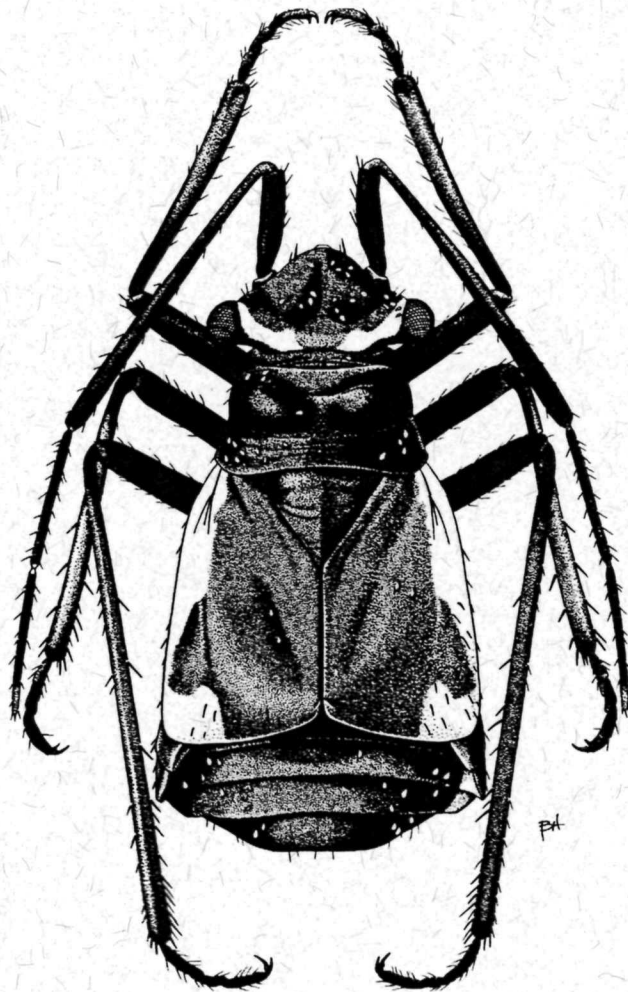


**ARTHROPOD INVESTIGATIONS OF THE
NORTH CASCADES NATIONAL PARK SERVICE COMPLEX
HEMIPTERA: HETEROPTERA, 1, 1997-1998**

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U.S. Department of the Interior
National Park Service - Pacific West Region
North Cascades National Park Service Complex
Sedro-Woolley, WA 98284
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May, 1999

North Cascades National Park Service Complex
2105 State Route 20
Sedro-Woolley, WA 98284

United States Department of the Interior - National Park Service - Pacific West Region



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Abstract

Twelve families, 24 genera, and 32 species of Hemiptera: Heteroptera were reported from the North Cascades National Park (Lattin, 1997): The present paper adds five new species of Anthocoridae, two species of Miridae, and one of Notonectidae, a new total of 13 families, 27 genera, and 40 species to date. Most of the collected taxa are boreal species, not surprising considering the geographical position of the Park. Placed against our knowledge of the composition of the greater bug fauna of North America, the Park is beginning to disclose its critical geographical position at the intersection of east-west and north-south transects. As other insect groups become known (e.g. butterflies, dragonflies, and damselflies), we will have a more precise knowledge of this important component of biological diversity.

Dedication

This paper is dedicated to the late John Hinchliff of Portland, Oregon. His recent passing left an enormous gap in our lives. John was a marvelous architect and left many examples of his special talents in the Pacific Northwest. Born in England, he brought with him a deep love of butterflies and pursued and studied them over much of the Northwest, together with his fellow lepidopterists. Ultimately, he became the scribe and recorder for a group of dedicated individuals interested in these graceful insects. As such, he kept meticulous records of every specimen collected and their localities, and in 1994, produced the Atlas of Oregon Butterflies. This atlas displayed the combined distribution of about 24,000 collection records of every species (159) and subspecies in the state - each displayed on a detailed map. As always, John was free to acknowledge his many friends and associates that made this volume possible.

As if that publication was not enough, he immediately started to bring together similar information on every species in Washington (140) and all of their subspecies from over 25,000 individual records, records from a large number of individuals made over many years. Each species and subspecies was carefully located and placed on a grid map by hand. Known host plants of species from both states were included in each volume. Thus, we have a rich tapestry of knowledge against which we can place our still-unknown data base of the butterfly fauna of the North Cascades National Park. This effort will be particularly useful because the results can be placed in a much larger context than otherwise possible. Nowhere else do we have such a rich legacy of information, representing as it does, the combined efforts of an enormous number of people. When our knowledge of the Park fauna becomes known, many visitors will be able to enjoy these colorful inhabitants as they now study birds. These efforts will be a long-lasting living monument to his special interests and long-term friendships to all who knew him. (Note: Both books are available from the Oregon State University Bookstore, Corvallis, Oregon, 97339).

Acknowledgments

Once again, I thank Reed Glesne of the North Cascades National Park for his interest in the arthropods of the Park. With each year, more species are being added to the known fauna. The more we know, the better understanding we have of the placement of the Park's fauna into the biological diversity of the Pacific Northwest Region. My thanks, too, to Ron Holmes, Sherry Bottoms and Brenda Cunningham for their collecting efforts and their well documented specimens. As I located their sites on my large-scale map, it was obvious that some very rugged terrain was traversed to reach them. My thanks to Bonnie Hall for the superb drawing used on the cover of this publication and to Linda Parks for her careful preparation of this manuscript.

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Introduction

This is the first supplement to the original paper that dealt with part of the Hemiptera: Heteroptera of the North Cascades National Park (Lattin, 1997). The reader is referred to that publication for the detailed review of the included species in this suborder and to the general references whose contents may be of interest. Several additions to that literature include Schuh (1995), a massive up-dated catalog on the world catalog of the family Miridae, and Slater and O'Donnell (1995), who compiled an up-date on the family Lygaeidae of the world, covering the literature from 1960-1994. Both of these publications are superb contributions to our knowledge of these families, and both well represented in the Park. Brooks and Kelton (1967) provided an extensive review of the aquatic and semiaquatic Heteroptera of central Canada.

The long-time interest in the Heteroptera by Dr. G.G.E. Scudder of the University of British Columbia is providing us with detailed knowledge of the fauna immediately adjacent to the north. Besides his work on other taxa, he is working with Dr. Michael D. Schwartz on the large family Miridae of British Columbia, soon to be completed. As we learn more about this large family in the Park, we will have a far better understanding of their position within the larger fauna since so many of our species have affinities to the boreal elements of the North American continent. Scudder provided us with a fine general overview of the northern arthropod fauna in his 1979 publication, a must for anyone interested in the broader picture of arthropod distribution.

Several of the species reported here are of note. Five more species of Anthocoridae are added: *Anthocoris tomentosus* Péricart, *Tetraphleps latipennis* Van Duzee, *Tetraphleps pilosipes* Kelton and Anderson, *Tetraphleps uniformis* Parshley and *Elatophilus* sp. A. All of these are predators on small insects. *A. tomentosus* lives on deciduous trees (willow) while the other species are found on various conifers (larch, true fir, mountain hemlock, pine). The extensive coniferous forests on the Park are reflected in the occurrence of these small predators that live on them, feeding on aphids and other small insects. The two species of the mirid genus *Labops* were collected on Rainy and Washington Pass, at the eastern edge of the Park, where they occurred around the bases of the meadow grasses. While *Labops hesperius* Uhler is a common species with wide distribution, in our area *Labops verae* Knight is a high latitude species, known only in the short-winged stage. Its occurrence on Rainy Pass and on Chinook Pass to the south, represents just such high elevational localities, not a surprise since it was described from Mt. Rainier (Knight, 1929). Kelton (1980) extended its range far to the north. There will be more such interesting distributions uncovered as we learn more.

Species Accounts

Family Anthocoridae

Anthocoris tomentosus Péricart (1971) was long known as *Anthocoris melanocerus* Reuter (1884) but renamed because the prior name was pre-occupied by another organism. Originally described from Colorado, it is now known to be western, occurring in Alaska, Alberta, British Columbia, California, Colorado, Idaho, Manitoba, North West Territories, Nevada, Utah and Yukon. (Henry, 1988) Specimens are at hand from Oregon and, of course, Washington.

As one moves southward, the species is found at higher elevations. Its extensive range to the northwest suggests the possibility it also may occur in the Soviet Far East.

Anderson (1962) provided basic biological information on *A. tomentosus* (under the name *A. melanocerus*). He indicated that records of most of the specimens he examined had been collected at 1,000 feet and some up to 7,300 feet in Colorado. As with *A. antevolens* White, it is found on deciduous rather than coniferous trees. Anderson stated that it was the most abundant anthocorid in the orchards of the Okanagan Valley of British Columbia, where the pear psylla was its chief prey. Madsen (1961) provided similar information on *A. tomentosus* as a predator of the pear psylla in British Columbia. He, too, indicated that it was sometimes found on low herbs as well. (Anderson suggested that there were three generations in the region of southeastern British Columbia.) Kelton (1978) provided an extensive list of deciduous trees and a few herbs for Canada, many of which occur in North Cascades National Park (e.g. *Prunus*, *Fraxinus*, *Betula*, *Cornus*, *Corylus*, *Crataegus*, *Acer*, and *Salix* (all under *A. melanocerus* rather than *A. tomentosus*). He provided a map of the species, a habitus drawing of the adult, as well as details of the clasper and scent gland opening. While *A. tomentosus* has completely shining fore-wings, as does *A. antevolens* White, the male claspers are very distinct and easily separate the two species, both species now known to occur in the Park. Habitat knowledge of these two species is limited but careful collections and habitat documentation will clarify this question. *A. antevolens* was taken on *Salix sitchensis*, while *A. tomentosus* was taken on *Salix* sp. and on *Abies amabilis*. The latter tree was likely a "sitting" record.

Tetrableps latipennis was described from California by Van Duzee in 1921, together with seven additional species of the family. The distribution of *Tetrableps latipennis* is similar to that of *T. uniformis* Parshley, although it extends southward into California. Henry (1988) provided a list of states and provinces. Several high altitude localities in Washington were added by Lattin and Stanton (1992), along with other localities in California, Idaho, and Oregon. See this last reference for additional literature citations, a synonym, and a habitus drawing of the adult bug. Besides the specimens reported here from Bridge Creek, Twisp Pass South and Diobsud Lake, I collected specimens of *T. latipennis* from white bark pine (*Pinus albicaulis*) at Washington Pass Meadow, about three miles north of the Park border at 1,662 meters. These specimens were collected on August 11, 1978. Other specimens of this bug were collected from Yakima County, White Pass Summit, at 1,292 meters from *Abies procera*; Chelan County, Pump Chance Creek, 4 miles east of Swauk Pass, at 1,415 meters; King County, Stevens Pass Summit,

on *Abies amabilis*: and Whatcom County, Mt. Baker National Forest, R9E, T39N, Sec. 17 on *Tsuga mertensiana*.

Furniss and Carolin (1977) felt this was the most abundant anthocorid on conifers where they reported it feeding on *Adelges cooleyi* (Homoptera: Adelgidae). Earlier, Kelton (1966) mentioned that *T. latipennis* fed upon the balsam woolly adelgid in eastern Canada. A good many coniferous “host trees” were cited by Lattin and Stanton (1992) including five species and subspecies of *Pinus*, *Pseudotsuga* spp., two species of *Picea*, four species of *Abies*, and at least one species of *Larix*. While Kelton (1966) also reported *Alnus* sp. as a “host”, it is likely that this was a collection of a resting adult, rather than a true “host tree” which seem to be only conifers. Adults were collected from late May to mid-September. As is typical for many anthocorids, the males seem to disappear early, leaving only females for most of the season. Anderson (1962) felt that there might be two generations per year, with adults overwintering.

Tetraphleps pilosipes Kelton and Anderson (1963) was described from Blackwall, Manning Park, British Columbia. The type series also contained specimens from other locations in British Columbia, Manitoba, the Yukon Territory, and Mary’s Peak, Benton County, Oregon. Lattin and Stanton (1992) cited specimens from Okanagan County, Washington, Washington Pass Meadow, 1,662 meters, August 11, 1978; Yakima County, 5 km east of White Pass Summit at 1,292 meters collected August 22, 1979 from *Abies procera*.

This is a northwestern North American species as the distribution indicates. The specimens from Mary’s Peak, Oregon, were collected at 1,231 meters from *Abies procera*. Hosts from other localities included *Abies lasiocarpa* from the type locality in British Columbia (Blackwall, Manning Park); *Larix laricina*, *Picea glauca*, *Picea mariana*, *Pinus albicaulis* and *Pinus contorta*. (These last four tree species were added by Kelton (1978)). Lattin and Stanton (1992) added *Pinus contorta latifolia*. Contrary to many species, males were collected into August at Manning Park, British Columbia, perhaps indicating a second generation or a prolonged single generation. Both males and females were collected from near the summit of Mary’s Peak, Oregon (1,123 m.) in early May, suggesting that here the species overwintered as an adult (as do many anthocorids). Specimens from within the Park are to be expected to occur on *Abies lasiocarpa*, *Pinus albicaulis*, and perhaps *Pinus contorta*. They appear to feed on aphids, especially species of *Cinara*.

Parshley (1920) described *Tetraphleps uniformis* from Mt. Washington, New Hampshire. While Parshley did not know the host, he postulated that it would be found on conifers, as indeed it has been. Kelton (1966) recorded it from *Picea glauca* and *P. mariana*, *Abies balsamea* and *Pinus contorta latifolia* and *P. sylvestris*. Lattin and Stanton (1992) added *Pinus contorta murrayana* and *Picea engelmanni*. Kelton (1978) provided a review of the distribution of this bug, indicating that it occurred from Newfoundland in the east and to the Yukon Territory and British Columbia in the west, besides Maine, New York and Colorado. Oregon and Wyoming localities were added by Lattin and Stanton (1992), so it is not surprising that specimens were found in the North Cascades National Park, Washington during 1997. Other Washington localities are likely to be found, especially in the Cascade Mountains and in Olympic National Park. Kelton (1978) stated that this bug was associated with the balsam woolly adelgid and suggested that aphids

might serve as prey as well. An aphid, *Cinara* sp. was a common potential prey item on *Pinus contorta murrayana* in the Cascade Mountains of Oregon (Lattin and Stanton, 1992). The same publication contains the major references to the species, including synonyms. The interested reader is referred to that publication for further details.

Elatophilus sp. A. was collected at Washington Pass, Okanogan County, Washington, 1,615 m, September 20, 1979 from *Picea engelmanni* (Lattin and Stanton, 1992). Additional specimens are known from Oregon and California. These specimens were taken from *Pinus contorta murrayana*, the Cascades subspecies of *Pinus contorta*. The bug is certain to be found within the Park, most likely from beating branches of conifers, especially *Pinus contorta murrayana* and *Picea engelmanni*. The genus *Elatophilus* is found in the Northern Hemisphere in the Old and New World. (Lattin and Stanton, 1993). Several of the species have been associated with scale insects of the genus *Matsucoccus*. Lussier (1965) was the only one to positively connect a species of *Elatophilus* with *Matsucoccus* in North America, although several species have been associated with scales of this genus in the Old World. These scales live deep under the bark of the trees and the bugs must reach them. The reader is referred to Lussier (1965) and Lattin and Stanton (1992, 1993) for a more extensive bibliography on the subject. Lattin (1999) also provides some basic information. There is evidence that aphids may be prey items, as well as scales (Cobben and Arnoud, 1969). As always, careful field work will clarify these problems. *Elatophilus* sp. A. can be separated from our other *Elatophilus* species by the enlarged second antennal segment. This species will be described in the near future, in another journal.

Family Miridae

The Miridae, or plant bugs, are the largest family of the Heteroptera, with almost 10,000 valid species world-wide (Schuh, 1995). The massive recent catalog by Schuh (1995) brings our knowledge of this widespread family up to date. It is a superb example of how a catalog should be presented. One interesting statistic he provided was that 6,603 species had been described before 1956. (The publication date of the former world catalog by Carvalho) while 5,452 had been described since that date, giving a total number of 12,055 species group names, of which 9,805 are now considered valid. The last four decades have resulted in over 1,000 new species being described each decade. By way of comparison, Henry and Wheeler (1988) reported 222 genera and 1,930 species from continental United States and Canada, and Parsons *et al.* (1991) reported 46 genera and 86 species from a 6,400 ha old-growth Douglas fir research site in western Oregon. Considering the strategic location of the North Cascades National Park, and its size and variability, there could be over 100 species.

While most mirids are plant feeders on a wide variety of different forbs, shrubs and trees, a small number are predaceous (e.g. *Deraeocoris*, *Pilophorus* and *Phytocoris*). The diversity of plants in the Park virtually guarantees great species richness of Miridae. Careful collecting with special attention to the host plants will be very productive. As with many different groups of insects, non-indigenous (introduced) species are to be expected (e.g. *Stenotus binotatus* (Fabricius), *Megaloceroea recticornis* (Geoffroy), and *Plagiognathus chrysanthemi* (Wolff)).

Most species cited above are to be found in disturbed grassy areas often on introduced plants. Thus, camp sites, road sides, and tourist stops are likely places to find them. The vast areas of undisturbed landscapes will display great diversity of native species as well, with the high meadows of particular interest. The two species of *Labops* reported here are examples of the latter.

The mirid genus *Labops* Burmeister is found throughout the northern portion of the Northern Hemisphere. There are six species found in the United States and Canada (Knight, 1922; Slater, 1954), chiefly in northwestern North America (Henry and Wheeler, 1988). Where known, species are found on grasses and sedges. One native species, *Labops hesperius*, is now known as a pest of the imported crested wheat grasses used to enhance western grazing, along with some species of the mirid *Irbisia* Reuter (Lattin *et al.*, 1994, 1995). While native grasses are the normal host plants for these native insects, the bugs have expanded their feeding to these non-indigenous grasses almost wherever they have been planted. Certainly, all plant materials should be screened prior to intentional introduction. Regrettably, this did not occur with the crested wheat grasses that were introduced - in this case, the introductions were made over 90 years ago, well before consideration was given to the potential impact of natural pests on these grasses. A similar situation seems to occur today between recently introduced plants of the genus *Kochia*, for range improvement and the movement of native species of *Lygus* onto the non-indigenous species of grass (Moore *et al.*, 1982). Efforts to import untreated wood, including logs from various parts of the world, is another current problem that results in the unexpected introductions of pest organisms being brought in. (Anonymous, 1991, 1994).

Labops hesperius Uhler was collected at Washington Pass, Washington, 5,477 feet elevation. This site is about 3 miles north of the eastern Park boundary. The species will surely be found within the boundaries of the Park for it is widely distributed in western and northwestern North America. It is commonly swept from grassy meadows with long and short-winged adults occurring. The species occurs primarily on the east side of the Cascade Mountains, but I have seen specimens from just below Hurricane Ridge in Olympic National Park, Washington.

Labops verae Knight was described from Van Trump Park, 6,000 feet on Mt. Rainier, Washington (Knight, 1929) and is now known to occur in Alberta, British Columbia, Manitoba, Northwest Territories, and Washington (Henry and Wheeler, 1988). Specimens of this unusual species were collected at Rainy Pass, Washington, 4,860 feet, just a mile east of the Park border and will certainly be found in the high meadows of the Park. Collecting is most easily done by searching at the bases of grass clumps in these meadows. This is a strongly brachypterous species (short-winged) and the only North American species known to occur only in this condition. There is a specimen from Chinook Pass, Washington (5,440 feet) in the Systematic Entomology Laboratory Collection at Oregon State University, Corvallis, Oregon. The specimen was collected on August 26, 1932; the specimen from Rainy Pass was collected by me on August 11, 1978. Several other species of *Labops* may be found in the Park, especially *L. hirtus* Knight, a very widespread species in northern United States and Canada (Slater, 1954; Henry and Wheeler, 1988).

Family Notonectidae

The Notonectidae, or back-swimmers, belong to a modest-sized family containing 11 genera and 343 species world-wide (Schuh and Slater, 1995). Three genera and 32 species are known to occur in the Continental United States and Canada (Polhemus and Polhemus, 1988). Two genera, *Buenoa* Kirkaldy and *Notonecta* Linnaeus, occur in the general vicinity of the North Cascades National Park, Washington, but only *Notonecta kirbyi* Hungerford has been collected to date. Other species will surely be found, especially in ponds, bogs, lakes and even quiet back waters of the streams. They are found only rarely in moving waters. Still waters at higher elevations are likely to produce several species of high latitude and elevation. One such species, *Notonecta borealis* Hussey, is a high latitude species that occurs in British Columbia and Alberta, besides other boreal regions of northern United States and Canada (see Polhemus and Polhemus, 1988, for details of the synonymy of the family).

All known North American Notonectidae are aquatic predators as nymphs and adults (Hungerford, 1920, 1934; Truxal, 1953, 1979; Usinger, 1956; Taylor, 1968; Sanderson, 1982; Voight and Garcia, 1976). They are frequent components of the standing water fauna. Their common name results from their posture in the water - they swim upside down using their long, powerful hind legs. When species of *Notonecta* are at rest under water, they must hold on to vegetation on the bottom to avoid floating to the top. (They are all air breathers.) The bug must come to the surface from time to time to replenish its air supply that is held in the dense hairs on the venter of the bug. Species of the genus *Buenoa* swim through the water as well, but when they cease movement, they remain in position in the water column, thanks to the presence of oxyhaemoglobin in selected tissues of the body. Not only are notonectids powerful swimmers, but they are strong fliers as well, and thus able to disperse to other bodies of water. When thorough surveys are made of the bodies of water in the Park, there will be a distinct fauna in place. According to Taylor (1968), Streams and Newfield (1972), and Streams (1974), each species of *Notonecta* has a preferred habitat in the water, even though they may be found together with others species.

Notonecta kirbyi Hungerford is the only species collected in the Park thus far but others will surely be found. The species is widely distributed in the Pacific Northwest, being recorded from Alberta, British Columbia, Idaho, Oregon and Washington (Polhemus and Polhemus, 1988). It is the only species of Notonectidae recorded from the H.J. Andrews Experimental Forest in Douglas fir old growth forest in western Oregon (Parsons, *et al.*, 1991). This latter site has almost no standing water because of the rugged terrain that is well drained by streams. Thus far, species of Belostomatidae, Gerridae, Saldidae and now Notonectidae have been found. There will be more!

Table 1. Species List of Hemiptera:Heteroptera collected at North Cascades National Park Service Complex, Washington.

Anthocoridae		
<i>Anthocoris antevolens</i>	White	(Lattin, 1997)
<i>Anthocoris tomentosus</i>	Péricart	new
<i>Elatophilus</i>	sp. A	new
<i>Tetrapleps latipennis</i>	Van Duzee	new
<i>Tetraphleps pilosipes</i>	Kelton and Anderson	new
<i>Tetraphleps uniformis</i>	Parshley	new
Aradidae		
<i>Aradus orbiculus</i>	Van Duzee	(Lattin, 1997)
Belostomatidae		
<i>Lethocerus americanus</i>	(Leidy)	(Lattin, 1997)
Ceratocombidae		
<i>Ceratocombus vagans</i>	Mcatee and Malloch	(Lattin, 1997)
Gerridae		
<i>Gerris buenoi</i>	Kirkaldy	(Lattin, 1997)
<i>Gerris incurvatus</i>	Drake and Hottes	(Lattin, 1997)
Lygaeidae		
<i>Cordillonotus stellatus</i>	Scudder	(Lattin, 1997)
<i>Cymus luridus</i>	Stål	(Lattin, 1997)
<i>Eremocoris borealis</i>	(Dallas)	(Lattin, 1997)
<i>Eremocoris obscurus</i>	Van Duzee	(Lattin, 1997)
<i>Geocoris pallens</i>	(Stål)	(Lattin, 1997)
<i>Kleidocerys fransicanus</i>	(Stål)	(Lattin, 1997)
<i>Kleidocerys resedae</i>	(Panzer)	(Lattin, 1997)
<i>Peritrechus Saskatchewanensis</i>	Barber	(Lattin, 1991)
<i>Scolopostethus pacificus</i>	Barber	(Lattin, 1997)
<i>Scolopostethus thomsoni</i>	Reuter	(Lattin, 1997)
<i>Stygnocoris sabulosus</i>	(Schilling)	(Lattin, 1997)
Miridae		
<i>Labops hesperius</i>	Uhler	new
<i>Labops verae</i>	Knight	new
Nabidae		
<i>Nabis alternatus uniformis</i>	Harris	(Lattin, 1997)
<i>Nabis roseipennis</i>	Reuter	(Lattin, 1997)

<i>Nabis rufusculus</i> Reuter	(Lattin, 1997)
<i>Pagasa fusca</i> (Stein)	(Lattin, 1997)
Notonectidae	
<i>Notonecta kirbyi</i> Hungerford	new
Pentatomidae	
<i>Banasa dimidiata</i> (Say)	(Lattin, 1997)
<i>Cosmopepla bimaculata</i> (Thomas)	(Lattin, 1997)
<i>Holcostethus tristis</i> (Van Duzee)	(Lattin, 1997)
<i>Neotiglossa trilineata</i> (Kirby)	(Lattin, 1997)
<i>Perillus exaptus</i> (Say)	(Lattin, 1997)
Reduviidae	
<i>Barce fraternus banksii</i> Baker	(Lattin, 1997)
Saldidae	
<i>Micracanthia quadrimaculata</i> (champion)	(Lattin, 1997)
<i>Saldula laticollis</i> (Reuter)	(Lattin, 1997)
<i>Saldula saltatoria</i> (Linnaeus)	(Lattin, 1997)
Tingidae	
<i>Acalypta lillianis</i> Torre-Bueno	(Lattin, 1997)
<i>Acalypta mera</i> Drake	(Lattin, 1997)

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural and cultural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interest of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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