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**LATE SUMMER-FALL SOLITARY WASP FAUNA
OF CENTRAL NEW YORK (HYMENOPTERA:
TIPHIIDAE, POMPILIDAE, SPHECIDAE)**

Frank E. Kurczewski¹ and Robert E. Acciavatti²

ABSTRACT

Eighty-one species of primarily ground-nesting solitary wasps belonging to the families Tiphidae, Pompilidae and Sphecidae were observed, collected and identified from six sandy and gravelly study areas in Cayuga and Onondaga Counties, New York. The observations and collections were made 1 September-3 November 1966, 1 September-1 November 1967 and 13 September-29 October 1984, with some species (*Ammophila urnaria*, *Diodontus franclemonti*) nesting through the entire months of September and October. An attempt to associate extended flight season with overnight resting site, geographic distribution, taxonomic affinity and prey type is made, but only the association with prey type appears to have any validity.

The late summer-fall solitary wasp fauna of the northeastern United States is poorly documented. Dates of collection after 1 September are unavailable for the majority of species. Leonard (1928) published collection dates after 1 September from upstate New York for 11 species of Pompilidae and 17 species of Sphecidae; however, many of these records contain only the month of collection and several of the species determinations are doubtful. Evans (1957, 1958a, b, 1959, 1962, 1964, 1966) reported late dates for the nesting activities of some species of digger wasps from the Northeast. Two of his papers (1958b, 1964) describe the nesting of typically late summer and early fall species, *Ancistromma distincta* (Smith) and *Philanthus lepidus* Cresson, respectively. Ten species of pompilids and 26 species of sphecsids were collected by Kurczewski and Kurczewski (1963) at Presque Isle State Park, Pennsylvania after 1 September, indicating that many solitary wasps continue nesting into the late summer and early fall despite cooler temperatures and shortened photoperiod. Their report suggests that a few species such as *Mimesa pauper* Packard, *Diodontus ater* (Mickel), *Nysson trichrus* (Mickel) and *Crossocerus elongatus* Van der Linden may be restricted to or have peak populations during this time period. An examination of the Sphecidae in the insect collections of Cornell University and the Museum of Comparative Zoology, Harvard University, reveals a dearth of material collected during September and October in the northeastern United States. A paucity of such collecting records has induced us to present information on the activities of primarily ground-nesting Tiphidae, Pompilidae and Sphecidae

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obtained during September, October and November of 1966, 1967 and 1984. Many of the specimens have been placed in the insect museum of the State University of New York College of Environmental Science and Forestry and some were retained by the identifiers.

Six areas in central New York were utilized as study sites but one proved to be far better than the others as a source of ground-nesting solitary wasps. This area comprised a man-made sand pit, 2 km S Auburn, Cayuga County (see Fig. 1, Kurczewski and Acciavatti, 1968). The area was partly surrounded by an oak-hickory forest, contained an abundance of flowering *Aster* and *Solidago* species and was moderated climatically by nearby Owasco Lake. None of the other sites contained such a vast array of wasps nor such dense aggregations of certain species. All but eight of the 81 species of solitary wasps listed below were collected or observed at this locality. Additional collections and observations were made in sand and gravel pits 3 km E Auburn, alongside U. S. Route 20, 2 km W and 5 km S Sennett, Cayuga County, and Marcellus and 2 km S Fayetteville, Onondaga County.

At first, nearly daily 1-hour periods of observation were made at each site except for the one near Fayetteville. After these areas had been explored for the relative richness or poorness of their wasp fauna, 2-to 3-hour periods of daily study were concentrated at the site near Owasco Lake with only occasional visits to the other areas. Observations and collections were usually made during the warmest hours of the day, i.e., between 1200 and 1600 h (EDT) on the days indicated in the text. A total of 248 h, 171 in 1966, 30 in 1967 and 47 in 1984 was spent in this endeavor. The 1966 data were systematically collected, but those of 1967 and 1984 were opportunistic because of teaching time limitations. During the course of study, various physical factors were measured and recorded daily, including high and low (ambient) temperature, temperature at times of wasp activity, sand surface and cell depth temperature, amount and kind of precipitation, day length (photoperiod) and pollen count. These data are available from the senior author, upon request. Sand temperature may have been the most appropriate measurement because it indicated conditions to which the wasp responded on the surface and at cell depth.

The total number of specimens utilized was 2,129. Of the 81 species of solitary wasps collected and observed during this study, 62 were Sphecidae. Males and females of Sphecidae were collected and identified except for common species in the genera *Chlorion*, *Sceliphron*, *Sphex*, *Tachysphex*, *Oxybelus*, *Alysson*, *Sphecius*, *Bicyrtes*, *Microbembex*, *Bembix* and *Philanthus* which were identified in situ. All of the tiphiids and pompilids were collected and identified after recording their activity. The species are listed below following their arrangement in the Catalog of Hymenoptera in America North of Mexico, except that Krombein's (1979) families and subfamilies of Sphecoidea are relegated to subfamilial and tribal statuses, respectively. The sexes, number of specimens, inclusive dates of collection and behavioral activity (in parenthesis) are given for each species. Abbreviations for the behavioral activities are as follows: (n) nesting, (s) searching for host, prey or nest, (r) resting, (w) walking, (f) flying, (m) mating, (t) maintaining territorial station, (h) obtaining honeydew and (d) dead on sand. A, D, M and S refer to wasps collected on the flowers of *Aster* spp., *Daucus carota*, *Melilotus alba* and *Solidago* spp., respectively.

Family TIPHIIDAE

Myzinum quinquecinctum (Fabricius): 1 ♀ (S) 13 Sept. 1966.

Methocha stygia (Say): 2 ♀♀ (s) 2-14 Sept. 1967.

Family POMPILIDAE

Tribe Pepsini

Priocnemis cornica (Say): 52 ♀♀ (n, s) 1 Sept.-27 Oct. 1966, 13 Sept.-2 Oct. 1967, 21 Sept.-29 Oct. 1984, (w) 12 Oct. 1984 (14° C, air; 16° C, sand).

Priocnemis notha (Cresson): 7 ♀♀ (n) 17 Sept.-26 Oct. 1966, (f) 27 Sept.-15 Oct. 1966.

Calicurgus hyalinatus alienatus (Smith): 13 ♀♀ (n, s) 8 Sept. 1966, 14 Sept.-4 Oct. 1967, 21 Sept.-14 Oct. 1984, (f) 4 Oct. 1967.

Tribe Auplopodini

Auplopus nigrellus (Banks): 6 ♀♀ (n) 10-22 Oct. 1966, 2-16 Oct. 1967.

Tribe Pompilini

Evagetes parvus (Cresson): 44 ♀♀ (s) 9 Sept.-27 Oct. 1966, 2 Sept.-16 Oct. 1967, 16 Sept.-10 Oct. 1984, (S) 8-14 Sept. 1966.

Episyron quinquenotatus (Say): 25 ♀♀ (n) 1 Sept.-16 Oct. 1966, 1 Sept.-2 Oct. 1967, (S) 14 Sept.-6 Oct. 1966; 5 ♂♂ (f) 1 Sept. 1966, (S) 2-15 Sept. 1967.

Anoplius (Lophopompilus) aethiops (Cresson): 4 ♀♀ (n) 8-10 Sept. 1966, (f, r) 26 Sept. 1966.

Anoplius (Arachnoproctonus) semirufus (Cresson): 10 ♀♀ (n) 1 Sept.-14 Oct. 1966, 16-23 Sept. 1984, (f, r) 26 Sept. 1966.

Anoplius (Pompilinus) marginatus (Say): 62 ♀♀ (n, s) 1 Sept.-10 Oct. 1966, 2 Sept.-15 Oct. 1967, 16 Sept.-14 Oct. 1984, (f) 14 Oct. 1966.

Anoplius (Pompilinus) subcylindricus (Banks): 5 ♀♀ (n) 18 Sept.-10 Oct. 1966.

Anoplius (Anoplius) illinoensis (Robertson): 3 ♀♀ (n) 1 Sept. 1966, (S) 9-14 Sept. 1966.

Anoplius (Anoplius) imbellis Banks: 1 ♀ (n) 17 Sept. 1966.

Anoplius (Anoplius) ventralis (Banks): 3 ♀♀ (n) 18 Sept.-22 Oct. 1966, 4 Oct. 1967.

Ammosphex michiganensis (Dreisbach): 2 ♀♀ (n) 9 Oct. 1966, (r) 2 Oct. 1966 (wings frayed).

Aporinellus medianus Banks: 1 ♀ (n) 3 Oct. 1966.

Aporinellus wheeleri Bequaert: 4 ♀♀ (n) 1-2 Sept. 1966, (h) 1 Sept. 1966.

Tribe Ceropalini

Ceropales maculata fraterna Smith: 1 ♀ (D) 6 Oct. 1966 (wings damaged, unable to fly).

Family SPHECIDAE

Subfamily Sphecinae

Chlorion aerarium Patton: 1 ♀ (r) 1 Sept. 1966.

Sceliphron caementarium (Drury): 3 ♀♀ (n) 10 Sept.-9 Oct. 1966, 4 Oct. 1984.

Spheg ichneumoneus (Linnaeus): 9 ♀♀ (n) 1-10 Sept. 1966, 13-16 Sept. 1984, (S) 8 Sept. 1966, 2 Oct. 1967.

Spheg pensylvanicus Linnaeus: 2 ♀♀ (f) 1 Sept. 1966, 1 Sept. 1967.

Prionyx atratus (Lepeletier): 2 ♀♀ (n) 18-19 Sept. 1966.

Podalonia robusta (Cresson): 55 ♀♀ (n, s) 1 Sept.-22 Oct. 1966, 1 Sept.-4 Oct. 1967, 16 Sept.-3 Oct. 1984, (S) 6-28 Sept. 1966, 2-15 Sept. 1967; 3 ♂♂ (f) 2 Sept. 1966, (S) 6 Sept. 1966, 5 Sept. 1967.

Eremnophila aureonotata (Cameron): 8 ♀♀ (f) 7-19 Sept. 1966, 13 Sept. 1967, (S) 6-19 Sept. 1966; 1 ♂ (S) 6 Sept. 1966.

Ammophila evansi Menke: 9 ♀♀ (n) 14 Sept.-28 Oct. 1966.

Ammophila harti (Fernald): 141 ♀♀ (n) 1 Sept.-15 Oct. 1966, 2 Sept.-16 Oct. 1967, 13 Sept.-29 Oct. 1984, (f, r) 4-24 Oct. 1984 (13° C, air; 20° C, sand), (A) 2 Oct. 1967, (S) 1-28 Sept. 1966, 2-5 Sept. 1967; 3 ♂♂ (f) 28 Sept. 1966, (m, attempted) 3 Oct. 1984, (S) 5 Sept. 1967.

Ammophila kennedyi (Murray): 23 ♀♀ (n, s) 2-19 Sept. 1966, 1-15 Sept. 1967, 25 Sept.-20 Oct. 1984, (f, w) 4 Oct. 1984 (13° C, air; 20° C, sand), (S) 6-28 Sept. 1966; 1 ♂ (S) 28 Sept. 1966.

Ammophila nigricans Dahlbom: 28 ♀♀ (n) 1 Sept.-14 Oct. 1966, 2 Sept.-4 Oct. 1967, 21-23 Sept. 1984, (A) 2 Oct. 1967, (S) 10 Sept. 1966, 2 Sept. 1967, 20 Sept. 1984; 2 ♂♂ (f) 6 Sept. 1966, 1 Sept. 1967.

Ammophila pictipennis Walsh: 12 ♀♀ (n) 6 Sept.-23 Oct. 1966, 1 Sept.-27 Oct. 1967, (S) 4-17 Sept. 1967; 1 ♂ (S) 10 Sept. 1966.

Ammophila urnaria Dahlbom: 169 ♀♀ (n, s) 1 Sept.-23 Oct. 1966, 1 Sept.-2 Oct. 1967, 16 Sept.-29 Oct. 1984, (f, w, r) 4-16 Oct. 1984 (13° C, air; 20° C, sand), (D) 19 Sept. 1966, (S) 13 Sept.-22 Oct. 1966, 1 Sept.-16 Oct. 1967; 5 ♂♂ (M) 1-6 Sept. 1966, (S) 1-5 Sept. 1967.

Subfamily Pemphredoninae

Mimesa ezra (Pate): 29 ♀♀ (n) 28 Sept.-26 Oct. 1966, 4-11 Oct. 1967, (f) 13-14 Oct. 1984, (D) 22 Oct. 1966, (S) 6-22 Oct. 1966, 2 Oct. 1967.

Psenulus pallipes parenosus (Pate): 2 ♀♀ (n) 22 Oct. 1966, 25 Sept. 1967.

Diodontus franclemonti (Krombein): 165 ♀♀ (n, s) 1 Sept.-3 Nov. 1966, 2 Sept.-1 Nov. 1967, 30 Sept.-29 Oct. 1984, (D) 18 Sept. 1966; 9 ♂♂ (f) 1-2 Sept. 1966.

Diodontus virginianus (Rohwer): 1 ♀ (n) 25 Sept. 1967.

Pemphredon lethifer (Shuckard): 7 ♀♀ (n) 11 Sept.-28 Oct. 1966.

Pemphredon sp. 1 ♀ (n) 11 Sept. 1966.

Spilomena sp. 1 ♀ (n) 22 Oct. 1966.

Subfamily Astatinae

Astata leuthstromi Ashmead: 7 ♀♀ (n) 14-18 Sept. 1966, 16-23 Sept. 1984; 1 ♂ (t) 14 Sept. 1967 (wings frayed).

Astata unicolor Say: 5 ♀♀ (n) 16-30 Sept. 1984; 2 ♂♂ (t) 16-18 Sept. 1984.

Subfamily Larrinae

Liris argentatus (Beauvois): 26 ♀♀ (f, r, w) 1-18 Sept. 1966, 13 Sept. 1967, 20 Sept.-29 Oct. 1984, (S) 30 Sept. 1984.

Ancistromma distincta (Smith): 16 ♀♀ (12 black, 4 red and black), (n) 2-17 Sept. 1966, 2-17 Sept. 1967; 1 ♂ (w) 13 Sept. 1984 (wings frayed).

Tachytes validus Cresson: 4 ♀♀ (n) 8 Sept. 1966, 2-5 Sept. 1967; 1 ♂ (S) 8 Sept. 1966.

Tachysphex acutus (Patton): 8 ♀♀ (n, w, r) 1 Sept.-3 Oct. 1966, 14 Sept. 1967.

Tachysphex tarsatus (Say): 31 ♀♀ (n) 1 Sept.-3 Oct. 1966, 5-14 Sept. 1967, (d) 28 Sept. 1966, (D) 2-10 Sept. 1966; 4 ♂♂ (f) 1-10 Sept. 1966, 13 Sept. 1967.

Tachysphex terminatus (Smith): 35 ♀♀ (n) 1 Sept.-6 Oct. 1966, 2-15 Sept. 1967; 8 ♂♂ (f) 1-18 Sept. 1966.

Lyroda subita (Say): 3 ♀♀ (n) 18-21 Sept. 1984.

Plenoculus davisi Fox: 7 ♀♀ (n) 1-6 Sept. 1966, 2 Sept. 1967.

Miscophus americanus Fox: 15 ♀♀ (n) 1-19 Sept. 1966, 1-5 Sept. 1967.

Subfamily Trypoxyloninae

Trypoxylon pennsylvanicum Saussure: 18 ♀♀ (n) 9-27 Oct. 1966, 13 Sept.-26 Oct. 1967; 2 ♂♂ (f) 15 Oct. 1966, 26 Oct. 1967.

Trypargilum collinum rubrocinctum (Packard): 4 ♀♀ (n) 14-27 Oct. 1966.

Subfamily Crabroninae

Oxybelus bipunctatus Olivier: 431 ♀♀ (n) 1 Sept.-23 Oct. 1966, 1 Sept.-11 Oct. 1967, 13 Sept.-20 Oct. 1984, (r) 22 Oct. 1966, (D) 18 Sept.-25 Oct. 1966, (S) 6 Sept.-25 Oct. 1966; 16 ♂♂ (f) 1-17 Sept. 1966, (S) 19-27 Sept. 1966.

Oxybelus subcornutus Cockerell: 8 ♀♀ (n) 1-13 Sept. 1967, 13-30 Sept. 1984.

Oxybelus uniglumis (Linnaeus): 27 ♀♀ (n) 1-13 Sept. 1966, 13 Sept.-4 Oct. 1967, 13 Sept.-25 Oct. 1984, (S) 8 Sept. 1966.

Anacrabro ocellatus Packard: 3 ♀♀ (D) 1-3 Sept. 1966.

Lindenius columbianus (Kohl): 13 ♀♀ (n) 11 Sept.-9 Oct. 1966, (r) 15-24 Oct. 1966, (D) 6 Oct. 1966, (S) 24 Oct. 1966.

Crossocerus maculipennis (Smith): 5 ♀♀ (n) 13-25 Sept. 1966, 20-23 Sept. 1984.

Crabro advena Smith: 3 ♀♀ (n) 15-22 Sept. 1967.

Crabro latipes Smith: 2 ♀♀ (n) 4-11 Oct. 1967.

Ectemnius sp. 1 ♀ (n) 8 Sept. 1966.

Subfamily Nyssoninae

Alysson melleus Say: 13 ♀♀ (n) 8 Sept.-9 Oct. 1966, 2 Sept.-4 Oct. 1967, 20 Sept.-13 Oct. 1984, (S) 10 Oct. 1966.

Nysson trichrus (Mickel): 4 ♀♀ (s) 13 Sept.-9 Oct. 1966, 25 Sept. 1967.

Epinysson basilaris tuberculatus (Handlirsch): 3 ♀♀ (s) 2-13 Sept 1966, 13 Sept. 1984.

Ochleroptera bipunctata (Say): 1 ♀ (n) 17 Sept. 1966.

Pseudoplisus phaleratus (Say): 1 ♀ (S) 28 Sept. 1966.

Sphecius speciosus (Drury): 4 ♀♀ (f) 8-10 Sept. 1966, (n) 2-5 Sept. 1967.

Hoplisoides placidus nebulosus (Packard): 13 ♀♀ (n) 1-8 Sept. 1966, 2-5 Sept. 1967.

Bicyrtes ventralis (Say): 3 ♀♀ (n) 2 Sept. 1967, 25 Sept. 1984, (r) 15 Sept. 1967.

Microbembex monodonta (Say): 49 ♀♀ (n) 8-19 Sept. 1966, 13-20 Sept. 1984, (f) 29 Sept. 1966, 14 Sept. 1967, (r) 2 Oct. 1967; 2 ♂♂ (f) 8 Sept. 1966.

Bembix americana spinolae Lepeletier: 45 ♀♀ (n) 1-27 Sept. 1966, 2 Sept.-4 Oct. 1967, 13 Sept.-13 Oct. 1984, (f) 28 Sept. 1966, (r) 9 Oct. 1966 (with only one forewing), 2 Oct. 1967; 2 ♂♂ (f) 1-13 Sept. 1966.

Subfamily Philanthinae

Philanthus bilunatus Cresson: 5 ♀♀ (n) 14 Sept. 1966, 4 Oct. 1967, (S) 2 Oct. 1967.

Philanthus gibbosus (Fabricius): 73 ♀♀ (n) 26 Sept.-10 Oct. 1966, 2-4 Oct. 1967, (f) 27 Sept.-23 Oct. 1966, (r) 22-23 Oct. 1966, (D) 22 Oct. 1966, (S) 8 Sept.-23 Oct. 1966, 2-15 Sept. 1967; 7 ♂♂ (S) 2-5 Sept. 1967.

Philanthus lepidus Cresson: 141 ♀♀ (n) 2 Sept.-9 Oct. 1966, 2 Sept.-4 Oct. 1967, 13 Sept.-20 Oct. 1984, (f) 9 Oct. 1966, (r) 9 Oct. 1966, 13 Oct. 1984, (S) 6 Sept.-14 Oct. 1966, 15 Sept.-2 Oct. 1967; 6 ♂♂ (S) 8-26 Sept. 1966.

Philanthus politus Say: 65 ♀♀ (n) 1-18 Sept. 1966, 2-13 Sept. 1967, (f) 6-18 Sept. 1966, (r) 6-18 Sept. 1966, 14-17 Sept. 1967, (S) 8-27 Sept. 1966, 2-13 Sept. 1967; 2 ♂♂ (S) 4-5 Sept. 1967.

Philanthus solivagus Say: 1 ♀ (n) 14 Sept. 1966; 2 ♂♂ (S) 5-6 Sept. 1967.

Philanthus ventilabris Fabricius: 3 ♀♀ (S) 6-8 Sept. 1966.

Cerceris dentifrons Cresson: 3 ♀♀ (S) 8 Sept.-2 Oct. 1966.

Cerceris deserta Say: 2 ♀♀ (n) 19 Sept. 1966, (S) 25 Sept. 1966; 2 ♂♂ (S) 5-10 Sept. 1966.

Cerceris fumipennis Say: 4 ♀♀ (n) 20 Sept.-3 Oct. 1984.

Cerceris nigrescens Smith: 16 ♀♀ (n) 1-10 Oct. 1966, (r) 28 Sept. 1966, (w) 6 Oct. 1966, (S) 8 Sept.-9 Oct. 1966, 15 Oct. 1967; 2 ♂♂ (S) 8-10 Sept. 1966.

DISCUSSION

The most detailed data of this three-year study were gathered during 1966. Several wasp species, including *Sphex ichneumoneus*, *Prionyx atratus*, *Eremnophila aureonotata*, *Astata leuthstromi*, *Ancistromma distincta* and *Miscophus americanus*, were not seen after 19 September of that year. Neither abrupt change in temperature or amount of rainfall or unavailability of prey appeared to govern the disappearance of these wasp species. Death caused by old age was probably responsible for the sudden absence of these species because some of the wasps had frayed wings and moved slowly and wobbly. The disappearance of *Tachysphex acutus*, *T. tarsatus*, *T. terminatus*, *Alysson melleus*, *Bembix americana spinolae* and *Cerceris nigrescens* during early October coincided with a series of cold nights and mornings on 6, 7 October during which temperatures dropped to 4° C. The disappearance of several species of *Philanthus* and *Cerceris* during late September and early October paralleled a significant decline in the number of flowers of *Solidago* spp., a primary food source for them. By 15 October flowers of *Melilotus alba*, *Daucus carota* and *Solidago* spp. had essentially disappeared, those of *Aster* spp. were scarce, there was still much living (green) vegetation and some prey species were evident. Wasps that nested at that time included the small species *Psenulus pallipes parenosas*, *Diodontus franclemonti*, *Mimesa ezra*, *Oxybelus bipunctatus* and *Lindenius columbianus*, medium-sized species such as *Trypoxylon pennsylvanicum*, *Trypargilum collinum rubrocinctum* and *Philanthus gibbosus*, but only *Podalonia robusta* and *Ammophila* spp. among the larger wasps. Most of these species were active on warm (15°-20° C) late October days, despite the fact that much vegetation had died due to several hard frosts, all of the deciduous trees, except oaks, had shed their leaves and many prey species were absent from the area. The last species to be observed was *Diodontus franclemonti* on 3 November 1966. Several females had survived night temperatures of -1° C, 11 frosts and 2 snowfalls of 1.9 and 3.8 cm. A few potential prey aphids were located on the sparse green vegetation that remained at that time.

There appears to be no correlation between extended flight season and where the wasp spends the night. One would assume that species which spend the night in burrows in the ground would be more protected from the rigors of the environment than species which spend the night above ground, e.g., clinging to vegetation, and, therefore, the former species should be evident later in the fall. However, certain species that slept on vegetation such as *Ammophila* spp., were among the last wasps to be seen nesting in late October. Many of the wasps that spent the night in burrows in the ground were among the first species to disappear in late summer and early fall, e.g., Astatinae, Larrinae, Nyssoninae and Cercerini. Conversely, other wasps that overwintered in burrows in the ground, e.g., certain species of *Oxybelus*, *Podalonia*, *Philanthus* and *Mimesa*, were among the last genera to be seen in the fall. *Podalonia luctuosa* Sm. females overwinter in deep, nearly vertical burrows which provide protection for them until they reexit the following spring and resume hunting activities (O'Brien and Kurczewski, 1982b), but adult females of *P. robusta* do not overwinter. Species that spent overnight in pre-existing burrows in soil or vegetation, e.g., Pemphredoninae and Trypoxyloninae, also nested into late October.

An attempt to correlate extended flight season with geographic distribution revealed few relationships. Species with northern geographic distributions such as *Ammosphex michiganensis*, *Podalonia robusta*, *Astata leuthstromi*, *Plenoculus davisii*, *Miscophus americanus* and *Crabro latipes* did not nest later into the fall than species with more southern distributions, e.g., several species of *Ammophila* and *Philanthus*. An exception appears to be *Eremnophila aureonotata* of the tribe Ammophilini, which belongs to a predominantly Neotropical genus and disappeared in late summer (see O'Brien, 1989).

Species belonging to certain genera disappeared at about the same time of year: *Priocnemis cornica*, *P. notha*, late October; *Sphex ichneumoneus*, *S. pennsylvanicus*, early September to early October; *Ammophila evansi*, *A. harti*, *A. kennedyi*, *A.*

pictipennis, *A. urnaria*, late October; *Astata leuthstromi*, *A. unicolor*, late September; *Tachysphex acutus*, *T. tarsatus*, *T. terminatus*, early October; *Cerceris dentifrons*, *C. deserta*, *C. fumipennis* and *C. nigrescens*, late September to mid-October. The congruity in flight season of certain congeneric species reflects uniformity in prey type. Several species of *Oxybelus* and *Philanthus*, on the other hand, were stratified seasonally in upstate New York. *Oxybelus bipunctatus* and *O. uniglumis* and *Philanthus gibbosus* and *P. lepidus* nested later in the year (mid-to late October) than other species in these genera. Seasonal stratification in species of *Oxybelus* is linked to prey type and flight season (Peckham, et al., 1973), but such a correlation has not been demonstrated for many species of *Philanthus* (Evans and Lin, 1959; O'Neill and Evans, 1982; Evans and O'Neill, 1987).

Species that nested latest in the year were also associated by prey type and included hunters of spiders (Pompilidae, Trypoxylonini), lepidopterous larvae (Ammophilini), Homoptera (Pemphredoninae), adult bees (Philanthini) and adult flies (Oxybelini). The only pompilids to nest in late October in this study were *Priocnemis cornica* and *P. notha*. All of the Orthoptera-hunting species of Sphecinae disappeared in late summer, but species of the caterpillar-hunting genus *Ammophila* were among the last wasps to nest in the fall. A related species, *Eremnophila aureonotata*, disappeared about a month sooner for reasons unknown. At least five genera of Homoptera-hunting Pemphredoninae nested into late October. Two species of *Astata* (Astatinae) preyed upon stinkbugs and nested only into late September. Except for females of *Liris argentatus*, which overwinter as adults (O'Brien and Kurczewski, 1982a) and *Tachysphex* spp. which disappeared during the first week in October, all species of Tachytini and Larrini were gone by late September. Species of *Trypoxylon* and *Trypargilum*, which prey upon spiders, extended their activities into the last week in October. Only two species of *Oxybelus*, among the several fly-hunting genera of Crabroninae, nested into late October. *Lindenius columbianus*, a generalized provisioning crabronine (Miller and Kurczewski, 1975), also nested into late October. The vast majority of species of Nyssoninae, except *Alysson melleus*, *Nysson trichrus* and an occasional *Bembix americana spinolae* or *Microbembex monodonta*, disappeared before 1 October.

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