

LIVE COLOR PHOTOGRAPHY OF
ENDEMIC HAWAIIAN INVERTEBRATES

William P. Mull
Research Associate
Entomology Department
Bishop Museum
Honolulu, Hawaii 96818

One of the great rewards for a field biologist is the excitement of finding a new species, a rare species or an unsuspected behavior. If the event can be captured on film in living color, the excitement of that discovery can be shared again and again with colleagues and other interested people. Also, the pictures of the organism alive and fresh can record morphological and behavioral data that are not revealed later by the preserved specimen.

For the past five years, I've been working with invertebrate zoologists to photograph their discoveries among Hawaii's endemic insects, spiders, land snails and other land invertebrates. In the next few minutes, we'll be looking at color slides that show some of the product of that experience--which has been at least as exciting and rewarding for me as for my scientist friends.*

Imagine the joyful shock Steve Montgomery (University of Hawaii) felt three years ago in the Wai-'anae forest on O'ahu, when he looked under a leaf and saw this happy little face beaming at him. This tiny theridiid spider with the unbelievable happyface pattern on her back, carefully guarding her cluster of eggs, is apparently an undescribed species. Two years later, Wayne Gagné (Bishop Museum) found this male relative of hers--with "eyebrows" added--laughing back at him from under a leaf in a Big Island forest; several more male and female specimens like this have since been collected here. Then last month, Klaus Sattler (British Museum, Natural History) found this happy little female, with the coy red mask, under a leaf in wet forest in the Kohala Mountains of the Big Island; she appears to be yet another new "happyface" spider species. At the same time, on Maui, Steve Montgomery came up with this "smiling" lady to add still another apparently distinctive species to this remarkable group of petite Hawaiian "happyface" spiders--which have eluded field workers here all these years.

*Editor's Note: The many color slides presented with this paper have not been reproduced here. Persons interested in viewing the slides should contact Mr. Mull directly.

Another chain-reaction spider event was set off five years ago when Frank Howarth (Bishop Museum) made his startling discovery of whole new ecosystems in the dark zones of Hawaiian lava tubes--one inhabitant of which was this species (*Lycosa howarthi*), the world's first-known small-eyed big-eyed hunting spider, first found here in Hawaii Volcanoes National Park. The vestigial eyes of this Big Island lycosid spider were soon overshadowed, though, by Frank's discovery a month later of the world's first-known no-eyed big-eyed hunting spider (*Adelocosa anops*)--in a lowland lava tube on Kaua'i. With no possible means of underground dispersal between Kaua'i and the Big Island, these two amazing spiders seem to represent a classic example of parallel evolution in an unexpected direction by closely related organisms with similar opportunities. As logical follow-up to these discoveries, a search was pursued for close surface relatives. This produced several apparently new lycosid species, including two from the Park; "Clarence," here was found by Wayne Gagné at the 8,000 ft. level on Mauna Loa, and I found "Big Mother," here, at the 5,000 ft. level just before those 300-plus piggyback youngsters emerged from the now-empty egg sac clutched under her--and before she got this contented-motherhood look on her face.

When Frank Howarth found this reduced-eyed *Caconemobius* cricket in lava tubes in and near the Park, he started a search of the Park's recent lava flows for a surface-dwelling relative and discovered this closely-related normal-eyed species, previously unknown. In another lava-tube cricket event, Frank found this *Thaumatoeryllus* cricket with reduced eyes in Big Island lava tubes several years ago and followed-up just last month with discovery of this *Thaumatoeryllus*, with even-more-reduced eyes, in a Maui lava tube. So far, the only known *Thaumatoeryllus* cricket species that is surface dwelling lives on Kaua'i.

One of the rarest, most cryptic, most elusive groups of endemic Hawaiian insects are the thread-legged bugs. This fancy last-instar nymph of an apparently new species of *Nesidiolestes* fell out of a tree onto their collecting sheet while Steve Montgomery and Jim Jacobi (University of Hawaii) were light-collecting moths at night on West Maui in early 1974. Six months earlier, in a Big Island lava tube, Frank Howarth and Wayne Gagné had come up with another new, even more exciting *Nesidiolestes* find--the world's first-known fully cave-adapted thread-legged bug, with greatly reduced eyes and no pigmentation whatsoever. A year of searching the Big Island for a surface relative finally produced this male last-instar *Nesidiolestes* nymph (followed by a dozen more specimens in the next few weeks), which I found under epiphytic *Astelia* on a mossy tree trunk in wet forest. It may be *N. selium*, known only from a single

damaged specimen in the British Museum collected over 70 years ago--the only previously known surface thread-legged bug endemic to the Big Island. Coincidentally, a month later, Frank, Wayne, Steve and Robin Rice (University of Hawaii) found a series of long-uncollected *N. insularis* during a night-time collecting foray in upper Makaha on male is one of them.

A fortuitous thread-legged bug bonus from my Big Island search for *Nesidiolestes* was this male *Saicella* specimen, which also was under *Astelia*, which is the first Big Island record for the genus, and which appears to be the first truly wingless species in this group of otherwise micropterous forms. This female came along with the male and started laying eggs--producing over 50 before she died four months later. The eggs hatched, and I doted over those *Saicella* kids for more than six months--finally rearing 18 through to adulthood.

Another bonus from my thread-legged bug search on the Big Island was this flightless mirid bug, also from *Astelia*, which doesn't really fit into any described genus. It is close, though, to the technically monotypic O'ahu genus *Nesidiorchestes*, of which several undescribed species exist in collections--including this new one discovered on Maui by Wayne Gagné in 1973.

Still another bonus was this male *Nabis*, also from Big Island *Astelia*, which fell into my net along with this female. They are distinct from the several *Nabis* species described from this island. Another apparently new *Nabis* species from the Big Island is this flightless male, collected on *Sphagnum* in wet forest by Wayne Gagné last year.

In the past year, Robin Rice has made a series of remarkable collections of rarely found endemic *Rhyncogonus* weevils. He has turned up most of the described Hawaiian species and, in the process, discovered several new ones, such as this male from koa on Kaua'i. Along with the male, he got this female--who laid these eggs during the several days I worked with the pair to get photographs.

I'm including nothing about the substantial recent discoveries among Hawai'i's drosophilid flies, or about the incredible endemic caterpillars that catch them--since both subjects will be addressed later during this conference--but I must show you this engaging little male tephritid fly with the striking wing patterns, proclaiming his territory on the *Bidens* leaf. Steve Montgomery reared him from a *Bidens* stem gall he found last December on West Maui. It was an undescribed species with apparently only one previous specimen known, from a Maui collection many years ago. Its biology was unknown.

Rarely does one have the opportunity to take live pictures of "extinct" species. But this beautiful endemic tree snail, *Achatinella lila*, was found in the Ko'olau range on O'ahu in March 1974, along with several other living specimens. The species was regarded as extinct--as was this *A. byronii* and this *A. casta*, both found in July 1975, also in the Ko'olau range. Their rediscoverer was Al Hart (University of Hawaii), who in the past three years has made a tremendous contribution to our understanding of the current status of most members of this marvelously-evolved but fast-declining endemic O'ahu genus, *Achatinella*.

The other day, I took time out from working on biological rarities to photograph this knobby-headed caterpillar with its head next to a similarly knobby new flower bud of its *Pipturus* host plant. Is there any significance to this curious structural similarity between these two closely associated but very different organisms? This picture reminds me that the potential for exciting discovery isn't confined to new or rare species. Even this commonplace Hawaiian *Pipturus* plant with its commonplace Ka-mehameha butterfly larva can hold revelations to quicken the pulse of the field biologist--and his photographer.