



# NC BIODIVERSITY PROJECT NEWSLETTER

## SPECIAL EDITION IN MEMORY OF BO SULLIVAN

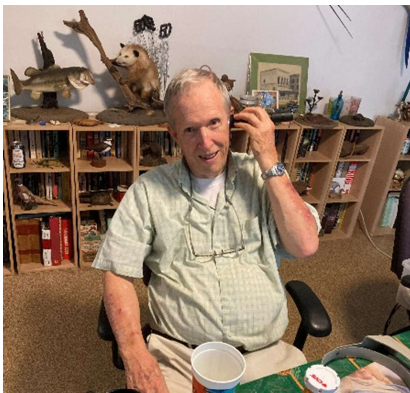
### January 2025

Bo Sullivan, a founding member of the NC Biodiversity Project, passed away on October 17, 2024. Following are remembrances from some of his NCBP friends and colleagues.

### MOTHS, KINDNESS, AND AN INFECTIOUS LAUGH

I first reached out to Bo Sullivan in 2019 with questions about North Carolina's native beetles and silkmoths. Despite my lack of expertise, Bo responded right away to my inquiries, always answering my questions with patience and an abundance of detailed information. He even sent me a few beetles to photograph for a magazine story.

As a founding member of the North Carolina Biodiversity Project, Bo's knowledge of the state's rich natural heritage was encyclopedic. Our emails back and forth to one another soon morphed into half-hour conversations by phone. We talked about all sorts of things---from politics to sports and fishing to plants. But mostly we talked about moths.



Bo at Jeff Beane's house in Hoffman

I especially loved hearing Bo's accounts of collecting moths and butterflies in South America. We also talked about his collecting experiences in the North Carolina mountains and in the cypress swamps along the coast. Some stories were about discovering a new species. Some were about documenting a known species of moth in the state for the very first time.

Others were about the decline of moths and butterflies in areas where they were once common. All his stories were told with a healthy dose of humor. Bo had a wonderful laugh. It was hearty and infectious.

Not long thereafter, Bo invited me to Beaufort. He and his wife, Ashley, warmly welcomed me into their home. I spent the better part of two days photographing his pinned insect collection and admiring his book collection, all the while enjoying ample southern hospitality.

I eventually convinced Bo to come to the Sandhills to collect moths in areas he had rarely sampled before. Bo, along with Steve Hall and Jim Petranka, stayed at my good friend Jeff Beane's house on numerous occasions. The three men ended up documenting over 500 species of moths in Jeff's yard over just a couple of summers. One memorable trip, Bo presented me with a first edition *The Natural History of New York* published in 1842 because he knew I collected old books.

The last time I saw Bo, he was hunched over Jeff's kitchen table examining hundreds of moths that had been caught the previous night. He had a pair of tweezers in his hand and was sorting the tiny moths, known as micros, into neat little piles. I asked Bo why he was doing that. He looked up from the table directly into my eyes and stated, "Because no one else is crazy enough to do it". He paused for a second, then he laughed.

Todd Pusser  
November 4, 2024

## A GOOD FRIEND

I first met Bo in person around six years ago when he and Ashley met me and my wife, Becky, for lunch at the Old Hampton Store and Barbecue in Linville. I had only been involved with the North Carolina Biodiversity Project for a couple of years and was just getting my feet wet with identifying moths at our home in Mars Hill just north of Asheville. He and Steve Hall played a major role in nurturing my budding interest in moths and helping with seemingly endless submissions that I had mis-identified. That was the beginning of a long relationship with Bo that involved almost daily email exchanges and numerous field trips to different areas of the state to collect moths.



Todd Pusser, John Petranka, Jim Petranka and Bo Sullivan

I cherish the times that I spent with Bo in the field. He was a great teacher and mentor who had an encyclopedic knowledge of the 3,000+ species of moths that we have in the state. More importantly, he was one of the finest individuals that I have ever met. Bo was such a kind and generous person, with a great sense of humor, and a child-like fascination with the natural world that kept him still wanting to explore and find new species, even after completing more than 50 years of field work. He was such an inspiration to me and to countless others and I, along with so many others, are going to miss him more than most can imagine. As I told Bo over the phone when I spoke to him shortly before he passed, my only regret is that I didn't get to know him earlier in life. He and Ashley had an amazing 60-year ride together through life and shared many wonderful memories of their family, friends and life-long experiences. We wish her and her loved ones the best during these difficult times.

Jim Petranka  
October 19, 2024

## REMEMBERING BO

### First Acquaintance

I met Bo in April, 1991 on the way back home from my first experience with moth-sampling. I was working with Dale Schweitzer of the Nature Conservancy to survey the moths and butterflies of the Green Swamp and three other TNC preserves in the Coastal Plain to determine if there were any habitat specialists that might be affected by the prescribed burning used to manage these preserves. We had succeeded spectacularly on this very first trip, finding sixteen species that looked like good candidates for such concern. The most exciting of these was *Hemipachnobia subporphyrea*, a species that

Dale thought had not been seen anywhere since the first specimens were collected in the late 1700s. Our euphoria about these discoveries, however, was about to crash.



*Hemipachnobia subporphyrea*

Dale had heard about Bo as an expert on the moths of the North Carolina Coastal Plain, an area that had otherwise not received a lot of attention in that regard. Before driving back to Raleigh, we gave him a call to see if we could pay a visit. Bo, who by that time had been welcoming wandering lepidopterists to his home for quite a while, was happy to have us to tour his collection. When we told him about our amazing finds, however, Bo informed us that the species we had been so excited about were common in that area and, in fact, that he had collected *Hemipachnobia* when he started collecting moths in this region back in 1974. **Lesson 1:** Whenever an apparently new moth turns up in North Carolina, the first thing to do was to check with Bo to see how many specimens he already had in his collection and how long ago he had found them!



A small part of Bo's collection in Beaufort

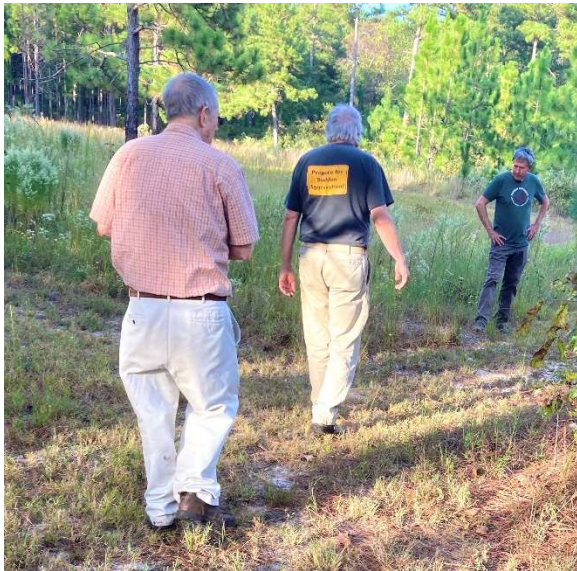
While Dale and Bo were engrossed in looking through Bo's massive collection, I was wondering just what had I gotten myself into? There were clearly an awful lot of moths, both species and individuals, but with only extremely limited resources -- at that time -- for identifying them, let alone any information on their distribution, abundance, life histories, habitat choices, and so on, this looked to be a very intimidating task. This was particularly true in the Southeast, which had been very poorly surveyed compared to the Northeast, where Dale represented a long line of lepidopterists who had been documenting the lepidopteran fauna for well over a century. At the

same time, however, it was abundantly clear that there was an opportunity here that could not be overlooked: lepidoptera were obviously an enormously diverse group of ecologically important and often highly specialized species. They were just the sort of group that the Natural Heritage Program (which I had joined just the previous year) needed to incorporate in their assessments of the state's biodiversity. From working with Dale, it was also clear that there were sampling techniques for this group that were highly effective, making comprehensive surveys at least thinkable. However, it was equally clear that we would need all the help we could get from the very few experts that existed for this group. With Dale's base of operations in the Northeast, that left Bo as virtually the sole candidate for the job.

### Partnership

Bo did, in fact, join us in 1992 on one of our final survey trips to the TNC preserves, but our first real collaboration began in 1994 when the three of us took part in one of the most intensive moth surveys that has ever been conducted in the Southeast (or anywhere in the country). This involved monitoring the impacts on native lepidoptera of a massive effort to eradicate an infestation of an Asian strain of Spongy Moths (=Gypsy Moths) that was discovered in 1993 at the Military Ocean Terminal at Sunny Point (MOTSU) near the mouth of the Cape Fear River. Based at least partly on the discoveries Dale and I had just made in this region, the US Forest Service was concerned about the potential for major impacts to native lepidoptera -- especially such rare species as *Hemipachnobia subporphyrea* -- and provided a large grant to the Natural Heritage Program to monitor the non-target impacts of this project. As part of this assessment, we were to compare the impacts of using Btk (*Bacillus thuringiensis kurstaki*) to treat most of the area versus treating especially sensitive areas with Gypchek, a viral-based agent that is much more specific in its impacts to Spongy Moths.

Between April 1994, when the spraying campaign began, and May 1995, we sampled the macro-moth fauna (consisting of 12 families of mainly larger and better-known species) at 55 sites. Several were sampled at weekly intervals, especially where Btk and Gypchek blocks existed side-by-side. These included MOTSU itself, along with Carolina Beach State Park, Fort Fisher State Recreation Area, and Bald Head Island. A total of 790 samples were taken during this period, resulting in 17,488 species records, covering 655 different species.



Bo, Steve Hall and Jesse Wimberley

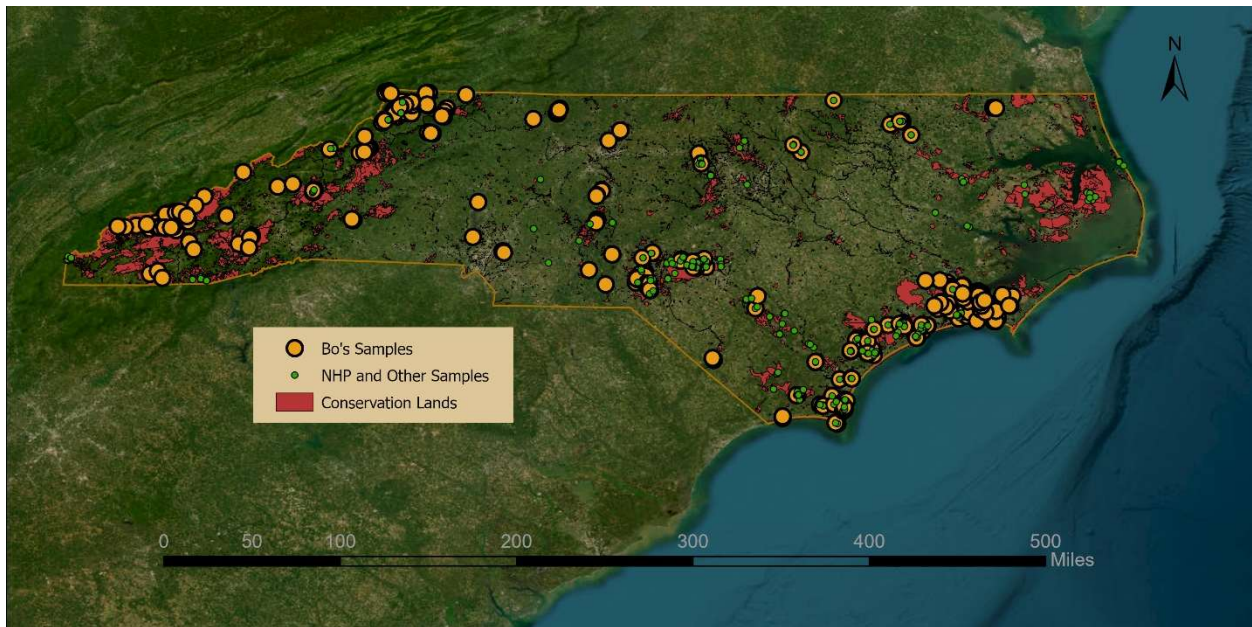
The eradication campaign was highly successful in wiping out the Spongy Moth infestation – none ever turned up in our traps -- but, as predicted, the spraying had a drastic effect on the native species of lepidoptera. Low numbers of individuals were found at all treatment sites compared to data compiled in the previous TNC survey, and were still low as much as two years following treatment. One particularly noteworthy casualty was a population of *Hemipachnobia subporphyrea*, where adults were found the first year in a block treated with Btk – only larvae are affected by Btk – but were absent the following year. On the other hand, they survived in a neighboring block that was treated with Gypchek, a notable success for the precautions taken by this project.

Beyond meeting the monitoring goals of this project – determining the level of impacts and the success of the protective measures -- this concentrated effort to identify and count all specimens of macro-moths boosted the total number of macro-moth species known for this region to over 900. We were also able to identify a number of species that appeared to be specialists associated with some of the state's best remaining examples of savannas, flatwoods, swamp forests, maritime forests, peatlands, and sand ridges. This produced a huge leap in our knowledge not only about these species themselves, but about the ecosystems of which these species are an integral part.

This project established a pattern that we followed in virtually all subsequent surveys. Bo's interest was primarily taxonomic, focusing on the individual species, making sure of their identities, documenting their life histories, and determining if any of them were new species to the state or to science more generally. My interests were more ecology- and conservation-oriented, focused more on the collections as data than as specimens. Although I took part in collecting, identifying, and counting species and individuals, my main task involved compiling the survey information in a database that could be used for analysis of abundance, habitat associations and conservation concerns. Dale took direct part in only a few more inventories in North Carolina, but he remained one of our most important sources of information, particularly with regard to the global conservation status of both our moths and butterflies.

The following map shows the locations of sites we sampled for lepidoptera between 1991 and 2024. Sites where Bo and I collaborated are shown with dots colored green and orange and those sampled just by Bo are shown as pure orange. Altogether, Bo was involved in sampling of at least 100 major sites and 465 subsites and sampling-stations, and I am sure that there were many more that I was unable to identify. Note that these surveys almost all took place within

some of the most important natural areas/conservation sites remaining in the state.



Lepidoptera sample sites between 1991 and 2024

Even where we did not directly collaborate, Bo sent collection data to me to compile in our statewide database. This was initially maintained by the Natural Heritage Program, but following the reduction-in-force of two-thirds of the Program's positions – including my own – in 2014, these data were transferred to the Moths of North Carolina Website (MONC) where they continued as the prime source of information for our understanding the moth fauna of the state. Planning for MONC, in fact, was initiated in a meeting involving Bo, Parker Backstrom, Merrill Lynch and myself on the night of the farewell party held for departing members of the Natural Heritage Program.

While this transfer did not affect our long-standing pattern in conducting surveys, it did alter our overall mission, opening up our information to the general public and, in fact, inviting their direct contribution of records. We also decided at that initial meeting to expand our coverage to include micro-moths. This group now, in fact, represents the vast majority of new records entered into our database and are a main

concern of the website's newest co-authors, Jim Petranka, Tracy Feldman, David George, and Jeff Niznik. Bo also shifted his taxonomic focus to this group, giving our entry of new records and species accounts a solid scientific basis.

### **Bo's Taxonomic Expertise**

I am sure that sometime in college or grad school Bo took a course in entomology. Otherwise, his academic career followed other paths. His early interest in birds took him to Cornell, where Charles Sibley was beginning to revolutionize avian and molecular taxonomy, both potential academic areas that Bo considered pursuing. He went to Texas, however, for graduate school, where he took what he regarded as a more pragmatic course of study, focusing on biochemistry; his doctoral dissertation was on the structure, function, and evolution of turtle hemoglobins. He then took this line of research to Duke, first as a post-doc and later joining the faculty, publishing 58 articles between 1964 and 1983 mainly on hemoglobin and other oxygen-transporting molecules in a wide range of taxa,

including lemurs, reptiles, amphibians, fish, polychaetes, and horseshoe crabs. Then disaster struck: a fire in 1980 at the Duke Marine Lab destroyed his lab, with all of his equipment and research articles. In 1985, Bo took an extended leave from Duke, leaving his formal academics behind but not his interest in scientific research.



All during his time with Duke, Bo maintained a serious side-interest in lepidoptera. In 1971, he published a paper in the Journal of the Lepidopterists Society entitled Captures of *Erora laeta* in North Carolina (Lycaenidae) and by 1974, he had already started building the famous moth collection that had attracted the attention of Dale Schweitzer. By the time we met him, Bo had established a reputation among lepidopterists particularly based on his extensive collecting efforts in Latin America, including surveys in Brazil, Columbia, and Costa Rica. Thirteen journal

articles resulted from those efforts, several of which were written by Bo himself and others done in collaboration with Dan Jansen, Don Lafontaine, Mike Pogue, and other members of the lepidopterist firmament.



While his trips to Latin America continued after Dale and I met him in 1991, with several of his descriptions of tropical species published as late as 2014, Bo increasingly turned his attention to documenting the moth fauna of North Carolina. As in his tropical studies, these efforts were greatly aided by his continued collaboration with museum and academic specialists across the country. This was especially important for the confirmation and description of new species. The following North Carolina species were described by Bo, several in collaboration with taxonomic specialists on the particular families or other groups to which these species belong:

- Elaphria alapallida* Pogue & Sullivan, 2003 - Pale-winged Midget
- Morrisonia triangula* Sullivan & Adams, 2009 - Triangular Woodgrain
- Rivula stepheni* Sullivan, 2009 - Stephen's Spotted Grass Moth (Photo, right)
- Gondysia telma* Sullivan, 2010 - No Common Name
- Palpita maritima* Sullivan & Solis, 2013 - Coastal Palpita
- Cherokeea attackullakulla* Sullivan and Quinter, 2014 - No Common Name
- Doryodes fusselli* Sullivan & Lafontaine, 2015 - Fussell's Doryodes
- Clemensia ochreata* Schmidt & Sullivan, 2018 - Little Ochre Lichen Moth



A number of other species were described by other authors but based at least partly on specimens initially collected by Bo. These include

the following North Carolina moths that bear Bo's name as a patronym:

*Meropleon diversicolor sullivanii* Ferguson, 1982  
*Anicla sullivanii* Lafontaine, 2004 (Photo, right)  
*Sparganothis sullivanii* Powell and Brown, 2012  
*Pelochrista sullivanii* Wright - Sullivan's Pelochrista, 2015



Several more are currently in the publication pipeline.

In the classic tradition of lepidopteran studies, Bo was interested in all aspects of moth and butterfly biology. In his surveys across vast areas of the state, he became an expert on a number of different collection techniques, including netting, sugar baiting, pheromone trapping, and use of various types of UV light sampling. In his collaboration with David Wagner and Dale Schweitzer to describe the larvae of the Erebid and Noctuid moths of eastern North America, Bo developed an expertise in finding and rearing caterpillars, requiring a different set of skills than used for the adults. On several of the trips we made together during that time, Bo brought along a menagerie of larvae that needed to be constantly tended and fed, with the particular food plant needs of each species taken into account.

As much time as he spent in the field, the real work began when he returned home. Not only did he pin and spread a huge number of his specimens – he sent vouchers by the hundreds and thousands to museums and other institutional collections across the country and beyond – but a substantial number of them had to be dissected in order to confirm their identification. This was a big task even when it came to the macro-moths but in the past several years Bo developed expertise for handling even the micros-moths, some of which have body lengths of only a couple of millimeters! Watching him pin and spread such tiny specimens a dozen at a time was an amazing sight and the effort involved in dissecting, staining, and mounting their reproductive structures on microscope slides is still difficult to comprehend!

While all of those myriad activities would have been familiar to 19<sup>th</sup> Century lepidopterists, Bo also kept up with developments in molecular taxonomy, which has been completely revolutionizing the classification of all species over the past several decades. He was especially involved in the use of genetic bar-coding to identify potential cryptic species (closely related, highly similar species that cannot be distinguished using traditional techniques). Starting with the bar-code trees produced by BOLD (Barcode of Life Data Systems), he would attempt to find morphological or ecological differences between species identified as representing distinct genetic lineages. Many of the ones he described as new were, in fact, first determined as such following this procedure. Many more that Bo discovered still await this sort of treatment.



Steve Hall, Jim Petranka and Bo

In addition to all of these multifarious taxonomic tasks, each time consuming in its own right, Bo compiled his records for entry into the Moths of North Carolina database. Especially for samples taken in conjunction with the NHP surveys, counts were also required (ideally) for each species collected – rare or common – and separately for each trap sample. All of this

incomprehensive amount of work was done without regular compensation and without it being a part of his academic profession. It was all done instead out of pure love for this subject.



Bo with Jim Petranka

### **Bo's Contributions to Lepidopteran Conservation**

Between 1994 and 2013, Bo took part in nine Natural Heritage Program site surveys that had conservation as their primary goal, involving in particular the identification of lepidopteran species at high risk of extirpation from the state. In addition to the massive Spongy Moth Nontarget Project, these included surveys of Camp Lejeune, Fort Liberty, Camp Mackall, Holly Shelter Game Land, Uwharrie Mountains, Lower Roanoke River Floodplain, and Tar River Floodplain. These surveys resulted in 213 records for the 82 species that are currently on the NHP list of Significantly Rare Species. Three of these, moreover, are considered Globally Imperiled by NatureServe: *Hemipachnobia subporphyrea* (G1), *Agrotis buchholzi* (G2), and *Papaipema eryngii* (G2). Additionally, Bo collected 16 species of macro-moths that have otherwise not been recorded by anyone else in North Carolina. One more -- *Papaipema* sp. 1 -- was added on one of Bo's final collecting trips, made with Jim Petranka in 2023. An equally long list of rare micro-moths will also be eventually added, once the information has been gathered to determine their degree of conservation concern.

Where these species are listed as Significantly Rare by the North Carolina Natural Heritage Program, their occurrences at particular sites helps identify those areas as high priorities for

conservation. This includes both acquisition of the sites as nature preserves and their management for the needs of these particular species. In the case of lepidopteran species -- including butterflies as well as moths -- NHP surveys have been particularly important in determining appropriate strategies for fire management and the use of narrowly targeted control efforts needed to combat the outbreak of exotic species such as the Spongy Moths.

Some of these species documented in our surveys are, in fact, among the rarest organisms in the state, nation, or even the globe. *Hemipachnobia subporphyrea* -- a constant refrain in discussing Bo's contributions -- in particular merits significant conservation concern as one of our rarest and most specialized species. As originally discovered by David Stephan at NCSU, the larvae of these species feed on Venus Flytraps, themselves one of the hallmarks of North Carolina biodiversity, and are far rarer than even their host plants, which themselves are of significant conservation concern.

In the case of this species and two others -- the Eastern Arogos Skipper (*Atrytonotone arogos arogos*) and Crystal Skipper (*Atrytonopsis quinteri*) -- Bo and I participated in status surveys commissioned by the US Fish and Wildlife Service to determine whether they qualify for federal protection under the Endangered Species Act. Additionally, we contributed information to the status survey for the Rattlesnake Master Borer Moth (*Papaipema eryngii*) conducted largely in the main part of its range, the tall-grass prairies located west of the Appalachians; the population we discovered during the course of the Spongy Moth Nontarget survey was the only one ever discovered east of the mountains.

As in our more general moth surveys, Bo's expertise -- particularly his knack of knowing exactly where and when to look -- played a major role in these projects. He not only found the first modern specimen of *Hemipachnobia* but was also involved in discovering the majority of its other populations. He also found the last known



population of the Arogos Skipper in the state and fortuitously kept the first specimen of the Rattlesnake Master Borer collected in the Nontarget survey, later identified by Eric Quinter on one of his visits to Bo and Ashley's home. On one of his visits, Eric also discovered the population of the Crystal Skipper that now bears his name.



Bo with Jim Petranka

Each of these projects involved hundreds of man-hours and travel over vast distances. The Arogos study in particular involved our coordination of separate surveys across five different states, from New Jersey to Louisiana. The Crystal Skipper survey also covered most of the North Carolina coastline, from Bird Island on the South Carolina border to the Currituck Outer Banks on the Virginia border, frequently requiring boats to reach isolated barrier islands, followed by long traverses on foot to search the dune fields potentially occupied by this species. While the *Hemipachnobia* study was more geographically focused, it also involved several years of effort, including a year-long larval rearing study to better understand its host plant uses. Nocturnal searches were also made for both larvae and adults – Bo had to rescue me once in the middle of the night when I got my vehicle completely enmired in a bog out in the middle of the Croatan and had to walk out several miles to the nearest pay phone (still in existence back then) to give him a call.

The effort we put into these surveys gave us a much clearer understanding of the causes of

decline in these species, particularly the effects of habitat fragmentation on organisms that are highly dependent on dispersal to sustain their populations in disturbance-maintained landscapes. This information allowed us to accurately predict the extirpation of both the Arogos Skipper and Rattlesnake Master Borer from the state, and we additionally documented the loss of one population of the Loammi Skipper – a close relative of the Crystal Skipper – that we included in our survey for that species. Following the destruction in a wildfire of the last-known population of the Arogos Skipper along with a subpopulation of *Hemipachnobia*, Bo spent several of the following years under contract with the US Forest Service to see if any more populations could be found in the Croatan for these species. While he did, in fact, discover a couple of new sites for *Hemipachnobia*, no sign of the Arogos Skipper has been found since its loss, not only in North Carolina but anywhere between New Jersey and Florida, where populations still exist.

Despite all these efforts and the vast amount of information we accumulated on these species, in each case no decision was reached to list these species as Endangered or Threatened until yet more surveys could be conducted; in the case of the Crystal Skipper, it also needed formal description before it could qualify (not done until 2015 by John Burns). **Sad Lesson 2:** conservation of lepidoptera – or insects of any kind – is a tough sell!

### Why Moths?

Indeed, why devote so much time, effort, and expense to moths? Back in the 1970s, when Bo began his investigations, moths were the epitome of obscure species – unknown creatures that flew around in the dark and best known for their hapless confusion by candle flames. If there was one other thing known about them it was that there were a lot of very serious pest species in this group – almost all research on moths up to that time (and still) concerned ways to control their depredations on crops. Even species that are native to our forests have been labeled as

“pests” – inimical to human interests – and more in need of elimination than conservation. If anything, however, research efforts conducted by Bo and other lepidopterists have more than documented moths – in all of their abundance and diversity – as critical for maintaining the vitality of our native ecosystems. Without their key roles as top-down control agents of the vegetation, as food for hundreds of other species – e.g., neotropical migratory birds – and as pollinators, these complex, highly interconnected systems would virtually cease to exist.



Bo at Bluff Mountain

Although Bo told me long ago how he got involved in moths, I am unclear now about the details. He appears to have taken a route taken by others, becoming entranced by birds when he was young, followed by a similar fascination with butterflies – bird-like in their bright colors, diversity, and conspicuous diurnal activities – and finally awakening to the much richer diversity and vibrancy of moths. Like myself and many others who have hung out a sheet to observe moths at night, the experience is eye-opening, revealing a vast, mysterious world that simply compels exploration. In this regard, Bo would have been right at home in the 19<sup>th</sup> Century, like Darwin, Wallace, Bates, and others, becoming fascinated with biodiversity and pursuing research into this field purely for its intrinsic interest.

Although I am sure that he would have happily pursued this interest purely as a taxonomist – communicating primarily with other similarly

interested experts in this field -- he certainly came to recognize the perilous condition of many of our moth and butterfly species and was easily swayed to become involved in their conservation. After our inconclusive efforts with the USFWS status surveys and particularly following the Big Riff (RIF = Reduction in Force) at the Natural Heritage Program, we both realized that the general lack of public awareness about moths or about the urgency of biodiversity conservation were themselves major obstacles to our efforts to protect the state’s natural heritage.

Instead of writing a book describing the moth fauna of North Carolina – a nearly impossible task except in the most general of terms – we decided to follow the example that Tom Howard and Harry LeGrand had pioneered, developing a taxon-focused website that could keep accumulating new information – a major concern for this group -- and that potentially could reach a much wider audience than a book could achieve (not that we didn’t ourselves have bookshelves full of field guides). In addition to making information on moths more easily and widely available, we also wanted to develop a way for members of the public to submit records directly to the website; this was something that Tom in particular was more than ready to implement as the new model for biodiversity websites.

Our intention was to make this website more than simply an identification guide: as in our earlier survey efforts – whose records formed the backbone of this project – we wanted to make use of the information submitted to the website to further document the ecological relationships and conservation needs of the state’s moth populations. In turn, we wanted to make this information itself much more widely understood, answering the basic question “why moths”. Quite simply, without a much wider base of public support, biodiversity conservation – and moth conservation in particular, as we had discovered -- would simply be impossible.

For this approach to work, however, we had to have as much scientific credibility as possible. In our previous surveys we were able to work directly with specimens, making use of the morphological features described by taxonomists to identify them to species. With the submission of records based solely on photographs, we needed to develop new expertise, based solely on external appearances, a much more challenging problem for accurate identification. In this regard, Bo was our vetter of last resort: any specimen that the rest of us could not easily identify, Bo would check against the specimens in his large collection, a key reference underlying the success of our efforts.



Bo in the Uwharries

More importantly, we relied on the expertise Bo had developed over many years of studying this group of species, both out in the field, in the lab, and through his collaboration with many other experts. This is a model that we continue to follow, thanks to the mentoring that Bo gladly provided to our group, helping to develop the next generation of experts. Rather than go the way of using AI as a short-cut for identification purposes, we put our trust in the development of human expertise, following Bo's example. This involves extensive experience both in the field and lab, the use of standard taxonomic methods, familiarity with the literature, and collaboration

with taxonomic experts. Particularly with respect to conservation, humans and the values they place on biodiversity, the natural world, and their place within it cannot be replaced by any artificial source. Only humans can both ask the question "why moths?" and appreciate the answer.

### Friendship

Although we grew up in different parts of the country and different circumstances, we both developed a strong interest in natural history early on and somehow managed to keep those interests a vital part of our lives into adulthood: in that regard, we had no problem understanding one another and enjoying each other's company. Although both of us were long accustomed to conducting solo natural history investigations, we also greatly appreciated each other's company in the field, which often involved adventuring into potentially hazardous terrain and weather conditions, both during the day and night. In many cases, this required using four-wheel drive to get to sites far from the nearest paved road and then hiking-in even farther to remote areas that still possessed interesting natural habitats. In the Fort Liberty surveys, we dodged plenty of cottonmouths in the wetland habitats we sampled and encountered more than a few bears both in the Coastal Plain and mountain wildernesses. Fortunately we all survived and were able to go about our business.

In addition to the time we spent in the field, I enjoyed many visits to Bo and Ashley's house in Beaufort – as mentioned before, a well-known haven for many itinerant lepidopterists -- as well as their cabin high atop a ridge in Ashe County. Bo also stayed with Dee and I on several occasions. When my daughter, Savannah, was young, she thought that the times that Bo visited us at home were mainly for her benefit – one time he brought her a chrysalis of a Brazilian Skipper, which she successfully kept until it eclosed and then released to the wild (although an exotic species, they appear to feed solely on Canna Lilies, which themselves are widely planted exotics).

We always looked forward to our next big adventure and our last project was particularly memorable. Beginning in 2020, we began making monthly trips down to the Sandhills Game Land, staying at Jeff Beane's farm house/field station in Hoffman (thanks Jeff!) as our base of operations. We were initially joined by Todd Pusser, who had grown up in the area and served as our guide to potentially rich sampling grounds. Jim Petranka – newly converted from herpetology to moth-ology – joined us the following year lugging around his massive live trap and setting up numerous sheets for moth photography. Jim's wife Becky and brother John joined us on a couple of our last trips, as did Carol Tingley, in search of myriapods rather than moths. Very sadly for me, I missed the last couple of trips to Hoffman and was unable to join Bo and Jim on their last big trip to the Nantahalas in September of 2023. Apart from one last survey trip to the Croatan in April of 2024, that was Bo's final sampling trip and, as always, it involved the discovery of a very rare species that had never before been seen in North Carolina, the still undescribed (but soon to be) *Papaipema* species 1.

### **Lasting Inspiration**

To me, Bo was above all else a finder: his ability to find new species or re-discover long lost ones was no accident, but a combination of intuition, long experience, and fundamental interest in his subject. These skills when applied to finding species are still much appreciated and coveted by naturalists – witnessed by the competition for

the longest life lists of birds, butterflies, or, now, even moths. However, I doubt that Bo ever bothered to tally up his amazing list of discoveries, but instead kept searching out of its own, intrinsic interest to him.

I also view his continued searches as an expression of his optimism. When the last known state population of Arogos Skippers went up in flames, I was more than ready to conclude that we had correctly predicted its demise, based on all of the work we had put into trying to understand the perils this species faced. Bo, however, was never ready to conclude that it had, in fact, been completely extirpated. He continued to think, that with the right skills and the continued searching of potential habitat areas that some heretofore hidden populations could still be discovered and – if so – then there was still a chance to get its conservation done right. The same was true for other apparently lost species: never give up the hope that they still might turn up.

Given the planet's dire set of predicaments, such optimism is now needed more badly than ever. Only by continuing the search – against long odds – for as yet undiscovered solutions do we have any hope for finding a way out. If Bo's example inspires such hope, that will be his most important legacy.

**Final Lesson:** keep on looking; keep on learning; search all the hidden corners!

Steve Hall  
January 2025



*Papaipema cerina*