

infiltrate of mononuclear cells to a much more severe chronic inflammatory reaction consisting of tubular and glomerular necrosis with diffuse interstitial infiltrate of mononuclear cells and fibrosis (Fig. 1). Tissues from several green turtles had what appeared to be trematode eggs surrounded by discrete chronic granulomatous reactions consisting of epithelial cells, multinucleated giant cells, and mononuclear cells. These eggs were seen as oblong homogenous yellow capsules surrounding a central area of undifferentiated cells measuring  $43\ \mu\text{m}$  by  $34\ \mu\text{m}$  (Fig. 2). The eggs of other spirorchiids which occur in freshwater turtles are known to cause similar tissue damage (Goodchild and Dennis, 1967, *J. Parasitol.* 53:38–45; Halliman et al., 1971, *J. Parasitol.* 57:71–77).

Since these turtles had been in the same holding tank for the past 18 months, it was probable that they had acquired the flukes during this period, suggesting infected snails and (or) cercariae were entering the tank with the incoming seawater. The tank was examined for the presence of potential intermediate hosts. Three species of snails were found on the bottom of the tank and were identified as *Nodolittorina muricatus*, *Strombus gallus*, and *Diodora listeri*. Although several living representatives of these snails were placed in seawater in containers overnight, no cercariae emerged.

Representative specimens of the flukes have been deposited in the U.S. National Parasite Collection, Beltsville, Maryland (USNM Nos. 75099 and 75100) and in the Harold W. Manter Laboratory of Parasitology, University of Nebraska State Museum, Lincoln, Nebraska (No. 20909).

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### *Research Note*

## **Helminths of the Ring-Necked Pheasant, *Phasianus colchicus* (Gmelin) (Phasianidae), from the Texas Panhandle**

The ring-necked pheasant, *Phasianus colchicus* (Gmelin), was first established in the Texas Panhandle about 1940 (Jones and Felts, 1950, *Texas Game and Fish* 8:4–7). The first hunting season was established in 1958 (Guthery et al., 1980, *U.S. For. Serv. Gen. Tech. Rep.*, in press), and this species has since become a primary resident gamebird of the region. Because of the complete dearth of information on the helminth fauna from pheasants in the Southwest, the present study was initiated.

**Table 1. Helminths of pheasants from the Texas Panhandle.**

|                                   | Prevalence                    |     | Intensity |      |
|-----------------------------------|-------------------------------|-----|-----------|------|
|                                   | No. infected/<br>No. examined | %   | Range     | Mean |
| <i>Heterakis gallinarum</i>       | 3/78                          | 3.8 | 1-2       | 1.5  |
| <i>Oxyuris petrowi</i>            | 1/30                          | 3.3 | 2         | 2.0  |
| <i>Choanotaenea infundibulum</i>  | 3/78                          | 3.8 | 1         | 1.0  |
| <i>Echinoparyphium recurvatum</i> | 1/78                          | 1.3 | 1         | 1.0  |

Viscera of 78 specimens of *P. colchicus* were collected from hunter-killed cocks in Dallam, Castro, Hale, and Floyd counties, Texas, during December 1978. Heads of 30 specimens were also examined. Specimens were frozen, later necropsied, and examined for helminths. Nematodes were briefly fixed in glacial acetic acid, stored in a mixture of 70% ethyl alcohol with 5% glycerin, and examined in glycerin wet mounts. Cestodes and trematodes were stained in Celestine blue B and Semicohn's acetic carmine, respectively, and mounted in Canada balsam. Simpson's index of diversity (Holmes and Podesta, 1968, Can. J. Zool. 46:1193-1204) was computed to indicate the concentration of dominance of helminth faunas in this and previous studies. An index of similarity (Holmes and Podesta, 1968, loc. cit.) was used to compare helminth faunas of pheasants from different geographic regions. Representative specimens of helminth species recovered in this study are deposited in the Medical Zoology Collection, The Museum of Texas Tech University, TTUS-MZ Nos. 12931-12937, and in the USNM Helm. Coll., Nos. 75403-75405.

One trematode, one cestode, and two nematode species were recovered (Table 1). Seven of 78 (9%) birds examined were infected with helminths. No individual host harbored more than one helminth species and worm burdens were very light with not more than two parasite specimens in a single host. There were no new host records established for helminths recovered from pheasants in the Texas Panhandle.

The eyeworm, *Oxyuris petrowi* Skrjabin, 1929 from West Texas pheasants, quail, and prairie chickens has been previously documented (Pence and Sell, 1979, Proc. Helminthol. Soc. Wash. 46:146-149). Although McClure (1941, J. Wildl. Manage. 13:394-397) found a prevalence of at least 40% of Nebraska pheasants infected with this species, it appears to be more commonly a parasite of quail and prairie chickens in West Texas.

*Heterakis gallinarum* (Schrank, 1788) appears to be the most common helminth, in terms of both prevalence and intensity of infection, in the pheasant. It has been reported in this host from Illinois (Leigh, 1940, Ill. Nat. Hist. Surv. Bull. 21:185-194), Minnesota (Olsen, 1938, J. Parasitol. 24[suppl.]:24-25), New York (Cheatum, 1952, Disease and Parasite Investigations, Pitmann, Robertson Proj. 1-R, Suppl. E, N.Y. Conser. Dept. 75 pp.), South Dakota (Gilbertson and Huggins, 1964, J. Wildl. Manage. 28:543-546), Nebraska (Greiner, 1972, J. Wildl. Dis. 8:203-206), and Oregon (Morgan, 1939, A Survey of Internal Parasites of Poultry and Gamebirds in Oregon, M.S. Thesis, Oregon State University, Corvallis, 89 pp.).

The cestode *Choanotaenea infundibulum* (Bloch, 1779) is reported from pheas-

|       |          |              |          |           |              |
|-------|----------|--------------|----------|-----------|--------------|
|       |          |              |          | -         | Minnesota    |
|       |          |              | -        | 81        | New York     |
|       |          | -            | 85       | 93        | South Dakota |
|       | -        | 56           | 42       | 56        | Nebraska     |
| -     | 89       | 45           | 31       | 45        | Texas        |
| Texas | Nebraska | South Dakota | New York | Minnesota |              |

Figure 1. Trellis diagram of indexes of similarity of helminth faunas of pheasants from different regions in North America.

ants in Minnesota (Olsen, 1938, loc. cit.), South Dakota (Gilbertson and Huggins, 1964, loc. cit.), and Nebraska (Greiner, 1972, loc. cit.). This is the most frequently reported cestode from this host in North America.

*Echinoparyphium recurvatum* (Linstow, 1873) was recovered from pheasants in Minnesota (Olsen, 1938, loc. cit.) and Nebraska (Greiner, 1972, loc. cit.). This is normally a cecal fluke of chickens, ducks, and geese (Becklund, 1964, Am. J. Vet. Res. 25:1138–1416) and reported levels of infection in pheasants are very low.

Simpson's index was 0.28 indicating a low concentration of dominance of helminth species in pheasants from western Texas. In contrast, this index for pheasants from Minnesota, South Dakota, Nebraska, and New York was 0.67, 0.74, 0.48, and 0.95, respectively. The low concentration of dominance of particular helminth species in the Texas pheasants is probably a reflection of (1) the low frequency of occurrence and infection levels and (2) lower frequency of occurrence of *H. gallinarum* in this area in contrast to other regions.

Data from previous studies on the helminth faunas of pheasants in Minnesota, New York, Nebraska, and South Dakota and from the present study were used in a similarity index for comparing helminth faunas from different regions in North America. These indexes were arranged in a trellis diagram (Fig. 1). The highest values between compared areas were Minnesota with New York and South Dakota, South Dakota with New York, and Texas with Nebraska. High values for similarity indexes between the northern tier of states indicate similar helminth faunas, while corresponding low values between these states with Texas and Nebraska indicate variation in helminth composition in the more southern and western portions of this host's range. The high index of similarity between Texas and Nebraska pheasant helminth faunas represents a similar helminth composition, undoubtedly resulting in part from similarities in climate and topography of the two areas. A striking difference, however, in the helminth faunas of Texas and Nebraska as well as all other areas previously examined, is the much lower prevalence of worm burdens in Texas pheasants.

Previous studies in South Dakota (Gilbertson and Huggins, 1964, loc. cit.) and New York (Cheatum, 1952, loc. cit.) indicate adult pheasants are more frequently parasitized than juveniles. Although the incidence of *H. gallinarum* appears independent of season in these studies, *C. infundibulum* was conspicuously absent in South Dakota pheasants collected during winter. Although the influence of sex, age, and season could not be determined, the ring-necked pheasant from the Texas Panhandle appears to have a very low prevalence rate and worm burdens of helminths based on data from fall-harvested cocks. This helminth fauna has a low concentration of dominance and is most similar in composition to that of Nebraska pheasants. Consequently, helminth parasitism is regarded as having little if any effect on the morbidity or mortality of this gamebird in western Texas.

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### *Research Note*

## **New Records of Leeches (Annelida: Hirudinea) from the Shortnose Sturgeon (*Acipenser brevirostrum*) in the Connecticut River**

During a study on the biology of the shortnose sturgeon (*Acipenser brevirostrum*) in the Connecticut River carried out by the junior author, leeches removed from captured fish were retained for study. A review of the literature revealed a record of *Placobdella montifera* on the shovelnose sturgeon (*Scaphirhynchus platyrhynchus*) (Pearse, 1924, Trans. Wis. Acad. Sci. Arts Lett. 21:161-194) and *Piscicola geometra* occurring on the Asian sturgeon (*A. güldenstadtii*) (Dubinin, 1952, in Astakhova, 1974, J. Ichthyol. [USSR] 14:788-792). No leech records for *A. brevirostrum* have been published.

Sturgeon were sampled with gill nets for 28 months (April 1976 to July 1978) throughout the Connecticut River from Enfield (Hartford Co.), Connecticut, to Montague (Franklin Co.), Massachusetts. Twenty-three of 356 sturgeon examined