

# Curatorial Report on the Midway Arthropod Collection<sup>1</sup>

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## **Summary:**

The following is a detailed description of the Midway arthropod collection currently housed at Bishop Museum, including its current level of curation and the conditions under which it is maintained. The list of available specimens is largely in agreement with the list of taxa supplied by Gordon Nishida in 1998. Missing taxa likely represent specimens known only by singletons or specimens currently out on loan. Counts include specimens collected in 1997 and 1998, and 2000. In the course of compiling this list two new records for Midway have been discovered. One of these species appears to be new to Hawaii.

## **Collection Background:**

The Midway collection was assembled during 1997, 1998, and 2000. The 1997 and 1998 samples were collected by Gordon Nishida, Adam Asquith, G. Allan Samuelson, and USFWS personal in order to construct an exhaustive list of Midway's terrestrial arthropod fauna, with particular attention paid to invasive species. A final report produced by Gordon Nishida in December of 1998 listed 508 species (Nishida, 1998), more than doubling the previous number, which stood at 221 (Suehiro, 1960). The report also provided recommendations for the control and monitoring of invasive arthropods, as well as an exhaustive bibliography. In 1999 John Beardsley collected additional specimens, and with Gordon Nishida, published a list of 546 species (Nishida & Beardsley, 2002). Gordon Nishida did further collecting in 2000 as part the NOWRAMP project (Nishida, 2001). These specimens are housed with the 1997 and 1998 arthropods.

## **Collection Curation:**

The Midway arthropod collection, which served as the basis for the 1998 report, is stored in Bishop Museum's climate-controlled arthropod storage facilities on the first floor of Pauahi Hall. Standard arthropod preservation practices are employed in the preservation and care of the collection.

### **- Fluid Collection**

Over the past year the fluid portion of the collection has been moved from odd-sized jars and Nalgene® bottles to standardized 16 ounce glass jars. Polypropylene caps and foamed polyethylene liners insure tight closures. Fluid evaporation is further reduced by sealing the jars with 3M Scotch® acrylic tape #311. When necessary the jars have been topped off with fresh 70% ethanol prior to sealing. The jars are clearly labeled with

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collecting information for unsorted samples. For sorted specimens the jars are labeled with the taxa they contain, and each individual specimen vial retains collecting data. In all cases the labels are printed via inkjet onto Resistall paper to insure longevity in fluid. This process takes approximately 15 to 20 minutes per jar. Additional effort has been put toward sorting samples into basic taxonomic units (in this case Order, Family, and occasionally morphologically distinct species). This activity takes an average of six to eight hours per jar and to date a dozen jars have been done, reducing the number of undetermined samples. During this process select specimens are removed for dry mounting (see below). The current breakdown of the fluid collection stands as follows:

Number of Undetermined Sample Jars

1997 33  
1998 29

Number of Sorted Jars

Amphipoda	1
Araneae	
Araneidae	
<i>Neoscona</i>	1
Clubionidae	
<i>Cheiracanthium</i>	1
Pholcidae	
<i>Smeringopus</i>	1
Salticidae	
<i>Menemerus</i>	1
<i>Plexippus</i>	1
“ <i>Sandalodes</i> ”	1
Undetermined	1
Scytodidae	
<i>Scytodes</i>	1
Segestriidae	
<i>Ariadna</i>	1
Tetragnathidae	
<i>Tetragnatha</i>	1
Theridiidae	
<i>Nesticodes</i>	1
Chilopoda	1
Insecta	
Blattodea	2
Coleoptera	3
Collembola	1
Dermaptera	1
Diptera	2
Formicidae	2
Heteroptera	1
Homoptera	1

Isopoda	1
Isoptera	1
Lepidoptera	1
Orthoptera	2
Psocoptera	1
Thysanoptera	1
Pseudoscorpionida	1

### - Pinned and Point-mounted Collection

The pinned and paper point-mounted portion of the collection is held in 18 BioQuip® insect drawers. They are separated from the Hawaiian and International collections to facilitate ease of access. As mentioned above, efforts have been taken to dry-mount select specimens, mainly those that do best pinned or point-mounted such as Coleoptera, and medium to large Diptera and Hymenoptera. Specimen preparation and labeling take approximately five minutes per insect. The current breakdown is as follows, with recently mounted specimens comprising the majority of the undetermined Insecta:

#### Number of Pinned and Point-mounted Insects

##### BLATTODEA

###### Blaberidae

<i>Diploptera punctata</i> (Eschscholtz, 1822)	3
<i>Pycnoscelus indicus</i> (Fabricius, 1775)	14

###### Blattellidae

<i>Blattella lituricollis</i> (Walker, 1868)	7
<i>Symploce pallens</i> (Stephens, 1835)	1

###### Blattidae

<i>Periplaneta americana</i> (Linnaeus, 1758)	1
<i>Periplaneta australasiae</i> (Fabricius, 1775)	1

##### COLEOPTERA

###### Anobiidae

<i>Lasioderma serricorne</i> (Fabricius, 1792)	1
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###### Anthicidae

<i>Anthicus tobias</i> Marseul, 1879	3
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###### Bruchidae

<i>Acanthoscelides</i> <i>macrophthalmus</i> Schaeffer, 1907	6
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###### Cerambycidae

<i>Ceresium unicolor</i> (Fabricius, 1787)	2
<i>Sybra alternans</i> (Wiedemann, 1825)	60

###### Cerylonidae

<i>Murmidius</i> sp.	1
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###### Ciidae

<i>Cis</i> sp.	2
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###### Cleridae

<i>Necrobia rufipes</i> (DeGeer, 1775)	12
Coccinellidae	
<i>Coelophora inaequalis</i> (Fabricius, 1775)	74
<i>Cryptolaemus montrouzieri</i> Mulsant, 1853	26
<i>Curinus coeruleus</i> (Mulsant, 1850)	7
<i>Diomus debilis</i> (LeConte, 1852)	15
<i>Diomus notescens</i> (Blackburn, 1889)	60
<i>Nephus bilucernarius</i> (Mulsant, 1850)	8
<i>Nephus ?bipunctatus</i> Kugelann, 1794	20
<i>Olla v-nigrum</i> (Mulsant, 1866)	8
<i>Rhyzobius forestieri</i> (Mulsant, 1853)	1
<i>Rhyzobius lophanthae</i> (Blaisdell, 1892)	1
<i>Rodolia cardinalis</i> (Mulsant, 1850)	4
<i>Scymnodes lividigaster</i> (Mulsant, 1853)	14
<i>Telsimia nitida</i> Chapin, 1926	2
Curculionidae	
<i>Asynonychus godmanni</i> Crotch, 1867	17
<i>Dryotribus wilderi</i> Perkins, 1916	12
<i>Orchidophilus</i> sp.	1
<i>Oxydema fusiforme</i> Wollaston, 1873	1
<i>Sphenophorus venatus</i> <i>vestitus</i> Chittenden, 1904	1
Dermestidae	
<i>Dermestes ater</i> DeGeer, 1774	58
<i>Dermestes maculatus</i> DeGeer, 1774	30
Elateridae	
<i>Conoderus amplicollis</i> (Gyllenhal, 1817)	3
<i>Conoderus exsul</i> (Sharp, 1877)	14
<i>Conoderus pallipes</i> (Eschscholtz, 1859)	14
Histeridae	
<i>Saprinus lugens</i> Erichson, 1834	18
Nitidulidae	
<i>Conotelus mexicanus</i> Murray, 1864	2
Scarabaeidae	
<i>Anomala sulcatula</i> Burmeister, 1844	8
<i>Pleurophorus parvulus</i> (Chevrolat, 1864)	3
<i>Protaetia fusca</i> (Herbst, 1790)	3
<i>Protaetia pryeri</i> (Janson, 1888)	13
Scolytidae	
<i>Hypothenemus</i> sp.	2
<i>Xyleborus perforans</i> (Wollaston, 1857)	4
Silvanidae	
<i>Oryzaeophilus surinamensis</i> (Linnaeus, 1758)	1
Staphylinidae	
<i>Atheta coriaria</i> (Kraatz, 1856)	2
<i>Carpelimus fulvipes</i> (Erichson, 1840)	1

? <i>Platystethus</i> sp.	1
<i>Scopaeus</i> sp.	1
Tenebrionidae	
<i>Alphitobius diaperinus</i> (Panzer, 1796)	2
<i>Alphitobius laevigatus</i> (Fabricius, 1781)	71
<i>Blapstinus dilatatus</i> LeConte, 1851	7
<i>Gonocephalum adpressiforme</i> Kaszab, 1951	105
<i>Tribolium castaneum</i> (Herbst, 1797)	13
DERMAPTERA	
Carcinophoridae	
<i>Anisolabis maritima</i> (Bonelli, 1832)	8
<i>Euborellia annulipes</i> (Lucas, 1847)	8
Labiduridae	
<i>Labidura riparia</i> (Pallas, 1773)	10
DIPTERA	
Agromyzidae	
<i>Amauromyza maculosa</i> (Malloch, 1913)	1
<i>Calycomyza humeralis</i> (Roser, 1840)	3
<i>Liriomyza sativae</i> Blanchard, 1913	116
<i>Liriomyza</i> spp.	80
<i>Melanagromyza splendida</i> Frick, 1953	5
<i>Pseudonapomyza spicata</i> (Malloch, 1914)	1
Asteiidae	
<i>Loewimyia ?bifurcata</i> Sabrosky, 1943	1
Calliphoridae	
<i>Chrysomya megacephala</i> (Fabricius, 1794)	11
<i>Lucilia graphita</i> Shannon, 1926	9
<i>Rhinia apicalis</i> (Wiedemann, 1830)	40
Chironomidae	
<i>Clunio littoralis</i> Stone & Wirth, 1947	5
<i>Polypedilum nubiferum</i> (Skuse, 1889)	29
Chloropidae	
<i>Cadrema pallida</i> (Loew, 1865)	59
<i>Siphunculina striolata</i> (Wiedemann, 1830)	34
Dolichopodidae	
<i>Chrysosoma globiferum</i> (Wiedemann, 1830)	7
Ephydriidae	
<i>Scatella stagnalis</i> (Fallen, 1813)	29
Lauxaniidae	
<i>Homoneura unguiculata</i> (Kertész, 1913)	14
Milichiidae	
<i>Milichiella lacteipennis</i> (Loew, 1865)	32
Syrphidae	
<i>Simosyrphus grandicornis</i> (Macquart, 1842)	11
Tephritidae	
<i>Acinia picturata</i> (Snow, 1894)	14

<i>Dioxya sorocula</i> (Wiedemann, 1830)	76
EMBIDIINA	
Oligotomidae	
<i>Oligotoma saundersii</i> (Westwood, 1837)	1
HETEROPTERA	
Cydnidae	
<i>Geotomus pygmaeus</i> (Dallas, 1851)	4
Lygaeidae	
<i>Geocoris pallens</i> Stal, 1854	36
Nabidae	
<i>Nabis capsiformis</i> Germar, 1837	7
Pentatomidae	
<i>Brochymena</i>	
<i>quadripustulata</i> (Fabricius, 1775)	1
Reduviidae	
<i>Empicoris</i>	
<i>rubromaculatas</i> (Blackburn, 1889)	1
<i>Zelus renardii</i> Kolenati, 1856	3
HOMOPTERA	
Cicadellidae	
<i>Deltocephalus sonorous</i> Ball, 1900	94
<i>Empoasca solana</i> DeLong, 1931	55
Delphacidae	
<i>Toya dryope</i> (Kirkaldy, 1907)	59
Flatidae	
<i>Melormenis basalis</i> (Walker, 1851)	33
Margarodidae	
<i>Icerya purchasi</i> Maskell, 1878	1
Membracidae	
<i>Vanduzeeia segmentata</i> (Fowler, 1895)	84
HYMENOPTERA	
Agaonidae	
<i>Pleistodontes froggatti</i> Mayr, 1906	1
Anthophoridae	
<i>Xylocopa sonorina</i> F. Smith, 1874	8
Aphelinidae	
<i>Azotus</i> sp.	4
<i>Coccophagus ceroplastae</i> (Howard, 1895)	7
Aphidiidae	
<i>Lysiphlebus testaceipes</i> (Cresson, 1880)	2
Bethylidae	
<i>Sierola</i> sp.	2
Braconidae	
<i>Apanteles carpatus</i> (Say, 1836)	1
<i>Apanteles</i> sp.	1
<i>Chelonus blackburni</i> Cameron, 1887	2

<i>Cotesia plutellae</i> (Kurdjumov, 1912)	77
<i>Parallorhogas pallidiceps</i> (Perkins, 1910)	1
<i>Phanerotoma hawaiiensis</i> Ashmead, 1901	27
<i>Rhaconotus vagrans</i> (Bridwell, 1920)	8
Ceraphronidae	
<i>Ceraphron plebeius</i> Perkins, 1910	7
<i>Ceraphron</i> sp.	16
Chalcididae	
<i>Antrocephalus apicalis</i> (Walker, 1874)	8
<i>Antrocephalus pertorvus</i> (Girault, 1917)	9
<i>Proconura</i> sp.	20
Diapriidae	
<i>Trichopria</i> sp.	9
Encyrtidae	
<i>Adelencyrtus odonaspidis</i> Fullaway, 1913	15
<i>Aeptencyrtus bruchi</i> DeSantis, 1957	1
<i>Anagyrus swezeyi</i> Timberlake, 1919	38
<i>Blepyrus insularis</i> (Cameron, 1886)	1
<i>Cheiloneurus</i> sp.	36
<i>Coccidoxenoides perminutus</i> Girault, 1915	1
<i>Dicarnosis ripariensis</i> Kerrich, 1978	37
<i>Diversinervus elegans</i> Silvestri, 1914	1
<i>Encyrtus infelix</i> (Embleton, 1912)	1
<i>Gyranusoidea phenacocci</i> (Beardsley, 1970)	20
<i>Gyranusoidea pseudococci</i> (Brèthes, 1924)	4
<i>Leptomastidea abnormis</i> (Girault, 1915)	1
<i>Metaphycus flavus</i> (Howard, 1881)	1
<i>Neodusmetia sangwani</i> (Subba Rao, 1957)	1
<i>Plagiomerus</i> sp.	8
Eucoilidae	
<i>Gronotoma micromorpha</i> (Perkins, 1910)	260
Eulophidae	
<i>Aprostocetus hagenowii</i> (Ratzeburg, 1852)	1
<i>Aprostocetus</i> sp.	1
<i>Elachertus advena</i> Timberlake, 1926	15
<i>Hemiptarsenus</i>	
<i>semialbiclavus</i> (Girault, 1916)	33
<i>Neochrysocharis formosa</i> (Westwood, 1833)	73
<i>Neotrichoporoides</i>	
<i>viridimaculatus</i> (Fullaway, 1955)	3
<i>Tetrastichus beardsleyi</i> Fullaway, 1956	4
Eupelmidae	
<i>Anastatus koebelei</i> Ashmead, 1901	21
Eurytomidae	
<i>Tetramesa</i> sp.	1
Evaniidae	

<i>Evania appendigaster</i> (Linnaeus, 1758)	1
Formicidae	
<i>Pheidole megacephala</i> (Fabricius, 1804)	6
Ichneumonidae	
<i>Anomalon californicum</i> (Cresson, 1879)	1
<i>Casinaria infesta</i> (Cresson, 1872)	2
<i>Diplazon laetatorius</i> (Fabricius, 1781)	25
<i>Venturia</i> sp. (not <i>canescens</i> )	56
Megachilidae	
<i>Megachile fullawayi</i> Cockerell, 1914	5
Mymaridae	
<i>Gonatocerus</i> sp.	22
<i>Stephanodes reduvioli</i> (Perkins, 1905)	3
Platygasteridae	
<i>Fidiobia</i> sp.	1
Pteromalidae	
<i>Chlorocytus longiscapus</i> Graham, 1965	19
<i>Halticoptera circulus</i> (Walker, 1833)	55
<i>Heteroschema</i> sp.	1
<i>Spalangia cameroni</i> Perkins, 1910	1
Scelionidae	
<i>Anteromorpha dubiosa</i> (Perkins, 1910)	1
<i>Encyrtoscelio</i> sp.	1
<i>Idris peregrinus</i> (Perkins, 1910)	1
<i>Telenomus nawai</i> Ashmead, 1904	2
<i>Telenomus vulcanus</i> Perkins, 1910	2
<i>Telenomus</i> sp.	2
Sphecidae	
<i>Chalybion bengalense</i> (Dahlbom, 1845)	6
<i>Isodontia mexicana</i> (Saussure, 1867)	4
Vespidae	
<i>Pachodynerus nasidens</i> (Latreille, 1832)	13
<i>Polistes aurifer</i> Saussure, 1853	18
<i>Polistes exclamans</i> Viereck, 1906	7
<i>Polistes jadvigae</i> Dalla Torre, 1904	12
<i>Polistes olivaceus</i> (De Geer, 1773)	1
Undetermined Hymenoptera	1,660
ISOPTERA	
Kalotermitidae	
<i>Incisitermes immigrans</i> (Snyder, 1922)	1
LEPIDOPTERA	
Cosmopterigidae	
<i>Asymphorodes dimorpha</i> (Busck, 1914)	23
Crambidae	
<i>Hellula undalis</i> (Fabricius, 1781)	24
<i>Herpetogramma licarsisalis</i> (Walker, 1859)	2



<i>Spoladea recurvalis</i> (Fabricius, 1775)	3
Geometridae	
<i>Cyclophora nanaria</i> (Walker, 1861)	3
<i>Macaria abydata</i> Guenee, 1857	2
Noctuidae	
<i>Agrotis ipsilon</i> (Hufnagel, 1767)	3
<i>Chrysodeixis eriosoma</i> (Doubleday, 1834)	2
<i>Hypena laceratalis</i> Walker, 1858	2
<i>Leucania loreyimima</i> Rungs, 1953	5
Nymphalidae	
<i>Vanessa cardui</i> (Linnaeus, 1758)	2
Oecophoridae	
<i>Stoeberhinus testaceus</i> Butler, 1881	87
Olethreutidae	
<i>Crociosema plebejana</i> Zeller, 1847	19
Plutellidae	
<i>Plutella xylostella</i> (Linnaeus, 1758)	28
Pterophoridae	
<i>Megalorhipida</i>	
<i>leucodactylus</i> (Fabricius, 1793)	1
Sphingidae	
<i>Agrius cingulata</i> (Fabricius, 1775)	2
Tineidae	
<i>Erechthias simulans</i> (Butler, 1882)	9
Tortricidae	
<i>Bactra</i> sp.	14
Undetermined Lepidoptera	53
ORTHOPTERA	
Gryllidae	
<i>Gryllodes sigillatus</i> (Walker, 1869)	8
<i>Modicogryllus conspersus</i> (Schaum, 1862)	1
Tettigoniidae	
<i>Conocephalus saltator</i> (Saussure, 1859)	5
<i>Scudderia paronae</i> Griffini, 1896	27
UNDETERMINED INSECTA	2,682

### - Slide Collection

There are only a small number of slide-mounted specimens within the Midway collection and no additional specimens have recently been added. Therefore, rather than being stored within Bishop Museum's arthropod slide room, the slides are interspersed among the pinned and point-mounted specimens and housed as mentioned above. They consist of the following:

#### Hymenoptera

##### Aphelinidae

<i>Aphytis ?hispanicus</i> Mercet, 1912	1
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<i>Aspidiotiphagus</i>	
<i>lounsburyi</i> (Berlese & Paoli, 1916)	1
Mymaridae	
<i>Anagrus frequens</i> Perkins, 1905	1
<i>Anagrus nigriventris</i> Girault, 1911	4
<i>Gonatocerus</i> sp.	2
<i>Stephanodes reduvioli</i> (Perkins, 1905)	1
Undetermined Insecta	9

### **New Records:**

In the course of compiling this list, two new species previously unreported from Midway have been discovered. They are repeated below from the list of pinned and point-mounted specimens. The encyrtid, identified by the late J.W. Beardsley, appears to be a new state record.

### HYMENOPTERA

#### Encyrtidae

*Gyranusoidea pseudococci* (Brèthes, 1924)

#### Vespidae

*Polistes olivaceus* (DeGeer, 1773)

### **References:**

- Nishida, G.M. 1998. Midway terrestrial arthropod survey final report. Report prepared for the U.S. Fish & Wildlife Service, Honolulu, Hawaii. 32 p.
- Nishida, G.M. 2001. NOWRAMP 2000 Terrestrial arthropod report. Prepared for the U.S. Fish & Wildlife Service, Honolulu, Hawaii. 33 p.
- Nishida, G.M. & J.W. Beardsley. 2002. A review of the insects and related arthropods of Midway Atoll. *Bishop Mus. Occas. Pap.* 68: 25-69
- Suehiro, A. 1960. Insects and other arthropods from Midway Atoll. *Proc. Hawaii. Entomol. Soc.* 17(2): 289-298