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2009 : September 2009 - Fast Moving Fronts : Dustin R. Rubenstein & Keith A. Hobson

## FAST MOVING FRONTS - 2009

September 2009



**Dustin R. Rubenstein & Keith A. Hobson talk with *ScienceWatch.com* and answer a few questions about this month's Fast Moving Front in the field of Agricultural Sciences. The authors have also sent along images of their work.**



**Article:** From birds to butterflies: animal movement patterns and stable isotopes

Authors: Rubenstein, DR;Hobson, KA

Journal: TREND ECOL EVOLUT, 19 (5): 256-263 MAY 2004

Addresses: Cornell Univ, Dept Neurobiol & Behav, Seeley G Mudd Hall, Ithaca, NY 14853 USA.

Cornell Univ, Dept Neurobiol & Behav, Ithaca, NY 14853 USA.

Environm Canada, Prairie & No Wildlife Res Ctr, Canadian Wildlife Serv, Saskatoon, SK S7N 0X4, Canada.

*Top Dustin R. Rubenstein, bottom: Keith A. Hobson.*



### SW: Why do you think your paper is highly cited?

Our paper reviewed the use of stable isotope measurements of animal tissues to study animal movements. The review represented one of the first comprehensive and accessible summaries that addressed the use of naturally occurring stable isotope markers to track movement in a variety of animal species, including humans.

### SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

This field marks a major departure from conventional mark-recapture techniques and so is a breakthrough in the way we can infer information of origin of individuals from a single capture. It describes a synthesis of knowledge and outlines ways to design effective studies.

### SW: Would you summarize the significance of your paper in layman's terms?

The use of stable isotopes, or naturally occurring biogeochemical markers, revolutionized studies of animal movement because it allowed researchers to track movement patterns without having to recapture animals. Our paper reviewed the state of the field and discussed a series of keys issues and assumptions that needed to be addressed for designing effective and insightful future studies of animal movements.

### SW: How did you become involved in this research and were any particular problems encountered along the way?

Our respective research groups published some of the first

Figure 1

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Feather sampling a Yellow-rumped Warbler.

Figure 2

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comprehensive studies in birds, using these techniques. Initially, stable isotope laboratory techniques were hampered by time-consuming offline methods but these have now been fully automated.

**SW: Where do you see your research leading in the future?**

The power of this approach to linking an animal to a geographical region, based on stable isotope analyses of its tissues, is based largely on our ability to describe spatial patterns of stable isotopes in nature (i.e. isoscapes). Refinement of our knowledge of isoscapes and how they may vary temporally is the next challenge in this field.

Other research frontiers include the development of a more precise understanding of how various tissue types (e.g., feathers, hair, blood, and nail) can be used to infer origin. As biogeochemical markers like stable isotopes are combined with other types of intrinsic (e.g., genetic) and extrinsic (e.g., radio telemetry) markers, we will gain even more precise details on animals movements.

**SW: Do you foresee any social or political implications for your research?**

These types of studies have important conservation implications for declining populations of migratory birds and other animals with large-scale and generally unknown movement patterns. Because many migratory animals move across political boundaries, this technique will allow better establishment of spatial connectivity and so link responsibilities of different governments and management agencies involved in animal conservation.

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**Senior Research Scientist**

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KEYWORDS: WARBLER WILSONIA-PUSILLA; MIGRATORY BIRDS; TROPHIC RELATIONSHIPS; NEOTROPICAL MIGRANT; MONARCH BUTTERFLIES; WINTERING GROUNDS; BREEDING ORIGINS; CARBON ISOTOPES; COOPERS-HAWKS; NORTH-AMERICA.



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Stable isotope laboratory  
(Environment Canada).

Figure 3

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Feather sampling a male American Redstart.