GENERAL NOTES

Insecticide residues in Little Blue Herons.—Breeding colonies of Little Blue Herons (*Florida caerulea*) have recently become established in shortleaf pine (*Pinus echinata*) plantations in southeast Missouri. Chlorinated hydrocarbon insecticides that have been used in the area include DDT, toxaphene, aldrin, dieldrin, and heptachlor. DDT has been used in southeast Missouri since approximately 1949. In recent years, it has been applied in May and June for the control of the corn borer (*Ostrinia nubilalis*) and, in combination with toxaphene and an organophosphate insecticide, for the control of the cotton bollworm (*Heliothis zea*) and armyworm (*Pseudaletia unipuncta*) in September. DDT has also been used for fly control on beef cattle. Aldrin has been used to control corn cutworms (Family Noctuidae) and dieldrin has been used primarily around buildings for the control of termites (*Reticulitermes flavipes*). Heptachlor has been used as a soil insecticide for the control of the corn rootworm (*Diabrotica* spp.).

Eggs, nestlings, and adults of Little Blue Herons were collected from heronries located in Scott and Mississippi counties in May, June, and July, 1967, and in May and June, 1968. The samples were analyzed for residues of chlorinated hydrocarbon insecticides (DDT, aldrin/dieldrin, and heptachlor) at the Wildlife-Pesticides Laboratory, Illinois Natural History Survey, Urbana. We were unable to analyze for residues of toxaphene because of limitations of time and of column sensitivity. Residues were extracted from tissue samples with a 1:1 mixture of acetonitrile and hexane. Florisil columns were used for cleanup. Egg contents were prepared by saponification in alcoholic potassium hydroxide and by acetonitrile partitioning (Burchfield, Johnson, and Storrs, Guide to the analysis of pesticide residues, Vol. 1, U.S. Public Health Service, Office of Pesticides, 1965). All specimens were analyzed with a Beckman model GC-4 gas chromatograph equipped with an electron capture detector. Columns were packed with 1 percent Shell EPON resin 1001 and 0.5 percent DuPont Viton A fluoroelastomer on a solid support of 100/120 mesh Varian Aerograph Chromosorb W. The lower limit of detection was considered to be 0.01 ppm.

Results of the analyses (Table 1) indicated that the herons were contaminated with higher levels of DDT residues than with those of aldrin/dieldrin or of heptachlor. *p,p'*-DDE was detected in all specimens that were analyzed individually. Maximum levels of *p,p'*-DDE in egg contents were 1.34 ppm in 1967 and 2.67 ppm in 1968. Eggs contained significantly lower levels of *p,p'*-DDE in 1967 than in 1968. Maximum levels of *p,p'*-DDE in breast muscle and in brain tissue of adult herons collected in 1967 were 5.56 ppm and 2.09 ppm, respectively. Adults appeared to have significantly higher levels of *p,p'*-DDE than did nestlings.

Dieldrin was detected in 9 of 18 eggs collected in 1967 and in 2 of 10 eggs collected the following year. Maximum levels were 0.45 ppm in 1967 and 0.47 ppm in 1968. In adult herons collected in 1967, dieldrin was detected in 6 of 11 breast muscles and in 9 of 14 brains. Maximum levels were 0.21 ppm in the breast muscle and 1.06 ppm in the brain.

Heptachlor epoxide was found in 5 of 18 eggs collected in 1967. No heptachlor epoxide was found in the 10 eggs collected in 1968, despite the fact that heptachlor was used in the area that year. The maximum level in 1967 was 0.15 ppm heptachlor epoxide. In adult herons collected in 1967, heptachlor epoxide was detected in 2 of 11 breast muscle samples and in 2 of 14 brains. Maximum levels were 0.25 ppm in the

TABLE 1

LEVELS OF *p,p'*-DDE, DIELDRIN, AND HEPTACHLOR EPOXIDE IN LITTLE BLUE HERONS.

Sample	Number of Specimens	Concentrations (ppm wet weight)[a]		
		p,p'-DDE	Dieldrin	Heptachlor Epoxide
1967				
Egg contents	18	0.18±0.08	0.06±0.03	0.011±0.008
Range		d–1.34	c–0.45	c–0.15
Nestlings				
Breasts	19[b]	0.25	0.02	c
Brains	18[b]	0.04	0.01	c
Adults				
Breasts	11	1.10±0.49	0.05±0.02	0.024±0.023
Range		0.08–5.56	c–0.21	c–0.25
Brains	14	0.75±0.16	0.17±0.07	0.012±0.010
Range		d–2.09	c–1.06	c–0.14
1968				
Egg contents	10	0.71±0.24	0.07±0.05	c
Range		0.10–2.67	c–0.47	c–c
Nestlings				
Breasts	10[b]	0.12	0.01	c
Livers	10[b]	0.48	c	0.01
Adults				
Breasts	10[b]	0.37	c	0.09
Livers	10[b]	0.39	c	c

[a] Concentration given as mean ± standard error for specimens analyzed individually.
[b] Pooled specimens analyzed as a single sample.
c Not detected at 0.01 ppm.
d Detected at levels below 0.01 ppm.

breast muscle and 0.14 ppm heptachlor epoxide in the brain. Heptachlor epoxide levels in the breast muscle of adult herons appear to have been significantly higher in 1968 than in 1967.

The food of the Little Blue Heron consists of "Small fishes, frogs, lizards, snakes, turtles, crustaceans, spiders, and insects" (Palmer, Handbook of North American birds, Vol. 1, Yale University Press, p. 437, 1962). The adult herons feed in meadows, marshes, ponds, and sluggish streams within a few miles of their heronries. Analysis of a pooled food sample (mostly small crayfish plus a few minnows, earthworms, and some submergent aquatic vegetation), taken from the crops of nestlings in 1968, indicated 0.01 ppm *p,p'*-DDE. No other residues were detected. It seems likely that the DDT residues detected in the nestlings and in the eggs were due to ingestion of contaminated food and to subsequent concentration of residues in the parent females, with resultant passage of these residues at relatively high levels into the lipid-rich egg yolks.

There are no indications of a major change in the number of Little Blue Herons

nesting in the two southeast Missouri counties. Nest counts conducted during the first week in June, 1965 through 1969, include a high count of 4,759 nests in 1968, a low count of 3,887 nests in 1967, and an average of 4,218 nests for the five years. Although these counts include other species of herons, their total numbers are insignificant when compared with the number of Little Blue Herons.

Least Bittern (*Ixobrychus exilis*) eggs from southern Louisiana were reported to contain *p,p'*-DDE at levels ranging from 0.15 to 0.42 ppm (Causey and Graves, Wilson Bull., 81:340–341, 1969). These levels are similar to those we found in eggs of Little Blue Herons, which is not surprising since the food habits of the two species are similar.

We thank Glen C. Sanderson, William H. Elder, Helen C. Schultz, William L. Anderson, and Stanley L. Etter for reading this manuscript and offering helpful criticisms.—ROBERT E. GREENBERG, *Illinois Natural History Survey, Urbana, Illinois 61801,* AND PAUL L. HEYE, *Southeast Missouri State College, Cape Girardeau, Missouri 63701, 2 July 1970.*

Nesting record of Mexican Duck (*Anas diazi*) in Texas.—Aldrich and Baer (Wilson Bull., 82:63-73, 1970) have recently reported on the status and speciation of the Mexican Duck (*Anas diazi*). They state that though it has been found in the past along the Rio Grande near El Paso, there are no definite nesting records in Texas. On 18 June 1969, we observed an adult Mexican Duck with six small young along Ash Creek on the Babcock Ranch, 16 miles SSE of Alpine, Brewster County. This locality is approximately 60 miles north of the Rio Grande and 200 miles southeast of El Paso. The following day we saw two adults fly overhead in this vicinity, but did not see the young again.

The three adults were identified by their similarity to a female Mallard (*Anas platyrhynchos*), but differing in having conspicuously darker tails.

The area is primarily grassland with scattered ash trees (*Fraxinus* sp.) along the creek. The stream is perennial with flow during the wetter seasons, primarily late summer and fall. There was some flow at the time this observation was made and water depth was generally less than one-half meter.

On 27 May 1970, Ohlendorf saw an adult duck accompanied by three small young at a small lake 2 miles SW of Balmorhea, Reeves County. These may have been either Mallards or Mexican Ducks, as they could not be identified with certainty. Water here was less than one foot in depth, with some flow into irrigation ditches. Accompanied by Tony Mollhagen and Bill Mealy, Ohlendorf returned to this locality on 6 July 1970. A pair of Mexican Ducks was seen there. Their legs were more reddish than those of Mallards and their tails were darker.

Recent reports by local residents suggest that Mallards also breed in the Trans-Pecos area of Texas. We have ourselves observed paired Mallards throughout the summer.

Contribution No. TA 8495 of the Texas Agricultural Experiment Station.—HARRY M. OHLENDORF AND ROBERT F. PATTON, *Department of Wildlife Science, Texas A&M University, College Station, Texas 77843, 6 May 1970.*

Egg turning by an incubating Wood Duck.—Although it is generally known that birds turn their eggs during incubation, little is known about the actual process. Because of the difficulty in making direct observations of the turning of eggs by a