

Note

The first documented migration of a potter wasp, *Ancistrocerus adiabatus* (Hymenoptera: Vespidae: Eumeninae)

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Abstract

Eumenine wasps are not known to be migratory and have never been proposed as migrants, let alone documented as such. We document a large-scale migration of a common eumenine, *Ancistrocerus adiabatus*, during which 44 000–68 000 wasps moved through a known migration corridor in southwestern Ontario, Canada, in less than an hour. Evidence for migration of another eumenine, *Pachodynerus erynnis*, six species of flower flies (Diptera, Syrphidae), and two dragonflies (Odonata) is also provided. We hope that this note encourages naturalists to focus their attention on insects at known migration concentration sites to learn more about this grossly understudied aspect of animal behaviour.

Key words: Insect migration; Vespidae; Odonata; Syrphidae

During 12–16 September 2020, J.H.S. was observing flora and fauna in the Point Pelee area of southwestern Ontario, Canada. On 12 September, he noted an abundance of *Ancistrocerus* wasps (Hymenoptera: Vespidae: Eumeninae). Every goldenrod inflorescence contained dozens of these insects, mainly stationary, none moving farther than between flower heads on adjacent plants.

The weather was mostly clear with easterly winds switching to southerly in the afternoon with a high of 24°C (J.H.S. pers. obs.) and continued, through the morning of 13 September, mostly clear with southerly winds switching to easterly through the day. The weather changed abruptly in the late afternoon when the wind switched to northwest. Bird migration increased and, at 1748, J.H.S. moved to a lakeshore location at the junction of Zion Road and Bluff Line (42.1127°N, 82.4083°W). This site on the north shore of Lake Erie is known to concentrate bird migrants moving south-west along the lakeshore on northwest winds.

On arriving, J.H.S. immediately noticed *Ancistrocerus* wasps moving from east to west in large numbers, typical of the direction of movement of visibly migrating birds. The wasps were moving in a narrow

band along the lakeshore, almost entirely between the agricultural fields and the lake over an 80-m wide swath of grasses, goldenrods, and other meadow plants. Their movement and flow were assessed over 69 min. For the first 50 min of observation, they moved steadily over the 80-m lakeshore buffer area. Migration started to slow at 1840, but some wasps were still moving when J.H.S. departed at 1857. Three one-minute-long counts were conducted with the following results: 170 in one min at 1815; 110 in one min at 1823; and 121 in one min at 1831. Wasps were only visible within 10 m of the observer and, given that numbers appeared to be consistent across the 80-m buffer, an estimated 880–1360 wasps were passing per min. Based on consistent passage observed for 50 min, that equals 44 000–68 000 wasps. Five specimens were collected as vouchers (stored in the Canadian National Collection of Insects, Arachnids and Nematodes: CNC1738754–CNC1738758) and one specimen was photographed at Point Pelee on 15 September (Figure 1). M.B. identified all of these specimens as females of a species of potter wasp, *Ancistrocerus adiabatus* (de Saussure, 1852); see Buck *et al.* (2008) for a key to species.



FIGURE 1. Female *Ancistrocerus adiabatus* at Point Pelee National Park, 15 September 2020 (record also on iNaturalist at <https://www.inaturalist.org/observations/59734868>). Photo: J.H. Skevington.

The next day, J.H.S. observed orders of magnitude fewer wasps on flowers. Presumably most had moved to points further south during the cold front on 13 September. Monarch butterfly (*Danaus plexippus* (Linnaeus, 1758) – Lepidoptera, Nymphalidae) migration at Point Pelee is similar, with numbers building on days with southerly winds followed by a mass movement south with north winds (J.H.S. pers. obs.). Wasp numbers appeared to build daily from 14 to 16 September when J.H.S. departed (south winds daily), presumably massing again until the next northerly flow.

Ancistrocerus adiabatus breeds in holes bored in twigs, stems, and wood; empty insect galls and sawfly cocoons; old mud-dauber nests; and rubber tubing. They make nest cell partitions and closing plugs from mud and provision their young with moth caterpillars from several families (Buck *et al.* 2008). As far as we know, eumenines overwinter as prepupae; thus, migration in this subfamily of wasps is unexpected. *Ancistrocerus adiabatus* is multivoltine (M.B. pers. obs.), occurring throughout the growing season in overlapping generations, so it is possible that migrant adults can reproduce again if they move south.

Migration in this species, other *Ancistrocerus* species, or in fact other eumenines has never been documented, but it has been hinted at. For example, some

eumenines have been recorded as possible vagrants in late autumn, suggesting that they may be migratory. For example, *Pachodynerus erynnis* (Lepeletier, 1841) was recorded at Point Pelee on 11 October 2020 (<https://www.inaturalist.org/observations/62367247>). The only other Canadian record is a male from Rondeau Provincial Park, South Point, 42°15'N, 81°52'W, on 7 September 2003 (collected by M.B., deposited in the University of Guelph Insect Collection, recorded by Buck *et al.* [2008]). Other previously published extralimital records for this species are cited in Buck *et al.* (2008). More recent observations have been reported on BugGuide, namely a male on 25 September 2019 from Cape May Point State Park, New Jersey (<https://bugguide.net/node/view/1733674>) and on iNaturalist, a female on 23 September 2019 on Staten Island, New York (<https://www.inaturalist.org/observations/33291119>). This species normally occurs from North Carolina to Texas and we hypothesize that these vagrants were displaced migrants..

The notable difference between these examples and our observation is that the former apparently migrated far north at the end of the season, whereas *A. adiabatus* at Point Pelee was apparently moving in the opposite direction. Furthermore, the latter was observed in large numbers. By contrast, the *P. erynnis* male at Rondeau Provincial Park was a singleton

(M.B. pers. obs.; no abundance information available for the other observations).

These trends are difficult to interpret. It remains to be clarified whether migrations are regular events or caused by exceptional circumstances. Regular seasonal migrations have only been reported for social vespids in the genera *Polistes* Latreille, 1802 and *Mischocyttarus* Saussure, 1853 (both Polistinae) in Central America (Hunt *et al.* 1999). Because of the different nesting biology of social wasps and their different stage of dormancy (adult versus prepupa) their behaviours are likely driven by different adaptive pressures.

Other apparent insect migrants (all moving east to west), noted at Zion Road on 13 September, included: Common Drone Fly (*Eristalis tenax* (Linnaeus, 1758) – Diptera, Syrphidae); Eastern Band-winged Hoverfly (*Ocyptamus fascipennis* (Wiedemann, 1830) – Diptera, Syrphidae); Monarch; Black Saddlebags (*Tramea lacerata* (Hagen, 1861) – Odonata, Libellulidae); and Green Darner (*Anax junius* (Drury, 1773) – Odonata, Aeshnidae). Shannon (1926) noted that insect migration was virtually an untouched field of study. Remarkably, this has changed little since that time. Shannon noted that *E. tenax* was migrating at several sites along the eastern seaboard, but did not note any other syrphids.

Few observations, such as these, have been made in North America despite considerable attention in Europe (e.g., Max Planck Society 2019; Wotton *et al.* 2019). Menz *et al.* (2019) documented a large passage of over 100 000 syrphids along the west coast of California in April 2017, but no specimens were collected to support more specific identification of these insects. On 22 September 2013, Skevington (2020) collected numbers of Oblique Stripetail (*Allograpta obliqua* (Say, 1823)), Aphideaters (*Eupeodes* Osten Sacken, 1877 spp.), Yellow-legged Flower Fly (*Syrphus rectus* Osten-Sacken, 1875), and Common Flower Fly (*Syrphus ribesii* (Linnaeus, 1758)) at Hawk Cliff near Port Stanley, southwestern Ontario (CNC8460–CNC8503) and speculated that these were migrants. Similarly, it is speculated here that *E. tenax* and *O. fascipennis* were migrating, but more fieldwork is required to confirm this.

Point Pelee and other known bird migration hotspots offer an excellent opportunity for entomologists interested in migration. Few species of insects have been documented migrating, but most naturalists are familiar with buildups of certain species in migration corridors, suggesting that the phenomenon is far more common than documented in the literature on insects. Hopefully, the advent of online databases, such as iNaturalist, other improved identification aids, better cameras, closer-focussing binoculars, and the increased number of people exploring nature

will ensure that we learn more about insect migration in the next few years than we have in the last 100. The lack of research on this subject in North America can be partly attributed to the difficulty of studying and tracking small animals over large distances, but the surge of interest in Europe suggests that we are simply behind. We encourage naturalists to focus their attention on insects at known migration concentration sites, such as Point Pelee National Park, Long Point, Rondeau Provincial Park, and locations along the eastern and western seaboards from late August to November. Citizen science offers great potential to better estimate the scale of insect migration as well as the species involved through mark–recapture, thorough documentation, and dedicated long-term observation.

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