



*The shimmering blue of Guava Skippers is created by iridescence.  
Dec. 7, 2004. NABA Butterfly Park, Hidalgo Co., TX.*

## REFLECTIONS ON *by Ron Rutowski and Joe Macedonia* BUTTERFLY COLORATION

The coloration of adult butterflies is mostly what makes them so compelling to us. The brightness and richness of their colors as well as the exquisite intricacies of their color patterns readily draw our attention and stimulate our curiosity and questions. What is the function of the colors and color patterns? How are these colors and dramatic patterns produced? These questions have occupied butterfly biologists and watchers for years and will continue to occupy us for a long time to come. But, while potential answers to questions about the

functions of coloration come quickly to mind for most of us — protection from predators through mimicry, warning colors or crypsis, mate attraction, signals used in courting, etc. — fewer of us have ready answers for questions about the mechanisms that produce the colors. Amazingly enough, the answers are as fascinating in the details as the colors themselves, and there are many stories to tell that enrich our understanding and appreciation of these spectacular animals.

The structures that produce colors in adult



*Cloudless Sulphurs (top) and Apricot Sulphurs (bottom) have very similar patterns. The easiest way to distinguish them is by color. Cloudless Sulphurs are yellow while Apricot Sulphurs are orange, especially on their topsides.*

*Top: Oct. 19, 2003. Santa Ana NWR, Hidalgo Co., TX.*

*Bottom: July 21, 2003. Near Palenque, Chiapas, Mexico.*



shorebirds at various times of the year is fully aware of how impressive these changes can be. But this is not so in butterflies, in which the adult emerges by shedding the pupal exoskeleton and never again molts. The basic elements of butterfly coloration thus cannot change during adulthood, although colors may fade through wing wear and exposure.

butterflies are in place on the wings when the adults emerge from the chrysalis. During the final days and hours of the pupal stage one can actually see the color pattern developing through the translucent pupal skin (see the Tawny Emperor pupa photo on page 38 of this issue). Birds and mammals shed and replace throughout their lives the feathers and hairs that are primarily responsible for their colors; thus the colors of individual adults can change dramatically from one season to the next. Anyone who has tried to identify warblers and

The colors are the end products of genetic and developmental processes in the pre-adult stages. These processes are being intensively studied especially by scientists such as Drs. Paul Brakefield, Fred Nijhout, Antonia Monteiro and others. But their stories will have to wait for another article. For now, we will focus on understanding how these end products, specifically the physical structures on the wings and pigments contained within them, cause color to happen right here and now as we observe a butterfly.