

focus on cognitive processes as adaptations is occasionally allowed to fade from active memory, and a reader who demands a judicious evaluation of how an adaptive approach has opened novel pathways to knowledge of cognitive processes will probably not be completely satisfied after reading the book.

However, Shettleworth was almost guaranteed to fall short of her main objective. Her standards for evidence of cognitive adaptation are admirably stringent and, as she argues in the preface to the book, the kind of evidence that allows for more than a tentative hypothesis about the adaptive value of any cognitive mechanism is rare. The benefits of an adaptationist approach are probably most evident in chapters that cover spatial learning, food-storing and song learning in birds, although some researchers are likely to dispute her assertion that there is little, if any, unambiguous evidence that any animal uses a cognitive map<sup>4-6</sup>. Shettleworth realizes her goal, perhaps most successfully, in a chapter on foraging and the measurement of rates, where behavioral ecologists and psychologists are well under way to a truly integrated approach to the study of behavior<sup>7-9</sup>. In general, the deficiencies of the book point to opportunities for future research.

The study of cognition and the neurological foundations of behavior have no doubt already benefited from an adaptationist perspective, but interest in behavioral variation, our primary indicator of potential distinctive cognitive processes, is sometimes forfeited to neuroscience<sup>10</sup>. Shettleworth envisions a truly integrative approach to the study of cognitive mechanisms, an approach that provides answers to questions about cognition and behavior on multiple levels. Her book provides a channel for this vision. *Cognition, Evolution, and Behavior* is a bi-directional synapse positioned at the juncture of two fields of study. Every behavioral ecologist or psychologist interested in cognitive aspects of animal behavior is a potential interdisciplinary neuroscientist and should read this book.

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## Migration mumbles

### Migration and Colonization in Human Microevolution

by Alan G. Fix

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How shall we think of human migration? Is it useful to think of famous travelers, such as Christopher Columbus and Sacagawea, as migrants? Both played pivotal roles in the movement of people to the Americas and within North America, respectively. However, as far as we know, both returned from their travels without leaving any offspring along the way. But, surely we appreciate these famous figures and their travels as causes of major human migrations. It is in this light that we necessarily envision human migrations as historical tales that are the result of singular events and, in the case of recent migrations, full of singular personalities of great consequence. Historical tales of human migrations can be wonderfully compelling and true. The thing is, it is hard to know how to carry out science on such special occurrences – unique events and extraordinary people are just not the sorts of things that general theories are made of. We do not have, and are not likely to realize, Asimov's fictional notion: a 'psychohistory' that is capable enough to predict unique individuals and their consequences<sup>1</sup>.

Where then do scientists of human migration turn? The major sources of insight are local, traditional, tribal societies, which are thought to be representative of 'real' human populations<sup>2</sup>. Ethnographies of various

cultures have told us a great deal about how and why people move about. The problem is that almost by definition, such localized societies do not undertake (or have not undertaken, within the scope of ethnographic research) the sorts of migrations that would count as colonization events. The 'tyranny of ethnographic analogy' is that migration processes that are often studied by anthropologists might mislead us about the processes that have most shaped the human diaspora.

The question of how to study human migration, whether as a process that can be modeled and theorized upon or as a sequence of unique events, is difficult and pervasive. It is a question that arises in the 'multiregional versus out-of-Africa' debate, and between those that focus on population genetic models and on phylogenetic history. The question also forms the heart of this book. Unfortunately it is a weak heart. This central conundrum of research on human migration does not appear until quite late in the book, where it sputters for a few pages and dies – the victim of an anemic synthesis. All we learn is to keep different parts of the problem in mind.

Alan Fix (Professor of Anthropology at the University of California, Riverside, USA) has provided a concise review, although in style and structure it resembles a disjointed edited volume rather than a cohesive whole. We are told about the different ways to define 'migration' and how it has been studied in humans. Population geneticists will find a succinct and accessible review of how migration happens within several traditional societies. Anthropologists might enjoy the summaries of the population genetic models that have been developed to help think about migration. All readers should come away with some sense of just how heterogeneous and difficult the topic of migration is. If Fix, or somebody else, were really going to tackle human migration, this book would be a useful place to start.

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