

MINUTES OF THE 845th MEETING OF THE BRODIE CLUB, DECEMBER 20th, 1988, IN THE FAUNAL LAB, UNIVERSITY OF TORONTO

The meeting came to order at 8.10 p.m. with Reading in the chair and B. Falls acting as recording secretary. There were 14 members present and 3 guests: Margaret Bodsworth guest of Bodsworth, Yvonne Bendell guest of Bendell, and Jeff Stewart guest of Carrick.

The chairman read the minutes of the 844th meeting, which were duly accepted.

Members notes and observations followed:

Aird commented on late season Swiss chard from his garden up to December 3rd. Also he had read in a parrot journal that caged birds died of fumes from overheated teflon.

Bruce Falls had noted subsong from a cardinal recently: Bendell had heard full song. Speakman also noted cardinals singing on bright days. Bodsworth reported "whisper" song from a budgie.

Eolissoneau had watched a timber wolf jump on a mouse in the Cannington town limits.

Bendell spoke of seeing ducks in Lake Ontario off Clarkson and commented that the composition of this assemblage seemed to be consistent from year to year at the same time. A brief discussion of waterfowl traditions ensued.

Carrick had caught two small white weasels using a live-trap. Their tails were black-tipped.

Savage reported that a caribou calcaneum found in a drumlin near Rice Lake had been dated at 4950 BP ± 80 years. He had the skeleton of a bull bison from the Rattlesnake Point herd which had died accidentally. He also asked members to help identify those in old photographs of a Brodie Club outing, recently received from Mary Devitt.

Reading who had recently returned from Guyana, displayed a large heavy bean that falls from the forest canopy: natives wore hard hats to avoid being "beaned".

The speaker of the evening was Brodie Club member David Sherry, of the Psychology Department at the University of Toronto, who spoke on the subject "Memory and the brain in food storing birds".

He introduced his talk with slides, pointing out that relatively few North American <sup>passerine</sup> bird species - chickadees, nuthatches, jays, and crows were known to store foods. He was studying the food storing habits of black-capped chickadees. This species stores nuts and insects, the latter sometimes as a small pellet, placing each item in a different site. A slide of storage sites used by one chickadee collecting food from a feeder showed that they were widely scattered. Stored items are retrieved within two to three days but the same sites are not used again.

The speaker speculated as to why birds stored food for such a short time. He suggested that it might be a way of evening out "boom and bust" variations in food supply and ensuring adequate food at dusk to survive the night.

To determine how they find food, the speaker had conducted laboratory experiments with chickadees. They were allowed to cache seeds in a "tree" with holes drilled in it. Then, while the birds were absent, the food was removed. Later their visits to the different sites were monitored. In this way any direct detection of stored food by sight or smell was precluded. After periods of 3 or 24 hrs, during which they were caged, the chickadees revisited sites where they had previously stored food more often than expected by chance. There was no evidence that they followed a regular route and it was concluded that they must

remember each storage site. In another experiment birds cached food and were then allowed to retrieve it from half the sites. After a period in cages, they were much more likely to visit unharvested sites. Thus they apparently remembered not only where they had stored food, but whether or not they had removed it.

The speaker then turned to questions relating the structure and functioning of the brain to food storage. He showed slides and models of bird brains, identifying the area of the hippocampus, implicated in studies of memory in mammals.

He then outlined two theories of how the brain might function in spatial memory. One idea - cognitive mapping - stated that a particular brain area stores spatial information, with particular cells firing associated with memory of particular sites. Another idea involved working memory. The speaker explained that, according to this view there were two kinds of memory, reference memory, which stored information on the performance of a task in general, and working memory, which dealt with particular instances. Damage to the hippocampus had been shown in previous studies to disorient animals and also to disrupt working memory. He hoped that studies of storage in chickadees would help to resolve these issues.

The speaker had set chickadees two tasks, to find food in response to a white card anywhere, and to find food in the same place. Damage to the hippocampus disrupted the place task but not the ability to find food in response to a cue card. This agreed with the cognitive mapping theory. However, revisiting errors made by birds with hippocampal damage suggested that working memory was also disrupted. So the hippocampus may perform both functions.

Not all titmice store food and the speaker had compared hippocampal volumes in British species, great and blue tits, which do not store and marsh tits which are storers. The latter proved to have a slightly larger hippocampus, as expected. He then compared families of cachers and non-cachers. Allowing for body size, cachers had a larger hippocampus than non-cachers. Dr. John Krebs at Oxford had confirmed these results with European species. The speaker suggested that natural selection acting on memory had resulted in increases in the size of the hippocampus in storing species.

This interesting account was followed by a number of questions which elicited more information from the speaker. Several dealt with reasons for caching. The need to survive in winter was important and Reading wondered if latitude or day length might affect tendency to cache. Caching takes place within a bird's home range but tends to start at the most distant sites. The speaker thought that sedentary habits and a non-perishable diet were pre-requisites. Short term caching dispersed food away from competitors. Stevens had found that, given two types of storage sites (bark or moss), birds would choose one if the other was persistently robbed. They would also move food among sites.

Members were intrigued by the memory capacity of birds. The speaker thought they could remember 100's or possibly 1000's of sites. Chickadees remember well after 14 days, less so at 28 days, and visited sites randomly after 56 days. It was not known if experience altered the hippocampus, as it apparently does in the case of brain areas associated with song learning. Studies of bird brains might help us to understand the human hippocampus and treat patients with damage in this area.

Speakman thanked the speaker on behalf of those present. He found unravelling behaviour and brain function fascinating. It being close to Christmas, the meeting adjourned to more than usually festive refreshments.