

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NATURAL HISTORY OF PLUMMERS ISLAND,
MARYLAND¹

XVII. ANNOTATED LIST OF THE WASPS (HYMENOPTERA:
BETHYLOIDEA, SCOLIOIDEA, VESPOIDEA, POMPILOIDEA, SPHECOIDEA)

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On 16 May 1902, five members of the Washington Biologists' Field Club—H. S. Barber, R. P. Currie, W. R. Maxon, J. H. Riley, and Wm. Palmer—visited Plummers Island, Maryland, in the Potomac River just above Washington, D. C. Although the only observation they made for that date in the Club register was a prosaic "river muddy," it can be assumed that it was a day of tranquil enjoyment such as our members anticipate to this day. The date is of importance in the present context, because Currie collected a queen of the common yellow jacket, *Vespa maculifrons* (Buysson). So far as I know, this was the first wasp specimen taken on the island, or at least the earliest one to be preserved in the National Museum collection.

Many of our early members had an intense interest in collecting and cataloguing the fauna and flora of the island. No wasp specialist was numbered among this group, and the insects collected most thoroughly were Coleoptera, Hemiptera, Diptera, and bees among the Hymenoptera. However, 10 members and 13 of their guests collected 303 wasp specimens plus the occupants of two yellow jacket nests between 1902 and 1923. H. S. Barber, J. C. Crawford, E. A. Schwarz, R. C. Shannon, and H. S. Viereck were the most active of this early group in collecting wasps; the others collected less than a dozen spe-

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cies each. Remarkably, these 303 specimens represent 123 different species. No additional wasp collections are known until my own efforts from 1956 through 1963, which resulted in the collection or rearing of 245 species. Altogether, a total of 274 species is now known from the island.

The early collecting was not thorough enough to enable me to detect any definite successional changes, such as are apparent in the flora of Plummers Island. Later collections include 100 of the 123 species taken by earlier workers. However, many of the 23 species which I did not capture are quite small and probably with rather obscure habits; some of the others may have been strays and not representatives of actual populations breeding on the island.

BIOLOGICAL STUDIES

Little attention was given to field studies of wasp biology in the early years. Barber in 1908 reared several specimens of *Trypoxylon politum* Say from the clay, "pipe organ" nests of this wasp, and dug up several subterranean nests of the common yellow jacket in 1912. He also reared a specimen of *Rhopalosoma nearcticum* Brues from a parasitized tree cricket, *Orocharis saltator* Uhler, collected by J. D. Hood in 1912 (Hood, 1913; recorded in error as *Rhopalosoma poeyi* Cresson).

Beginning in 1956 I carried on extensive biological studies of a number of solitary wasps. These resulted in several publications (Krombein, 1958, 1959, 1961, 1962*b*, and in press) containing short notes on the following species: *Calicurgus hyalinatus alienatus* (Smith), *Auplopus a. architectus* (Say), *Episyron q. quinquenotatus* (Say), *Tachytes crassus* Patton, *Trypoxylon pennsylvanicum* Saussure, *T. Richardsi* Sandhouse, *Mimesa basirufa* Packard, *Xylocelia virginiana* Rohwer, *Stigmus americanus* Packard, *Passaloecus annulatus* (Say), *Xysma ceanothae* (Viereck), *Podium luctuosum* Smith, *Gorytes canaliculatus* Packard, *Cerceris insolita* Cresson, *Euplilis rufigaster* (Packard), *Crossocerus planipes* (Fox), and *Oxybelus emarginatum* Say. A more extensive study is in preparation dealing with several crabronine wasps, *Ectemnius paucimaculatus* (Packard), *Crossocerus stictochilos* Pate, *Euplilis coarctata modesta* (Rohwer) and *E. rufigaster*, which breed in *Hibiscus* stems. I have also made life-history studies of a number of solitary wasps nesting in wooden borings;

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PLATE I. Fig. 1, Plummers Island looking NW from S end of Cabin John Bridge, 2 December 1962; upper (west) end of island not visible; cabin chimney just visible to left and above large rock formation (Cactus Rock) at center. Fig. 2, Cabin (Winnemana Lodge) viewed from SW, 5 May 1961; many species of wasps nest in borings in porch rafters and posts. Fig. 3, Cabin viewed from NNE, 5 May 1962; foreground left and center is nesting site of large colony of *Xylocelia virginiana* Roh.





these will be published in a separate report including results from similar studies carried on in New York, Virginia, North Carolina, Florida, and Arizona.

HABITATS

Despite its small extent (12 acres), Plummers Island offers a variety of habitats because of the varied topography, soil, and vegetative cover. The island is elongate, triangular in shape, with the attenuated eastern end pointing downstream (Fig. 1). It is a short distance above the fall line of the Potomac River and below Great Falls. The highest point is about 110 ft. above sea level and about 60 ft. above the mean low-water mark. There are several rocky bluffs, ridges, and knolls which bear varying depths of soil and a moderately open tree cover dominated by oak, hickory and hop hornbeam, among which is interspersed a rich under-cover of small shrubs and herbaceous vegetation (Figs. 3, 5). At the west end is a small area of coarse, alluvial sand exposed to sunlight through most of the day (Fig. 4). Similar deposits of coarse sand occur at points along the channel separating the island from the Maryland mainland and on the entire lower end, but these areas are mostly rather shaded. There are also mud flats along the river which, like the sandy areas, are subject to annual inundation during the spring floods. The lower end of the island, which is mostly a flood-plain, is quite densely shaded by a mixture of sycamore, elm, cottonwood and pawpaw, and a variety of other trees and shrubs.

The varied soil types and the degree of shade to which each is exposed offer a variety of nesting sites for ground-nesting wasps. Wasps that nest in abandoned borings of other insects in dead wood have available a great number of nesting sites in the dead standing or fallen trees (Fig. 6) and in the cabin porch rafters and posts (Fig. 2). Other wood-nesting wasps, which bore in soft pith, find nesting sites in such plants as *Hibiscus* on the mud flats or in such shrubs as the fringe tree, *Chionanthus*. Parasitic wasps of the families Bethyridae and Dryinidae can find a number of appropriate hosts in the rich insect fauna.

There have been some marked successional changes in the vegetative cover over the years, and it is likely that there have been corresponding changes in the insect fauna, particularly in such groups as Coleoptera and Lepidoptera, which are associated more intimately with the vegetation than are the wasps. For example, early photographs show that the knoll on which the cabin stands had a number of red cedars. These died off

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PLATE II. Fig. 4, Sandy area at upper (west) end of island, nesting site of many psammophilous wasps, 6 October 1962; stand of *Hibiscus militaris* Cav. in middle distance at right in whose stems *Ectemnius paucimaculatus* (Pack.) and *Euplilis* spp. nest. Fig. 5, Open wooded slope west of cabin, 5 May 1962. Fig. 6, Wooden trap nests containing hollow borings attached to trunk of dead standing tree, 5 May 1961; many wood-nesting wasps used these traps as nesting sites at various stations on the island.

and were supplanted largely by oak and hickory, thus decreasing the amount of shade beneath and on the ground cover.

ANNOTATED LIST OF WASPS

The annotated list which follows enumerates 274 species of wasps which have been collected on, reared from, or sighted on Plummers Island. It is thought that most of these species, especially those which nest in the ground, are represented by breeding populations. However, some are undoubtedly strays which flew in from adjacent areas. The number of species represented by single specimens causes one to wonder how many species may be present that have not yet been captured. Undoubtedly, we can also expect to find additional species in the years to come as a result of three factors. One is the newly constructed circumferential highway which crosses the Potomac River just west of the island. The broad, grassy right-of-way for this highway offers an excellent avenue to the island for field-dwelling species which formerly did not penetrate the forested shores of the river. A second factor is the annual spring flooding of the Potomac which deposits a certain amount of driftwood which may contain nests of wood-dwelling species. The third is the introduction of collecting techniques not used previously on the island, such as the Malaise insect trap, which may result in the capture of species not taken by other methods.

The list is based entirely on two sources. The first was a careful scrutiny of identified wasps in the collection of the U. S. National Museum, and the recording of label data for all specimens bearing Plummers Island locality labels. Club members, indicated by an asterisk before their names, and their guests who made collections from 1902 to 1923 are as follows:

*Herbert S. Barber (HSB)	P. R. Myers (PRM)
Jos. Bequaert (JB)	*Waldo L. McAtee (WLM)
Nathan Banks (NB)	Alan H. Pottinger (AHP)
D. H. Clemons (DHC)	F. C. Pratt (FCP)
*J. C. Crawford (JCC)	*Wm. Palmer (WP)
*Rolla P. Currie (RPC)	Sievert A. Rohwer (SAR)
*Albert K. Fisher (AKF)	*Eugene A. Schwarz (EAS)
George M. Greene (GMG)	*Raymond C. Shannon (RCS)
J. Douglas Hood (JDH)	*Henry L. Viereck (HLV)
L. O. Jackson (LOJ)	*Alexander Wetmore (AW)
Josef N. Knull (JNK)	W. V. Warner (WVW)
John R. Malloch (JRM)	

The other, and major source, is the material collected from 1956 through 1963 by the following members and guests:

Donald B. Baker (DBB)	Frank E. Kurczewski (FEK)
Oscar L. Cartwright (OLC)	*Karl V. Krombein (KVK)
Howard E. Evans (HEE)	*Paul J. Spangler (PJS)
*Henry S. Fuller (HSF)	George C. Steyskal (GCS)
	Jacobus van der Vecht (JvdV)

The information recorded for each species is as follows: The scientific name, author, and common name if there is one; extreme dates of capture on the island and initials of collectors who captured specimens; an indication as to whether the species is univoltine (one generation annually) or multivoltine (two or more generations); and brief biological data where any are known. It should be noted that the extreme dates of capture are not the same as the seasonal flight range, which is frequently much longer. The number of specimens collected is usually a rough measure of the relative abundance except for social wasps belonging to the genera *Vespula* and *Polistes*, of which only representative samples were taken. Readers who are interested in consulting more detailed biological accounts will find most sources listed under the appropriate species headings in the catalog, "Hymenoptera of America north of Mexico," and its two supplements (Muesebeck, Krombein and Townes, 1951, U. S. Dept. Agr., Agr. Monogr. 2: 1-1420; Krombein, *op. cit.*, pp. 1-305, 1958; Krombein and Burks, *op. cit.*, in preparation).

SUPERFAMILY BETHYLOIDEA

FAMILY CHRYSIDIDAE

All of the Plummers Island cuckoo wasps are parasitic on other solitary wasps or bees except for *Mesitiopterus kahlII* Ashm., which parasitizes walking-stick eggs.

Omalus (Omalus) aeneus (Fabricius). 2 ♀, 1 ♂; 28-30 May (KVK); multivoltine; parasitic on wood-nesting pemphredonine wasps, *Passaloecus*.

Omalus (Omalus) iridescens (Norton). 17 ♀, 4 ♂; 19 May to 26 October (HSB, HEE, KVK, WLM, HLV); multivoltine, parasitic on wood-nesting pemphredonine wasps, *Stigmus* and *Diodontus*.

Omalus (Pseudomalus) auratus (Linnaeus). 1 ♀; 3 August (KVK); multivoltine; parasitic on wood-nesting pemphredonine wasps, *Pemphredon* and *Passaloecus*.

Omalus (Pseudomalus) janus (Haldeman). 1 ♂; 26 April (HSB); multivoltine; parasitic on wood-nesting pemphredonine wasps, *Pemphredon*.

Omalus (Pseudomalus) macswaini Bohart and Campos. 4 ♀, 1 ♂; 28 May to 13 August (JCC, KVK); multivoltine; parasitic on wood-nesting pemphredonine wasps, *Stigmus* and *Pemphredon*.

Omalus (Diplorrhous) intermedius (Aaron). 66 ♂ and 1 reared ♀; 26 May to 14 June (KVK); univoltine; parasitic on the ground-nesting pemphredonine wasp, *Xylocelia virginiana* Roh., which flies at the same time and nests near the outdoor fireplace.

Elampus viridicyaneus Norton. 5 ♀, 9 ♂; 2 June to 9 July (KVK, EAS, PJS); multivoltine; parasitic on the ground-nesting gorytine wasp, *Psammaecius costalis* (Cr.).

Hedychridium dimidiatum Say. 1 ♀, 3 ♂; 3-21 July (JB, KVK, HLV); multivoltine; host unknown.

Hedychrum violaceum Brullé. 1 ♀, 1 ♂; 25–29 June (KVK, RCS); multivoltine; parasitic on *Cerceris architis* Mick.

Chrysura kyrae Krombein. 3 ♀, and many reared ♀ ♂; 25 April to 3 May (KVK); females may be active at the island from 9 April until the end of May; univoltine; I have reared it at the island from the wood-nesting vernal megachilid bee, *Osmia (Osmia) l. lignaria* Say; described from Plummers Island.

Chrysura pacifica (Say). 3 ♀, 1 ♂; 17–23 May (KVK); univoltine; I have reared it at the island from the wood-nesting vernal megachilid bee, *Osmia (Nothosmia) pumila* Cresson.

Chrysogona verticalis (Patton). 61 ♀, 114 ♂; 5 May to 26 October (JB, KVK, HLV, JvdV); multivoltine; I have reared it at the island from several species of wood-nesting sphecid wasps, *Trypoxylon* subg. *Trypoxylon*.

Chrysis (Trichrysis) carinata Say. 3 ♀ and many reared ♀ ♂; 2 June to 18 August (HSB, KVK); multivoltine; I have reared it at the island from wood-nesting sphecid wasps, *Trypoxylon* subg. *Trypargilum*.

Chrysis (Trichrysis) tridens (Lepelletier). 2 ♀; 6–23 June (HSB, EAS); multivoltine; presumably parasitic on the mud-dauber wasp, *Sceliphron caementarium* (Dru.).

Chrysis (Chrysis) alabamensis Mocsáry. 1 ♀; 17 July (KVK); multivoltine; hovering around standing dead tree in woods and presumably parasitic on the sphecid wasp, *Podium luctosum* Sm. nesting therein; has been reared in North Carolina and Florida from *Podium rufipes* (F.).

Chrysis (Chrysis) cembraicola Krombein. 6 ♀, 2 ♂; 5 May to 17 August (KVK, RCS, JvdV); most specimens on cabin porch; usually univoltine; parasitic on the wood-nesting vispid wasp, *Symmorphus canadensis* (Sauss.).

Chrysis (Chrysis) coeruleans Fabricius. 17 ♀, 2 ♂; 9 May to 19 October (HSB, JCC, KVK, PRM, EAS, RCS, JvdV); multivoltine; parasitic on wood-nesting vespids wasps, *Rygchium*, *Symmorphus*, and *Ancistrocerus*; I have reared it at Plummers Island from an unidentified vespids wasp.

Chrysis (Chrysis) nitidula Fabricius. 8 ♀ and some reared specimens; 21 May to 4 September (HSB, KVK, EAS, HLV); most specimens on cabin porch, one hovering before dead standing tree trunk; I have reared it at the island from the wood-nesting vespids wasp, *Ancistrocerus a. antilope* (Panz.).

Chrysis (Chrysis) smaragdula Fabricius. 1 ♀ and a few reared specimens; 30 July; (DBB, KVK); multivoltine; I have reared it at the island from the wood-nesting vespids wasp, *Monobia quadridens* (L.), and also from the same host in North Carolina.

Mesitiopterus kahlii Ashmead. 3 ♀, 36 ♂; 17 August to 23 September (JCC, HEE, KVK); univoltine; parasitic on eggs of the walking stick, *Diapheromera femorata* Say; swept from herbaceous vegetation in open woods.

FAMILY BETHYLIDAE

Scleroderma carolinense (Ashmead). 3 ♀; 25 April to 1 June (KVK,

EAS, RCS); probably multivoltine; parasitizes larvae of old house borer and probably other wood-boring coleopterous larvae (1 ♀ at island taken on trunk of dead fallen sapling in woods).

Laelius trogodermatis Ashmead. 3 ♀; 11 June to 2 September (JCC, KVK); multivoltine; parasitizes *Trogoderma* (dermestid) larvae in wood borings.

Epyris bifoveolatus (Ashmead). 1 ♀, 10 ♂; 23 September to 22 October (HEE, KVK); univoltine; swept from herbaceous vegetation in open woods.

Epyris brachypterus (Ashmead). 6 ♀, 19 ♂; 25 June, 19 September to 22 October (HEE, KVK); univoltine; swept from herbaceous vegetation and leaf litter in open woods.

Epyris vierecki Krombein. 2 ♀, 18 ♂; 28 August to 5 October (JCC, HEE, KVK); univoltine; swept from herbaceous vegetation in open woods; described from Plummers Island.

? *Holepyris coronatus* (Ashmead). 4 ♂; 12–22 October (KVK); univoltine; swept from herbaceous vegetation in open woods.

Holepyris marylandicus Fouts. 1 ♀, 1 ♂; 6 June, 23 September (HEE, KVK); probably univoltine; ♂ swept from herbaceous vegetation and ♀ on leaf litter, both in open woods.

Anisepyrus columbianus (Ashmead). 20 ♂; 19 September to 26 October (KVK); univoltine; swept from herbaceous vegetation in open woods.

Pristocera armifera (Say). 37 ♂; 27 August to 22 October (HEE, KVK); univoltine; swept from herbaceous vegetation in open woods; has been reared from elaterid larva, *Limonius* sp., in soil.

Pseudisobrachium ashmeadi Evans. 27 ♂; 30 August to 22 October (HEE, KVK); univoltine; this and the following species of the genus swept from herbaceous vegetation in open woods; members of this genus are parasitic in ant nests, presumably on ant larvae.

Pseudisobrachium carbonarium (Ashmead). 35 ♂; 30 August to 22 October (HEE, KVK, HLV); univoltine.

Pseudisobrachium prolongatum (Provancher). 325 ♂; 19 August to 22 October (HEE, KVK); univoltine.

Pseudisobrachium rufiventre (Ashmead). 4 ♂; 23 September to 22 October (HEE, KVK); univoltine.

Dissomphalus barberi Evans. 1 ♀, 2 ♂; 10 August to 17 October (HSB, KVK); probably univoltine; 1 ♂ swept from herbaceous vegetation in open woods, ♀ reared from log infested with cecidomyids and micromalthids; described from Plummers Island.

Dissomphalus foveolatus (Brown and Cheng). 1 ♀; 22 October (EAS); probably univoltine.

Goniozus columbianus (Ashmead). 15 ♀, 11 ♂; 5 May to 9 June and 4 September to 10 October (KVK); probably multivoltine; this and the following species swept from herbaceous vegetation in open woods and along the river.

? *Goniozus electus* Fouts. 1 ♀; 19 October (KVK); visiting aphid honeydew on oak leaf.

Goniozus platynotae Ashmead. 2 ♀; 30 July to 7 October (KVK); multivoltine; parasitizes a number of lepidopterous larvae.

Perisierola cellularis (Say). 1 ♀; 11 June (HSB); multivoltine; parasitizes several spp. of lepidopterous larvae.

Perisierola n. sp. 1 ♀; 26 May (KVK).

FAMILY DRYINIDAE

Most species of this family are parasitic on Homoptera (Cicadellidae and Fulgoridae), but hosts are unknown for all but one of the Plummers Island species. Records are so scanty that it is impossible to determine whether there are one or more generations per year.

Mesodryinus crawfordi Krombein. 1 ♀; 11 July (JCC); described from Plummers Island.

Eucamptonyx secundus Fenton. 2 ♀; 5–30 July (KVK); crawling on semirecumbent trunk of live maple sapling on sandy soil at lower end of island.

Chalcogonatopus areolatus Fenton. 1 ♀; 24 July (KVK); crawling on plant stem on sandy beach.

Gonatopus curriei Krombein. 1 ♀; 3 August (RPC); described from Plummers Island.

Anteon puncticeps Ashmead. 1 ♀, 2 ♂; 6 June to 20 July (RCS).

Chelogyne virginiensis Fenton. 5 ♀; 9 June to 30 July (KVK); on vegetation in sandy areas.

Deinodryinus variabilis Fenton. 1 ♀; 3 June (KVK).

Aphelopus albopictus Ashmead. 2 ♀; 30 June to 27 August (KVK); on beach vegetation and in wooden boring.

Aphelopus comesi Fenton. 1 ♀; 12 August (KVK); on beach vegetation; the type was reared from the leafhopper, *Erythroneura comes* (Say).

SUPERFAMILY SCOLIOIDEA

FAMILY TIPHIIDAE

The species of *Tiphia* and *Myzinum*, so far as known, are parasitic on soil-dwelling scarabaeid beetle larvae. Most specimens of *Tiphia* and *Myrmosa* were captured in open woods, and those of *Myzinum* on the upper sandy beach on flowers.

Tiphia affinis Malloch. 1 ♂; 23 June (KVK); univoltine.

Tiphia egregia Viereck. 14 ♀, 45 ♂; 3 July to 22 October (HSB, RPC, HEE, KVK, JRM, EAS, HLV); multivoltine.

Tiphia illinoensis Robertson. 1 ♂; 13 August (KVK).

Tiphia inaequalis Malloch. 5 ♂; 18 July to 25 August (HSB, KVK, PRM, HLV); 2 ♂ taken on lower sandy beach; univoltine.

Tiphia infossata Allen. 5 ♀, 167 ♂; 26 May to 30 June (HSB, JCC, GMG, KVK, EAS); univoltine; part of the type series of *T. hollowayi* Allen, a synonym, came from Plummers Island.

Tiphia intermedia Malloch. 2 ♀, 1 ♂; 27 July to 9 September (KVK); multivoltine.

Tiphia jaynesi Allen. 1 ♀; 1 September (HLV).

Tiphia relativata Viereck. 2 ♀, 10 ♂; 15 June to 27 August (HSB, NB, JCC, KVK, JRM, PRM); multivoltine; *T. winnemanae* Malloch, a synonym, was described from Plummers Island.

Tiphia rugulosa Malloch. 7 ♀, 24 ♂; 5 May to 28 June and 6-19 October (KVK, RCS, HLV); probably univoltine.

Tiphia subcarinata Malloch. 1 ♀, 24 ♂; 25 June to 28 July (JCC, KVK, WP, HLV); univoltine.

Tiphia vernalis Rohwer. 6 ♀, 3 ♂; 5 May to 11 June (KVK); univoltine; liberated in U. S. in late 1920's to control Japanese beetle.

Myzinum maculatum (Fabricius). 1 ♀; 6 September (KVK); multivoltine; on flowers of *Polygonum* on upper beach.

Myzinum obscurum (Fabricius). 1 ♀; 8 August (JCC); univoltine (?).

Myzinum quinquecinctum (Fabricius). 1 ♀; 30 August (KVK); on upper beach on flowers; univoltine (?).

Myrmosa (*Myrmosa*) *unicolor* Say. 6 ♀, 34 ♂; 6 June to 6 September (HSB, KVK, EAS); multivoltine; parasitic on small ground-nesting wasps and bees.

FAMILY SIEROLOMORPHIDAE

Sierolomorpha canadensis (Provancher). 1 ♀, 1 ♂; 17-27 June (DHC, KVK); on vegetation on lower beach.

FAMILY MUTILLIDAE

So far as known, the velvet ants are parasitic on mature, resting insect larvae, usually of other wasps and bees but occasionally of Lepidoptera, Diptera, or Coleoptera. Hosts are known for very few of the Plummers Island species.

Photomorphus (*Photomorphus*) *banksi* (Bradley). 2 ♀; 3-13 August (KVK); univoltine (?); one near the cabin and one on the upper beach.

Sphaerophthalma (*Sphaerophthalma*) *pennsylvanica scaeva* (Blake). 4 ♀, 6 ♂ and several reared specimens; 13 June to 2 September (HSB, HVK, EAS); multivoltine; mostly in wooded areas; I have reared it from cocoons of the sphecid wasps, *Trypoxylon* (*Trypargilum*) *collinum rubrocinctum* Pack. and *striatum* Prov. at the island, and it has been reared elsewhere from other mud-daubing wasps.

Pseudomethoca frigida frigida (Smith). 19 ♀, 16 ♂; 4 May to 23 September (HSB, JCC, KVK, WLM); multivoltine; occurs both in wooded and sandy areas; parasitizes small ground-nesting bees, *Lasioglossum* subg. *Chloralictus*.

Pseudomethoca simillima (Smith). 2 ♀, 15 ♂; 11 April to 17 October (JCC, HEE, KVK, PRM); multivoltine; mostly in wooded areas.

Pseudomethoca vanduzeei Bradley. 1 ♂; 31 August (KVK); multivoltine; flying in open wooded area.

Dasymutilla alesia Banks. 1 ♀; 4 July (JB, HLV); a woodland species.

Dasymutilla nigripes (Fabricius). 3 ♀, 1 ♂; 25 June to 4 September (HSB, KVK, EAS); multivoltine; in wooded areas; parasitic on the ground-nesting sphecid wasp, *Cerceris flavofasciata* H. S. Sm.

Dasyutilla vesta vesta (Cresson). 6 ♀, 1 ♂; 11 June to 12 September (JCC, KVK, SAR, RCS, HLV); multivoltine; 2 ♀ in wooded areas.

Timulla (Timulla) dubitata (Smith). 2 ♀; 10 May to 10 August (HSB, JCC, EAS); multivoltine.

Timulla (Timulla) dubitatiformis Mickel. 1 ♀; 11 June (HSB); a paratype. This is a composite species known only from females; the Plummers Island ♀ listed here is quite likely to be the opposite sex of the following species.

Timulla (Timulla) hollensis melanderi Mickel. 3 ♂; 5 July to 22 August (JCC, EAS, RCS); one ♂ is a paratype.

Ephuta (Ephuta) pauxilla pauxilla Bradley. 5 ♀, 15 ♂; 9 June to 13 October (KVK); multivoltine; in sandy areas; has been reared from the spider wasp, *Dipogon (Deuteragenia) s. sayi* Bks.

Ephuta (Ephuta) scrupea (Say). 12 ♀, 24 ♂; 26 May to 4 November (HSB, JCC, KVK, PRM, WLM, EAS, RCS); multivoltine; mostly in wooded areas, occasionally on sand; parasitic on the spider wasp, *Phanagenia bombycina* (Cr.).

FAMILY RHOPALOSOMATIDAE

Rhopalosoma nearcticum Brues. 1 ♀ reared; emerged in spring; parasitic on adult tree cricket, *Orocharis saltator* Uhl. (Hood, 1913).

Oxilon banksii (Brues). 1 ♀; 17 August (JvdV); also represented in National Museum collection by a field cricket nymph, *Nemobius* sp., August (HSB), bearing the cast exuviae of a small rhopalosomatid larva.

FAMILY SCOLIIDAE

Members of this family are parasitic on scarabaeid beetle larvae in the ground or in rotten wood.

Scolia (Scolia) bicincta Fabricius. 4 ♀, 5 ♂; 4 August to 6 September (RPC, KVK, JvdV); univoltine; mostly in open wooded areas.

Scolia (Scolia) dubia dubia Say. 3 ♀, 1 ♂; 25 August to 6 September (KVK, WLM); on upper beach on flowers; univoltine; parasitic on larvae of *Cotinis nitida* (L.).

Campsomeris (Dielis) plumipes plumipes (Drury). 1 ♂; 6 May (JCC).

FAMILY SAPYGIDAE

Sapyga centrata Say. 4 ♀ and reared specimens; 25 April to 21 May (KVK); univoltine; 2 ♀, one of which slept overnight in a boring in post, hovering in front of cedar posts of cabin; I have reared this from nests from Plummers Island in borings in wood of the megachilid bees, *Osmia (Centrosmia) bucephala bucephala* Cr. and *O. (Nothosomia) pumila* Cr.

SUPERFAMILY VESPOIDEA

FAMILY VESPIDAE

The vespid wasps include the social wasps (hornets, yellow jackets, and paper wasps) of the genera *Vespa*, *Vespula*, and *Polistes*, as well as a large number of solitary species belonging to several genera which nest in borings in wood, fabricate clay cells or nest in the ground. No attempt has been made to collect more than a sampling of the social wasps of the genera *Vespula* and *Polistes*, so the specimens cited do not reflect the relative abundance. In the social wasps each colony is started in the spring by a single overwintering fertilized queen. Successive broods of sterile females (workers) are produced during the summer, and males and new queens develop late in August and September.

Vespa crabro var. *germana* (Christ), the European hornet. 1 ♀; April 29 (HSF); in cabin.

Vespula (Vespula) maculifrons (du Buysson), the yellow jacket. 28 ♀, 28 ♂; queens captured 14 April to 17 June and again in mid-October, workers taken 6 June to 26 October (HSB, JCC, OLC, RPC, LOJ, KVK, WLM, FCP, WP, JvdV); this is our most common and troublesome ground-nesting yellow jacket.

Vespula (Vespula) squamosa (Drury). 2 ♀; 23–30 May (LOJ, KVK); queens thought to be temporary parasites in young colonies of *maculifrons*; *squamosa* workers, males, and queens are developed later in the season.

Vespula (Vespula) vidua (Saussure). 4 ♀, 15 ♂, 1 ♂; queens captured 28 April to 20 May and again in late October, workers taken 13 June to 8 September (HSB, KVK, JvdV).

Vespula (Dolichovespula) arenaria (Fabricius). 6 ♀; 28 June to 21 July (KVK, PJS); on beach. This species, like the following, builds a paper nest in a tree.

Vespula (Dolichovespula) maculata (Linnaeus), the bald-faced hornet. 3 ♀, 5 ♂; queens captured 29 April to 11 June, workers 16 July to 8 September (DHC, KVK).

Polistes annularis (Linnaeus). 16 ♀, 2 ♂; 18 April to 26 October (KVK, WP, AW); females frequently overwinter in the cabin in large numbers; the pendent single-comb nests are placed beneath eaves or other sheltered situations as is the case for the following species of the same genus.

Polistes exclamans exclamans Viereck. 3 ♀; 25 April to 12 September (KVK, JvdV).

Polistes fuscatus fuscatus (Fabricius). 3 ♀, 1 ♂; 2 May to 18 October (HSB, AKF, WLM).

Polistes fuscatus pallipes Lepeletier. 6 ♀, 4 ♂; 25 April to 28 September, and 9 November (in cabin ?) (HSB, KVK, WVV, JvdV).

Polistes metricus Say. 7 ♀, 2 ♂; 27 March to 2 May (HSB, KVK, JvdV).

Zethus (Zethusculus) spinipes Say. 2 ♂; 30 August to 8 September (KVK, JvdV); on upper beach.

Eumenes fraternus Say. 10 ♀, 12 ♂; 30 May to 19 October (AKF, KVK, WLM, JvdV); in wooded areas and on beach; multivoltine; builds the familiar jug nest of mud in which it stores caterpillars.

Pseudodynerus quadrisectus (Say). 6 ♀, 5 ♂; 6 June to 28 August (AKF, KVK, WLM, PJS, HLV); multivoltine; mostly in wooded areas; nests in old carpenter bee burrows in wood.

Monobia quadridens (Linnaeus). 14 ♀, 10 ♂, and reared specimens; 2 June to 13 October (AKF, KVK, WLM, EAS, JvdV); multivoltine; I have reared this species from wooden trap nests from the island; it also nests frequently in rafters of the cabin porch in abandoned carpenter bee borings and provisions its nests with caterpillars (Krombein, 1962*b*).

Rygchium foraminatum foraminatum (Saussure). 9 ♀, 32 ♂, and reared specimens; 19 May to 9 September (JCC, KVK, JvdV); multivoltine; common in open wooded areas; I have reared this and the following species from wooden trap nests from the island; both species provision with caterpillars.

Rygchium schwarzi Krombein. 3 ♀, 9 ♂, and reared specimens; 19 May to 10 September (HSB, KVK, HLV); multivoltine; frequents open wooded areas; described from the island.

Ancistrocerus antilope antilope (Panzer). 10 ♀ and reared specimens; 18 August to 13 October (KVK, JvdV); multivoltine; in open wooded areas, sometimes hovering in front of dead standing trees, and visiting *Polygonum* flowers on upper beach; I have reared this and the three following species from wooden trap nests from the island; all four species store caterpillars as prey.

Ancistrocerus campestris (Saussure). 6 ♀, 25 ♂, and reared specimens; 2 June to 23 September (KVK, JvdV); multivoltine; in open wooded areas and visiting flowers on upper beach.

Ancistrocerus catskill catskill (Saussure). 2 ♂ and reared specimens; 2 June to 12 August (KVK); multivoltine; on flowers on upper beach and in open woods.

Ancistrocerus tigris tigris (Saussure). 41 ♀, 5 ♂, and reared specimens; 10 May to 26 October (JCC, KVK, JRM, JvdV); multivoltine; in open wooded areas, occasionally nesting in cedar posts on cabin porch, and visiting *Polygonum* flowers on upper beach.

Ancistrocerus unifasciatus unifasciatus (Saussure). 1 ♀; 30 May (KVK); multivoltine.

Symmorphus albomarginatus (Saussure). 5 ♀ and reared specimens; 12 June to 28 July (KVK); univoltine, though occasionally with a small partial second generation; in open wooded areas and on beaches; I have reared this and the following species from wooden trap nests from the island; this species stores its nests with *Chrysomela* beetle larvae.

Symmorphus canadensis (Saussure). 38 ♀, 7 ♂ and reared specimens; 19 May to 17 October (HSB, JCC, KVK, EAS); univoltine, but occasionally with a small partial second generation; stores its nests with leaf-mining lepidopterous and coleopterous larvae.

Symmorphus cristatus (Saussure). 1 ♀; 9 June (KVK).

Stenodynerus (*Stenodynerus*) *blepharus* Bohart. 11 ♀, 15 ♂; 19 May to 18 August (KVK, PJS); apparently multivoltine; in open wooded areas.

Stenodynerus (*Parancistrocerus*) *fulvipes fulvipes* (Saussure). 2 ♀, 6 ♂; 2 June to 6 September (KVK); multivoltine; mostly on upper beach but occasionally in open wooded areas; I have reared this in North Carolina from wooden trap nests which were provisioned with caterpillars.

Stenodynerus (*Parancistrocerus*) *pedestris pedestris* (Saussure). 23 ♀, 19 ♂; 19 May to 28 September (KVK, SAR, HLV, JvdV); multivoltine; in open wooded areas; I have reared this from wooden trap nests from New York; it provisions its nests with caterpillars as do the following two species.

Stenodynerus (*Parancistrocerus*) *perennis perennis* (Saussure). 43 ♀, 10 ♂; 23 May to 24 September (DHC, KVK, PRM, HLV, JvdV); multivoltine; in open wooded areas, on beaches, and hovering in front of standing dead tree trunk containing borings; 1 ♂ transitional to *p. anacardivora* (Rohwer); it has been reared from borings in sumach stems and provisions its nest with caterpillars.

Stenodynerus (*Parancistrocerus*) *vogti* Krombein. 1 ♀, reared from wooden trap nest, 23 May (KVK); described from Plummerville Island.

SUPERFAMILY POMPILOIDEA
FAMILY POMPILIDAE

This family consists of the spider wasps. All species prey on spiders except *Ceropalae* and *Evagetes*, which are social parasites of other pompilid wasps.

Chirodamus albopilosus (Cresson). 7 ♀, 14 ♂; 2-30 June (HSB, KVK, PJS, RCS); multivoltine; in open wooded areas.

Chirodamus fortis (Cresson). 5 ♀; 2 July to 17 October (KVK, HLV); apparently multivoltine; in open wooded areas.

Priocnessus nebulosus (Dahlbom). 4 ♀, 4 ♂; 5 April to 28 August (KVK); multivoltine; in open wooded areas; preys on *Agelenopsis*.

Dipogon (*Deuteragenia*) *calipterus calipterus* (Say). 1 ♀; 18 July (KVK); multivoltine.

Dipogon (*Deuteragenia*) *papago anomalous* Dreisbach. 5 ♀ and reared specimens; 28 May to 13 October (JCC, KVK); I have reared this and the following species from wooden trap nests placed on dead standing tree trunks; these species store their nests with jumping spiders.

Dipogon (*Deuteragenia*) *sayi sayi* Banks. 10 ♀ and reared specimens; 14 May to 23 September (HSB, HEE, KVK, EAS); in woods; preys principally on crab spiders.

Dipogon (*Dipogon*) *brevis brevis* (Cresson). 2 ♀, 6 ♂; 21 May to 13 September (KVK); multivoltine; in open woods, males on foliage; preys on *Phidippus*.

Dipogon (*Winnemanella*) *fulleri* Krombein. 1 ♀; 18 August (KVK);

on standing dead tree trunk in woods; described from Plummers Island; preys on *Icius hartii* Em.

Priocnemis (Priocnemissus) minorata Banks. 12 ♀, 3 ♂; 30 March to 12 June (JCC, KVK, PRM, WLM, AHP, RCS, HLV); univoltine; on leaf litter in woods; preys on a variety of errant and snare-building spiders and nests in soil.

Priocnemis (Priocnemis) cornica (Say). 16 ♀, 14 ♂; 4 June to 28 September (FEK, KVK); multivoltine; most specimens taken on sand along river bank; preys on a variety of errant spiders and nests in pre-existing holes in ground.

Priocnemis (Priocnemis) germana (Cresson). 33 ♀, 35 ♂; 30 May to 17 October (JDH, KVK, WP, HLV, JvdV); multivoltine; on leaf litter in woods and on beaches in shade; preys on *Amaurobius* and probably nests in pre-existing holes in ground.

Priocnemis (Priocnemis) hestia Banks. 1 ♀; 13 October (HLV); multivoltine; preys on immature clubionids.

Priocnemis (Priocnemis) scitula scitula (Cresson). 58 ♀, 70 ♂; 19 May to 13 October (HEE, KVK, GCS, HLV); multivoltine; mostly in sandy areas.

Calicurgus hyalinatus alienatus (Smith). 26 ♀, 5 ♂; 4 June to 1 October (KVK, PJS); multivoltine; in woods and on sandy areas. I collected this at Plummers Island transporting araneid spiders (Krombein, 1958, 1961); nests in ground.

Calicurgus hyalinatus rupex (Cresson). 1 ♀; 18 August (KVK); multivoltine; a southern race not recorded previously north of North Carolina; this particular specimen may be just a variant in a population of *h. alienatus*.

Phanagenia bombycina (Cresson). 2 ♀, 1 ♂; 3 July to 28 August (KVK); multivoltine; builds clay cells under stones and preys on errant spiders.

Auplopus adjunctus (Banks). 3 ♀, 3 ♂; 4 June to 13 September (KVK); in wooded areas; multivoltine; constructs mud cells.

Auplopus architectus architectus (Say). 7 ♀, 1 ♂; 30 July to 26 October (KVK); multivoltine; constructs mud cells under stones: I captured it on Plummers Island with prey, a *Clubiona* sp. (Krombein, 1961).

Auplopus caerulescens caerulescens (Dahlbom). 4 ♀, 4 ♂; 23 May to 28 September (JCC, GMG, KVK); multivoltine; constructs mud cells under loose bark.

Auplopus mellipes mellipes (Say). 18 ♀, 5 ♂ and reared specimens; 3 June to 13 October (JCC, KVK, HLV, JvdV); multivoltine; usually in woods, several ♀ nesting in abandoned borings in dead standing trees; it constructed clay cells in several of my wooden trap nests; preys on errant spiders.

Auplopus nigrellus (Banks). 61 ♀, 36 ♂; 17 May to 13 October (HSB, HEE, FEK, KVK, JvdV); multivoltine; in open woods; builds clay cells under stones and stores errant spiders.

Ageniella (Ageniella) mintaka Brimley. 1 ♂; 20 July (KVK); univoltine; in woods.

Ageniella (Ageniella) norata Banks. 1 ♀, 2 ♂; 3 July to 31 August (KVK); univoltine; in woods.

Ageniella (Priophanes) arcuatus (Banks). 1 ♂; 12 August (KVK); multivoltine; on upper beach; preys on *Oxyopes*.

Ageniella (Priophanes) agenioides (Fox). 3 ♀; 21 July to 28 August (KVK).

Minagenia clypeata (Banks). 19 ♀, 1 ♂; 25 June to 23 September (KVK); multivoltine; on shaded, vegetated, sandy area.

Minagenia julia (Brimley). 6 ♂; 3-13 July (JB, KVK, HLV); multivoltine; in open woods.

Minagenia osoria (Banks). 2 ♀, 8 ♂; 6 July to 9 September (KVK); on shaded, vegetated, sandy area; larva an external parasite on abdomen of active spider.

Ceropales hatoda Brimley. 1 ♀, 3 ♂; 20 July to 13 August (KVK); multivoltine (?); probably a social parasite of *Ageniella (A.) partita* Bks.

Ceropales maculata fraterna Smith. 2 ♂; 13 August to 6 September (KVK); multivoltine.

Aporus (Aporus) niger (Cresson). 3 ♀, 21 ♂; 28 June to 31 August (KVK); univoltine (?); in open woods.

Allaporus rufiventris (Cresson). 1 ♀, 3 ♂; 6 June to 31 August (KVK, RCS); univoltine (?); in open woods.

Psorthaspis legata (Cresson). 2 ♂; 22-26 June (HSB, EAS); univoltine (?).

Psorthaspis mariae (Cresson). 11 ♀, 6 ♂; 6 June to 1 October (HSB, KVK, RCS, JvdV); multivoltine; in open woods.

Evagetes parvus (Cresson). 2 ♀; 21-30 July (KVK); multivoltine; on sand; apparently parasitic on several species of *Anoplus* and *Pompilus*.

Agenioideus (Agenioideus) humilis (Cresson). 5 ♀, 23 ♂; 3 June to 2 September (HSB, JCC, KVK, EAS, RCS); multivoltine; abundant about cabin and presumably nesting among or under rocks supporting porch; preys on orb weavers.

Sericopompilus apicalis (Say). 1 ♂; 29 June (RCS); multivoltine; preys on a variety of errant and snare-building spiders and nests in ground.

Episyron biguttatus biguttatus (Fabricius). 19 ♀, 4 ♂; 4 June to 9 September (DBB, HSB, FEK, KVK, EAS, HLV); multivoltine; a woodland species.

Episyron quinquenotatus quinquenotatus (Say). 21 ♀, 22 ♂; 2 June to 16 September (DBB, FEK, KVK); on open sand; I have taken it at Plummers Island preying on orb weavers and nesting in sand (Krombein, 1961, in press).

Tachypompilus ferrugineus ferrugineus (Say). 5 ♀, 1 ♂; 17 August to 6 September (KVK, JvdV); multivoltine; on cabin wall attacking large

orb-weaver spider; reported as preying on wolf and fishing spiders and nesting in soil.

Anoplius (Lophopompilus) aethiops (Cresson). 2 ♀, 2 ♂; 23 September to October (KVK, WP); multivoltine (?); on beach on *Polygonum* flowers; preys on wolf spiders.

Anoplius (Lophopompilus) carolina (Banks). 4 ♀, 2 ♂; 4 July to 13 August (JB, KVK, HLV); a woodland species; preys on agelenids and nests in pre-existing holes in ground.

Anoplius (Notiochaes) amethystinus atramentarius (Dahlbom). 5 ♀, 2 ♂; 14 August to 28 September (KVK, JvdV); multivoltine; preys on wolf spiders and nests in ground.

Anoplius (Arachnophroctonus) americanus trifasciatus (Beauvois). 5 ♀, 2 ♂; 17 June to 21 August (KVK); multivoltine; on sand along river margin.

Anoplius (Arachnophroctonus) semirufus (Cresson). 2 ♀, 2 ♂; 6–17 August (KVK); multivoltine; on bare sand; preys on wolf spiders and nests in sand.

Anoplius (Pompilinus) insolens (Banks). 5 ♂; 2 June to 6 July (KVK); multivoltine (?).

Anoplius (Pompilinus) marginatus (Say). 3 ♀; 6–19 June (KVK, RCS); multivoltine; in open woods. The females of several species may be confused under this name; Plummers Island males are needed to determine what species actually occurs here.

Anoplius (Anoplius) depressipes Banks. 1 ♀, 1 ♂; 28 August to 6 September (KVK); multivoltine; on upper beach; nests in pre-existing holes in soil or wood and preys on fishing spiders.

Anoplius (Anoplius) ithaca (Banks). 2 ♀, 10 ♂; 12–31 August (DBB, KVK, JvdV); multivoltine; on upper beach near rock jetty built for bridge construction; preys on small wolf spiders and nests in ground.

Anoplius (Anoplius) virginensis (Cresson). 22 ♀, 28 ♂; 21 May to 17 October (DHC, HEE, KVK, JvdV); multivoltine; a woodland species; nests in decaying wood and preys on agelenid and amaurobiid spiders.

Pompilus (Anoplochaes) apicatus Provancher. 29 ♀, 28 ♂; 26 May to 30 July (HSB, JCC, KVK, EAS); univoltine (?); a woodland species.

Aporinellus completus Banks. 6 ♀, 5 ♂; 4 June to 2 September (KVK); multivoltine; on knoll near cabin and on upper beach; preys on jumping spiders.

Aporinellus medianus Banks. 1 ♀; 21 June (KVK); multivoltine; on knoll near cabin; preys on errant spiders and nests in ground.

SUPERFAMILY SPHECOIDEA

FAMILY AMPULICIDAE

Dolichurus greenei Rohwer. 1 ♀, 1 ♂; 18 August to 23 September (HEE, KVK); univoltine; in open wooded areas; preys on the woods cockroach, *Parcoblatta*, and nests under leaf litter.

FAMILY SPHECIDAE

This is the largest family of wasps, and its members exhibit the most diversified prey preferences and nesting behavior.

Lyroda subita (Say). 2 ♀, 5 ♂; 17 July to 19 August (KVK); probably multivoltine; on sandy areas; nests in ground and provisions with field cricket nymphs, *Nemobius*.

Miscophus americanus Fox. 3 ♀, 2 ♂; 6 June to 9 September (KVK, JvdV); in open woods and on sand; multivoltine; preys on orb-weaver spiders and nests in ground.

Nitela virginiensis Rohwer. 3 ♀; 17 August to 26 October (KVK, JvdV); multivoltine; one female visiting aphid honeydew on oak leaf; nests in pre-existing borings in twigs of smooth sumac.

Tachytes (Tachyplena) crassus Patton. 4 ♀, 13 ♂; 21 July to 27 August (KVK); univoltine; visits flowers of swamp milkweed along river; preys on katydid nymphs, *Orchelimum*, and nests in ground (Krombein, 1961).

Tachytes (Tachynana) minutus Rohwer. 5 ♀, 1 ♂; 11 July to 19 August (KVK); probably multivoltine; I have watched it hunting its pygmy mole cricket prey, *Tridactylus*, on the muddy edges of the river.

Tachytes (Tachynana) obscurus Cresson. 1 ♀; 1 September (KVK); probably univoltine; at upper end of island.

Tachysphex (Tachysphex) similis Rohwer. 1 ♀, 2 ♂; 13-30 August (KVK); multivoltine; on upper beach sand.

Motes (Notogonius) argentata (Beauvois). 7 ♀, 2 ♂; 29 March to 1 October (JCC, KVK, HLV); multivoltine, adult females apparently overwintering; nests in ground and stores field crickets, *Gryllus* and *Nemobius*.

Pison (Krombeiniellum) koreense (Radoszkowski). 1 ♀; 13 September (KVK); probably multivoltine; gathering mud near outdoor fireplace; stores spiders in diagonal row of delicate clay cells.

Trypoxylon (Trypoxylon) backi Sandhouse. 3 ♀, 3 ♂; 26 May to 8 September and reared specimens (KVK, JvdV); multivoltine; this species nests in cedar posts of the cabin porch and I have also reared it from trap nests from the island; provisions its cells with a sheet-web spider, *Tennesseellum formicum* (Em.), an ant mimic.

Trypoxylon (Trypoxylon) carinatum Say. 4 ♀, 9 ♂ and reared specimens; 2 June to 18 August (KVK); multivoltine; nests in cedar posts of cabin porch and I have reared it from wooden trap nests from the island.

Trypoxylon (Trypoxylon) clarkei Krombein. 1 ♂ and reared specimens from trap nests; 26 May (KVK); multivoltine; described from Plummers Island.

Trypoxylon (Trypoxylon) frigidum Smith. 24 ♀, 85 ♂ and reared specimens; 17 May to 27 September (JCC, KVK); multivoltine; I have reared it from trap nests from Plummers Island; preys on orb-weaver spiders.

Trypoxylon (Trypoxylon) johnsoni Fox. 3 ♀, 1 ♂ and reared speci-

mens; 6 June to 5 July (KVK); multivoltine; I have reared it from trap nests from Plummers Island; it also nests in hollow twigs.

Trypoxylon (Trypoxylon) pennsylvanicum Saussure. 50 ♀, 29 ♂; 17 May to 26 October (KVK); multivoltine; preys on orb-weaver spiders (Krombein, 1961).

Trypoxylon (Trypoxylon) richardsi Sandhouse. 20 ♀, 14 ♂; 28 May to 20 July (KVK); multivoltine; this species was reared from a nest in a *Chionanthus* twig at Plummers Island (Krombein, 1959).

Trypoxylon (Trypargilum) clavatum Say. 2 ♀, 3 ♂ and many reared specimens; 22 June to 5 August (HSB, GMC, KVK, EAS); multivoltine; nests commonly in wooden trap nests at Plummers Island and provisions the cells with wandering spiders.

Trypoxylon (Trypargilum) collinum rubrocinctum Packard. 9 ♀ and many reared specimens; 26 June to 21 July (JCC, KVK, RCS); univoltine, though occasionally with a very small second generation; nests commonly in wooden trap nests at Plummers Island and provisions the cells with snare-building spiders.

Trypoxylon (Trypargilum) politum Say. 11 ♀, 1 ♂; 11 June to 16 July (HSB, DHC, KVK); probably univoltine; this builds the clay "pipe organ" nests on the cabin porch and in rock clefts; it stores snare-building spiders.

Trypoxylon (Trypargilum) striatum Provancher. 3 ♀, 3 ♂; 15 June to 18 July and many reared specimens (HSB, KVK, RCS); multivoltine; nests commonly in wooden trap nests at Plummers Island and provisions the cells with snare-building spiders.

Diodontus atratus parenosus Pate. 3 ♀; 4 July to 13 October (KVK, WLM); multivoltine; nests in wooden trap nests and abandoned beetle borings in wood; provisions its cells with aphids (Krombein, 1958).

Psen (Psen) barthi Viereck. 2 ♀; 25 June to 5 July (KVK); univoltine (?); in open woods; nests in wood and preys on membracids.

Psen (Psen) erythropoda Rohwer. 5 ♀; 4 June to 11 July (JCC, AKF, KVK); probably univoltine; in open woods.

Psen (Psen) monticola Packard. 1 ♀; 28 July (HLV); probably univoltine.

Psen (Pseneo) kohlii kohlii Fox. 15 ♀; 13 June to 19 September (HSB, JCC, AKF, KVK, EAS); multivoltine; in woods and on beach around pokeweed; nests in soil and preys on leafhoppers.

Psen (Pseneo) simplicicornis Fox. 1 ♀; 16 July (KVK); probably multivoltine; in open woods; preys on leafhoppers.

Mimesa (Mimesa) basirufa Packard. 6 ♀, 1 ♂; 4 June to 5 September (KVK); usually univoltine; nests in soil near outdoor fireplace at the island and preys on leafhoppers (Krombein, 1961).

Mimesa (Mimesa) ezra Pate. 2 ♀; 13-31 August (KVK); on upper beach.

Mimesa (Mimumesa) leucopus (Say). 24 ♀, 52 ♂; 19 May to 1 October (KVK, JvdV); multivoltine; in woods and on beaches.

Mimesa (Mimumesa) longicornis (Fox). 3 ♀, 9 ♂; 6–19 August (KVK); on upper beach.

Xylocelia franclemonti Krombein. 5 ♂; 28 July to 28 August (KVK); on upper beach flying around scrub cottonwood infested with aphids; the colony from which these came apparently is along the new circumferential highway right-of-way just off the island.

Xylocelia virginiana Rohwer. 65 ♀, 132 ♂; 30 May to 30 July and 31 August to 13 October (JB, KVK, HLV); usually multivoltine; a large colony nests near the outdoor fireplace; nests in soil and provisions with woolly alder aphid, *Prociphilus tessellatus* (Fitch) (Krombein, 1958).

Pemphredon (Pemphredon) sp. 1 ♂; 13 June (KVK); in open woods at lower end of island; apparently a new species, but description withheld until associated females are available.

Pemphredon (Cemonus) harbecki Rohwer. 2 ♀, 1 ♂; 9 June to 28 September (KVK).

Pemphredon (Cemonus) lethifer lethifer (Shuckard). 2 ♀, 7 ♂ and reared specimens; 4 July to 13 August (KVK, HLV, JvdV); multivoltine; on upper beach; preys on *Aphis* and nests in sumac stems.

Pemphredon (Cemonus) tenax Fox. 12 ♀, 28 ♂; 19 May to 16 September (KVK); multivoltine; on both beaches around herbaceous vegetation; nests in twigs and preys on aphids.

Stigmus americanus Packard. 45 ♀, 26 ♂; 8 May to 26 October (HEE, KVK, RCS, JvdV); multivoltine; mostly in wooded areas and around cabin; nests in small deserted beetle borings in porch rafters, and *Chionanthus* twigs, and preys on aphids (Krombein, 1958, 1961).

Passaloecus annulatus (Say). 19 ♀, 10 ♂; 20 May to 13 October (JCC, KVK); multivoltine; mostly in woods and around cabin; nests in abandoned beetle borings in porch rafters and cedar stump at the island (Krombein 1958, 1961).

Passaloecus mandibularis (Cresson). 1 ♀; 19 May (KVK); univoltine; nests in abandoned beetle borings and wooden trap nests; preys on aphids.

Passaloecus relativus Fox. 2 ♀, 1 ♂; 21 May to 2 June (KVK); multivoltine; around cedar post on cabin porch; preys on aphids and nests in deserted beetle borings.

Spilomena barberi Krombein. 3 ♀, 1 ♂; 19 May to 31 August (KVK); multivoltine; nests in abandoned beetle borings and preys on nymphal thrips; described from Plummers Island.

Spilomena pusilla (Say). 2 ♀, 1 ♂; 26 May to 6 June (KVK); multivoltine; nests in rafters on cabin porch; preys on thrips.

Xysma ceanothae (Viereck). 6 ♀; 2–29 June (KVK); univoltine; preys on thrips; nests in deserted anobiid beetle borings in porch rafters at island (Krombein, 1958).

Chlorion (Ammobia) ichneumoneum (Linnaeus). 1 ♀ (?); 9 July (sight record, KVK); at upper end of island; nests in ground and preys on katydids.

Chlorion (Ammobia) pennsylvanicum (Linnaeus). 1 ♀; 21 August

(KVK); on beach on swamp milkweed flowers; nests in soil and preys on katydid.

Isodontia auripes (Fernald). Reared from several wooden trap nests in woods (KVK); multivoltine; preys on tree crickets.

Isodontia azteca (Saussure). 2 ♀, 1 ♂; 1-8 September (KVK, HLV, JvdV); multivoltine; on upper beach on *Polygonum* flowers.

Isodontia cinerea (Fernald). 2 ♀; 9 July to 31 August (KVK); multivoltine; in woods.

Sphex aureonotatus (Dahlbom). 12 ♀, 15 ♂; 25 June to 29 September (HSB, DHC, AKF, GMG, KVK, WLM, JvdV); multivoltine; in open woods and on beach; nests in ground and preys on notodontid caterpillars.

Sphex nigricans (Dahlbom). 2 ♀, 1 ♂; 8 September to October (WP, JvdV); multivoltine; preys on noctuid caterpillars and nests in ground.

Sphex urnarius (Dahlbom). 3 ♀, 9 ♂; 2 June to 9 September (HSB, JCC, KVK, JvdV); multivoltine; nests in ground and preys on noctuid and geometrid caterpillars.

Sceliphron caementarium (Drury), the black and yellow mud-dauber. 2 ♀; 25 June to 21 July (AKF, KVK); multivoltine, preys on spiders.

Chalybion californicum (Saussure). 5 ♀, 2 ♂; 11 June to 17 August (AKF, KVK, JvdV); appropriates *Sceliphron* nests; preys on spiders.

Podium luctuosum Smith. 18 ♀ and reared specimens; 11 June to 18 August (JB, JCC, JNK, KVK, HLV); probably univoltine; nests in wooden traps and abandoned insect borings in dead standing trees; preys on woods cockroaches (Krombein, in press).

Alysson conicus Provancher. 18 ♀, 6 ♂; 17 June to 30 August (KVK); multivoltine; on beach.

Alysson melleus Say. 1 ♀, 3 ♂; 22 July to 12 August (KVK); multivoltine; on beach; nests in sand and preys on leafhoppers.

Alysson oppositus Say. 6 ♀, 2 ♂; 30 June to 8 September (KVK, GCS); multivoltine; on beach.

Alysson triangulifer triangulifer Provancher. 1 ♀, 2 ♂; 9-25 June (KVK); multivoltine; on beach.

Didineis texana (Cresson). 1 ♀; 19 August (KVK); multivoltine; preys on fulgorids.

Nysson (Nysson) lateralis Packard. 1 ♀; 4 July (JB, HLV); multivoltine.

Nysson (Epinysson) hoplisivora Rohwer. 1 ♂; 28 July (FEK); upper beach; social parasite of the sphecid wasp, *Psammaecius costalis* (Cr.).

Nysson (Epinysson) opulentus Gerstaecker. 1 ♂; 28 June (PJS); multivoltine.

Argogorytes (Archarpactus) nigrifrons (Smith). 1 ♀; 18 August (RCS).

Ochleoptera bipunctata (Say). 9 ♀; 28 July to 9 September (KVK); probably univoltine; mostly on beach, but also around cabin; nests in ground and preys on leafhoppers.

Sphecius (Sphecius) speciosus (Drury), the cicada killer. 2 ♀; 25

August to 5 September (KVK); univoltine; one of these females had a nest in the sand on the lower beach; preys on cicadas.

Gorytes (Gorytes) canaliculatus Packard. 6 ♀, 1 ♂; 9 June to 22 July (AKF, KVK); probably univoltine; I have observed this species nesting in sand on the upper beach and preying on leafhoppers, *Idiocerus* sp. (Krombein, in press).

Gorytes (Gorytes) mcateei Krombein and Bohart. 2 ♀; 3-6 June (KVK); probably univoltine; in open wooded areas; described from Plummers Island.

Gorytes (Pseudoplisus) phaleratus Say. 1 ♀; 20 July (PRM); possibly multivoltine.

Bembix spinolae Lepeletier. 1 ♀; 9 September (KVK); multivoltine; on upper beach; nests in sand and provisions with a variety of flies.

Philanthus gibbosus (Fabricius). 11 ♀, 15 ♂; 6 June to 23 September (DBB, KVK, JvdV); on beach and near cabin; nests in ground and preys on solitary bees.

Cerceris atramontensis Banks. 1 ♀; 6 September (KVK); probably multivoltine; near upper end of island; nests in soil in open wooded areas and preys on *Conotrachelus* weevils.

Cerceris clypeata Dahlbom. 1 ♀, 12 ♂; 5 July to 28 September (JCC, KVK, PJS, JvdV); multivoltine; near upper end of island and on beach; several male species may be confused under *clypeata*.

Cerceris compacta compacta Cresson. 1 ♀; 6 September (KVK); probably multivoltine; on upper beach.

Cerceris fumipennis Say. 6 ♂; 19 August to 6 September (KVK); multivoltine; on flowers on upper beach; preys on buprestid beetles, and, secondarily, on chrysomelid beetles.

Cerceris halone Banks. 2 ♀; 8 September (JvdV); on *Solidago* and *Eupatorium* flowers.

Cerceris insolita Cresson. 4 ♀, 1 ♂; 21 June to 31 August (RPC, KVK); probably univoltine; on sandy beaches; I have taken it on the island with its chrysomelid beetle prey, *Rhabdopterus praetextus* (Say) (Krombein, in press).

Anacrabro ocellatus ocellatus Packard. 2 ♀; 17 July to 30 August (KVK); probably multivoltine; nests in ground and preys on *Lygus* bugs.

Entomognathus (Toncahua) memorialis Banks. 2 ♀, 2 ♂; 28 June to 4 July (JB, KVK, HLV); probably multivoltine; in open wooded areas; males on foliage, one female labeled "nest in soil along wood path."

Crabro (Paranothyreus) snowii Fox. 3 ♀, 9 ♂; 3-30 July (KVK); univoltine; in open woods.

Crabro (Crabro) cribrellifer (Packard). 1 ♀, 1 ♂; 9-21 June (KVK); probably univoltine; in open wooded area.

Euplilis (Corynopus) coarctata modesta (Rohwer). 13 ♀, 14 ♂ and reared specimens; 17 May to 17 October (KVK); multivoltine; in wooded areas and on beach; nests in *Hibiscus* stems and preys on midges (Krombein, in press).

Euplilis (Corynopus) rufigaster (Packard). 65 ♀, 4 ♂ and many reared specimens; 19 May to 17 October (KVK); multivoltine; in wooded areas and on beach; nests in abandoned beetle borings in cabin steps, wooden trap nests, and *Hibiscus* stems; preys on midges (Krombein, 1958, in press).

Crossocerus (Microcrabro) xanthochilos Pate. 1 ♀; 16 September (KVK); multivoltine; on mud flat adjacent to river; nests in ground.

Crossocerus (Crossocerus) lentus (Fox). 11 ♀, 2 ♂; 12 May to 9 September (KVK); multivoltine; around post on cabin porch and on beach.

Crossocerus (Crossocerus) planifemur Krombein. 2 ♀; 11–17 June (KVK); apparently univoltine; in open woods.

Crossocerus (Crossocerus) planipes (Fox). 4 ♀; 26 May to 9 June (KVK); multivoltine; nests in soil along woodland path and preys on empidid flies (Krombein, in press).

Crossocerus (Crossocerus) similis (Fox). 4 ♀, 1 ♂; 28 May to 17 August (KVK); probably multivoltine; nesting in soil along woodland path.

Crossocerus (Crossocerus) spangleri Krombein. 7 ♀, 2 ♂; 19 May to 18 July (KVK, PJS); multivoltine; mostly on beach, but one male near cabin; described from Plummers Island.

Crossocerus (Blepharipus) ambiguus (Dahlbom). 3 ♀, 2 ♂; 9 June to 26 October (KVK); multivoltine; on beach; nests in beetle borings in wood and preys on leafhoppers.

Crossocerus (Blepharipus) harringtonii (Fox). 4 ♀, 2 ♂; 5 May to 30 June (KVK); multivoltine; hovering before borings in cedar posts of cabin porch and standing dead tree.

Crossocerus (Blepharipus) impressifrons (Smith). 5 ♀, 7 ♂; 6 May to 13 October (JB, KVK, PJS, HLV); multivoltine; hovering before borings in cedar posts of cabin porch and around beach vegetation.

Crossocerus (Blepharipus) stictochilos Pate. 5 ♂ and several specimens reared from nest in green *Hibiscus* stem; 4 June to 5 September (KVK, JvdV); multivoltine; around beach vegetation.

Crossocerus (Blepharipus) tarsalis (Fox). 4 ♀, 22 ♂; 17 May to 28 September (JB, KVK, HLV); multivoltine; in open woods and around beach vegetation.

Crossocerus (Nothocrabro) nitidiventris (Fox). 3 ♀, 2 ♂; 6 May to 23 September (KVK); multivoltine; in woods, on beach, and in borings of cedar posts of cabin porch; preys on crane flies.

Ectemnius (Clytochrysus) lapidarius (Panzer). 4 ♀, 3 ♂; 17 May to 6 September (KVK); multivoltine; around vegetation on beach; nests in rotten wood and preys on syrphid and anthomyid flies.

Ectemnius (Lophocrabro) singularis (Smith). 2 ♀; 6 June to 1 September (KVK, HLV); multivoltine; preys on syrphid flies.

Ectemnius (Hypocrabro) continuus (Fabricius). 5 ♀, 1 ♂; 26 May to 6 September (KVK); multivoltine; on beach, in woods, and hovering before cedar post on cabin porch; nests in logs and preys on muscoid flies.

Ectemnius (Hypocrabro) paucimaculatus (Packard). 24 ♀, 24 ♂ and many reared specimens; 19 May to 16 September (KVK); multivoltine; nests in green *Hibiscus* stems at edge of river and preys on flies occurring on mud flats, principally Ephydriidae and Agromyzidae (Krombein, in preparation).

Ectemnius (Hypocrabro) stirpicida (Packard). 4 ♀; 19 May to 19 October (KVK); multivoltine; nests in twigs and preys principally on small acalyptrate muscoid flies.

Ectemnius (Apoctemnius) excavatus banksi (Rohwer). 8 ♀, 2 ♂; 4 June to 28 August (KVK, PRM); multivoltine; in open woods and occasionally on beach; nests in rotten logs.

Ectemnius (Ectemnius) brunneipes (Packard). 1 ♀; 5 July (KVK); multivoltine; nests in logs.

Ectemnius (Ectemnius) dives (Lepeletier and Brullé). 1 ♂; 2 June (KVK); multivoltine; in woods; nests in logs, timber, and stems and preys on muscoid flies.

Lestica (Solenius) producticollis (Packard). 7 ♀, 3 ♂; 26 May to 1 September (HSB, KVK, PJS); multivoltine; in woods and on beach hovering in front of stump.

Oxybelus bipunctatum Olivier. 5 ♀, 1 ♂; 26 May to 25 August (KVK); multivoltine; on sandy beach; nests in sand and preys on flies.

Oxybelus cressonii Robertson. 9 ♂; 29 June to 24 July (KVK, RCS); multivoltine; on sandy beach.

Oxybelus emarginatum Say. 1 ♀, 8 ♂; 2 June to 19 August (KVK); multivoltine; on sandy beach; I have taken it on the island with its prey, a male dolichopodid fly, *Gymnopternus* sp. (Krombein, in press).

LITERATURE CITED

The only sources listed here are the articles describing new wasps from Plummers Island or reporting biological studies made there.

- ALLEN, H. W. 1934. Descriptions of twelve new species of Tiphidae from the United States with taxonomic notes. Trans. Amer. Ent. Soc., 60: 295-316.
- BRUES, C. T. 1943. The American species of *Rhopalosoma*. Ann. Ent. Soc. Amer., 36: 310-318, 1 pl.
- EVANS, H. E. 1954. The North American species of *Dissoniphalus*. Proc. Ent. Soc. Wash., 56: 288-309, 21 figs.
- HOOD, J. D. 1913. Notes on the life history of *Rhopalosoma poeyi* Cresson. Proc. Ent. Soc. Wash., 15: 145-147, 1 fig.
- KROMBEIN, K. V. 1958. Miscellaneous prey records of solitary wasps. III. Proc. Biol. Soc. Wash., 71: 21-26.
- . 1959. Natural history of Plummers Island, Maryland. XII. A biological note on *Trypoxylon richardsi* Sandhouse. Proc. Biol. Soc. Wash., 72: 101-102.
- . 1961. Miscellaneous prey records of solitary wasps. IV. Bull. Brooklyn Ent. Soc., 56: 62-65.

- . 1962a. Natural history of Plummers Island, Maryland. XIII. Descriptions of new wasps from Plummers Island, Maryland. *Proc. Biol. Soc. Wash.*, 75: 1-17.
- . 1962b. Biological notes on acarid mites associated with solitary wood-nesting wasps and bees. *Proc. Ent. Soc. Wash.*, 64: 11-19.
- . 1963. A new *Chrysura* from Plummers Island, Maryland. *Ent. News*, 74: 149-152.
- . In press. The host-parasite relationship between *Xylocelia virginiana* Rohwer and *Omalus intermedius* (Aaron).
- . In press. Miscellaneous prey records of solitary wasps. V.
- . In preparation. Natural history of Plummers Island, Maryland. XVIII. The hibiscus wasp, an abundant rarity, and its associates.
- MALLOCH, J. R. 1918. The North American species of *Tiphia* in the collection of the Illinois Natural History Survey. *Bull. Ill. Nat. Hist. Surv.*, 13 (1): 1-24, 1 pl.
- MICKEL, C. E. 1937. The mutillid wasps of the genus *Timulla* which occur in North America north of Mexico. *Ent. Amer. (n. s.)*, 17: 1-119, 3 pls.