

NOTE

*Andrena macra* Mitchell (Hymenoptera: Andrenidae)  
Overwinter and Delay Spring Emergence in Virginia

*Andrena macra* Mitchell are known from West Virginia and Maryland southward to Florida, and westward to Texas and Oklahoma (LaBerge 1985. Trans. Amer. Entomol. Soc. 112(3): 191-248). The only biological investigation of this species was done by Sivik (1954. Entomol. News 65(10): 253-256), where he witnessed the emergence of adults, and determined the distribution of nests in a site near East Raleigh, North Carolina. The purpose of this note is to present some unusual observations on the life cycle of this solitary, soil-nesting bee.

The nesting site observed in this study was adjacent to a graveled off-road on the United States Marine Corps Reservation in Quantico, Virginia. *Andrena macra* nests were excavated so that the overwintering brood of this bee could be observed. Excavations were conducted on the following days of each month: 15, 17, 19, 31 March 1984; 7, 12, 26 April 1984; and 2, 10, 11 May 1984. Brood were removed from the nests with a microspatula and placed, individually, inside 4-dram glass shell vials. The numbers of live *A. macra* found on daily excavations beneath the surface of this site during Winter and Spring 1984 are listed in Table 1. A total of 59 overwintering prepupae were kept in the laboratory at room temperature (24-27 degrees Celsius), inside the shell vials, to see if and when they would complete their development to the mature adult stage. Eleven were reared successfully (Table 2). Prepupae required  $78 \pm 8.4$  days (mean and standard error) to metamorphose into pupae. These pupae required  $21 \pm 1.3$  days to metamorphose into mature adults.

*Andrena macra* overwintered in the prepupal and adult stages of development. Species of *Andrena* were previously known to

overwinter only as adults (Linsley 1958. Hilgardia 27(19): 543-599). Some of the overwintering *A. macra* also delayed spring emergence in 1984. The evidence in favor of delayed emergence is as follows: (1) prepupae were found inside nest brood cells on the same days that adults had emerged and were present on the surface of the nesting site, and (2) prepupae that were found in March and May completed their development to the mature adult stage near the end, or after the end, of the Spring 1984 nesting season (see Table 2). All adult nesting activities had ceased by mid-June 1984.

Delayed emergence has been reported for several species of *Andrena* distributed in the western United States. *Andrena mojaviensis* Linsley and MacSwain and *Andrena omninigra clarkiae* Linsley and MacSwain delayed spring emergence in California and these spring seasons were unfavorable for host flower blooming (Linsley et al. 1964. Univ. Calif. Publ. Entomol. 33(2): 59-98; MacSwain et al. 1973. Univ. Calif. Publ. Entomol. 70: 1-80). Thorp (1979. Ann. Mo. Bot. Gard. 66: 788-812) indicated that a species of *Andrena* delayed emergence dur-

Table 1. The numbers of live *Andrena macra* found in nest brood cells during daily excavations in 1984.

| Prepupae | Adults | Date Found |
|----------|--------|------------|
| 28       | 15     | 15 March   |
| 8        | 2      | 17 March   |
| 2        | 24     | 19 March   |
| 7        | —      | 31 March   |
| 1        | —      | 7 April    |
| —        | 2      | 12 April   |
| 10       | 4      | 26 April   |
| 8        | 2      | 2 May      |
| 5        | —      | 10 May     |
| 3        | 1      | 11 May     |



Table 2. Results of the rearing experiment in 1984.

| Date Found | *P-P | Date at Mature Adult Stage | Sex of Reared <i>Andrena macra</i> |
|------------|------|----------------------------|------------------------------------|
| 15 March   | 40   | 4 June                     | F                                  |
| 15 March   | 49   | 6 June                     | M                                  |
| 15 March   | 51   | 13 June                    | M                                  |
| 15 March   | 51   | 18 June                    | M                                  |
| 15 March   | 70   | 8 July                     | M                                  |
| 15 March   | 83   | 15 July                    | M                                  |
| 15 March   | 83   | 17 July                    | F                                  |
| 31 March   | 126  | 30 August                  | F                                  |
| 2 May      | 95   | 27 August                  | M                                  |
| 2 May      | 98   | 29 August                  | M                                  |
| 10 May     | 109  | 23 September               | F                                  |

\* P-P = number of days required for prepupae to metamorphose into pupae.

F = female; M = male.

ing the time that a drought occurred in California.

Delaying spring emergence in the eastern United States may insure survival for *A. macra* especially when they nest in dense

aggregations. Female *A. macra* of large nesting sites may have to rely on limited sources of pollen and nectar to provision their nest brood cells with, each spring season. Emergence of the individuals of a population in two years, instead of one, will prevent the depletion of floral resources.

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Eric W. Riddick, *Department of Zoology, Howard University, Washington, D.C. 20059. Present address: Department of Entomological Sciences, University of California-Berkeley, Berkeley, California 94720.*



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