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OCCURRENCE OF TWO SPECIES OF OLD WORLD BEES, ANTHIDIUM MANICATUM AND A. OBLONGATUM (APOIDEA: MEGACHILIDAE), IN NORTHERN OHIO AND SOUTHERN MICHIGAN

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ABSTRACT

Anthidium manicatum and *A. oblongatum* are two European bees species that have recently established themselves in North America. *Anthidium manicatum* has previously been documented in New York and Ontario, Canada, and *A. oblongatum* has been documented in New York, New Jersey, Maryland, and eastern Pennsylvania. We surveyed a number of sites in Ohio, Michigan, and Indiana for these species in 2000 and 2001, and found both bee species to have extended their ranges into northern Ohio, and *A. manicatum* to have moved into southern Michigan. We present a key identifying the four *Anthidium* species now known from northeastern North America.

A recent report estimates that approximately 4,500 species of non-indigenous organisms ("exotics") are now established in the United States (U.S. Congress 1993). Insects, including several bees, make up a significant part of this total (U.S. Congress 1993, Ascher 2001). The potential impacts of some of these exotic bees on native bees, and on the wild and cultivated plants that depend on native bees for pollination, may be cause for concern (Buchmann and Nabhan 1996). As part of an effort to track the movements and distribution of nonindigenous species, we report here the first occurrence in Ohio and Michigan of two Old World bees, *Anthidium (Anthidium) manicatum* (L.) and *A. (Proanthidium) oblongatum* (Illiger) (Megachilidae, Anthidiini).

The Wool-Carder Bee (*A. manicatum*), a robust hymenopteran native to Europe, is renowned for its highly aggressive territorial behavior of the males (Severinghaus et al. 1981, Wirtz et al. 1988, Starks and Reeve 1999). This cavity-nesting bee was introduced to New York State sometime before 1963 (Jaycox 1967), and by 1990 had spread to Ontario, Canada (Smith 1991). This species has also invaded various other locales outside its native range, including Brazil, Argentina, Uruguay, and the Canary Islands (Hoebeke and Wheeler 1999).

We first collected *A. manicatum* in the Akron, Ohio area (Summit County) in 1996, and in the following years noticed that this species was common in many urban and suburban gardens near Akron. Therefore, during summer 2000 and 2001 we searched and collected throughout northern Ohio and adjacent areas in Michigan and Indiana (June - September) to better understand the current distribution of this invader. We chose collecting sites based on convenience, access and permission, and on presence of known or suspected food plants (primarily Lamiaceae). We spent at least two hours at each site, and visited many sites multiple times on separate days. Voucher specimens are deposited at the Entomology collection, University of Akron, and at the Enns Entomological Museum, University of Missouri - Columbia. We found *A. manicatum* to be common in urban and rural gardens throughout northern Ohio and at one site in southern Michigan (Table 1), but we did not find it in any of the several parks and natural areas we studied. Notably, we were unable to find any *A. manicatum* at our original 1996

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Table 1. Results of search for *Anthidium* spp. in northern Ohio and adjacent areas, 1997-2001. UR (urban residential), UP (urban park), RR (rural residential), and RP (rural park).

State	County	Place	Habitat	Coordinates	*Anthidium* sp. present	Number Collected	Date	Plants visited
OH	Sandusky	Ballville	RR Garden	N 41.31806 W 83.14910	***A. manicatum***	1	6/30/2000	*Stachys byzantina*
OH	Sandusky	Fremont	UR Garden	N 41.34890 W 83.09548	***A. manicatum***	3	6/23/2000	*Stachys byzantina*
OH	Sandusky	Green Springs	UR Garden	N 41.25949 W 83.04696	***A. manicatum***	1	7/29/2001	*Stachys byzantina*
OH	Seneca	Clyde	RR Garden	N 41.22653 W 83.02554	***A. manicatum***	6	6/30/2000 7/7/2000 7/15/2000	*Stachys byzantina*
OH	Summit	Franklin Twp	UR Garden	N 40. 93040 W 81.54272	***A. manicatum,***	3	7/23/2000 8/4/2000	*Senecio cineraria*
					A. oblongatum	2	7/28/2000	
OH	Summit	University of Akron, Akron	UP Garden	N 41.07679 W 81.51106	***A. manicatum***	6	8/5/1998 8/13/1998 8/19/1998 8/26/1998	*Perovskia atriplicifolia*
OH	Summit	West Akron	UR Garden	N 41.06646 W 81.32030	***A. manicatum***	4	7/3/1997 6/28/2000	*Stachys byzantina,* *Penstemon digitalis*
OH	Summit	Bath Township	Wild Park	N 41.10551 W 81.38561	Absent			
OH	Summit	Boston Mills Site 1	Wild Park	N 41.25580 W 81.53907	Absent			
OH	Summit	Boston Mills Site 2	Wild Park	N 41.25927 W 81.52192	Absent			
OH	Summit	Boston Mills Site 3	Wild Park	N 41.25758 W 81.54059	Absent			
OH	Summit	Boston Mills Site 4	Wild Park	N 41.25580 W 81.53907	Absent			
OH	Summit	Boss Park, Akron	UP Garden	N 41.06834 W 81.51503	Absent			
OH	Lucas	Toledo	UR Garden	N 41.89850 W 83.22721	***A. manicatum***	1	7/27/2001	*Stachys byzantina* *Origanum heracleoti-cum*
IN	LaGrange	Shipshewana	UR Garden	N 41.67851 W 85.57952	Absent			
MI	Lenawee	Tipton	Rural Garden	N 42.02927 W 84.11032	***A. manicatum***	1	7/28/2001	*Stachys byzantina*

collection site (Boston Mills Site 1 in Table 1). We did not find *A. manicatum* at our one Indiana site, perhaps indicating the edge of the range expansion to date.

In agreement with other published reports (Severinghaus et al. 1981), we often found *A. manicatum* females associated with plants with downy leaf pubescence, such as cultivated *Stachys byzantina* K. Koch ex Scheele (Lamb's Ears, Lamiaceae). Female bees use trichomes from this plant as nest-building material (Smith 1991). We most commonly observed *A. manicatum* visiting flowers and leaves of Lamb's Ears, and occasionally flowers of *Penstemon digitalis* Nutt. ex Sims**.** (Foxglove Beardtongue, Scrophulariaceae) and *Perovskia atriplicifolia* Benth. (Russian Sage, Lamiaceae) and leaves of *Senecio cineraria* DC. (Dusty Miller, Asteraceae).

Both male and female *A. manicatum* were very abundant wherever we found them; several individuals were often visible at once. Males defended territories near floral resources at all sites (see also Starks and Reeve 1999), and we frequently observed them aggressively defend these territories against other bee species, including honey bees (*Apis mellifera* (L.)) and bumble bees (*Bombus* spp.). Many male *Anthidium* species have prominent spines on the apical margin of tergum 7 which they use in territorial defense, in the case of *A. manicatum* often killing or disabling honey bees and other bee species (Wirtz et al. 1988, Starks and Reeve 1999).

A second species of Old World *Anthidium*, *A. oblongatum*, was discovered in North America (eastern Pennsylvania) in 1995, and has since been found in several other eastern states (New York, New Jersey, and Maryland) (Hoebeke and Wheeler 1999). We only collected this species at the Franklin Township site (Summit County). Here females were gathering trichomes from Dusty Miller (*Senecio cineraria*), in the same areas where we also caught *A. manicatum*. We also found a single specimen of *A. oblongatum* in the University of Akron student Entomology collection, from southern Stark County (Massillon; collected in 1999).

These new records extend the US ranges of *A. manicatum* and *A. oblongatum* into the upper midwest, where they have not been previously reported (Hoebeke and Wheeler 1999). It seems possible that one or both of these "hitchhiking" species may be established in areas further west, such as Chicago and Indianapolis. Bee surveys in these and other urban areas are needed. Casual examinations of likely sites in southern Wisconsin and St. Louis, Missouri, however, have not revealed either species (RJM and MSA, personal observations).

Continued spread of these two adventive species, which seems likely, will bring them into the ranges of some of our native *Anthidium*. Most North American *Anthidium* occur in the western states, but two native species are known from parts of the northeastern quarter of North America (Hurd 1979). *Anthidium (Anthidium) psoraleae* Robertson, primarily an oligolege of Fabaceae found in central US prairies and prairie-like areas, occurs as far east as southwestern Michigan in remnant prairie communities (M. Arduser, unpublished data). *Anthidium (A.) maculifrons* Smith, also an apparent oligolege of Fabaceae, is a species of the southern US, but has been found as far north as southern Illinois (although not recently; John Marlin, in litt.), and in southern Missouri (M. Arduser, unpublished data). Both native species seem dependent on natural communities and native plants, and are unlikely to be found in disturbed sites, urban areas, or manicured gardens of non-native plants, habitats apparently favored by the two adventive species (Hoebeke and Wheeler 1999, this study).

As a guide to the identification of the four species of *Anthidium* now known from the northeastern quarter of North America, we offer the following key [detailed descriptions and illustrations of the two native species (*Anthidium psoraleae* and *A. maculifrons*) can be found in Mitchell (1962), of *A. oblongatum* in Hoebeke and Wheeler (1999); Jaycox (1967) provides brief descriptive notes on *A. manicatum*].

Key to *Anthidium* species in northeastern North America:

1. Females (scopa and sting present) 2
   Males (scopa and sting absent) 5
2. (Females): posterior margin of tergum 6 with a conspicuous projection medially, laterally with flattened, triangular teeth (one on each side) ..... *psoraleae* Robertson
   Posterior margin of tergum 6 rounded, without conspicuous projections (though very small teeth or denticles may be present laterally) 3
3. Pronotal lobe divided by a thin, raised plate (lamella) into dorsal and anterior halves; basal mandibular tooth noticeably larger than apical mandibular tooth ..... *oblongatum* (Illiger)
   Pronotal lobe rounded, not divided by a lamella; basal mandibular tooth similar in size to apical tooth 4
4. Clypeal margin convex and denticulate in dorsal view, produced slightly beyond lower ends of eyes; hairs on surface of clypeus (@ 60x) dense and hooked apically ..... *manicatum* (L.)
   Clypeal margin essentially truncate (margin somewhat thickened, with irregular crenulations), not produced beyond lower ends of eyes; hairs on surface of clypeus dense but straight throughout, not hooked or bent apically ..... *maculifrons* Smith
5. (Males): posterior margin of tergum 7 bi-lobed, without a median spine; posterior margin of tergum 6 with a small pointed projection medially ..... *oblongatum* (Illiger)
   Posterior margin of tergum 7 with a distinct spine between the two lateral lobes; posterior margin of tergum 6 entire, without a projection medially 6
6. Lateral margins of tergites 1-5 with conspicuous curly hair tufts, brown to pale brown in color, to some extent obscuring integument; clypeal margin apically with a pair of small teeth lateral to midline, best seen in oblique lateral view. ..... *manicatum* (L.)
   Lateral margins of tergites 1-5 without conspicuous curly hair tufts; clypeal margin apically simple, without small teeth 7
7. Scape wholly maculated with yellow or whitish-yellow; tergum 6 punctures separated by 1-3 puncture widths; mandibles robust, all three teeth similar in size ..... *maculifrons* Smith
   Scape wholly dark; tergum 6 punctures fine, dense, many contiguous or nearly so; mandibles slender, tapering, basal tooth larger than other teeth ..... *psoraleae* Robertson

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