of the northern United States and become a peridomestic pest species.

Ectobius sylvestris (Poda)
"lesser cockroach," "forest cockroach"

Blatta sylvestris Poda 1761: 50.
Ectobius sylvestris: Roth & Willis 1960: 9 (ecology); Roth 1968: 103 (ootheca); Cornwell 1968: 90 (general information); Princis 1971: 1073 (world catalog); Hoebeke & Nickle 1981: 529 (interception U.S., taxonomy, figure); Pratt 1988: 883 (checklist U.S.).

Distribution. Finland, Sweden, Denmark, Holland, Belgium, France, Germany, Switzerland, Northern Italy, Austria, Czechoslovakia, Hungary,

Yugoslavia, Rumania, Bulgaria, Poland, eastern U.S.S.R.[38]. United States: **New York**: Geneva[38].

Comments. This species was collected on three occasions in and around houses in Geneva, N.Y. (Hoebeke & Nickle 1981).

Euthlastoblatta abortiva (Caudell)
"fragile cockroach"
Map 18

Anaplecta abortiva Caudell 1904: 105.

Euthlastoblatta abortiva: Hebard 1917a: 28 (taxonomy U.S., figure); Hebard 1943: 260 (taxonomy Tex.); Helfer 1963: 37 (key U.S., figure); Princis 1969: 756 (world catalog); Pratt 1988: 883 (checklist U.S.).

Distribution. Mexico[26]. United States: **Texas**: Cameron (TAMU)[26], Hidalgo (LSUC, TAMU, UADE, USNM).

Ecology. This species has been collected in leaf litter (Hebard 1943) and in burrows of wood rats, *Neotoma* sp. (Hebard 1917a).

Euthlastoblatta diaphana (F.)

Hebard (1917) noted that previous records of *Ceratinoptera diaphana* (referred to genus *Aglaopteryx*) from the United States were based on misidentifications and actually referred to a distinct species, *A. gemma*, which he described in the same publication. Princis (1969) and Pratt (1988) failed to note this distinction and erroneously listed this species from the United States. *Euthlastoblatta diaphana* is known from Cuba, Hispaniola, Puerto Rico, Jamaica, and the Lesser Antilles (Princis 1969).

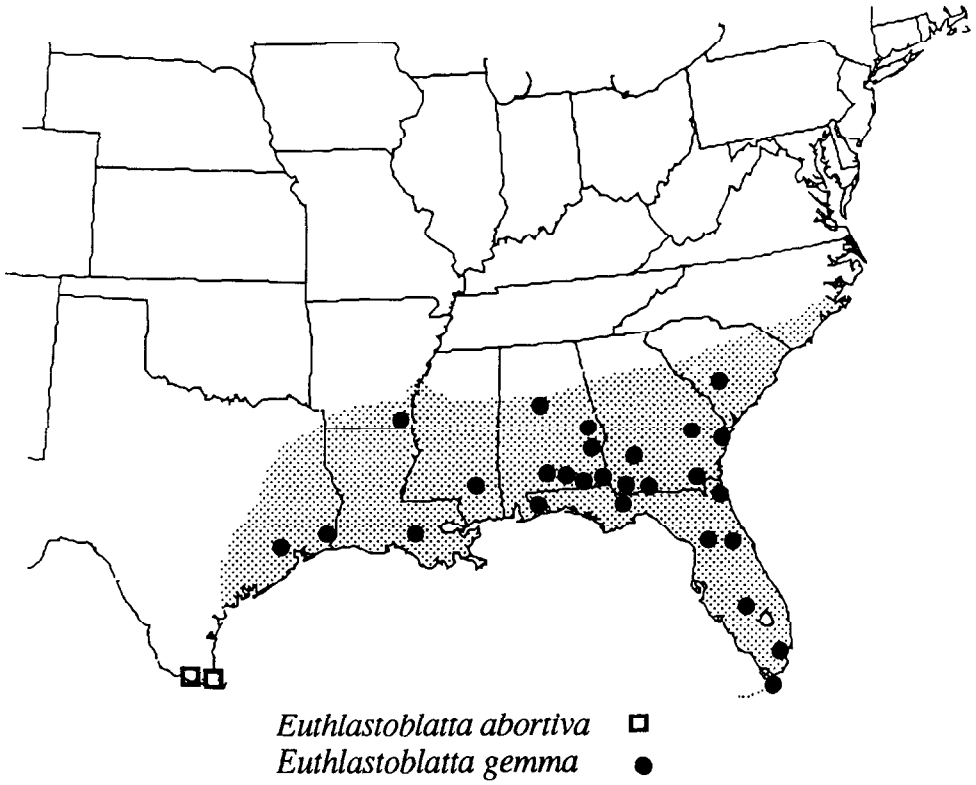
Euthlastoblatta gemma (Hebard)
"shortwing gem cockroach"
Map 18

Aglaopteryx gemma Hebard 1917a: 30 (description, figure); Blatchley 1920: 68 (taxonomy eastern U.S., figure); Hebard 1943: 261 (taxonomy Tex.); Friauf 1953: 122 (ecology Fla.); Roth & Willis 1960: 7 (ecology); Helfer 1963: 37 (key U.S., figure); Princis 1969: 757 (world catalog); Dakin & Hays 1970: 13 (taxonomy Ala.); Gorham et al. 1971: 133 (ecology, control, photo).

Euthlastoblatta gemma: Princis 1969: 757 (world catalog); Pratt 1988: 883 (checklist U.S.); Peck & Beninger 1989: 615 (ecology Fla.); Atkinson et al. 1990a: 314 (taxonomy Fla.).

Ceratinoptera diaphana (not *diaphana* F.) of Rehn & Hebard: Davis before 1917 (*fide* Hebard 1917a).

Distribution. Bahamas[26]. Southeastern United States: **Alabama**: Barbour[14], Conecuh[14], Covington[14], Geneva[14], Jefferson (USNM), Lee[14], Mobile[26], Houston[26]; **Arkansas**: Ashley (USNM); **Florida**[26]: Alachua[4], Dade[26],



Map 18. *Distribution of* Euthlastoblatta abortiva *(Caudell) and* E. gemma *(Hebard).*

Duval[26], Escambia[26], Gadsen[26], Highlands[2], Monroe[26,45], Putnam[19], **Georgia**: Chatham (USNM), Decatur[26], Emmanuel (USNM), Lee (USNM), Thomas[21]; **Louisiana**: Lafayette[26], **Mississippi**: Forrest[26]; **South Carolina**: Barnwell (USNM); **Texas**: Harris[26], Orange[26].

Ecology. This species is found in a wide variety of native habitats throughout its range (Peck & Beninger 1989, Friauf 1953, Blatchley 1920, Dakin & Hays 1970, M.A. Deyrup personal communication). Gorham et al. (1971) reported this species in and around houses in southern Georgia. It is not clear from their report whether any breeding actually occurred inside structures or how large the populations were. Hebard (1943) noted that most specimens had been collected in arboreal habitats.

Comments. According to Hebard (1917) previous records of this species from the United States had consistently been misidentified as *Ceratinoptera diaphana* (especially Rehn & Hebard, Davis before 1917).

Ischnoptera bilunata Saussure

Ischnoptera bilunata Saussure 1869: 111.
Ischnoptera bergrothi of Atkinson et al. 1990b, not Griffini: Atkinson et al. 1990b: 12 (introduction U.S., photo, taxonomy).

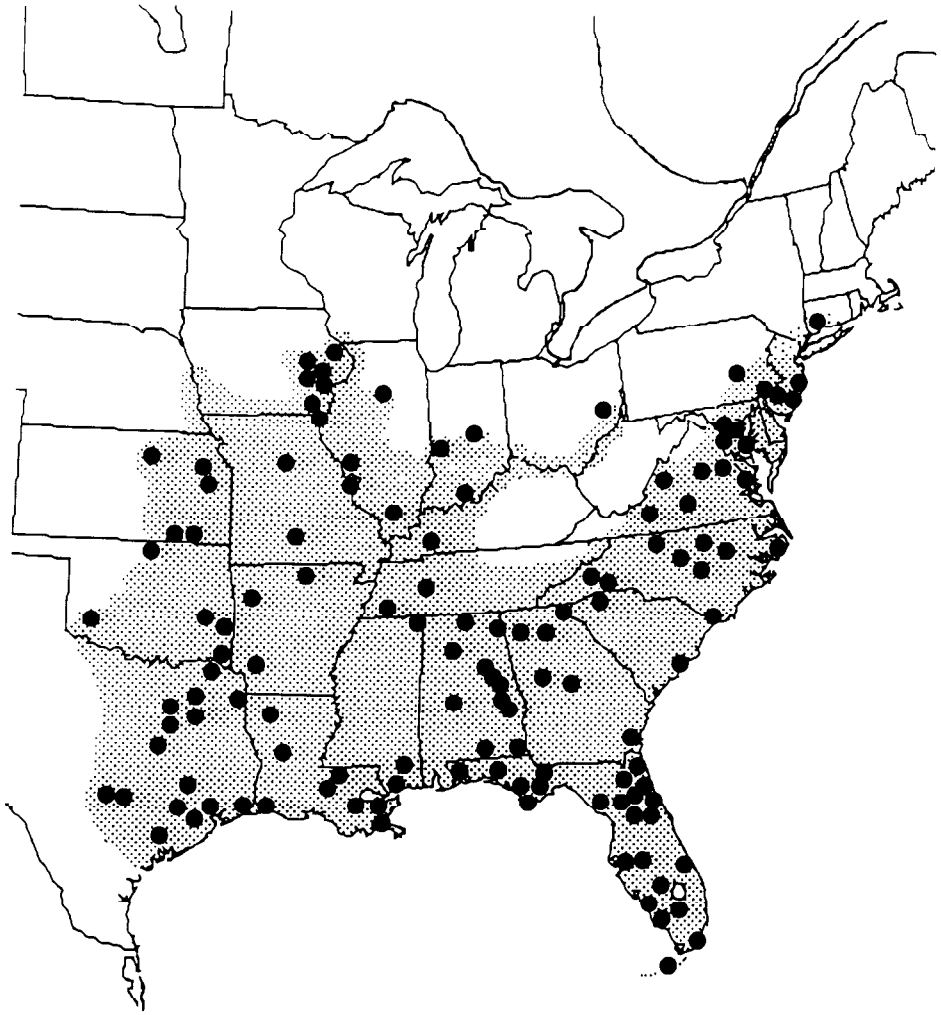
Distribution. Brazil[51], Bolivia[51], Paraguay[51], Argentina[51]. United States: **Florida**: Alachua (FSCA), Bay (FSCA), Highlands (FSCA), Hillsborough (FSCA, USNM), Marion (FSCA), Pinellas (FSCA). We are aware of anecdotal accounts of this species from southern Louisiana but have seen no specimens. Its native distribution is northern Argentina to southern Brazil and Bolivia, areas with a subtropical – subtemperate climate, suggesting that it may spread over a considerable area of the southeastern United States.

Ecology. In Florida, this cockroach is most commonly found in low, weedy vegetation near lakes, ponds, or marshes. High populations have been observed around residences built in or near these areas.
Comments. *Ischnoptera bilunata* closely resembles *I. bergrothi* (Griffini), a Central American species, and a note on its occurrence in the United States was published under that name due to a misidentification (Atkinson et al. 1990b). Recently, the senior author was able to visit the Hebard collection at the Academy of Natural Sciences in Philadelphia and identify this species correctly.

Ischnoptera deropeltiformis (Brunner)
"dark wood cockroach"
Map 19

Temnopteryx deropeltiformis Brunner 1865: 87.
Ischnoptera deropeltiformis: Hebard 1917a: 63 (taxonomy U.S., figure); Blatchley 1920: 75 (taxonomy eastern U.S., figure); Hebard 1931: 125 (taxonomy Kans.); Hebard 1934: 153 (taxonomy Ill.); Hebard 1938: 12 (taxonomy Okla.); Hebard 1943: 262 (taxonomy Tex.); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 173 (taxonomy Iowa); Walker 1957: 270 (ecology Tenn.); Roth & Willis 1960: (ecology, photo); Helfer 1963: 38 (key U.S., figure); Lawson 1967: 269 (ecology Kans.); Roth 1968: 100 (ootheca); Princis 1969: 747 (world catalog); Dakin & Hays 1970: 15 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Gorton 1980: 21 (ecology Kans.); Pratt 1988: 884 (checklist U.S.); Lago et al. 1988: 87 (distribution Miss.); Peck & Beninger 1989: 615 (ecology Fla.); Atkinson et al. 1990a: 314 (taxonomy Fla.).
Ischnoptera nigricollis Walker 1868: 118.
Ischnoptera johnsoni Rehn 1903: 234; Hebard 1917a: 63.
Ischnoptera intricata Blatchley 1903: 186.

Distribution. Eastern United States: **Alabama**: Clay (LSUC)[26], Covington[14], DeKalb[14], Houston[14], Lee[14], Madison[14], Perry[14], St. Clair[14], Talladega[14], Tallapoosa[14], Winston[14]; **Arkansas**: Baxter (FSCA), Hempstead



Map 19. *Distribution of* Ischnoptera deropeltiformis *(Brunner).*

(CASC), Washington (USNM); **Connecticut**: Fairfield (USNM); **District of Columbia**[26], **Florida**: Alachua (FSCA), Bay (FSCA), Bradford (FSCA), Broward[2], Clay (FSCA), Collier[26], Dade (FACA)[26], Duval[26], Escambia (FSCA), Gadsen[26], Glades[4], Gulf (USNM), Hendry (USNM), Highlands (FSCA)[2], Hillsborough[40], Lee (USNM), Levy[26], Liberty (FSCA), Marion (FSCA), Monroe (incl. Keys) (USNM, FSCA)[26,45], Polk[26], St. Johns (FSCA)[26], St. Lucie[26], Seminole[26], Volusia[26], Walton[26]; **Georgia**: Barton (USNM), Bibb[26], Clarke (FSCA), Glynn[26], Meriwether[26], Rabun[26]; **Iowa**: Cedar[20], Henry[20], Jackson[20], Johnson[26], Lee[26], Linn[20], Muscatine[20]; **Illinois**: Jackson[32], Jersey (ANSP), Marshall[4];

Indiana: Crawford[26], Marion (FSCA), Vigo[4]; **Kansas**: Chataqua[30], Douglas (FSCA)[30], Franklin[26], Montgomery[30], Riley[40]; **Kentucky**: Trigg (FSCA); **Louisiana**: Bienville[26], Calcasieu (LSUC), E. Baton Rouge (EGRC, FSCA, LSUC), Natchitoches (LSUC), Orleans[26], Plaquemines (LSUC), St. John the Baptist (FSCA), W. Feliciana (LSUC); **Maryland**: Anne Arundel (USNM), Montgomery[26]; **Missouri**: Randolph (EGRC), St. Louis[26], Texas[26]; **Mississippi**: Hancock[30], Stone (UMIC), Tishomingo (UMIC); **North Carolina**: Alamance (CASC), Buncombe[26], Chatham (NCSU), Columbus (NCSU), Dare (USNM), Durham (NCSU), Moore[26], Polk[26], Wake[26]; **New Jersey**: Atlantic[26], Gloucester[26], Ocean[26]; **Ohio**: Tuscarawas (USNM); **Oklahoma**: Garfield (FSCA), Kiowa[35], Latimer (FSCA), LeFlore[35], McCurtain[30]; **Pennsylvania**: Cumberland[26], Delaware[26]; **South Carolina**: Charleston (NCSU), Spartanburg[26]; **Tennessee**: Benton (FSCA)[59], Chester[17], Hardeman[40], Knox[40]; **Texas**: Brazos[36], Colorado[36], Dallas[26], Ellis[36], Fort Bend[36], Harris[26], Henderson[36], Kendall[26], Kerr[26], Lamar[26], Marion[36], McLennan[26], Orange (CASC), Van Zandt[36], Victoria[26]; **Virginia**: Albemarle[26], Alexandria[26]; Appomattox[26]; Arlington[26], Bath[26], Essex[26], Fairfax[26], Montgomery[26], Spottsylvania[26].

Ecology. *Ischnoptera deropeltiformis* is found principally on the ground, under litter, logs, etc. (Hebard 1917a, Blatchley 1920). This species has been reported from tropical hardwood hammocks in Dade County, and the upper and lower Keys and pinelands in Dade County (Peck & Beninger 1989). Friauf (1953) found this species very commonly in a wide variety of scrub, flatwoods, and hammock communities in northeastern Florida. Gorton (1980) observed this species frequently in shrub and grassland communities in Kansas.

Ischnoptera nox Hebard

Ischnoptera nox Hebard 1919: 68

Distribution. Panama (type locality). United States: **Florida**: Broward (FSCA, USNM).

Comments. This is the first report of this species from the United States. It was discovered during a survey of peridomestic cockroaches in southern Florida (T.H. Atkinson & J.R. Mangold, unpublished data). At present, a single, well-established population is known from a suburban commercial area in Ft. Lauderdale. The cockroaches have been found in large numbers in extensively landscaped grounds of several motels. The area is within 2 km of an airport and within 1 km of a major north - south freeway.

Florida specimens were directly compared with the holotype and paratype series in the National Museum of Natural History by T.H. Atkinson.

Ischnoptera rufa occidentalis Saussure

Hebard (1917) believed that this species, known from southern Mexico and Central America, was not actually established in the United States and that existing records from New Orleans and "Texas" constituted interceptions in ports. Twenty-five years later, after extensive field work in Texas, he

maintained this opinion in the absence of new specimens (Hebard 1943). No additional specimens of this species have been deposited in the collections examined by T.H. Atkinson including regional collections from Louisiana and Texas.

Latiblattella lucifrons Hebard
"pale headed cockroach"
Map 20

Latiblattella lucifrons Hebard 1917a: 43 (description, taxonomy U.S., figure); Hebard 1935b: 273 (taxonomy Ariz.); Ball et al. 1942: 265 (taxonomy Ariz.); Roth & Willis 1960: 11 (ecology); Helfer 1963: 39 (key U.S.); Princis 1969: 770 (world catalog); Pratt 1988: 884 (checklist U.S.).

Distribution. Mexico. United States: **Arizona**: Pima[26], Sta. Cruz (USNM)[26].

Ecology. Found feeding on pollen and dead insects in flower stalks of *Yucca* sp. in southern Arizona (Ball et al. 1942).

***Latiblattella rehni* Hebard**
"Rehn's cockroach"
Map 20

Latiblattella rehni Hebard 1917a: 38 (description, taxonomy U.S., figure); Blatchley 1920: 69 (taxonomy eastern U.S., figure); Roth & Willis 1960: 11 (ecology); Helfer 1963: 38 (key U.S., fig.); Princis 1969: 769 (world catalog); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 315 (taxonomy Fla.).

Distribution. Bahamas, Cuba[51]. United States: **Florida**: Alachua (FSCA)[26], Broward (USNM)[26], Charlotte[26], Collier[26], Dade (FSCA, USNM)[26], Highlands (FSCA, USNM)[2], Indian River (USNM), Lee[2], Monroe (incl. Keys) (FSCA, USNM)[26], Palm Beach (FSCA)[26], Pinellas[4], Polk[26].

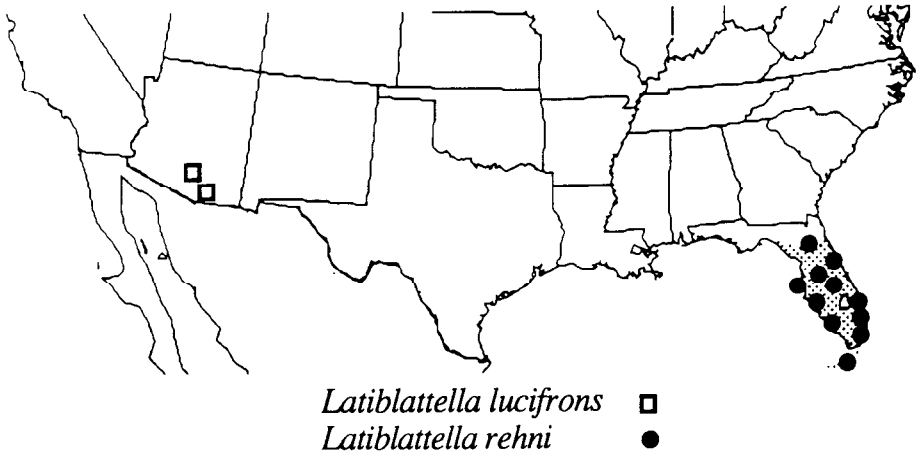
Ecology. This species is found in native habitats (Blatchley 1920; M.A. Deyrup, personal communication). It has also been found in attics in northcentral Florida (Atkinson et al. 1990a). It has been collected in Spanish moss and other arboreal situations (Hebard 1917a, Blatchley 1920).

Neoblattella detersa (Walker)

Blatta detersa Walker 1868: 215.

Neoblattella detersa: Hebard 1917a: 262 (taxonomy); Roth & Willis 1960: 11 (ecology); Roth 1968: 95 (ootheca); Princis 1969: 791 (world catalog); Peck & Beninger 1989: 615 (presence in U.S., ecology Fla.); Atkinson et al. 1990a: 315 (taxonomy Fla.).

Distribution. Haiti[26], Jamaica[26]. United States: **Florida**: Dade (FSCA, USNM)[45], Monroe[45].



Map 20. *Distribution of* Latiblattella lucifrons *Hebard and* L. rehni *Hebard.*

Ecology. Peck & Beninger (1989) collected this species in tropical hardwood hammocks of Dade County and the upper and lower Keys and in open pinelands in Dade County Specimens were collected in landscaped plantings around a residence in northern Dade County (T.H. Atkinson & J.R. Mangold, unpublished data).

Comments. Reports of this species before Peck & Beninger (1989) were based on misidentifications of *Latiblatella rehni* Hebard.

***Parcoblatta americana* (Scudder)**
"western wood cockroach"
Map 21

Loboptera americana Scudder 1901: 93.

Parcoblatta americana: Hebard 1917a: 85 (taxonomy U.S., figure); Ball et al. 1942: 265 (taxonomy Ariz.); Roth & Willis 1960: 12 (ecology); Helfer 1963: 41 (key U.S., figure); Princis 1969: 716 (world catalog); Pratt 1988: 884 (checklist U.S.).

Distribution. Mexico: Baja California[51]. United States: **Arizona**: La Paz[26]; **California**: Alpine (CASC), Amador (USNM), Calaveras (CASC), El Dorado (CASC, NCSU), Fresno (CASC)[26], Humboldt[26], Kern (USNM), Los Angeles (FSCA)[26], Mariposa (USNM), Mendocino (CASC), Mono (CASC, USNM), Monterey (UMIC), Napa (CASC), Plumas (UAIC), Riverside (USNM), San Bernardino (USNM), San Diego (CASC)[26], San Mateo[26], Santa Clara (USNM, TAMU), Shasta (FSCA, NCSU), Siskiyou[26], Sonoma[26], Stanislaus (CASC),

Tulare (CASC)[26]; **Nevada**: Washoe (CASC, USNM)[26]; **Oregon**: Benton (CASC, USNM, FSCA), Douglas (FSCA), Jackson (FSCA), Jefferson (USNM), Linn (USNM), Polk (USNM).

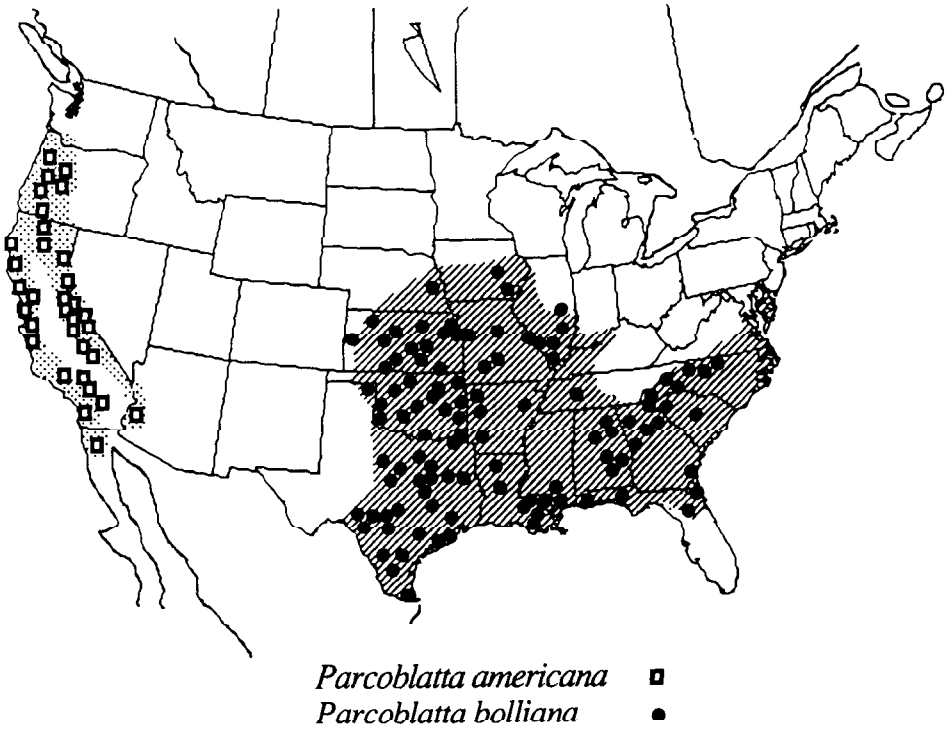
Ecology. Found in humid montane habitats in the far western United States. It is occasionally reported near houses (Ebeling 1975).

Parcoblatta bolliana (Saussure & Zehntner)
"Boll's wood cockroach"
Map 21

Ischnoptera bolliana Saussure & Zehntner 1893: 4.

Parcoblatta bolliana: Hebard 1917a: 77 (taxonomy U.S., figure); Blatchley 1920: 80 (taxonomy eastern U.S.); Hebard 1931: 125 (taxonomy Kans.); Hebard 1934: 154 (taxonomy Ill.); Hebard 1938: 12 (taxonomy Okla.); Hebard 1943: 263 (taxonomy Tex.); Froeschner 1954: 175 (taxonomy Iowa); Roth & Willis 1960: 12 (ecology); Helfer 1963: 40 (key U.S., figure); Lawson 1967: 267 (ecology Kans.); Roth 1968: 98 (ootheca); Princis 1969: 715 (world catalog); Dakin & Hays 1970: 16 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Gorton 1980: 21 (ecology Kans.); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 315 (taxonomy Fla.).

Distribution. Alabama: Baldwin (UAIC), Bibb (UAIC), Cherokee[14], DeKalb[14], Lee[14], Macon (ANSP), Tallapoosa[14]; **Arkansas**: Cross (UADE), Hempstead (ANSP, CASC), Logan (USNM), Washington (CASC); **Florida**: Alachua (FSCA), Duval (USNM), Okaloosa (FSCA, UAIC); **Georgia**: Chatooga (UAIC), Clarke (FSCA), Fulton[26], Glynn[26], Harris (CASC), Rabun[26]; **Iowa**: Johnson[26], Lee[26], **Illinois**: Clay[30], Coles[32], Jackson[30], Parker[32], St. Clair[32], Washington[30]; **Kansas**: Chataqua[30], Clark[30], Douglas[26], Ellis[26], Hamilton[30], Kiowa[30], Leavenworth[30], Marion[30], Medora[30], Ness[30], Reno[30], Riley[40], Sedgewick[26], Wyandotte[30]; **Louisiana**: E. Baton Rouge (LSUC)[26], E. Feliciana (LSUC), Natchitoches (LSUC), St. James (LSUC), St. John the Baptist (FSCA), St. Tammany (LSUC), Union (LSUC), W. Feliciana (FSCA); **Missouri**: Boone (USNM), Greene (ANSP), Jackson (FSCA), St. Louis (USNM), Wright[26]; **Mississippi**: Hancock (UAIC), Lamar (UMIC); **North Carolina**: Buncombe[26], Graham (UAIC), Guilford (NCSU), Polk[26], Wake (NCSU)[26], Wilkes (NCSU); **Nebraska**: Otoe[26]; **Oklahoma**: Alfalfa (ANSP)[35], Caddo[35], Canadian[35], Delaware[35], Dewey[35], Greer[35], LeFlore[35], Marshall[35], McCurtain[35], Okfuskee[35], Pawnee[35], Payne[26], Roger Mills[35], Sequoyah[35]; **South Carolina**: Lexington[26], Pickens (USNM); **Tennessee**: Chester[17]; **Texas**: Anderson (TAMU), Bexar (TAMU), Blanco[26], Brazoria (TAMU), Brazos (TAMU)[36], Cameron (TAMU)[26], Cherokee (TAMU), Colorado[36], Dallas[36], Denton (TAMU), Duval[26], Eastland[36], Ellis[36], Galveston[26], Harris[26], Johnson[36], Kerr[36], Lamar[26], La Salle[36], Lipscomb (TAMU), Live Oak[36], McLennan[26], Palo Pinto[36], Real[26], Travis[26], Uvalde[26]. Based on distributions of other species of *Parcoblatta*, *P. bolliana* probably also occurs in Kentucky, Indiana, and Ohio along the Ohio River, and along the



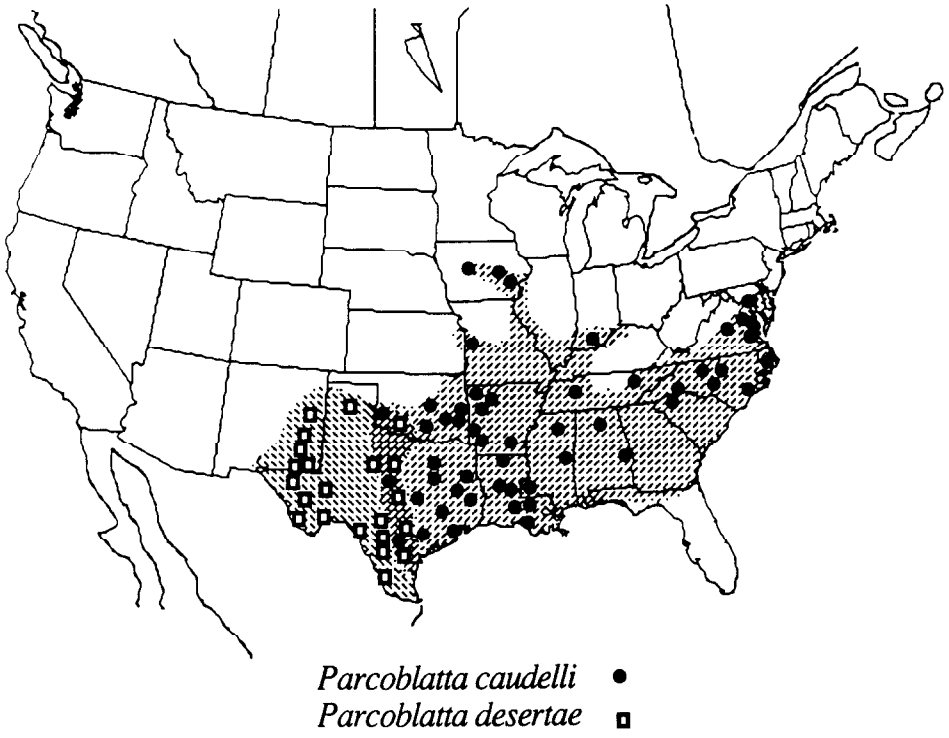
Map 21. *Distribution of* Parcoblatta americana *(Scudder) and* P. bolliana *(Saussure & Zehntner).*

Atlantic seaboard into Virginia and possibly Maryland.

Ecology. In Alabama, it is found in wooded areas where it is associated with leaf litter and loose bark (Dakin & Hays 1970). In Kansas, it has been reported from grasslands (Lawson 1967) and shrub communities (Gorton 1980). Lawson (1967) stated that young nymphs are consistently associated with nests of ants of the genus *Crematogaster* but did not elaborate on the nature of the association. No ant associations have been reported for any other species of *Parcoblatta*.

Parcoblatta caudelli Hebard
"Caudell's wood cockroach"
Map 22

Parcoblatta caudelli Hebard 1917a: 122 (description, taxonomy U.S., figure); Hebard 1938: 12 (taxonomy Okla.); Hebard 1943: 266 (taxonomy Tex.); Froeschner 1954: 177 (taxonomy Iowa); Walker 1957: 269 (ecology Tenn.); Roth & Willis 1960: 12 (ecology); Helfer 1963: 45 (key U.S., figure); Roth 1968: 98 (ootheca); Princis 1969: 722 (world catalog); Dakin & Hays 1970: 16



Map 22. *Distribution of* Parcoblatta caudelli *Hebard and* P. desertae *Rehn & Hebard.*

(taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Pratt 1988: 884 (checklist U.S.).

Distribution. Alabama: Lee[14], Morgan (USNM); **Arkansas**: Benton (UADG), Bradley (FSCA), Hempstead (CASC), Johnson (UADG), Logan (USNM), Polk[26]; **District of Columbia**[26], **Iowa**: Boone[20], Johnson[20], Muscatine[20]; **Indiana**: Crawford[26]; **Louisiana**: E. Baton Rouge (EGRC), Natchitoches (LSUC), St. Mary (LSUC), Union (LSUC), W. Feliciana (FSCA); **Maryland**: Calvert (USNM), Prince George (USNM); **Missouri**: Vernon (FSCA); **Mississippi**: Adams (UMIC), Clarke (CASC), Lafayette (UMIC)[26]; **North Carolina**: Currituck (USNM), Forsythe (NCSU), Jones (NCSU), Moore[26], Polk[26], Wake (NCSU)[26]; **Oklahoma**: Beckham[35], Carter (TAMU), Cleveland (CASC), Latimer (FSCA) LeFlore[95], Sequoyah (USNM); **South Carolina**: Spartanburg[26]; **Tennessee**: Benton[59], Chester[17], Knox[40]; **Texas**: Anderson (TAMU), Bexar (TAMU), Brazos (TAMU)[36], Collin[36], Colorado[36], Dallas[26], Harris (TAMU), McLennan[26], Nacogdoches (TAMU), Smith (TAMU); **Virginia**: Albemarle[26], Essex[26], Fairfax[26], Lancaster (NCSU), New Kent (NCSU).

Aiken (USNM); **Tennessee**: Chester[17], Obion[40]; **Texas**: Liberty[36]; **Virginia**: Prince George[26], Suffolk (USNM, NCSU); **Wisconsin**: "Wisconsin"[40]. Based on the distributions of other species of *Parcoblatta*, we would expect this species to be found along the Mississippi and Ohio River Valleys of the central United States in Illinois and Kentucky. Lawson (1967) cited this species from "Wisconsin," well to the north of any other known locality. This record requires confirmation.

Ecology. *Parcoblatta divisa* has been collected in dry pinelands, oak scrub, and moist hammocks in northern Florida and in deep cool ravines along the Appalachicola River (Hebard 1943). In Kansas, this species overwinters as nymphs; it is found on borders of woodlands and pastures, sometimes invading houses built in wooded areas (Lawson 1967).

Parcoblatta fulvescens (Saussure & Zehntner)

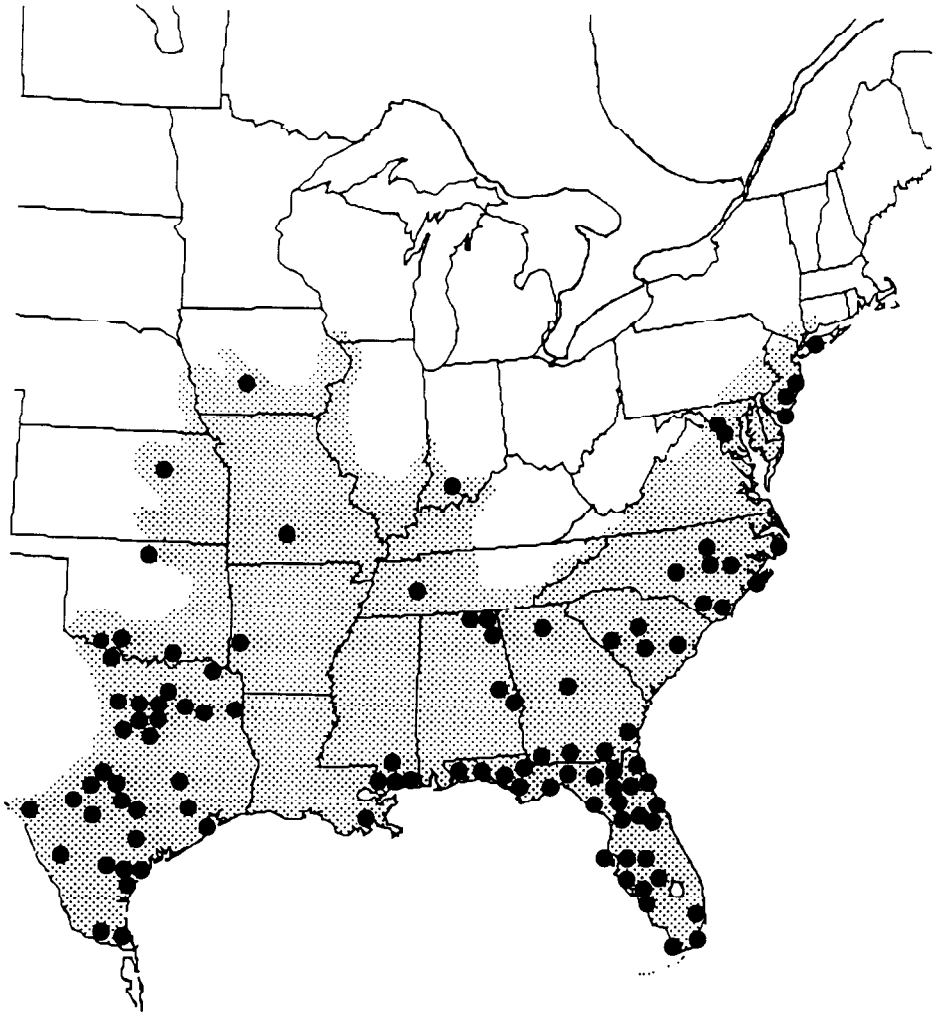
"fulvous wood cockroach"

Map 24

Ischnoptera uhleriana var. *fulvescens* Saussure & Zehntner 1893: 36.

Parcoblatta fulvescens: Hebard 1917a: 114 (taxonomy U.S., figure); Blatchley 1920: 83 (taxonomy eastern U.S., figure); Hebard 1931: 126 (taxonomy Kans.); Hebard 1934: 155 (taxonomy Ill.); Hebard 1938: 12 (taxonomy Okla.); Hubbard & Goff 1939: 154 (ecology Fla.); Hebard 1943: 265 (taxonomy Tex.); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 176 (taxonomy Iowa); Roth & Willis 1960: 12 (ecology); Helfer 1963: 43 (key U.S., figure); Lawson 1967: 268 (ecology Kans.); Roth 1968: 98 (ootheca); Princis 1969: 721 (world catalog); Dakin & Hays 1970: 16 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Pratt 1988: 884 (checklist U.S.); Lago et al. 1988: 87 (distribution Miss.); Peck & Beninger 1989: 615 (ecology Fla.); Atkinson et al. 1990a: 316 (taxonomy Fla.).

Distribution. Eastern United States: **Alabama**: DeKalb[14], Jackson[14], Lee[14], Madison[14], Tallapoosa[14]; **Arkansas**: Polk[26]; **District of Columbia**[26], **Florida**: Alachua (FSCA)[61], Baker (FSCA), Bay (FSCA), Broward[26], Charlotte[26], Dade (FSCA)[26], Duval[26], Escambia (FSCA), Gulf (USNM), Highlands (FSCA)[2], Hillsborough[26], Jefferson (FSCA), Lake[26], Lee[26], Levy (FSCA), Liberty (FSCA), Marion (FSCA), Monroe (FSCA)[26,45], Pinellas[4], Polk[26], Putnam (FSCA, NCSU)[6], St. Johns[26], Sarasota[26], Seminole[26], Suwannee[26], Volusia[26], Wakulla (FSCA); **Georgia**: Bibb[26], Clarke (FSCA), Decatur[26], Glynn[26], Thomas[26]; **Iowa**: Dallas[26]; **Illinois**: Union[32]; **Indiana**: Crawford[4]; **Kansas**: Atchison[30], Montgomery[30], Riley[40]; **Louisiana**: Jefferson (LSUC); **Maryland**: Montgomery[26]; **Missouri**: Wright[26]; **Mississippi**: Hancock[39], Harrison[26], Jackson[26], Stone[26]; **North Carolina**: Bladen (NCSU), Carteret (NCSU), Dare (USNM), Johnston (NCSU), Moore[26], New Hanover (NCSU), Wake (NCSU)[26], Wayne[26]; **New Jersey**: Atlantic[26], Cape May[26], Ocean[26]; **New Mexico**: Eddy (TAMU); **New York**: Suffolk[26]; **Oklahoma**: Comanche[35], Garfield (FSCA), Marshall[35], Tillman[35]; **South Carolina**: Aiken (USNM), Bamberg[26], Georgetown (UAIC), Richland[26]; **Tennessee**: Chester[17]; **Texas**: Aransas (LSUC)[36], Bastrop (TAMU),



Map 24. *Distribution of* Parcoblatta fulvescens *(Saussure & Zehntner).*

Blanco[26], Bexar[26], Bosque[36], Brazos (TAMU), Burnett[26], Caldwell[36], Cameron (TAMU, EGRC)[26], Dallas[26], Dimmitt (UAIC), Ellis[36], Erath (TAMU), Ft. Bend[26], Galveston[36], Harrison[36], Hidalgo (TAMU, FSCA), Johnson[36], Kerr[36], Lamar[26], Live Oak[26], McLennan[26], Nueces (TAMU), Parker (EGRC), San Patricio (EGRC), Smith[26], Tarrant[36], Travis[36], Van Zandt[36], Victoria[26], Wichita[36], Williamson (TAMU), Zavala[26]; **Virginia**: Arlington[26], Fairfax[26], Essex[26]. Despite the lack of published records, this species is undoubtedly found in Kentucky, Illinois, and Virginia. It is the only species of *Parcoblatta* which is found throughout peninsular Florida.

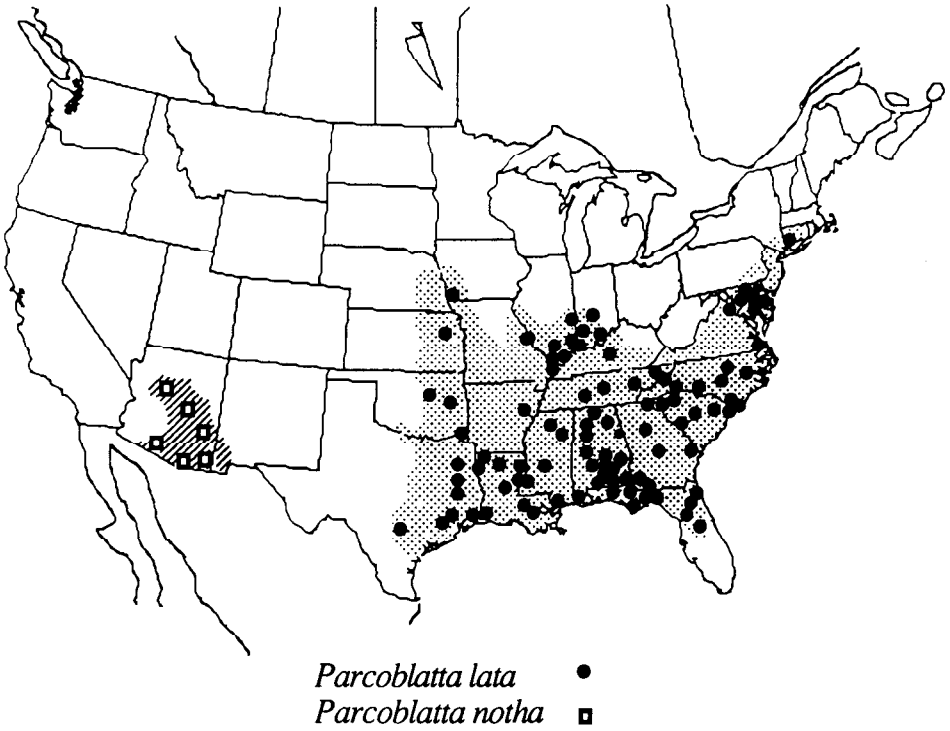
Ecology. This species has been reported from pinelands of Dade County, and tropical hardwood hammocks of the upper and lower Keys (Peck & Beninger 1989). Friauf (1953) found this species only in hammock communities in an ecological study in northeastern Florida (Putnam County). It was more abundant in xeric communities than in mesic or hydric communities. Hubbard & Goff (1939) found females and immatures in burrows of pocket gophers, *Geomys* spp.

Parcoblatta lata (Brunner)
"broad wood cockroach"
Map 25

Ischnoptera lata Brunner 1865: 135.

Parcoblatta lata: Hebard 1917a: 126 (taxonomy U.S., figure); Blatchley 1920: 84 (taxonomy eastern U.S.); Hebard 1931: 126 (taxonomy Kans.); Hebard 1934: 155 (taxonomy Ill.); Hebard 1938: 12 (taxonomy Okla.); Hebard 1943: 266 (taxonomy Tex.); Froeschner 1954: 176 (taxonomy Iowa); Friauf 1953: 122 (ecology Fla.); Moore 1957: 6 (distribution); Roth & Willis 1960: 12 (ecology); Helfer 1963: 44 (key U.S., figure); Lawson 1967: 268 (ecology Kans.); Princis 1969: 722 (world catalog); Dakin & Hays 1970: 16 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Gorton 1980: 21 (ecology Kans.); Pratt 1988: 884 (checklist U.S.); Lago et al. 1988: 87 (distribution Miss.); Atkinson et al. 1990a: 317 (taxonomy Fla.).

Distribution. Eastern United States: **Alabama**: Butler[26], Cherokee[14], Conecuh[26], Covington[14], Dallas[26], DeKalb[14], Elmore[26], Escambia[26], Houston[26], Lawrence[14], Lee[14], Madison[14], Mobile[26], Montgomery[14], Perry[14], Talladega[14], Tallapoosa[14], Winston[14]; **Arkansas**: Cross (UADE); **Connecticut**: New London[41]; **District of Columbia**: "DC"[26]; **Delaware**: "Delaware"[26]; **Florida**: Alachua (FSCA)[36], Duval[26], Gadsen[26], Jackson[26], Leon[26], Levy[26], Liberty (FSCA), Orange (FSCA), Walton[26]; **Georgia**: Bibb[26], Decatur[26], Effingham[26], Fulton[26], Rabun[26], Thomas[26]; **Iowa**: Page[20]; **Illinois**: Clark[36], Jackson[30], Massac[32], Pulaski[32], Union[32], Wabash[30], Washington[30]; **Indiana**: Crawford[26], Gibson[4], Lawrence (UAIC), Posey[26]; **Kansas**: Douglas[30]; **Kentucky**: Edmonson[36]; **Louisiana**: Bossier (LSUC), Caddo (LSUC), Calcasieu[26], E. Baton Rouge (FSCA, LSUC)[26], Madison[26], Ouachita[26], Rapides (TAMU), St. John the Baptist (FSCA), Tensas (LSUC); **Maryland**: Anne Arundel (USNM), Dorchester[26], Harford (NCSU), Montgomery (USNM), Prince Georges[26], Queen Annes[26]; **Missouri**: St. Louis[26]; **Mississippi**: Adams[26], Hancock[39], Hinds[26], Lafayette (UMIC), Oktibbeha[26]; **North Carolina**: Brunswick[26], Buncombe[26], Columbus[26], Mecklenburg (NCSU)[26], Moore[26], Polk[26]; Wake (NCSU)[26], Wayne[26]; **Ohio**: Ottawa (NCSU), **Oklahoma**: McCurtain[35],: Muskogee[35], Payne[36]; **South Carolina**: Aiken (USNM), Florence[26], Richland[26], Horry (USNM), Pickens (USNM), Spartanburg[26]; **Tennessee**: Chester[17], Knox[40], Rutherford (NCSU), Washington[36]; **Texas**: Bexar (TAMU), Cherokee[26], Harris[26], Liberty[36], Orange[26], San Jacinto (USNM), Smith (TAMU); **Virginia**: Chesapeake[26], Fairfax[26].



Map 25. *Distribution of* Parcoblatta lata *(Brunner) and* P. notha *(Rehn & Hebard).*

Ecology. Friauf (1953) found this species rarely in low-lying mesic hammocks in northeastern Florida. Dakin & Hays (1970) considered this the most common species of the genus in Alabama. Hebard (1943) considered it abundant in pinelands of the southeastern coastal plain. Gorton (1980) reported it from grassland and shrub communities in Kansas. Moore (1957) reported an outdoor infestation around houses in Connecticut.

Parcoblatta notha (Rehn & Hebard)
"Arizona wood cockroach"
Map 25

Ischnoptera notha Rehn & Hebard 1910: 442.

Parcoblatta notha: Hebard 1917a: 93 (taxonomy U.S., figure); Hebard 1935b: 273 (taxonomy Ariz.); Ball et al. 1942: 265 (taxonomy Ariz.); Roth & Willis 1960: 12 (ecology); Helfer 1963: 45 (key U.S., figure); Princis 1969: 717 (world catalog); Pratt 1988: 884 (checklist U.S.).

Distribution. Arizona: Cochise (UAIC)[26], Gila (UAIC), Graham (FSCA)[26], Pima (CASC, UAIC)[26], Sta. Cruz (CASC, USNM)[26], Yavapai[26].

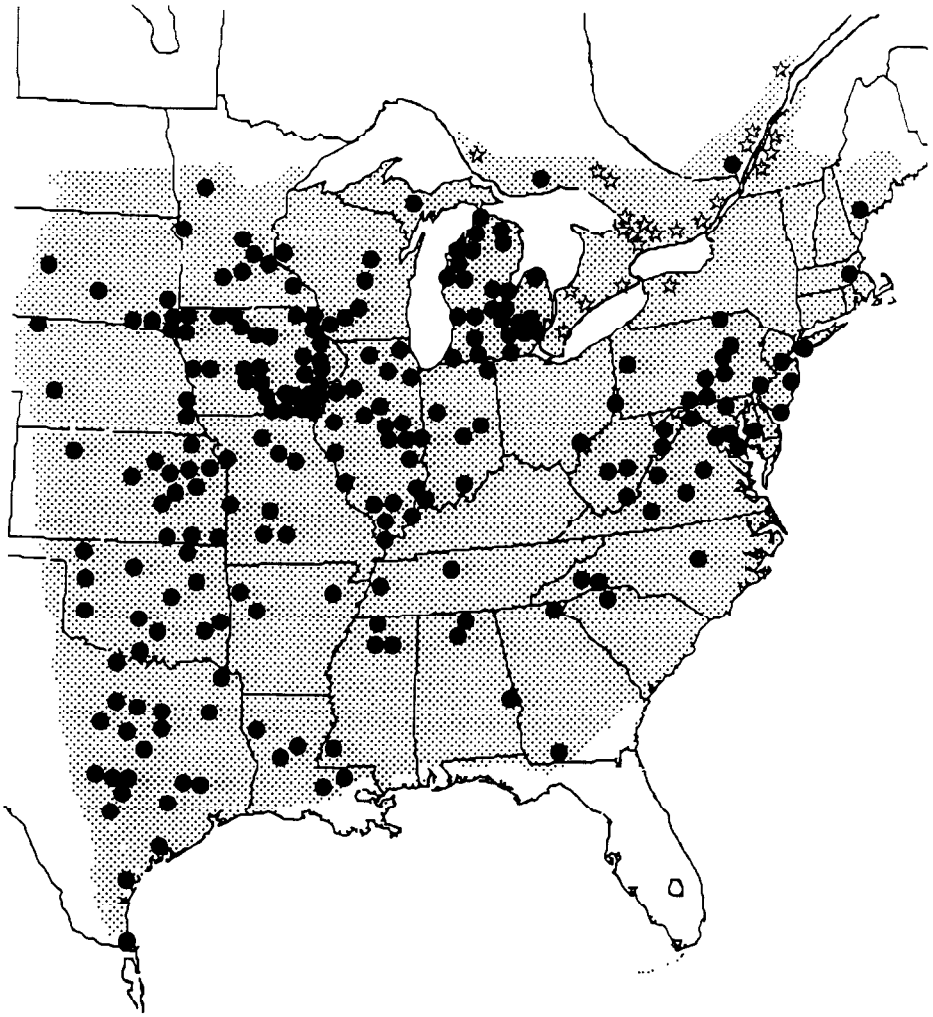
Ecology. This species is found in the upper Sonoran zone in Arizona (temperate montane forests).

Parcoblatta pensylvanica (DeGeer)
Pennsylvania wood cockroach
Map 26

Blatta pensylvanica DeGeer 1773: 537.

Parcoblatta pensylvanica: Hebard 1917a: 139 (taxonomy U.S., figure); Blatchley 1920: 86 (taxonomy eastern U.S., figure); Morse 1920: 308 (taxonomy New England); Hebard 1925: 40 (taxonomy S. Dak.); Hebard 1931: 127 (taxonomy Kans.); Hebard 1932: 20 (taxonomy Minn.); Hebard 1934: 156 (taxonomy Ill.); Hebard 1938: 13 (taxonomy Okla.); Rau 1940: 4 (biol Mo.); Cantrall 1943: 73 (ecology Mich.); Hebard 1943: 268 (taxonomy Tex.); Froeschner 1954: 177 (taxonomy Iowa, figure); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 42 (key east U.S., figure); Lawson 1967: 268 (ecology Kans.); Cantrall 1968: 304 (taxonomy Mich.); Roth 1968: 98 (ootheca); Cornwell 1968: 86 (general information); Princis 1969: 724 (world catalog); Dakin & Hays 1970: 17 (taxonomy Ala.); Ebeling 1975: 236 (general information); Gorton 1980: 21 (ecology Kans.); Vickery & McKevan 1985: 115 (taxonomy Canada); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 317 (taxonomy Fla.).

Distribution. Southeastern Canada: Ontario: Sudbury[26,58]; Quebec: Abbotsford[26,58], Montreal[26]. Eastern United States: **Alabama**: Lee[14], Morgan[26]; **Arkansas**: Lawrence (USNM), Logan (USNM), Washington (FSCA, USNM); **District of Columbia**[26]; **Delaware**: Sussex[26]; **Georgia**: Rabun[26], Thomas[26]; **Iowa**: Allamakee[20], Appanoose[20], Boone[20], Cedar[20], Cerro Gordo[20], Clayton[20], Crawford[20], Dallas[26], Davis[20], Delaware[20], Des Moines[20], Dickinson[20], Emmet[20], Fremont[20], Hancock[20], Henry[20], Iowa[20], Jefferson[20], Johnson[20], Jones[20], Keokuk[20], Kossuth[20], Lee[20], Linn[20], Lucas (UMIC), Lyon[20], Marion[20], Monona[20], Monroe[20], Muscatine[26], Polk[26], Souix[20], Storey[20], Van Buren[20], Wapello[20], Warren[20], Washington[20], Winneshiek[20]; **Illinois**: Champaign[32], Cook[32], Douglas[32], Ford[32], Gallatin[32], Henry[32], Jackson[26], Kane[32], Lake[32], Marshall[32], Mason[32], McDonough (NCSU), McLean[32], Ogle[26], Peoria[26], Piatt[26], Pike[32], Pulaski[32], Rock Island[32], St. Clair[32], Vermillion[32], Wabash[32], Washington[32]; **Indiana**: Crawford[26], Marion[26], McHenry[26], Posey (FSCA), Steuben[26], Tippecanoe (USNM, WVDA); **Kansas**: Brown[26], Chase[30], Chataqua[30], Cherokee[30], Douglas (FSCA), Graham[30], Lyon[30], Montgomery[26], Osage[26], Riley[40], Saline[30], Shawnee[26], Wabaunsee[30]; **Louisiana**: DeSoto (USNM)[26], E. Baton Rouge (EGRC), E. Feliciana (LSUC), Grant (LSUC), Natchitoches (LSUC); **Massachussetts**: Middlesex[26]; **Maine**: Cumberland[26]; **Maryland**: Calvert (USNM), Harford (NCSU), Prince Georges (NCSU)[26], Queen Annes[26]; **Michigan**: Allegan[8], Bay[26], Benzie[8], Berrien[8], Charlevoix[8], Clinton[8], Emmett[8], Genesee[8], Grand Traverse[8], Gratiot[8], Hillsdale[8], Huron[8], Jackson[8], Kalamazoo[8], Kent[8], Lake[8], Livingston[7], Mason[8], Manistee[8], Marquette[8], Midland[8], Montcalm[8], Montmorency[8], Musk[8], Oakland[8], Oscola[8], St. Joseph[8], Shiawassee[8], Washtenaw[8], Wayne[8]; **Minnesota**: Big Stone[31],



Map 26. *Distribution of* Parcoblatta pensylvanica *(DeGeer). Stars are taken from map (exact localities not specified) in Vickery & McKevan (1985).*

Goodhue[31], Hennepin[31], LeSeur[31], Nicollet[31], Ottertail[31], Ramsey[26]; **Missouri**: Boone (USNM), Greene (ANSP), Hickory (TAMU), Jackson (FSCA), Linn[26], Randolph (EGRC), St. Louis (USNM)[26], Vernon (FSCA), Wright[26]; **Mississippi**: Adams[26], Lafayette (UMIC), Marshall (UMIC), Pontotoc (UMIC); **North Carolina**: Buncombe[26], Polk (USNM), Wake[26]; **Nebraska**: Cass[26], Cherry[26], Lincoln[26], Otoe[26]; **New Jersey**: Cape May[26], Middlesex[26], Ocean[26]; **New York**: Richmond[26]; **Ohio**: Meigs[26]; **Oklahoma**: Alfalfa[35], Atoka[26], Craig[35], Kiowa[35],

Latimer (FSCA), LeFlore[26], Marshall[35], Muskogee[35], Okfuskee[35], Payne[26], Pontotoc[35], Woodward (FSCA); **Pennsylvania**: Adams[26], Bradford[26], Cumberland[26], Dauphin[26], Fulton[26], Mercer[26], Montour[26], Northumberland[26], Philadelphia[26]; **South Carolina**: Spartanburg[26]; **South Dakota**: Bon Homme[28], Brule[28], Jones[28], Lincoln[28], Minnehaha[28], Union[28], Yanktown[28]; **Tennessee**: Davidson[26], Dyer (FSCA); **Texas**: Bexar (TAMU), Bowie[36], Brazos (TAMU)[36], Burnett (FSCA), Caldwell[36], Cameron[26], Cherokee (TAMU), Clay[26], Colorado (USNM), Dallas[26], Eastland[36], Ellis[36], Gonzales (LSUC); Jackson[36], Kerr (USNM), McLennan[26], Palo Pinto[36], Parker (EGRC), San Jacinto (USNM), San Patricio (USNM), Travis[36], Williamson (TAMU); **Virginia**: Alexandria[26], Bath[26], Fairfax[26], Montgomery[26], Nelson[26], Spottsylvania[26]; **Vermont**: Grand Isle[42]; **Wisconsin**: Dane[26], Grant[26], Iowa[26], Polk[26], Shawano (NCSU), Waushara (USNM); **West Virginia**: Brooke[26], Hardy (WVDA), Jefferson (WVDA), Kanawha (WVDA), Mineral (WVDA), Monroe (WVDA), Nicholas (WVDA). This species has been collected in Thomas County, Ga., and probably occurs in northwestern Florida as well. The record from Brownsville, Tex. (Hebard 1917a) seems unlikely, although there are other records from central Texas.

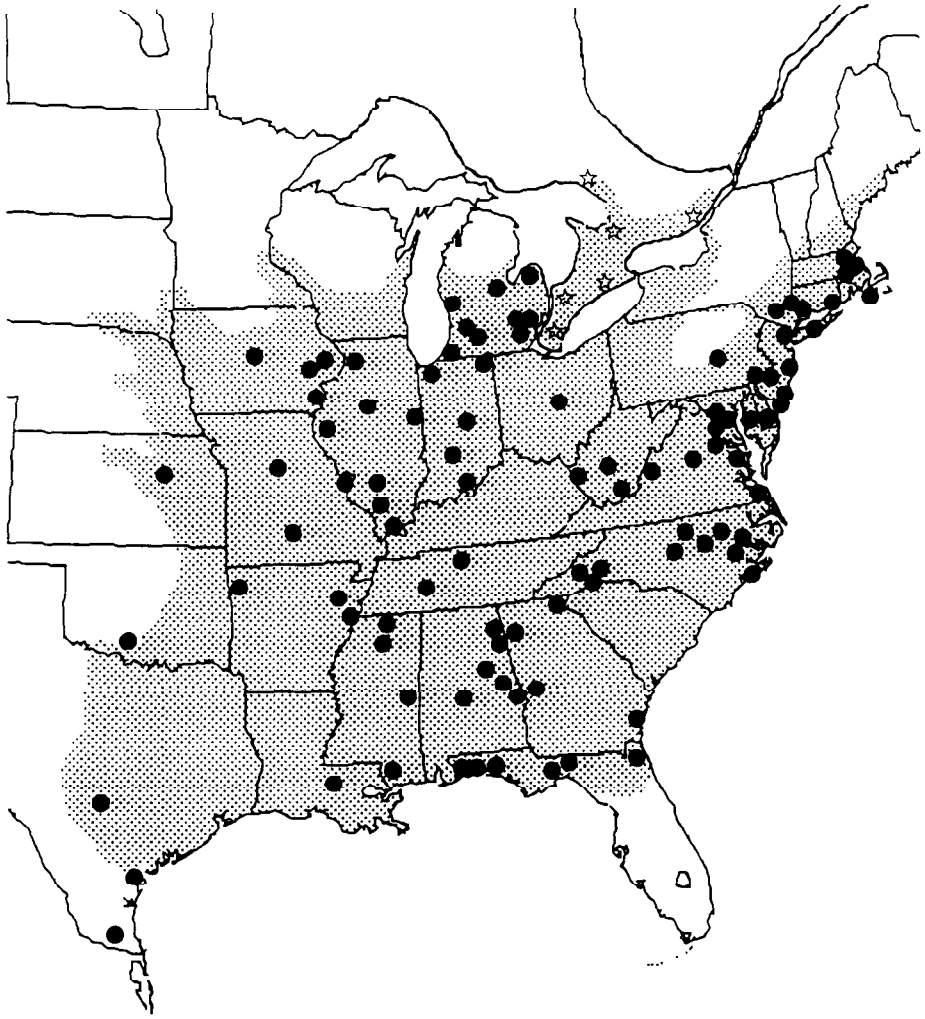
Ecology. Froeschner (1954) considered this to be the commonest native cockroach in Iowa. In Kansas, it is found in open timbered areas with little ground cover (Lawson 1967) and in forest, shrub, and grassland communities (Gorton 1980).

Parcoblatta uhleriana (Saussure)
"Uhler's wood cockroach"
Map 27

Ischnoptera uhleriana Saussure 1862: 169.

Parcoblatta uhleriana: Hebard 1917a: 105 (taxonomy U.S., figure); Blatchley 1920: 81 (taxonomy east U.S., figure); Hebard 1934: 155 (taxonomy Ill.); Cantrall 1943: 72 (ecology Mich.); Lawson 1954: 14 (ootheca); Froeschner 1954: 175 (taxonomy Iowa); Walker 1957: 269 (ecology Tenn.); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 43 (key U.S., figure); Lawson 1967: 268 (ecology Tenn.); Cantrall 1968: 304 (taxonomy Mich.); Roth 1968: 98 (ootheca); Princis 1969: 719 (world catalog); Dakin & Hays 1970: 16 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Gorton 1980: 21 (ecology Kans.); Vickery & McKevan 1985: 113 (taxonomy Canada); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 318 (taxonomy Fla.).

Distribution. Southeastern Canada: Ontario[58]. Eastern United States: **Alabama**: Cherokee[14], DeKalb[14], Lauderdale (FSCA), Lee[26], Perry[14], Talladega[14], Tallapoosa[14]; **Arkansas**: Cross (UADE), Lee (NCSU), Washington (FSCA, UADE); **Connecticut**: New Haven[26], New London[26]; **District of Columbia**[26], **Delaware**: Sussex (USNM); **Florida**: Duval[26], Escambia (FSCA), Leon (FSCA), Liberty (FSCA), Okaloosa (FSCA), Sta. Rosa (FSCA); **Georgia**: Chatooga (UAIC), Glynn[26], Harris (CASC), Rabun[26]; **Iowa**: Cedar[20], Henry[20], Johnson[26], Story[20]; **Illinois**: Carrol[32], Jackson[32], McDonoush (NCSU), Parker[32], Peoria[26], Pulaski[32], Vermillion[32], Washington[32]; **Indiana**: Crawford[26], Lawrence[4],



Map 27. *Distribution of* Parcoblatta uhleriana *(Saussure). Stars are taken from map (exact localities not specified) in Vickery & McKevan (1985).*

Marion[4], Porter (UAIC), Steuben[4]; **Louisiana**: E. Baton Rouge (EGRC); **Kansas**: Riley[40]; **Massachussetts**: Dukes[26], Middlesex[26], Norfolk[26], Suffolk[26]; **Maryland**: Harford (NCSU), Montgomery[26], Queen Annes[26]; **Michigan**: Allegan[8], Berrien[8], Huron[8], Kalamazoo[8], Livingston[7], Midland[8], Musk[8], Oakland[8], Washtenaw[8], "Saginaw Bay"[4]; **Missouri**: Boone (USNM), St. Louis (USNM)[26], Wright[26]; **Mississippi**: Clarke (CASC), Lafayette (UMIC), Marshall (UMIC), Pearl River (LSUC); **North Carolina**: Beaufort (NCSU), Bun-

combe[26], Carteret (NCSU), Durham (LSUC, NCSU, USNM), Edgecombe (NCSU), McDowell (NCSU), Pitt (NCSU), Polk (USNM), Randolph (NCSU), Wake (NCSU)[26]; **New Jersey**: Atlantic[26], Bergen[26], Camden[26], Cape May[26], Ocean[26]; **New York**: Orange[26], Richmond[26], Suffolk[26]; **Ohio**: Franklin (FSCA); **Oklahoma**: Comanche (USNM); **Pennsylvania**: Chester[26], Dauphin[26], Delaware[26]; **Tennessee**: Benton (FSCA)[59], Chester[17], Davidson[26]; **Texas**: Hidalgo (USNM), Kerr (USNM), San Patricio (USNM); **Virginia**: Albemarle[26], Alexandria[26], Arlington[26], Bath[26], Essex[26], Queen Anne (USNM), Spotsylvania[26]; **West Virginia**: Kanawha (WVDA), Monroe (WVDA), Wayne (WVDA). South Carolina, Kentucky, and Louisiana lie well within the range of known localities, even though there are no published records from these states.

Ecology. Reported from forested areas in Kansas (Lawson 1967, Gorton 1980).

Parcoblatta virginica (Brunner)

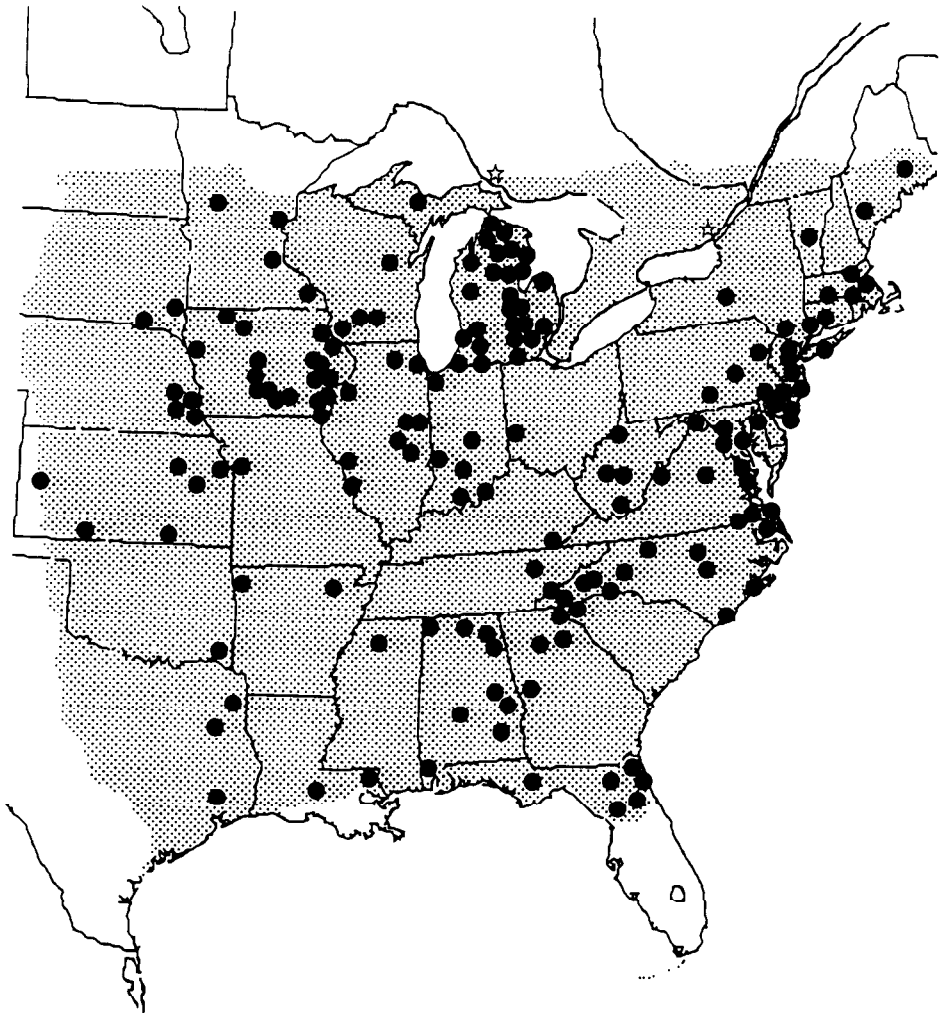
"Virginia wood cockroach"

Map 28

Temnopteryx virginica Brunner 1865: 86.

Parcoblatta virginica: Hebard 1917a: 96 (taxonomy U.S., figure); Blatchley 1920: 82 (taxonomy eastern U.S., figure); Morse 1920: 306 (taxonomy New England); Hebard 1925: 40 (taxonomy S. Dak.); Hebard 1931: 126 (taxonomy Kans.); Hebard 1932: 20 (taxonomy Minn.); Hebard 1934: 154 (taxonomy Ill.); Cantrall 1943: 72 (ecology Mich.); Hebard 1943: 265 (taxonomy Tex.); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 176 (taxonomy Iowa); Roth & Willis 1960: 12 (ecology); Helfer 1963: 41 (key U.S., figure); Lawson 1967: 269 (ecology Kans.); Cantrall 1968: 304 (taxonomy Mich.); Roth 1968: 98 (ootheca); Princis 1969: 718 (world catalog); Dakin & Hays 1970: 15 (taxonomy Ala.); Fisk 1974: 36 (distribution Tenn.); Gorton 1980: 21 (ecology Kans.); Vickery & McKevan 1985: 112 (taxonomy Canada); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 318 (taxonomy Fla.).

Distribution. Southeastern Canada: Ontario[58]. Eastern United States: **Alabama**: Cherokee[14], DeKalb[14], Lauderdale (FSCA), Lee[26], Madison (FSCA)[14], Mobile[14], Perry[14], Pike[14], Tallapoosa[14]; **Arkansas**: Lawrence (USNM), Washington (UADE); **Connecticut**: Fairfield (USNM), New Haven[26], **Florida**: Alachua (USNM), Columbia (USNM), Duval (USNM), Liberty (FSCA), Nassau[26], Putnam[19]; **Georgia**: Harris (CASC), Rabun (CASC)[26]; **Iowa**: Cedar[20], Clayton[20], Des Moines[20], Dickinson[20], Dubuque[20], Fremont[20], Henry[20], Johnson[20], Lee[20], Linn[20], Louisa[20], Marion[20], Monroe[20], Muscatine[20], Palo Alto[20], Polk[20], Story[20], Wapello[20], Warren[20], Washington[20], Woodbury[20]; **Indiana**: Clarke[26], Crawford[26], Lake[26], Lawrence[26], Marion[26], Vigo[26]; **Illinois**: Champaign[32], Coles[32], Cook[32], Jackson[32], Piatt[32], Pike[32], Pulaski[32], Rock Island[26], Union[32], Vermillion[32], Wabash[32], Washington[32]; **Kansas**: Clark[30], Cowley[26], Johnson (UMIC), Osage[26], Riley[40], Wallace[30], Wyandotte[30]; **Kentucky**: Bell[26]; **Louisiana**: E. Baton Rouge (FSCA, LSUC), Washington (LSUC); **Massachussetts**: Hampden[26], Middlesex[26], Norfolk[26], Suffolk[26]; **Maryland**:



Map 28. *Distribution of* Parcoblatta virginica *(Brunner). Stars are taken from map (exact localities not specified) in Vickery & McKevan (1985).*

Anne Arundel (USNM), Montgomery[26], Prince Georges (NCSU, USNM), Queen Annes[26]; **Maine**: Oxford[26], Penobscot[26]; **Michigan**: Alcona[8], Allegan[8], Berrien[8], Charlevoix[8], Cheboygan (FSCA)[8], Clinton[8], Emmett[8], Grand Traverse[8], Gratiot[8], Hillsdale[8], Huron[8], Ingham[8], Iosco[8], Jackson[8], Kalamazoo[8], Kent[8], Lake[8], Livingston[7], Marquette[8], Midland[8], Montmorency[8], Oakland[8], Ogemaw[8], Otsego[8], Roscommon[8], Saginaw[8], St. Joseph[8], Shiawassee[8], Washtenaw[8]; **Missouri**: Jackson (FSCA), St. Louis (USNM)[26]; **Mississippi**: Lafayette (UMIC); **Minnesota**: Goodhue[31], Hennepin[31], Mahnomen[31], Pine[31];

North Carolina: Buncombe (NCSU)[26], Carteret (NCSU), Currituck (USNM), Harnett[26], Haywood (FSCA, NCSU), Jackson (NCSU), Madison (NCSU), McDowell (NCSU), New Hanover (NCSU), Polk[26], Wake (NCSU); **Nebraska**: Cass[26], Lancaster[26], Otoe[26], Saunders[26]; **New Jersey**: Atlantic[26], Burlington[26]; Camden[26], Cape May[26], Gloucester[26], Middlesex[26], Ocean[26], Passaic[26], Union (FSCA); **New York**: Orange[26], Richmond[26], Suffolk[26], Tompkins[26]; **Ohio**: Butler (NCSU); **Oklahoma**: McCurtain[36]; **Pennsylvania**: Dauphin[26], Fulton[26], Monroe[26], Philadelphia[26]; **South Carolina**: Pickens (USNM); **South Dakota**: Bon Homme[28], Lincoln[28]; **Tennessee**: Cumberland[17], Knox (NCSU); **Texas**: Harrison[36], Liberty[36]; **Virginia**: Albemarle[26], Bath[26], Chesapeake[26], Essex[26], Fairfax[26], Lancaster (NCSU), Queen Anne (USNM), Southampton[26], Suffolk (USNM); **Vermont**: Windsor[26]; **Wisconsin**: Dane[26], Grant[26], Iowa[26], Shawano (NCSU); **West Virginia**: Jefferson (WVDA), Kanawha (WVDA), Monroe (WVDA), Nicholas (WVDA), Tyler (WVDA).

This is one of the most widely distributed species of *Parcoblatta*.

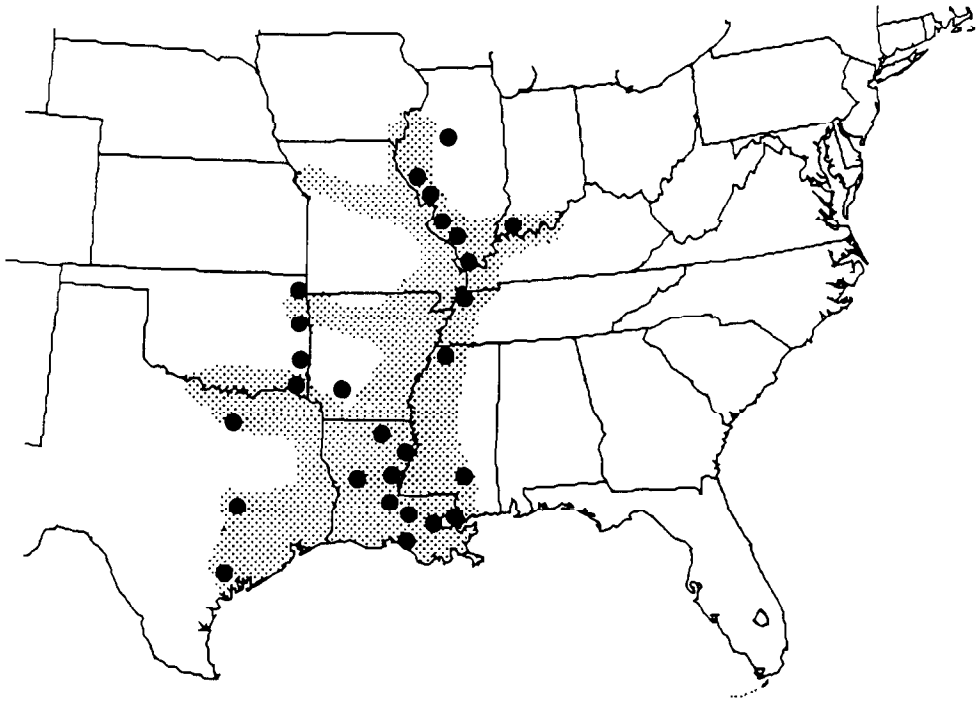
Ecology. Friauf (1953) found this species infrequently in scrub habitats in northeastern Florida. Lawson (1967) and Gorton (1980) reported it from woodlands in Kansas and Froeschner (1954) reported it from woodland borders in Iowa.

Parcoblatta zebra Hebard
"banded wood cockroach"
Map 29

Ischnoptera uhleriana Saussure & Zehntner (not Saussure 1862) 1893: 36.

Parcoblatta zebra Hebard 1917a: 89 (description, figure); Hebard 1934: 154 (taxonomy Ill.); Hebard 1938: 12 (taxonomy Okla.); Hebard 1943: 264 (taxonomy Tex.); Roth & Willis 1960: 12 (ecology); Helfer 1963: 42 (key U.S., figure); Princis 1969: 717 (world catalog); Pratt 1988: 884 (checklist U.S.).

Distribution. Arkansas: Montgomery (LSUC); **Illinois**: Calhoun[32], Jackson[32], Mason[26], Pike[32], Pulaski[26, 32]; **Indiana**: Knox[26]; **Louisiana**: Avoyelles (LSUC)[26], Concordia (UMIC), E. Baton Rouge (EGRC), Grant (LSUC), Ouachita[26], St. John the Baptist (FSCA), St. Martin (LSUC), St. Tammany (LSUC), Tensas (LSUC); **Mississippi**: DeSoto[26], Forrest[26]; **New Mexico**: "New Mexico"[26]; **Oklahoma**: Delaware[35], LeFlore[35], McCurtain[35], Sequoyah[35]; **Tennessee**: Obion[26]; **Texas**: Brazos (TAMU), Dallas[26], Victoria[26]. This species is apparently restricted to the southcentral United States along the Mississippi and its tributary drainages. It is the most narrowly distributed species of the genus in eastern North America. The record from "New Mexico" (Hebard 1917a) lies far to the west of the remainder of its known distribution and requires confirmation.

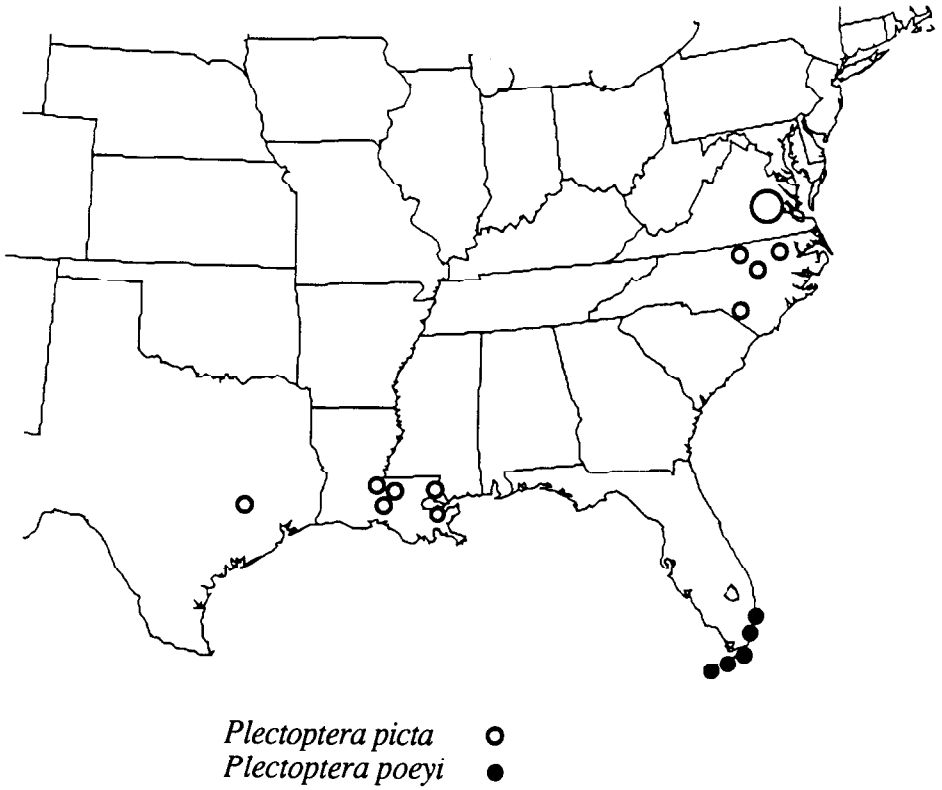


Map 29. *Distribution of* Parcoblatta zebra *Hebard.*

Plectoptera picta Saussure & Zehntner
"pictured beetle cockroach"
Map 30

Plectoptera picta Saussure & Zehntner 1893: 85; Hebard 1917a: 273 (taxonomy, occurrence U.S.); Princis 1965: 362 (world catalog); Nickle & Gurney 1985: 187 (taxonomy, distribution U.S.); Pratt 1988: 884 (checklist); Atkinson et al. 1990a: 318 (taxonomy Fla.).

Distribution. Mexico: Veracruz[43], Costa Rica[43]. United States: **Louisiana**: E. Baton Rouge (USNM), Iberville (LSUC), St. John the Baptist (USNM)[43], St. Landry (LSUC), St. Tammany (LSUC), W. Baton Rouge (USNM)[43]; **North Carolina**: Bertie (USNM)[43], Columbus (USNM), Edgecombe (USNM)[43], Warren (USNM)[43]; **Texas**: Montgomery (TAMU); **Virginia**: "Virginia"[43]. Hebard (1917) questioned the significance of early records of this species in the United States, considering them to be interceptions. Nickle & Gurney (1985) con-



Map 30. *Distribution of* Plectoptera picta *Saussure & Zehntner and* P. poeyi *(Saussure).*

firmed the presence of this species in the southeastern United States. Since Nickle & Gurney's (1985) note, this species has been collected several more times, including the first definite locality from Texas. They suggested that it might be an uncommonly collected native species or an introduced species, favoring the latter conjecture. In either event, the species should eventually be found in coastal areas of most of the southeastern states.

Plectoptera poeyi (Saussure)
"Florida beetle cockroach"
Map 30

Blatta poeyi Saussure 1862: 164.

Plectoptera poeyi: Roth & Willis 1960: 13 (ecology); Helfer 1963: 58 (key U.S., figure); Princis 1965: 364 (world catalog); Pratt 1988: 884 (checklist U.S.); Peck & Beninger 1989: 615 (ecology Fla.); Atkinson et al. 1990a: 319 (taxonomy Fla.).

Plectoptera floridana Hebard 1917a: 251 (taxonomy U.S., figure); Blatchley 1920: 112 (taxonomy east. U.S).

Distribution. Cuba[26]. United States: **Florida**: Broward (FSCA), Dade (FSCA, USNM), Monroe (Keys) (FSCA, USNM)[26,43].

Ecology. This species has been collected in tropical hardwood hammocks of the lower Keys (Peck & Beninger 1989). It has been found in hollow twigs of mangroves (M.A. Deyrup, personal communication). Rehn & Hebard (1917) reported this species from arboreal habitats in mangrove swamps and nearby marshes.

Pseudomops septentrionalis Hebard
"palebordered field cockroach"
Map 31

Pseudomops septentrionalis Hebard 1917a: 156 (description, taxonomy U.S., figure); Hebard 1938: 13 (taxonomy Okla.); Hebard 1943: 268 (taxonomy Tex.); Roth & Willis 1960: 13 (ecology); Helfer 1963: 47 (key U.S., figure); Roth 1968: 99 (ootheca); Princis 1969: 945 (world catalog); Chapin 1980: 335 (distribution. La.); Appel & Rust 1985: 670 (distribution Tex.); Pratt 1988: 884 (checklist U.S.).

Distribution. Mexico: Coahuila[26], Sinaloa[34], Tamaulipas[26]. United States: **Louisiana**: Acadia[11], Caddo[11], E. Baton Rouge[11], Grant[11], Lafayette[11], Rapides[11], St. Landry[11], Vernon[11]; **Oklahoma**: Comanche[35], Murray[35], Pontotoc[35]; **Texas**: Bandera (LSUC), Bastrop (TAMU), Bexar (CASC)[36], Blanco[26], Bowie[36], Brazos[36], Brewster (UADE), Cameron (CASC)[26], Comal (CASC)[36], Dallas[26], Dimmit[26], Eastland[36], Ellis[36], Erath (TAMU), Fort Bend[36], Galveston (LSUC), Gillespie (TAMU), Gonzales (LSUC), Harris[1], Hidalgo (NCSU)[26], Kendall[36], Kerr (CASC, UAIC)[36], McLennan[26], Menard[36], Nacogdoches[36], Newton[36], Nueces (CASC, TAMU), Pecos (CASC), Real (FSCA), San Patricio (TAMU), Starr (EGRC), Travis[36], Uvalde (CASC), Val Verde[26], Williamson[36], Wilson[36], Zavala[26]. This species probably also occurs in adjacent areas of Arkansas.

Ecology. This species is abundant on foliage of herbaceous plants in weedy areas and clearings in scrub communities (Hebard 1917a, 1943). Appel & Rust (1985) found it around residences near Houston, Tex.

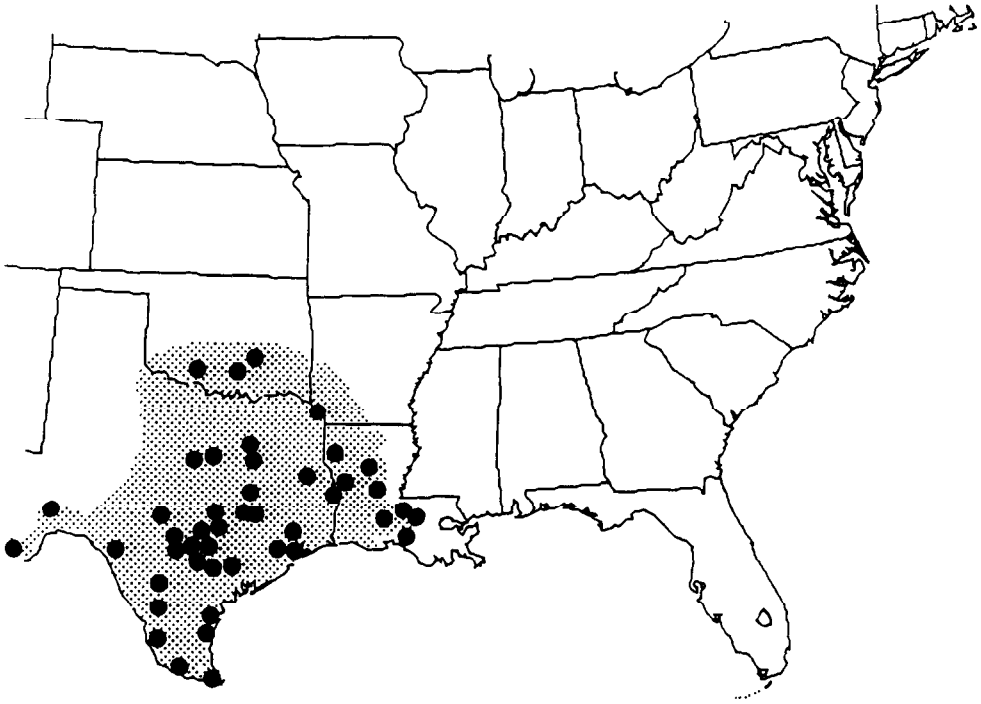
Supella longipalpa (F.)
brownbanded cockroach*

Blatta longipalpa F. 1798: 185.

Supella longipalpa: Cantrall 1968: 303 (taxonomy Mich.); Roth 1968: 94 (ootheca); Princis 1969: 917 (world catalog); Gurney 1970: 752 (taxonomy); Wright & McDaniel 1973: 251 (ecology N.C.); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 319 (taxonomy Fla.).

Blatta supellectilium Serville 1839: 114 (*Phyllodromia*).

Supella supellectilium: Hebard 1917a: 47 (taxonomy U.S., figure); Blatchley 1920: 70 (taxonomy eastern U.S., figure); Hebard 1935b: 273 (taxonomy Ariz.);



Map 31. *Distribution of* Pseudomops septentrionalis *Hebard.*

Ball et al. 1942: 265 (taxonomy Ariz.); Hebard 1943: 261 (taxonomy Tex.); Rehn 1945: 271 (dispersal); Froeschner 1954: 179 (taxonomy Iowa); Pratt 1955: 9 (taxonomy, figure, key); Roth & Willis 1960: 13 (ecology, photo); Helfer 1963: 46 (key U.S., figure); Cornwell 1968: 67 (general information, photo); Dakin & Hays 1970: 14 (taxonomy Ala.); Ebeling 1975: 228 (general information).

Distribution. Tropical regions of the world, probably of African origin (Rehn 1945, Princis 1969). Found in all states except Vermont (Cornwell 1968).

Ecology. Species appears an obligate domicilary in the United States.

Symploce morsei Hebard

Symploce morsei Hebard 1916b: 365; Rehn & Hebard 1927: 131 (taxonomy Caribbean); Princis 1969: 879 (world catalog); Roth 1984: 28 (taxonomy

Neotropics, figure); Peck & Beninger 1989: 615 (ecology Fla.); Atkinson et al. 1990a: 319 (taxonomy Fla.).

Distribution. Bahamas, Haiti[51]. United States: **Florida**: Monroe[45].

Ecology. This species was found in tropical hardwood hammocks on the upper and lower Keys (Peck & Beninger 1989).

Symploce pallens (Stephens)
"smooth cockroach"

Ectobius pallens Stephens 1835: 46.

Symploce pallens: Roth 1984: 51 (taxonomy Neotropics, figure); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 319 (taxonomy Fla.).

Phyllodromia hospes Perkins 1899: 5.

Symploce hospes: Roth & Willis 1960: 14 (ecology); Roth 1968: 100 (ootheca).

Symploce lita Hebard 1916b: 357; Hebard 1917a: 151 (taxonomy U.S., figure); Blatchley 1920: 90 (taxonomy eastern U.S.); Helfer 1963: 48 (key U.S., figure).

Distribution. Circumtropical, originally from Africa (Roth 1984). United States: **Florida**: (Key West) (ANSP)[26].

Ecology. Hebard (1917) reported this species inside structures in Key West.

Blaberidae

Blaberus craniifer Burmeister
"deathshead cockroach"

Blaberus craniifer Burmeister 1838: 516; Hebard 1917a: 201 (taxonomy U.S., figure); Blatchley 1920: 106 (taxonomy eastern U.S.); Roth & Willis 1960: 8 (ecology, photo); Helfer 1963: 52 (key U.S., figure); Dakin & Hays 1970: 17 (taxonomy Ala.); Princis 1963: 126 (world catalog); Ebeling 1975: 238 (general information); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 320 (taxonomy Fla.).

Distribution. Dominican Republic[48], Cuba[26], Yucatan[26], Belize[26]. United States: **Florida**: Monroe (Key West) (USNM)[26]. Recorded in central Alabama as an adventive (Dakin & Hays 1970).

Ecology. Hebard (1917) treated this species as introduced into the Florida Keys, stating that it "has become firmly established at Key West." It is found naturally over a wide area including Cuba and the Antilles, and its presence in Florida may be natural. It was collected by Rehn & Hebard (1914) in wood piles, refuse, and around buildings. There are recent records of this species from Key West, indicating that the local population has persisted regardless of its origin.

Blaberus discoidalis Serville

Blaberus discoidalis Serville 1839: 76; Roth & Willis 1960: 8 (ecology); Princis 1963: 127 (world catalog); Roth 1969: 242 (taxonomy, male genitalia, figure); Atkinson et al. 1990a: 320 (taxonomy Fla.).

Distribution. Costa Rica[53], Nicaragua[53], Panama[47], Colombia[47], Venezuela[47], Ecuador[47], Trinidad[47], Vieques Island[47], Dominican Republic[53], Haiti[47] Jamaica[47], Cuba[47]. United States: **Florida**: Broward (FSCA)[2], Dade (FSCA)[2], Monroe (USNM)[2]. Roth (1969: 248), cited specimens of *B. discoidalis* from Key West in a footnote to a table on distributions of species in a study of male genitalia in the genus *Blaberus*. This obscure reference was overlooked by Pratt (1988). There are many specimens in the Florida State Collection of Arthropods collected between 1960 and 1970 from Key West, Stock Island, and Coral Gables.

Ecology. Specimens in the FSCA were collected under the bark of a dead tree and under a board on the ground.

Epilampra maya Rehn
"Maya cockroach"

Epilampra maya Rehn 1902: 3; Hebard 1917a: 265 (taxonomy); Roth & Gurney 1969: 617 (taxonomy Neotropics); Nickle & Sibson 1984: 487 (introduction into Florida, habits); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 321 (taxonomy Fla.).

Epilampra maya brachyptera Hebard 1921: 210 Trans. Amer. Entomol. Soc.

Epilampra abdomen-nigrum (not DeGeer 1773) Rehn & Hebard 1927: 219 (taxonomy Caribbean); Princis 1967: 691 (world catalog).

Distribution. Mexico[55], Guatemala[55], Honduras[55], Nicaragua[55], Costa Rica[55], Panama[55]. United States: **Florida**: Reported from Arcadia (Desoto County) by Nickle & Sibson (1984), where it was apparently well established.

Ecology. Nickle & Sibson (1984) reported this species from in and around houses in Arcadia. It was also abundant near a small stream close to an infested house. *Epilampra maya* has been reported from aquatic and other moist habitats in Central America.

Hemiblabera tenebricosa Rehn & Hebard
"broad Keys cockroach"

Hemiblabera tenebricosa Rehn & Hebard 1927: 247; Caudell 1931: 204 (occurrence in Florida); Gurney 1959: 78 (distribution Fla.); Princis 1963: 138 (world catalog); Helfer 1963: 52 (key U.S., figure); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 321 (taxonomy Fla.).

Distribution. Bahamas[47], Haiti[47]. United States: **Florida**: Monroe (Key Largo) USNM, FSCA)[9], Dade (Elliot Key)[22]. This species has not been collected from the Florida mainland.

Ecology. Specimens in the Florida State Collection of Arthropods were collected under boards.

Nauphoeta cinerea (Olivier)
cinereous cockroach*, "lobster cockroach"

Blatta cinerea Olivier 1789: 314.

Nauphoeta cinerea: Rehn & Hebard 1927: 254 (taxonomy Caribbean); Rehn 1945: 274 (dispersal); Gresham 1952: 77 (introd. Florida); Gurney 1953: 46 (taxonomy); Roth & Willis 1960: 11 (ecology, photo); Helfer 1963: 54 (key U.S., figure); Princis 1965: 289 (world catalog); Cornwell 1968: 79 (general information, photo); Ebeling 1975: 288 (general information); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 321 (taxonomy Fla.).

Distribution. Circumtropical, including Cuba, Hispaniola, and Mexico. It is probably of African origin (Rehn 1945). United States: **Florida**: Hillsborough (Gresham 1952). This species became established in the Tampa area and was reported to breed in feed mills. There have been no further records or reports of this species since then, leading us to suspect that the introduction may not have persisted.

Ecology. In tropical areas, this species is found commonly in and around structures (Cornwell 1968).

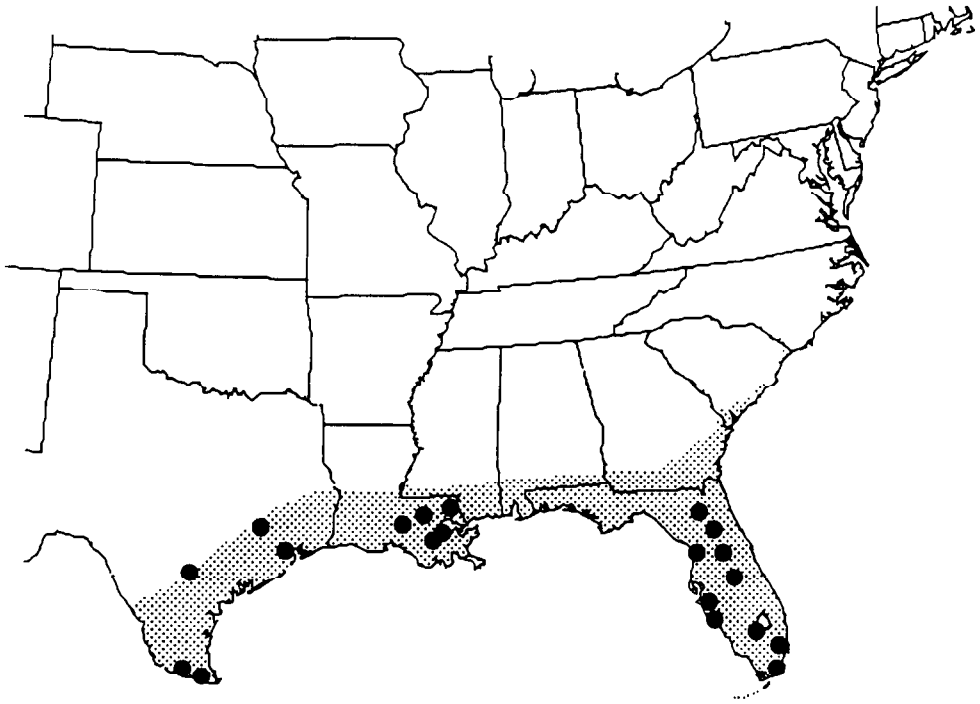
Panchlora nivea (L.)
Cuban cockroach*
Map 32

Blatta nivea L. 1758: 424.

Panchlora nivea: Gurney 1955: 285 (taxonomy); Princis 1964: 180 (world catalog); Roth & Willis 1960: 12 (ecology, photo); Helfer 1963: 53 (key U.S., figure); Chapin 1980: 335 (distribution. La.); Pratt 1988: 884 (checklist); Atkinson et al. 1990a: 322 (taxonomy Fla.).

Panchlora cubensis Saussure 1862: 230; Hebard 1917a: 161 (taxonomy U.S., figure); Blatchley 1920: 105 (taxonomy eastern U.S., figure); Hebard 1943: 272 (taxonomy Tex.); Froeschner 1954: 184 (taxonomy Iowa).

Distribution. Greater Antilles, Mexico, Central America[49], Bahamas. United States: **Florida**: Alachua[2], Broward (FSCA)[2], Dade (FSCA)[2], Hendry[2], Hernando (FSCA), Hillsborough (FSCA)[2], Lake (UMIC), Manatee (FSCA), Marion (FSCA)[2], Pinellas[2], Polk[2], St. Lucie[2]; **Louisiana**: East Baton Rouge[2, 11], Iberville[11], St. James[11], St. John the Baptist[11]; **Texas**: Brazos (TAMU)[2], Cameron[26], Hidalgo[36]. Hebard (1917) and Blatchley (1920) stated that this species was not found in Florida, although specimens were intercepted in ports with some frequency. It was presumably introduced into



Map 32. *Distribution of* Panchlora nivea *(L.).*

Florida because it seems unlikely that a green cockroach that is attracted to lights would have been overlooked by earlier collectors. We have been unable to locate any documentation of when this occurred. As late as the seventies (Helfer 1963, Gurney 1955, Gurney & Roth 1972), this species was considered to occur only in southern Texas in the United States. Specimens from Florida in the FSCA date from 1940 (Polk County). Specimens from southern Louisiana date from the early 1970s (Chapin 1980). It is currently abundant throughout Florida and found along the Gulf Coast in Louisiana and adjacent parts of Texas.

Ecology. This species is common around houses and in wooded areas within the city of Gainesville in moist, shaded areas with abundant leaf litter (Hagenbuch et al. 1988). We do not have any information regarding its occurrence in relatively undisturbed areas, but its habits suggest that it may occur in some natural communities, such as mesic hammocks.

Phoetalia pallida (Brunner)
"pallid cockroach"

Nauphoeta pallida Brunner 1865: 286.

Leurolestes pallidus: Hebard 1917a: 161 (taxonomy U.S., figure); Blatchley 1920: 93 (taxonomy eastern U.S.); Rehn 1945: 275 (dispersal); Helfer 1963: 39 (key U.S., figure).

Phoetalia pallida: Princis 1967: 652 (world catalog); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: 323 (taxonomy Fla.).

Distribution. Circumtropical[51]. United States: **Florida**: Monroe (Key West) (ANSP)[26].

Rehn (1945) suggested that this species is native to the West Indies, including the Greater Antilles. Its occurrence in the Keys may be natural.

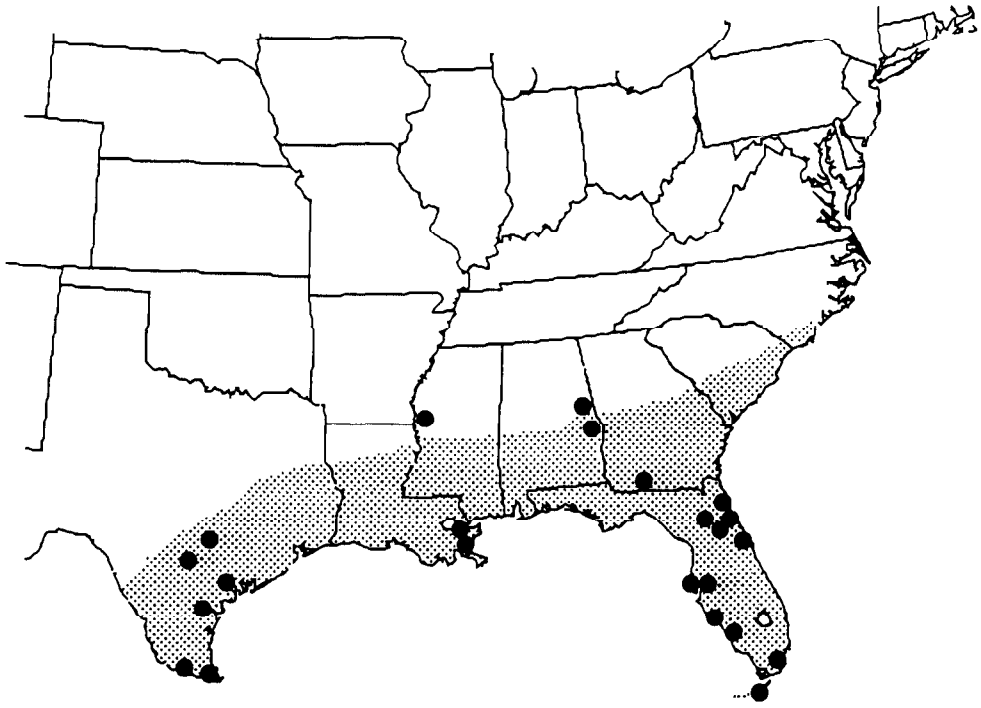
Ecology. This species may be found in and around structures (Blatchley 1920, Rehn 1945).

Pycnoscelus surinamensis (L.)
Surinam cockroach*
Map 33

Blatta surinamensis L. 1758: 424.

Pycnoscelus surinamensis: Hebard 1917a: 193 (taxonomy U.S., figure); Blatchley 1920: 104 (taxonomy eastern U.S., figure); Morse 1920: 317 (taxonomy New England); Hebard 1934: 157 (taxonomy Ill.); Hebard 1943: 271 (taxonomy Tex.); Rehn 1945: 271 (dispersal); Friauf 1953: 122 (ecology Fla.); Froeschner 1954: 183 (taxonomy Iowa, figure); Roth & Willis 1960: 13 (ecology, photo); Helfer 1963: 54 (key U.S., figure); Princis 1964: 263 (world catalog); Roth 1967: 774 (taxonomy); Lawson 1967: 269 (ecology); Cornwell 1968: 74 (general information, photo); Dakin & Hays 1970: 17 (taxonomy Ala.); Ebeling 1975: 237 (general information); Kevan 1980: 77 (taxonomy); Hagenbuch et al. 1988: 378 (ecology Fla.); Brenner 1988: 583 (ecology Fla.); Pratt 1988: 884 (checklist U.S.); Peck & Beninger 1989: 613 (ecology Fla.); Atkinson et al. 1990a: 323 (taxonomy Fla.).

Distribution. Circumtropical[48]. Breeds outdoors in the lower southeastern United States: **Alabama**: Clay[14], Lee[14]; **Florida**: Alachua[26,9], Charlotte[26], Dade[26], Duval[26], Hillsborough[26], Monroe (incl. Keys)[26,43], Pinellas[4], Putnam[26], St. Johns[26], Sarasota[4], Volusia[26]; **Iowa**: Story (greenhouse)[20]; **Illinois**: Cook (greenhouse)[32]; **Louisiana**: E. Baton Rouge (LSUC), Jefferson (LSUC), Orleans (LSUC)[26], Plaquemines[26]; **Texas**: Bexar[26], Cameron[26], San Patricio[26], Victoria[26]. Based on records in other southeastern states, this species probably breeds outdoors in coastal South Carolina.



Map 33. *Distribution of* Pycnoscelus surinamensis *(L.).*

Rehn (1945) stated that this species is native to the Indo-Malayan region and has subsequently been transported around the world.

Ecology. All stages of this cockroach burrow into loose soil. This is probably the only exotic cockroach species in Florida which has become well established in natural communities as well as in highly disturbed areas. It was commonly found in tropical hammocks of southern Dade County, the lower Keys, and open pinelands in Dade County (Peck & Beninger 1989). Friauf (1953) found this species occasionally in xeric and mesic hammocks in an ecological study in northeastern Florida (Putnam County). It is common around houses in northcentral Florida (Hagenbuch et al. 1988). This species is frequently found in greenhouses in parts of the United States, where it cannot survive outdoors. It is frequently moved northward from Florida in nursery stock and house plants. It is occasionally a pest in large indoor plantings in shopping malls, hotel lobbies, etc. All populations in the continental United States are parthenogenetic (Roth 1967). It has been reported from rodent burrows (Hebard 1917a).

Rhyparobia maderae (F.)
Madeira cockroach*

Blatta maderae Fabricius 1781: 341.

Leucophaea maderae: Hebard 1917a: 268 (taxonomy); Rehn & Hebard 1927: 242 (taxonomy Caribbean); Rehn 1945: 272 (dispersal); Gurney 1953: 40 (introduction U.S., description, figure); Roth & Willis 1960: 10 (ecology, photo); Helfer 1963: 53 (key U.S., figure); Princis 1965: 298 (world catalog); Cornwell 1968: 76 (general information, photo); Ebeling 1975: 237 (general information).

Rhyparobia maderae: Kevan 1980: 77 (taxonomy); Pratt 1988: 884 (checklist U.S.); Atkinson et al. 1990a: (taxonomy Fla.).

Distribution. Old World tropics, introduced and widely distributed in the Caribbean area (Rehn 1945). It was introduced into New York City, apparently from Puerto Rico (Gurney 1953). Infestations persist in New York City and specimens are occasionally seen in nearby northeastern cities, but this cockroach has spread little since its original detection. Although there have been no records of this species in Florida, its presence on nearby islands (Cuba and the Bahamas) and its pest status make it a potential threat.

Ecology. This species is found in and around structures in the Antilles and is considered a pest there (Rehn 1945).

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References Cited

Appel, A. G. 1986. Field and laboratory studies on American cockroach activity and distribution. J. Ala. Acad. Sci. 57: 57–64.

1989. Rapid and non-destructive gender determination of nymphal and adult *Cryptocercus punctulatus* Scudder (Dictyoptera: Cryptocercidae). Proc. Entomol. Soc. Wash. 91: 286–287.

[1]**Appel, A. G. & M. K. Rust. 1985.** Outdoor activity and distribution of the smokybrown cockroach, *Periplaneta fuliginosa* (Dictyoptera: Blattidae). Environ. Entomol. 14: 669–673.

1987. A bibliography of the smokybrown cockroach (Dictyoptera: Blattidae), an urban and suburban pest. J. Entomol. Sci. 22: 175–187.

Appel, A. G. & J. B. Tucker. 1986. Occurrence of the German cockroach, *Blattella germanica* (Dictyoptera: Blattellidae), outdoors in Alabama and Texas. Fla. Entomol. 69: 422–423.

Appel, A. G., A. N. Van Dyke & M. K. Rust. 1983. A technique for rearing and some notes on the biology of a desert cockroach, *Arenivaga-investigata* (Dictyoptera: Polyphagidae). Proc. Entomol. Soc. Wash. 85: 598–600.

Appel, A. G., M. K. Rust & D. A. Reierson. 1991. The smoky brown cockroach: potential new pest in California. Calif. Agric. 44: 23–24.

Arnett, R. & P. A Samuelson. 1986. The insect and spider collections of the world. Brill/Flora & Fauna Publs., Gainesville, Fla.

[2]**Atkinson. T. H., P. G. Koehler & R. S. Patterson. 1990a.** Annotated checklist of the cockroaches of Florida (Dictyoptera: Blattaria: Blattidae, Polyphagidae, Blattellidae, Blaberidae). Fla. Entomol. 73: 303–327.

1990b. The Nicaraguan cockroach, our newest immigrant. Pest Manage. 9: 12–13.

[3]**Ball, E. D., E. R. Tinkham, R. Flock & C. T. Vorhies. 1942.** The grasshoppers and other Orthoptera of Arizona. Arizona Agric. Exp. Stn. Tech. Bull. 93: 257–373.

Blatchley, W. S. 1903. The Orthoptera of Indiana. pp. 123–471. *In* Indiana Dept. Geol. Nat. Resources, 27th Annu. Rep., Indianapolis (not seen).

[4]**1920.** Orthoptera of northeastern America with especial reference to the faunas of Indiana and Florida. Nature, Indianapolis, Ind..

Bey-Bienko, G. 1967. Some orthopteroid insects of the orders Blattoptera, Orthoptera, and Dermaptera from Afganistan. Acta Entomol. Bohemoslav. 64: 407–438 (not seen).

Brenner, R. J. 1988. Focality and mobility of some peridomestic cockroaches in Florida (Dictyoptera: Blattaria). Ann. Entomol. Soc. Am. 81: 581–592.

in press. Asian cockroaches: implications in the food industry and complexities of management strategies. *In* J.R. Gorham [ed.], Food & Drug Admin. Tech. Bull. No. 4.

[5]**Brenner, R. J., R. S. Patterson & P. G. Koehler. 1988.** Ecology, behavior, and distribution of *Blattella asahinai* (Orthoptera: Blattellidae) in central Florida. Ann. Entomol. Soc. Am. 81: 432–436.

Brunner de Wattenwyl, C. 1865. Nouveau Systeme des Blattaires. G. Braumuller, Vienna (not seen).

Burmeister, H. 1838. Handbuch der Entomologie, II (2). Berlin (not seen).

[6]**Buxton, G. M. & T. J. Freeman. 1968.** Positive identification of *Blattella vaga* and *Blattella germanica* (Orthoptera: Blattellidae). Pan-Pac. Entomol. 44: 168–169.

Carlson, D. A. & R. J. Brenner. 1988. Hydrocarbon-based discrimination of three North American *Blattella* cockroach species (Orthoptera: Blattellidae) using gas chromatography. Ann. Entomol. Soc. Am. 81: 711–723.

[7]**Cantrall, I. J. 1943.** The ecology of the Orthoptera and Dermaptera of the George Reserve, Michigan. Misc. Publ. Mus. Zool. Univ. Mich. 54: 1–182, Plates i–x.

[8]**1968.** An annotated list of the Dermaptera, Dictyoptera, Phasmatoptera, and Orthoptera of Michigan. Michigan Entomol. 1: 299–346.

Caudell, A. N. 1903. Some new or unrecorded Orthoptera from Arizona. Proc. Entomol. Soc. Wash. 5: 162–166.

1904. Orthoptera from southwestern Texas. Mus. Brooklyn Inst. Arts Sci., Sci. Bull. 1: 105–116 (not seen).

1918. Two new species of the blattid genus *Arenivaga*. Proc. Entomol. Soc. Wash. 20: 154–157.

[9]**1931.** Notes on Blattidae, adventive to the United States (Orthop.). Psyche 32: 204.

[10]**Chandler, D. S. 1985.** A new introduction of a European cockroach, *Ectobius lapponicus* (Dictyoptera: Blattellidae). Entomol. News 96: 98–100.

[11]**Chapin, J. B. 1980.** New distribution records for *Pseudomops septentrionalis* Hebard and *Panchlora nivea* (L.) (Dictyoptera: Blattellidae, Blaberidae). Proc. Entomol. Soc. Wash. 82: 335–336.

[12]**Cleveland, L. R. 1934.** The wood-feeding cockroach *Cryptocercus*, its protozoa, and the symbiosis between protozoa and roach. The roach. Mem. Am. Acad. Arts Sci. 17: 187–200.

[13]**Cohen, A. C. & J. L. Cohen. 1976.** Nest structure and microclimate of the desert cockroach, *Arenivaga apacha* (Polyphagidae, Dictyoptera). Bull. South. Calif. Acad. Sci. 75: 273–277.

1981. Microclimate, temperature and water relations of two species of desert cockroaches. Comp. Biochem. Physiol. A Comp. Physiol. 69: 165–167.

Cornwell, P. B. 1968. The cockroach, a laboratory insect and industrial pest, vol. 1. Rentokil Library, Hutchinson, London.

[14]**Dakin, M. E. & K. L. Hays. 1970.** A synopsis of Orthoptera (sensu lato) of Alabama. Ala. Agric. Exp. Stn. Auburn Univ. Bull. 404.

Davis, W. & C. Leng. 1912. Insects on a recently felled tree. J. New York

Entomol. Soc. 20: 119–121.

DeGeer, C. 1773. Memoire pour servir a l'histoire des insectes. Vol 3 Orthoptera. Stockholm (not seen).

Deyrup, M. A. 1989. Arthropods endemic to Florida scrub. Fla. Sci. 52: 254–270.

1990. Arthropod footprints in the sands of time. Fla. Entomol. 73: 529–538.

[15]**Deyrup, M. A. & F. W. Fisk. 1984.** A myrmecophilous cockroach new to the United States (Blattaria: Polyphagidae). Entomol. News 95: 183–185.

[16]**Ebeling, W. 1975.** Urban entomology. Univ. California Div. Agric. Sci., Los Angeles.

Edmunds, L. R. 1957. Observations on the biology and life history of the brown cockroach *Periplaneta brunnea* Burmeister. Proc. Entomol. Soc. Wash. 59: 283–288.

Edney, E. B., S. Haynes & D. Gibo. 1977. Distribution and activity of the desert cockroach *Arenivaga investigata* (Polyphagidae) in relation to microclimate. Ecology 55: 120– 127.

Fabricius, J.C. 1775. Systema entomologicae. Flensburgi & Lipsiae, Korte (not seen).

1781. Species insectorum exhibentes eorum differentias specificas, etc. Hamburgi et Kilonii (not seen).

1793. Entomologia systematica emendata et aucta, secundem classes, ordines, genera, species adjectis symnominimis, locis, observationibus, descriptionibus. Proft, Hafniae (not seen).

1798. Supplementum entomologiae systematicae. Proft et Storch, Hafniae (not seen).

[17]**Fisk, F. W. 1974.** Cockroach collections from Tennessee (Blattaria: Blattellidae) J. Tenn. Acad. Sci. 49: 36.

Flint, O. S. 1951. A new cockroach record from the United States. Bull. Brooklyn Entomol. Soc. 46: 53.

[18]**Flock, R. A. 1941.** The field cockroach *Blattella vaga*. J. Econ. Entomol. 34: 121.

[19]**Friauf, J. J. 1953.** An ecological study of the Dermaptera and Orthoptera of the Welaka area in northern Florida. Ecol. Mon. 23: 79–126.

Friauf, J. J. & E. B. Edney. 1969. A new species of *Arenivaga* from desert sand dunes in southern California (Dictyoptera: Polyphagidae). Proc. Entomol. Soc. Wash. 71: 1–7.

[20]**Froeschner, R. C. 1954.** The grasshoppers and other Orthoptera of Iowa. Iowa State College J. Sci. 29: 163–354.

[21]**Gorham, J. R., Karl P. Conradi & K. Page Conradi. 1971.** Household infestation by the cockroach *Aglaopteryx gemma* in Georgia. J. Ga. Entomol. Soc. 6: 133–135.

Gorton, R. E. 1980. A comparative ecological study of the wood cockroaches in northeastern Kansas. Univ. Kansas Sci. Bull. 52: 21–30.

Gresham 1952. Untitled note on occurrence of *Nauphoeta cinerea* in Florida. *In* Items of interest. Fla. Entomol. 35: 77.

Gurney, A. B. 1942. Studies in Cuban Blattidae (Orthoptera). Bull. Mus. Comp. Zool. 89: 1–60, 4 plates.

1953. Distribution, general bionomics, and recognition characters of two cockroaches recently established in the United States. Proc. U.S. Natl. Mus. 103(3315): 39–56.

1955. Notes on the Cuban cockroach, *Panchlora nivea* (L.) (Orthoptera: Blattidae). Proc. Entomol. Soc. Wash. 57: 285– 286.

[22]**1959.** New records of Orthoptera and Dermaptera from the United States. Fla. Entomol. 42: 75–80.

[23]**1968.** The spotted Mediterranean cockroach, *Ectobius pallidus* (Olivier) (Dictyoptera, Blattaria, Blattellidae), in the United States. USDA Coop. Econ. Ins. Rep. 18: 684–686.

1970. On the scientific name of the brown-banded cockroach, *Supella longipalpa* (Fabricius) (Dictyoptera, Blattaria, Blattellidae). USDA Coop. Econ. Ins. Rep. 20: 752–754.

[24]**1978.** Untitled note. USDA APHIS Coop. Plant Pest Rep. 3(25): 295.

Gurney, A. B. & L. M. Roth. 1972. A generic review of the cockroaches of the subfamily Panchlorinae (Dictyoptera, Blattaria, Blaberidae). Ann. Entomol. Soc. Am. 65: 521– 532.

Gurney, A. B. & T. J. Walker. 1976. Notes on several cockroaches of southeastern United States and on the name "palmettobug." USDA Coop. Plant Pest Rep. 1(43): 823–826.

[25]**Hagenbuch, B. E., P. G. Koehler, R. S. Patterson & R. J. Brenner. 1988.** Peridomestic cockroaches (Orthoptera: Blattidae) of Florida: their species composition and suppression. J. Med. Entomol. 25: 377–380.

Hebard, M. 1916a. A new genus, *Cariblatta*, of the group Blattellites. Trans. Am. Entomol. Soc. 42: 147–186 (not seen).

1916b. Studies in the group Ischnopterites (Orthoptera, Blattidae, Pseudomopinae). Trans. Am. Entomol. Soc. 42: 337–383.

[26]**1917a.** The Blattidae of North America north of the Mexican boundary. Mem. Am. Entomol. Soc. 2: 1–284, i–vi, 10 pl.

1917b. A new species of myrmecophilous blattid. (Orthoptera: Blattidae; Corydiinae). Entomol. News 28: 360–363.

1919. The Blattidae of Panama. Mem. Am. Entomol. Soc. 4: 1–148, plates I–IV.

[27]**1920.** Revisionary studies in the genus *Arenivaga* (Orthoptera, Blattidae, Polyphaginae). Trans. Am. Entomol. Soc. 46 (No. 803): 197–217.

1921. Mexican records of Blattidae (Orthoptera). Trans. Am. Entomol. Soc. 47: 199–220 (not seen)

[28]**1925.** The Orthoptera of South Dakota. Proc. Acad. Nat. Sci. Phila. 77: 33–155.

1928. The Orthoptera of Montana. Proc. Acad. Nat. Sci. Phila. 80: 211–305.

[29]**1929.** The Orthoptera of Colorado. Proc. Acad. Nat. Sci. Phila. 81: 303–425.

[30]**1931.** The Orthoptera of Kansas. Proc. Acad. Nat. Sci. Phila. 83: 119–227.

[31]**1932.** The Orthoptera of Minnesota. Minn. Agric. Exp. Stn. Tech. Bull. 85: 1–61.

[32]**1934.** The Dermaptera and Orthoptera of Illinois. Illinois Dep. Reg. Ed., Bull. Div. Nat. Hist. Surv. 20(3): 124–279.

[33]**1935a.** Studies on the Orthoptera of Arizona. Part I. New genera, species, and geographic races. Trans. Am. Entomol. Soc. 61: 111–153.

[34]**1935b.** Studies on the Orthoptera of Arizona. Part II. A list of the Dermaptera and Orthoptera of Arizona with new records and corrections of the literature subsequent to 1900. Trans. Am. Entomol. Soc. 61: 269–316.

[35]**1938.** An ecological survey of the Orthoptera of Oklahoma. Okla. Agric. Exp. Stn. Tech. Bull. 5: 1–31.

[36]**1943.** The Dermaptera and orthopterous families Blattidae, Mantidae, and Phasmidae of Texas. Trans. Am. Entomol. Soc. 63: 239–311.

[37]**Helfer, J. R. 1963.** How to know the grasshoppers, cockroaches, and their allies. Wm. C. Brown, Dubuque, Iowa.

[38]**Hoebeke, E. R. & D. A. Nickle. 1981.** The forest cockroach, *Ectobius sylvestris* (Poda), a European species newly discovered in North America (Dictyoptera: Blattodea: Ectobiidae). Proc. Entomol. Soc. Wash. 83: 592–595.

Hubbard, T. H. & C. C. Goff. 1939. Florida pocket-gopher burrows and their arthropod inhabitants. Proc. Fla. Acad. Sci. 4: 127–166.

Kevan, D. K. M. 1980. Names involving the Madeira and Surinam cockroaches (Dictuoptera, Blattodea, Nauphoetidae). Entomol. Rec. J. Var. 92: 77–82.

[39]**Lago, P. K., S. Testa & M. E. Dakin. 1988.** The insects of Point Clear Island and surrounding marshlands, Hancock County, Mississippi. II: Orthoptera, Dermaptera, Isoptera, and Embioptera. J. Miss. Acad. Sci. 33: 81–91.

Lawson, F. A. 1952. Structural features of cockroach egg capsules. II. The ootheca of *Cariblatta lutea lutea* (Orthoptera: Blattidae). Ohio J. Sci. 52: 296–300.

1953. Structural features of cockroach egg capsules. III. The ootheca of *Eurycotis floridana* (Orthoptera: Blattidae). J. Tenn. Acad. Sci. 28: 28–33.

1954. Structural features of cockroach egg capsules. IV. The ootheca of *Parcoblatta uhleriana* (Orthoptera: Blattidae). J. Kans. Entomol. Soc. 27: 14–20.

[40]**1967.** Ecological and collecting notes on eight species of *Parcoblatta* (Orthoptera: Blattidae) and certain other cockroaches. J. Kans. Entomol. Soc. 40: 267–269.

Linnaeus, C. 1758. Systema naturae per regna tria naturae secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis, 10th ed. Holmiae (not seen).

1767. Systema naturae per regna tria naturae secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis, 12th ed. Holmiae (not seen).

McKittrick, F. A. 1964. Evolutionary studies of cockroaches. Cornell Univ. Agric. Exp. Stn. Mem. 389.

Mizukubo, T. 1981. A revision of the genus *Blattella* (Blattaria:

Blattellidae) of Japan. I. Terminology of the male genitalia and description of a new species from Okinawa Island. Esakia 17: 149–159.

[41]**Moore, C. E. 1957.** Wood roaches in New England (letter). Pest Control 25(10): 6.

[42]**Morse, A. P. 1920.** Manual of the Orthoptera of New England. Proc. Boston Soc. Nat. Hist. 35: 197–556.

Moser, J. C. 1964. Inquiline roach responds to trail-marking substance of leaf-cutting ants. Science 143: 1048–1049.

1967. Mating activities of *Atta texana* (Hymenoptera: Formicidae). Insectes Soc. 14: 295–312.

[43]**Nickle, D. A. & A. B. Gurney. 1985.** Confirmation of the neotropical cockroach *Plectoptera picta* Saussure and Zehntner in the United States (Blattodea: Blattellidae). Proc. Entomol. Soc. Wash. 87: 187–190.

Nickle, D. A. & B. W. Sibson. 1984. *Epilampra maya* Rehn, a Central American cockroach newly established in the U.S. (Blattodea; Blaberidae; Epilamprinae). Fla. Entomol. 67: 487–489.

Olivier, G.A. 1789. Encyclopedie methodique dictionaire des insectes. Vol IV, Paris (not seen).

[44]**Olson, C. A. 1985.** *Blatta (Shelfordana) lateralis*, the Turkestan cockroach (Blattoidea: Blattidae) recorded from Arizona. Bull. Entomol. Soc. Am. 31: 30.

[45]**Peck, S. B. & C. Beninger. 1989.** Insects of the Florida Keys cockroaches (Blattodea), mantids (Mantodea), and walkingsticks (Phasmatodea). Fla. Entomol. 72: 612–617.

Perkins, R.C.L. 1899. Orthoptera. pp. 1–30, pl. 1–2. *In* D.Sharp [ed.], Fauna Hawaiiensis. Cambridge University Press (not seen).

Poda, N. 1761. Insecta musei gracencis, qui in ordines, genera et species juxta systema natura Caroli Linnai. J.B. Dietrich, Berlin (not seen).

Powell, P. K. & W. H. Robinson. 1980. Descriptions and key to the first instar nymphs of five *Periplaneta* species (Dictyoptera: Blattidae). Proc. Entomol. Soc. Wash. 82: 212– 228.

Pratt, H. D. 1955. Cockroach identification with CDC pictorial key. Pest Control 23(5): 9–12.

1988. Annotated checklist of the cockroaches of North America. Ann. Entomol. Soc. Am. 81: 882–885.

Princis, K. 1957. Wo ist die urheimat von *Blatta orientalis* L. zu suchen? Opusc. Entomol. 19: 202–204.

[46]**1962.** Blattaria: subordo Polyphagoidea: fam. Polyphagidae, pars 3: pp. 1–74. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

[47]**1963.** Blattaria: subordo Polyphagoidea: fam. Homeogamiidae, Euthyrrhaphidae, Latiiniidae, Anacompsidae, Atticolidae, Attaphilidae. Subordo Blaberoidea: fam. Blaberidae, pars 4: pp. 77–172. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

[48]**1964.** Blattaria: subordo Blaberoidea: fam. Panchloridae, Cynopeltidae, Derocalymmidae, Perispaeriidae, Pycnoscelidae, pars 6: pp. 175–281. *In* M. Beier [ed.], Orthopteroru(m catalogus. Junk, The Hague

[49]**1965.** Blattaria: subordo Blaberoidea: fam. Oxyhaloidae, Panethiidae,

Cryptocercidae, Chorisoneuridae, Oulopterygidae, Diplopteridae, Anaplectidae, Archiblattidae, Nothoblattidae, pars 7: pp. 285–400. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

[50]**1966.** Blattaria: subordo Blattoidea, fam.: Blattidae, Nocticolidae, pars 8: pp. 403–614. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hag

1967. Blattaria: subordo Epilamproidea, fam.: Nyctiboridae, Epilampridae, pars 11: pp. 617–710. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

[51]**1969.** Blattaria: subordo Epilamproidea: fam. Blattellidae, pars 13: pp. 713–1038. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

1971. Blattaria: subordo Epilamproidea: fam. Ectobiidae, pars 14: pp. 1041–1224. *In* M. Beier [ed.], Orthopterorum catalogus. Junk, The Hague.

Rau, P. 1940. Life history of the wood-roach *Parcoblatta pensylvanica*. Entomol. News 51: 4–9: 33–35.

Rehn, J. A. G. 1902. A contribution to the knowledge of the Orthoptera of Mexico and Central America. Trans. Am. Entomol. Soc. 29: 1–34 (not seen).

1903a. A new roach of the genus *Ischnoptera* from Florida. Entomol. News 14: 233–234.

1903b. A revision of the Orthopterous genus *Homeogamia*. Proc. Acad. Nat. Sci. Philadelphia 55: 177–192.

1918. On a collection of Orthoptera from the state of Para, Brazil. Proc. Acad. Natur. Sci. Philadelphia 70: 144–236, pl. I–II.

1930. New or little known Neotropical Blattidae (Orthoptera) II. Trans. Am. Entomol. Soc. 56: 19–71, pl I–V.

1945. Man's uninvited fellow traveler – the cockroach. Sci. Mon. 61: 265–270.

Rehn, J. A. G. & M. Hebard. 1909. An orthopterological reconnaisance of the southwestern United States, Part II. New Mexico and Western Texas. Proc. Acad. Nat. Sci. Philadelphia 61: 111– 175 (not seen)

1910. A revision of the North American species of the genus *Ischnoptera*. Proc. Acad. Nat. Sci. Philadelphia 62: 407–453 (not seen).

1914. On the Orthoptera found in the Florida Keys and in extreme southern Florida. Proc. Acad. Nat. Sci. Phila. 66: 375–912.

1927. The Orthoptera of the West Indies, No. 1. Blattidae. Bull. Am. Mus. Nat. Hist. 54: 1–320, 25 pl.

[52]**Riherd, P. T. 1953.** The occurrrence of *Blattella vaga* Hebard in Texas. Proc. Entomol. Soc. Wash. 55: 39–40.

Ross, M. H. & D. E. Mullins. 1988. Nymphal and oothecal comparisons of *Blattella asahinai* and *Blattella germanica* (Dictyoptera: Blattellidae). J. Econ. Entomol. 81: 1645–1647.

Roth, L. M. 1967. Sexual isolation in parthenogenetic *Pycnoscelus surinamensis* and application of the name *Pycnoscelus indicus* to its bisexual relative (Dictyoptera: Blattaria: Blaberidae: Pycnoscelinae). Ann. Entomol. Soc. Am. 60: 774–779.

1968. Oothecae of the Blattaria. Ann. Entomol. Soc. Am. 61: 83–111.

[53]**1969.** The male genitalia of Blattaria. I. *Blaberus* spp. (Blaberidae:

Blaberinae). Psyche 76: 217–250.

1984. The genus *Symploce* Hebard. I. Species from the West Indies (Dictyoptrea: Blattaria, Blattellidae). Entomol. Scand. 15: 25–63.

[54]**1985.** A taxonomic revision of the genus *Blattella* Caudell (Dictyoptera, Blattaria: Blattellidae). Entomol. Scand. Suppl. 22: 1–221.

1986. *Blattella asahinai* introduced into Florida (Blattaria: Blattellidae). Psyche 93: 371–374.

[55]**Roth, L. M. & A. B. Gurney. 1969.** Neotropical cockroaches of the *Epilampra abdomennigrum* complex: a clarification of their systematics. Ann. Entomol. Soc. Am. 62: 617–627.

Roth, L. M. & E. R. Willis. 1957. Observations on the biology of *Ectobius pallidus* (Olivier) (Blattaria, Blattidae). Trans. Am. Entomol. Soc. 83: 31–37.

1960. The biotic associations of cockroaches. Smithsonian Misc. Collect. 141: 1–470.

Saussure, H. 1862. Orthoptera nova americana (Diagnoses praeliminares) III. Rev. Mag. Zool. 14: 163–171, 227–234.

1864. Orthopteres de l'Amerique Moyenne. Mem. d'Hist. Nat. Mex. IV: 1–279, Geneva and Paris (not seen).

1869. Blattarum novarum species aliquot. Rev. Mag. Zool. 21: 109–113.

Saussure, H. & L. Zehntner. 1893–1894. Family Blattidae. Biol. Centr.–Am. Orthoptera 7: 13–123, pl. 3–5.

Scudder, S.H. 1862. Materials for a monograph of the North American Orthoptera, including a catalogue of the known New England species. J. Boston Soc. Nat. Hist. 7: 409–480 (not seen).

1901. Catalogue of the described Orthoptera of the United States and Canada. Proc. Davenport Acad. Sci. 8: 1–101.

Scudder, S.H. & T.D.A. Cockerell. 1902. A first list of the Orthoptera of New Mexico. Proc. Davenport Acad. Sci. 9: 1–60, pl. I–IV.

Serville, J.G. 1839. Histoire naturelle des insectes. Orthopteres. Paris (not seen).

[56]**Spencer, C. B., R. D. White & L. C. Stover. 1979.** Discovery and control of the Turkestan cockroach. Pest Contol 47: 14, 45

Stephens, J.F. 1835. Illustrations of British entomology. 6., London (not seen).

Stoetzel, M. B. 1989. Common names of insects and related organisms, 1989. Entomolological Society of America, Lanham, Md.

Stoll, C. 1787–1813. Representation exactement coloree d'apres nature des spectres ou phasmes, etc. rassamblees et decrites. I. Spectres et Mantes. Amsterdam (not seen).

[57]**Thoms, E. & W. H. Robinson. 1987.** Distribution and movement of the oriental cockroach (Orthoptera: Blattidae) around apartment buildings. Environ. Entomol. 16: 731–737.

Turton, W. 1806. British Fauna, containing a compendium of the zoology of the British Islands arranged according to the Linnean system. J. Evans, Swansea.

[58]**Vickery, V.R. & D.K. McE. McKevan. 1985.** The insects and arach-

nids of Canada. Part 14. The grasshoppers, crickets and related insects of Canada and adjacent regions. Ulonata: Dermaptera, Cheleutoptera, Notoptera, Dictuoptera, Grylloptera and Orthoptera. Agriculture Canada, Research Branch Publ. 1777.

Walker, F. 1868. Catalogue of the specimens of Blattariae in the collection of the British Museum. British Mus. (Nat. Hist.), London (not seen).

[59]**Walker, T. J. 1957.** Ecological studies of the arthropods associated with certain decaying materials in four habitats. Ecology 38: 262–276.

Wheeler, W.M. 1900. A new myrmecophile from the mushroom gardens of the Texan leaf-cutting ant. Am. Natur. 34: 851–862.

[60]**Wright, C. G. & H. C. McDaniel. 1973.** Further evaluation of the abundance and habitat of five species of cockroaches on a permanent military base. Fla. Entomol. 56: 251–254.

[61]**Young, F. N. 1949.** Insects from burrows of *Peromyscus polionotus*. Fla. Entomol. 32: 77.