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LATE WINTER FORAGING BY HONEYBEES (HYMENOPTERA: APIDAE) AT SAPSUCKER DRILL HOLES

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ABSTRACT

Observations of *Apis mellifera* foraging at sapsucker drill holes were made during February 1988 in southwestern Virginia. Foraging bouts were dependent upon temperature; more bees visited drill holes when ambient temperatures exceeded 10°C. Honeybees did not feed directly at drill holes but collected congealed sap from bark surfaces.

The yellow-bellied sapsucker, *Sphyrapicus varius*, feeds in part upon sap procured from holes it drills into tree trunks. Sap-rich drill holes also provide a food resource for other birds, mammals, and insects (Batts 1953, Kilham 1953, 1958, Nickell 1965, Foster and Tate 1966, Southwick and Southwick 1980). Through their drilling activities, sapsuckers furnish access to a supply of carbohydrate often unavailable from alternate sources, particularly in late winter and early spring when floral nectar is virtually nonexistent (Southwick and Southwick 1980).

Insects of various orders have been observed feeding at sapsucker drill holes. Most insect observations, however, are made in summer when alternate carbohydrate sources are abundant and ambient temperatures are high (Nickell 1965, Foster and Tate 1966). This note reports observations of late winter foraging by honeybees, *Apis mellifera* L., at sapsucker drill holes in southwestern Virginia, the first published record of honeybees foraging at sapsucker drills during any season. Daily visitation patterns of honeybee workers at drill holes, and ambient temperatures during foraging periods, are described. Observations of winter foraging by honeybees are rare; energetic constraints and low nectar availability greatly restrict honeybee foraging during winter months (Heinrich 1979, Seeley 1985).

MATERIALS AND METHODS

The study was conducted in Blacksburg, Montgomery County, Virginia during February 1988. The focus of honeybee foraging observations was a multi-trunked sugar maple (*Acer saccharum*) having four trunks ranging in size from 11.8 to 33.7 cm dbh. They were the only tree trunks in a wooded corridor that were extensively drilled by sapsuckers. Drill holes were confined to the southward (170° S of N) face of the tree and were distributed from 1 to 10 m above ground level. Observations of foraging honeybees were restricted to a 2 m vertical section of the tree trunks extending upward from the ground, where the majority of drill holes occurred.

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Honeybees foraged almost exclusively within this height range during observation periods.

To determine visitation patterns of honeybees at drill holes, I conducted counts of foraging workers on 22, 28, and 29 February, from 1100 to 1700 h. At 15 minute intervals, I counted all actively foraging workers on each tree trunk. Counts were typically completed in 30 sec or less and were conducted within 1 m of the tree. Ambient temperature was recorded immediately after each bee count with a Wexler bimetal thermometer suspended 30 cm from the tree surface. Attempts were also made to conduct bee counts from 23 to 27 February but freezing temperatures, high winds, and (or) rain provided no opportunity for honeybees to forage on these days.

I collected samples of tree sap at hourly intervals from 1200 to 1600 h on 22 February to obtain an estimate of sap sugar content. Sap flow was extremely variable among drill holes so samples were pooled from several actively flowing drills. Sap was collected with clean eyedroppers, placed into small glass vials, and immediately frozen. Sugar content (sucrose is the predominant sap constituent in woody plants [Bidwell 1979]) was determined for subsamples of each hourly collection with a handheld, temperature-compensated refractometer (Reichert model 10431). Sap sugar concentrations are presented in °Brix (g solute per 100 g solution), as suggested by Bolton et al. (1979).

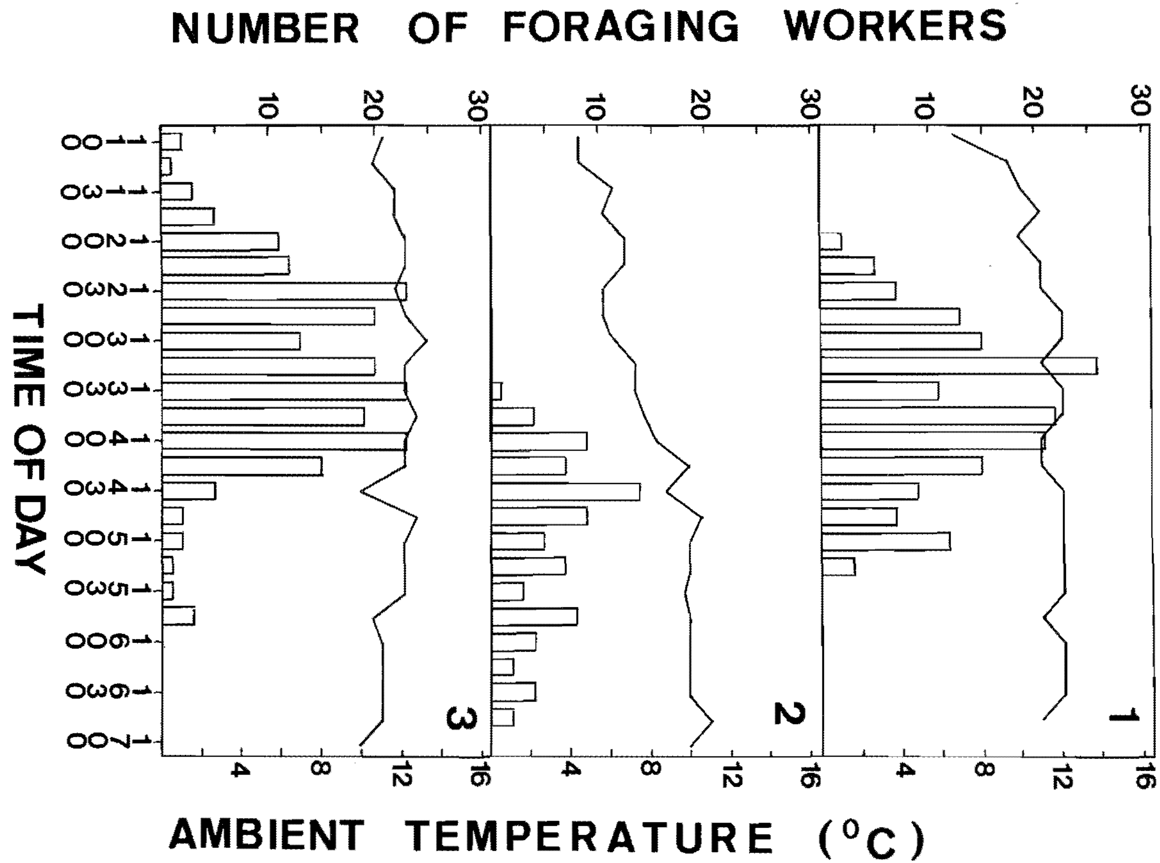
RESULTS AND DISCUSSION

Temperature and visitation patterns: Mean ambient temperatures differed among observation dates. The lowest mean temperature was recorded on 28 Feb. ($\bar{X}$ = 8.2 ± 0.4°C SE) whereas temperature means for 22 Feb. ($\bar{X}$ = 11.3 ± 0.3°C SE) and 29 Feb. ($\bar{X}$ = 11.7 ± 0.2°C SE) were similar. Temperatures generally increased during observation periods (Figs. 1–3), and on all three dates, clear weather prevailed and insolation was high.

Visitation patterns of honeybees were noticeably influenced by temperature during the study. On 28 Feb., when the mean ambient temperature was 8.2°C, the mean number of bees foraging at drill holes ($\bar{X}$ = 3.2 ± 0.8 SE) was less than half that observed on either 22 Feb. ($\bar{X}$ = 6.7 ± 1.6 SE) or 29 Feb. ($\bar{X}$ = 8.2 ± 1.8 SE), when mean temperatures exceeded 10°C (Figs. 1–3). Foraging duration (the total length of time in hours that bees were observed foraging at drill holes), similar for 22 and 28 Feb. (3.2 hours), was greater by 1.3 hours on 29 Feb. The shift in foraging activity toward the later, warmer part of the day on 28 Feb. illustrates the potential role of temperature in regulating winter foraging activity. Heinrich (1979) also observed decreased honeybee activity at 9°C, even during copious *Eucalyptus* nectar flows.

Observations suggest that honeybees may receive thermal benefit from the tree trunks on which they forage. The southward face of the drilled sugar maple received high insolation for most of the day; thus honeybees probably gained heat from solar radiation and from the warmed tree surface. Bees were often observed on trunks receiving greater amounts of insolation during cooler portions of the day.

Sap sugar content and foraging behavior: Sugar concentrations of sugar maple sap collected from drill holes were considerably variable for a single source (4.5–28.5 °Brix, n = 38 samples). The lowest sugar concentrations were similar to those previously reported for sugar maple sap (2–3% sugar [Zimmerman and Brown 1980]). Honeybees, however, did not forage directly on sap at drill holes; rather, they usually foraged on congealing sap that had collected in furrows of bark below the drills. By virtue of evaporation, the actual sugar content of sap that bees foraged upon was probably much higher than that escaping from drill holes (sugar content of congealed sap was not determined as adequate bark-free quantities could not be collected). An alternate nectar source, a patch of flowering purple dead-nettle



Figures 1–3. Number of foraging honeybees and ambient temperature recorded from 1100 to 1700 h on each of three dates: (1) 22 February, (2) 28 February, (3) 29 February 1988. Open bars = number of honeybees, solid lines = temperature.

(*Lamium purpureum*), occurred near the observation tree (ca. 20 m distant), but no honeybees were observed visiting flowers during sap flows.

In summary, sapsucker drill holes offer a unique carbohydrate source for overwintering honeybees. Use of this resource is, however, subject to the vagaries of the winter climate. Conditions favorable for winter foraging by honeybees, particularly ambient temperatures above 10°C (Heinrich 1979, Seeley 1985), may occur on few winter days depending on the region. When environmental conditions permit, active drill holes can provide a dependable food resource for overwintering honeybees.

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LITERATURE CITED

Batts, H. L. 1953. Siskin and goldfinch feeding at sapsucker tree. Wilson Bull. 65:198.

Bidwell, R. G. S. 1979. Plant physiology. 2nd. ed. MacMillan Publ. Co., Inc. New York, NY.

Bolton, A. B., P. Feinsinger, H. G. Baker and I. Baker. 1979. On the calculation of sugar concentration in flower nectar. Oecologia 41:301–304.

Foster, W. L. and J. Tate. 1966. The activities and coactions of animals at sapsucker trees. Living Bird 5:87–113.

Heinrich, B. 1979. Thermoregulation of African and European honeybees during foraging, attack, and hive exits and returns. J. Exp. Biol. 80:217–229.

Kilham, L. 1953. Warblers, hummingbird, and sapsucker feeding on sap of yellow birch. Wilson Bull. 65:198.

Kilham, L. 1958. Red squirrels feeding at sapsucker holes. J. Mamm. 39:596–597.

Nickell, W. P. 1965. Birds and insects feed at sapsucker trees. Bird-Banding 36:192.

Seeley, T. D. 1985. Honeybee ecology. Princeton Univ. Press. Princeton, NJ.

Southwick, E. E. and A. K. Southwick. 1980. Energetics of feeding on tree sap by ruby-throated hummingbirds in Michigan. Am. Midl. Nat. 104:328–334.

Zimmerman, M. H. and C. L. Brown. 1980. Trees: structure and function. Springer-Verlag. New York, NY.

