

MINUTES OF THE BRODIE CLUB

~~89~~⁴⁷rd MEETING

held in the faunal archaeological laboratory of the
Borden (City Dairy) Building, University of Toronto

April 19, 1994

CHAIRMAN: Fred Bodsworth

SECRETARY: Norm Martin

ROLL CALL: was made by DeMatteis. There were 20
members present and eight guests:

Yvonne Bendell guest of Bendell

Mary Tasker guest of Tasker

Vicky Draper guest of Fowle

Jennifer Young guest of Young

Allison Starkey, Mark Renzotti and Greg Day
guests of Savage

Trudy Rising guest of Rising

MINUTES - With minor correction, the minutes were
declared adopted as circulated.

ANNOUNCEMENTS -

1. Savage introduced a discussion of the annual field outing. Carrick suggested a good place and agreed to obtain more information for the next meeting. June 5 was settled as the date of the outing.
2. Tasker reminded the members of the upcoming Baillie Birdathon, and remarked that the Canadian Wildlife Service adds some financial contribution to some of the projects funded.
3. Reynolds noted that Friends of Algonquin Park is an active organization that not only helps the Park but also various good causes in neighbouring communities. This organization has opposed the use of the CN line through

the north side of the Park for combined CN-CP freight traffic, but so far has not been heeded by government. Reynolds himself is making personal representation on this issue.

4. Mary Tasker suggested an environmental advisory committee to the federal minister of the environment would be preferable to the appointment of a single person as suggested by the minister.
5. Norm Martin made various FON announcements.

INTRODUCTION OF SPEAKER, Dr. Jim Rising, was made by Churcher.

SPEAKER - The subject was the biochemical evidence for avian relationships.

One aspect of this field is DNA hybridization. In the nucleus two strands of DNA are intertwined. These strands appose each other in a particular way, producing a consistent sequence of nucleotides. The resulting code is transferred to the construction of proteins.

In birds red blood cells can be used in this kind of study, as avian red blood cells have nuclei. DNA strands of different species are broken into pieces and mixed together. Recombinations are compared with originals, so that closeness of relationships can be established. Radioactive labelling facilitates these comparisons. The work of Charles Sibley is well-known in this field, although the whole method is considered by many to be controversial.

Various surprising conclusions include close relationships between New World toucans and pan-tropical barbets. A large group of Australian songbirds belongs to a corvini complex, and members of this appear to have radiated to other parts of the world. The variety of derived species decreases away from the origin. Thus in North America there are 10 genera of corvids, with an increase closer to Australia. Sibley claims the vireos belong to this group. Some of the crows then reinvaded Australia.

Another group is the Pelecaniformes, with totally webbed feet. DNA studies suggest the members of this order (tropicbirds, pelicans, frigatebirds, gannets and boobies, cormorants and anhinga) in fact represent two or three different groups. Mimidae were thought to be related to thrushes, but DNA analysis shows them more closely related to starlings. The relationship of the yellow-breasted chat to the warblers has sometimes been questioned, but DNA analysis confirms that it is indeed so.

Electrophoresis uses another biochemical approach. A piece of tissue is ground up into a suspension, filter paper is inserted and the whole is subjected to an electric current. Individual cells are broken down into molecules which respond to an electric charge. These migrate at various rates across the filter paper. The specimen is stained to reveal bands of proteins which can be identified. Similarities of species can be distinguished by the positions of these enzymes on respective filter papers.

Using this method, the brown towhee and its close relatives have been studied, and relationships have been proposed. Distribution maps support these relationships, with closely related species having ranges close to one another.

Members of the painted bunting group show a dichotomy between east coast birds and those in central North America.

British Columbia chickadees are very similar in appearance to Carolina chickadees. They were always thought to be closely related, but electrophoresis suggests this is not so.

In sharp-tailed sparrows there is colour variation among three races currently recognized, and distribution maps show disjunct populations. Electrophoresis shows them divided into two groups rather than three.

Seaside sparrows are distributed along the southern Atlantic coast . Electrophoresis suggests glaciation separated eastern and western populations, and after retreat of the ice the western recolonized the east coast as sharp-tailed sparrows, overlapping the eastern seaside sparrow range.

Savannah sparrows have many populations throughout the continent, and these methods are helpful in sorting them out. This species is suffering from the destruction of marine estuaries.

Cytochrome C is another aspect of the biochemical approach to relationships. By comparing sequences of amino acids on cytochrome C molecules, similarities can be noted and presumed relationships worked out.

The red crossbill is a variable species in both colour and voice. Electrophoresis seems to corroborate a separation into several species based on behaviour.

QUESTIONS

Bendell: Does this approach help us understand adaptations?

A: No, but it may help us understand the morphology of convergence, as in barbets. Also non-adaptive mutations in these nucleotides can select against a species. Thus the differences we are studying cannot be seriously deleterious, as in that case they would have died out.

Bodsworth: What about "fingerprinting" of individuals?

A: DNA in nuclei establishes individual differences; mitochondrial DNA does not. Also DNA in mitochondria is bacterial, not double helix as in nuclei.

Reynolds: Can bones be used?

A: Yes, as long as the bone has not been mineralized.

Churcher: There are many difficulties in working with bone.

Fowle: This whole subject looks at DNA and its components as if they were physical building blocks.

A: Yes, because it's all biochemistry.

Bendell: Is biochemical the way to go now?

A: It is helpful in interpreting adaptation, but it is just one facet in the study of relationships.

Reynolds: What does this do to traditional systematics?

A: It introduces some dramatic changes, especially in splitting as against lumping.

Tasker: Are New and Old World warblers close to each other?

A: No. Quite different groups.

THANKS: by Reynolds.
Hearty applause.

MEMBERS' NOTES

Young - commented on the recent ABA publication, Bird Finding. Covers 40 areas in North America. There is good information on each area, but there is no index.

Rising - Many migrating sparrows are going through currently, and a Carolina wren was seen.

Savage - Recent bones of "sea mink" found in New Brunswick could have come from a single individual. Some artefacts have been discovered which must have come from Maine. The remains indicate size larger than Mustela vison, and may represent a different species.

Tasker - commented on the distinction of savannah sparrows in the Santiago area. Also he saw no black squirrels in the Concord area this winter.

Churcher - A sandhill crane was seen in a local marsh. An inordinate number of dead muskrats were washed up after the ice went out. Carrick remarked that muskrats suffer various epidemic diseases.

Reynolds reported that a new book, Ornithology in Ontario, is out and is very good, with articles by various local ornithologists.

Bendell - commented that The Inadequate Environment states that all herbivores, and indirectly carnivores, are limited by the amount of nitrogen in the environment. also, he feels that this winter and spring have been relatively normal.

Carrick - A family of six trumpeter swans have settled at Bronte rather than Wye Marsh. Lishman's geese returned to Ontario on their own, with a good survival rate.

Bodsworth - So far this spring, robins and cardinals are scarce around his home. Yellow-rumped warbler, towhee, white-throated sparrow, a pair of Carolina wrens seen in nearby ravine. Lots of squirrels.

Bendell - Winter wrens are showing nesting behaviour in his area.

DeMatteis - The snow has been deep in Grey County this winter. An outbreak of meadow voles has stripped much of the bark off young woody stems under the snow.

Aird - commented on a book with reproductions of some lovely black and white sketches by Thorald MacDonald who was colour-blind.

ADJOURNMENT: 10.30 p.m.

REFRESHMENTS

Norm Martin.