APPARENT OCULAR ANOMALIES IN AMERICAN WOODCOCK IN NEW BRUNSWICK

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Abstract

The reported occurrence of ocular anomalies in American Woodcock (Philohela minor) in New Brunswick was investigated in 1978. Gross post-mortem examination, analysis of birds for toxic chemical residues, and bacteriological and virological testing were conducted on selected samples from a total of 165 birds. It was concluded that the eye lesions observed were not related to infectious agents or to chemcial contamination but were the direct effect of shot-induced trauma to the skull, frequently not apparent on superficial examination.

Introduction

In 1976 and 1977 upland gamebird hunters reported gross ocular abnormalities in woodcock (Philohela minor) shot in New Brunswick. Descriptions of the lesions ranged from a cloudiness in the eye, through a shrunken, raisin-like appearance of the cornea, to apparent degeneration of the eyeball. Widespread speculation as to the cause included public expression of concern that the long-established and extensive aerial spray program against the spruce budworm in New Brunswick, a highly controversial issue in that province, might be an associated factor. The study reported here was conducted in 1978 to determine the cause of the ocular anomalies.

Materials and Methods

Field sampling.

Twenty-five woodcock were collected by shooting on spring singing grounds in southwestern New Brunswick. An additional 25 birds were shot in the spring in the northeast of the province during a separate study. Thirty birds were captured alive by night-lighting on summer fields in central New Brunswick and examined: most were released and a few were killed. Some woodcock from all three sources were from areas which had been sprayed with fenitrothion in that year. Eighty woodcock were obtained during the fall hunting season: some were submitted fresh or frozen by hunters in widely separated parts of

New Brunswick, and a group of hunters was accompanied in the field to obtain freshly-killed birds.

Toxic chemical analysis.

Five composite samples, each containing five woodcock, as well as 25 individual woodcock were analysed at the laboratories of the Ontario Research Foundation for residues of organochlorine compounds and fenitrothion, the major insecticide used in the spruce budworm spray operations. The samples comprised adults and juveniles of both sexes, with and without apparent eye defects. The samples included birds collected in spring, summer, and fall in areas both within and outside 1978 forest spray zones. The samples, stored on dry ice pending analysis, were composed of whole birds with heads and highly-keratinized parts removed. Organochlorine residues were determined by ether/hexane extraction, cleanup and separation on Florisil, and analysis by GLC/EC. Fenitrothion and two of its derivatives, fenitro-oxon and S-methyl fenitrothion, were determined by blending homogenate samples with acetone in the presence of Nuchar/Attaclay, partitioning into methylene chloride, taking up in benzene, and analysing by GLC/N-P. A nitrocresol derivative of fenitrothion, 3-methyl-4-nitrophenol, was determined by extraction with ether/HCL, partitioning between hexane and acetonitrile, methylation by diazomethane, and analysis by GLC/EC.

Gross pathology.

Woodcock were examined for the presence of ocular lesions without reference to observations made by the hunter. The skin was removed from the skull of each bird and the presence of pellet wounds, hemorrhages, fractures, corneal ruptures, and degenerative or inflammatory responses noted.

Bacteriology and virology.

The possibility of involvement by bacterial or viral pathogens in the ocular lesions was investigated by the National Wildlife Health Laboratory, U.S. Fish and Wildlife Service, to which 50 specimens were submitted, either in Bouin's solution, in formalin, or frozen. Bacteriological studies were conducted by direct inoculation of eye fluid or by the streaking of eye swabs onto blook agar plates. Ocular swabs were also placed in viral transport media. Following stabilization of any potential virus present, the media

were inoculated into primary duck embryo fibroblasts and, both intramuscularly and intraocularly, into adult coots. A small number of woodcock shot in Ontario in 1978 that were suspected of having ocular anomalies were submitted to the Ontario Veterinary College for histological examination.

Results and Discussion

The highest wet-weight concentrations of residues of toxic chemicals were those of the two that occurred in all samples, DDE (0.12 to 5.00 ppm) and PCBs (polychlorinated biphenyls) (0.10 to 0.89 ppm). Mirex was usually present at much lower concentrations, being most pronounced (up to 0.93 ppm) in those birds taken in spring. Hexachlorobenzene (<0.01) occurred in all samples analysed for organochlorines, p,p'-DDD (<0.39 ppm), p,p'-DDT (<0.18 ppm) in two thirds, and dieldrin and oxychlordane (<0.01 ppm) in one third. No fenitrothion, fenitro-oxon, or S-methyl fenitrothion was detected. Low levels (up to 0.48 ppm) of 3-methyl-4-nitrophenol were found, but not confirmed, in 80% of the samples analysed for fenitrothion and derivatives. There was no relation between eye condition and the presence of chemical contaminants, the forest spray history of the sites where the woodcock were taken, or the age and sex of the birds. Physical examination of live woodcock captured during summer revealed no evidence of gross eye defects.

Acute lesions were noted in some of the woodcock shot in the fall, their occurrence being unrelated to the age or sex of the birds. The following lesions were apparent on careful inspection: shattered sclera, skull fracture, rupture of the cornea, and hemorrhage in the eye socket. We found no evidence of any inflammatory or degenerative process, or presence of parasites of the eyes in those birds. No chronic, reparative lesions were found. After extensive bacteriological and virological studies it was concluded that an infectious etiology could be eliminated on the basis of absence of inflammation, the inability to obtain a significant bacterial isolate, and the failure of attempts to passage an infectious agent (L.M. Siegfried, pers. comm.).

When the results of our examinations were compared with hunter reports it was found that in all cases noted as an ocular anomaly by the hunter, the bird has sustained pellet damage to the head. Those woodcock identified by hunters as normal were nearly always free of shot damage to the head. Because small shot (#7½-9) is used in hunting woodcock there was frequently no disturbance of feathers or obvious wound to indicate that the bird had been hit in the head, superficial examination thus being of little diagnostic value. Since the woodcock's eyes are large, occupying one-third of the volume of its head, there would be a reasonable chance that any pellet entering the head would impinge directly on the eyes or indirectly cause damage to them.

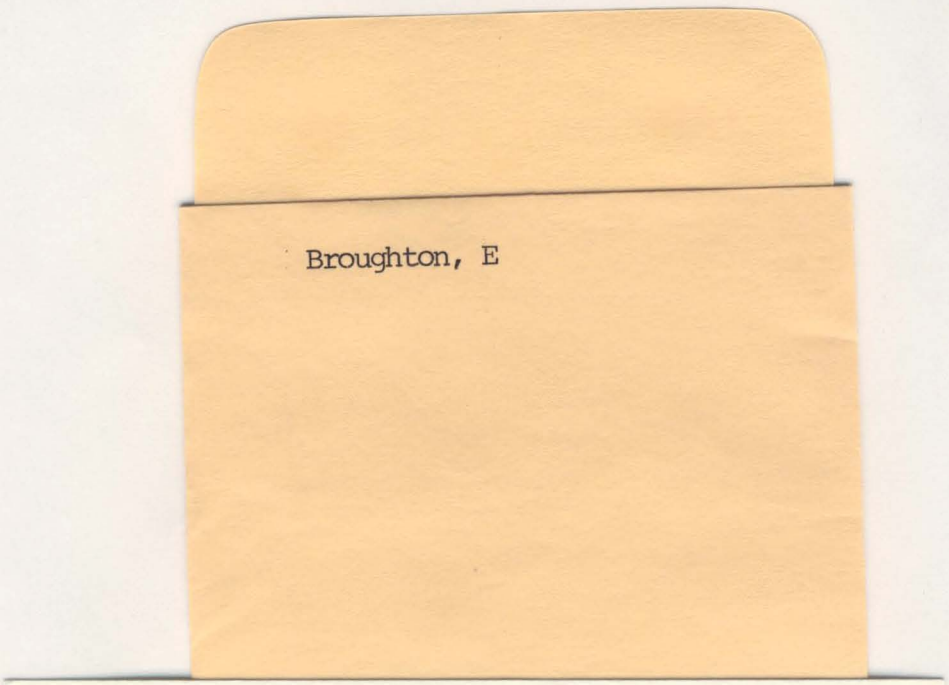
After examination of the birds from Ontario, it was concluded that the lesions were the result of trauma or post-mortem changes resulting from the anatomic peculiarities of prominence and presence of bony sclera, characteristic of woodcock eyes, coupled with the loss of intraocular pressure after death (I.K. Barker, pers. comm.).

The elimination of involvement by toxic chemicals, parasites, and by bacteria and viruses, and the almost consistent finding of ocular anomalies in head-shot woodcock indicated a direct cause-and-effect relationship. Results of our investigation were released prior to the 1979 hunting season, and what had become known as the "woodcock eye problem" has since ceased to be a public issue.

Acknowledgements

We are grateful to D.M. Keppie, of the University of New Brunswick, for making woodcock specimens available to us. R. Gamble and G. Belyea assisted in the field collections, as did J.W. Maxwell and W.R. Whitman of the Canadian Wildlife Service. The support of J.C. Baird, of the New Brunswick Fish and Wildlife Branch, in providing advice, help in the field, and liaison with other wildlife agencies in Canada and the U.S. is most appreciated. We are especially indebted to I.K. Barker and his staff at the Ontario Veterinary College for examining woodcock from Ontario, and to L.M. Siegfried and colleagues at the

National Wildlife Health Laboratory, U.S. Fish and Wildlife Service, for histopathological examination of a considerable number of birds from New Brunswick. Finally, we thank the woodcock-hunting fraternity in that province for most helpful cooperation and interest throughout the investigation.



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Name Date