

DRONE BEES SELECTED BY BIRDS

By CHAPMAN GRANT

I have kept a hive of bees on my garage roof in San Diego, California, for three years. Mockingbirds (*Mimus polyglottos*) and Black Phoebes (*Sayornis nigricans*) have lived in the garden and raised their families during this period without molesting the bees. This year I noticed the Mockingbirds standing on the roof and springing into the air to capture bees which they would pound on the roof and finally swallow. A little later on they were carrying away many bees and later still they brought two young and fed them from the roof a few feet from the entrance of the hive. In early July one of the Black Phoebes brought her three grown young and fed them regularly on bees. She would swoop near the hive, snap a bee in midair, and fly to a cornice where she pounded the bee a little and then crammed it down the throat of her ravenous young. This performance took place after the young Mockingbirds had left, but the adult Mockingbirds continued their depredations.

These observations were new to me and accordingly they were related to Mr. Clinton G. Abbott and Mr. Lawrence M. Huey of the San Diego Society of Natural History. Neither had ever heard of Mockingbirds eating bees. Further investigation led me to Mr. Geo. B. Wright, apiarist and for many years a dealer in bee supplies in San Diego. He stated that he had seen Mockingbirds eat bees and had had reports that California Jays (*Aphelocoma californica*) also ate them.

Mr. Fred Hanson, for 27 years bee inspector of San Diego County, stated that he had known that Mockingbirds and Cliff Swallows (*Petrochelidon albifrons*) ate bees. He recalled that only that morning he had inspected 60 stands of bees at the home of Mrs. Ted Hopkins at Ocean Beach, San Diego, and that a flock of swallows was feeding on her bees. I asked Mr. Hanson how it was possible for a tender-mouthed swallow to feed on stinging bees. He replied that possibly they might be feeding on drones and that, contrary to common belief, drones fly about.

I immediately went to Ocean Beach and found a few swallows hawking around the apiary. The next day Mr. L. M. Huey accompanied me. There were probably thirty swallows circling around. We observed them catching the bees, and they always flew immediately thereafter in the same direction, carrying their catch protruding from the mouth. We also noted bees following swallows for short distances. It seemed strange to me that birds as expert as swallows should do so much circling through the flying bees before making a capture. This fact recalled Mr. Hanson's statement that the swallows might be selecting drones from among the multitude of flying workers.

The following day Mr. Huey and I again visited the apiary and saw numerous swallows. Mr. Huey collected seven adults. One had a bee in its mouth, but dropped it when shot and we were unable to locate the bee. We followed the line of flight and found the colony nesting under the eaves of the stucco home of Mrs. I. W. Parks about five city blocks from the apiary. There, we collected 12 young from 3 of the 12 nests. The young were well feathered but still unable to fly. Mrs. Parks had intended to destroy the nests after the young departed because of the vermin with which the nests and birds were infested. The nests were alive with Barn Swallow bugs (*Oeciacus vicarius*) and fleas (*Ceratophyllus gallinulae*) which Mr. Charles Harbison obligingly identified. Mr. Huey found the adults covered with the fleas, which adhered to the host. The trash in the nests contained wriggling flea larvae.

Mrs. Hopkins told us that a Black Phoebe had been in the habit of eating bees, sometimes as many as ten in rapid succession. We saw Mockingbirds eating bees at her apiary, but did not see the phoebe feeding.

Mr. Charles Harbison identified the stomach contents of the 7 adult and 12 young swallows. In the 7 adults he found three drones. Mr. Huey had already removed one drone from the throat of a specimen he prepared. Thus the 7 adults contained 4 drones. One specimen contained a rose-weevil (*Pantomorus godmani*) as identified by Mr. Harbison. "Adults of this beetle do not fly and may be kept off trees by cotton or tanglefoot around the trunks" (Essig and Hoskins, Univ. Calif. Agr. Ext. Service, Circular 87, 1934:42). How then did the swallow capture the rose-weevil? The stomach contents of the 12 young included 12 drones. Five specimens contained one each; two had two each; one had three and three had contents so far digested that identification was not made. The identifications were all from complete drone heads. No part of a worker bee was found. This finding apparently gives the Cliff Swallow a clean bill of health with the apiarist. As to the Mockingbird it would be interesting to determine the class of bee it eats, but inasmuch as it beats them before swallowing I believe that workers as well as drones may be taken.

Mr. Ed. Harrison of Encinitas, California, informs me that from his personal observation he knows that the Cassin Kingbird (*Tyrannus vociferans*), Western Kingbird (*Tyrannus verticalis*), Black Phoebe, and Western Wood Pewee (*Myiochanes richardsonii*) eat bees.

When I was a small boy at my present home in San Diego, there was a large eucalyptus tree in the yard. A pair of Western Kingbirds, "bee martins" to us, nested in this tree. Bees were attracted by the flowers of the tree. Underneath the tree there was almost always to be seen the heads and thoraces, still living and buzzing, of honey bees. I could hear the kingbirds snap their bills, but cannot say that I ever actually saw them snip the abdomen from a bee. I am certain, however, that the mutilated bees under the tree were due to the predation of the bee martins. I feel it safe to assume that flycatchers can handle stinging bees without being hurt, but that birds that catch their prey with the mouth instead of the bill must select stingless drones.

Under date of June 23, 1945, Dr. Alexander Wetmore kindly furnished this observation: "In June, 1911, at Lares, Puerto Rico, Señor Linares, who had a small apiary, reported to me that birds were very active among his bees. I spent parts of two days studying this matter and found that the principal species attracted was the Gray Kingbird, *Tyrannus dominicensis*. I shot a number at this apiary and found domestic bees of the worker group in the stomach of all of them. While some other species were suspected, namely another large flycatcher, *Tolmarchus taylori*, I did not find that they were troubling the bees. The kingbirds were definitely taking workers and not drones by actual stomach examination."

The list of the United States Fish and Wildlife Service of birds that are known to eat bees shows that our observations on the Black Phoebe are unrecorded. The U.S.D.A. Farmer's Bulletin No. 630, revised, 1926, states on pages 23 and 24 that kingbirds eat a great majority of drones. Six hundred and sixty-five stomachs of the Eastern Kingbird (*Tyrannus tyrannus*) were examined and 22 contained 61 honey bees of which 51 were drones and 8 workers; 62 stomachs of the Western Kingbird contained 30 honey bees of which 29 were drones and one a worker. This discrimination makes me believe that a phoebe also probably selects drones, but there is no observational evidence of selection as there was among the swallows. I never saw kingbirds appear to select.

Following is a complete list of birds which are known to eat bees as compiled from the files of the U. S. Fish and Wildlife Service and kindly furnished by Mr. A. L. Nelson, Assistant Chief, Division of Wildlife Research.

		Number of stom- achs in which bees were found	Range of num- ber of bees in stomachs
<i>Colymbus grisegena</i>	Red-necked Grebe	2	1
<i>Colymbus auritus</i>	Horned Grebe	5	1-6
<i>Butorides virescens</i>	Green Heron	1	1
<i>Buteo lineatus</i>	Red-shouldered Hawk	1	2
<i>Bonasa umbellus</i>	Ruffed Grouse	2	1
<i>Plasianus colchicus</i>	Ring-necked Pheasant	3	1
<i>Fulica americana</i>	American Coot	1	1
<i>Squatarola squatarola</i>	Black-bellied Plover	5	1-3
<i>Arenaria interpres</i>	Ruddy Turnstone	1	1
<i>Larus philadelphia</i>	Bonaparte Gull	1	1
<i>Geococcyx californianus</i>	California Road-runner	6	1-10
<i>Melanerpes erythrocephalus</i>	Red-headed Woodpecker	1	1
<i>Asyndesmus lewis</i>	Lewis Woodpecker	1	1
<i>Tyrannus tyrannus</i>	Eastern Kingbird	27	1-7
<i>Tyrannus verticalis</i>	Western Kingbird	6	1-12
<i>Myiarchus crinitus</i>	Crested Flycatcher	1	1
<i>Myiochanes virens</i>	Eastern Wood Pewee	2	1
<i>Nuttallornis borealis</i>	Olive-sided Flycatcher	16	1-10
<i>Hirundo erythrogaster</i>	Barn Swallow	1	1
<i>Petrochelidon albifrons</i>	Cliff Swallow	13	1-6
<i>Progne subis</i>	Purple Martin	5	1-3
<i>Cyanocitta stelleri</i>	Steller Jay	3	1
<i>Aphelocoma californica</i>	California Jay	11	1-6
<i>Pica pica</i>	Black-billed Magpie	2	1
<i>Corvus brachyrhynchos</i>	American Crow	4	1-2
<i>Heleodytes brunneicapillus</i>	Cactus Wren	1	3
<i>Mimus polyglottos</i>	Mockingbird	4	1
<i>Dumetella carolinensis</i>	Catbird	1	1
<i>Toxostoma rufum</i>	Brown Thrasher	1	1
<i>Toxostoma redivivum</i>	California Thrasher	1	2
<i>Turdus migratorius</i>	Robin	2	1
<i>Sialia sialis</i>	Eastern Bluebird	1	1
<i>Vireo belli</i>	Bell Vireo	1	1
<i>Vireo olivaceus</i>	Red-eyed Vireo	1	1
<i>Piranga erythromelas</i>	Scarlet Tanager	5	1-12
<i>Hedymeles melanocephalus</i>	Black-headed Grosbeak	1	1
<i>Zonotrichia coronata</i>	Golden-crowned Sparrow	1	2

San Diego, California, July 16, 1945.