

## Using a Novel Micro-sampling Technique to Monitor the Effects of Methylmercury on the Eggs of Wild Birds

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*Abstract:* Methylmercury is the predominant chemical form of mercury reported in the eggs of wild birds. The embryo is the life stage at which birds are most sensitive to methylmercury. Protective guidelines have been based largely on captive-breeding studies done with chickens (*Gallus domesticus*), mallards (*Anas platyrhynchos*), and ring-necked pheasants (*Phasianus colchicus*). Typically these studies are cost and time prohibitive. In the past, researchers have used either egg injections or the “sample egg” technique to determine contaminant effects on bird eggs. Both techniques have their limitations. As an alternative to the above methods and because most of the methylmercury is found in the albumen we have developed a novel, less invasive technique, to micro-sample the albumen of eggs in the field. An albumen sample would be analyzed and then compared to the hatching success of that egg. Using the micro-sampling procedure, the egg is oriented with the blunt end up and the pointed end down. A vent hole is drilled at the top to relieve pressure. Approximately one third up from the bottom, a withdrawal site is drilled just until the inner shell membrane is exposed. A syringe with a 21 or 18 gauge needle is gently inserted just into the egg and approximately 200–300 $\mu$ l of albumen is removed. Almost concurrently this site and then the vent are sealed. Thus far we have experimented with both chicken and mallard eggs in the laboratory. We sampled chicken eggs at days 0 and 3 of incubation with a hatching success of 76% and 70%, respectively. Neither group was significantly different from control eggs ( $P = 0.52, 0.54$ ). Field studies are in progress using this technique in which birds are allowed to incubate their own eggs. We envision micro-sampling to be a tool that researchers and managers could use in the field to determine the effects of mercury or other contaminants in bird populations. Micro-sampling would reduce the impact on the sampled population and could be used to monitor sensitive species without impacting reproduction and recruitment.

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