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DISCOVERY OF AN ISOLATED POPULATION OF *ANAX LONGIPES* IN MICHIGAN (ODONATA: AESHNIDAE)

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ABSTRACT

Anax longipes is a large aeshnid dragonfly previously unknown from Michigan. Adults and larvae were found in abundance at a series of experimental ponds within the E.S. George Reserve in Livingston County, Michigan.

Anax longipes Hagen was previously undocumented from Michigan (Kormondy 1958), and is rarely encountered in the Great Lakes Region (Glotzhober 1995, Kielb 1996, Tennessen 1992). The species is widely distributed throughout the eastern United States, from Massachusetts to Wisconsin and south to Florida, with scattered records from southern Ontario, Canada (Dunkle 1989). However, in 1996 we discovered a small, but apparently stable population of *Anax longipes* at the University of Michigan's E. S. George Reserve (referred to as ESGR in numerous publications and on many specimens collected there) in southwestern Livingston County, Michigan. The species was serendipitously discovered during the course of experiments on prey response of *Hyla versicolor* tadpoles (Amphibia: Hylidae) to the presence of aquatic predators (Scott Peacor, pers. comm.). *Anax* nymphs for the above experiments were collected from a series of 22 eight-year old artificial ponds. Upon close inspection, it was discovered that two species of Odonata nymphs were being used in the experiments, *Anax junius* Drury and *Anax longipes*. Over 400 late-instar nymphs of *A. longipes* had been used in various phases of the experiments (Josh Van Buskirk, pers. comm.). Both species of *Anax* were shown to occur sympatrically in the ponds.

On 6 August 1996 we visited the ESGR site and were able to observe a minimum of four *Anax longipes* and several *Anax junius*. Specimens of adult *A. junius* were obtained, but unfortunately no *A. longipes* were collected at that time. Ten *Anax* exuviae were collected from cattail (*Typha*) stems and later, when compared to the exuviae resulting from the emergence of adults from captive nymphs (Table 1), were determined to be *A. longipes*. Six final instar *Anax* nymphs were also collected. These had all ceased to eat and were nearing adult emergence. In the course of the next eight days four of the six adults successfully emerged (Table 1).

At least two other man-made ponds (constructed around 1940) at the ESGR had populations of *A. junius* in 1966–67, but no records of *A. longipes*. Warren Brockelman (1968) collected aquatic samples at George Pond and

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Table 1. Emergence of adults from ultimate instars collected 6 August 1996.

Date	species	sex	comments
7 Aug 1996	*A. longipes*	F	Emerged before 0600 h
9 Aug 1996	none emerged		Two died.
10 Aug 1996	*A. longipes*	F	Emerged before 0600 h
13 Aug 1996	*A. longipes*	M	Emerged before 0730 h
14 Aug 1996	*A. longipes*	M	Emerged before 0430 h

Table 2. Sex and seasonal range of recently-emerged *Anax junius* collected at the E.S. George Reserve in 1967 by M.Y. Brockelman.

No.	Sex	Dates
16	Female	3 June - 31 August
22	Male	9 June - 16 September

Burt Pond "from screen traps placed over the bottom of the ponds" thus ensuring collection of emerging tenerals. A total of 38 *A. junius* were collected (Table 2) between 3 June and 16 September. The early emergence during June is in contrast to Walker (1958) who found very few exuviae in nearby Ontario before August, although consistent with Trottier (1967, 1971) who found emerging *Anax* in June in southern Quebec. Interestingly there were two periods of emergence—June-early July (26) and mid August–September (9), with very few emergences in late July and early August (3). The early July emergence-period (or non-emergence period, as the case may be) coincides with the emergence of the above *A. longipes*. Glotzhober (1995) reported the dates of 22 June to 25 July for scattered records of *A. longipes* in Ohio, and Tennessen (1992) observed flying *A. longipes* in south-central Wisconsin on 27 June and 4 July 1978.

We made a return visit to the ponds on 4 September 1996. A survey of the emergent vegetation at each pond revealed a total of 117 *Anax* exuviae. There were numerous (10+) teneral *Anax junius* flushed from the pond margins, and six were still perched upon their exuviae. No free-flying *Anax longipes* were encountered, although several mature adult *A. junius* were observed. Of 17 exuviae collected, 16 were determined to be *A. junius*, one *A. longipes*. Thus, at these ponds there were very different emergence patterns for the two species, with the majority of *A. longipes* emerging much earlier in the season.

Comparing the exuviae we collected demonstrates that the two species' larvae are easily separated by size (adult characters of *A. longipes* are very obvious). This is consistent with previously published data [Calvert (1934) gave ranges of 41.5–50.0 mm for *A. junius* and 56.5–62.0 mm for *A. longipes*; Walker (1958) gave a range of 43.5–47.0 mm for *A. junius*.]. *Anax junius* (13 specimens collected 4 September) had a mean length of 45±1.5 mm, whereas the exuviae of eleven *A. longipes* (one from 4 September, four emergences from above, and six collected 6 August) had a mean length of 60±2 mm. The size difference is easily discernible even from a distance of several meters.

DISCUSSION

With one exception, all of the eight-year old artificial ponds are fishless. The status of the two natural ponds in 1967 remains unclear, although they appear to have also been fishless since fish were not listed as a *Bufo* predator by Brockelman (1968). We have been assured that no specimens have been introduced from outside the area, thus eliminating the possibility that this could be an artificially founded population. The closest records of *A. longipes* are from Ottawa and Paulding Counties in northwestern Ohio (Glotzhober 1995). Members of the genus *Anax* are known to be strong fliers, as well as capable of migration. Therefore, an opportunistic, vagrant female *A. longipes* may have been responsible for the ESGR population. Previously, it has been reported that *A. longipes* outnumbered *A. junius* at artificial ponds in New Jersey (Beatty 1945). However, Johnson and Crowley (1980) estimated that *A. junius* outnumbered *A. longipes* over 10 to 1 in a fishless pond in Tennessee. Dunkle (1989) reports *A. longipes* as breeding in barrow pits and semi-permanent, grassy pools.

Questions arise with the discovery of a population of *Anax longipes* in an area not previously documented to be within its range. Are these ephemeral populations, in existence as long as the ponds used for ovipositing remain fishless? Other than via a "foundress," could this species have been introduced via transport or transplanting of ornamental aquatic vegetation? What of the sympatric relationship, both as nymph and adult, between the two species of *Anax*? Both species of *Anax* occur together elsewhere within their range, but there are no studies documenting interspecific interactions. Are there other fishless ponds in the area near the ESGR with similar populations? Obviously, aside from documenting the existence of the species within the state, there are many questions to be explored.

ACKNOWLEDGMENTS

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