Additional Information on Egg Shell Thickness in Relation to DDE Concentrations in Great Blue Heron Eggs

Vermeer and Reynolds (Can. Field-Nat. 84: 117-130, 1970) showed that shell thickness was inversely correlated with DDE residue levels in a sample of 40 eggs of Great Blue Herons, Ardea herodias, from Alberta. Comparisons on a wet, dry and lipid-weight basis revealed that the best correlation with shell thickness was obtained with the lipid-weight DDE concentrations ($r = -0.569$). The regression coefficient of the linear relationship between shell thickness and DDE concentrations was significantly different from zero ($p < 0.01$). Although the distribution of eggshell thickness data was approximately normal, the distribution of DDE residues within the sample was skewed towards the higher values. A logarithmic conversion failed to convert the distribution to normality ($\chi^2 = 9.63$, 3 df, $0.01 < p < 0.25$). Because of the skewed nature of this data, we have expanded the statistical language used to describe the relationship and here report the results.

Conversion of the data to their logarithms yields a better correlation between thickness and DDE residues ($r = -0.701$, log th. vs. log DDE; $r = -0.690$, th. vs. log DDE). Analysis of variance of the regression of log thickness on the log of DDE concentrations in lipid showed a significant

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**Figure 1.** Relation between DDE concentrations and shell thickness in forty Great Blue Heron eggs from Albertan heronries in 1969.
### Table 1. Spearman rank correlation coefficients, thickness versus pollutant concentration.

<table>
<thead>
<tr>
<th></th>
<th>DDE</th>
<th>Dieldrin</th>
<th>Heptachlor epoxide</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>wet weight</td>
<td>lipid</td>
<td>wet weight</td>
</tr>
<tr>
<td>$r_s$</td>
<td>-0.522</td>
<td>-0.537</td>
<td>-0.319</td>
</tr>
<tr>
<td>$N$</td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>$p$</td>
<td>&lt; 0.01</td>
<td>&lt; 0.01</td>
<td>&lt; 0.05</td>
</tr>
</tbody>
</table>

A chi-square test indicated no significant deviation of the distribution of the residuals from normality ($\chi^2 = 3.25$, 4 df, $0.5 < p < 0.9$). Figure 1 shows the regression and the 95 per cent confidence intervals, calculated by computer, of the log of thickness on the log of DDE concentrations. The broadening of the 95 per cent confidence intervals with decreasing shell thickness and increasing DDE levels is most likely related to the small sample sizes in this region.

A non-parametric test that is independent of the distribution of the respective variables also shows a significant negative relationship between DDE and thickness (Table 1). The apparent relationship between dieldrin and thickness, considerably less significant than that of DDE, may be explained by the high correlation between dieldrin and DDE ($r_s = 0.63$, $p < 0.001$). The statistical significance is clearly not dependent upon the higher values of DDE, since either the two highest or the five highest values, wet weight basis, may be omitted without affecting significance ($r_s = -0.438$, $N = 38$, $p < 0.01$; $r_s = -0.396$, $N = 35$, $p < 0.02$). These treatments provide additional support, therefore, of the earlier conclusion that DDE is the cause of shell thinning in Great Blue Heron eggs.

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First Yellow Wagtail
Nest Record for Canada

In the summer of 1972 considerable effort was put into gas pipeline impact studies in the Yukon Territory. As part of these studies a small camp was established on May 28 on the Babbage River by LGL Research Associates.

At the camp location (latitude 68° 52', longitude 138° 15') the river runs east-west, and the camp was situated on the river's south side. Here the bank slopes up from the river at about 45 degrees to a height of 80 feet. There are willow trees 2 to 4 feet in height by the river and the remainder of the bank is tussock tundra.

Yellow Wagtails (*Motacilla flava*) were first seen near the camp on June 2. On June 17, on a walk along the river bank from the camp, east to a valley about one-half mile from the camp, and then along the valley side for one-half mile south, 6 pairs of wagtails were seen.

On June 24 a nest containing 5 eggs was found about 10 feet from the top of the river bank. The nest was made of grasses and was located in the northern side of a tussock. The bird and nest were photographed cinematically for Robin Gunn Ltd. on July 1. The nest was visited on July 4, and the eggs were still unhatched. On July 5 the nest was found torn out of the tussock and the eggs were gone.

Godfrey (1966) has given the status in Canada of the Yellow Wagtail: 'Found in summer in northern Yukon (near mouth of Firth River); probably breeds'.

In view of these remarks, the findings of the nest represents a first breeding record for Canada. Moreover, the Babbage River is roughly 30 miles east of the Firth River. It is quite possible that Yellow Wagtails may be found breeding even farther east, in a similar habitat, on river banks of the Yukon Territories.

### Literature Cited


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