

LEPIDOPTERA NEWS

March 2001

No. 1

THE McGUIRE CENTER FOR LEPIDOPTERA

The McGuire Centers for Lepidoptera Research and Insect Conservation to be Established in Gainesville at the University of Florida

by Thomas C. Emmel

The largest private donation for insect systematics in American history has been made for the formation of a world center for Lepidoptera research in Gainesville, Florida.

On December 28, 2000, the University of Florida received a gift of \$4.2 million from Dr. William W. McGuire and Mrs. Nadine M. McGuire of Minnesota (Fig. 1, p. 4). This donation, expected to be matched 1:1 by a donation enhancement program of the State of Florida, for a total endowment of \$8.4 million, provides the support to construct two major new facilities in Gainesville: a 35,000 sq. ft. educational museum and research complex to be named McGuire Hall, which will contain the McGuire Center for Lepidoptera Research, and a 6,200 sq. ft. research and teaching facility to be named the McGuire Center for Insect Conservation.

McGuire Center for Lepidoptera Research

The state-of-the-art McGuire Center for Lepidoptera Research facility (Fig. 2, p. 5) will enable the University and the State of Florida to gather its substantial but widely scattered collections and research programs dealing with this huge group of insects into one centralized building for the first time. It will unite over 1.2 million specimens from the Allyn Museum, currently in Sarasota, Florida, with several million Lepidoptera specimens in Gainesville from the Florida State Collection of Arthropods, the University of Florida, and the William W. McGuire collection, plus other donated collections. The combined collections are estimated to presently comprise over 3 million specimens, and may soon reach approximately 6 million specimens, once expected donations are included. Sufficient expansion space is planned to double or triple these holdings with additional material from all over the world in the next 20-30 years.

The new McGuire Center for Lepidoptera Research will include numerous offices and research laboratories to accommodate up to 12 curators and faculty who will be working with Lepidoptera. These include present curatorial positions centered at the Allyn Museum of Entomology, in Sarasota, the Florida State Collection of Arthropods, at the Division of Plant Industry, in Gainesville, and faculty from the departments of Entomology/Nematology and Zoology at the University of Florida.

The new building, McGuire Hall (Fig. 2), will house over 80,000 glass-topped insect drawers in four parallel mechanical compactor systems, with multiple aisles in each compactor row, thus maximizing the use of available floor space. These drawers will hold the combined Lepidoptera collections presently scattered among the cooperating units in Florida, from Sarasota (at the Allyn Museum of

Entomology) to Gainesville, at the Florida State Collection of Arthropods (FSCA) and across the University of Florida campus in facilities as diverse as the departments of Zoology, Entomology/Nematology, Natural Sciences (at the Florida Museum of Natural History), and the Boender Endangered Species Laboratory, plus other collections expected to be added within the next few years. McGuire Hall will be built adjacent to the current Florida Museum of Natural History (FMNH) building on the campus of the University of Florida and nearby also to the present building of the Florida Dept. of Agriculture & Consumer Services, Division of Plant Industry (DPI), where most of the FSCA is housed (see Fig. 4, p. 7).

McGuire Hall, set among the museum complex of the University of Florida (Fig. 3), will be administered as part of the Florida Museum of Natural History (FMNH), while the collections will be part of the statewide Florida State Collection of Arthropods (FSCA). All the state-supported insect collections in Florida comprise the FSCA. The FSCA includes the insect collections that are housed in Gainesville, plus certain aquatic insect groups currently housed at Florida A. & M. University, in Tallahassee, and will total about 12 million insect specimens once all collections and expected donations are consolidated in 2003.

There will also be a special collection area in McGuire Hall with compactors to house the substantial holdings in immature Lepidoptera of the FSCA, with nearly half a million eggs, larvae, and pupae in alcohol vials: one of the world's largest such accumulations of preserved larvae and other immatures. As with the main collection room for the adult specimens, there will be sufficient space to house the projected growth of the immatures collection for at least the next two to three decades. Included also are large quantities of chromosome samples at the University of Florida from a high percentage of the butterflies of the world, plus a growing special collection of the FSCA of adult Lepidoptera preserved in alcohol for future detailed internal morphology studies.

McGuire Hall will also include advanced laboratories equipped for the newest techniques in systematics: molecular genetic research with DNA sequencing, gas chromatography of cuticular hydrocarbons and other organic chemicals potentially useful in systematics, as well as electrophoresis of enzymes, pheromone analysis, assays for juvenile hormones, development of artificial diets for Lepidoptera, plus other developmental, physiological and genetics related research areas.

The facility will also house two scanning electron microscope (SEM) instruments: one presently at the Allyn Museum of Entomology and one at the Boender Endangered Species Lab. Combined with

[cont. on p. 4]

LEPIDOPTERA NEWS

Editor: J. B. Heppner
Assoc. Editor: Thomas C. Emmel

Published by the
Association for Tropical Lepidoptera, Inc.
P. O. Box 141210

Gainesville, FL 32614-1210, USA

Tel: (352) 392-5894 FAX: (352) 392-0479 www.troplep.org

Frequency: Quarterly (March, June, September, December)

e-mail: jbhatl@aol.com

ISSN: 1062-6581

The Association for Tropical Lepidoptera, Inc., is a non-profit corporation for the study and conservation of tropical and subtropical Lepidoptera of the world. Contributions are tax-deductible. Advertising is accepted.

ASSOCIATION FOR TROPICAL LEPIDOPTERA

BOARD OF DIRECTORS

Vitor O. Becker (Brazil)	Gerardo Lamas (Peru)
Don R. Davis (USA)	Olaf H. H. Mielke (Brazil)
Boyce A. Drummond, III (USA)	Eugene G. Munroe (Canada)
Peter J. Eliazar (USA)	Jon D. Turner (USA)
Thomas C. Emmel (USA)	

Chairman and Executive Director: J. B. Heppner

ADVISORY COUNCIL

Andrés O. Angulo (Chile)	Jean-Francois Landry (Canada)
Yutaka Arita (Japan)	Torben B. Larsen (England)
George T. Austin (USA)	Claude Lemaire (France)
Manuel A. Balcázar L. (Mexico)	Jorge Llorente B. (Mexico)
Henry S. Barlow (Malaysia)	Martin Lödl (Austria)
Dubi Benyamini (Israel)	Wolfram Mey (Germany)
Ronald Boender (USA)	Kauri Mikkola (Finland)
Keith S. Brown Jr. (Brazil)	Scott E. Miller (USA)
José A. Clavijo A. (Venezuela)	Joël Minet (France)
Charles V. Covell Jr. (USA)	W. M. Neukirchen (Germany)
U. Dall'Asta (Belgium)	K. T. Park (South Korea)
Philip J. DeVries (USA)	Rod E. Parrott (Canada)
Edward W. Diehl (Indonesia)	Amnuay Pinratana (Thailand)
Julian P. Donahue (USA)	Dalibor Povolný (Czech Rep.)
Ulf Eitschberger (Germany)	Jozef Razowski (Poland)
Eric Garraway (Jamaica)	M. Alma Solis (USA)
Dale H. Habeck (USA)	Dieter Stünig (Germany)
Christoph Häuser (Germany)	Gerhard Tarmann (Austria)
Lowell N. Harris (USA)	Paul Thiaucourt (France)
Hiroshi Inoue (Japan)	Jürgen H. R. Thiele (Germany)
Daniel H. Janzen (USA)	Antonio Vives M. (Spain)
Kurt Johnson (USA)	András Vojnits (Hungary)
R. L. Kitching (Australia)	Hsiau-Yue Wang (Taiwan)
George O. Krizek (USA)	Per O. Wickman (Sweden)
Tosio Kumata (Japan)	Allen M. Young (USA)

TO OUR READERS

This issue has perhaps the most noteworthy news that we will ever announce: the formation of the new McGuire Center for Lepidoptera Research. The donation by Dr. & Mrs. McGuire, for this new Lepidoptera Center, probably is on a par only with what Lord Rothschild did after 1881 in the formation of his Tring Museum, which later went to the British Museum, in London, in 1937. Together with matching funds from the State of Florida, the new McGuire Center is an unparalleled development for Lepidoptera studies worldwide.

Dr. Emmel has taken the lead over these past 15 years in working on the development of a Gainesville-based Center for Lepidoptera, to consolidate all the Lepidoptera collections of the Florida State Collection of Arthropods and the Allyn Museum, plus the Lepidoptera laboratories of the University of Florida. The beginning efforts resulted initially in the support he garnered for the Boender Endangered Species Laboratory, culminating now with his efforts in having Dr. McGuire bring his collections and support to a new Center in Gainesville. The new Lepidoptera museum of the Florida State Collection of Arthropods, in the McGuire Center, will initially house a worldwide collection of about 3 million specimens of pinned adults, plus about 400,000 larvae in alcohol vials.

Further development of Lepidoptera studies in Gainesville will include support for graduate students and visiting researchers, and a vigorous effort to collect Lepidoptera samples from biodiversity hotspots in the world before more and more of them become degraded by timber harvesting and development. Basic studies on Lepidoptera genetics and morphology, besides collection-based taxonomic research, will be at the forefront of the new Lepidoptera Center. Likewise, efforts already made by our ATL to form new field stations for biodiversity studies, in such remote areas as Rondônia, Brazil, and in Ecuador, will be enhanced as more such sites will be sought and developed, particularly with your added donations for conservation.

J. B. HEPPNER
Executive Director

NOTES

1. **2001 Annual Meeting:** April 20-22 in Gainesville.
2. **2001 Annual Photo Contest:** deadline is March 15, 2001. Note that the prize awards include a Grand Prize winner.
3. **Cover Photos:** members can note that color photos for journal covers are always sought. ATL does not pay photo fees, but you do have the gratification of having your photo selected for one of the front or back covers. Photos should be exceptionally sharp and in our page proportion.
4. **ATL Debentures:** a number of ATL members have already taken advantage of our interest rates and invested in ATL debentures. Please let us know what you can do to help! Returns of principal (at end of period) and interest (paid annually) are guaranteed.
5. **ATL Home Page:** see it at <http://www.troplep.org>. Coming soon (hopefully): color photo files of worldwide butterflies and moths!
6. **2000 Journals:** the 2000 issues are in preparation and probably will be issued together as a group, or mailed nearly simultaneously.
7. **ATL Photo Archives:** Consider ATL as the ultimate depository for your valued color slides of moths and butterflies and larvae. Do not let your investment of time and effort go to relatives who may not appreciate photographs of Lepidoptera; donate them to the ATL Photo Archives. You are welcome to send listings of your holdings to add to the ATL Photofile database: let others know what species you have recorded on film.
8. **Life memberships:** ATL life membership costs \$2,000 (or \$400 per year for 5 years).
9. **Membership List:** the new membership list is being compiled and should be out this year as an issue of the *News*.

ELECTIONS

Results of the 2000 vote make Dr. Olaf H. H. Mielke President for 2001:

Dr. Olaf H. H. Mielke, Curitiba, Brazil	145
Dr. Martin Lödl, Vienna, Austria	47

Candidates for other offices were re-elected for another year of service. There was a write-in vote for George Austin for VP, and for Dr. Jeremy Holloway for President, however, Holloway is not an ATL member.

JOURNALS: separates (1990-95 only), \$1 first page, 25¢ each added page (specify author and citation). Past journal issues: \$22.50 each (1990-98) (1994 *HL* double issue: \$45). *Lepid. News*: \$10 per year.

CONTENTS for the journals are issued every two years.

NEW MEMBERS: the ATL journals are \$65 the first year for new members, the same as ATL members who pay before Dec. 31 each year. New members may join ATL anytime but membership begins in January (either the year of joining or for the next year).

BACKGROUND ON THE McGUIRE GIFT: A Family's Interest in the Natural World and its Preservation



Fig. 1. Dr. William McGuire.

The \$4.2 million private gift to the University of Florida Foundation for the construction of the McGuire Center for Lepidoptera Research, McGuire Hall, and the McGuire Center for Insect Conservation, comes from the William and Nadine McGuire Family Foundation, in Wayzata, Minnesota.

Dr. William W. McGuire, who received his medical degree from the University of Texas at Austin and married Nadine, a fellow U.T. student there, has long had an avocational interest in Lepidoptera. As his career took him ever higher in the professional health care field, ultimately resulting in becoming President, then Chairman and CEO of the giant United Healthcare Corporation (now the UnitedHealth Group), he never lost sight of his early interest in Lepidoptera. Particularly intriguing to Dr. McGuire was the group of small butterflies known as skippers, in the families Hesperidae and Megathymidae. These are particularly diverse in the southwestern United States, and during the McGuires' years in Texas, southern California and Colorado, prior to moving to their present home near Minneapolis, Minnesota, Dr. McGuire made many notable discoveries in the field of lepidopterology. He has had several new butterflies named after him, and has also published a number of professional systematic papers describing new skippers (particularly in the Holarctic genus *Hesperia*) and important notes about their biology and ecology.

The McGuires have previously sponsored studies at the University of Florida on conservation of the Schaus Swallowtail (*Papilio aristodemus ponceanus* Schaus), a Federally listed endangered butterfly species in the Florida Keys, and also the Rockland Skipper, an endangered species of skipper butterfly in the genus *Hesperia* (near *meskei*) found today only on Big Pine Key in the Florida Keys and nearly extinct.

In previous years, Dr. McGuire has also given his very important collections to the University of Florida, completing these gifts in 1997 with over 30,000 specimens of the diverse and widespread genus *Hesperia*, found across North America and Europe. His collection represents the most extensive personal collection of these skippers in the world. His earlier gift of reared southwestern United



Fig. 2. Mrs. Nadine McGuire.

States material of the Giant Skipper family Megathymidae, ranked as the foremost collection then outside any other institutional collection and has provided a fertile field of research for graduate students in the Departments of Entomology/Nematology and Zoology at the University of Florida.

Nadine McGuire has served on the boards of many civic organizations in Minneapolis, MN, and Washington, D.C., including the Kennedy Center, and has a passionate interest in public education, particularly focusing on elementary school and secondary school students and fostering their interest in the sciences. McGuire Hall, the museum and exhibit facility to be constructed as part of this gift, will include more than 5,000 sq. ft. of public exhibit space using butterflies and moths as examples of how scientists have discovered many important interrelationships in ecology, evolution, genetics, developmental biology, and similar fields. There will also be a major public display of living butterflies and moths in a 2,000 sq. ft. tropical setting at the front of McGuire Hall, to dramatically allow the visitor to experience the thrill of discovery for themselves of some of these phenomena such as the development of mimicry patterns, protective camouflage, and even frightening coloration, used to evade bird and lizard predators.

The McGuires' two daughters, Marissa (18) and Chelsea (12), share their parents' enthusiasm for educational outreach and the importance of understanding the natural world and all its ramifications. Marissa accompanied the University of Florida research group in May and June 2000 to the Florida Keys to work on Schaus Swallowtail research and a tropical hardwood hammock restoration project. She also participated in work with endangered sea turtles on the east coast of Florida and on a special expedition to Tortuguero (as well as other tropical sites) in Costa Rica with advanced students.

All four of the McGuires came to Gainesville on December 15, 2000, to personally visit and approve the sites where the McGuire Center for Lepidoptera Research and the McGuire Center for Insect Conservation will be built. So this is truly a family interest, one culminating in this major gift for these exciting new programs at the University of Florida.

THOMAS C. EMMEL
Univ. of Florida, Gainesville, Florida

Florida Museum of Natural History



Fig. 1. The McGuire family at the Florida Museum of Natural History, in Gainesville, in December 2000: left to right are, University of Florida President Dr. Charles Young, Mrs. Nadine McGuire, Dr. William McGuire, their two daughters Chelsea and Marissa, and Prof. Thomas C. Emmel.

these will be state-of-the-art image analysis systems and advanced optical microscopes for detailed analysis of neural and sensory organ anatomy, chromosomes and other cellular structures in Lepidoptera.

Special preparation rooms and work areas for student preparators and professional collection managers will be provided. Included will be a sorting center to process specimens from large-scale surveys and expeditions to assess Lepidoptera diversity in various areas of the world by sampling and documenting this biodiversity. Offices and laboratory spaces for up to 30 or more graduate students and undergraduates interested in Lepidoptera are planned, plus eventual funding to support such students.

Additionally, provision is being made for offices for Resident and Visiting Scientists, including amateur and professional lepidopterists who wish to work for short or long periods of time on groups of interest in the McGuire Center collections. It is hoped that numerous specialists in different Lepidoptera groups will come to the McGuire Center to study the collections and publish research findings.

A fully equipped library room to house the 6,000 volumes on Lepidoptera from the Allyn Museum of Entomology, and the more than 5,000 volumes in other collections at the University of Florida and in off-campus facilities, will be included, plus tens of thousands of Lepidoptera reprints. A separately funded auditorium for the museum complex (see Fig. 4) is planned, thus allowing conferences to be held in the most up-to-date theater-like setting. The University of Florida Conference Center is also nearby (on the west side of the

main thoroughfare, 34th Street), offering meeting rooms, dining facilities, and hotel accommodations for society meetings and visitors.

McGuire Hall

A public museum and exhibit facility will comprise the north front of McGuire Hall (Fig. 2), facing the existing Harn Museum of Art across a landscaped mall (Fig. 4). This public display facility will include a large living butterfly vivarium, open 365 days per year to an expected several hundred thousand visitors annually. More than 5,000 sq. ft. of permanent and traveling exhibits will focus on the many themes in the biological and natural sciences to which research on butterflies and moths has contributed over the centuries. There will be educational and interactive displays on ecology, biodiversity, conservation, environmental pollution and change, tropical rain forests and other habitats around the world, mimicry and protective coloration, the fossil history of butterflies and the flowering plants, developmental biology, genetics, behavior, and of course the science of systematics and principles of classification, phylogenetic analysis, and the history of taxonomy as illustrated by the Lepidoptera. Adjacent to the butterfly house of McGuire Hall, there will be an extensive butterfly garden (Fig. 4).

McGuire Hall will be the largest such facility in the world dedicated to the biodiversity and systematics of Lepidoptera, and to the intensive study of the biological phenomena that butterflies and moths help to interpret. It will provide ample housing for what will

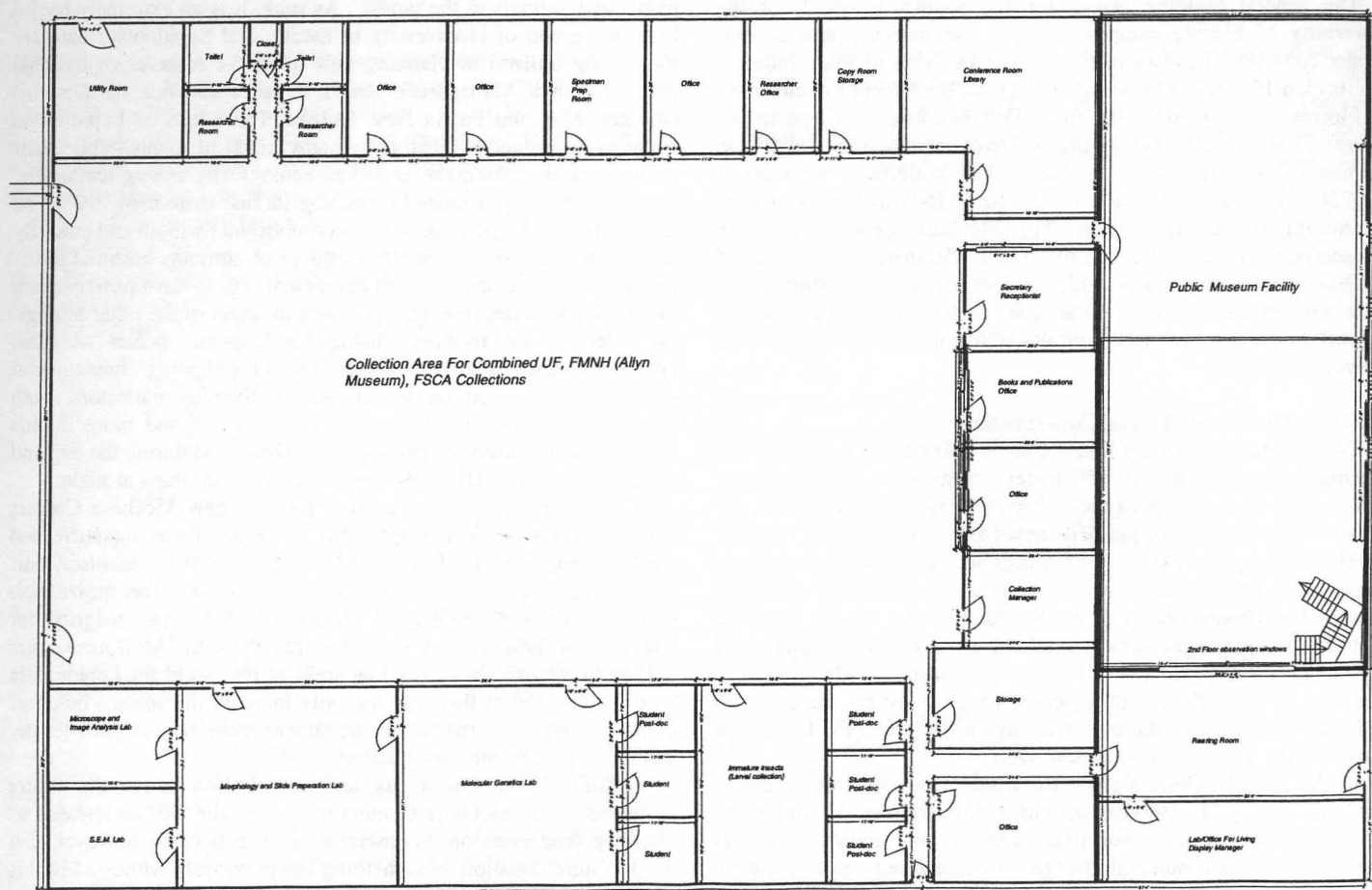


Fig. 2. Draft floor plan for McGuire Hall: 4 compactors will fill the central collection room to house over 80,000 insect drawers; offices may be doubled in number with a perimeter second floor around the open collection room. The collection room is 80x145 ft., and the overall building is 130x200 ft. (plus the vivarium).

be one of the most inclusive collections of this important order of animals in the world. In fact, it will likely be second only to the venerably rich collections of the British Museum (BMNH), in London (now called the Natural History Museum), in comprehensive coverage of the approximately 20,000 species of butterflies, including more than 95% of the known butterfly genera and species. Equal emphasis will be placed on building the Center's holdings of moths, to eventually include as many of the world's estimated 235,000 moth species as possible, representing more than 90% of lepidopteran biodiversity.

With the combined collections in McGuire Hall to include all the Lepidoptera collections of the FSCA, substantial space will be freed in the present FSCA Doyle Conner Building museum, of DPI, for expansion of other insect groups, now totaling over 7 million non-lepidopteran insect specimens, and making Gainesville a principal destination to visit for systematic entomologists from around the world. Total insect collections in Gainesville will approach 12 million curated specimens once McGuire Hall is completed and all upcoming donations and other acquisitions have been incorporated, and with what will remain in the nearby FSCA/DPI building, making the insect collections in Gainesville among the largest such holdings in the world.

Ground breaking is expected by the autumn of 2001 and, with an accelerated construction schedule, the two buildings should be ready for occupancy in early 2003. McGuire Hall, home of the McGuire Center for Lepidoptera Research, will be placed on an elevation far above any possible floodplain, with standby power generators, underground utilities, special wind resistant construction, fire suppression and other precautions, to thus be among the most advanced and secure museum buildings in the world.

A world-class architect and designer will be engaged to develop the final concept and design of the building. When construction is completed, the Allyn Museum of Entomology, in Sarasota, together with its curatorial positions, will move to Gainesville to the new facilities in early 2003. The Allyn Museum was brought to Sarasota from Chicago thirty years ago by the late Arthur Allyn, who later donated the collection and building in Sarasota to the University of Florida Foundation in 1981. Since then, the Allyn Museum, now totaling about 1.2 million Lepidoptera, has been administered by the Florida Museum of Natural History, but has remained in Sarasota awaiting space to house it in Gainesville. The Allyn Museum has the world's largest holdings of Neotropical butterflies.

Current floor plans for McGuire Hall (Fig. 2) present a building of 130 x 200 ft., with the public exhibit and live flight areas under separate ventilation and utilities service to prevent any preservation problems for the museum collections. The 80 x 145 ft. main collection room has enough floor space to house a maximum of 80,640 insect drawers when arranged in 4 large storage compactors. The drawer capacity of McGuire Hall is sufficient to house close to 10 million Lepidoptera (based on the 8.5 million Lepidoptera specimens currently housed in 75,000 drawers at the BMNH, in London). The compactors are expected to have enough open aisles to allow a minimum of 8 researchers access to parts of the collection at any one time. Another possible design, to add onto the floor plan shown (Fig. 2), awaits further refinement once the architects work on the building plans, and would have a second floor of offices and laboratories around the perimeter of the main collection room, thus making it possible eventually to also economically install another floor of collection space for a second group of 80,000 drawers, should the need arise in the future.

The general building layout for the southwest corner of the University of Florida campus, housing the museum and concert theater complex, is shown in Fig. 3. The Division of Plant Industry has its own 10 acres of buildings and grounds adjacent to University of Florida property (only the main DPI building is shown in the figure). Covered walkways are planned to connect McGuire Hall both to Powell Hall of the FMNH and to the DPI building where most of the FSCA is housed. Future plans of the FMNH include a modern auditorium and a planetarium. The McGuire Center for Insect Conservation, to be built only 1400 ft. (ca. 450 meters) to the east of McGuire Hall, will be accessible on foot via a meandering nature walk through the wooded natural area south of the concert theater, and will be adjacent to the Entomology/Nematology Building on the University campus.

McGuire Center for Insect Conservation

The McGuire Center for Insect Conservation building, to be built approximately 1400 ft. (ca. 450 meters) away from McGuire Hall, will be next to the present Entomology/Nematology building on the University of Florida campus. The new facility will provide approximately 6,200 sq. ft. of space for rearings and studies on Lepidoptera, conservation of endangered species, habitat restoration and preservation, and environmental policy, all added to the on-site butterfly flight and rearing cages already available at the Boender Endangered Species Laboratory, funded in 1994 by gifts from Ronald and Grace Boender, of Butterfly World (Coconut Creek, Florida), the National Fish and Wildlife Foundation (Washington, DC), and the U. S. Fish and Wildlife Service (Washington, DC).

In the new McGuire Center for Insect Conservation, research, teaching, and public service activities will address the important environmental issues of our time, such as the impact of global warming and environmental change on endangered species, insects as indicators of healthy biodiversity in natural habitats ranging from the Florida Everglades to the tropical rainforests of the world, and the impact of biocontrol measures versus the use of chemical pesticides on agricultural crop pests and the health of surrounding human populations and ecosystems.

The insect order Lepidoptera contains an estimated 255,000 species of butterflies and moths in the world (thus far, about 146,000 species have been described and named), and is thought to be second in size and importance only to the beetles among all the orders of

plants and animals in the world. As such, it is an extremely useful indicator group of biodiversity in nature, and Lepidoptera data are now being utilized in planning new areas for reserves or national parks in Kenya, Madagascar, Brazil, Ecuador, Jamaica, the Dominican Republic, and Papua New Guinea. The adults of Lepidoptera serve as important pollinators to many kinds of plants, while their caterpillars are extremely important ecologically and agriculturally. For example, it is estimated by ecologists that more than 90% of all leaf damage in tropical forests is accomplished by moth and butterfly caterpillars, creating a constant turnover of nutrients essential to the health of the ecosystem as their excrement falls to the topsoil beneath the trees. Likewise, research programs in many of the other biological sciences are routinely using Lepidoptera species as ideal laboratory and field organisms for investigating fundamental questions in the natural world. As biodiversity indicators, both butterflies and moths are becoming used more and more in this capacity, with butterflies being easily inventoried during the day and most moths being efficiently captured with light traps at night.

It is to be fervently hoped that the two new McGuire Centers being founded in Florida will help to further focus scientific and public interest on the Lepidoptera, both to further elucidate their fascinating evolution and biodiversity, and also to further utilize their diverse species as biological indicators of habitat integrity for conservation programs. A special emphasis of the McGuire Center will be to intensively survey key areas of the world for Lepidoptera biodiversity, and in this way not only increase the species holdings of the Center, but also further document these faunas prior to any further environmental degradation.

Additional announcements and information about the future programs of the McGuire Centers in Gainesville will be released as planning progresses on this major project. It is clear, however, that the McGuire donation — something not previously witnessed in this country and perhaps comparable only to the Rothschild donation of the Tring Museum and Lepidoptera collections to the British Museum in 1937 — will energize the possibilities of studies on Lepidoptera to unexpected heights for many years to come, and just at the time when biodiversity studies are most needed in threatened tropical and temperate habitats around the world.

THOMAS C. EMMEL
Univ. of Florida, Gainesville, Florida

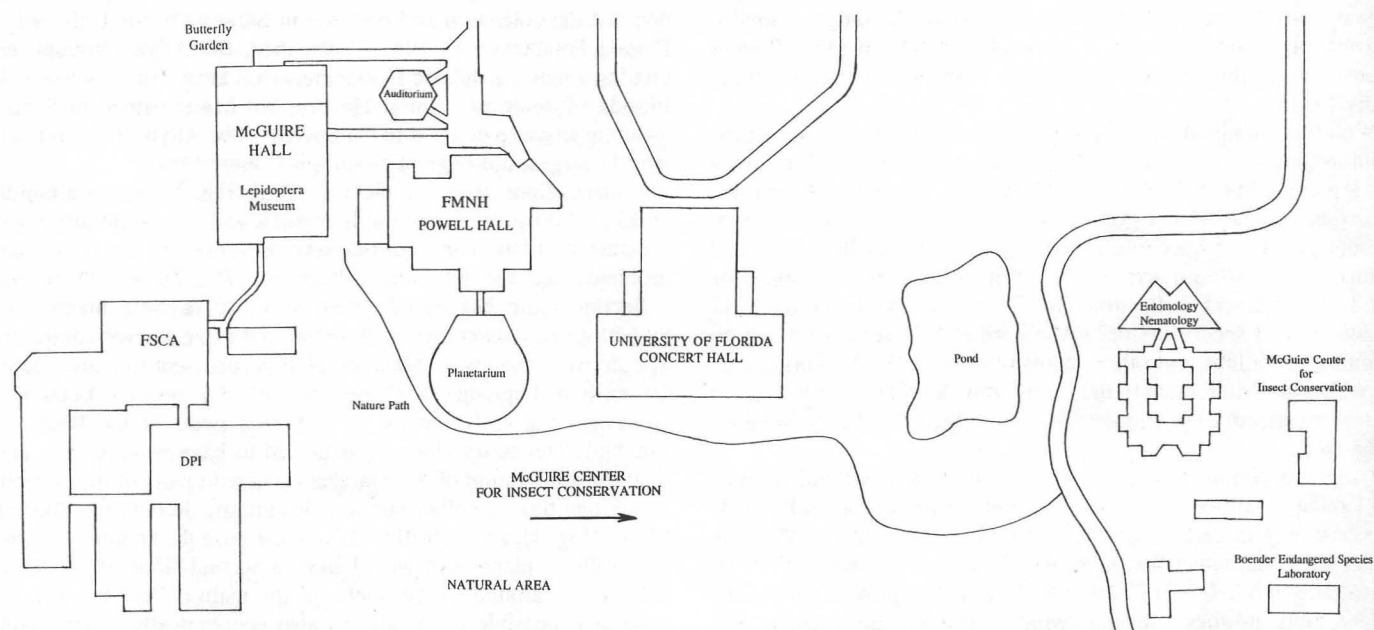


Fig. 3. Map of the southwestern corner of the University of Florida campus and the DPI grounds, showing placement of McGuire Hall adjacent to the Florida Museum of Natural History (FMNH), and where the McGuire Center for Insect Conservation will be adjacent to the Entomology/Nematology Building further east.

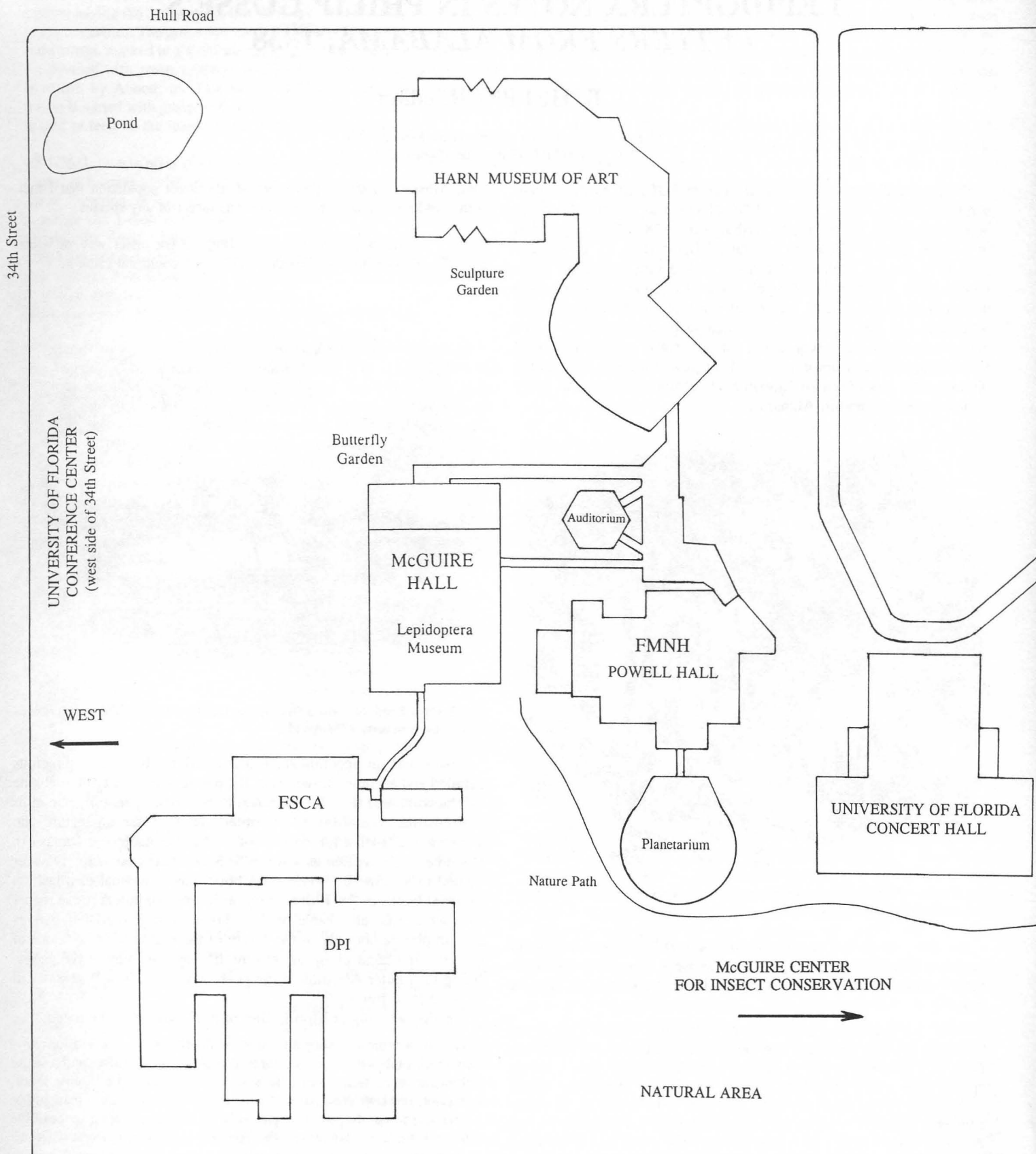


Fig. 4. Museum complex of the University of Florida, showing the location of the new McGuire Hall and its proximity to the present FSCA (in the DPI facility) and FMNH (the auditorium and planetarium shown are planned in the future by the FMNH). The insect conservation facility will be 1400 ft. (450m) to the east.

LEPIDOPTERA NOTES IN PHILIP GOSSE'S LETTERS FROM ALABAMA, 1838

J. B. HEPPNER, editor

Florida State Collection of Arthropods, FDACS, DPI,
P. O. Box 147100, Gainesville, Florida 32614

The natural history travelog, *Letters from Alabama*, by the British naturalist Philip Henry Gosse (1810-1888), was written from his notebooks during his travels to Alabama in 1838, where he resided in a small frontier village in central Alabama (Fig. 1). It was not until 1859 that he published the book, now a rare and rather little-known work. What makes Gosse's book of interest is his extensive descriptions of the natural history of a region of the United States little visited in the 1830s, and even less so by a naturalist. He also particularly noted the insect fauna, since that was a great interest of his, although he later became a noted authority on fishes and marine biology after his return to England. He made notes on the many Lepidoptera he found in Alabama.



Fig. 1. View of the main street of Pleasant Hill, Dallas Co., central Alabama, as Gosse saw it in 1838 (p. 157).

It is less known that on his way to Alabama he stopped for a brief period at Boca Grande in the Marquesas Keys (Fig. 2) of southernmost Florida, and has a few comments in his book on butterflies he found there:

[19-20] We rowed for a long beach of white sand, and immediately on landing, I ran with eagerness into the bushes armed with my insect-net. I expected to behold a gorgeous display of bright-winged tropical insects, and to make a rich harvest, to provide for which I had loaded myself with boxes. To my disappointment, however, insects were by no means abundant; probably owing to the peculiar nature of the vegetation, which consisted almost wholly of bushes having thick saline leaves, of which there might be a dozen varieties, and a few sedges. The soil was nothing but sand, composed of minute fragments of shells and corals; on close examination, I could not discover a particle of anything else: a great part of the island was overflowed by the sea. I saw *Vanessa orithya* and a little brown *Hesperia* — these were the only butterflies: a few insignificant moths, a small brown *Libellula*, an *Agrion* with blue wings, a large and handsome yellow wasp, a large green locust, an ichneumon, and

some Muscae, made up the totale of the insect population that I met with. I did not see a single coleopterous insect of any species.

[21] . . . as the wind had veered a little, we got under way. A white butterfly (*Pontia*) followed us on board, but I could not catch it.

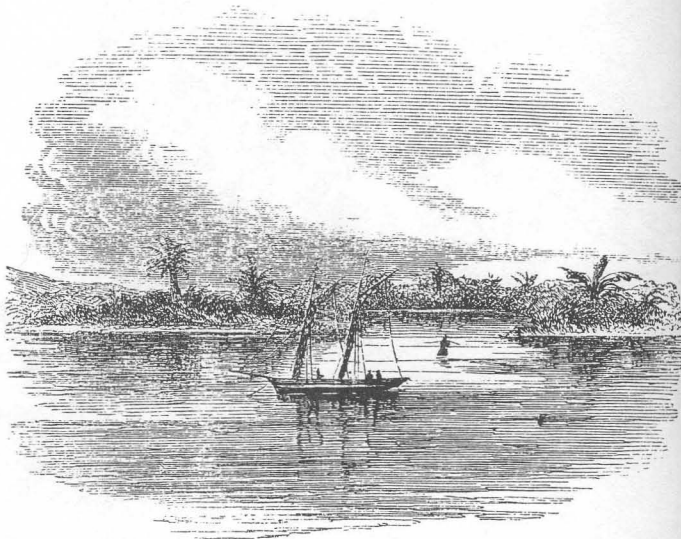


Fig. 2. Cayo Boca (now Boca Grande Key), in the Marquesas Keys, Florida, as Gosse saw it in early 1838 (p. 17).

Gosse was an accomplished artist, and his book has numerous detailed and accurate drawings of the nature and scenery of Alabama that he witnessed (Fig. 3-6). Interestingly, Gosse spent only 8 months in Alabama, from May to December 1838, observing nature and working as a teacher for children of well-to-do planters of Dallas Co. His notes were written as a series of letters that were actually never mailed to anyone: this style for a book was somewhat of a fashion in travel books in the 19th century, as a series of letters to the reader as it were. His remarkable book of his brief stay in Alabama gives a vivid picture not only of the nature of the region but also is one of the few first hand glimpses into the life and customs of the people living in frontier Alabama in the years when the Civil War was still in the distant future.

On first arriving at Mobile Bay in mid-May 1838, he noted:

[24] . . . one fine morning after a good night's run, we saw a long low tongue of land, with some scattered pine-trees on its ridge, and a white lighthouse at its termination. This was announced to be Mobile Point; two pilot boats were cruising about, from which we took a man and at once passed over the bar. This can only be passed at certain states of the tide, and is always dangerous; the breakers were running on it when we passed. There are several small islands about, — mere low, flat sandbanks, over which the tide runs, but on one of them there is another lighthouse erected. As we passed within a few hundred yards of the point, many specimens of a pretty moth flew on board; they were *Geometrae*, with angular wings, of a rich velvety cream colour, without spots. A very fine individual of the black swallowtail butterfly (*Papilio asterius*) likewise fluttered about the vessel.

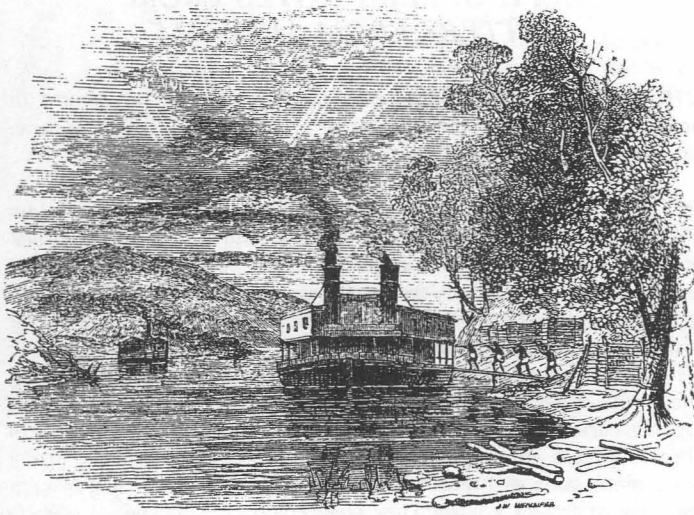


Fig. 3. Scene on the Alabama River, 1838 (p. 31).



Fig. 4. A swamp near Pleasant Hill, Alabama (p. 97).

He described the forest habitats he observed in central Alabama in this way:

[27] Everything here was new, scarcely a tree occurred that I was familiar with, and few I can now recollect sufficiently to identify. The magnolias, superb and magnificent as they are, were conspicuous and numerous; the large, glossy, laurel-like leaves gave them a rich and noble appearance, though I saw none of them adorned with the beautiful blossoms for which they are so famous. It may be that I was too late, that the season of flowering was over; for, as I passed up the river, many trees on the banks were richly ornamented with blossoms, especially as I approached the hill country. Large and gorgeously coloured insects hovered over the flowers, or fluttered from bush to bush, in such profusion that I was almost bewildered.

[117] There is an inexpressible grandeur in these primeval forests. Many of the trees are of immense magnitude, and their trunks rise like pillars from the soft and damp soil, shooting upward in columnal majesty; . . .

[118] And thus we see the original forest. The ground is commonly clear of underwood to a remarkable degree, so that it is by no means unusual for hunters to pursue their game on horseback at full speed through these sylvan recesses. A few slender shrubs occur, of species that delight in the greenwood shade; and in some parts the trees are united by trailing vines and prickly creepers that clog up the way; but these are rather found in the woods of second growth than in the pristine forests.

These images of the great Southern hardwood and pine forests of Alabama and nearby areas document what has for the most part been lost to development and agriculture over the past 170 years. Virgin forest with "immense" trees is a great rarity now in the eastern United States, although a few pockets of such old growth forest do remain and are for the most part now under protection.

Gosse was born in England in 1810. At the age of only 17, he went to Newfoundland to work as a clerk for a 7-year period, followed by stays in other areas of eastern Canada. After these years in Canada, he went to Pennsylvania and then travelled to Alabama in 1838 to find work as a school teacher. During his trip south, the ship he was on stopped in the Marquesas Keys and then proceeded on to Mobile Bay in early 1838. Upon his return to England, in early 1839, Gosse had wanted to publish a book on the insects of Alabama but his manuscript with over 250 color plates (Fig. 7) was never published (Gosse, ms.). He did finish another book, *The Canadian Naturalist* (1840). Gosse then studied on his own the collections at the British Museum in London, where after a period of this self-study he was hired as a collector and sent to Jamaica to collect natural history specimens for the museum. Gosse published two books from his Jamaica trip: *Birds of Jamaica* (1847) and *A Naturalist's Sojourn in Jamaica* (1851). Gosse then studied marine biology and became most known for his studies in this field. He started the first aquarium at London's Regent Park, later starting the first successful marine aquarium in 1853. He published extensively on fishes and marine biology, including several books. Gosse brought natural history to the average reader with his popularly written but now little-known book, *The Romance of Natural History* (1860), and earlier with his book on the nature of Devonshire (Gosse, 1853).

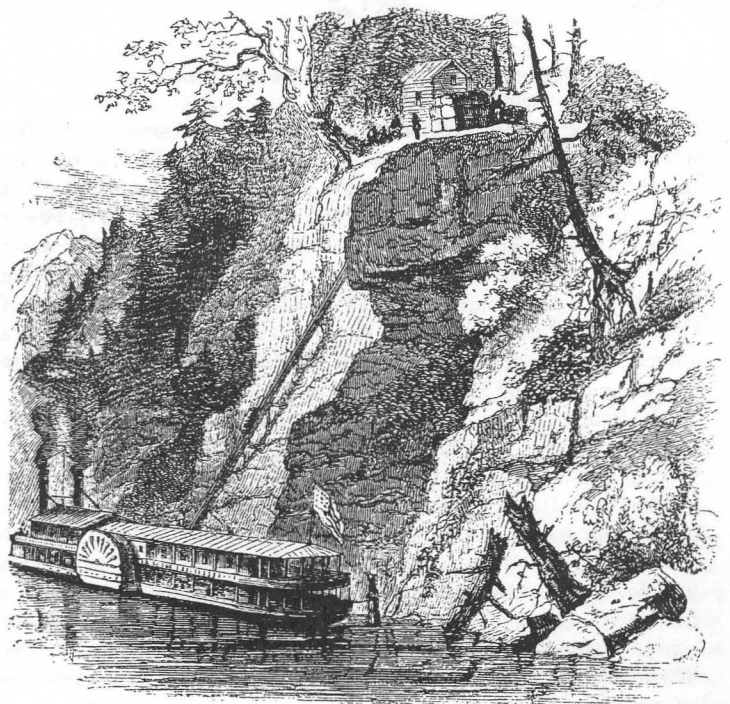


Fig. 5. Shipping cotton on the Alabama River, 1838 (p. 304).

The few notes on Lepidoptera that we have from the southern United States before 1860 include only those of Abbot and Smith (1797) for Georgia, and a few text lines or figures in the works of Bartram (1791) and Catesby (1729-41). The artist and naturalist Titian Peale, who was especially interested in butterflies, visited Florida at least twice, once in 1817 along with Thomas Say, William Maclure, and George Ord, to northeast Florida and Georgia, and then in 1826 at Key West (Poesch, 1961). Peale and Say also explored the Great Plains, getting as far south as Arkansas, with the Major Long expeditions, but only Gosse seems to have been in Alabama in the years before the Civil War and additionally left us notes on the Lepidoptera.

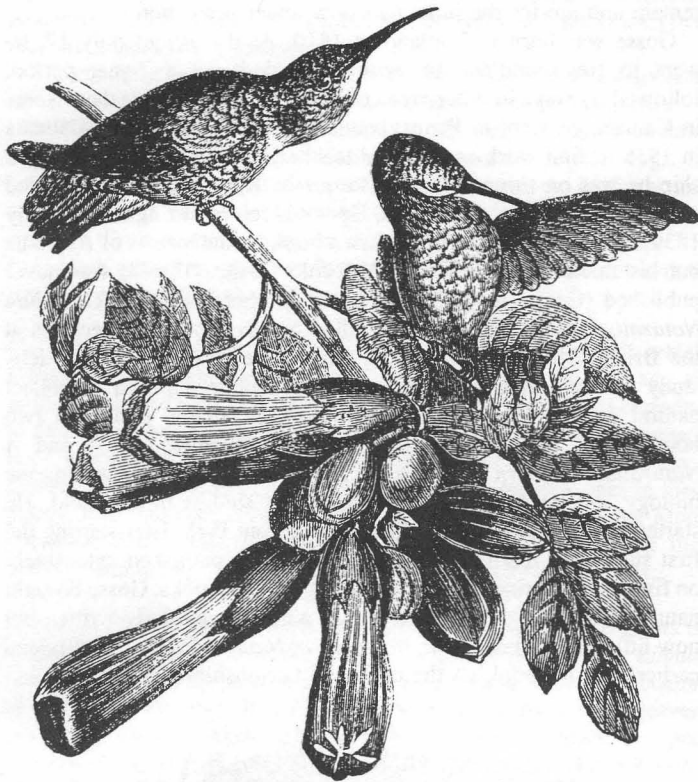


Fig. 6. Ruby-throated hummingbirds and trumpet vine flowers (p. 113).

Gosse's *Letters from Alabama* is now a rather obscure book. The author of a fairly recent book on naturalists (Jenkins, 1978) only saw Gosse's manuscript and even thought it had never been published (a reprint of Gosse's 1859 book was not published until 1983). Fewer still are aware of all the Lepidoptera and other insects Gosse wrote about and illustrated in his journal (Fig. 8-12). The following excerpts on what Gosse found in the untouched Alabama forests of 1838 will be of some interest to present-day readers. All Lepidoptera references in Gosse's book are noted below, along with Lepidoptera figures he drew and included in his published book (Fig. 13-17).

All figures herein are from Gosse's 1859 book, taken from sketches he made in 1838 (except Fig. 7 which is from his unpublished "Insects of Alabama"); other figures from the 1838 book involve birds (like Fig. 6) and other larger animals. In the excerpts below, Gosse's text has been followed, including his Old English spellings and grammar; only the scientific names have the species with lower case letters (Gosse often wrote the species names with a first capital letter, as was often done in more popular books of the time). Current scientific names are given in the appendix (p. 23). Where text continues over several pages, there are no breaks between paragraphs.

LEPIDOPTERA NOTES FROM LETTERS FROM ALABAMA

[27] I took a pretty little skipper butterfly which is not figured in Boisduval's splendid "Iconographie;" it is much like *Hesperia malvae*, but still more resembles *H. proto* of Godart, or *H. orcus* of Cramer.

[37] With the day before me, I was not disposed to hurry on my journey, especially as so many charming things were every instant catching my attention, and enchainning my observation. Butterflies became abundant, especially the very beautiful little Hairstreaks (*Thecla*), species of great delicacy and beauty, whose hind wings end in one or two lengthened tags (* see on p. 52 [Fig. 13]). They are frisky little creatures, very fond of chasing each other through the air, and tumbling about with surprising quickness of evolution. When at rest, they often rub the surfaces of the hind wings upon each other, up and down alternately, and after a flight often return, like the flycatchers among birds, to the same spot from whence they departed; a projecting twig, or the topmost leaf of a bush. They were chiefly of one species (*Thecla falacer*, Boisd.), accompanied by several *Polyommata*. I did not find the *Theclae* numerous anywhere, but at that particular spot near King's landing.

[37-38] The beautiful Scarlet Woodbine (*Caprifolium sempervirens*) grew in profuse splendour among the bushes, its flowers being no less remarkable for fragrance than for elegance of form, and brilliancy of colour. I found that it possessed attractions not only for man; for, having gathered a spike, it was visited, even while in my hand, by a fine yellow Butterfly (*Colias eubule*, Boisd.), which instantly began probing the deep tubular blossoms with its sucker; so eager was it to gratify its appetite, that without any trouble I caught it in my fingers.

[49-50] Since I am speaking of ants, I may mention another instance of their voracity: I had several caterpillars and chrysalids that I was rearing in a breeding-box: on opening it the other day, to my chagrin I found it occupied by a legion of these little black ants, which had killed all but one chrysalis, and partially devoured them. My preserved specimens of insects I find almost impossible to secure from them: they find them out in the store-boxes, even when these are inclosed in a trunk; and making their way through the keyhole, or beneath the lid, commit great havoc. The only effectual resource is to imbue each insect, as soon as killed, with a solution of corrosive sublimate; after which the ants will not touch it.

[51-53] Let us stop here awhile. Here are several species of butterflies, revelling, with multitudes of bees, wasps, and other insects, on the thick beds of Horehound (*Marrubium vulgare*), which abounds on each side of the road, and which is now in full blossom, and on the singular, but beautiful disks of the Passion-flower (*Passiflora caerulea*), which trails its long stems, and entwines its tendrils over the ground. Here is a very handsome kind, the Zebra Swallowtail (*Papilio ajax*). This beautiful butterfly is remarkable for the elegance of its shape, and the unusual length of the tails of the hinder wings, which sometimes project an inch and a quarter beyond the wing, although the butterfly is rather small for a *Papilio*. It is marked with alternate transverse bands of black and yellowish white, with a spot of bright scarlet, and three azure crescents on the hind pair. The under surface his two scarlet spots, and a band of the same colour. The larva is said to feed on the Swamp Papaw (*Anona palustris*). The chrysalis is short and thick, shaped almost like the body of a pig, with a sharp thorax. Its colour is dusky brown, with pale lines.

And there are no less than three species of *Colias*, all pretty: one is of a bright saffron-yellow, with a common black border, unspotted — the Black-bordered Yellow (*C. nicippe*). This is numerous in gardens, particularly in the morning. That large, one now resting on a flower, opening its brilliant wings to the sun, is the Black-based Yellow (*C. caesonia*). It is a strikingly-marked species, the sulphur-yellow contrasting well with the broad border and basal cloud of deep black. Each wing has a silvery spot in the centre of the under surface, on which side the

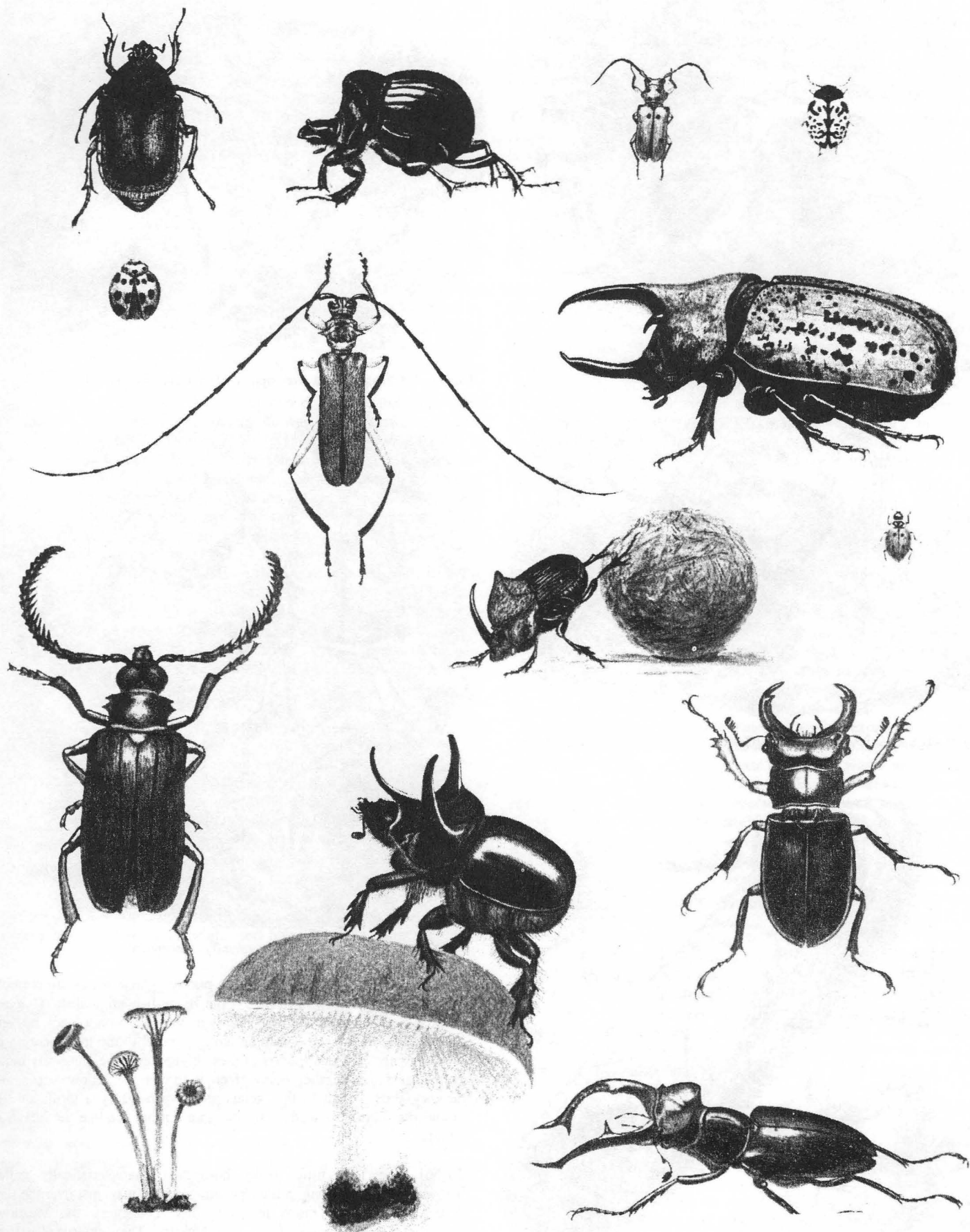


Fig. 7. Plate of beetles from Gosse's unpublished "Insects of Alabama" (mostly Cerambycidae and Scarabaeidae) (after Jenkins, 1978). Had he published his book of 250 color plates, it would have been the most well known early insect book in America.

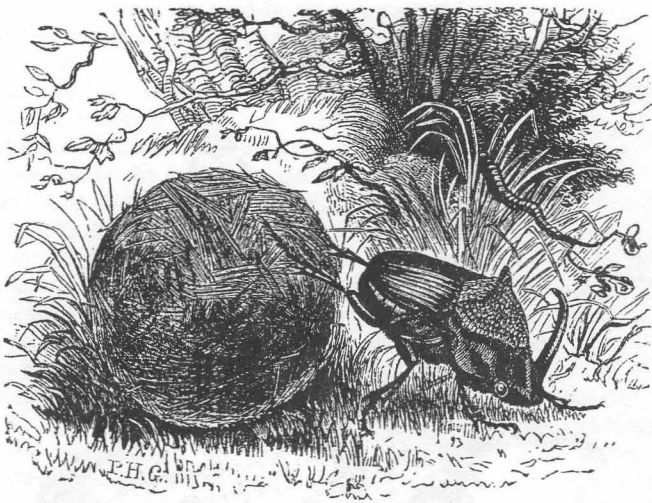


Fig. 8. Dung beetle, *Phanaeus* sp. (Coleoptera: Scarabaeidae) (p. 164).

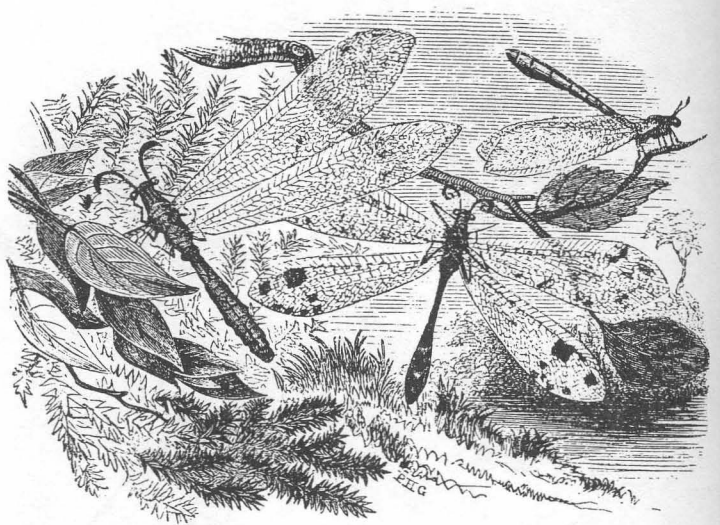


Fig. 11. Ant lions in flight (Neuroptera: Myrmeleontidae) (p. 248).

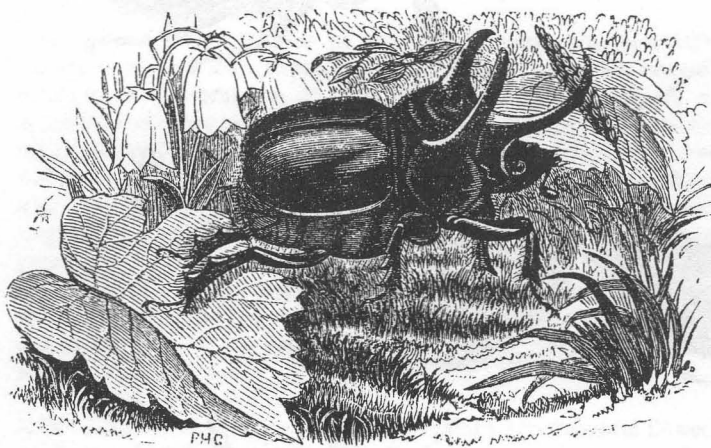


Fig. 9. Ox beetle, *Strategus antaeus* (Coleoptera: Scarabaeidae) (p. 167).

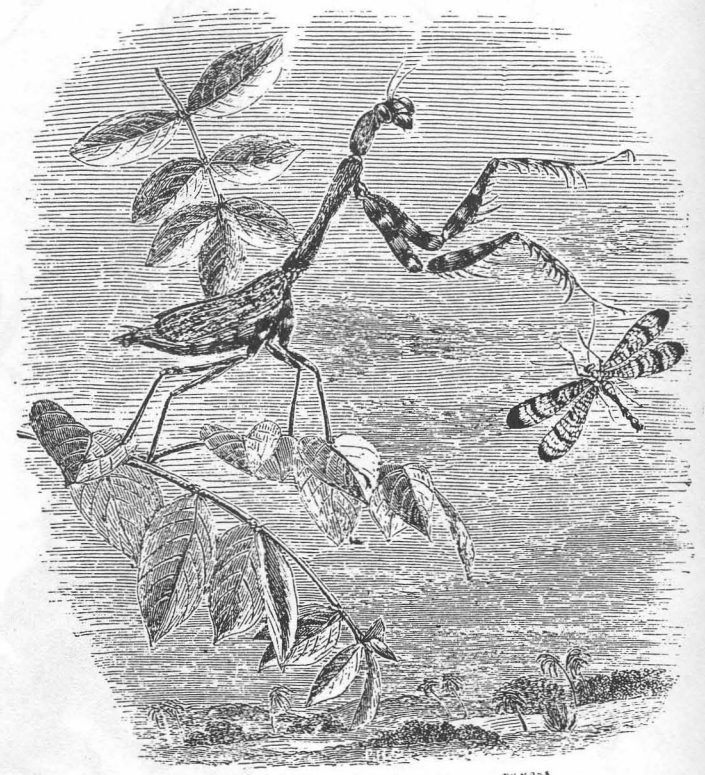


Fig. 12. Mantid (Mantodea) and scorpionfly (Mecoptera) (p. 273).

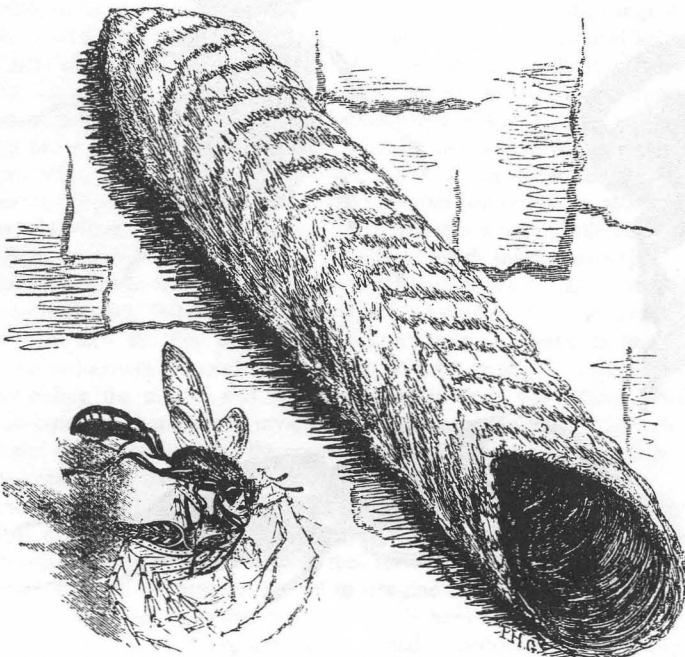


Fig. 10. Wasp (*Sceliphron?* sp.) and nest (Hymenoptera: Sphecidae) (p. 244).

black is altogether wanting. And this pigmy, whose wings are scarcely more than half an inch in length, is the Black-banded Yellow (*C. diara* [sic]); it is of the same sulphur-yellow as the last, with a black tip, and a broad band of the same running along parallel to the inner margin of the fore wings. The caterpillars of these butterflies have, generally much resemblance to each other, being green, with white or yellow stripes; and the chrysalids, which in this genus are suspended by a girdle of silk around the thorax, as well as by the anal button, are like the larvae in colour.

[55-56] See the little dusky butterflies characteristically called "Browns," dancing along in their peculiar jerking way, just over the tops of the bushes; they much resemble their congeners, the Meadow-butterflies (*Hipparchiae*) of our own country. They chiefly affect the glades and lanes of the woods, being not very often seen in the clearing; sometimes, however, they come into our gardens, of a morning, but then they fly along close to the ground, beneath the shrubs, and in the shelter

of the fence, as if shade were more congenial to their feelings than sunshine. Perhaps, as there is a correspondence and a harmony in all the divine works, there may be a reference to these retiring habits in the dull tint common to the tribe, and the want of those glowing colours so general among butterflies. These are both small species; one is the Dusky Argus (*Hipparchia eurythris*), with two double-pupilled eyes in each fore wing, and one on each hind wing, besides a very minute eye in the angle of the latter; beneath, the hind wings have four eyes. The smaller of the two is the Blind Argus (*H. sosybius*), of which the upper surface is spotless brown, the under handsomely marked with a numerous series of eyes near the margin, and two transverse dark lines.

[59] And now, as the declining sun indicates the approach of five o'clock, having dismissed our tumultuous boys, who have rushed from their restraint whooping and shouting at the return of liberty, we, with perhaps not less of enjoyment, will take our quiet walk homeward. We have yet two good hours of day, although the fierce heat of the high sun has in some degree abated. The dayfliers have not yet retired, for here is that widespread species, the Violet-tip Butterfly (*Grapta c-aureum*), slaking its thirst at the edge of the brook. And just now I saw another northern species, the little Pearl Crescent Fritillary (*Melitaea tharos*), which seems to be rather common.

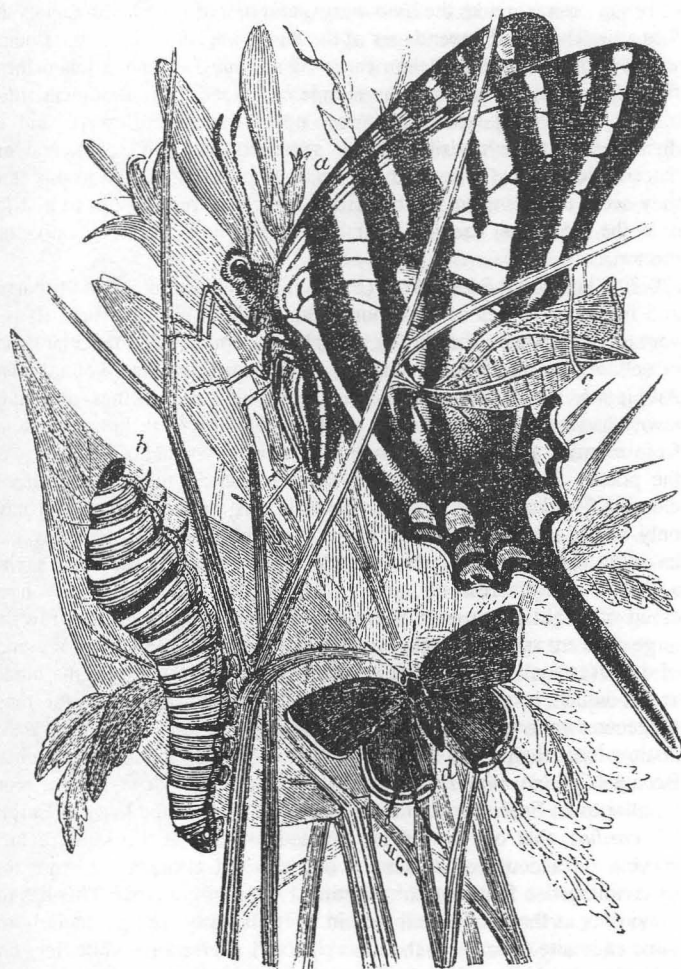


Fig. 13. Zebra swallowtail adult, *Eurytides marcellus* (Cramer), pupa and caterpillar (Papilionidae); and the hairstreak Gosse called *Thecla poeas* Hübner [= *Calycopis cecrops* (Fabricius)] (Lycaenidae) (p. 52).

[61] Here is a flower of great beauty, growing neglected and unnoticed in the corners of the railfence. It is the Indian Pink (*Spigelia marylandica*); its spike, of slender tubular flowers, brilliant crimson externally, and internally yellow, would alone entitle it to our admiration; but it has other claims to our regard, on account of its value in medical botany. But notice that heavy, thickset butterfly, probing with its long tongue the deep nectar-tube of the corolla. Like the rest of its tribe, for it is one of

that extensive group commonly called Skippers (Hesperiidae), the White-spotted Skipper (*Eudamus tityrus*) is more like a moth than a butterfly, and serves well to be one of the connecting links between the diurnal and the nocturnal Lepidoptera. It is very susceptible of alarm, flies swiftly, violently, and in a headlong manner, and has many of the motions of the Hawkmoths.

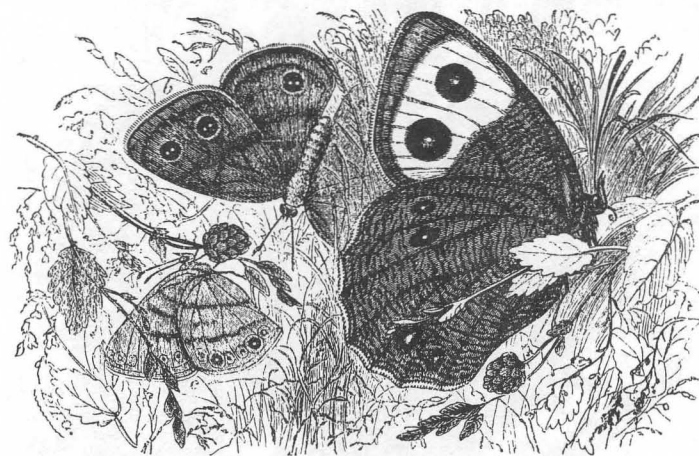


Fig. 14. Ringlet butterflies: *Hipparchia alope* [= *Cercyonis pegala alope* (Fabricius)] (right), *H. eurythris* [= *Megisto cymela* (Cramer)] (center), and *H. sosybius* [= *Hermeuptychia sosybius* (Fabricius)] (lower left) (p. 55).

[65] . . . the Four o'Clock, from the singular habit of opening its flowers just at that hour. During the heat of the day they remain closed, the mouth or wide part of the corolla being curled inward, and appearing shrivelled; but about four in the afternoon, — and I have often been struck with admiration at the precision with which the hour is marked, — the blossoms begin to unfold, and in the course of a quarter of an hour all are widely expanded, and remain open all night. They are sweet-smelling, and their deep tubes make them a great centre of attraction to the large Hawk-moths which choose the morning and evening gloaming for their peregrinations; and it is partly for them that I have brought you to this bush.

We will be patient a moment: — there is one; I hear the humming of his muscular wings: be cautious! now I see him coming round the further side of the bush; we won't net him yet; we will watch his motions a few minutes, as well as we can for the dim twilight. He is suspended on the wing, just over the mouth of a flower into which his long tongue or sucker is inserted, probing to the very bottom, where the nectar lies: his wings are like an undefined film on each side, owing to the rapidity of their vibration, and by their motion make that shrill hum which so instantly discovers his presence. Now he is at another flower, having changed his position so quickly that it seems as if done merely by a volition, without passing through the intervening space. He stays three or four seconds at each blossom, visiting them in succession, if undisturbed, pretty regularly; not unerringly, however, as he often revisits a flower which he has just robbed. He never works in a resting position; I have never seen one alight; they always continue on the wing, and if alarmed, are gone like a thought.

[66] This is the Tobacco Hawkmoth (*Sphinx carolina*), a large but sober-coloured species. The usual food of the larva is the tobacco plant, on which it is found in considerable numbers, and it is therefore eagerly sought and destroyed; yet still the perfected moth is by no means scarce. I have also taken it from the tomato. The pupa is large, dark reddish brown, subterranean in its habits, and is remarkable for a curious departure from ordinary structure, though this departure is not quite peculiar to it. If we take off the hard, shelly skin of a chrysalis, not very near its time of change, we find what appears to be a nearly homogeneous mass of white matter in a semifluid state, without any semblance of limbs, members, or organs. Yet all the parts of the future fly are there, perfectly separate and distinct, though not yet fully developed. In the outer skin, however, which has acquired consistency by exposure, the shape of the limbs and external organs is definitely marked. On the front

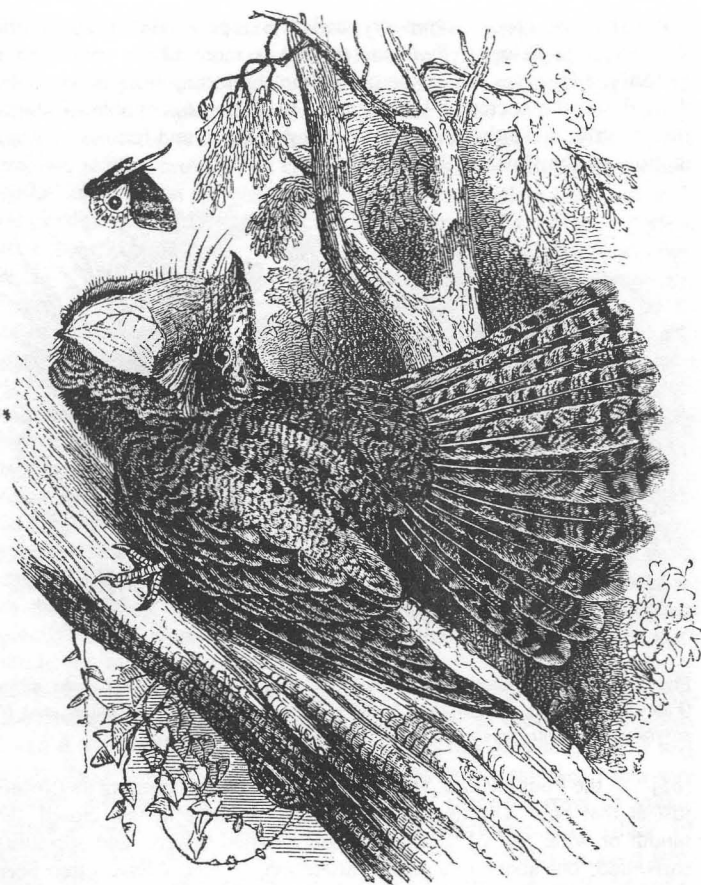


Fig. 15. Chuck-will's widow, as Gosse named the bird, chasing an Io moth (p. 70; no mention of the Io moth in the text until p. 205).

of a chrysalis, we usually perceive in the centre, running from the head, halfway down the body, a double line, which covers the tongue; on each side of this are ranged three other folds, marking the positions of the three pairs of legs; these folds are broadest at the head, and taper to a point; then come the antennae, long and slender, one on each side the leg; in some moths, however, they are very wide and short; and outside them, the fore wings folded down on the breast, small of course, but still displaying the future form, and even the nervures; the hind wings cannot be seen, because they are folded directly beneath the others.

[67] Now, as I said, the tongue usually lies straight down the middle of the breast, but in some of the larger Sphinges this organ is destined to be, in the future moth, of unusual length and size; and therefore, as in this species, it is not folded down with the other members, and covered only by the common skin of all, but has a separate skin or sheath, projecting from the head, with the tip (in some instances recurved) resting on the breast, looking very much like the trunk of an elephant. The tongue or sucker, when the perfect insect is evolved, is an organ well worth a moment's examination, as a beautiful instance of the modification of a part to adapt it to altered circumstances. Look here! I will unfold the apparatus, nearly two inches long, yet when rolled up in this beautiful spiral, curl within curl, scarcely larger than the head of the pin with which I am opening it. It is tubular throughout its whole length; and, what is singular, it is composed of two parts perfectly separable, you see, each part being a cylinder, yet when placed side by side, meeting in such a manner as to form a tube quite air-tight between the two lateral ones. It is this central tube which forms the sucking-pump; the outer ones being intended (so it is asserted) for the reception of air. In what way suction is performed, however, is still a mystery.

Now, in this long cylinder, who could detect the slightest analogy to the hard, toothed jaws of a beetle? yet, in fact, the two halves of the cylinder are neither more nor less than the two jaws, altered and modified to suit the necessities of the insect; for a Sphinx placed at the outside of a tubular flower, furnished only with a pair of short, hard

jaws, would be in somewhat the same condition as the fox whom the stork invited to dinner

[76-77] A tall syngenesious plant, bearing a flower much like an aster, but with yellow rays (*Helianthus scaber*), is common, and two species of Swallowwort (*Asclepias tuberosa* and *A. parviflora*) grow in groups or beds here and there. These latter bear large clusters of flowers, the former bright orange red, the latter white, both possessing much fragrance. They are also called milkweed, from the white glutinous fluid, highly acrid, which exudes from the stalk and leaves when broken, and also butterfly weed, because they form such an attraction to those brilliant insects. From this little hill an extensive, but not very pleasing prospect is visible, little being seen but the summit of an almost endless forest, varied here and there by the white smoke curling up from some dwelling hidden in its recess. Hither I frequently come to spend an hour entomologizing, and never fail to be well rewarded.

One of the most numerous of the many species that gaily flutter their brilliant wings in the burning beams of almost vertical noon, and contribute so much to the life and beauty of nature by their presence, is the Blue Swallowtail (*Papilio philenor*, Boisd.). The upper surface of the fore wings is dull black, generally spotless, but the hind wings have a remarkable gloss, bright blue in one light and greyish green in another, with a row of white spots. Beneath, a row of large crescent-shaped spots of bright orange marks the hind wings, and one of round white spots the fore pair. The tailed appendages of the wings are short, sometimes being scarcely more developed than those of a *Vanessa*. I have taken these fluttering about the heads of the orange milkweed, their abdomens filled almost to bursting with the yellow nectar of these flowers, and so distended that the division of the segments are obliterated, and are discernible only by being bare of the scaly plumage. When in this state they seem unwilling to fly, but either remain at rest, or run to and fro over the blossoms, keeping their hind wings in a vibratory, quivering motion.

[78-79] The Black Swallowtail (*P. asterius*, Boisd.), found on the barren and icebound shores of Newfoundland, is also numerous here. It is a very elegant species, the black ground being relieved with macular bands of yellow, and on the hind wings by a series of bright azure clouds. The Archippus, too (*Danaus archippus*), with his broad wings of orange tawny handsomely striped with black, probes the mellifluous blossoms from morning to night, and is one of the most conspicuous flutterers on the prairie. But a more beautiful species than all these is the Green-clouded Swallowtail (*P. troilus*, Boisd.). It is, however, rare, as I have only as yet seen a single specimen. The wings are black, the fore pair having a row of yellow-green spots at the margin, the hind pair having a similar row of crescents, and the whole disk sprinkled with a large cloud of bright green dots. Beneath, the hind wings have two rows of large crescent spots of bright orange, and a row between them of clouds of dots (fasciae), all of which are blue except the third from the hinder angle, which is green. Among those of humbler birth, — for these gorgeous swallowtails seem to be of royal blood, to have a presence that distinguishes them from the meaner herd, — I may mention the Painted Beauty (*Cynthia huntea*) as one not inferior, though of a form more familiar to an English eye. It is so much like the Painted Lady of Europe (*C. cardui*), that one would be tempted to think it the same, a little varying on account of difference of food and climate, were not that species likewise found on this continent in nowise altered. This has the same tints as that, and distributed in a similar way, and particularly the same exquisite delicacy in the diverging and intersecting white lines and sober brown shades of the under surface, but it has only two eye spots instead of four.

[79] Moths are likewise numerous, chiefly of the smaller kinds, but these I cannot attempt to particularize: there is one, however, too pretty to pass over in silence. It is the Pinkwing (*Deiopeia bella*). It is well known in many parts of North America, and among the flowers of these prairies it is particularly plentiful; we can scarce stir the tall rank herbage in any direction, but three or four of these pretty creatures, before unseen, scuttle out and flit away for a few yards, and then plunge down into the mazes of the leaves and stalks again: if repeatedly disturbed, however, they fly a good way before they again alight. The

fore wings of this species, which is about an inch and a half in spread of wing, are marked with alternate transverse bands of white and orange-tawny, about a dozen in all, the white ones having a row of black dots in them: the hind pair are pink bordered with deep black. I have seen specimens in which the bands on the fore wings, which are usually tawny, were of a fine scarlet, but these are rare.

[79-80] Perhaps you will say I am somewhat extravagant in my admiration of these insects, but really I think that any words of description are insufficient to do justice to their surpassing beauty. Take a butterfly into your hand and examine it yourself for a moment superficially; for though the internal organization would be equally instructive, we will not enter into that at present. Look at the richness of the colours. What brilliant hues! Note the burnished metallic gloss and the changeable glow of many of them; the soft velvety downiness of all. Look at the distribution of the colours; into what elegant forms are they thrown — lines, and bands, and spots, and rings, and eyes: think that the whole surface is a mosaic, the most minute, the most elaborate, and the most perfect, that can be, conceived. Think that every atom of coloured dust is a feather of regular and prescribed shape, a feather having projecting points, and longitudinal ribs, and a little quill or footstalk, a socket into which it enters, and an organization by which it is fastened there! The subject is not new, and an allusion to it may seem trite, but I can never look at the shining motes that adhere to my finger after having touched their beautiful wings, or take up two or three upon the point of a needle, without feeling a fresh emotion of wonder and admiration. Then look at the structure of the wing itself, divested of its fairy plumes: composed of the most filmy gossamer, transparent, elastic, and firm withal; furnished with hollow ribs radiating to every part; possessing a wide-extended surface to compress a large column of air in flight, provided with powerful muscles to give it rapid and vigorous motion, and yet the whole so light that we can hardly hold it in our hand. Strength and buoyancy, the two great requisites for active aerial motion, are here in perfection. O Lord! manifold are, thy works; in wisdom hast thou made them all.

There are prairies not very far distant of many miles in extent; the residents on which suffer greatly in dry seasons from the scarcity of water, a want that in a hot climate is peculiarly felt. There are no springs in the prairies, and the inhabitants depend on the rain-water, which, owing to the tenacity of the soil, does not soak into the ground, but accumulates in the hollows until evaporated by the sun.

[85] Some little beetles resort to the heads of flowers, especially the syngenesious ones, among whose anthers they riot and revel, and almost cover themselves with the powdery farina. In their brighter colours and more active habits, and in a greater readiness to take wing, they seem more suited to the flowers they frequent, than the dark dorrs that nocturnally crawl over the earth. One little *Cetonia*, whose brown elytra are elegantly marked with white spots, gives out a very fragrant smell. Another (*Trichius delta*) has the thorax handsomely ornamented with a snow-white triangle. A third (*Tetraopes ternerater*) is glossy crimson, with two black dots on each of the elytra, and four on the thorax. These three, with others, delight to bask on the prairie flowers, in company with the butterflies, beneath the beams of noon.

[85-86] There is a handsome plant in the garden, trained over a lattice arbour, which it profusely covers with a luxuriant foliage of pinnate leaves. It is called the Virgin's Bower, but erroneously, as that name belongs to a species of *Clematis*; I believe it is rather *Glycine frutescens*. I have already intimated that it is a climbing plant, several stems as big as a man's thumb twisting round each other like a cable, so tight that a knife could scarce be thrust between. It bears a long and thick spike of flowers, of a pink or lilac colour, of pleasant odour. About a fortnight ago I observed in several places two or three of the leaves fastened together, and lined with a coating of silk, making a very snug tent; in each one of these leaf-tents was a singular-shaped caterpillar. It was long-oval, convex above and flat beneath, something like the common insect called a woodlouse, or carpenter (*Oniscus*); the head was oddly fastened to the body by a slender neck, which, as well as the head itself, was reddish brown, two large spots on the face being bright orange; the

whole body was green, transversely wrinkled.

[86] I took half-a-dozen of these to rear; in a day or two they ceased to eat, and began to change colour, as many caterpillars do just before going into the chrysalis state, turning of a pale, pink or flesh-colour on the back, and becoming quite pellucid, so that the dorsal vessel was distinctly seen, with its alternate contractions and expansions, proceeding in regular waves from the tail to the head. Each then spun a girth composed of many threads of silk, placed side by side, and fastened at each end to two points within its tent, which, being completed, was passed over the head, until it embraced the fore part of the body; and thus it quietly awaited its transformation, gradually becoming more and more inactive and helpless. A day elapsed after the alteration of colour, before the spinning of the girdle, and after another day the skin was thrown off, and the soft white pupa was evolved, which soon, however, acquired consistency, and its permanent dingy tint, a greenish brown. They remained thirteen days in this state, and then produced the White-spotted Skipper (*Eudamus tityrus*), which I had observed before on the flowers by the roadsides.

[86-87] I have bred very many butterflies, and have universally found them, on first opening the dark box in which they had been evolved, perfectly still, and making no attempt to escape when touched with the fingers; but these Skippers formed a singular exception. Before the lid was half raised, all was scuffle and flutter within, the first intimation I had of their birth; though, as I had examined them every day, I knew by the discoloration of the pupa that the change was near. Before I could catch a glimpse of anything within, one dashed out like lightning, and if I had not shut the box, the other would have followed as quickly; I was obliged to get my gauze net, and cover the box while I opened it, or I could not have secured the specimen. The others, as they successively attained the imago state, each manifested the same wildness.

This tribe of Butterflies show their natural proximity to the Moths, as well by the position of holding their wings, as by other more prominent marks. Although like others they not unfrequently close the wings, the two surfaces being in contact, yet, far more commonly, they are held upward diagonally, the surfaces widely separated, and the hind pair almost horizontal.

[102] A pretty moth which I had not seen before (*Callimorpha lecontei*) was rather numerous: the wings are horizontal, white, fantastically marked into numerous divisions by bands of dark-brown, much more conspicuous in some specimens than in others.

[119-120] A large moth, the Purple Underwing (*Catocala epione*), led me a wild-goose chase the other day. All the moths of this genus are beautiful, the under wings being generally dyed with brilliant crimson, scarlet, or orange, banded with black; in some however they are wholly black, as in the species before us, with a changeable purple gloss. The upper wings, in all, I believe, are finely variegated with sober colours, grey, brown, and black, in many waves and shades; and in this we see a wise ordination of Providence for their safety. Their usual resting place is the perpendicular trunk of a tree; and if the bright and conspicuous under-wings were visible, their retreat would be at once discovered; but when at rest, these are entirely concealed by the fore-wings, whose varied but sombre hues so exactly correspond with those of the bark as effectually to baffle the sight, unless the observer be very eagle-eyed. In pursuing these moths, particularly a very handsome one, whose hind-wings are scarlet, with two black bands (*Catocala ilia*), I have observed and admired this fact, though as a collector I have been ready to wish they were a little more readily seen. They haunt the interior of the forest, and fly usually in the afternoon; the brilliant red of the wings is very visible in flight, and therefore their course is easily traced; they fly swiftly and suddenly, and on alighting on the trunk of a tree, usually a little out of reach, are perfectly at rest in an instant, so that they appear to vanish; for though I have watched them to a tree only a few yards distant, and have kept my eye fixed on the spot; on coming to it, I have looked in vain for the moth, and supposed that I have been deceived; but, to be sure, on reaching up to the spot with a stick, the red wings flash out, and away flits the moth to another tree.

[121-122] Three or four species-of butterflies have fallen under my notice since my last [letter], which I had not before observed. Two of them are very little, the Red-lined Ringlet (*Hipparchia areolata*), and the Silver-spotted Ringlet (*H. gemma*). They are much alike, both dusky on the upper surface, and beneath marked with a few eye-spots; the former has two reddish-brown lines crossing the wings; the latter, two or three dashes of silver on the under surface. Their caterpillars are green, with longitudinal stripes; and that of the former feeds, according to Abbott, on a grass-like plant, the drooping, Andropogon (*Andropogon nutans*).

[122] Another species of this genus, the Pearly-eye (*H. andromacha*), larger than these, and more beautiful, from the pearly iridescence of the inferior surface, is now common. It is interesting from its social and gamesome habits. A particular individual will frequent the foot of a particular tree for many successive days, contrary to the roaming habits of butterflies in general. Hence he will sally out on any other passing butterfly, either of his own or of another species; and, after performing sundry circumvolutions, retire to his chosen post of observation again. Occasionally I have seen another butterfly of the same species, after having had his amicable tustle, take likewise a stand on a neighbouring spot; and after a few minutes' rest, both would simultaneously rush to the conflict, like knights at a tournament; and wheel and roll about in the air as before. Then each would return to his own place with the utmost precision, and presently renew the "passage of arms" with the same result, for very many times in succession.

[122-123] A fourth species is the largest living butterfly I have ever seen, being upwards of five inches from tip to tip of the expanded wings. I call it the Black Emperor Swallowtail (*Papilio glaucus*); it is a very noble fly, and forms quite a contrast to the dusky pigmies I just now noticed. Its colour is deep black, with two marginal rows of yellow crescents; and within them a row of larger azure crescents, which are obliterated towards the tip of the first wings; the second pair has a large cloud of azure dots in the centre. The under surface is much the same, but the black is more dusky; the crescents in the second wings are larger and tinged with orange, and the azure, central cloud is wanting. It appears to be rare, as I have seen only two specimens of it, but one of which I succeeded in obtaining. This I caught in a garden just as the sun was setting, hovering over a strawberry-bed; the other was seen in the middle of the day, but in the dark shade of the woods; I gave chase to it, but it redoubled its speed, and was soon out of reach in the forest. I observed that it flew high, which butterflies do not generally do. The larva of this fine species is said to be in all respects like that of the Tiger Swallowtail (*Papilio turnus*), being of a fine, green, with two eye-spots on the thickest parts of the body.

[123] I have taken a single individual, in very shabby, weather-beaten condition, of another fine butterfly, the Red-spotted Purple (*Limenitis ursula*). It is black, or rather a very deep purple, the hind-wings broadly banded with lustrous bluishgreen, and marked with crescents of the same. The under surface, besides, has many spots of bright red. It very much resembles the Banded Purple of the north (*Limenitis arthemis*), but it wants the delicate pearly-white band. It seems to replace that species in the south. The larva and pupa have a still more exact resemblance; the former is said to feed on the Green-wooded Whortleberry (*Vaccinium stamineum*).

[123-124] And, while speaking of insects, I may just mention two or three others that I have recently seen, though I know little of them but their appearance.

[124] I took a few days ago, sucking some flowers beneath the burning beams of noon, a very pretty little creature, the Humble-bee Hawkmoth (*Sesia pelagus*). Having taken it in Canada, likewise, I presume it is widely scattered over the continent; though my northern specimen differs somewhat from the present. It looks very much like a humble-bee, the body being clothed with the same sort of down, and banded with black and yellow; the wings are perfectly transparent, except the margins, which are covered with dark brown scales. Like the Humming-bird Hawkmoth (*Macroglossa stellatarum*) of our own country, it is abroad (I believe exclusively) by daylight, and delights in whisking from flower to flower; its motions are swift and sudden. There is a beautiful flower now in blossom in the gardens, the Horned Poppy (*Argemone mexicana*), which forms an attraction to these bright-hued insects. It is of a golden

yellow, and has handsomely spotted, thistle-like leaves.

[138-139] In the school-yard there are several towering oak-trees left for the purpose of shade. Examining the trunks of these the first day I saw them — which, as a good entomologist and true, I was bound to do — I found in one several round holes about half an inch in diameter, as if made by an auger; and from one projected the pupa-skin of some very large moth, being near three inches long. Some days after I found another in a similar situation, and after that another. As my curiosity was roused, I procured an axe, and with the aid of a young man began to cut away some of the wood of the tree, exposing many passages filled with excrement, and some of them lined with web. We at length exposed two very large caterpillars, one of which we unfortunately cut in two, as we also did a pupa nearly matured, about two and a half inches long. The remaining caterpillar was very wary, and I nearly lost my patience in trying to get hold of him. I had to chop very cautiously for fear of cutting him through like the others; and as fast as his hole was exposed, he retired further in; sometimes he would poke his tail just out; but on my touching him, he, would instantly draw back. At last I managed to outwit him in this way: I began to batter the opposite side of the tree with the poll of the axe, and was pleased to see that at every blow he gave a start, projecting his binder part farther and farther out of the hole, when I suddenly seized him with my fingers, and, maugre his utmost efforts and strong struggles, dragged him from his fortress into daylight.

[139] I found it was the larva of a species of *Cossus*, very much like that of the Goat-moth of Europe, about three inches in length, of a livid reddish hue, thinly scattered over with fine hairs, with a hard horny deep-brown head. He was very fierce, seizing my hand with his jaws whenever I attempted to touch him, and jerking round his head with great spitefulness. It crawled very swiftly. I could not find that it had the sense of sight; for fierce and resentful as it was, when I placed my finger before it, even close to its head, it took not the least notice; but if I touched but the tip of one of the hairs, then it instantly raised its head and stretched open its jaws. Indeed, spending its life immured in the centre of a tree, sight would be perfectly useless to it. I did not detect the strong and subtle odour which distinguishes its European congener.

[139-140] The economy of this and, similar insects is curious. The egg is laid by the parent moth, on or beneath the bark of a living tree. The larva, as soon as hatched, eats its narrow passage into the heart, living on the particles of wood which it abrades. Of course its ejecta fill up the cell behind as fast as it proceeds, and thus it has no alternative but to go forward. Indeed, were it not so, it could not retrace its steps; for the diameter of the chamber is always but just sufficient for it to move comfortably in; and as it increases in size, it of course makes a wider passage; therefore, the excavation which contained it yesterday, would to-day be too straight to admit it.

[140] This species appears to be slower of growth than most caterpillars, taking two or three years to attain its full size. Before it goes into the pupa state, it either opens the passage into the air or (which I think more probable) leaves an extremely slight lamina of wood unpierced at the very extremity, which the pupa can break with its head, or perhaps dissolve with some secreted fluid. From my finding the pupa in the heart of the tree, I presume that it waits until the time of exclusion of the perfected moth is near; before it comes to the edge; then works its way outward by means of a ring of little points directed backward, with which each segment of the body is furnished. On its arrival at the mouth, which appears (at least in all the cases I observed) to take place during the night, it projects the fore-parts until half of the insect is exposed; then the skin opens at the usual places, and the moth is evolved, leaving the empty puparium sticking in the hole.

[140-141] I took the caterpillar home, and put him into a box, with some pieces of the wood of the tree; but he was sulky, and refused to eat. I kept him two or three weeks, and at last he died. I never saw him eat anything the whole time.

[144-145] There is a pretty little Butterfly common now, the Pale Azure (*Polyommatus pseudargiolus*), which so nearly resembles an English species (*P. argiolus*), as scarcely to be distinguished from it. Its colour is light azure-blue on the upper surface (with a broad black margin in the

female), and, on the under side, much paler still, nearly white, with some small black dashes. In appearance and manners it much resembles the delicate little Hairstreaks (*Thecla*) with which it associates. Like them it appears to be very pugnacious, attacking with Quixotic knight-errantry any intruder, no matter how much bigger than itself. It is particularly gamesome a few hours after sunrise; taking its stand on some prominent leaf of a bush, it rushes out upon every butterfly that passes by; then they perform such swift and tortuous evolutions that the eye is unable to follow them: this lasts only for a few seconds; for having pursued the traveller three or four yards, the *Polyommatus* returns to the very same leaf to watch as before. All this, however, I believe is done in a spirit of play, and not with any warlike intent. This constancy of resort to one individual leaf or twig is very singular and unaccountable: sometimes on my approach to one so situated, it has been alarmed and flown to a considerable distance, but, taking a flight round, it returns to the place; and presently there is the little thing alighting on the very leaf again. The playful pugnacity just noticed seems almost peculiar to the *Lycaenadae*. With the exception of the Pearly Eye (*Hipparchia andromacha*), noticed in my last [letter], which has the same habit, I do not recollect any instance in which I have seen it displayed by any of the other families of butterflies.

[145-146] I have just seen a pretty but very destructive little insect, the Peach Hawk-moth (*Aegeria exitiosa*). It was in the woods; and as it flitted in a hurried manner from shrub to shrub, and crawled swiftly to and fro over the leaves quivering its antennae, and flirting its violet wings, I was again struck with an observation that I have before made, — how very hymenopterous many of the *Aegeriae* are! The similarity is not confined to shape, though this is striking in antennae, wings and body; the most usual colours are black banded with yellow, with white, sometimes with orange or scarlet, — all hymenopterous colours. The prevalence of purple reflections from the wings, and the angle with the body at which they are often carried, are hymenopterous; as are also their manners. Their flight is usually rapid, and in straight lines; they alight suddenly, and as suddenly depart; move by fits and starts, and in short are, so much like the waspish tribes, that, notwithstanding the acquaintance with insects which some years' observation of their habits has given me, I have often been deceived. It was not until I looked at the *Exitiosa* very closely, that I discovered it to be a moth.

[146] Most insects of this genus pass their larva state in the trunks of trees, either between the bark and the wood, or in the heart of the wood itself. This species inhabits the peach-tree, to which it is very injurious, often causing premature decay and death. The larva is white, as are most larvae which are habitually excluded from the light, whether residing in holes in wood, in cells of combs, or beneath the surface of the earth. The pupa near the time of its exit works its way to the circumference of the tree, like the *Cossus* I mentioned before, where it opens, the perfect insect entering upon a new existence, and leaving the exuviae of the pupa, its grave-clothes, lying at the mouth of its late sepulchre. It has now become a pretty fly, with wings perfectly destitute of plumage, but glossed with a reflection of bright steel blue, the body bright blue, with one band of scarlet.

[147-148] A singular instance of voracity, or of deviation from ordinary appetite, has come under my notice. I had found while out, a large downy caterpillar of the Tobacco Hawk-moth (*Sphinx carolina*), and soon after, I took a stout dragon-fly (*Libellula*, — ?). I put both into the same box to bring them home, and, on opening it, found that the caterpillar, having taken a fancy for a change of diet, had ventured upon animal-food, and had actually eaten a large piece out of his companion's wing, including a good deal of the stiff and hard front rib: I should think he must have found it rather a dry dainty. I have occasionally before known a caterpillar to eat into the bowels of a living chrysalis, or to seize upon another caterpillar; and I once reared one which ate young earth-worms with great relish. Had the caterpillar any patriotic intention of avenging the atrocities perpetrated occasionally by the Dragon-fly race upon the Lepidopterous tribes?

[148] Two species of Butterfly have occurred to my notice since my last: the Variegated Fritillary (*Argynnis columbina*) and the Coral Hairstreak (*Thecla mopsus*). The former is tessellated with orange, black,

and yellow, which colours on the under surface (especially of the hind wings) are admirably varied with shades of soft rich brown. It is not deficient in beauty, though it wants the brilliant metallic spots common to many of its congeners. Two inches and a half is its usual extent; I have seen a specimen which measured three inches and one-tenth, but it was one of unusual size. It is as yet rare, and very difficult of approach. The Hairstreak is a little one; the hind-wings are of rather an unusual shape, running off to a point: the colour is dull brown, unspotted above, beneath marked with a row of round spots of bright scarlet, like a string of beads. These are rather common. Of the butterflies which I have, noticed before, the Green Clouded Swallowtail (*Papilio troilus*) and the Painted Beauty (*Cynthia huntea*), are becoming quite common: the Blue Swallowtail (*Pap. philenor*) is becoming scarce, and the Zebra Swallowtails (*P. ajax*) are nearly all gone.

As one species goes out of season another comes in; so that there is a constant succession: and the fields and prairies are still enlivened and adorned with these beautiful fairy creatures.

[149] An eye accustomed only to the small and generally inconspicuous butterflies of our own Country, the Pontiae, Vanessae, and Hipparchiae, can hardly picture to itself the gaiety of the air which swarms with large and brilliant-hued Swallowtails and other patrician tribes, some of which, in the extent and volume of their wings, may be compared to large bats. These occur, too, not by straggling solitary individuals: in glancing over a blossomed field or prairie-knoll, we may see hundreds, including, perhaps, more than a dozen species, besides moths, flies, and other insects.

[169-170] Some very fine Lepidoptera have fallen under my observation lately. The Arched Swallowtail (*Papilio calchas*) begins to be frequently met with; it is about four inches and a-half in spread of wing; black on the upper surface, with three rows of yellow crescents on the front pair, and on the hind two rows, and a broad band of yellow across the middle. Beneath, the front pair are as above, but the hind wings have the band divided into large and regular crescents, forming a third series, and all the rows are beautifully tinged with orange; there is also an intermediate row of azure fasciae. The anterior margin of the fore wings is unusually curved, causing, these wings to assume a rounded form. This fine insect is not noticed by Abbott, nor is a yet nobler species, the Yellow Emperor Swallowtail (*Papilio thoas*), which measures, when expanded, five inches and a-half. The ground colour of this is black, with a very broad macular band of buff-yellow, crossing the base of the hind wings, and running on to the tip of the fore wings; there is a similar band likewise common to both pairs, which follows the course of the outer margin at some distance from it. The tails are yellow, with a black border. Beneath, the ground is yellow, on which the nervures are broadly traced in black, and three or four similar black lines run along the middle area of the fore wing; a narrow black band crosses both pairs near the outer margin, containing a series of azure crescents in the hind pair. The contrast between the prevailing colours of the upper and under surface is very observable, as the insect floats carelessly along, slowly flapping its voluminous wings, or rests half expanded to sip the slushy mud in the stable-yard: when it has a magnificent appearance. It seems to be rare, as I have seen but a single specimen. Boisduval gives a figure of its larva, which is of large size, and, from a singular distribution of its colours, reminds one of a piebald horse. The tints are arranged in about seven large patches, — two white, four black (viz. two on each side), and a large brick-red one behind the head. I have never met with it myself, and know not its food.

[170-171] From the largest of our butterflies, I come, by a contrast quite unintentional, to speak of the very least, which I am but just now acquainted with. It is the, Red-striped Hairstreak (*Thecla poeas*), a most active, vivacious little creature, measuring exactly one inch in expanse. The hind wings have each two thread-like appendages in the form of tails, which, though found in many species of the genus, are more developed in this than in any other of ours which I know. The upper surface is black, with a blue gloss; the under side soft brown, with a transverse band of scarlet. It is fond of skipping about the bushes at the edge of the forest during the brightest hours of sunshine, or walking to and fro on a leaf, rubbing the two surfaces of the hind wings, together,

when erect; but with so delicate a contact, that not an atom of the feathery bloom is rubbed off or displaced.

[171-172] I may not omit to mention the capture of that very fine insect, the Great Plane-tree Moth (*Ceratocampa imperialis*), though I can give but a meagre account of its economy. My specimen is a female, measuring five inches and a-half in spread of wing, and was found lying motionless on the ground, beneath the lofty sycamores on the swampy bank of Mush Creek. It is exceedingly inert (as are many female moths, especially the thick-bodied Sphingidae and Bombycidae), allowing itself to be handled without any resistance or attempt to escape, so that I should hardly know it to be alive, but for the slight adhesion of the tarsi, when the feet are touched. The colour is pale buff, each of the wings having a round purplish spot in the centre, and a band proceeding from the tip to the inner margin of the same hue; there are also very many scattered dots, the whole, being softened, or, as it were, blurred. The male I have seen only in cabinets; it is smaller, adorned with brighter purple, and more of that hue; the antennae, which in the female are thread-like, are, in the male, feathered through half their length. Abbott gives a figure of the larva and pupa; the former is about four inches long, and thick in proportion, tubercled, with tufts of hair on the back; the colour is sometimes green, but usually tawny. It feeds on the sycamore, liquidambar, oak, and pine. The chrysalis is large and blackish, with a forked tail.

[172] The mere enumeration of species, in general, possesses little interest to any but the scientific collector; it is not altogether useless, however, as the formation of local faunas materially contributes to accurate ideas of the geographical distribution of animals. This must be my excuse for occasionally giving the names of insects which I have met with, even when I can supply no other information about them. I have lately caught *Milesia ornata*, a large dipterous fly, handsomely and singularly marked with black, upon a bright yellow ground; *Amphipyra pyramidea*, a moth, which I have taken in Canada, and which is a native also of England; *Sphinx pampinatrix*, a pretty little olive-coloured Hawk-moth, which sat vibrating her wings as if shivering, on a bush in the garden, one evening, and which I netted without difficulty, as she would scarcely leave the spot.

[185-186] Feeding on the acrid milky leaves of a very beautiful flower, the Butterfly weed (*Asclepias tuberosa*), I found, a few weeks ago, a fine caterpillar of the large black and orange butterfly (*Danaus archippus*). It had a tigrine appearance, being marked with transverse bands and stripes of yellow, white, and black, and was adorned withal with four flexible fleshy horns or tentacles, two on the shoulders, and two on the rump. A day or two ago, it hung itself up by the tail, from a little conical knob of silk, which it had skilfully spun, thread over thread, on the roof of its box; an apparently trivial circumstance, yet so decisive as to show indubitably to which of the two great divisions of the butterfly tribe it was to be referred. The pupae of butterflies are, I believe, invariably suspended, or at least tied; but while those of one great section are loosely hung from a little button, as in the specimen before us, those of the other have, besides this support, a slender but strong girdle of silk, which, passing round the body near the head, binds them generally in a horizontal position, and allows them little scope to swing about. It is a remarkable fact, that the Butterflies which are evolved from the former position, have the first pair of feet so short as to be useless as instruments of locomotion, while those using the latter mode, have these feet resembling the middle and hindmost pairs in form and office. This association of characters is invariable; yet we cannot perceive the most distant connexion between the presence of a girdle in the pupa, and the development of the feet in the imago.

[186-187] But I was going to advert to the change of form, which takes place in the transition from the caterpillar to the chrysalis state. Those persons who are aware of the fact that such a change occurs, but have never observed the process, are apt to imagine that the chrysalis comes forth in the form in which they see it, all hard and horny from the bursting skin of the caterpillar, as the armed Minerva from the head of Jupiter. But in truth, the change of general form is gradual; beginning before the disruption of the skin, and mainly going on after that skin has been thrown off. The former part of the alteration consists in a gradual

obliteration of the annulose divisions, a rounding and shortening of the body and a perceptible approximation to the form of the matured pupa, especially in the moth tribes. But the change of form which the evolved pupa undergoes is most conspicuous in the suspended butterflies; and I have never seen it more remarkable than in this of the *archippus*, although I have observed the metamorphosis of many species; and I may here remark, by the way, that there are few processes in nature more interesting to be witnessed than the transformations of a butterfly. In this case the abdominal segments were at first much elongated, being distinctly separable, as in the caterpillar; those of the thorax, on the contrary, were contracted, while the wings were small, thick, and wrinkled; their extremities being free, for a purpose we shall presently discover. The whole skin was soft, moist, and pulpy, and the colour bright green with alternate yellow bands. In a few hours, the abdominal segments had contracted into the form of a smooth, blunt cone, all traces of the divisions being lost, except where a fine line, scarcely perceptible, marked their position; the thoracic segments had much lengthened, and the wings now occupied the half of the entire length; their tips, which before were free, had stretched beyond their first boundary, far over the abdomen, and were now fixed in the general outline. The whole surface was become tense, hard, and glossy, and the hue an uniform greenish white, with a few gilt dots. I may add, that the amusing act of taking bold of the sloughed skin with the abdomen, while the tail was thrust out to feel for the silk button was performed just as the common *Vanessae* of our own country, the tortoise-shell, the peacock, &c. would do it: by observing which, most of the preceding remarks may be readily verified. [187-188] The chrysalis in question produced the imago in eight days, but under circumstances worthy of narration. Having accidentally let fall the box containing it, the fragile shell of the chrysalis was broken off, leaving the anal joint and tail-like process attached to the silk. It was, however, too near its exit for any wound to be made in the body of the enclosed butterfly, though some liquid was discharged. This occurred in the morning; in the course of the day, the chrysalis began to assume the colours and marks of the *archippus* butterfly, or, to speak more correctly, these tints began to be visible on the contained insect, through the increasing transparency of the pupa-skin. The next morning, early, I looked at it, just as it was bursting into its new life; it attained its perfection in the usual way, in about half-an-hour, without any injury from its accidental fall; having been but eight days in the pupa state. Whether from the caterpillar's having been bred in confinement, I know not, but the butterfly is the smallest individual of the species I have ever seen.

[192-193] I sometimes feel rather disappointed that I am able to do so little, either in collecting, or in making observations out of doors, seeing that there are so many things, particularly in Entomology, worthy of being observed and recorded. But the fact is, the sun's heat is so intense, being almost vertical, and rarely shadowed by a cloud, that it is scarcely prudent to expose oneself to it during the middle, part of the day. Gentlemen, who ride on horseback (none walk), usually carry an umbrella, as *locum tenens* of a parasol; but to pursue swallow-tailed butterflies, with a net in one hand and an umbrella in the other, would be not quite "the thing." There is, moreover, a degree of bodily languor and weakness induced by excessive perspiration, which depresses the mind and blunts scientific zeal, if not strongly combated. Of the prostration of strength arising from this cause, you may form an idea from a single fact. Sitting down in my room alone to write, without any previous exercise to warm me, almost undressed, I had not written half a page, when I found, where my hand had lain, a little pool of water on the paper, as much as a teaspoon could contain, the exudation from my hand alone during those few minutes. The morning hours, therefore, are the only part of the day that can habitually be rendered effective to science; for very few insects or birds, comparatively, are abroad in the evening, except the night-fliers. My usual plan is, to take a long walk through the forest in the morning, before the sun is very high; and in the heat of the day, if business permits, arrange my captures, write, or paint insects and flowers.

[202] The Tiger Swallowtail Butterfly (*Papilio turnus*), so numerous in

Canada, and extending even to Newfoundland, has lately come under my notice; and a still older acquaintance, the Admirable, or Red Admiral of English collectors (*Vanessa atalanta*), a denizen also of both the northern countries I have just named, as well as of most parts of the Old World. Here, however, it appears to be a great rarity, and the former is by no means common.

[203-204] The latest novelties in the butterfly *beau monde* are the following: the Blue-eyed Ringlet (*Hippachia alope*), a large and fine species, having the upper surface of a soft, sober, brown hue, with a great patch on the fore wings of a yellowish white, in which are two large black eyelets with azure pupils, and an obscure eyelet near the angle of the hind pair. Beneath, the colours are much the same, but the eyelets are brighter, and there are four in the hind wing, and the brown ground is beautifully marked with transverse dashes of black. The Paleclouded Ringlet (*Hipparchia* — ?), an undescribed species, I believe, is much like it, but smaller, having the brown upper surface darker, the patch smaller and yellower, and only the front eyelet present in either surface, much reduced in size. On the hind wings the four eyelets of the under surface are reduced to two (with, however, a slight indication of the other two), and the one on the upper side is hardly visible. It may possibly be the male of the preceding. They bear a resemblance, particularly the latter, to our English Meadow Brown (*S. jurtina*), but are handsomer. They are wary, and fly swiftly, chiefly affecting lanes in the forests, but occasionally coming into the gardens early in the morning. The third which I notice is one which, in the enthusiasm of my first acquaintance with it, when after a hard chase in the burning sun I captured it, appeared the most splendid butterfly I had ever seen, and amply repaid me, by the triumph of possession, for my fatiguing pursuit. It is the Vanilla Fritillary (*Argynnis vanillae*). Though it has appeared but a few days, it has already become rather numerous. The upper surface is deep orange-tawny, in some males almost vermilion, with a few black spots, and the nervures dilated into black stripes. But it is in the under surface that the superlative glory of this most lovely insect is seen. The front wings are deep scarlet, with the tip yellowish brown; the hind wings are of this brown tint, and both are adorned, but particularly the latter, with many large and irregular spots of bright white, which have all the lustre of silver; each spot is surrounded with a black edge, that seems to set off its beauty — a beauty of which the silver spots on some of our English Fritillaries can give but a faint idea. Slight traces of this metallic brilliance even appear on the upper surface, as silver pupils to the larger black spots of the fore wings. The caterpillar of this exquisite creature is said to feed on the flesh-coloured Passion flower (*Passiflora incarnata*).

[204] A fourth is the Snout Butterfly (*Libythea motya*), remarkable for the great development of the palpi, which are lengthened into a snout, as in some small moths, projecting nearly half an inch from the head. In other respects it is much like a little *Vanessa*. The wings are orange, with brown margins; the tip of the first pair is brown, containing three large white patches; beneath, the first pair are as above; the second are dark brown.

Add to these, two little sable urchins, regular "chummies" in appearance — the Sooty Skipper (*Hesperia catullus*), and the Banded Skipper (*H. phylaeus*); but they are too ugly to be worth any other description, than that they are blackish brown, with a few white dots.

[205] I have also obtained some very fine moths: the Green Emperor (*Saturnia luna*) is a very remarkable as well as beautiful species. It is large, measuring nearly five inches in breadth; the wings are of a pale pea-green, with a half-shut eyespot in each; the hind pair are elongated into a long tail-like process, as in the swallow-tailed butterflies, which extends more than an inch and a half from the outline of the wing. An eminent naturalist observes, that "the lower wings of the Lepidoptera, when thus unusually lengthened, perform the same office in flight as the tail does among birds, for we find that all the swiftest flying butterflies have what are aptly and justly called swallow-tailed wings." I am not aware, however, that the present species affords any exception to the generally heavy flight of the thick-bodied family to which it belongs: the specimen which has come under my notice was particularly slow and

tame (although a male), but as both the tailed processes were much shortened by being weather-beaten, it would not be fair to draw a conclusion from it alone. I suppose, without breeding the insect from pupa, it would be rare to meet with a perfect specimen, these long tails being, from their fragile nature, particularly liable to injury.



Fig. 16. Emperor moths (Saturniidae): Io moth, *Saturnia io* [= *Automeris io* (Fabricius)], which Gosse called "corn emperor," and luna moth, *Saturnia luna* [= *Actias luna* (Linnaeus)], which Gosse called "green emperor" (p. 206).

[205-206] Two specimens of another species of the same genus, the Corn Emperor (*Saturnia io*), were lately given to me; one of which flew into a house in the evening, the other was flying in the shade of a large tree in the middle of the day. Both are females; they are four inches and a half in extent; the fore wings dark red, with two dusky bands; the hind wings yellow, with two concentric semicircular bands, the outer red, the inner black, and a very large, round, deep black eyespot in the centre, having a linear white pupil. The male of this moth differs remarkably; his fore wings being bright yellow, with a few spots and dashes of dark red; the body also is yellow; the hind wings are like those of the other sex. The larva is said by Abbot to feed on the maize, dogwood (*Cornus*), sassafras, &c.

[207] A very splendid, but I believe undescribed species of *Catocala*, a genus commonly known by the appellation of Crimson Underwings, has lately occurred. It far exceeds in beauty, as well as in size, the Scarlet Underwing, formerly noticed, being four inches and five-sixths in spread of wing; the fore pair of a soft rich brown, with lighter shades, crossed by two very sinuous lines of intense black; the hind pair brilliant crimson, with three black bands, and an indented pale margin. I know nothing of its habits; my specimen was observed resting with closed wings on a rafter in a house, during daytime; I carefully put my insect net over it, and on touching it, it suddenly opened its bright hues, and darted off in the headlong manner common to the genus, but unfortunately for itself, plunged into the bag of the net. From the perfectly uninjured state of the plumage, I conclude that it was but just out of pupa.

[208] Everybody knows how liable the Common Dorr and the Humble-bee of our own country are to be infested with parasitic mites or ticks, to so great an extent, indeed, as often to be almost covered with them, while the poor exhausted creature is utterly unable to defend itself against their attacks, and at length dies. Mr. Rennie, in his "Insect Miscellanies," speaks of having seen butterflies and dragonflies burdened in the same manner. I have lately observed a parallel fact, in the case of a little dragonfly (*Libellula berenice*), which I found much infested with minute scarlet mites, beneath the abdomen. But there is a much more interesting fact, which I forgot to mention when speaking of the Ocellated Clickbeetle (*Alaus oculatus*), viz. that one of these beetles was molested by great numbers of the curious little creature, Chelifer. It resembles a very tiny scorpion without a tail; and these, which I found, ran backward as readily as forward. That these little insects are fiercely predaceous has been long known, but not (at least that I am aware,) that they are gregarious, or parasitical.

The continuation of the species seems to be the chief end of individual insect existence: an instinct which almost triumphs over death itself.

[208-209] "Naturam expellas furcâ, tamen recurret." Moths which have been pinned by the collector before the deposition of their eggs, in conformity with this instinct, hasten to deposit them on the setting board, and I have seen one of the Ghost Moths (*Hepialidae*), which eject their eggs to a distance, immediately on being pinned, begin to shoot forth her little black eggs with great rapidity, as if aware that she had not long to live, and anxious to make the most of her time.

[210] I visited again, a day or two since, the little prairie knoll, which I have already mentioned, and which was a month or two ago so profusely clothed with flowers, and swarming with insect life. I expected to find insects equally numerous, though the species should be changed; but I was much disappointed. The *Asclepias*, and all the other former flowers have disappeared, and though there are some new ones in their places, there are but very few butterflies. The pretty Pink-wing, Moth (*Deiopeia bella*) was still abundant, flitting to and fro among the, herbage, and hiding, when pursued, among the stalks of the grass,

[212-213] There is a plant now abundantly in blossom, which grows in neglected fields and such-like places, in company with the *Zinnia*, covering, like it, large patches of ground with a dense mass of vegetation two or three, feet high. It is *Cassia occidentalis*. It has pinnate leaves, with many narrow leaflets; a bright yellow flower, succeeded by a pod like that of a sweet pea, which contains seeds hard and unpleasant to the taste. From its local name, Florida Coffee, I infer that these seeds are roasted, as an imitation of the Mocha berry, but such a use seems unknown here. The caterpillar of the Cloudless Sulphur Butterfly (*Colias eubule*) is said to feed on this plant. I may remark that this gay butterfly, which was among the first that I noticed, still continues plentiful. Another kindred species, but a very little one (*Xanthidia jucunda*), the Black-banded Sulphur, which was common in May and June, is become scarce, though it has not yet disappeared. I will describe it, for a reason which appears in the note. It is an inch and three-eighths in extent, sulphur-yellow, with a black cloud at the tip of the first pair, and some black irregular spots running into each other, at the margin of the second. But its distinguishing character is a broad band of black, running along the inner margin of the fore wings. Beneath, the first pair are yellow, with a dusky tip; the second greyish, with innumerable specks. Another species, of as nearly as possible the same size, has but recently appeared, but is become quite common; the Black-edged Sulphur (*Xanthidia delia*). It is marked very much as the preceding, save that the band at the inner margin of the first wings is altogether wanting. Beneath, both pairs are yellow, with pink fringes; numerous specks, and a few larger black dots, are scattered over the surface.*

* Boisduval, in his beautiful "Histoire et Iconographie des Lépidoptères de l'Amérique," has figured the Black-banded as the female of *delia*, but in this he is mistaken, as I have caught *delia* in circumstances which enable me to determine the male and female with precision. The sexes of this species differ in nowise from each other, except that the male is of a slightly brighter yellow, and has rather more of the black margin to the hinder wings. No trace of the band appears in either sex. This error is the more unaccountable, since he gives the Black-banded again, as the male and female of *jucunda*, which is correct. I have little doubt, also, that his *Thecla favoninus*, and *Thecla hyperici*, are identical.

[229] At length we reached the melon-patch, and having dismounted and tied our horses to the hanging twigs of the roadside trees, we crossed the rail-fence to beat the ground on foot. It was a large field, entirely covered with melons the long stems of which trailed over the soft earth, concealing it with the coarse foliage and the great yellow flowers of the plant; while the fruit, of all sizes, lay about in boundless profusion, from the berry just formed, to the fully matured and already rotten-ripe melon, as large as a butter-firkin. . . . Moths of various species were collected around the wounded fruit, some of them (which I should have prized for my cabinet, if I had had time and means to capture and bring them home) inert and bloated with the juices which they had been sucking; others fluttering by scores around, or attracted by the light to dance round the torches.

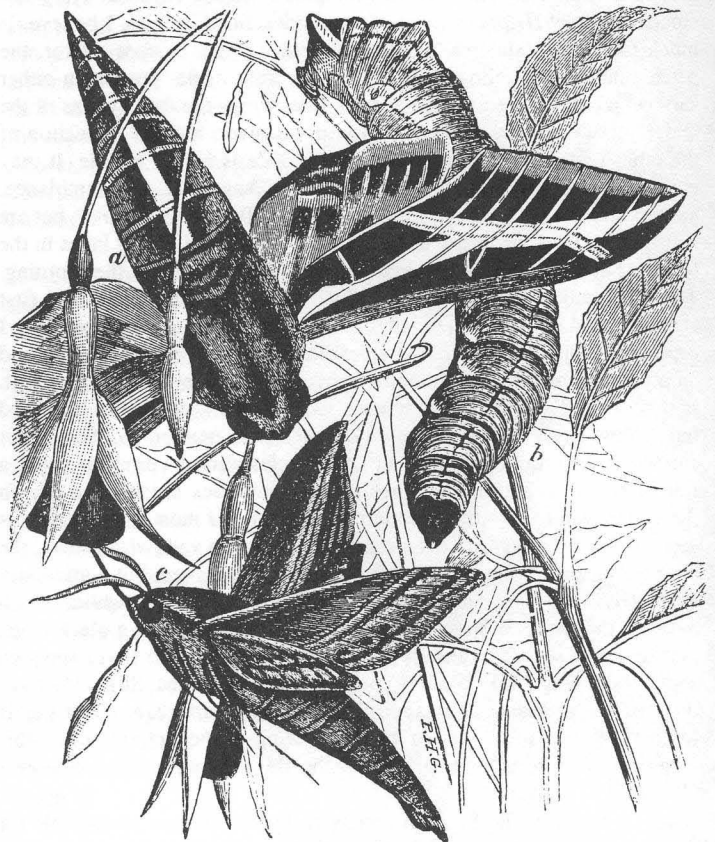


Fig. 17. Hawkmoths (Sphingidae): *Sphinx vitis* [= *Eumorpha vitis* (Linnaeus)] and caterpillar (above); *Sphinx tersa* [= *Xylophanes tersa* (Linnaeus)] (below) (p. 246).

[245-246] The great profusion of insects which has struck me hitherto as so remarkable has begun to subside; many species that were common have either become scarce or have altogether disappeared, while those that have, come into season are comparatively few. Still, however, in favourable spots and in fine weather, the air is still gay with these beautiful beings. The good housewives are now drying their peaches for winter store. The fruit is pared, stoned, and sliced, like apples for a tart, and the pieces are, spread on cloths to dry in the sun, and then strung on threads and suspended in a dry room. The saccharine juices of the drying fruit attract many day-flying insects, and among others gorgeous butterflies congregate to suck the tempting morsels. I have taken several fine specimens lately under these circumstances.

[246-247] In the garden the beds of *Mirabilis jalapa* continue in profuse blossom, and the twilight-loving Hawkmoths resort hither to rifle their tubes of the abundant nectar. Two species of large size and unusual beauty have just occurred to me. One is the Green-clouded Hawk (*Sphinx satellitia*), a species which closely resembles the Oleander Hawk of Europe (*S. nerii*), being variously clouded and blotched with dark green, on a pale ground, the colours blended with the beautiful softness so characteristic of this tribe of moths. As it is not figured by Abbott, it

is probably a rare insect. The other species is even more beautiful, the colours having the definiteness and vividness of those which we look for in the butterflies. The ground-colour is drab or pale buff on the body and front wings, marked in a symmetrical manner with black; the hind wings are clouded with green, crimson, and black in a charming manner. This is called, by Abbott, the Painted Hawk (*Sphinx vitis*); the caterpillar, which is varied with green, red, and white, and marked with black lines, is said to feed on the leaves of the vine and the magnolia.

[262-263] Insects often play around the fire. Beetles "wheel their drony flight" in buzzing circles round for a few turns and are gone; and moths come fluttering about, and often scorch their plumy wings. A few evenings ago I took at the lightstand a specimen of a very handsome Sphinx, the Blind Hawk (*Smerinthus excaecatus*), the front wings of which are of a rich brown dashed and clouded with black, and the hinder pair crimson, with a large black eye-spot on each, having an azure pupil. It was an unusually large specimen, and quite uninjured, though it flew among the ashes of the fire.

[272] But I turn from the exploits of these mighty hunters to detail my own successes in the pursuit of minuter game. The insect season has been waning for some time. Since August, butterflies have been comparatively few, both as to the number of species and of individuals. Yet their abundance up to that time may be inferred from the fact that on the morning of the 25th of August I counted twenty different species abroad. The following thirteen I saw during about half an hour that I spent in the garden, soon after sun-rise:

<i>Papilio philenor</i>	<i>Grapta interrogationis</i>
" <i>calchas</i>	<i>Cynthia huntera</i>
<i>Argynnis columbina</i>	<i>Hipparchia sosybius</i>
" <i>vanillae</i>	<i>Eudamus tityrus</i>
<i>Colias nicippe</i>	<i>Hesperia orcus?</i>
" <i>eubule</i>	<i>Pamphila otho?</i>
	<i>Pamphila</i> — ?

In the course of a ride in the forenoon the seven following were observed, in addition to those already enumerated:

<i>Papilio troilus</i>	<i>Limenitis ursula</i>
<i>Melitaea tharos</i>	<i>Hipparchia andromacha</i>
<i>Colias delia</i>	<i>Thecla comyntas</i>
	<i>Eudamus bathyllus</i>

[273] Other species were active on the days that preceded and that followed this.

[280-281] One of the children lately found on a leaf of dog-wood a most singular caterpillar. It is about an inch in length, somewhat five-sided, the back flat, truncate at each end; the head invisible when at rest, being drawn into the body, so that I had to turn it over a great many times before I could distinguish head from tail, which at last I did only by catching sight of the six little white feet; for it has no prolegs, but the whole underpart except near the head is soft and fleshy, and clings with its whole surface to the ground, moving with a sort of undulation in crawling like the belly of a slug, except that it is dry, and not slimy. The middle of the body is velvety green, bordered with white, and having on the centre of the back a white ring surrounding a brown centre: each end of the body is of the same reddish-brown hue. It has four fleshy horns, one at each corner of the green on the back, which are studded with sharp hairs radiating in every direction; outside these, at both ends, are shorter horns similarly armed; and a row of similar armed projections, but of lighter colour, defends each side. When the hand touches these spines, a sting is felt exactly like, that of a nettle, but of greater smart, which continues for about an hour. By this sting the boys discovered it; but on my being told of it, I disbelieved it, till I was convinced by actual experiment, repeated more than once. It crawls slowly. I subsequently obtained another of these larvae, on the leaves of a sassafras bush; it is doubtless that of some butterfly or moth, but I did not succeed in rearing either individual.

[281-282] The same urticating property is possessed by the caterpillar of the Corn Emperor (*Saturnia io*). This is of far superior size, being longer than my little finger, and as thick; its ground colour is very pale

bluish green, with a white band bounded by crimson lines running down each side, in which are the spiracles; between the prolegs are on each segment a pair of red, triangular network spots. Every segment has six tubercles, which sting on the slightest touch, like a nettle, causing a little red tumour, with considerable pain: those segments which do not bear the prolegs, have eight bundles of spines; these spines are of a yellower green than the body.

[282] Madame Merian (if I recollect rightly, for I have not here any means of reference), has mentioned a caterpillar of Surinam which has the same power of stinging. These, however, are the only cases in which it has ever fallen under my own observation.

[282-283] Let me mention to you some particulars of the history of yet another caterpillar, a still greater oddity in its way. Early in the month of September I found upon an apple-tree many singular looking spindle-shaped cases or cocoons, made of a strong tough silk of a dirty white hue. The extremities were tapered to a point; the length was from one and a half to two inches; the upper end terminated in a silken band, fastened tightly round a twig, from which the case was suspended. The surface was thickly studded with pieces of twigs, from one-third to two-thirds of an inch long, attached longitudinally, but somewhat slightly: these were most numerous in the upper part. I made an incision in the silk, and found within a smooth plump caterpillar, dull reddish-brown, tapering at the extremities, the head and first three segments horny and polished, white with black spots. I threw the cases into a box, and the next day examined one or two more, and found that some contained pupae. In a large cocoon there was a dark brown pupa, much elongated, with no vestige of wings in the usual place, the head, legs, and antennae very small (for all these members can be traced in a Lepidopterous pupa, as in the imago); in another was a pupa much smaller, which had wings of middling size, and short thick antennae. I had reason to think that this cocoon was used by the caterpillar as a shelter or defence, while, projecting the three polished segments of its body to eat in the manner of Phryganea, for on suddenly opening the box I saw one, draw his head within the cocoon at the lower end, vanishing just as I looked at him. This induced me, by making a hole near the, top of the cocoon and touching the larva behind, to drive him clean out, as I have done a Phryganea, at the lower end, which is tubular and open. But soon after I found by actual observation that the manners of the larva had the supposed resemblance to the Trichoptera, for at night I saw that the caterpillar crawled about the leaves, dragging the tent after him as far as it would allow, the first three segments being projected. I could not but admire the circumstance, that this resemblance between insects of very different orders was made still more complete by the bits of stick which were stuck about the case so profusely, and of which I could not discover the use. I at first thought they might have been the living twigs to which the web was first fastened, as a stay until it attained form, and that they had afterwards been cut off by the caterpillar, to free the case when finished: but if so, there would surely have been but two or three, instead of a dozen or two. Perhaps they were intended to make it more rough looking and less observable. Those cases which I had cut partly open were soon accurately closed nearly as tight and strong as ever, by an internal coat of silk over the incision.

[283-285] On the evening of the 5th of October I was surprised at seeing in my box a little moth, which was fluttering his wings so swiftly as to render them almost invisible. On his becoming still, I observed that the wings were almost totally destitute of scales, and consequently transparent: the posterior pair very minute. On the posterior wings there was a very narrow band on the inner margin, which was clothed with black scales, and a few very sparingly scattered on an undefined stripe that ran down the anterior wings. The head, thorax, and abdomen, which were somewhat robust, were thickly clothed with black down; the antennae doubly pectinate, curled, and very short. The moth measured half an inch in length and an inch in spread of wing. It flew but a very few inches at a time, but constantly (or nearly so) vibrated its wings. When these organs were not in motion they were deflexed, and the abdomen was turned up. It was a male, and had proceeded from one of the smaller cases, at the mouth of which the pupa skin was left protruding about two-thirds of its length. Another pupa had just begun to make its head visible from the mouth of another cocoon. I then

opened some of the larger female cocoons, but in most of them the pupae were filled with a soft satiny dust, of a buff-brown colour. In one cocoon I found the female evolved from the pupa; the exuviae, of which were likewise filled with this downy dust. The perfected female had little of the form of a moth, but appeared like a transparent bag of soft eggs; the anterior parts were dark brown, and the limbs were very minute, flabby and almost undistinguishable, looking nearly decomposed. No wings were to be seen, and there was not a vestige of down upon the body, except two or three tufts near the tail, which resembled that left in the pupa-skin. I should have supposed that it was dead, but that at intervals there were certain motions which indicated the possession of vitality. "Take it for all in all," larva, pupa, and imago, this was the most singular moth that ever it was my fortune to make, acquaintance with. I have ascertained that it is the *Thyridopteryx ephemeraeformis* of Stephens.

[292] All through the autumn, several species of *Oenothera* have opened their beautiful blossoms to the evening air, courting the softened rays of the, moon and stars rather than of the sun. One sort in particular, the large-flowered Evening-primrose (*Oe. grandiflora*), with its fine blossoms of brilliant yellow, as wide as a tea-cup, is well worthy of admiration. Some species of Willow-herb (*Epilobium*) discharges its feathery down here, which is borne by the breeze into our eyes, nose, and mouth, and hangs about in ragged slovenly bunches. But most characteristic is the plant called the Golden-rod (*Solidago*), which covers many acres with tall coarse herbage, and spikes of small but close-set yellow blossom. Many autumnal insects, as the Hymenoptera and Diptera, and some moths, flutter around these spikes of blossom, which else would present few attractions.

[292-293] Hence we emerge into the high road, bounded on both sides by the hardwood forest, where the oaks and hickories, the sycamore and the tulip-tree, the chestnut and the sweet-gum, cast a greenwood shade, varied, however, now with gorgeous tints, like the rays that stream through the painted window of some old cathedral, by the dying foliage. Beneath these trees the eye of an entomologist is often caught by droppings which indicate caterpillars of large size feeding on the leaves above; and thus I have been guided to the discovery of some fine species: while, not uncommonly, we discern far up in the trees the great cocoons of some of the Emperor Moths (*Saturnia*, *Ceratocampa*, &c.) suspended from the twigs by a narrow ribbon of strong silk, and rocking in the breeze. The cocoon of the Swallow-tailed Emperor (*S. luna*), for instance, is affixed to the liquidambar or sweet-gum; that of the Corn Emperor (*S. io*) to the oak, and that of the great Yellow Elephant Moth (*C. imperatoria*) to the sycamore. The caterpillars of some of these moths are of magnificent dimensions, and often richly coloured. A few weeks ago one of my little lads came to tell me of one which he had just found, and which he described as unusually gigantic — too big, in fact, to be touched. On my coming to the spot, the prize was *non inventus*, having crawled away. On my asking the lad why he had not put the caterpillar into a collecting canister which he had, he exclaimed with unfeigned astonishment, "Law, sir! he would'n't begin to go in!" meaning, not to ascribe any reluctance on the part of the insect to the change of residence, but that the orifice of the box was not wide enough to receive even the smallest extremity of its body.

[298] We have nothing like winter yet. The weather resembles what you have in Canada in September; the trees have lost their gay autumnal tints, and have put on a sober russet hue, but in general they still wear their foliage. The seedlings are still fresh and green, and, in the swamps, the magnolias, the water-oak, the holly, and the palmetto are as verdant as in summer. Herbs and weeds still fill the angles of the fences, and the fields of autumn-sown rye, are clothed in a flush of tender green, like that of a meadow in June. Some few flowers still linger, and on sunny days butterflies and other insects flutter in the beam.

ACKNOWLEDGMENTS

Much of what is noted about Philip Gosse is taken from the biography written by his son (Gosse, 1890) and from biographical notes by Jenkins

(1978). Figures from his *Letters from Alabama* are taken from an original copy of Gosse's book in my personal library.

Contribution No. 901, Entomology Section, Bur. Ent. Nema. Plant Path., Div. Plant Industry, Florida Dept. Agric. & Consumer Serv.

REFERENCES

Abbot, J., and J. E. Smith

1797. *The Natural History of the Rarer Lepidopterous Insects of Georgia including their systematic characters, the particulars of their several metamorphoses, and the plants on which they feed. Collected from the observations of Mr. John Abbot, many years resident in that country.* London. 2 v.

Bartram, W.

1791. *Travels Through North & South Carolina, Georgia, East & West Florida, the Cherokee country, the extensive territories of the Muscogulges, or Creek Confederacy, and the country of the Chactaws; containing, an account of the soil and natural productions of those regions, together with observations on the manners of the Indians. Embellished with copper-plates.* Philadelphia. 552pp, 9 pl.

Catesby, M.

[1729-47]. *The Natural History of Carolina, Florida and the Bahama Islands: Containing the Figures of Birds, Beasts, Fishes, Serpents, Insects and Plants: particularly, the Forest-Trees, Shrubs, and other Plants, not hitherto described, or very incorrectly figured by Authors. Together with their Descriptions in English and French. To which, are added Observations on the Air, Soil and Waters: With Remarks upon Agriculture, Grain, Pulse, Roots, &c. To the whole, Is Prefixed a new and correct Map of the Countries Treated of.* London. 263 pl. [2nd ed. 1754, London. 3rd ed. 1771, London. German ed. 1756, Nuremberg]

Essig, E. O.

1931. *A History of Entomology.* New York: Macmillan. 1029pp.

Gosse, E. W.

1890. *The Life of Philip Gosse.* London.

Gosse, P. H.

1840. *The Canadian Naturalist.* London: J. Van Voorst. 372pp.

1847. *The Birds of Jamaica.* London: J. Van Voorst. 447pp, 4 pl.

1851. *A Naturalist's Sojourn in Jamaica.* London: Longmans, Brown, Green & Longmans. 508pp, 7 pl.

1853. *A Naturalist's Rambles on the Devonshire Coast.* London: J. Van Voorst. 454pp.

1859. *Letters from Alabama, (U.S.), Chiefly Relating to Natural History.* London: Morgan & Chase. 306pp. (Reprinted, 1983, Tuscaloosa: Univ. Alabama Pr.)

1860. *The Romance of Natural History.* London: J. Nisbet. 393pp.

Jenkins, A. C.

1978. *The Naturalists: Pioneers of Natural History.* New York: Mayflower Bks. 200pp.

Kohlstedt, S. G. (ed.)

1991. *The Origins of Natural Science in America: the Essays of George Brown Goode.* Washington: Smithsonian Inst. Pr. 411pp.

Mallis, A.

1971. *American Entomologists.* New Brunswick: Rutgers Univ. Pr. 549pp.

Osborn, H.

1937. *Fragments of Entomological History. [Part I].* Columbus. 394pp, 47 pl.

Poesch, J.

1961. *Titian Ramsey Peale, 1799-1885, and His Journals of the Wilkes Expedition.* Philadelphia: Amer. Philos. Soc. 214pp (Mem. Amer. Philos. Soc., Vol. 52).

Stroud, P. T.

1992. *Thomas Say: New World Naturalist.* Philadelphia: Univ. Penn. Pr. 340pp, 9 pl.

Weiss, H. B.

1936. *The Pioneer Century of American Entomology.* New Brunswick, NJ. 320pp.

Weiss, H. B., and G. M. Ziegler

1934. *Thomas Say: Early American Naturalist.* Springfield: C. E. Thomas. 260pp.

APPENDIX

The following alphabetical list gives original scientific names of Lepidoptera used by Gosse in his 1859 book, *Letters from Alabama*, along with their current correct names and occasional notes. Page numbers are noted to the right. Gosse used names mostly obtained from the works of Abbot and Smith (1797), Boisduval and LeConte (1829-34. *Histoire Generale et Iconographie des Lépidoptères et des Chenilles de l'Amérique Septentrionale*. Paris: Roret), Hübner, and other works from Europe. Gosse often uses the larger generic concepts of earlier authors and places all related species under these large groupings: e.g., skippers are in *Hesperia* (some in *Pamphila* and *Eudamus*), hawkmoths are mostly in *Sphinx* (day-fliers are in *Sesia*), all emperor moths are *Saturnia*, etc.

Among all the Lepidoptera noted by Gosse from central Alabama, it is surprising he did not mention the zebra, *Heliconius charithonia*, but it is more common along the Gulf Coast and, since he did not stop in Mobile for long, it appears he never saw it. There is no current book on the butterflies of Alabama but the field guide by Lucien Harris (1972. *Butterflies of Georgia*. Norman: Univ. Oklahoma Pr.), for Georgia, treats most all of the same species; for moths the nearest guide is the Kimball (1965. *The Lepidoptera of Florida: an Annotated Checklist*. Gainesville: Fla. Dept. Agric.) treatment for Florida (see Heppner, in press, *Lepidoptera of Florida*, for updated edition).

<i>Aegeria exitiosa</i>	<i>Synanthedon exitiosa</i> (Say) (Sesiidae)	145
<i>Amphipyra pyramidea</i>	<i>Amphipyra pyramidoides</i> Guenée (Noctuidae)	172
Gosse notes a capture of " <i>Amphipyra pyramidea</i> " in Alabama but this is a European species; he undoubtedly was referring to the American relative, <i>A. pyramidoides</i> .		
<i>Argynnis columbina</i>	<i>Euptoieta claudia</i> (Cramer) (Nymphalidae)	148, 272
Gosse misidentified this species as the tropical species now called <i>Euptoieta hegesia</i> (Cramer), which just enters our region in Texas; the Alabama species is common the South: <i>E. claudia</i> . His use of the Palearctic genus <i>Argynnis</i> did not distinguish what we now call <i>Euptoieta</i> from <i>Speyeria</i> ; the genus <i>Argynnis</i> is now only used for Palearctic species, while <i>Speyeria</i> is American.		
<i>Argynnis vanillae</i>	<i>Agraulis vanillae</i> (Linnaeus) (Nymphalidae)	204, 272
<i>Callimorpha lecontei</i>	<i>Haploa lecontei</i> (Guérin-Méneville) (Arctiidae)	102
<i>Catocala</i> sp.	<i>Catocala</i> sp.? (Noctuidae)	207
It remains unclear which species Gosse was referring to, since the species with red hindwings have 2 black bands, and he noted 3 black bands and a size larger than <i>C. ilia</i> ; perhaps only a form of <i>C. ilia</i> .		
<i>Catocala epione</i>	<i>Catocala epione</i> (Drury) (Noctuidae)	119
<i>Catocala ilia</i>	<i>Catocala ilia</i> (Cramer) (Noctuidae)	120
<i>Ceratocampa imperatoria</i>	<i>Eacles imperialis</i> (Drury) (Saturniidae)	292
Gosse uses this name later in the book, a synonym of <i>imperialis</i> .		
<i>Ceratocampa imperialis</i>	<i>Eacles imperialis</i> (Drury) (Saturniidae)	171
<i>Colias caesonias</i> [sic]	<i>Zerene cesonia</i> (Stoll) (Pieridae)	53
Gosse's spelling was a common misspelling of this species: <i>cesonia</i> is the correct original spelling of Stoll.		
<i>Colias delia</i>	<i>Eurema daira</i> (Godart) (Pieridae)	272
<i>Colias diara</i> [sic]	<i>Eurema daira</i> (Godart) (Pieridae)	53
<i>Colias eubule</i>	<i>Phoebis sennae eubule</i> (Linnaeus) (Pieridae)	38, 212, 272
<i>Colias nicippe</i>	<i>Eurema nicippe</i> (Cramer) (Pieridae)	53, 272
<i>Cossus</i>	<i>Prionoxystus robiniae</i> (Peck) (Cossidae)	139
Gosse undoubtedly referred here to the American carpenterworm moth, which is our largest species; the genus <i>Cossus</i> only occurs in the Palearctic.		
<i>Cynthia cardui</i>	<i>Vanessa cardui</i> (Linnaeus) (Nymphalidae)	78
<i>Cynthia huntera</i>	<i>Vanessa virginiensis</i> (Drury) (Nymphalidae)	78, 148, 272
Older literature usually called this species " <i>huntera</i> " but the senior name is <i>V. virginiensis</i> ; <i>Cynthia</i> has been used for the genus but now is referred to <i>Vanessa</i> .		
<i>Danais archippus</i>	<i>Danaus plexippus</i> (Linnaeus) (Nymphalidae)	78, 185
Gosse used a preoccupied name, <i>archippus</i> , for what we now call the monarch, <i>D. plexippus</i> .		
<i>Deiopeia bella</i>	<i>Utetheisa bella</i> (Linnaeus) (Arctiidae)	79, 210
<i>Eudamus bathyllus</i>	<i>Thorybes bathyllus</i> (Smith) (Hesperiidae)	272
<i>Eudamus tityrus</i>	<i>Epargyreus clarus</i> (Cramer) (Hesperiidae)	61, 86, 272
ghost moth	<i>Sthenopsis auratus</i> Grote (Hepialidae)	208
Gosse notes that he captured a ghost moth; the only species in Alabama (and very rare) is <i>Sthenopsis auratus</i> .		
<i>Grapta c-aureum</i>	<i>Polygonia ?comma</i> (Harris) (Nymphalidae)	59
Gosse used the name of a European butterfly for one of the American anglewings, but it is uncertain which species he saw.		
<i>Grapta interrogationis</i>	<i>Polygonia interrogationis</i> (Fabricius) (Nymph.)	272
<i>Hesperia</i>	? <i>Hesperia</i> (Hesperiidae)	20
There are a number of skippers Gosse may have seen that fit his description, not only in the genus <i>Hesperia</i> .		
<i>Hesperia catullus</i>	<i>Pholisora catullus</i> Fabricius (Hesperiidae)	204
<i>Hesperia malvae</i>	<i>Pyrgus</i> sp., ? <i>communis</i> (Grote) (Hesperiidae)	27
<i>Hesperia orcus</i> , <i>Hesperia proto</i>		27, 272
These species mentioned by Gosse are European species, now in the genus <i>Pyrgus</i> , that resemble a skipper he saw in Alabama: possibly <i>Pyrgus communis</i> , described from central Alabama by Grote in 1872.		

<i>Hesperia phylaeus</i>	<i>Hylephila phyleus</i> (Drury) (Hesperiidae)	204
Gosse used the misspelling prevalent in the literature (" <i>phylaeus</i> ") for this species.		
<i>Hipparchia alope</i>	<i>Cercyonis pegala</i> (Fabricius) (Nymphalidae)	203
The species Gosse refers to is sometimes named as a subspecies of <i>C. pegala</i> , occurring throughout the eastern United States. He also mentions a different form of the species. <i>Hipparchia</i> is a Palearctic genus.		
<i>Hipparchia andromacha</i>	<i>Enodia portlandia</i> (Fabricius) (Nymphalidae)	122, 272
<i>Hipparchia areolata</i>	<i>Neonympha areolata</i> (Smith) (Nymphalidae)	121
<i>Hipparchia eurythris</i>	<i>Megisto cymela</i> (Cramer) (Nymphalidae)	55
The spelling " <i>eurythris</i> " was a common misspelling of the Fabrician name, <i>eurytris</i> ; now a junior synonym of <i>M. cymela</i> .		
<i>Hipparchia gemma</i>	<i>Cyllopsis gemma</i> (Hübner) (Nymphalidae)	121
<i>Hipparchia sosybius</i>	<i>Hermeuptychia sosybius</i> (Fabricius) (Nymphalidae)	56, 272
<i>Libythea motya</i>	<i>Libytheana carinenta bachmanii</i> (Kirtland) (Libytheidae)	204
Gosse noted his capture of <i>L. motya</i> (Boisduval & LeConte), but this is a tropical species; he undoubtedly was referring to the usual species in the Southeast, <i>L. carinenta bachmanii</i> .		
<i>Limenitis arthemis</i>	<i>Limenitis arthemis</i> (Drury) (Nymphalidae)	123
<i>Limenitis ursula</i>	<i>Limenitis arthemis astyanax</i> (Fabricius) (Nymphalidae)	123, 272
Gosse's use of the synonym name, <i>ursula</i> , for the red-spotted purple butterfly refers to the eastern form of <i>L. arthemis</i> , which is the white admiral in the Northeast; <i>astyanax</i> actually is only the blue-black form of <i>artemis</i> common in the South and most of the eastern states. Gosse noted that he thought the red-spotted purple (<i>astyanax</i>) very similar and related to the northern <i>artemis</i> he was familiar with from Canada, as was proven later with genetics and cross-breeding experiments.		
<i>Macroglossa stellatarum</i>	<i>Macroglossum stellatarum</i> (L.) (Sphingidae)	124
Gosse is referring here to a European species that resembles an American species.		
<i>Melitaea tharos</i>	<i>Phyciodes tharos</i> (Drury) (Nymphalidae)	59, 272
<i>Pamphila otho</i>	<i>Wallengrenia otho</i> (Smith) (Hesperiidae)	272
<i>Papilio ajax</i>	<i>Eurytides marcellus</i> (Cramer) (Papilionidae)	51, 148
The name <i>Papilio ajax</i> was often used for our zebra swallowtail but this Linnaean name was rejected in favor of <i>marcellus</i> (ICZN Op. 286).		
<i>Papilio asterius</i>	<i>Papilio polyxenes asterius</i> Stoll (Papilionidae)	24, 78
This is the common black swallowtail, which ranges south to South America; <i>asterius</i> is the North American subspecies.		
<i>Papilio calchas</i>	<i>Papilio palamedes</i> Drury (Papilionidae)	169, 272
<i>Papilio glaucus</i>	<i>Papilio glaucus</i> Linnaeus (Papilionidae)	122
<i>Papilio philenor</i>	<i>Battus philenor</i> (Linnaeus) (Papilionidae)	77, 148, 272
<i>Papilio thoas</i>	<i>Papilio cresphontes</i> Cramer (Papilionidae)	169
Although <i>P. thoas</i> has been recorded in extreme southern parts of the United States (Texas and Florida), it is mainly Neotropical; Gosse was undoubtedly referring instead to the giant swallowtail, <i>P. cresphontes</i> .		
<i>Papilio troilus</i>	<i>Papilio troilus</i> Linnaeus (Papilionidae)	78, 148, 272
<i>Papilio turnus</i>	<i>Papilio glaucus</i> Linnaeus (Papilionidae)	123, 202
Early literature used either <i>turnus</i> (the yellow form) or <i>glaucus</i> for the tiger swallowtail, but <i>P. turnus</i> is the senior name; <i>glaucus</i> actually refers to the black female form.		
<i>Polyommatus argiolus</i>	<i>Celastrina argiolus</i> (Linnaeus) (Lycaenidae)	144
Gosse is referring here to the European species, <i>C. argiolus</i> .		
<i>Polyommatus pseudargiolus</i>	<i>Celastrina argiolus ladon</i> (Cramer) (Lycaenidae)	144
The blue referred to here by Gosse is the Spring azure; the American subspecies is now referred to the Eurasian <i>C. argiolus</i> ; the names <i>pseudargiolus</i> (Boisduval & LeConte) is a synonym of <i>C. a. ladon</i> .		
<i>Pontia</i>	? <i>Appias drusilla</i> (Cramer) (Pieridae)	20
Most likely, Gosse saw one of the more active fliers among the white butterflies, either <i>Appias drusilla</i> or <i>Ascia monuste</i> (Linnaeus).		
<i>Saturnia io</i>	<i>Automeris io</i> (Fabricius) (Saturniidae)	205, 281, 292
<i>Saturnia luna</i>	<i>Actias luna</i> (Linnaeus) (Saturniidae)	205, 292
<i>Satyra jurtina</i>	<i>Maniola jurtina</i> (Linnaeus) (Nymphalidae)	203
In his book, Gosse is referring this European species as being similar to a satyr he thought a different species from what he called <i>Hipparchia alope</i> (= <i>Cercyonis pegala</i>), but actually it is only a form of <i>C. pegala</i> .		
<i>Sesia pelagus</i>	<i>Hemaris thysbe</i> (Fabricius) (Sphingidae)	124
Gosse referred to this as the "humble-bee hawkmoth;" this was usual in older literature when the bumble bee was called the humble bee. Early literature used the generic name <i>Sesia</i> in Sphingidae but it now is used only for some Sesiidae moths.		
Slug caterpillar	<i>Acharia stimulea</i> (Clemens) (Limacodidae)	280
This species, the saddle-back caterpillar, is described as a slug-like caterpillar by Gosse; the correct name is <i>Acharia stimulea</i> (formerly in the genus <i>Sibine</i>).		
<i>Smerinthus excaecatus</i>	<i>Paonias excaecatus</i> (Smith) (Sphingidae)	263
<i>Sphinx carolina</i>	<i>Manduca sexta</i> (Linnaeus) (Sphingidae)	65, 147

<i>Sphinx nerii</i>	<i>Daphnis nerii</i> (Linnaeus) (Sphingidae)	246
This is a European species Gosse noted as being similar to <i>satellitii</i> .		
<i>Sphinx pampinatrix</i>	<i>Darapsa myron</i> (Cramer) (Sphingidae)	172
<i>Sphinx satellitia</i>	<i>Eumorpha satellitia</i> (Linnaeus) (Sphingidae)	246
<i>Sphinx vitis</i>	<i>Eumorpha vitis</i> (Linnaeus) (Sphingidae)	247
<i>Thecla comyntas</i>	<i>Everes comyntas</i> (Godart) (Lycaenidae)	272
<i>Thecla falacer</i>	<i>Satyrium calanus falacer</i> (Godart) (Lycaenidae)	37
<i>Thecla favonius</i>	<i>Fixsenia favonius</i> (Smith) (Lycaenidae)	213
<i>Thecla hyperici</i>	<i>Strymon melinus</i> Hübner (Lycaenidae)	213
Gosse notes that he considered <i>favonius</i> and <i>hyperici</i> as identical species. Yet they are different and in separate genera.		
<i>Thecla mopsus</i>	<i>Satyrium titus mopsus</i> (Hübner) (Lycaenidae)	148
<i>Thecla poeas</i>	<i>Calycopis cecrops</i> (Fabricius) (Lycaenidae)	170
<i>Thyridopteryx ephemeriformis</i> (Haworth) (Psychidae)		285
Gosse has the name correct for the bagworm.		
<i>Vanessa atalanta</i>	<i>Vanessa atalanta</i> (Linnaeus) (Nymphalidae)	202
Gosse refers to both the Alabama specimens and what he knew in England; all one species, but the American subspecies is called <i>V. atalanta rubria</i> (Fruhstorfer).		
<i>Vanessa orithya</i>	<i>Junonia ?coenia</i> (Hübner) (Nymphalidae)	20
The species <i>Junonia "orithya"</i> is Indo-Australian (the genus <i>Precis</i> , which often has been used for these butterflies, is African)		
<i>Xanthidia delia</i>	<i>Eurema daira</i> (Godart) (Pieridae)	212
Gosse noted this species also as " <i>Colias daira</i> ." This species is also listed as <i>Colias delia</i> on p. 272.		
<i>Xanthidia jucunda</i>	<i>Eurema daira</i> (Godart) (Pieridae)	212
Gosse notes here the summer form of <i>Eurema daira</i> . He has a footnote discussion about the two <i>Xanthidia</i> names, stating that he thought them different species, but Boisduval had it right that only different forms are involved.		

ATLAS OF NEOTROPICAL LEPIDOPTERA

Series ISBN: 0-945417-25-X

SERIES EDITOR: Dr. J. B. Heppner

Plan: 125 vol., including color synopsis and LSDS species pages

Checklist, Part 1: Micropterigoidea - Immoidea. 1984. xxvii + 112 pp. ISBN: 90-6193-038-3 \$18.50 (non-ATL: \$35.00)

Checklist, Part 2: Hyblaeoidea - Pyraloidea - Tortricoidea. 1995. liv+243 pp. ISBN: 0-945417-26-8 \$19.95 (non-ATL: \$37.95)

Checklist, Part 3: Uranioidea - Geometroidea

In prep.

Checklist, Part 4A: Papilionoidea (Lamas) 2001.

In prep.

Checklist, Part 4B: Drepanoidea - Bombycoidea - Sphingoidea. 1996. I+87 pp. ISBN: 0-945417-32-2 \$14.95 (non-ATL: \$29.95)

Checklist, Part 5A: Noctuoidea (Notodontidae - Arctiidae)

In prep.

Checklist, Part 5B: Noctuoidea (Noctiidae)

In prep.

Checklist, Part 6: General Index

In prep.

Vol. 124. Bibliography of Butterflies and Skippers. 1995. xiv + 463 pp. ISBN: 0-945417-31-4 \$32.50 (non-ATL: \$62.95)

ATLAS OF NORTH AMERICAN LEPIDOPTERA

Series ISBN: 0-945417-00-4

SERIES EDITOR: Dr. J. B. Heppner

Plan: 26 vol., including color synopsis and LSDS species pages

Checklist of North American Butterflies. In prep. ca. 120 pp. ISBN: 0-945417-24-1

\$10.95 (non-ATL: 19.95)

Fasc. 95. Papilionidae

In prep.

ATLAS OF PALEARCTIC LEPIDOPTERA

Series ISBN: 0-945417-96-9

SERIES EDITOR: Dr. J. B. Heppner

Plan: 30 vol., including color synopsis and LSDS species pages

Future series to illustrate and catalog all Eurasian Lepidoptera, including temperate regions of Japan. A new catalog (replacing the Staudinger/Rebel catalog of 1901) will be produced first, following the LSDS numbering format.

LEPIDOPTERA OF TAIWAN

Series ISBN: 0-945417-75-6

SERIES EDITORS: Dr. J. B. Heppner & Dr. Hiroshi Inoue

Plan: 10 vol., includes color synopsis; LSDS species pages

Vol. 1. Part 1: Introduction and Color Synopsis

\$81.50 (non-ATL: \$125.50)

2001. ca. 200 pp (including 60 color pl). (8½ x 11 in). ISBN: 0-945417-76-4

Vol. 1. Part 2: Checklist. 1992. xlix + 276 pp. (8½ x 11 in). ISBN: 0-945417-77-2

\$21.50 (non-ATL: \$39.95)

LEPIDOPTERORUM CATALOGUS (NEW SERIES)

Series ISBN: 0-945417-50-0

SERIES EDITOR: Dr. J. B. Heppner

Plan: 125 parts

Fasc. 7. Neopseustidae (Davis) 1997. viii + 8pp. ISBN: 0-945417-51-9 (Fasc. 7)

\$1.50 (non-ATL: \$4.50)

Fasc. 9. Neotheoridae (Kristensen). viii + 8pp. ISBN: 0-945417-51-9 (Fasc. 9)

in prep.

Fasc. 11. Prototheoridae (Davis). In prep. viii + 8pp. ISBN: 0-945417-51-9 (Fasc. 11)

\$1.50 (non-ATL: \$4.50)

Fasc. 28. Amphitheridae (Heppner). In prep. viii + 12pp. ISBN: 0-945417-52-7 (Fasc. 29)

\$2.00 (non-ATL: \$6.00)

Fasc. 29. Schreckensteiniidae (Heppner) In prep. viii + 8pp. ISBN: 0-945417-52-7 (Fasc. 29)

\$1.50 (non-ATL: \$4.50)

Fasc. [47] 48. Epermeniidae (Gaedike) 1996. viii + 16pp. ISBN: 0-945417-54-3 (Fasc. 47)

\$2.50 (non-ATL: \$7.50)

Fasc. 48. Ochsenheimeriidae (Davis) 1998. viii + 8pp. ISBN: 0-945417-55-1 (Fasc. 48)

\$1.50 (non-ATL: \$4.50)

Fasc. 49. Glyphipterigidae (Heppner). viii + 48pp. ISBN: 0-945417-55-1 (Fasc. 49)

in prep.

Fasc. 55. Acrolepiidae (Gaedike) 1997. viii + 16pp. ISBN: 0-945417-55-1 (Fasc. 55)

\$2.50 (non-ATL: \$7.50)

Fasc. 61. Tineodidae (Heppner) 1998. viii + 8pp. ISBN: 0-945417-58-6 (Fasc. 61)

\$1.50 (non-ATL: \$4.50)

Fasc. 62. Oxychirotidae (Heppner) 1997. viii + 8pp. ISBN: 0-945417-58-6 (Fasc. 62)

\$1.50 (non-ATL: \$4.50)

Fasc. 64. Brachodidae (Heppner). In prep. viii + 24pp. ISBN: 0-945417-58-6 (Fasc. 64)

\$3.50 (non-ATL: \$9.50)

Fasc. 66. Urodidae (Heppner). In prep. viii + 28pp. ISBN: 0-945417-59-4 (Fasc. 66)

\$2.50 (non-ATL: \$7.50)

Fasc. 71. Lacturidae (Heppner). In prep. viii + 32pp. ISBN: 0-945417-60-8 (Fasc. 71)

\$4.50 (non-ATL: \$12.50)

Fasc. 72. Somabrachyridae (Heppner). In prep. viii + 8pp. ISBN: 0-945417-60-8 (Fasc. 72)

\$1.50 (non-ATL: \$4.50)

Fasc. 84. Ratardidae (Owada). In prep. viii + 8pp. ISBN: 0-945417-64-0 (Fasc. 84)

\$1.50 (non-ATL: \$4.50)

Fasc. 93. Hedylidae (Scoble) 1998. viii + 16pp. ISBN: 0-945417-66-7 (Fasc. 93)

\$2.50 (non-ATL: \$7.50)

Fasc. 99. Libytheidae (Heppner). In prep. viii + 8pp. ISBN: 0-945417-67-5 (Fasc. 99)

\$1.50 (non-ATL: \$4.50)

Fasc. 105. Carthaeidae (Heppner). In prep. viii + 8pp. ISBN: 0-945417-69-1 (Fasc. 105)

\$1.50 (non-ATL: \$4.50)

Fasc. 115. Oxytenidae (Heppner). In prep. viii + 8pp. ISBN: 0-945417-69-1 (Fasc. 115)

\$1.50 (non-ATL: \$4.50)

Fasc. 116. Cercophanidae (Heppner). In prep. viii + 8pp. ISBN: 0-945417-69-1 (Fasc. 116)

\$1.50 (non-ATL: \$4.50)

Fasc. 117. Saturniidae (Lemaire/Peigler). viii + 120pp. ISBN: 0-945417-69-1 (Fasc. 117)

in prep.

Fasc. 118. Sphingidae (Heppner). viii + 120pp. ISBN: 0-945417-70-5 (Fasc. 118)

in prep.

Fasc. [124] 118. Noctuidae (Poole) 1989. 3 pts., 1314pp. ISBN: 0-916846-45-8

\$50.00 (non-ATL: \$150.00)

Fasc. 124A. Noctuidae: Introduction (Heppner). ca. 260 pp. (8½ x 11 in). ISBN: 0-945417-99-3

in prep.

SHIPPING HANDLING: \$2 first book, \$1 each added book (outside USA, add another \$1 for each book).

Lepidopterorum Catalogus only: \$2 for first 80 pages (e.g., 5 parts each with viii+8 pp. = 80pp), \$1 each added 40 pages (outside USA, add \$1 for first 80pp and another \$1 for each added 250pp) [NOTE: Fasc. 124 ships at bookrate of \$7 in the USA, for 3 volumes].

ATL SUPPLEMENTS

NOTE: Supplements are sent free to ATL members who are current in their yearly dues; extra copies may be purchased at the member or non-member prices as noted below. Not all volumes have supplements. Non-members, add \$2 shipping for each supplement ordered (outside of the USA, non-members must add another \$1 per supplement ordered).

TROPICAL LEPIDOPTERA

1991 – Volume 2

1 FAUNAL REGIONS AND THE DIVERSITY OF LEPIDOPTERA

by John B. Heppner 85 pp (16 Dec 1991)

\$ 10.00 (\$18.00 non-members)

1992 – Volume 3

1 BUTTERFLY FARMING AND TROPICAL FOREST CONSERVATION IN THE INDO-AUSTRALIAN REGION

by Michael J. Parsons 62 pp (29 Jun 1992)

\$ 10.00 (\$18.00 non-members)

2 SEDGE MOTHS OF TAIWAN (*Lepidoptera: Glyphipterigidae*)

by Yutaka Arita and John B. Heppner 40 pp (28 Dec 1992)

\$ 10.00 (\$18.00 non-members)

1993 – Volume 4

1 THE *COPAXA* OF MEXICO AND THEIR IMMATURE STAGES (*Lepidoptera: Saturniidae*)

by Kirby L. Wolfe 26 pp (1 Jun 1993)

\$ 10.00 (\$18.00 non-members)

2 NOTES ON NEOTROPICAL SKIPPERS (*Lepidoptera: HesperIIDae*)

by G. T. Austin, J. R. Brock, O. H. H. Mielke, and S. R. Steinhauser 36 pp (30 Aug 1993)

\$ 8.00 (\$15.00 non-members)

3 KEYS TO FAMILIES OF LEPIDOPTERA

by John B. Heppner 28 pp (Sep 1993 [26 Nov 1996])

\$ 7.50 (\$13.50 non-members)

4 THE CLEARWING BORERS OF FLORIDA (*Lepidoptera: Sesiidae*)

by Larry N. Brown and Russell F. Mizell, III 22 pp (28 Sep 1993)

\$ 8.50 (\$16.00 non-members)

1994 – Volume 5

1 CATALOGO DE LA FAMILIA SATURNIIDAE DE MEXICO

by Carlos R. Beutelspacher-B. and Manuel A. Balcázar-L. 28 pp (23 Dec 1994)

\$ 7.50 (\$13.50 non-members)

1997 – Volume 8

1 CLASSICAL BIOLOGICAL CONTROL OF THE CITRUS LEAFMINER *PHYLLOCNISTIS CITRELLA* STANTON (*Lepidoptera: Gracillariidae*): Theory, Practice, Art and Science

by Marjorie A. Hoy and Ru Nguyen 20pp (25 Jun 1997)

\$ 7.50 (\$13.50 non-members)

2 CLADISTICS OF THE CERATOCAMPINAE (*Lepidoptera: Saturniidae*)

by Manuel A. Balcázar-L. and Kirby L. Wolfe 53 pp (23 Dec 1997)

\$ 8.00 (\$16.00 non-members)

3 CONTRIBUTIONS TO STUDIES OF WEST AFRICAN BUTTERFLIES

by Andrei Sourakov, with Thomas C. Emmel and Torben B. Larsen 44 pp (23 Dec 1997)

\$ 12.00 (\$22.00 non-members)

1998 – Volume 9

1 A CONTRIBUTION TO RIODINID SYSTEMATICS (*Lepidoptera: Riodinidae*)

by Jason P. W. Hall, with K. R. Willmott and D. J. Harvey 48 pp (Dec 1998)

\$ 10.00 (\$18.00 non-members)

2 NOTES ON NEOTROPICAL SKIPPERS. 2 (*Lepidoptera: HesperIIDae*)

by George T. Austin *et al.* 52 pp (Dec 1998)

\$ 10.00 (\$18.00 non-members)

1999 – Volume 10

1 LEPIDOPTERA OF BELIZE

1. Catalog of Butterflies

2. Catalog of the Emperor Moths and Hawk Moths

by Jan Meerman 60 pp (1999)

\$ 7.50 (\$13.50 non-members)

HOLARCTIC LEPIDOPTERA

1998 – Volume 5

1 CLASSIFICATION OF LEPIDOPTERA. Part 1. Introduction

by John B. Heppner 148 pp

\$18.00 (\$36.00 non-members)

BOOK NEWS

YOUR FLORIDA GUIDE TO BUTTERFLY GARDENING:

A Guide for the Deep South

by Jaret C. Daniels

2000. Univ. Press of Florida, Gainesville, Florida. 95pp (18 x 25cm). \$14.95 paper. ISBN 0-8130-1790-4.

This booklet on butterfly gardening for Florida discusses and illustrates the various plants used to attract butterflies and which best to grow in Florida. Many color photographs illustrate most of the larger Florida butterflies in their natural settings. The only unfortunate thing about the book is that it continues the seemingly everlasting repetition of certain misspellings, something which both popular books and the scientific literature continue to be plagued with: the polydamas swallowtail, *Battus polydamas* (misspelled as "polydamus") (the common name is also misspelled) and the zebra longwing, *Heliconius charithonia* (misspelled as "charitonius"). The misspellings, however, are only noticed by those who know the correct names, in what is otherwise an excellent book.

GUIDE BOOK TO INSECTS IN TAIWAN (20): Microlepidoptera

by Hsiao-Yue Wang, Kyu-Tek Park, and Yutaka Arita

2000. Shu Shin Books, Taipei, Taiwan. 252pp (15 x 21cm). NT\$480 (ca. \$15) paper. ISBN 957-531-655-X.

Continuation of the *Guide Book* series for Taiwan insects gives us part 20, treating 175 species of the numerous Microlepidoptera of Taiwan. Families covered include Adelidae, Tineidae, Psychidae, Gelechiidae, Cosmopterigidae, Lecithoceridae, Agonoxenidae, Oecophoridae, Microp-terigidae, Neopseustidae, Palaesetidae, Carposinidae, Glyptopterigidae, Yponomeutidae, Immidae, Sesiidae, Choreutidae, Brachodidae, and Epi-pyropidae (this is in the random order as they are treated in the book). Attached at the end of the book is an appendix for some macro-moths in Thyrididae, Epiplemididae, and Lasiocampidae. Text is in Chinese, but the color illustrations allow many of the species to be identified by wing maculation alone.

GUIDE TO THE BUTTERFLIES OF THE PALEARCTIC REGION

Satyridae Part 2. Subfamily Satyrinae: Tribe Ypthimini

by G. C. Bozano (editor).

2000. Omnes Artes, Milan. 58pp (21 x 29cm). \$50.00 paper. ISBN 88-87989-00-1. Available from Flora & Fauna Books, Gainesville, FL.

This continues the series on Palearctic butterflies, treating the tribe Ypthimini. In this part, the genera *Argestina*, *Boeberia*, *Callerebia*, *Grumia*, *Hemadara*, *Loxerebia*, *Paralasa*, and *Proterebia* are included (all otherwise in *Erebia* in most works but split by the authors into several "genera"). Each of the 65 species treated is illustrated in color in the text, with text notes on diagnostic characters, range and distribution map, and references. Biologies and hostplants are not mentioned. Each genus begins a new page, with diagnostic characters and a list of Palearctic known species. Genitalia of all species are illustrated. Palearctic regions of China and Nepal are included.

BUTTERFLIES OF THE WORLD

by E. Bauer and T. Frankenbach (editors)

1998-2000. Goecke & Evers, Keltern. (24 x 34cm). Mostly DM 48 each part (ca. \$24 each) paper. ISBN 0-953224 (English edition), 3-931374 (German edition). Available from Flora & Fauna Books, Gainesville, FL.

This new series proposes to revise the butterflies in Seitz-like format, and in a modern style and taxonomy. The large-format series is full color. The text is minimal and in two editions, either English or German. Production of parts does not follow any particular order. Thus far, 11 parts have been issued:

1. Papilionidae I: *Achillides*, *Bhutanitis*, *Teinopalpus* (1998. 3pp, 13 pl.), by E. Bauer and T. Frankenbach
2. Nymphalidae I: *Agrias* (1999. 11pp, 20 pl.), by M. Späth
3. Nymphalidae II: *Ithomiinae* (1999. 17pp, 16 pl.), by G. Lamas
4. Nymphalidae III: *Euphaedra* (1999. 9pp, 16 pl.), by J. Hecq
5. Papilionidae II: *Battus* (1999. 13pp, 20 pl.), by E. Möhn
6. Papilionidae III: *Troides* I (1999. 2pp, 32 pl.), by K. Rumbacher and B. von Knötgen
7. Papilionidae IV: *Troides* [II] (1999. 3pp, 40 pl.), by K. Rumbacher and B. von Knötgen
8. Papilionidae V: New and Rare Papilionidae (1999. 5pp, 4 pl.), by E. Möhn
9. Nymphalidae IV: *Bebearia* (2000. 8pp, 32 pl.), by J. Hecq
10. Pieridae I. (2000. 40pp, 48 pl.), by W. Winhard.
11. Nymphalidae V: *Oeneis* (2000. 12pp, 28 pl.), by V. Lukhtanov and U. Eitschberger

Part 8 has several new subspecies described. The color plates are excellent and show the species about life size, all printed on thick glazed paper. The prices are quite reasonable, given the number of color plates in each part (the slightly larger Parts 7 and 10 are DM 60 and DM 72, respectively).

A FIELD GUIDE TO WESTERN BUTTERFLIES

by P. A. Opler (illustrated by Amy B. Wright)

1999. Houghton-Mifflin, Boston. 540pp., 44 pl. (12 x 19cm). \$32 cloth, ISBN 0-395-79152; \$20 paper, ISBN 0-395-79151-0.

This revised edition of Opler's 1992 version adds stray species along the Mexican border and from the eastern states, bringing the total number of species treated to 590. Each species has a short text and a detailed range map as is usual for these Peterson field guides. There are 44 color plates of painted renditions of the adults newly created (the original color plates from the first edition of 1986, by Tilden and Smith, are not used), plus 110 color photos from nature interspersed in the text. This new edition is geared to butterflyers and allows most species to be identified by field markings, which are emphasized with arrows on the figure for each species.

MEETINGS

2001
Mar 7
Apr 20-22
Jul 26-29

Entomologischer Verein Apollo, Frankfurt, Germany
Association for Tropical Lepidoptera, Gainesville, Florida, USA
Lepidopterists' Society, Corvallis, Oregon, USA

CONTENTS

- 1 - Emmel: The McGuire Center for Lepidoptera Research
- 3 - Emmel: Background on the McGuire Gift
- 4 - Emmel: McGuire Center (cont.)

- 7 - Heppner: Lepidoptera Notes in Gosse's *Letters from Alabama*, 1838
- 28 - Book News