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Tamara Roush, '94
Illinois Wesleyan University

Sheryl Swartz Soukup
Illinois Wesleyan University

Given Harper, Faculty Advisor
Illinois Wesleyan University

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DNA FINGERPRINTING: ITS APPLICATION TO PARENTAGE STUDIES IN HOUSE WRENS (Troglodytes aedon) AND ITS EXTRAPOLATION TO OTHER ORGANISMS

Tamara Roush, Sheryl Swartz Soukup, and Given Harper*,
Departments of Biology, IWU and ISU

It has been shown for many species of birds that all of the nestlings in a given nest are not necessarily related to the parents. Such "multiple parentage" may result from intraspecific brood parasitism (when a female lays an egg in another female's nest), extra-pair fertilizations (when a male or female mates successfully with a parent that does not attend the nest), or rapid mate switching (when the original male is replaced by a different mate, who then achieves some paternity in the resulting brood). Consequently, ecological studies of avian reproductive success that simply count the number of surviving offspring in a given nest may not accurately measure the actual reproductive success. Our study is part of an ongoing experiment to determine levels of multiple parentage in a population of house wrens (Troglodytes aedon) by using the technique of DNA fingerprinting. This technique utilizes restriction enzymes to cut DNA at specific base pair sequences, creating fragments of different sizes. When these fragments are labeled with a radioactive probe, a "bar code" of bands unique to each individual bird is generated (i.e. a fingerprint is formed). DNA for these analyses was extracted from the blood of adult and nestling house wrens. We have preliminary evidence that multiple parentage does occur in this population of house wrens breeding in nest boxes in central Illinois. In addition, we made DNA fingerprints from a number of other organisms to see if this technique could be successfully used in unmodified form on tissues other than blood. Only small amounts of DNA were extracted from these tissues in comparison to DNA extracted from wren blood, but these samples were still free of contaminating proteins. Those fingerprints made from plant tissues did not work, but we had some success with the fingerprints made from various animals. This suggests that the technique could be extrapolated without modification to other animals, but not to any plants, to answer similar questions of parental identity.