The Geographic Mosaic Theory of Coevolution. John N. Thompson. 2005. Cloth $75.00 (ISBN 0-226-79761-9); Paper $28.00 (ISBN 0-226-79762-7). 400 pages. University of Chicago Press.

John Thompson has provided an updated version of his sensible theory on coevolution. He intentionally only covers new ground since his previous books (1982, 1994). All three volumes are necessary reading for anybody interested in coevolution.

His latest book is incredibly detailed. He reviews a myriad of empirical studies on coevolutionary processes amongst populations. This includes reproduction of the data graphics from many seminal works, especially Craig Benkman's work on interactions between crossbills, conifers, and red squirrels, and the Brodies' work on garter snakes and *Taricha* newts. In many ways, Thompson's latest book is reminiscent of Mary Jane West-Eberhard's magnum opus *Evolutionary Developmental Plasticity*, except that Thompson is not quite so exhaustive, especially in his index. Thompson demonstrates expertise and interest in all life forms, including plant-animal interactions. Thus, we see his own botanical work. Thompson takes particular pains in laying out many testable hypotheses arising from his geographic mosaic theory of coevolution, thereby providing research ideas for an entire generation of empirical biologists.

This book also shines in presenting gorgeous theoretical work supporting the geographic mosaic theory of coevolution, theory developed by his Pullman/Moscow colleagues Dick Gomulkiewicz and Scott Nuismer. The marriage of theory and detailed empirical work is wonderful.

One peculiarity of this book is that the concise one-sentence summary of the book's topic apparently does not appear until chapter six, i.e. a quarter of the way through the book. At this juncture, we learn that the geographic mosaic theory of coevolution is nothing more than the statement that evolution acts on populations, and not species. This was the classic Fisher-Wright debate of whether or not populations are panmictic. Realizing the importance of populations removed the typological view of species from evolutionary biology. Yet, Thompson is correct in pointing out that much work on coevolution maintains the erroneous typological view of the importance of species…as does much work in macroevolution. His book goes far in dispelling the anachronistic view that, in evolution, species matter more than populations. He persistently reminds us that evolution does not equal speciation. He persistently reminds us that evolution, including coevolution, can be rapid. Evolution can and does occur on ecological time scales. His geographic mosaic theory places coevolution firmly within the purview of evolutionary ecology.

Thompson is relentless is stating that coevolution occurs at the population level. He points out that individuals and populations are often <u>not</u> generalists, even if the species appears to be. Say that a given plant population is only be pollinated by one or a few species of insect, yet different populations of this plant species are pollinated by different insects. Many biologists would have deemed this plant species to be a generalist with respect to pollination, and ignored the fact that each population consists purely of specialists. Analogously, it would be erroneous to say that humans are generalists with respect to languages because, world-wide, humans speak thousands of languages. In fact, each population tends to be very much of a specialist with respect to number of languages spoken. The main message of this book is that coevolution is very much a local (population-level) ecological phenomenon. And, if we are to understand coevolution, we must dig down to the details of dynamics of many interacting multi-species meta-communities.

I believe Thompson has primarily presented a Wrightian view of coevolution (although, based on pages 133-134 of his book, Thompson would disagree with this assertion). If we envision evolution as temporal changes in allele frequencies within a population, then coevolution are the changes in the joint distribution of allele frequencies across populations across both space and time. This can be thought of as a generalized from of epistasis, where the interacting alleles are not confined to a single individual, but can be between multiple species. Alleles from other species form part of the genetic background of a focal individual. Such a generalized, multi-species view of epistasis admittedly does not yet exist. There has been no real theory developed to support this generalized Wrightian view of coevolution. Yet, I suspect it is a theoretical direction that will place coevolution firmly within the modern neo-Darwinian framework.

The book ends with a chapter on humans, which seems to be a modern publisher's requirement for all books on evolution. Compared with the rest of the book, this is a relatively weak chapter. For example, Thompson seems surprised at there being a geographically large coevolutionary cold spot between corn (*Zea mays*) and corn smut (*Ustilago maydis*; huitlacoche) with human cultivation. He implicitly assumes that humans highly value corn and greatly deplore corn smut. Yet many people in southern Mexico highly value both organisms in their diet (Ruiz-Herrera & Martínez-

Espinoza 1998 *Internatl Microbiol*). Thus humans impose a geographic mosaic on the three-way interaction between corn, corn smut, and humans. But this is a minor complaint and the last chapter can largely be ignored as window dressing.

Read this book. Savor the intricate details and appreciate the marriage of nascent data with nascent theory. If the devil is in the details, then this book will certainly please.

- Root Gorelick,

Crop Ferality and Volunteerism. Gressel, Jonathan, ed. 2005. ISBN 0-8493-2895-0 (Cloth US$ 169.95) 422pp. CRC Press, Taylor and Francis Group, 6000 Broken Sound Parkway, NW, Suite 300, Boca Raton, FL. 33487-2742.

Crop Ferality and Volunteerism is a magnificent original contribution concerning one of the significant new botanical challenges of our age. A workshop titled "Crop Ferality and Volunteerism: a threat to Food Security in the Transgenic Era?" sponsored by the OECD Cooperative Research Program and hosted by the Rockefeller Foundation Conference Center in Ballagio, Italy, from May 24-28, 2004 formed the foundation for this book. Growing public concerns due to the increasing territory of commercial cultivation of transgenic plants motivated the workshop's subject.

The editor's Foreword states that transgenic plants were grown on more than 60 million hectares in 2004 and expected to increase in the future. Volunteerism is well known in the daily practice of agriculture, and ferality is usually neglected. Only plant breeders are well aware of ferality due to their experiences based on long-term selection efforts. The phenomena of volunteerism and ferality have to be considered in this transgenic era especially in relation to gene flow. Since no one is performing research related to ferality *per se*, the inquiry was addressed by convening those world experts who are most actively working in related fields. It was anticipated that on the basis of their recent findings, the scientific community would be able to find out whether trangenics are different in this context from normally cultivated crops.

As this information is otherwise unavailable in depth, it was decided to collate the information into a book. Accordingly, the logistical preparation was exceptional: chapters in this book were peer-reviewed prior to the workshop. The questions and answers in the long discussions that followed every presentation were recorded. Each author was given the prerogative of either including the issues and answers from the discussion directly as part of the revised text or including them at the end of the chapter in a separate section.

For the duration of my reading I had the flashback of sitting at the Crop Evolution Laboratory's conference table having conversations with Jack R. Harlan and J.M.J. de Wet and their numerous visitors. This volume draws from those foundations. Suzanne Warwick and C. Neal Stewart's authoritative opening chapter about three principal paths of weed evolution is launched with a quote from Harlan and de Wet. Titled Crops Come from Wild Plants – How Domestication, Transgenes, and Linkage Together Shape Ferality, it defines essential terminology - [1] plant domestication [2] weediness and [3] ferality. A table recognizes comparisons among the three groups: crop, weed, and wild, by means of a series of genetic traits. The characteristics of weediness and domestication traits are explored thoroughly. Each succeeding chapter describes those phenomena probing our foremost food crops.

Since, during the discussions it became apparent that there were other cases of ferality or instances where ferality might become an issue, a special chapter (15) was added by participants and/or was commissioned after the workshop. This multi-authored chapter, Issues of Ferality or Potential for Ferality in Oats, Olives, the *Vigna* group, Ryegrass species, Safflower and Sugarcane appends the vast array of measures plants have used to evolve ferality.

Contributors with exceptional credentials were brought together to inform one another about the world's major crops and their wild and weedy relatives. The result is both scholarly and inspirational. The usual drawback of multi-authored volumes is absent here, thanks to skillful editing and extraordinary groundwork.

This book will appeal to a wide variety of readers. Those interested in theoretical aspects of plant domestication as well as persons with applied interests e.g. assessing the environmental risks of transgenic volunteer weeds, the potential economic damage by feral crops, will profit from this book. I find the contents extremely thought provoking as a primer in consideration of my own monographic revision of the genus *Sesamum* and its various forms: crop, weed and wild.

The book is carefully edited, and each chapter is comprehensive and well referenced. However, one feature followed in this volume as with other CRC publications, is the custom of placing sources cited only by a number in (parentheses) (*sic*), without