

A Muscle Biopsy Procedure for use in Electrophoretic Studies of Birds

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Population geneticists working on birds frequently wish to examine nondestructively the genetic structure of a population. Collecting may not be allowed in some places, a species may be numerically rare, or the investigator may wish to conduct behavioral studies on the same individuals that have been examined electrophoretically for enzyme polymorphisms. Such might be the case, for example, in sociobiological studies where relatedness or paternity are of interest.

Most investigators collect specimens and utilize tissues from various organs (muscle, heart, liver, gonad, blood) to maximize the number of scorable electrophoretic loci. No single tissue seems to reveal the strength of activity and resolution of all loci equally well. I have worked with blood but have been unable to resolve as many loci as with any other single tissue, especially with small birds, in which bleeding from a vein produces too limited an amount of material and heart puncture is too dangerous. It is possible to perform relatively harmless muscle-tissue sampling of birds for the purpose of electrophoretic studies by use of a biopsy procedure that I have used since 1973 on 581 White-crowned Sparrows (*Zonotrichia leucophrys*), Tree Sparrows (*Spizella arborea*), and Dark-eyed Juncos (*Junco hyemalis*) (Baker and Fox 1978, *Evolution* 32: 697; Baker in prep.). The wound caused by the biopsy does not hinder flight, birds return to normal activity such as foraging and territorial singing, and recapture of individuals during successive days reveals that healing proceeds rapidly.

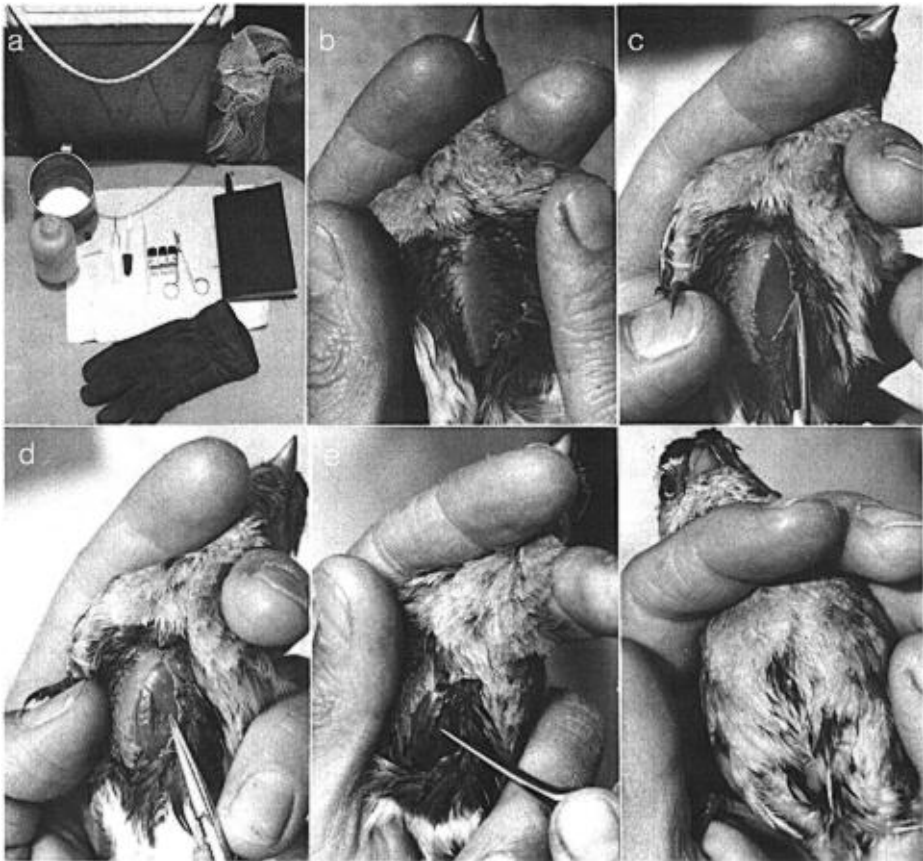


Fig. 1. Materials and procedure used to obtain a biopsy of the pectoral muscle of a White-crowned Sparrow. See text.

Supplies.—Containers of distilled water and alcohol (antiseptic), cup, forceps (e.g. Dumont #5), dropper, vials, scissors (e.g. Jarit #360-100), record book, glove for handling dry ice, styrofoam container (e.g. 25 × 25 × 25 cm.). (See Fig. 1a).

Procedure.—Hold the bird in one hand with breast up, and wet the feathers with water on a finger, spreading the feathers along the tract (Fig. 1b). Cut a slit in the skin 15–20 mm long and through the connective tissue to expose the pectoralis muscle (Fig. 1c). Cut a section, in a longitudinal direction, out of the pectoralis muscle about 2 mm deep, 8 mm long, and 3 mm wide (Fig. 1d). Lift out the tissue with forceps (Fig. 1e), and place tissue into vial with 2 drops of distilled water. Place the vial onto dry ice. Smooth the feathers over the wound (Fig. 1f), and release the bird. Total time required to perform one biopsy is about 2 min.

The styrofoam container fits conveniently into a backpack and holds dry ice sufficient for a full day in 27°C weather. Dry ice slabs can be formed into walls and floor within the styrofoam container with another slab serving as a lid. On returning to living quarters, one may store vials in a 25-l flask of liquid nitrogen until biochemical work is performed. In my initial work with finches, I used suturing and collodion in closing the wound, but the extra time, stress on the bird, and feather fouling caused more problems for the bird than simply releasing it. The tissue obtained by this biopsy is adequate to load 3–4 starch gels 6 mm thick, each of which may be sliced 3 times to provide 9–12 enzyme assays. I obtain 8 variable loci in certain populations of White-crowned Sparrows and 4–5 in Dark-eyed Juncos and Tree Sparrows.

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Whooping Crane Preyed Upon by Golden Eagle^a

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The Golden Eagle (*Aquila chrysaetos*) is the largest predatory bird in North America and is well known for its predatory abilities. Attacks have been reported on mammals such as whitetail jackrabbits (*Lepus townsendi*) (McGahan 1967, J. Wildl. Mgmt. 31: 496), pronghorn antelope (*Antilocapra americana*) (Bruhns 1970, Can. Field-Natur. 84: 301), Mallards (*Anas platyrhynchos*) (Kelleher and O'Malia 1971, Auk 88: 186), and Great Blue Herons (*Ardea herodias*) (Carnie 1954, Condor 56: 3). This communication describes an attack on an immature Whooping Crane (*Grus americana*) by a Golden Eagle and the subsequent necropsy findings.

The victim was an apparently healthy immature Whooping Crane that had been raised by foster-parent Greater Sandhill Cranes (*Grus canadensis tabida*) at Grays Lake National Wildlife Refuge in Idaho [Drewien and Bizeau 1978, Pp. 201–222 in *Endangered birds—management techniques for preserving threatened species* (S. A. Temple, Ed.). Madison, Wisconsin, Univ. Wisconsin Press] and was migrating through Colorado enroute to wintering grounds in New Mexico.

The attack occurred southwest of Rangely, Colorado and was witnessed by a party of nine deer hunters on the afternoon of 13 October 1979. An interview with the hunters revealed the following scenario. The Whooping Crane, accompanied by two Sandhill Cranes, was flying at an estimated altitude of 300 m when the eagle attacked. The Whooping Crane glided toward the ground after being struck and crashed into a juniper (*Juniperus* sp.) tree just before hitting the ground. The crane was still alive when found by one of the hunters but died about 10 min later.

Subsequent x-ray examination and necropsy at the National Wildlife Health Laboratory (NWHL) showed that the cause of death was a direct result of the eagle attack and the subsequent fall. Four talon

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